



LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

PREPARED FOR:

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I. EXECUTIVE SUMMARY

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

Entity: Gloucester Township

Facilities: Library
Recreational Center
Senior Community Center
Academy Hall
Municipal Building
Department of Public Works
Monroe Drive Swimming Facility

Municipal Contact Person: Tom Cardis, Township Administrator
Facility Contact Person: Guedo Clementi, DPW Supervisor

This audit is performed in connection with the New Jersey Clean Energy - Local Government Energy Audit Program for Gloucester Township facilities. The purpose of this analysis is to provide the township insight into the energy savings potential that exists within facilities at Gloucester Township. Energy Efficiency changes and upgrades requires support from the building occupants, operations personnel and the administrators of the township in order to maximize the savings and overall benefit. The efficiency improvement of public buildings provides a benefit for the environment and the residence of New Jersey. Through this report it has been demonstrated that there is a great potential for energy savings and infrastructure improvements at Gloucester Township.

Fast Payback Energy Conservation Measures:

The Energy Conservation Measures (ECMs) identified within the reports represent the potential annual savings at each facility. It is recommended to consider all ECMs as part of the township's initiative to save energy, reduce emissions, and lower operating costs. Several ECMs shown within this report represent significant savings relative to the cost to implement. The ECMs shown with a simple payback of 10 years and less are considered very cost effective for a public entity such as Gloucester and should be considered a high priority for Gloucester Township. The following ECMs are highly recommended throughout the township.

- Lighting Upgrades (All facilities)

Lighting retrofits throughout the township buildings is a straight forward conservation measure that is prescriptive in nature and provides substantial savings for the investment. Lighting retrofits is a good example of ECMs that can be implemented with "in house" staff to reduce the installation cost and further reduce paybacks. In many facilities such as the Library, Senior Center, Municipal building, and Public Works building, the measure includes replacing existing 700 series T-8 fluorescent lamps with new higher efficiency T-8 lamps. In other facilities such as the Recreation Center and Academy Hall, a whole fixture replacement provides much more

energy savings. The Recreation center will save significant energy with new high-bay fluorescent fixtures in place of the existing metal halid / high pressure sodium up-lighting. The Academy Hall utilizes old T-12 fixtures with magnetic ballasts which can be replaced with high efficiency T-8 bulbs with electronic ballasts. Overall lighting upgrades represent one of the most easily implemented ECMs and are highly recommended throughout all Gloucester Township facilities.

- Lighting Controls (All facilities)

Similar to lighting upgrades, lighting controls are very prescriptive in nature and can save considerable energy. Lighting controls do not require replacement of the fixture and typically can save more energy than lighting upgrades. For the purpose of this energy audit, each ECM is calculated as stand-alone ECMs. The maximum savings can be achieved through the implementation of both the lighting upgrades and lighting controls ECMs. Lighting controls will automatically turn off lights when spaces and rooms are not occupied. It is important to note that ECMs are calculated as stand-alone ECMs and therefore the total savings will be slightly less than the sum of both individual ECMs (Lighting Upgrade and Lighting Controls). The discrepancy between additive ECMs is within the tolerances for this level of analysis (+/- 20%). Lighting controls provide the maximum savings in spaces that have changing occupancy schedules throughout the day such as the Senior Center, Library, and Recreation Center. Other facilities with standard operating hours such as the Municipal Building, Police Building, Department of Public Works Building, will also see substantial savings because all spaces are not occupied continuously. Lighting controls throughout Gloucester Township is highly recommended in addition to the lighting upgrade ECMs.

- Computer Monitor Replacement (All facilities)

Plug loads within buildings is becoming a larger and larger portion of the total energy use for commercial facilities. Plug loads are most dominant in combination with computers and computer equipment. Modern computer monitors are flat screen LCD panels that are far more efficiency than older style cathode ray-tube (CRT) monitors. Typical energy use of a flat screen monitor is approximately 1/3 of the energy used by a CRT monitor. The majority of computer monitors within the facilities are LCD style monitors. However, Gloucester Township utilizes some CRT monitors throughout the township buildings. It is highly recommended to replace the existing CRT monitors with flat screen monitors to take advantage of the energy savings as well as other ergonomic benefits of modern LCD monitors.

- Programmable Thermostats (Library & Senior Center)

Standard non-programmable thermostats at the Library and Senior Center do not allow a building to save energy during unoccupied periods. In the heating season the highest building loads on an HVAC system are at night when the building is empty. Programmable thermostats allow the system to set-back the temperature when the building is empty to limit the unnecessary energy use. Since programmable thermostats are a very small portion of the overall system cost, the energy savings far outweighs the cost to implement. The payback for programmable thermostat installations is typically within 1-2 months of the heating or cooling season. The

installation of a central control system that includes the Library and Senior Center (as part of the township future plans) will provide the same benefit as stand-alone programmable thermostats and therefore programmable thermostats would not need to be implemented.

- Pump Controls (Monroe Drive Swimming Facility)

The Pool facility is only open from Late May through Early September. There are no controls on the filter pumps which forces the pumps to run 24/7. Simple time clock controls would allow the pumps to turn off during unoccupied periods up to a period that is acceptable to the pool service consultant's recommendations. This ECM is based on turning off the pool pumps (except for the small pool pump) for 12 hours per day through a mechanical time clock controller. The savings associated with this reduction in operation is \$1,783 per season in electric costs. This ECM is highly recommended and it is an example of a retrofit that can be performed with the Township staff instead of contracted services.

Capital Improvement Energy Conservation Measures:

The ECMs that have much longer paybacks are considered capital improvement ECMs. These ECMs typically have high installation costs that are more difficult to justify the savings based solely on the energy savings associated with the improvement. Despite the long paybacks, these ECMs in many cases provide valuable and much needed infrastructure improvements for the facility. These ECMs include boiler upgrades, HVAC equipment upgrades, as well as other large equipment replacements. The savings identified for the following ECMs provides additional incentive for Gloucester Township's capital improvement projects.

- Energy Recovery Unit (Recreation Center)

The Recreation Center utilizes large air handling units that provide the heating / cooling and ventilation for the large activity facility. The outside air provided to the space is substantial due to the potentially high occupancy levels for the facility. However, the occupancy is often a small fraction of the maximum occupancy. The installation of an energy recovery unit will reduce the energy required to condition the outside air by approximately 70%. This ECM is a substantial investment that provides substantial savings as well.

- AC Unit Upgrades (All Facilities)

High efficiency AC unit installations will typically have high installation costs. However, the savings over time can be substantial. The simple paybacks for AC units range between 15 yrs and 40 years depending on the existing equipment efficiency, runtime, and size / installation cost. Similar to most capital improvement projects, the energy savings alone does not justify the installation. The benefit of replacing the aging AC systems with new equipment provides value for Gloucester Township that should not be overlooked.

- Condensing Boilers / Furnaces (Library, Senior Center, Academy Hall, & Municipal Bldg)

Condensing boiler replacements are one of the the most significant HVAC system upgrade for small public facilities. The installation of condensing boilers provides a heating efficiency increase ranging from 10% to 15%. Condensing furnaces are less expensive to implement where facilities utilize small residential style furnaces in lieu of a boiler system for heat. The condensing furnace ECM is proposed at the Senior Center with a simple payback of 11 yrs. The simple payback for condensing boiler ECMs range from 30 to 80 years depending on the boiler capacity and installation difficulty. These ECMs represent the most substantial upfront cost which creates long paybacks. They also represent significant infrastructure improvements throughout the Township.

Combined Project Approach:

Although individual projects with a simple payback of 10 years and less are considered financially self sustaining, it is important to consider how multiple projects can be combined together. When ECMs are aggregated into a single project, the lower cost ECMs provides valuable savings to offset the higher cost ECMs. Likewise when multiple facilities are aggregated together into a single entity energy efficiency project, the same benefits are seen on a larger scale.

The Energy Savings Improvement Program (ESIP) allows for financing of any combination of energy efficiency projects across multiple facilities into one large project. The term of the financing must be under 15 years and the savings provides the revenue for the financing cost. The combination of all facilities into one large energy efficiency project provides Gloucester Township with the opportunity to implement all ECMs identified within this report with an overall simple payback of 10.3 years. This option allows Gloucester Township to implement much needed infrastructure improvements such as new air conditioning equipment, new condensing boilers and furnaces, as well as high efficiency lighting and lighting controls for all facilities. The program financing allows for the implementation with no upfront cost for Gloucester Township. Implementation of an ESIP provides significant benefits and should be strongly considered for Gloucester. The total Entity Project Summary table below shows the savings, costs, incentive programs and paybacks for all ECMs at Gloucester Township.

Table 1
ESIP -Total Entity Project Summary

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL ENERGY EFFICIENCY PROJECT					
FACILITY ENERGY EFFICIENCY PROJECTS	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Library	\$5,637	\$64,474	\$2,620	\$61,814	11.0
Recreation Center	\$28,292	\$205,614	\$3,620	\$201,139	7.1
Senior Community Center	\$3,674	\$41,929	\$1,980	\$39,894	10.9
Academy Hall	\$3,630	\$91,853	\$795	\$89,004	24.5
Municiple Building	\$21,957	\$316,153	\$10,929	\$304,169	13.9
Public Work Building	\$6,352	\$48,709	\$1,924	\$46,390	7.3
Monroe Drive Swimming Facility	\$3,068	\$3,689	\$120	\$3,569	1.2
Total Entity Project	\$72,610	\$772,422	\$21,988	\$750,434	10.3

Total Township Energy Costs: \$306,604
Est. Total Township Energy Savings: \$72,610
Overall Township Percent Reduction: 23.7%

Gloucester Township has the option to utilize the Direct Install program for their facilities. With access to funding through the Energy Efficiency Conservation Block Grant, Gloucester can utilize this funding in conjunction with the Direct Install program to further reduce the project costs. When utilizing Direct Install in lieu of the Smart Start incentive for eligible measures, it is estimated that an additional \$45,000 of incentive could be available through the use of this program. The eligibility of the ECMs are dependent on the facility evaluation through the program and must be verified through the program contractor. This approach maximizes the savings for Gloucester Township and could reduce the overall project payback to 9.7 years. It is highly recommended to utilize all available incentives including Direct Install by contacting the Direct Install Contractor to perform the site evaluation for all facilities.

Implementation of all ECMs identified within the ESIP – Entity Total Project Summary table represents a total annual savings of approximately \$72,610 for Gloucester Township. The individual facility project summaries are shown within each facility energy audit report.

It is understood that the Gloucester Township is in the planning phase of installing a new control system throughout the district. It is important to note that the cost of a new township wide control system is not included in the cost estimates above, however the implementation of a new central control system would provide the same savings provided by the recommended local

control ECMs such as programmable thermostats. ESIP allows for a maximum financing term of 15 years. Based on the project costs and savings identified above, there is some room for an increase in scope, which may be able to support the central control system implementation. This would allow the new control system to be implemented through the ESIP program in lieu of the township financing the improvements with other means. Further review is needed to verify this option.

Other Considerations:

- Maintenance and Operational Measures

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

1. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
2. Maintain all weather stripping on entrance doors to limit unnecessary infiltration.
3. Clean all light fixtures to maximize light output to provide better light output and avoid the use of task lighting where otherwise not necessary.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

- Renewable Energy Measures

Renewable Energy Measures (REMs) were also reviewed for implementation at Gloucester Township. CEG utilized a combination of roof mounted solar arrays and canopy style parking lot solar arrays to house PV systems throughout the township buildings. The total solar electric production potential for these systems is approximately 306,549 kWh, which would reduce Gloucester Township's grid purchased electric energy by 27% (not including the existing system installed on the municipal building). The system's calculated simple payback of approximately 13 years is past the standard 10 year simple payback threshold; however, with alternative funding this payback could be lessened. CEG recommends the Owner review all funding options available with the implementation of this renewable energy measure.

- Alternative Fuel for Vehicles

Gloucester Township has taken leadership role in their goals to reduce emissions and environmental impacts. Ten years ago the natural gas fueled vehicles initiative was originally implemented to address these concerns. Since the beginning of the initiative to utilize compressed natural gas (CNG) vehicles, there has been a substantial increase in the cost of

conventional fuel (gasoline & diesel). The fuel switch is now providing a significant energy cost savings as a result of the CNG vans compared to the cost of gasoline driven service vans. The fuel cost to operate a CNG service van is 40% less than the current gasoline fuel cost based on BTU content of the fuel assuming equal engine efficiency. The Department of Public Works is currently saving approximately \$737 annually per service van based on a usage of 8,000 miles per year. Gloucester should consider continuing its use and expansion of CNG vehicles to realize further savings.

Overall Assessment:

Overall, Gloucester Township is maintained and operating fairly efficiency. There are numerous ECMs that can be implemented to further reduce energy use and save on the facility's operating costs. The total energy cost of \$302,725 could be reduced by approximately 24% through the implementation of the ECMs recommended in this audit. Gloucester Township is in a unique position to implement energy efficiency improvements and still include large capital projects. When the total project is capable of being funded through the savings, CEG highly recommends the Township to take advantage of this opportunity.

II. INTRODUCTION

The comprehensive energy audit covers the following buildings in Gloucester Twp:

- Library
- Recreation Center
- Senior Community Center
- Academy Hall
- Municipal Building
- Public Works Building
- Monroe Drive Swimming Facility

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

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

The Energy Use Index (EUI) is established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft²/yr), which is used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting the annual consumption of all energy sources to BTU's and dividing by the area (gross square footage) of the building. Blueprints (where available) are utilized to verify the gross area of the facility. The EUI is a good indicator of the relative potential for energy savings. A low EUI indicates less potential for energy savings, while a high EUI indicates poor building performance therefore a high potential for energy savings.

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

The preliminary audit information is gathered in preparation for the site survey. The site survey provides critical information in deciphering where energy is spent and opportunities exist within

a facility. The entire site is surveyed to inventory the following to gain an understanding of how each facility operates:

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

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

III. METHOD OF ANALYSIS

This audit is consistent with an ASHRAE level 2 audit. The cost and savings for each measure is $\pm 20\%$. The evaluations are based on engineering estimations and industry standard calculation methods. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

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

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

The project / Entity summary tables are based on the implementation of multiple measures. The analysis is reviewed and determined if the nature of the ECMs will cause a major conflict of the overall savings. When additive measures do not cause a major effect on the overall savings the ECMs are included. Where a major conflict is identified, the combined savings is evaluated appropriately to ensure the overall estimates are $\pm 20\%$.

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

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

ECM Calculation Equations:

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

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

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

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

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

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

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

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage

The energy usage for the facilities is tabulated and plotted in graph form as depicted within each facility report (see the individual facility energy audit reports for details). Each energy source has been identified and monthly consumption and cost noted per the information provided by the Owner. The electric and natural gas utilities are shown below in Table 2 & 3 for all facilities:

Table 2
Electric Utility Summary

ELECTRIC UTILITY USAGE PER FACILITY			
FACILITY	ANNUAL ELECTRIC UTILITY		
DESCRIPTION	USAGE (KWH)	COST (\$)	AVE RATE (\$/KWH)
Library	118,485	\$21,203	\$0.18
Recreation Center	301,180	\$47,730	\$0.16
Senior Community Center	25,896	\$5,985	\$0.23
Academy Hall	38,964	\$7,393	\$0.19
Municiple Building	604,000	\$101,382	\$0.17
Public Work Building	238,666	\$38,303	\$0.16
Monroe Drive Swimming Facility	26,268	\$5,383	\$0.20
Total	1,353,459	\$227,377	\$0.17

**Table 3
Natural Gas Summary**

NATURAL GAS UTILITY USAGE PER FACILITY			
FACILITY	ANNUAL NATURAL GAS UTILITY		
DESCRIPTION	USAGE (THERMS)	COST (\$)	AVE RATE (\$/THERM)
Library	2,783	\$4,696	\$1.69
Recreation Center	7,766	\$13,128	\$1.69
Senior Community Center	1,417	\$2,404	\$1.70
Academy Hall	2,749	\$3,878	\$1.41
Municiple Building	13,773	\$22,942	\$1.67
Public Work Building	19,996	\$31,961	\$1.60
Monroe Drive Swimming Facility	25	\$217	\$8.69
Total	48,509	\$79,227	\$1.63

B. Energy Use Index (EUI)

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

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

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

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

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

**Table 4
Energy Use Index Summary**

ENERGY USE INDEX PER FACILITY				
FACILITY	BUILDING AREA	ENERGY USE INDEX		
DESCRIPTION	(SF)	SITE (KBTU/SF/YR)	SOURCE (KBTU/SF/YR)	ELECTRIC (KWH/SF/YR)
Library	9,868	69	166	12.0
Recreation Center	19,855	91	214	15.2
Senior Community Center	4,000	58	111	6.5
Academy Hall	5,376	76	136	7.2
Municipe Building	43,000	80	194	14.0
Public Work Building	27,250	103	177	8.8
Monroe Drive Swimming Facility	1,460	63	207	18.0

See the Appendix C - Statement of Energy Performance for comparason to other facilities
Highlighted areas are estimated.

Figure 1 through 4 below depicts a national EUI grading for the source energy use of various building types similar to the buildings at Gloucester Township.

**Figure 1
Source Energy Use Intensity Distributions: Public Order Buildings**

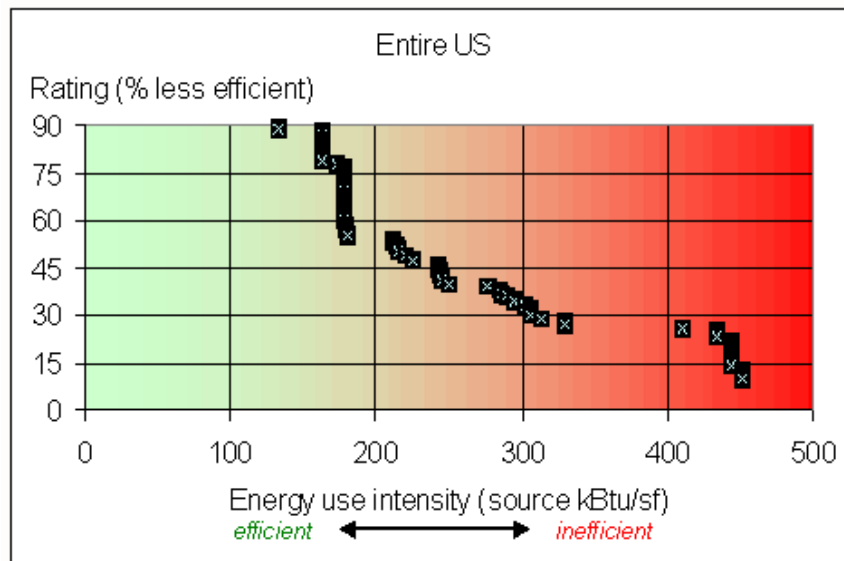


Figure 2
Source Energy Use Intensity Distributions: Fire-Police Station

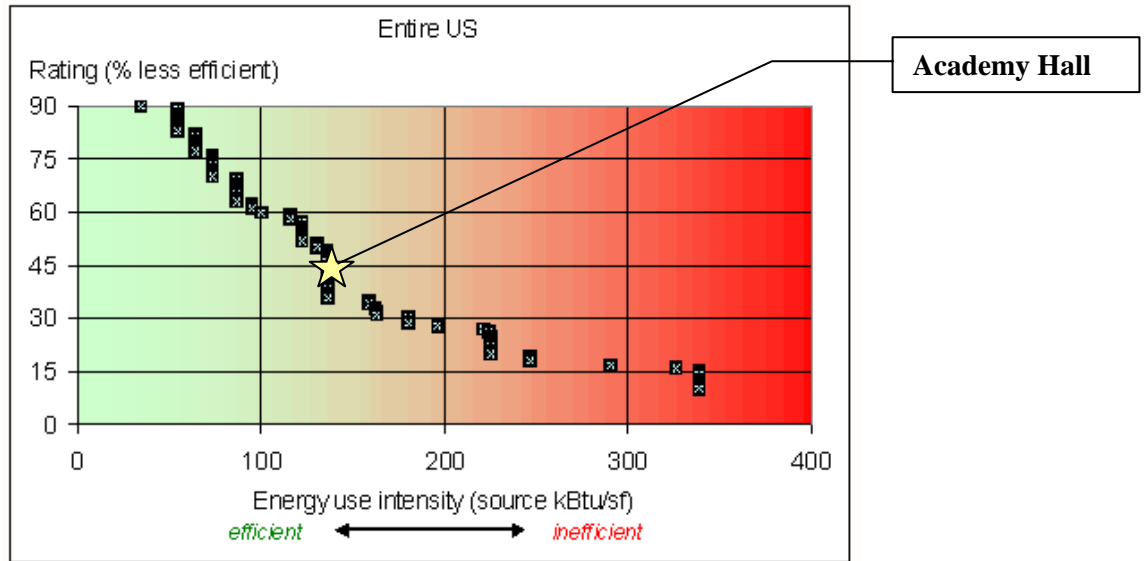


Figure 3
Source Energy Use Intensity Distributions: Library

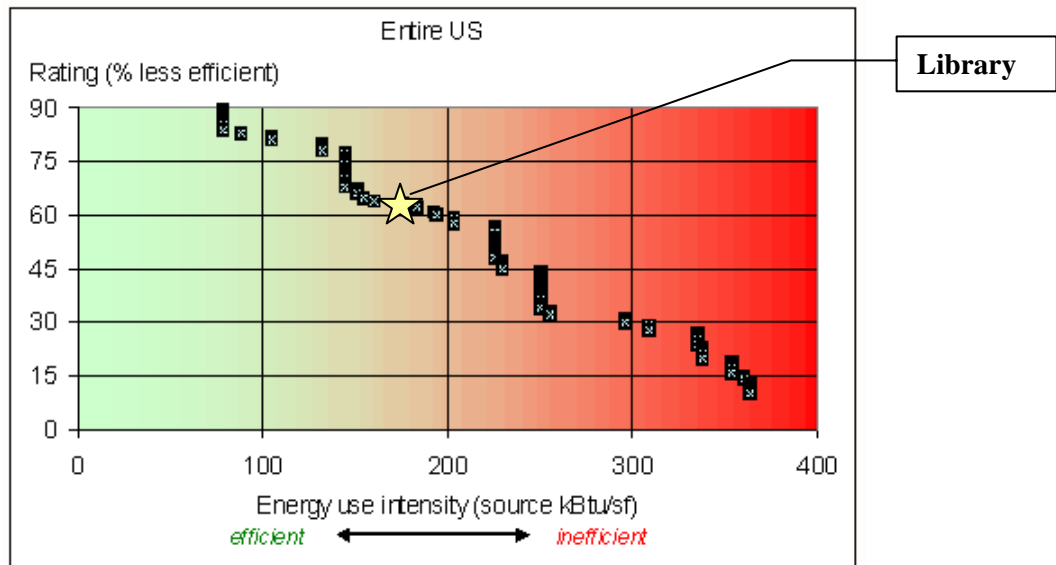
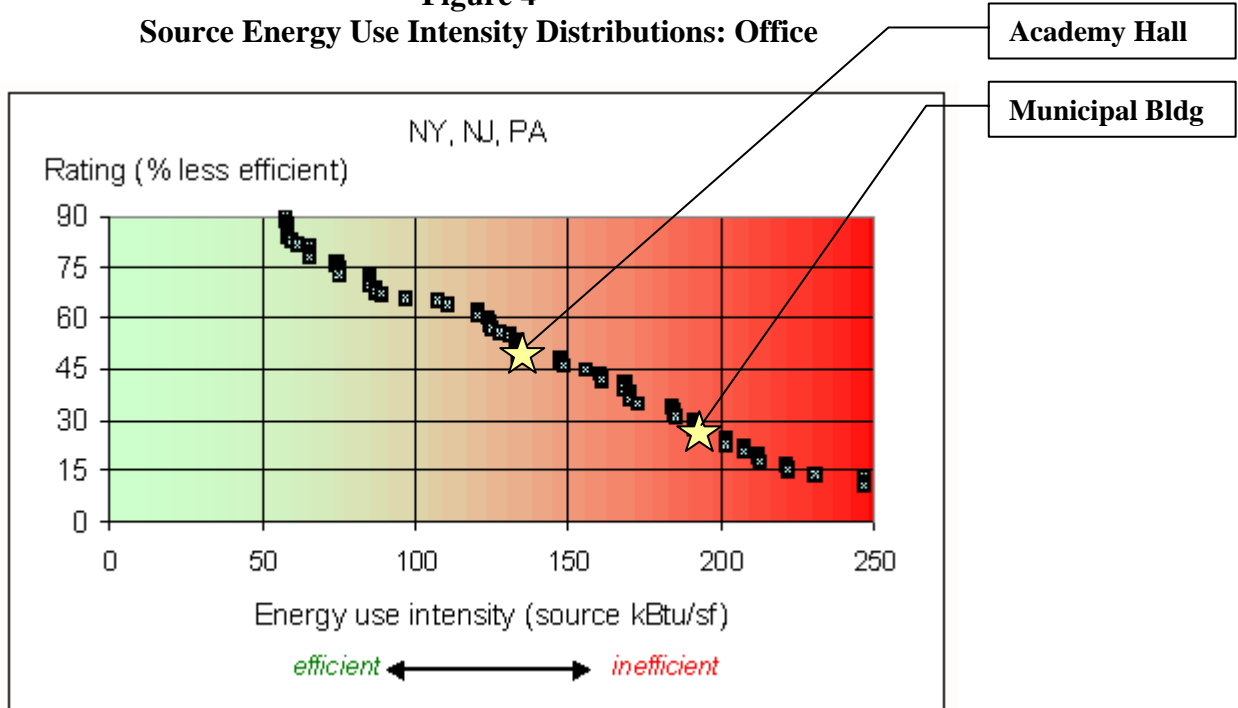


Figure 4
Source Energy Use Intensity Distributions: Office



In addition, data has been gathered by the US Department of Energy (DOE) for various facilities cataloguing the standard site and source energy utilization. This data has been published in the 2003 Commercial Building Energy Consumption Survey and is noted as follows for facilities of this type:

- Service (Gloucester DPW Building – 18% over):
77 kBtu/SF Site Energy, 150 kBtu/SF Source Energy.
- Public Assembly (Gloucester Library – **33% under**):
104 kBtu/SF Site Energy, 246 kBtu/SF Source Energy.
- Public Assembly (Gloucester Recreation Center – 57% over):
65 kBtu/SF Site Energy, 136 kBtu/SF Source Energy.
- Public Assembly (Gloucester Senior Center – 9% over):
52 kBtu/SF Site Energy, 102 kBtu/SF Source Energy.
- Public Order and Safety (Gloucester Academy Hall – **13% under**):
78 kBtu/SF Site Energy, 157 kBtu/SF Source Energy.

Overall the Gloucester Township buildings are slightly below average as far as their energy use performance. The Academy Hall and library are the only buildings below the 50% threshold for source energy use which represents a facility that uses less energy than 50% of similar buildings.

C. EPA Energy Benchmarking System

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

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

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

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

[Redacted]
[Redacted]
[Redacted]
[Redacted]

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

**Table 5
Energy Star Performance Summary**

ENERGY STAR PERFORMANCE RATING PER FACILITY			
FACILITY	ENERGY STAR PERFORMANCE RATING		
DESCRIPTION	SCORE	AVERAGE	POTENTIAL CERTIFICATIONS
Library	N/A	50	N/A
Recreation Center	N/A	50	N/A
Senior Community Center	N/A	50	N/A
Academy Hall	42	50	N/A
Municipal Building	N/A	50	N/A
Public Work Building	N/A	50	N/A
Monroe Drive Swimming Facility	N/A	50	N/A

See the Appendix C - Statement of Energy Performance for comparative facilities
 Score: "N/A" represents facility that could not receive a rating. See Energy Star website for details.

Refer to **Statement of Energy Performance Appendix** for the detailed energy summary for each facility. Facilities that do not have a rating is a result of one of the following issues:

- Utility data is not consistent over the same 12 months worth of data
- Facility size is less than 5000 SF
- More than 50% of the facility space is not a pre-designated space type defined by energy star where insufficient data is available for a rating

V. RENEWABLE/DISTRIBUTED ENERGY MEASURES

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

Solar Generation

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which are mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). Parking lots can also be utilized for the installation of a solar array. A truss system can be installed that is high enough to park vehicles under the array and no parking lot area is lost.

The state of NJ has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit is around \$350, this value was used in our financial calculations. This equates to \$0.35 per kWh generated.

Gloucester Township has previously investigated the potential for photovoltaic solar panels on their facilities. The analysis included a structural review of the existing roofs and building. The structural analysis showed that the following buildings were not suitable for a solar PV installation without significant cost to reinforce the building and roof structure:

- DPW Building (Old Building)
- Municipal Building (Municipal Hall)
- Academy Hall
- Recreation Center
- Senior Center

CEG has reviewed the existing roof area and parking lot canopy area potential of the remaining facilities being audited for the purposes of determining a potential for a photovoltaic system. The facilities with structural deficiencies were not considered for a roof mounted system. Instead where applicable a parking lot canopy system was reviewed. The facilities with roof mounted PV designs are the Library and Public Works Building (New). A parking lot canopy design was evaluated for the Senior Center. The Recreation Center, Academy Hall, and Pool facility were

evaluated to be un-suitable for either a roof or canopy style PV system due to shading, high traffic area, or lack of space at the site and parking lots. A depiction of the area utilized at each facility is shown in **Renewable / Distributed Energy Measures Calculation Appendix**. The system sizes are shown below for each building where installation of a solar PV system is feasible. The total KWH production for all facilities combined is 306,549 kWh annually, reducing the overall utility bill for the township by approximately 27% percent. (This does not include the system currently installed on the Municipal building which is expected to begin producing electric energy in the near future). A detailed financial analysis can be found in the **Renewable / Distributed Energy Measures Calculation Appendix** within each facility report. This analysis illustrates the payback of the system over a 25 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

**Table 6
Renewable Energy Summary**

POWER PRODUCTION SUMMARY - PHOTOVOLTAIC SYSTEM PER FACILITY			
FACILITY	PRODUCTION SUMMARY		
DESCRIPTION	ELECTRIC PRODUCTION (KWH)	TOTAL FACILITY USE (KWH)	% REDUCTION
Library	94,690	118,485	80%
Recreation Center	0	301,180	0%
Senior Community Center	22,478	25,896	87%
Academy Hall	0	38,964	0%
Municiple Building	0	604,000	0%
Public Work Building	189,381	238,666	79%
Monroe Drive Swimming Facility	0	26,268	0%
Total	306,549	1,353,459	23%

The proposed photovoltaic array layout is designed based on the specifications for the Sun Power SPR-230 panel. This panel has a “DC” rated full load output of 230 watts, and has a total panel conversion efficiency of 18%. Although panels rated at higher wattages are available through Sun Power and other various manufacturers, in general most manufacturers who produce

commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

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

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

Direct purchase involves the Gloucester Twp paying for 100% of the total project cost upfront via one of the methods noted in the Installation Funding Options section below. Calculations include a utility inflation rate as well as the degradation of the solar panels over time. The financial summary per facility is as follows:

**Table 7
Renewable Financial Summary**

FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM PER FACILITY			
FACILITY	DIRECT PURCHASE FINANCIAL SUMMARY		
DESCRIPTION	INSTALLATION COST (\$)	TOTAL SAVINGS (\$)	INTERNAL RATE OF RETURN
Library	\$697,590	\$50,091	5.8%
Recreation Center	N/A	N/A	N/A
Senior Community Center	\$165,600	\$13,060	7.0%
Academy Hall	N/A	N/A	N/A
Municiple Building	N/A	N/A	N/A
Public Work Building	\$1,395,180	\$98,668	5.6%
Monroe Drive Swimming Facility	N/A	N/A	N/A
Total	\$2,258,370	\$161,819	

CEG recommends Gloucester Township to review all options available for installation of solar PV systems at their facilities including a Power Purchase Agreement (PPA). This option utilizes providers who will own, operate, and maintain the system for a period of 15 years. During this time the PPA Provider would sell all of the electric generated by Solar Arrays to the township at a reduced rate compared to their existing electric rate.

Wind Generation

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

VI. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

A load profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. For this report, the facility's energy consumption data was gathered from the township and presented in table format and plotted in graph form to create the load profile. Refer to the Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profiles.

Electricity Overview:

The Township facility's electricity usage profiles demonstrate a typical cooling load profile. Historical usage is steady throughout the year with the months of May, June, July August & September having greater consumption.

The historical usage profile of the facilities will allow for competitive energy prices when shopping for alternative suppliers. Third Party Supplier (TPS) electric commodity contracts that offer's a firm, fixed price for 100% of the facilities electric requirements and are lower than the PSE&G's BGS-FP and Atlantic City Electric's BGS-FP default rates are recommended.

Natural Gas Overview:

The Natural Gas Usage Profile demonstrates a very typical natural gas (heat load) profile. The summer months have either zero or low consumption.

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

Tariff Analysis:

Electricity:

The Library, Swimming Pool, Academy Hall and Senior Center facilities currently receive electric distribution service through PSE&G on rate schedule GLP (General Power and Light). The Municipal Building currently receives electric distribution service through PSE&G on rate schedule LPLS (Large Power and Light Secondary). The Recreation Center received its electric distribution and commodity service through Atlantic City Electric (ACE) on rate schedule AGS (Annual General Service). The Public Works Building receives its electric distribution and BGS

commodity service through Atlantic City Electric (ACE) on rate schedule MGS (Monthly General Service). None of the facilities have contracted a Third Party Supplier (TPS) to provide electric commodity service in lieu of Basic Generation Service from the utility. For electric supply (basic generation) service, the client has a choice to either use PSE&G's or ACE's default service rate BGS-FP or contract with a Third Party Supplier (TPS) to supply electric.

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

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

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

The utility, PSE&G and or Atlantic City Electric will continue to be responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity or natural gas from.

Natural Gas:

All facilities currently receive natural gas distribution service through South Jersey Gas (SJG) on rate schedule GSG (General Service Gas). Only the Recreation Center, Municipal Building, Public Works Building and Senior Center have contracted a Third Party Supplier (TPS) to provide firm natural gas commodity service. The Library, Academy Hall and Swimming Pool are not currently contracted with a Third Party Supplier to provide natural gas commodity and are receiving natural gas commodity service or BGSS directly from the utility.

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

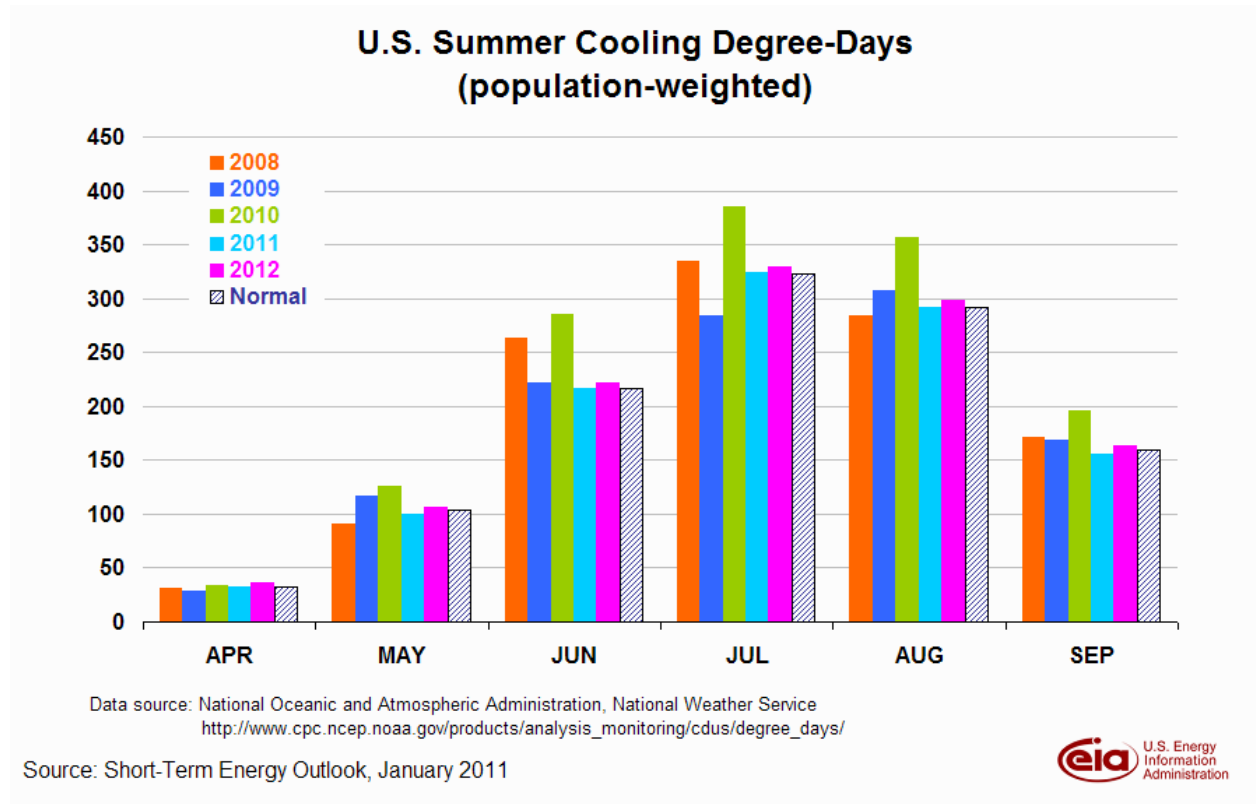
<http://www.southjerseygas.com/108/tariff/bgssrates.pdf>

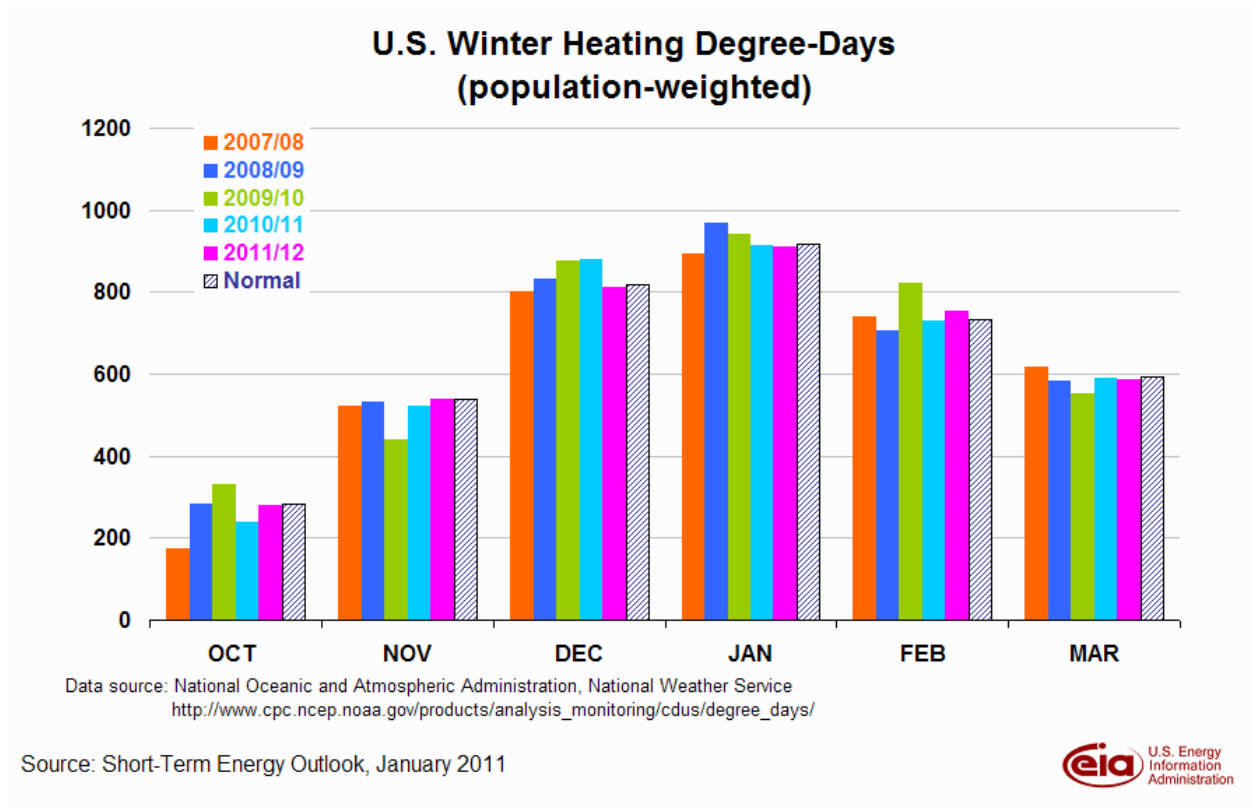
The utility, South Jersey Gas is responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their natural gas from.

Electric and Natural Gas Commodities Market Overview:

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

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





Short Term Energy Outlook - US Energy Information Administration (1/11/2011):

U.S. Natural Gas Prices. The Henry Hub spot price averaged \$4.25 per MMBtu during December, an increase of about 54 cents from November's price of \$3.71 per MMBtu. EIA expects the higher forecast production during the first half of 2011 compared with the same period last year, combined with a decline in consumption, to moderate natural gas spot prices. The projected spot price falls to a low of \$3.73 per MMBtu in June then rises to \$4.61 in December, averaging \$4.02 per MMBtu for all of 2011, which is \$0.37 per MMBtu lower than the 2010 average and \$0.31 per MMBtu lower than in last month's *Outlook*. In 2012, the spot price rises to an average of \$4.50 per MMBtu.

Uncertainty over future natural gas prices is slightly lower this year compared with last year at this time. Natural gas futures for March 2011 delivery (for the 5-day period ending January 6) averaged \$4.39 per MMBtu, and the average implied volatility over the same period was 43 percent. This produced lower and upper bounds for the 95-percent confidence interval for March 2011 contracts of \$3.21 per MMBtu and \$6.02 per MMBtu, respectively. At this time last year, the natural gas March 2010 futures contract averaged \$5.73 per MMBtu and implied volatility averaged 57 percent. The corresponding lower and upper limits of the 95-percent confidence interval were \$3.88 per MMBtu and \$8.47 per MMBtu.

U.S. Electricity Retail Prices. EIA expects the U.S. retail price for electricity distributed to the residential sector during 2010 to average 11.6 cents per kilowatt-hour, about the same level as in 2009. EIA expects the U.S. residential price to increase only slightly over the forecast period--by 0.6 percent in 2011 and by 1.0 percent in 2012.

Recommendations:

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

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

Overall, after review of the utility consumption, billing, and current commodity pricing outlook, CEG recommends that the Township utilize the advisement of 3rd party unbiased Energy Consulting Firm experienced in the aggregation of facilities, NJ contracting law and procurement of retail natural gas and electricity commodity. The Energy Consulting Firm should incorporate a rational, defensible strategy for purchasing commodity in volatile markets based upon the following:

- Budgets that reflect sound market intelligence
 - An understanding of historical prices and trends
 - Awareness of seasonal opportunities (e.g. shoulder months)
 - Negotiation of fair contractual terms
 - An aggressive, market based price
2. CEG recommends that the Township consider utilizing a third party utility billing-auditing service to further analyze historical utility invoices such as water and sewer for incorrect billings and rate tariff optimization services. This service could provide refunds on potential over billings experienced by the Township.

VII. INSTALLATION FUNDING OPTIONS

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

A. Incentive Programs:

Pay For Performance

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

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

1. Energy Reduction Plan – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant \$0.10 per square foot between \$5,000 and \$50,000, and not to exceed 50% of the facility's annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)
2. Project Implementation – Upon installation of the recommended measures along with the "Substantial Completion Construction Report," the incentive will grant savings per KWH or Therm based on the program's rates. Minimum saving must be 15%. (Example \$0.11 / kWh for 15% savings, \$0.12/ kWh for 17% savings, ... and \$1.10 / Therm for 15% savings, \$1.20 / Therm for 17% saving, ...) Increased incentives result from projected savings above 15%.
3. Measurement and Verification – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program's rates. Minimum savings must be 15%. (Example \$0.07 / kWh for 15% savings, \$0.08/ kWh for 17% savings, ... and

\$0.70 / Therm for 15% savings, \$0.80 / Therm for 17% saving, ...)
Increased incentives result from verified savings above 15%.

Direct Install Program

The New Jersey Clean Energy's Direct Install Program is a state funded program that targets small commercial and industrial facilities with peak demand of less than 100 kW. This turnkey program is aimed at providing owners a seamless, comprehensive process for analysis, equipment replacement and financial incentives to reduce consumption, lower utility costs and improve profitability. The program covers up to 60% of the cost for eligible upgrades including lighting, lighting controls, refrigeration, HVAC, motors, variable speed drives, natural gas and food service. Participating contractors (refer to www.njcleanenergy.com) conduct energy assessments in addition to your standard local government energy audit and install the cost-effective measures. The following measures are potential candidates for Direct Install:

- Lighting Upgrade – Academy Building & Recreational Building
- Lighting Controls – All Facilities
- AC Unit upgrades – Academy Hall
- Programmable Thermostats – Library & Senior Center

Smart Start Program

Prescriptive Measures - The New Jersey Clean Energy's Smart Start prescriptive measures incentives include unit pricing incentives for installation of energy efficient equipment and controls. Proposed equipment and controls must meet the minimum efficiency requirements as well as other application requirements. The Smart Start prescriptive incentives applicable for new construction, renovations, remodeling and equipment replacements, for a wide range of equipment including:

- Electric Chillers
- Gas Cooling
- Electric Unitary HVAC
- Ground Source Heat Pumps
- Gas Heating
- Variable Frequency Drives
- Gas Water Heating
- Premium Motors
- Prescriptive Lighting
- Lighting Controls
- Technical Studies

Custom Measures - The New Jersey Clean Energy's Smart Start prescriptive measures incentives include all measures not identified in the prescriptive measures category or measures that must have savings verified through additional analysis such as energy model simulations. Custom measures are intended to include savings as a result of unique

energy efficiency measures, which are typically facility specific such as waste heat recovery. Custom incentives are provided based on the amount of energy saved and minimum internal rate of return in order to be eligible.

Energy Efficiency and Conservation Block Grants

The EECGB rebate provides supplemental funding up to \$50,000 for counties and local government entities to implement energy conservation measures. The EECGB funding is provided through the American Recovery and Reinvestment Act (ARRA). The local government must be among the eligible local government entities listed on the NJ Clean Energy website as follows - <http://njcleanenergy.com/commercial-industrial/programs/eecbg-eligible-entities>. This program is limited to municipalities and counties that have not already received grants directly through the US department of Energy.

Gloucester Township is not eligible for an additional grant through this program since Gloucester Township has already received a larger block grant directly through the US department of Energy in 2009. It is important to note that this allotment of funding if used for energy improvements through the Direct Install program allows the township to be eligible for the Direct Install program without the upper building limit of 100KW. It is recommended to take advantage of the Direct Install program as outlined in the Facility Project Summary Table shown within each facility report.

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

B. Financing Options:Municipal Bonds

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

Power Purchase Agreement

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

Energy Savings Improvement Program (ESIP):

Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. The “Energy Savings Improvement Program (ESIP)” law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources. This program provides public entities to make valuable facility infrastructure improvements that are associated with energy savings. All energy savings projects are eligible as long as the financing period does not extend beyond 15 years. The financing can be utilized for all aspects of energy efficiency project implementation including, energy savings plan development, engineering, construction management, construction management, commissioning, and measurement and verification.

This program provides the much needed financing for energy efficiency projects without the burden of increased debt. The program allows for procurement of financing without voter approval or extending existing debt. The program requires evaluation to ensure a positive cash-flow through the entire 15 year financing period. The first phase of implementing an ESIP is the development of an Energy Savings Plan (ESP) to verify the energy savings, construction costs, and overall financial model.

The underlining program requirement is the limitation of the project term to 15 years. The ESIP project size is open for multiple buildings to be included within one project. In addition all applicable incentive programs can also be utilized to help reduce the overall construction cost.

The following breakdown is an estimated project scope with the potential to qualify for the ESIP. An ESP is required to verify the costs and savings as part of an ESIP project.

**Table 8
ESIP -Total Entity Project Summary**

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL ENERGY EFFICIENCY PROJECT					
FACILITY ENERGY EFFICIENCY PROJECTS	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Library	\$5,637	\$64,474	\$2,620	\$61,814	11.0
Recreation Center	\$28,292	\$205,614	\$3,620	\$201,139	7.1
Senior Community Center	\$3,674	\$41,929	\$1,980	\$39,894	10.9
Academy Hall	\$3,630	\$91,853	\$795	\$89,004	24.5
Municiple Building	\$21,957	\$316,153	\$10,929	\$304,169	13.9
Public Work Building	\$6,352	\$48,709	\$1,924	\$46,390	7.3
Monroe Drive Swimming Facility	\$3,068	\$3,689	\$120	\$3,569	1.2
Total Entity Project	\$72,610	\$772,422	\$21,988	\$750,434	10.3

Total Township Energy Costs: \$306,604
Est. Total Township Energy Savings: \$72,610
Overall Township Percent Reduction: 23.7%

VIII. ENERGY AUDIT ASSUMPTIONS

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

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

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FACILITY ENERGY REPORT

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Appendix F – Renewable / Distributed Energy Measures Calculations

I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider:	Public Service Electric & Gas
Electric Utility Rate Structure:	General Lighting & Power (GLP)
Third Party Supplier:	None

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

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

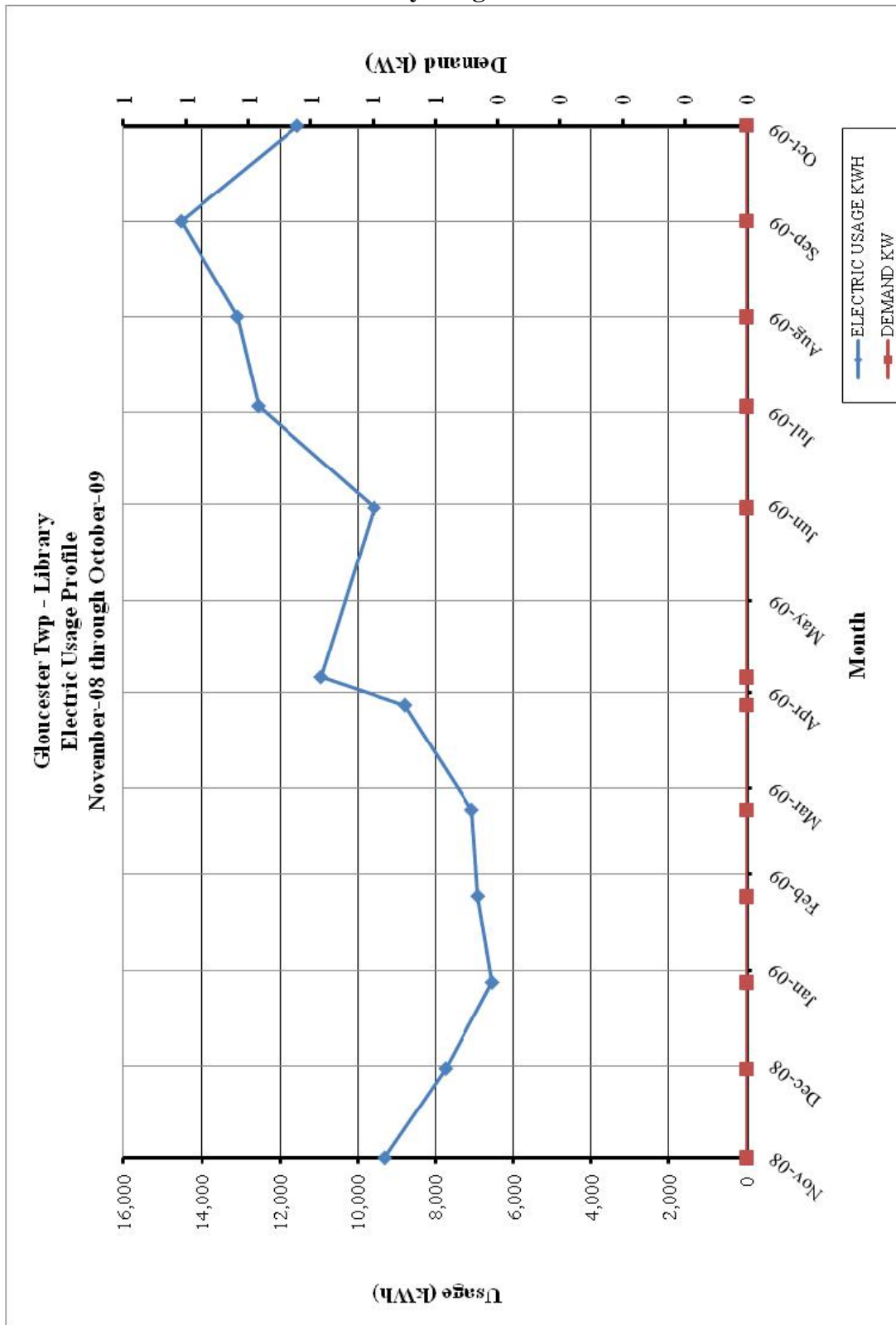
The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

**Table 1
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: PSE&G			
Rate: GLP (General Power and Lighting Service)			
Meter No: 278005298			
Customer ID No: 6613499501 (Account #)			
Third Party Utility			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
25-Nov-08	9,285	0.0	\$1,391
24-Dec-08	7,740	0.0	\$1,189
21-Jan-09	6,540	0.0	\$1,079
18-Feb-09	6,900	0.0	\$1,159
18-Mar-09	7,065	0.0	\$1,177
21-Apr-09	8,775	0.0	\$1,356
30-Apr-09	10,935	0.0	\$1,689
24-Jun-09	9,570	0.0	\$2,107
27-Jul-09	12,540	0.0	\$2,654
25-Aug-09	13,080	0.0	\$2,747
25-Sep-09	14,520	0.0	\$2,838
26-Oct-09	11,535	0.0	\$1,815
Totals	118,485	0.0 Max	\$21,203
AVERAGE DEMAND		0.0 KW average	
AVERAGE RATE		\$0.179 \$/kWh	

Demand data was not available for this facility.

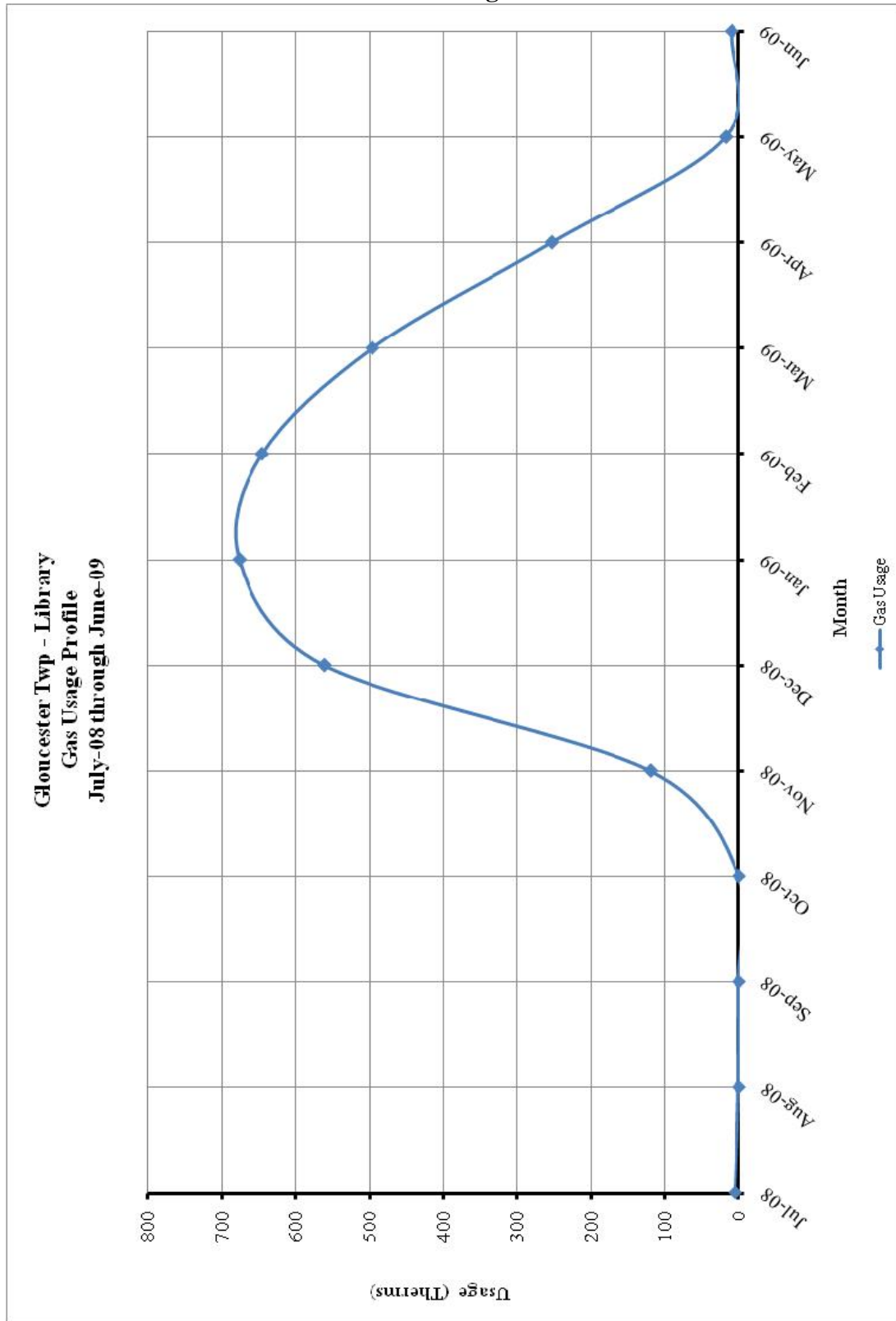
**Figure 1
Electricity Usage Profile**



**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas		
Rate: GSG (General Service Gas)		
Meter No:		
Point of Delivery ID:		
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
29-Jul-08	5.00	\$27.04
27-Aug-08	0.00	\$18.10
26-Sep-08	0.00	\$18.73
29-Oct-08	0.00	\$193.97
26-Nov-08	119.00	\$187.63
30-Dec-08	561.00	\$895.73
28-Jan-09	676.00	\$1,068.08
27-Feb-09	645.00	\$1,014.95
30-Mar-09	496.00	\$781.70
29-Apr-09	253.00	\$409.08
29-May-09	18.00	\$47.25
29-Jun-09	10.00	\$33.63
TOTALS	2,783.00	\$4,695.89
AVERAGE RATE:	\$1.69	\$/THERM

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Gloucester Township Public Library is located on 15 South Black Horse Pike in Gloucester Township, New Jersey. The 9,868 SF Public Library was built in 1989 with no renovations. The building is a single story facility comprised of library space for books, mechanical room and offices.

Occupancy Profile

The typical hours of operation for the Public Library are Monday through Thursday between 9:00 am and 9:00 pm, Friday and Saturday between 9:00 am and 5:00 pm. The Public Library's occupancy can vary during the day. The library employs 5 people.

Building Envelope

Exterior walls for the Public Library are brick faced with a concrete block construction. The amount of insulation within the walls is approximately ¾" foam insulation. The windows throughout the Public Library are in good condition and appear to be maintained. Typical windows throughout the Public Library are double pane, operable, ¼" clear glass with aluminum frames. Blinds are utilized through the office area of the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is a flat, built up rubber roof where the HVAC equipment resides. The amount of insulation below the roofing ranges from 2" to 5" depending on the location and slope of the roof.

HVAC Systems

The Public Library system consists of a hot water boiler, a packaged air conditioning unit and a split system air handling unit.

The boiler is a gas-fired hot water boiler, with an input of 325 MBH and an output of 256 MBH. Manufactured by Weil McLain and having a boiler efficiency of 80%. This boiler serves the baseboard heat which is run throughout the building, as well as hot water coils within the air handling equipment.

The Coleman model HHB, 20 ton split system condenser is located on the roof and serves a carrier indoor air handling unit. This unit is the main source for cooling in the library area and is controlled by a non-programmable thermostat in the library area.

The meeting room within the public library requires supplementary heating and cooling which is provided by a 5 ton packaged Carrier rooftop unit. This unit is split into two zones with dampers in the supply ductwork for each half of the meeting room.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. The two small toilet rooms are controlled by the light switch. The larger bathroom group is controlled by the main library relay which turns on all of the lights within the library.

HVAC System Controls

The HVAC systems within the Public Library are controlled through non-programmable thermostats. Two thermostats are utilized for occupied mode and unoccupied mode. A time clock controls which thermostat is utilized based on the occupancy schedule. Currently, the Public Library is not one of the buildings controlled via the building management system in the Department of Public Works office. Occupied modes are set for the same hours of operation in that 9:00 am to 9:00 pm during the week and 9:00 am to 5:00 pm on Friday and Saturday, the temperature set-points are approximately 72°F for cooling and 70°F for heating in occupied with roughly a 10 degree setback during unoccupied. The outside air is shut during unoccupied periods. The meeting room does not have thermostat programmability. The room set points are approximately 72°F for cooling and 70°F for heating. The meeting room rooftop unit is turned off in the winter.

Domestic Hot Water

Domestic hot water for the restrooms is provided by two (2) 12 gallon Bradford White electric hot water heater, capacity of 1500 Watts. The HWHs are located close to the point of use and serve the lavatories within the bathrooms.

Lighting

Refer to the Investment Grade lighting Audit Appendix for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. MAJOR EQUIPMENT LIST

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

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

IV. ENERGY CONSERVATION MEASURES

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

**Table 1
ECM Financial Summary**

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	Lighting Upgrade	\$4,273	\$1,580	2.7	454.6%
ECM #2	Lighting Controls	\$260	\$154	1.7	788.5%
ECM #3	Computer Monitors	\$800	\$215	3.7	303.1%
ECM #4	Condensing Boiler	\$22,211	\$515	43.1	-53.6%
ECM #5	AC Unit Replacements	\$25,260	\$1,568	16.1	-6.9%
ECM #6	Programmable Thermostats	\$600	\$1,605	0.4	3912.5%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	77 kW Solar Photovoltaic System	\$697,590	\$52,752	13.2	13.4%
Notes:	A. Cost takes into consideration applicable NJ Smart Start™ incentives.				
	B. Savings takes into consideration applicable maintenance savings.				

**Table 2
ECM Energy Summary**

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade	2.6	8,829	0
ECM #2	Lighting Controls	0	429	0
ECM #3	Computer Monitors	0.4	1,200	0
ECM #4	Condensing Boiler	0.0	0	305
ECM #5	AC Unit Replacements	7.3	8,762	0
ECM #6	Programmable Thermostats			
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	77 kW Solar Photovoltaic System	62.4	101,446	0

**Table 3
Facility Project Summary**

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Lighting Upgrade	\$1,580	\$4,323	\$50	\$4,273	2.7
Lighting Controls	\$154	\$300	\$40	\$260	1.7
Computer Monitors	\$215	\$800	\$0	\$800	3.7
Condensing Boiler	\$515	\$22,741	\$530	\$22,211	43.1
AC Unit Replacements	\$1,568	\$27,300	\$2,040	\$25,260	16.1
Programmable Thermostats	\$1,605	\$600	\$0	\$600	0.4
<i>Design / Construction Extras (15%)</i>		<i>\$8,410</i>		<i>\$8,410</i>	
Total Project	\$5,637	\$64,474	\$2,620	\$61,814	11.0

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade

Description:

The majority of the lighting at the Library is 32 watt T-8 bulbs with electronic ballasts. There are a few locations with T-12 lamps and magnetic ballasts. The existing T-8 lamps are 700 series which are efficient; however there have been improvements in lamp technology. All exit signs throughout the building are currently high efficiency LED exit signs.

This ECM includes replacement or retrofit of all fixtures with magnetic ballasts in the facility with electronic ballasts and T-8 lamps. T-8 lamps with electronic ballasts provide energy savings as well as improved light over the existing T-12 fixtures. This ECM will also provide maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need 33% less lamps replaced per year.

This ECM also includes switching out all existing 32 watt T-8 lamps with “SuperSaver” 28 watt T-8 lamps. The new lamp technology provides equivalent lighting with reduced input wattage, while utilizing the existing electronic ballast. Several electronic ballasts were checked for compatibility with 28 watt lamps to verify the applicability of this ECM.

This ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

Energy Savings Calculations:

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

From the **NJ Smart Start Incentive Appendix**, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamps) = \$10 per fixture

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

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (5 \text{ fixtures} \times \$10) = \$50$$

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{replacement } \$ \text{ per lamp} + \text{Labor } \$ \text{ per lamp})$$

$$\text{Savings} = (0 \text{ lamps per year}) \times (\$2.00 + \$5.00) = \$0$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$4,323
NJ Smart Start Equipment Incentive (\$):	\$50
Net Installation Cost (\$):	\$4,273
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,580
Total Yearly Savings (\$/Yr):	\$1,580
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.7
Simple Lifetime ROI	454.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$23,700
Internal Rate of Return (IRR)	37%
Net Present Value (NPV)	\$14,588.94

ECM #2: Lighting Controls

Description:

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

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy sensors.

This ECM includes replacement of standard wall switches with sensors wall switches for the office, lunch room, and bathrooms. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) as well as other details are shown in the **Investment Grade Lighting Audit Appendix**.

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

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

$$Smart\ Start^{\circledR}\ Incentive = (\# \text{ of wall mount} \times \$ 20) + (\# \text{ of ceiling mount} \times 35) \\ = (2 \times \$20) + (0 \times \$35) = \$40$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$300
NJ Smart Start Equipment Incentive (\$):	\$40
Net Installation Cost (\$):	\$260
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$154
Total Yearly Savings (\$/Yr):	\$154
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.7
Simple Lifetime ROI	788.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$2,310
Internal Rate of Return (IRR)	59%
Net Present Value (NPV)	\$1,578.44

ECM #3: Computer Monitor Replacement

Description:

The computers throughout the facility utilize a mixture of CRT computer monitors and LCD computer monitors. Computers are located throughout the facility and are becoming a larger and larger portion of a facility's energy usage. The CRT computer monitors are outdated and have several disadvantages such as; significantly increased higher energy consumption, uses large amount of desk space, poor picture quality, distortions and flickering image, secular glare problems, and high weight, and electromagnetic emissions. Many of these drawbacks are difficult to quantify except for the energy use. CRT monitors use considerably more energy than an alternative flat panel LCD monitor. Replacement of the existing CRT monitors with LCD monitors saves considerable energy as well as provides other ergonomic benefits.

Based on the site survey it was noted that there are 23 LCD monitor and 8 CRT monitors. Some of the monitors were left in screen saver mode, which is deceiving since this mode only saves the computer screen from image burn in, however it does not save on energy consumption. The average operating hours for all computers and monitors is estimated based on the site survey observations. Energy consumption of computer monitors is based on averages for power usage of various computer monitors.

This ECM includes replacement of all existing CRT monitors with LCD flat panel monitors throughout the facility. Installation costs were neglected for this ECM with the intention that this ECM would be replaced by the township. The calculations are based on the following operating assumptions:

Energy Savings Calculations:

No. of CRT Monitors:	8
Operating Weeks per Yr:	50
Hrs per Week:	60 (12 hrs per day estimated average)

$$Electric\ Usage = \frac{\#of\ Computers \times Monitor\ Power\ (W) \times Operation\ (Hrs)}{1000 \left(\frac{W}{KW} \right)}$$

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

COMPUTER MONITOR CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	CRT Monitors	LCD Monitor	
# of Computers	8	8	
Monitor Power Cons. (W)	75	25	
Operating Hrs per Week	60	60	
Operating Weeks per Yr	50	50	
Elec Cost (\$/kWh)	0.179	0.179	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Usage (kWh)	1,800	600	1,200
Energy Cost (\$)	\$322	\$107	\$215
COMMENTS:	CRT Monitor consumption based on Dell CRT monitor M/N: CRT-E771MM. Operating hours estimated.		

Installation cost of new monitors is estimated based on current pricing for a 17” LCD monitor on the market today. No labor costs were included for replacing the existing monitors with the new monitors. No incentives are available for installation of computer monitors. Net cost per monitor was estimated to be \$100.

Installation Costs: # Monitors X Cost per Monitor
 8 Monitors X \$100 per Monitor
 \$800

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$800
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$800
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$215
Total Yearly Savings (\$/Yr):	\$215
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.7
Simple Lifetime ROI	303.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$3,225
Internal Rate of Return (IRR)	26%
Net Present Value (NPV)	\$1,766.66

ECM #4: Condensing Boiler Installation

Description:

The central heating system consists of one Weil Mclain cast iron boiler that serves the building's heating hot water loop through baseboards. The boiler is natural gas. The existing boiler was installed in 1988 (approximately). The boiler has roughly 8 years of service life left for a typical cast iron boiler.

New condensing boilers could substantially improve the operating efficiency of the heating system of the building. Condensing boiler's peak efficiency tops out at 99% depending on return water temperature. Due to the operating conditions of the building, the annual average operating efficiency of the proposed condensing boiler is expected to be 88%. The existing boiler's efficiency is approximately 78%, which makes the condensing boiler a 10% increase in efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature.

This ECM includes installation of one condensing gas fired boilers to replace the existing boilers located in the original boiler room. The basis for this ECM is Aerco, Modulex series boiler model number MLX – 303 boiler or equivalent. The boiler installation is based on a one for one replacement based on capacity of the existing boiler.

Energy Savings Calculations:

Baseline Hot Water Gas Use: 11 Therms

Existing Heating Natural Gas: 2,783 Therms – (11 Therms X 9 Months)
2,684 Therms

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

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

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

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Cast Iron Boiler	New Condensing Boilers	
Existing Nat Gas (Therms)	2,684	0	
Boiler Efficiency (%)	78%	88%	10%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	209	209	
Gas Cost (\$/Therm)	1.69	1.69	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Natural Gas Usage (Therms)	2,684	2,379	305
Energy Cost (\$)	\$4,536	\$4,021	\$515
COMMENTS:			

Installation cost of the one new 303 MBH condensing boiler, demolition, flue piping, boiler water piping modifications, gas piping modifications, electric, etc. is estimated to be \$22,741.

From the **NJ Smart Start Appendix**, the installation of new condensing boilers warrants the following incentive: \$1.00 per MBH.

$$\text{Smart Start}^{\text{®}} \text{ Incentive} = 1 \times (\text{Boiler MBH} \times \$1.00) = 1 \times (303 \times \$1.75) = \$530$$

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$22,741
NJ Smart Start Equipment Incentive (\$):	\$530
Net Installation Cost (\$):	\$22,211
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$515
Total Yearly Savings (\$/Yr):	\$515
Estimated ECM Lifetime (Yr):	20
Simple Payback	43.1
Simple Lifetime ROI	-53.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$10,300
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	(\$14,549.10)

ECM #5: Air Conditioning Unit Upgrades

Description:

The Public Library is air conditioned by a split system AC unit and a packaged rooftop unit. In some cases these units are older and in need of replacement. The existing units have a range of efficiencies. The units currently installed are only past their ASHRAE service life and can be replaced with new units with much higher efficiency. New air conditioners provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and refrigerants.

This ECM includes one-to-one replacement of the older air conditioning units with new higher efficiency systems. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of this ECM can be found in the table below:

IMPLEMENTATION SUMMARY					
ECM INPUTS	SERVICE FOR	NUMBER OF UNITS	COOLING CAPACITY, BTU/HR	TOTAL CAPACITY, TONS	REPLACE UNIT WITH
Coleman CU-1	Air Handler	1	240,000	20.0	20 Ton Carrier - 38AUZ
Carrier RTU-1	Meeting Rm	1	60,000	5.0	5 Ton Carrier - 48HC
Total		2	300,000	25.0	

The basis for the split system air conditioner is the Carrier 38AUZ Series split system with R410a refrigerant. The basis for the packaged air conditioning system with gas heat is the Carrier 48HC Series system with R410a refrigerant and gas heat. This ECM includes replacement of the outdoor condensing units only.

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	EXISTING UNITS EER	SPLIT UNITS EER	# OF UNITS	ENERGY SAVINGS kWh	DEMAND SAVINGS kW
Coleman CU-1	240,000	1,200	8.8	11	1	6,545	5.5
Carrier RTU-1	60,000	1,200	9	12.45	1	2,217	1.8
Total					2	8,762	7.3

Project Cost, Incentives and Maintenance Savings

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

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

SPLIT SYSTEM AC UNITS REBATE SUMMARY				
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE \$/TON	PROPOSED CAPACITY TONS	TOTAL REBATE \$
≥20 to 30 tons	10.5 EER	79	20	\$1,580
5.4 tons or less Unitary	≥14 SEER	\$92	5.0	\$460
TOTAL			25	\$2,040

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

COST & SAVINGS SUMMARY							
ECM INPUTS	INSTALLED COST	# OF UNITS	TOTAL COST	REBATES	NET COST	ENERGY SAVING	PAY BACK YEARS
Coleman CU-1	\$18,200	1	\$18,200	\$1,580	\$16,620	\$1,172	14.2
Carrier RTU-1	\$9,100	1	\$9,100	\$460	\$8,640	\$397	21.8
Total		2	\$27,300	\$2,040	\$25,260	\$1,568	16.1

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

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$27,300
NJ Smart Start Equipment Incentive (\$):	\$2,040
Net Installation Cost (\$):	\$25,260
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,568
Total Yearly Savings (\$/Yr):	\$1,568
Estimated ECM Lifetime (Yr):	15
Simple Payback	16.1
Simple Lifetime ROI	-6.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$23,520
Internal Rate of Return (IRR)	-1%
Net Present Value (NPV)	(\$6,541.32)

ECM #6: Programmable Thermostats

Description:

The library consists of the main library and the meeting each with respective HVAC systems for heating and cooling. The main library utilizes two thermostats, one for occupied hours and one for unoccupied hours. A mechanical time clock switch controls which thermostat is utilized based on the occupancy schedule. The meeting room utilizes a standalone non programmable thermostat to control the heating and cooling set points. These set points are held constant 24/7.

A programmable thermostat provides energy savings by allowing the building to automatically setting back the temperature setting when the building is not occupied at night and returning to the normal temperature setting when the building is occupied during the day. The major benefit for programmable thermostats is in the heating season since the outside temperature is the coldest during unoccupied periods. In night setback the overall building energy use is reduced since the inside temperature is kept closer to the outside temperature which limits heat loss.

This ECM includes installation of programmable thermostats to control the meeting room heating and cooling HVAC unit as well as installing a new programmable thermostat for the main library. The basis for this ECM is a Honeywell Vision Pro Series thermostat or equivalent. The recommended thermostat set points for heating in the offices are as follows:

Occupied Heating =	70° F
Unoccupied Heating =	60° F
Occupied Cooling =	72° F
Unoccupied Cooling =	82° F

Energy Savings Calculations:

Energy savings calculations are based on percent savings through heating degree days for standard base temperatures and set-back temperatures. The reduced heating degree days represents a lower heating load for the portion of hours that the thermostat is in night set-back. Based on information provided by the operations personnel, the existing night set back system for the main library does provide a measurable reduction in temperature because the meeting room does not set back and therefore keeps the majority of the facility warm. The estimated savings is therefore based on the whole building energy savings as a result of the meeting room set back controls.

Cooling energy savings is based on the capacity of the cooling equipment installed and the percent savings through the cooling degree days for standard base temperatures and set back temperatures. Since the night time cooling hours are typically at or below the occupied cooling set point, the cooling set back savings is based only on the unoccupied daytime hours (Friday, Saturday evening, as well as all day Sunday).

Heating Energy Savings:

Baseline Hot Water Gas Use: 0.0 Therms

Existing Heating Natural Gas: 2,783 Therms – (0 Therms X 12 Months)
2,783 Therms

$$\text{Set Back Heating Energy} = \text{Existing Gas (Therms)} \times \frac{\text{HDD}_{55^{\circ}\text{F}}}{\text{HDD}_{65^{\circ}\text{F}}} \times \frac{\text{Set Back Hrs Per Week}}{168 \text{ Hrs per Week}}$$

$$\text{Non Set Back Heating Energy} = \text{Existing Gas (Therms)} \times \frac{\text{Non Set Back Hrs Per Week}}{168 \text{ Hrs per Week}}$$

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

Energy savings calculations are summarized in the table below.

PROGRAMMABLE THERMOSTAT HEATING ENERGY CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Standard on-board thermostat controls	Programmable Thermostats (10°F Setback)	
Total Heating Energy (Therms)	2,783	2,783	
Heating Degree Days (65°F / 55°F)	5,154	3,072	2,082
Hours of setback per week	0	104	
Heating Fuel Value	100,000	100,000	
Gas Cost (\$/Therm)	\$1.69	\$1.69	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Heating Energy, Therms (non setback)	2,783	2,087	
Heating Energy Cost (\$)	\$4,703	\$3,527	\$1,176
COMMENTS:	Degree Days based on McQuire AFB, NJ.		

Cooling Energy Savings:

$$\text{Cooling Energy kWh} = \text{Cooling Capacity,} \frac{\text{BTU}}{\text{Hr}} \times \left(\frac{1}{\text{EER}} \right) \times \frac{\text{Full Load Hrs}}{1000 \frac{\text{W}}{\text{kWh}}}$$

$$\text{Set Back Cooling Energy} = \text{Cooling Energy (kWh)} \times \frac{\text{HDD}_{82^{\circ}\text{F}}}{\text{HDD}_{72^{\circ}\text{F}}} \times \frac{\text{Set Back Hrs Per Week}}{168 \text{ Hrs per Week}}$$

$$\text{Non Set Back Cooling Energy} = \text{Cooling Energy (kWh)} \times \frac{\text{Non Set Back Hrs Per Week}}{168 \text{ Hrs per Week}}$$

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

PROGRAMMABLE THERMOSTAT COOLING ENERGY CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Standard on-board thermostat controls	Programmable Thermostats (10°F Setback)	
CU-1 Cooling Capacity (Tons)	20	20	
CU-1 Efficiency (EER)	8.8	8.8	
RTU-1 Cooling Capacity (Tons)	5	5	
RTU-1 Efficiency (EER)	10.0	10.0	
Full Load Cooling Hrs	800	800	
Cooling Energy, kWh (Non Set Back)	26,618	26,618	
Cooling Degree Days (82°F / 72°F)	761	186	575
Hours of setback per week	0	20	
Electric Cost (\$/kWh)	\$0.179	\$0.179	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Cooling Energy kWh	26,618	24,224	
Electric Energy Cost (\$)	\$4,765	\$4,336	\$429
COMMENTS:	Degree Days based on McQuire AFB,NJ.		

Cost

Installed cost of programmable thermostats is \$300/Unit. This ECM requires the installation of two programmable thermostats.

Total cost of implementation of this ECM is \$600.

Note: Gloucester Township is planning to include the library with the central control system at the DPW building. With the installation of central controls that include night setback as indicated above, the savings shown in this ECM would be realized.

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$600
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$600
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,605
Total Yearly Savings (\$/Yr):	\$1,605
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.4
Simple Lifetime ROI	3912.5%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	\$24,075
Internal Rate of Return (IRR)	267%
Net Present Value (NPV)	\$18,560.39

V. ADDITIONAL RECOMMENDATIONS

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

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- E. Turn off computers when not in use. Ensure computers are not running in screen saver mode which saves the monitor screen not energy.
- F. Ensure outside air dampers are functioning properly and only open during occupied mode.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Gloucester Township – Public Library

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1 + IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1 + DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Lighting Upgrade	\$4,323	\$0	\$50	\$4,273	\$1,580	\$0	\$1,580	15	\$23,700	\$0	454.6%	2.7	36.63%	\$14,588.94
ECM #2	Lighting Controls	\$300	\$0	\$40	\$260	\$154	\$0	\$154	15	\$2,310	\$0	788.5%	1.7	59.18%	\$1,578.44
ECM #3	Computer Monitors	\$800	\$0	\$0	\$800	\$215	\$0	\$215	15	\$3,225	\$0	303.1%	3.7	26.04%	\$1,766.66
ECM #4	Condensing Boiler	\$9,536	\$13,205	\$530	\$22,211	\$515	\$0	\$515	20	\$10,300	\$0	-53.6%	43.1	-6.42%	(\$14,549.10)
ECM #5	AC Unit Replacements	\$18,750	\$8,550	\$2,040	\$25,260	\$1,568	\$0	\$1,568	15	\$23,520	\$0	-6.9%	16.1	-0.88%	(\$6,541.32)
ECM #6	Programmable Thermostats	\$300	\$300	\$0	\$600	\$1,605	\$0	\$1,605	15	\$24,075	\$0	3912.5%	0.4	267.50%	\$18,560.39
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	77 kW Solar Photovoltaic System	\$697,590	\$0	\$0	\$697,590	\$17,246	\$35,506	\$52,752	15	\$791,279	\$532,592	13.4%	13.2	1.62%	(\$67,841.00)

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



Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

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

Desiccant Systems

\$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

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



STATEMENT OF ENERGY PERFORMANCE

Gloucester Twp - Public Library

Building ID: 2555133
For 12-month Period Ending: October 31, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: January 17, 2011

Facility

Gloucester Twp - Public Library
 15 South Black Horse Pike
 Gloucester Township, NJ 08012

Facility Owner

Gloucester Township
 1261 chews landing road
 Gloucester Township, NJ 08012

Primary Contact for this Facility

Tom Cardis
 1261 chews landing road
 Gloucester Township, NJ 08012

Year Built: 1989

Gross Floor Area (ft²): 9,868

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	404,271
Natural Gas (kBtu) ⁴	299,800
Total Energy (kBtu)	704,071

Energy Intensity⁵

Site (kBtu/ft ² /yr)	71
Source (kBtu/ft ² /yr)	169

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	78
---	----

Electric Distribution Utility

Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	246
% Difference from National Average Source EUI	-31%
Building Type	Library

Stamp of Certifying Professional

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

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

Michael Fischette
 520 South Burnt Mill Road
 Voorhees, NJ 08043

Notes:

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Library

Rooftop / AC Units

Tag	AC-1	RTU-1	
Unit Type	Split System Condensing Unit	Packaged	
Qty	1	1	
Location	Roof	Roof	
Area Served	Air handling unit in mechanical room	Meeting Room	
Manufacturer	Coleman	Carrier	
Model #	HHB240	N/A	
Serial #	N/A	N/A	
Cooling Type	DX, R-22	DX, R-22	
Cooling Capacity (Tons)	20 Tons	5 Tons	
Cooling Efficiency (SEER/EER)	8.8 EER	10 EER	
Heating Type	N/A	Hot Water Coil	
Heating Input (MBH)	N/A	N/A	
Efficiency	N/A	N/A	
Fuel	N/A	N/A	
Approx Age	21	N/A	
ASHRAE Service Life	15	15	
Remaining Life	(6)		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Library

Boilers

Tag	Boiler-1		
Unit Type	Gas-Fired Hot Water Heater		
Qty	1		
Location	Mechanical Room		
Area Served	Baseboard Heating		
Manufacturer	Weil McLain		
Model #	P-FG-6		
Serial #	3		
Input Capacity (Btu/Hr)	325,000 Btu/hr		
Rated Output Capacity (Btu/Hr)	256,750 Btu/hr		
Approx. Efficiency %	79%		
Fuel	Natural Gas		
Approx Age	22		
ASHRAE Service Life	30		
Remaining Life	8		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Library

Domestic Water Heaters

Tag	HWH-1 & 2		
Unit Type	Electric Hot Water Heater		
Qty	2		
Location	Janitor Closet		
Area Served	Bathrooms		
Manufacturer	Bradford White		
Model #	M12UT5S-1		
Serial #	EG 7065326		
Size (Gallons)	12 Gallons		
Input Capacity (MBH/KW)	1500 Watts		
Recovery (Gal/Hr)	-		
Efficiency %	100%		
Fuel	Electric		
Approx Age	23		
ASHRAE Service Life	12		
Remaining Life	(11)		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Library

Pumps

Tag	HWP-1,2		
Unit Type	In-Line Pump		
Qty	2		
Location	Mechanical Room		
Area Served	Boiler pumps for baseboard & heat coil		
Manufacturer	Bell & Gossett		
Model #	Series 60 Model 623T		
Serial #	N/A		
Horse Power	1 HP		
Flow	N/A		
Motor Info	Bell & Gossett		
Electrical Power	208-230/460		
RPM	1750 RPM		
Motor Efficiency %	82.5%		
Approx Age	22		
ASHRAE Service Life	20	20	20
Remaining Life	2		
Comments			

Investment Grade Lighting Audit

CEG Job #: 9C10076
Project: Library

Library

KWH COST: \$0.179

Bldg. Sq. Ft.

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS				
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
264.21	Book Stacks	3600	62	6	4x4, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	172	10.66	38,390.4	\$6,871.88	62	6	Relamp - Sylvania Lamp FO28/841/SS/ECO	148	9.18	33033.6	\$5,913.01	\$42.00	\$2,604.00	1.49	5356.8	\$958.87	2.72
227.21	Periodicals	3600	9	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.59	2,106.0	\$376.97	9	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.44	1587.6	\$284.18	\$24.00	\$216.00	0.14	518.4	\$92.79	2.33
111.14	Utility Room	2600	3	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	48	0.14	374.4	\$67.02	3	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.08	195	\$34.91	\$80.00	\$240.00	0.07	179.4	\$32.11	7.47
227.21	Librarian's Office	3600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,404.0	\$251.32	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	1058.4	\$189.45	\$24.00	\$144.00	0.10	345.6	\$61.86	2.33
227.21	Office	3600	7	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.46	1,638.0	\$293.20	7	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.34	1234.8	\$221.03	\$24.00	\$168.00	0.11	403.2	\$72.17	2.33
100	Men's Rest Room	2600	1	2	2' Vanity Light, 2-Lamp, 20w T12, Mag. Ballast, Wall Mnt., Glass Lens	42	0.04	109.2	\$19.55	1	2	Reballast & Relamp; 17w T8 Elec. Ballast	33	0.03	85.8	\$15.36	\$60.00	\$60.00	0.01	23.4	\$4.19	14.32
100	Staff Rest Room	2600	1	2	2' Vanity Light, 2-Lamp, 20w T12, Mag. Ballast, Wall Mnt., Glass Lens	42	0.04	109.2	\$19.55	1	2	Reballast & Relamp; 17w T8 Elec. Ballast	33	0.03	85.8	\$15.36	\$60.00	\$60.00	0.01	23.4	\$4.19	14.32
227.21	Staff Lunch Room	3600	7	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.46	1,638.0	\$293.20	7	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.34	1234.8	\$221.03	\$24.00	\$168.00	0.11	403.2	\$72.17	2.33
227.21	Meeting Room	3600	18	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	1.17	4,212.0	\$753.95	18	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.88	3175.2	\$568.36	\$24.00	\$432.00	0.29	1036.8	\$185.59	2.33
623		1800	4	1	Track Head, 65w BR30	65	0.26	468.0	\$83.77	4	1	Energy Star Rated, 26w CFL Flood Lamp	26	0.10	187.2	\$33.51	\$20.00	\$80.00	0.16	280.8	\$50.26	1.59
560	Lobby	3600	6	1	Recessed Down Light, 26w CFL Lamp	26	0.16	561.6	\$100.53	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
560	Vestibule	3600	6	1	Recessed Down Light, 26w CFL Lamp	26	0.16	561.6	\$100.53	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Men's Rest Room	2600	3	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.20	507.0	\$90.75	3	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.15	382.2	\$68.41	\$24.00	\$72.00	0.05	124.8	\$22.34	3.22
227.21	Woman's Rest Room	2600	3	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.20	507.0	\$90.75	3	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.15	382.2	\$68.41	\$24.00	\$72.00	0.05	124.8	\$22.34	3.22
211.44	Maintenance Room	1200	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Wall Mnt., No Lens	32	0.03	38.4	\$6.87	1	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	0.03	30	\$5.37	\$7.00	\$7.00	0.01	8.4	\$1.50	4.66
725	Exterior	4400	4	1	150w HPS Wallpack	188	0.75	3,308.8	\$592.28	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals			137	29			14.94	52,625	\$9,420	137	27			12.0	42,673	\$7,638		\$4,323	2.6	8,829	\$1,580	2.74

Investment Grade Lighting Audit

CEG Job #: 9C10076
 Project: Library
 Address: 0
 0
 Building SF: -

Library

KWH COST: \$0.179

ECM #2: Lighting Controls

EXISTING LIGHTING					PROPOSED LIGHTING CONTROLS										SAVINGS								
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
264.21	Book Stacks	3600	62	6	4x4, 6 Lamp, 32w 700 Series T8, Elect. Ballast, Pendant Mnt., Prismatic Lens	172	10.664	38390.4	\$6,871.88	62	0	No Change	172	10.66	0%	38390.4	\$6,871.88	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Periodicals	3600	9	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.585	2106	\$376.97	9	0	No Change	65	0.59	0%	2106	\$376.97	\$0.00	\$0.00	0.00	0	\$0.00	0.00
111.14	Utility Room	2600	3	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	48	0.144	374.4	\$67.02	3	0	No Change	48	0.14	0%	374.4	\$67.02	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Librarian's Office	3600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1404	\$251.32	6	0	No Change	65	0.39	0%	1404	\$251.32	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Office	3600	7	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.455	1638	\$293.20	7	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.36	20%	1310.4	\$234.56	\$75.00	\$75.00	0.09	327.6	\$58.64	1.28
100	Men's Rest Room	2600	1	2	2' Vanity Light, 2-Lamp, 20w T12, Mag. Ballast, Wall Mnt., Glass Lens	42	0.042	109.2	\$19.55	1	0	No Change	42	0.04	0%	109.2	\$19.55	\$0.00	\$0.00	0.00	0	\$0.00	0.00
100	Staff Rest Room	2600	1	2	2' Vanity Light, 2-Lamp, 20w T12, Mag. Ballast, Wall Mnt., Glass Lens	42	0.042	109.2	\$19.55	1	0	No Change	42	0.04	0%	109.2	\$19.55	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Staff Lunch Room	3600	7	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.455	1638	\$293.20	7	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.36	20%	1310.4	\$234.56	\$75.00	\$75.00	0.09	327.6	\$58.64	1.28
227.21	Meeting Room	3600	18	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	1.17	4212	\$753.95	18	0	No Change	65	1.17	0%	4212	\$753.95	\$0.00	\$0.00	0.00	0	\$0.00	0.00
623		1800	4	1	Track Head, 65w BR30	65	0.26	468	\$83.77	4	0	No Change	65	0.26	0%	468	\$83.77	\$0.00	\$0.00	0.00	0	\$0.00	0.00
560	Lobby	3600	6	1	Recessed Down Light, 26w CFL Lamp	26	0.156	561.6	\$100.53	6	0	No Change	26	0.16	0%	561.6	\$100.53	\$0.00	\$0.00	0.00	0	\$0.00	0.00
560	Vestibule	3600	6	1	Recessed Down Light, 26w CFL Lamp	26	0.156	561.6	\$100.53	6	0	No Change	26	0.16	0%	561.6	\$100.53	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Men's Rest Room	2600	3	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.195	507	\$90.75	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.16	20%	405.6	\$72.60	\$75.00	\$75.00	0.04	101.4	\$18.15	4.13
227.21	Woman's Rest Room	2600	3	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.195	507	\$90.75	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.16	20%	405.6	\$72.60	\$75.00	\$75.00	0.04	101.4	\$18.15	4.13
211.44	Maintenance Room	1200	1	1	1x4, 1 Lamp, 32w T8, Elect. Ballast, Wall MNT., No Lens	32	0.032	38.4	\$6.87	1	0	No Change	32	0.03	0%	38.4	\$6.87	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals				137	29		14.9	52,624.8	\$9,420	137	4			14.7		51,766.8	\$9,266.26		\$300	0.26	858	\$154	1.95

Project Name: LGEA Solar PV Project - Gloucester Township Library							
Location: Blackwood, NJ							
Description: Photovoltaic System - Direct Purchase							
Simple Payback Analysis							
	Photovoltaic System - Direct Purchase						
Total Construction Cost	\$697,590						
Annual kWh Production	101,446						
Annual Energy Cost Reduction	\$17,246						
Annual SREC Revenue	\$35,506						
First Cost Premium	\$697,590						
Simple Payback:	13.22						Years
Life Cycle Cost Analysis							
Analysis Period (years):	25			Financing %:	0%		
Financing Term (mths):	0			Maintenance Escalation Rate:	3.0%		
Average Energy Cost (\$/kWh)	\$0.170			Energy Cost Escalation Rate:	3.0%		
Financing Rate:	0.00%			SREC Value (\$/kWh)	\$0.350		
Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	\$697,590	0	0	0	\$0	(697,590)	0
1	\$0	101,446	\$17,246	\$0	\$35,506	\$52,752	(\$644,838)
2	\$0	100,939	\$17,763	\$0	\$35,329	\$53,092	(\$591,746)
3	\$0	100,434	\$18,296	\$0	\$35,152	\$53,448	(\$538,298)
4	\$0	99,932	\$18,845	\$0	\$34,976	\$53,821	(\$484,477)
5	\$0	99,432	\$19,410	\$1,024	\$34,801	\$53,187	(\$431,290)
6	\$0	98,935	\$19,993	\$1,019	\$34,627	\$53,601	(\$377,689)
7	\$0	98,440	\$20,592	\$1,014	\$34,454	\$54,033	(\$323,656)
8	\$0	97,948	\$21,210	\$1,009	\$34,282	\$54,483	(\$269,173)
9	\$0	97,458	\$21,846	\$1,004	\$34,110	\$54,953	(\$214,220)
10	\$0	96,971	\$22,502	\$999	\$33,940	\$55,443	(\$158,777)
11	\$0	96,486	\$23,177	\$994	\$33,770	\$55,953	(\$102,824)
12	\$0	96,004	\$23,872	\$989	\$33,601	\$56,485	(\$46,339)
13	\$0	95,524	\$24,588	\$984	\$33,433	\$57,038	\$10,699
14	\$0	95,046	\$25,326	\$979	\$33,266	\$57,613	\$68,312
15	\$0	94,571	\$26,086	\$974	\$33,100	\$58,212	\$126,524
16	\$0	94,098	\$26,868	\$969	\$32,934	\$58,834	\$185,358
17	\$0	93,628	\$27,674	\$964	\$32,770	\$59,480	\$244,837
18	\$0	93,160	\$28,505	\$960	\$32,606	\$60,151	\$304,988
19	\$0	92,694	\$29,360	\$955	\$32,443	\$60,848	\$365,836
20	\$0	92,230	\$30,241	\$950	\$32,281	\$61,571	\$427,408
21	\$1	91,769	\$31,148	\$945	\$32,119	\$62,322	\$489,729
22	\$2	91,310	\$32,082	\$940	\$31,959	\$63,100	\$552,830
23	\$3	90,854	\$33,045	\$936	\$31,799	\$63,908	\$616,738
24	\$4	90,399	\$34,036	\$931	\$31,640	\$64,745	\$681,482
25	\$5	89,947	\$35,057	\$926	\$31,482	\$65,612	\$747,095
Totals:		2,389,657	\$628,770	\$20,465	\$836,380	\$1,444,685	\$638,510
Net Present Value (NPV)						\$747,120	
Internal Rate of Return (IRR)						6.3%	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW _{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Gloucester Township Library	5500	Sunpower SPR230	337	14.7	4,955	77.51	101,446	11,121	15.64




AC Energy
&
Cost Savings



Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	77.0 kW
DC to AC Derate Factor:	0.810
AC Rating:	62.4 kW
Array Type:	Fixed Tilt
Array Tilt:	39.5°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	17.0 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	3.61	7258	1233.86
2	4.20	7556	1284.52
3	4.78	9117	1549.89
4	5.23	9363	1591.71
5	5.44	9828	1670.76
6	5.48	9199	1563.83
7	5.55	9511	1616.87
8	5.41	9371	1593.07
9	5.23	8969	1524.73
10	4.60	8388	1425.96
11	3.59	6664	1132.88
12	3.17	6221	1057.57
Year	4.69	101446	17245.82

 = Proposed PV Layout

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

**TOWNSHIP OF GLOUCESTER
RECREATION CENTER**

**80 BROAD ACRE DRIVE
GLOUCESTER TOWNSHIP, NJ 08012**

FACILITY ENERGY REPORT

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I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider: Atlantic City Electric
Electric Utility Rate Structure: Annual General Service (AGS)
Third Party Supplier: None

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

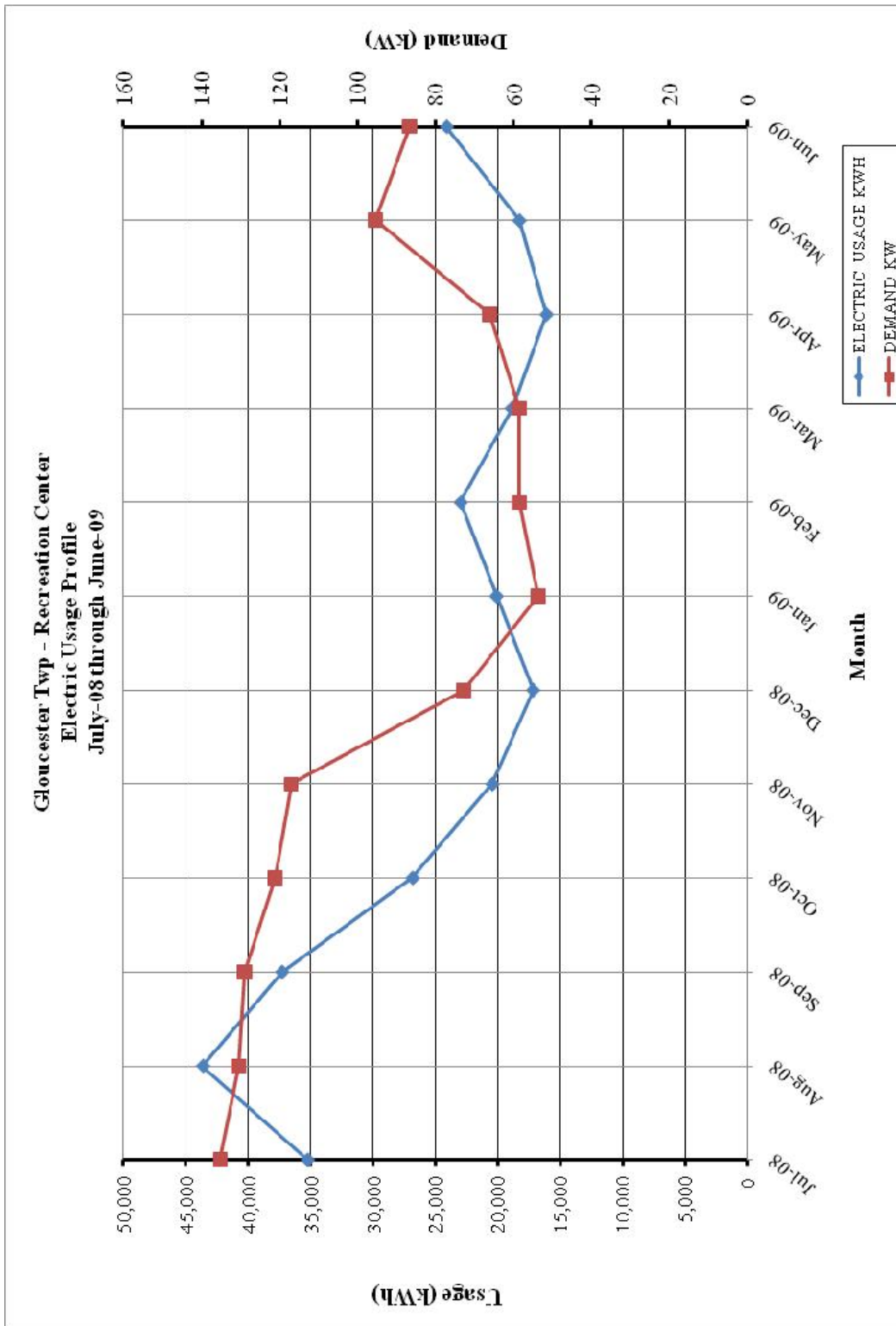
The electric usage profile represents the actual electrical usage for the facility. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts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

The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

**Table 1
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: Atlantic City Electric			
Rate: AGS			
Meter No:			
Customer ID No:			
Third Party Utility 1143300-99994			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
03-Jul-08	35,260	135.2	\$5,680
04-Aug-08	43,660	130.4	\$6,868
03-Sep-08	37,320	129.0	\$5,947
03-Oct-08	26,840	121.2	\$4,430
03-Nov-08	20,440	117.0	\$3,160
04-Dec-08	17,180	72.8	\$2,748
06-Jan-09	20,120	53.6	\$3,139
03-Feb-09	22,980	58.6	\$3,358
05-Mar-09	18,900	58.6	\$2,964
03-Apr-09	16,100	66.0	\$2,625
07-May-09	18,280	95.4	\$3,011
08-Jun-09	24,100	86.6	\$3,800
Totals	301,180	135.2 Max	\$47,730
AVERAGE DEMAND		93.7 KW average	
AVERAGE RATE		\$0.158 \$/kWh	

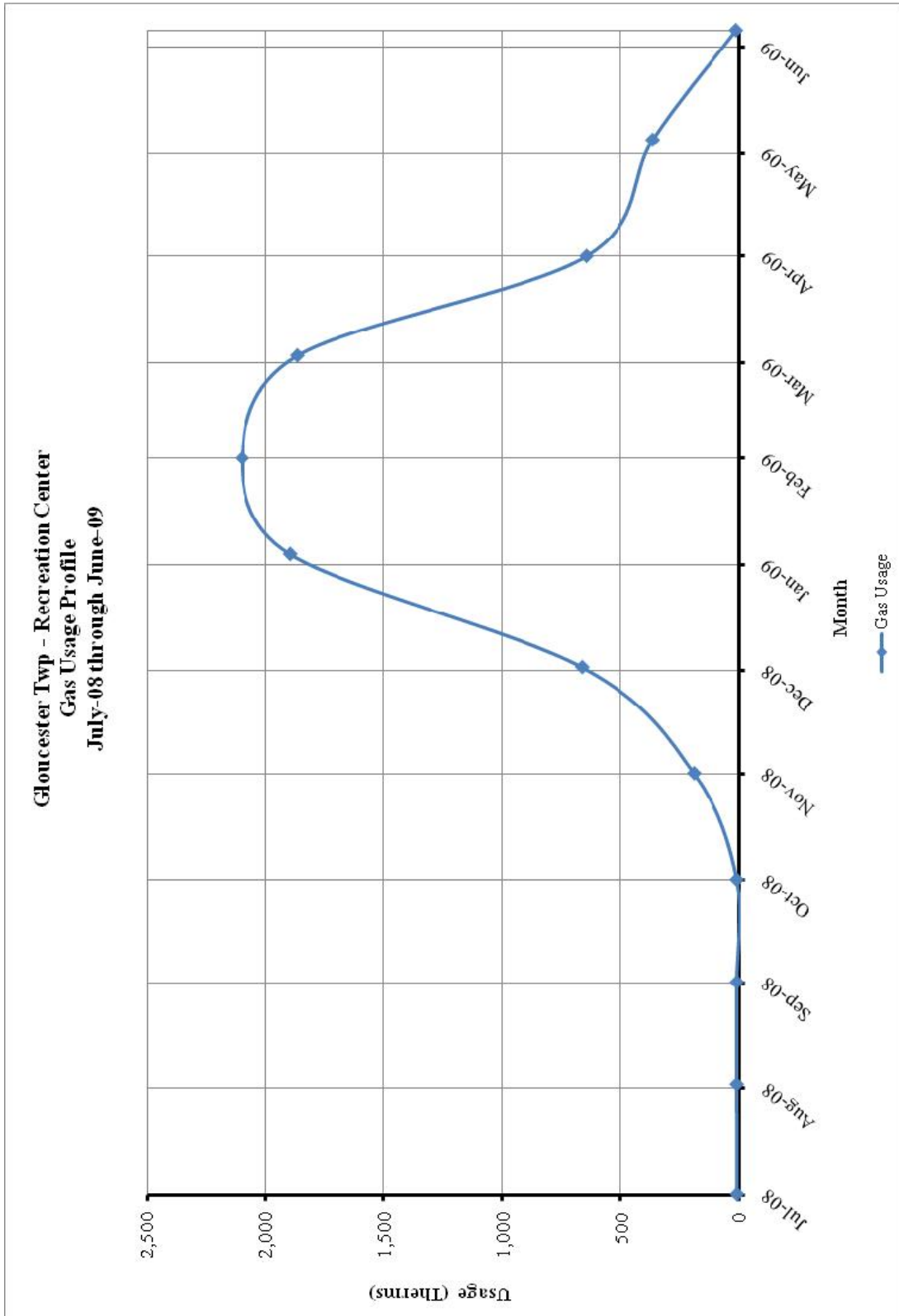
Figure 1
Electricity Usage Profile



**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas		
Rate: GSG		
Meter No:		
Point of Delivery ID:		
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
03-Jul-08	9.00	\$36.78
04-Aug-08	10.00	\$35.18
03-Sep-08	10.00	\$35.51
03-Oct-08	10.00	\$33.28
03-Nov-08	190.00	\$279.16
04-Dec-08	662.00	\$1,115.79
06-Jan-09	1,893.00	\$3,160.79
03-Feb-09	2,096.00	\$3,533.71
05-Mar-09	1,863.00	\$3,130.29
03-Apr-09	644.00	\$1,092.70
07-May-09	365.00	\$631.66
08-Jun-09	14.00	\$42.94
TOTALS	7,766.00	\$13,127.79
AVERAGE RATE:	\$1.69	\$/THERM

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Gloucester Township Recreation Center is located on 80 Broad Acre Drive in Gloucester Township, New Jersey. The 19,855 SF Recreation Center was built in 1992 with no renovations. The building is a single story facility comprised of a mechanical room, offices and hockey rink.

Occupancy Profile

The hours of operation for the Recreation Center are variable and scheduled based on events. Typical use is approximately 12 hours per day, 4 days per week. The Recreation Center runs a daycare program during the week from Monday through Thursday and has minimal use during the weekend.

Building Envelope

Exterior walls for the Recreation Center are a concrete block construction with a stucco façade. The amount of insulation within the walls is approximately 2” of rigid insulation. The windows throughout the Recreation Center are in good condition and appear to be maintained. Typical windows throughout the Recreation Center are double pane, ¼” clear glass with aluminum frames. Blinds are utilized through the office area of the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is sloped A-frame style with metal seam roofing throughout. The roof insulation is wrapped batt insulation below the metal roof approximately R-19 insulation value.

HVAC Systems

The HVAC system for the Recreation Center consists of two (2) large ‘King Air Systems’ air handling units in the ice rink area of the building and one (1) Lennox Pulse air handling unit along with matching split condensers located on grade outside the building.

The ‘King Air Systems’ air handling units serve the large ice rink portion of the building. These air handling units are paired with York condensing units outside the building for cooling. The cooling capacity for these units is approximately 20 tons, supplying 17,500 CFM of air to the space. In addition these air handlers have direct fired gas burners for heating. The air handling units are in good condition, however the remote condensing units are in poor condition.

The Lennox Pulse furnace is located in the mechanical room hanging from the ceiling. This unit supplies the office area of the building with a heating capacity of 100 MBH and is paired with a condensing unit which provides 5 ½ tons of cooling capacity. This system is in fair condition.

A natural gas unit heater provides heat for the back storage room. This unit is in good condition and is used to keep the storage room tempered throughout the winter.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. The toilet room exhaust fan is operated based on the facility occupancy controlled through the BMS within the Public Works Building. The schedules are manually adjusted for changes in the building’s schedule.

HVAC System Controls

The HVAC systems within the facility are controlled through an antiquated building management system remotely located in the department of public works office. Programming of temperature set-points for this building are set approximately 72°F for cooling and 68°F for heating in occupied mode. The temperature set points are manually set within the building while the scheduling is controlled through the BMS system. In unoccupied mode the building is set back approximately 6 degrees by switching control of the building to a separate thermostat. Air handlers run continuously in an occupied mode and cycle in unoccupied mode. The AHUs introduce approximately 15% O.A. for ventilation during occupied periods. Simultaneously relief dampers open to relieve building pressure. The outside air dampers are shut in unoccupied mode.

The storage room unit heater is not controlled by the building management system but is set to maintain 55°F all year.

Domestic Hot Water

Domestic hot water for the restrooms is provided by a 40 gallon John Wood gas-fired hot water heater, capacity of 33,000 Btu/h. Domestic hot water is not circulated throughout the building.

Lighting

Refer to the Investment Grade lighting Audit Appendix for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. MAJOR EQUIPMENT LIST

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

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

IV. ENERGY CONSERVATION MEASURES

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

**Table 1
ECM Financial Summary**

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	Lighting Upgrade	\$20,470	\$16,108	1.3	1080.4%
ECM #2	Lighting Controls	\$3,070	\$1,555	2.0	659.8%
ECM #3	Split System AC Upgrades	\$42,780	\$2,961	14.4	3.8%
ECM #4	Energy Recovery Unit Retrofit	\$108,000	\$7,668	14.1	6.5%
Notes:	A. Cost takes into consideration applicable NJ Smart Start™ incentives.				
	B. Savings takes into consideration applicable maintenance savings.				

**Table 2
ECM Energy Summary**

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade	29.4	101,461	0
ECM #2	Lighting Controls	28.9	97,972	0
ECM #3	Split System AC Upgrades	13.8	16,543	0
ECM #4	Energy Recovery Unit Retrofit	0.0	27,372	3,101

**Table 3
Facility Project Summary**

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Lighting Upgrade	\$16,108	\$21,140	\$670	\$20,470	1.3
Lighting Controls	\$1,555	\$3,255	\$185	\$3,070	2.0
Split System AC Upgrades	\$2,961	\$46,400	\$3,620	\$42,780	14.4
Energy Recovery Unit Retrofit	\$7,668	\$108,000	\$0	\$108,000	14.1
<i>Design / Construction Extras (15%)</i>		\$26,819		\$26,819	
Total Project	\$28,292	\$205,614	\$3,620	\$201,139	7.1

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade

Description:

The lighting at the Recreation Center is of 34 watt T-12 fixtures with magnetic ballasts for the individual offices, lobby, and storage rooms. The hockey rink is lit with large indirect fixtures with dual lamps. One lamp is a 400 watt MH lamp and the second is a 250 watt HPS lamp. Exit signs throughout the facility are lit with 7 watt fluorescent lamps.

This ECM includes replacement or retrofit of all fixtures with magnetic ballasts in the facility with electronic ballasts and T-8 lamps. T-8 lamps with electronic ballasts provide energy savings as well as improved light over the existing T-12 fixtures. This ECM will also provide maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need 33% less lamps replaced per year.

This ECM includes replacing the large indirect MH / HPS fixtures with low bay T-8 fixtures and electronic ballasts. The existing fixtures require significantly higher outputs than required because the light is directed upward and reflected back down on the space. New low bay T-8 fixtures will be able to provide equal light levels at a considerably reduced input wattage.

This ECM includes replacement of any incandescent lamps with compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

Finally this ECM also includes replacement of all exit signs lit with fluorescent lamps to LED exist signs. LED exist signs are available with a power requirement of only 2 watts. In addition the LED lighting typically lasts for 50,000 hours or more.

Energy Savings Calculations:

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

From the **NJ Smart Start Incentive Appendix**, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamps) = \$10 per fixture

Smart Start® *Incentive* = (# of 1-4 lamp fixtures × \$10)

Smart Start® *Incentive* = (67 fixtures × \$10) = \$670

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{replacement } \$ \text{ per lamp} + \text{Labor } \$ \text{ per lamp})$$

$$\text{Savings} = (11 \text{ lamps per year}) \times (\$2.00 + \$5.00) = \$77$$

No maintenance savings is estimated for the retrofit of MH / HPS fixtures to T-8 fixtures.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$21,140
NJ Smart Start Equipment Incentive (\$):	\$670
Net Installation Cost (\$):	\$20,470
Maintenance Savings (\$/Yr):	\$77
Energy Savings (\$/Yr):	\$16,031
Total Yearly Savings (\$/Yr):	\$16,108
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.3
Simple Lifetime ROI	1080.4%
Simple Lifetime Maintenance Savings	\$1,155
Simple Lifetime Savings	\$241,620
Internal Rate of Return (IRR)	79%
Net Present Value (NPV)	\$171,826.26

ECM #2: Lighting Controls

Description:

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

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy sensors.

This ECM includes replacement of standard wall switches with sensors wall switches for the offices, and break room. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent. This ECM also includes purchasing factory mounted occupancy sensors for each fixture proposed in the lighting upgrade ECM. The cost associated with this installation is based on only the additional cost to include the factory mounted occupancy sensor. The savings is based on only the additional savings associated with occupancy controls on the proposed low bay T-8 fixtures within the hockey rink. This ECM is based on the implementation of the lighting upgrade for the hockey rink.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) as well as other details are shown in the **Investment Grade Lighting Audit Appendix**.

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

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

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

$$\begin{aligned} \text{Smart Start}^{\circledR} \text{ Incentive} &= (\# \text{ of wall mount} \times \$ 20) + (\# \text{ of ceiling mount} \times 35) \\ &= (4 \times \$20) + (3 \times \$35) = \$185 \end{aligned}$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$3,255
NJ Smart Start Equipment Incentive (\$):	\$185
Net Installation Cost (\$):	\$3,070
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,555
Total Yearly Savings (\$/Yr):	\$1,555
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.0
Simple Lifetime ROI	659.8%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$23,325
Internal Rate of Return (IRR)	51%
Net Present Value (NPV)	\$15,493.49

ECM #3: Air Conditioning Unit Upgrades

Description:

The Recreation Center is air conditioned by split system AC units. In this case these units are older and in need of replacement. The 5.5 ton unit has a seasonal energy efficiency rating (SEER) of 10 while the two (2) 20 ton split systems have an energy efficiency rating (EER) of 8.7. The units currently installed are past their ASHRAE service life and can be replaced with new units with much higher efficiency. New air conditioners provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and refrigerants.

This ECM includes one-to-one replacement of the older air conditioning units with new higher efficiency systems. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of this ECM can be found in the table below:

IMPLEMENTATION SUMMARY					
ECM INPUTS	SERVICE FOR	NUMBER OF UNITS	COOLING CAPACITY, BTU/HR	TOTAL CAPACITY, TONS	REPLACE UNIT WITH
Lennox CU-1	Lobby/office	1	60,000	5.0	5 Ton Trane - XL20i
York CU-2,3	Ice Rink	2	240,000	40.0	20 Ton Carrier - 38AUZ
Total		3	300,000	45.0	

The basis for the split system air conditioner is the Carrier 38AUZ Series split system with R410a refrigerant. The basis for the packaged air conditioning system with gas heat is the Carrier 48HC Series system with R410a refrigerant and gas heat. This ECM includes replacement of the outdoor condensing units only.

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	EXISTING UNITS (S)EER	SPLIT UNITS (S)EER	# OF UNITS	ENERGY SAVINGS kWh	DEMAND SAVINGS kW
Lennox CU-1	60,000	1,200	10 SEER	16 SEER	1	2,700	2.3
York CU-2,3	240,000	1,200	8.7 EER	11 EER	2	13,843	11.5
Total					3	16,543	13.8

Project Cost, Incentives and Maintenance Savings

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

$$\text{SmartStart}^{\circledR} \text{ Incentive} = (\text{CoolingTons} \times \text{\$/Ton Incentive})$$

SPLIT SYSTEM AC UNITS REBATE SUMMARY				
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE \$/TON	PROPOSED CAPACITY TONS	TOTAL REBATE \$
≥20 to 30 tons	10.5 EER	79	20	\$1,580
5.4 tons or less Unitary	≥14 SEER	\$92	5.0	\$460
TOTAL			25	\$2,040

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

COST & SAVINGS SUMMARY							
ECM INPUTS	INSTALLED COST	# OF UNITS	TOTAL COST	REBATES	NET COST	ENERGY SAVING	PAY BACK YEARS
Lennox CU-1	\$10,000	1	\$10,000	\$460	\$9,540	\$483	19.7
York CU-2,3	\$18,200	2	\$36,400	\$3,160	\$33,240	\$2,478	13.4
Total		3	\$46,400	\$3,620	\$42,780	\$2,961	14.4

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

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$46,400
NJ Smart Start Equipment Incentive (\$):	\$3,620
Net Installation Cost (\$):	\$42,780
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$2,961
Total Yearly Savings (\$/Yr):	\$2,961
Estimated ECM Lifetime (Yr):	15
Simple Payback	14.4
Simple Lifetime ROI	3.8%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$44,415
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	(\$7,431.77)

ECM #4: Energy Recovery Unit Retrofit

Description:

The Recreation Center is heated and cooling by two large air handling units. The heating for these units are direct fired modulating burners. As a result the units require increased outside air to continuously ventilate the space and provide combustion air for the natural gas burners. In addition the products of combustion emit CO₂ within the space making these units impractical to implement demand control ventilation controls for the units. To save cost on the significant energy required to condition outside air, an energy recovery unit can provide the ventilation required for the unit and space while capturing the heat otherwise exhausted from the building. An energy recovery unit also provides valuable energy savings in the cooling season by pre-cooling the outside air to the unit's cooling coils with the cool room air otherwise exhausted.

This ECM includes retrofitting the two existing air handling units within the Recreation Center to include outside air pre-conditioning through a total energy recovery wheel. The O.A. energy recovery unit would be connected to the O.A. connection to the existing AHU. The return side of the energy recovery unit would be ducted to draw air from a maximum height of 9-10 Ft above finished floor. The exhaust would be routed to the building exterior, a minimum of 10Ft horizontally from the O.A. intake. The basis for this ECM is the Semco energy recovery wheel Series FV-5000 energy recovery unit with an airflow gauge, electric pre-heat coil, and rotation sensor.

It is recommended to perform airflow measurements of the existing equipment to verify the O.A. quantities prior to implementation of this ECM. It is also recommended to have a professional engineer provide further review of the equipment selection and load analysis prior to implementing this ECM. The energy savings calculations are based on the follow input data:

AHU Nominal Airflow (CFM) =	17,500 ea.
Occupied O.A. percentage =	15%
Unoccupied O.A. percentage =	5%
Occupied Set Point =	68°F
Unoccupied Set Point =	60°F
Energy Recovery Efficiency	70%

Energy Savings Calculations:

Heating Energy Savings:

Total heating capacity is calculated with the equation below.

$$\text{Heating Load, } \frac{\text{BTU}}{\text{Hr}} = 1.08 \times \text{Airflow (CFM)} \times \text{O. A. \%} \times (\text{Indoor } ^\circ\text{F} - \text{Outdoor } ^\circ\text{F})$$

$$\begin{aligned} \text{Occ Ventilation Heating Energy} \\ &= \frac{\text{Occ Heating Load}}{\Delta T \times \text{Eff} \times V} (\text{Occ. HDD}_{68^\circ\text{F}} \times \text{NonSetback Hrs}) \times (1 \\ &\quad - \text{Energy Rec. Eff. \%}) \end{aligned}$$

$$\begin{aligned} \text{Unocc Ventilation Heating Energy} \\ &= \frac{\text{Unocc Heating Load}}{\Delta T \times \text{Eff} \times V} (\text{Unocc. HDD}_{60^\circ\text{F}} \times \text{Setback Hrs}) \times (1 \\ &\quad - \text{Energy Rec. Eff. \%}) \end{aligned}$$

Where:

- HDD = number of Heating Degree Days as Specified Base Temperature
- ΔT = Design temperature difference, ° F
- Eff = Efficiency of Energy Utilization (100%, Electric Heat)
- V = Heating value of fuel, BTU/kWh (3,413 Btu = 1 kWh)

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

Energy savings calculations are summarized in the table below.

ENERGY RECOVERY HEATING ENERGY CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	No O.A. Preconditioning	Total O.A. Energy Recovery Wheel	
Total AHU Airflow (CFM)	35,000	35,000	
Occ. O.A. Percentage (%)	15%	15%	
Unocc. O.A. Percentage (%)	5%	5%	
Occ. Temp Diff (°F)	55	55	
Unocc. Temp Diff (°F)	65	65	
Heating Degree Days (68°F)	5,887	5,887	
Heating Degree Days (60°F)	4,057	4,057	
Hours of setback per day (ave)	15	15	
Heating System Efficiency (%)	100%	100%	
Heating Fuel Value	100,000	100,000	
Energy Recovery Sys Efficiency	0%	70%	
Occ O.A. Heating Load (Btu/Hr)	311,850	93,555	
Unocc O.A. Heating Load (Btu/Hr)	122,850	36,855	
Occ O.A. Heating Energy (Therms)	2,070	621	
Unocc O.A. Heating Energy (Therms)	1,669	501	
Gas Cost (\$/Therm)	\$1.69	\$1.69	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
O.A. Heating Energy (Therms)	3,739	1,122	2,617
Heating Energy Cost (\$)	\$6,319	\$1,896	\$4,424
COMMENTS:	Degree Days based on McQuire AFB,NJ.		

Cooling Energy Savings:

Cooling Energy savings are based on the energy required to condition outside air during occupied hours only. The cooling energy required for minimal outside air at unoccupied hours are negligible and therefore not included in this calculation. Enthalpy difference is based on design cooling day (95°F DB, 78°F WB), and average room conditions (75°F, 50% RH).

$$\text{Cooling Load } \frac{\text{BTU}}{\text{Hr}} = 4.5 \times \text{Airflow (CFM)} \times \text{O. A. \%} \times \text{Enthalpy Diff}$$

Cooling Energy kWh

$$= \text{Cooling Capacity, } \frac{\text{BTU}}{\text{Hr}} \times \left(\frac{1}{\text{EER}} \right) \times \frac{\text{Full Load Hrs}}{1000 \frac{\text{W}}{\text{kWh}}} \times (1 - \text{Energy Rec. Eff. \%})$$

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

ENERGY RECOVERY COOLING ENERGY CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	No O.A. Preconditioning	Total O.A. Energy Recovery Wheel	
Total AHU Airflow (CFM)	35,000	35,000	
Occ. O.A. Percentage (%)	15%	15%	
Occ. Enthalpy Diff (°F)	14	14	
Unocc. Enthalpy Diff (°F)	0	0	
Full Load Cooling Hrs	800	800	
Cooling System Efficiency (EER)	8.7	8.7	
Energy Recovery Sys Efficiency	0%	70%	
O.A. Cooling Load (Btu/Hr)	318,938	95,681	
Elec Cost (\$/kWh)	\$0.158	\$0.158	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
O.A. Cooling Energy (kWh)	29,328	8,798	20,529
Cooling Energy Cost (\$)	\$4,634	\$1,390	\$3,244
COMMENTS:	Degree Days based on McQuire AFB,NJ.		

Cost

Installation cost of two energy recovery units providing O.A. preconditioning for the existing air handling units, ductwork modifications, electrical connections, and misc construction requirements, is estimated to be \$108,000 (\$52,000 Materials)

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$108,000
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$108,000
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$7,668
Total Yearly Savings (\$/Yr):	\$7,668
Estimated ECM Lifetime (Yr):	15
Simple Payback	14.1
Simple Lifetime ROI	6.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$115,020
Internal Rate of Return (IRR)	1%
Net Present Value (NPV)	(\$16,459.91)

V. ADDITIONAL RECOMMENDATIONS

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

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output. This is extremely important for upright fixtures and indirect lighting.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- E. Turn off all lighting in unoccupied spaces when not in use. This is most important in facilities that have variable occupancy profiles.
- F. Ensure outside air dampers and building relief dampers close during unoccupied periods to minimize energy required to condition outside air

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

Gloucester Twp - Recreation Center

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1 + IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1 + DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Lighting Upgrade	\$21,140	\$0	\$670	\$20,470	\$16,031	\$77	\$16,108	15	\$241,620	\$1,155	1080.4%	1.3	78.68%	\$171,826.26
ECM #2	Lighting Controls	\$3,255	\$0	\$185	\$3,070	\$1,555	\$0	\$1,555	15	\$23,325	\$0	659.8%	2.0	50.54%	\$15,493.49
ECM #3	Split System AC Upgrades	\$32,000	\$14,400	\$3,620	\$42,780	\$2,961	\$0	\$2,961	15	\$44,415	\$0	3.8%	14.4	0.47%	(\$7,431.77)
ECM #4	Energy Recovery Unit Retrofit	\$52,000	\$56,000	\$0	\$108,000	\$7,668	\$0	\$7,668	15	\$115,020	\$0	6.5%	14.1	0.80%	(\$16,459.91)

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



Concord Engineering Group, Inc.

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SmartStart Building Incentives

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

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

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

Desiccant Systems

\$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

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



STATEMENT OF ENERGY PERFORMANCE

Gloucester Twp - Recreation Center

Building ID: 2555157
For 12-month Period Ending: June 30, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: January 17, 2011

Facility

Gloucester Twp - Recreation Center
 80 Broadacres Drive
 Gloucester Township, NJ 08012

Facility Owner

Gloucester Township
 1261 chews landing road
 Gloucester Township, NJ 08012

Primary Contact for this Facility

Tom Cardis
 1261 chews landing road
 Gloucester Township, NJ 08012

Year Built: 1992

Gross Floor Area (ft²): 19,855

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	1,027,626
Natural Gas (kBtu) ⁴	776,600
Total Energy (kBtu)	1,804,226

Energy Intensity⁵

Site (kBtu/ft ² /yr)	91
Source (kBtu/ft ² /yr)	214

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	198
---	-----

Electric Distribution Utility

Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	65
National Average Source EUI	136
% Difference from National Average Source EUI	57%
Building Type	Recreation

Stamp of Certifying Professional

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

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

Michael Fischette
 520 South Burnt Mill Road
 Voorhees, NJ 08043

Notes:

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Recreation Center

Rooftop / AC Units

Tag	CU-1	AH-1	CU-2,3
Unit Type	Split System Condenser	Air Handling Unit	Split System Condensing
Qty	1	1	2
Location	Outside on grade	Mechanical Room	Outside on grade
Area Served	Lobby/Office Area	Lobby/Office Area	Ice Rink Area
Manufacturer	Lennox	Lennox Pulse	York
Model #	HS19-653V-3Y	N/A	VDC
Serial #	5192J04373	N/A	N/A
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	5.0 Tons	5.0 Tons	20 Tons
Cooling Efficiency (SEER/EER)	10 SEER	10 SEER	8.7 EER
Heating Type	N/A	Gas Fired	N/A
Heating Input (MBH)	N/A	100 MBH	N/A
Efficiency	N/A	90%	N/A
Fuel	N/A	Nat Gas	N/A
Approx Age	18	18	18
ASHRAE Service Life	15	15	15
Remaining Life	(3)	(3)	(3)
Comments			

Rooftop / AC Units

Tag	AHU-2,3		
Unit Type	Air Handling Unit with Gas Burners		
Qty	2		
Location	Ice Rink Area		
Area Served	Ice Rink Area		
Manufacturer	King Air Systems		
Model #	2136-4E		
Serial #	92V2333A1		
Cooling Type	DX, R-22		
Cooling Capacity (Tons)	20 Tons		
Cooling Efficiency (SEER/EER)	8.7 EER		
Heating Type	Gas Fired Burners		
Heating Input (MBH)			
Efficiency			
Fuel	Nat Gas		
Approx Age	18		
ASHRAE Service Life	15		
Remaining Life	(3)		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Recreation Center

Domestic Water Heaters

Tag	HWH-1		
Unit Type	Gas-Fired Domestic Hot Water Heater		
Qty	1		
Location	Janitor Closet adjacent to Mech Room		
Area Served	Rec Center		
Manufacturer	John Wood		
Model #	JW1040TNC		
Serial #	9208384705		
Size (Gallons)	40 Gallons		
Input Capacity (MBH/KW)	33 MBH		
Recovery (Gal/Hr)	N/A		
Efficiency %	N/A		
Fuel	Nat Gas		
Approx Age	18		
ASHRAE Service Life	12		
Remaining Life	(6)		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Recreation Center

Unit Heaters

Tag			
Unit Type	Gas Fired Unit Heater		
Qty	1		
Location	Storage Area		
Area Served	Storage Area		
Manufacturer	Reznor		
Model #	Series 100, Model B		
Serial #	N/A		
Heating Type	Nat Gas		
Heating Capacity (MBH)	75 MBH		
CFM	1230 CFM		
RPM/HP	1/3 HP		
GPM	N/A		
Approx Age	18		
Ashrae Service Life	20		
Remaining Life	2		
Comments			

Investment Grade Lighting Audit

CEG Job #: 9C10076

Project: Recreation Center

Recreation Center

KWH COST: \$0.158

Bldg. Sq. Ft.

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS				
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
142.21	Hockey Rink	3400	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.62	2,121.6	\$335.21	4	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.34	1169.6	\$184.80	\$100.00	\$400.00	0.28	952	\$150.42	2.66
121.14		3400	12	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.94	3,182.4	\$502.82	12	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.70	2366.4	\$373.89	\$100.00	\$1,200.00	0.24	816	\$128.93	9.31
771		3400	48	2	400w MH & 250 HPS Indirect Lighting	760	36.48	124,032.0	\$19,597.06	48	6	2x4, 6 Lamp, 32w T8, Elect. Ballast, Lo Bay w/Wire Guard	220	10.56	35904	\$5,672.83	\$260.00	\$12,480.00	25.92	88128	\$13,924.22	0.90
601		8760	6	2	(2) 7w CFL Exit Sign	16	0.10	841.0	\$132.87	6	1	LED Exit Sign	2	0.01	105.12	\$16.61	\$65.00	\$390.00	0.08	735.84	\$116.26	3.35
121.14	Games Storage	3400	8	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.62	2,121.6	\$335.21	8	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.46	1577.6	\$249.26	\$100.00	\$800.00	0.16	544	\$85.95	9.31
121.14	Electrical Room	2200	8	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.62	1,372.8	\$216.90	8	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.46	1020.8	\$161.29	\$100.00	\$800.00	0.16	352	\$55.62	14.38
132.21	Lobby	3400	6	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.76	2,590.8	\$409.35	6	2	2 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	58	0.35	1183.2	\$186.95	\$100.00	\$600.00	0.41	1407.6	\$222.40	2.70
601		8760	2	2	(2) 7w CFL Exit Sign	16	0.03	280.3	\$44.29	2	1	LED Exit Sign	2	0.00	35.04	\$5.54	\$65.00	\$130.00	0.03	245.28	\$38.75	3.35
142.21	Vestibule	3400		4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.00	0.0	\$0.00	0	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.00	0	\$0.00	\$100.00	\$0.00	0.00	0	\$0.00	0.00
601		8760	2	2	(2) 7w CFL Exit Sign	16	0.03	280.3	\$44.29	2	1	LED Exit Sign	2	0.00	35.04	\$5.54	\$65.00	\$130.00	0.03	245.28	\$38.75	3.35
132.21	Business Office/ Reception Area	3400	4	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.51	1,727.2	\$272.90	4	2	2 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	58	0.23	788.8	\$124.63	\$100.00	\$400.00	0.28	938.4	\$148.27	2.70
142.21	Break Room	3400	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.31	1,060.8	\$167.61	2	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.17	584.8	\$92.40	\$100.00	\$200.00	0.14	476	\$75.21	2.66
132.21	Business Office	3400	4	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.51	1,727.2	\$272.90	4	2	2 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	58	0.23	788.8	\$124.63	\$100.00	\$400.00	0.28	938.4	\$148.27	2.70
550		3400	1	1	Recessed Down Light, 50w MH Lamp	70	0.07	238.0	\$37.60	1	1	Bypass ballast. Install socket adapter and 26w CFL Flood Lamp	26	0.03	88.4	\$13.97	\$30.00	\$30.00	0.04	149.6	\$23.64	1.27
142.21	Ticket Office	3400	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	530.4	\$83.80	1	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.09	292.4	\$46.20	\$100.00	\$100.00	0.07	238	\$37.60	2.66
122.21	Men's Rest Room	3400	3	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.23	795.6	\$125.70	3	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.15	510	\$80.58	\$100.00	\$300.00	0.08	285.6	\$45.12	6.65
121.21		3400	6	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.47	1,591.2	\$251.41	6	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.35	1183.2	\$186.95	\$100.00	\$600.00	0.12	408	\$64.46	9.31
122.21	Women's Rest Room	3400	3	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.23	795.6	\$125.70	3	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.15	510	\$80.58	\$100.00	\$300.00	0.08	285.6	\$45.12	6.65
121.21		3400	6	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.47	1,591.2	\$251.41	6	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.35	1183.2	\$186.95	\$100.00	\$600.00	0.12	408	\$64.46	9.31
750		4400	7	1	250w HPS Wallpack	295	2.07	9,086.0	\$1,435.59	7	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00

Investment Grade Lighting Audit

767	Exterior	4400	8	1	400w Probe Start MH "Shoebox" Parking Lot Light	460	3.68	16,192.0	\$2,558.34	8	1	Venture Lighting Optiwave Ballast V90U7421K and 320w MH Lamp	349	2.79	12284.8	\$1,941.00	\$160.00	\$1,280.00	0.89	3907.2	\$617.34	2.07
	Totals		141	50			48.91	172,158	\$27,201	141	43			17.4	61,611	\$9,735		\$21,140	29.4	101,461	\$16,031	1.32

CEG Job #: 9C10076
Project: Recreation Center
Address: 0
0
Building SF: -

Recreation Center

KWH COST: \$0.158

ECM #2: Lighting Controls

EXISTING LIGHTING						PROPOSED LIGHTING CONTROLS											SAVINGS						
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kWh Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
142.21	Hockey Rink	3400	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.624	2121.6	\$335.21	4	0	No Change	156	0.62	0%	2121.6	\$335.21	\$0.00	\$0.00	0.00	0	\$0.00	0.00
121.14		3400	12	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.936	3182.4	\$502.82	12	0	No Change	78	0.94	0%	3182.4	\$502.82	\$0.00	\$0.00	0.00	0	\$0.00	0.00
771		3400	48	6	2x4, 6 Lamp, 32w T8, Elect. Ballast, Lo Bay w/Wire Guard	220	36.48	124032	\$5,672.83	48	0	Packaged Occupancy Sensor Option w/ New Fixture in ECM #1	220	8.45	20%	28723.2	\$4,538.27	\$50.00	\$2,400.00	28.03	95308.8	\$1,134.57	2.12
601		8760	6	2	(2) 7w CFL Exit Sign	16	0.096	840.96	\$132.87	6	0	No Change	16	0.10	0%	840.96	\$132.87	\$0.00	\$0.00	0.00	0	\$0.00	0.00
121.14	Games Storage	3400	8	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.624	2121.6	\$335.21	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.50	20%	1697.28	\$268.17	\$75.00	\$75.00	0.12	424.32	\$67.04	1.12
121.14	Electrical Room	2200	8	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.624	1372.8	\$216.90	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.50	20%	1098.24	\$173.52	\$75.00	\$75.00	0.12	274.56	\$43.38	1.73
132.21	Lobby	3400	6	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.762	2590.8	\$409.35	6	0	No Change	127	0.76	0%	2590.8	\$409.35	\$0.00	\$0.00	0.00	0	\$0.00	0.00
601		8760	2	2	(2) 7w CFL Exit Sign	16	0.032	280.32	\$44.29	2	0	No Change	16	0.03	0%	280.32	\$44.29	\$75.00	\$0.00	0.00	0	\$0.00	0.00
142.21	Vestibule	3400	0	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0	0	\$0.00	0	0	No Change	156	0.00	0%	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
601		8760	2	2	(2) 7w CFL Exit Sign	16	0.032	280.32	\$44.29	2	0	No Change	16	0.03	0%	280.32	\$44.29	\$0.00	\$0.00	0.00	0	\$0.00	0.00
132.21	Business Office/ Reception Area	3400	4	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.508	1727.2	\$272.90	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	127	0.41	20%	1381.76	\$218.32	\$75.00	\$75.00	0.10	345.44	\$54.58	1.37
142.21	Break Room	3400	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.312	1060.8	\$167.61	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	156	0.25	20%	848.64	\$134.09	\$75.00	\$75.00	0.06	212.16	\$33.52	2.24
132.21	Business Office	3400	4	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	127	0.508	1727.2	\$272.90	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	127	0.41	20%	1381.76	\$218.32	\$75.00	\$75.00	0.10	345.44	\$54.58	1.37
550		3400	1	1	Recessed Down Light, 50w MH Lamp	70	0.07	238	\$37.60	1	0	No Change	70	0.07	0%	238	\$37.60	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.21	Ticket Office	3400	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.156	530.4	\$83.80	1	1	Dual Technology Occupancy Sensor - Remote Mnt.	156	0.12	20%	424.32	\$67.04	\$160.00	\$160.00	0.03	106.08	\$16.76	9.55
122.21	Men's Rest Room	3400	3	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.234	795.6	\$125.70	3	1	Dual Technology Occupancy Sensor - Remote Mnt.	78	0.19	20%	636.48	\$100.56	\$160.00	\$160.00	0.05	159.12	\$25.14	2.12
121.21		3400	6	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.468	1591.2	\$251.41	6			78	0.37	20%	1272.96	\$201.13		\$0.00	0.09	318.24	\$50.28	
122.21	Women's Rest Room	3400	3	2	2x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.234	795.6	\$125.70	3	1	Dual Technology Occupancy Sensor - Remote Mnt.	78	0.19	20%	636.48	\$100.56	\$160.00	\$160.00	0.05	159.12	\$25.14	2.12
121.21		3400	6	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.468	1591.2	\$251.41	6			78	0.37	20%	1272.96	\$201.13		\$0.00	0.09	318.24	\$50.28	
750	Exterior	4400	7	1	250w HPS Wallpack	295	2.065	9086	\$1,435.59	7	0	No Change	295	2.07	0%	9086	\$1,435.59	\$0.00	\$0.00	0.00	0	\$0.00	0.00
767		4400	8	1	400w Probe Start MH "Shoebbox" Parking Lot Light	460	3.68	16192	\$2,558.34	8	0	No Change	460	3.68	0%	16192	\$2,558.34	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals			141	50			48.9	172,158.0	\$13,277	141	8			20.1		74,186.5	\$11,721.46		\$3,255	28.86	97,972	\$1,555	2.09

**TOWNSHIP OF GLOUCESTER
SENIOR COMMUNITY CENTER**

**1261 CHEWS LANDING ROAD
GLOUCESTER TOWNSHIP, NJ 08012**

FACILITY ENERGY REPORT

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Appendix A – ECM Cost & Savings Breakdown

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Appendix C – Portfolio Manager “Statement of Energy Performance”

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Appendix F – Renewable / Distributed Energy Measures Calculations

I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider:	Public Service Electric & Gas
Electric Utility Rate Structure:	General Lighting & Power (GLP)
Third Party Supplier:	None

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

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

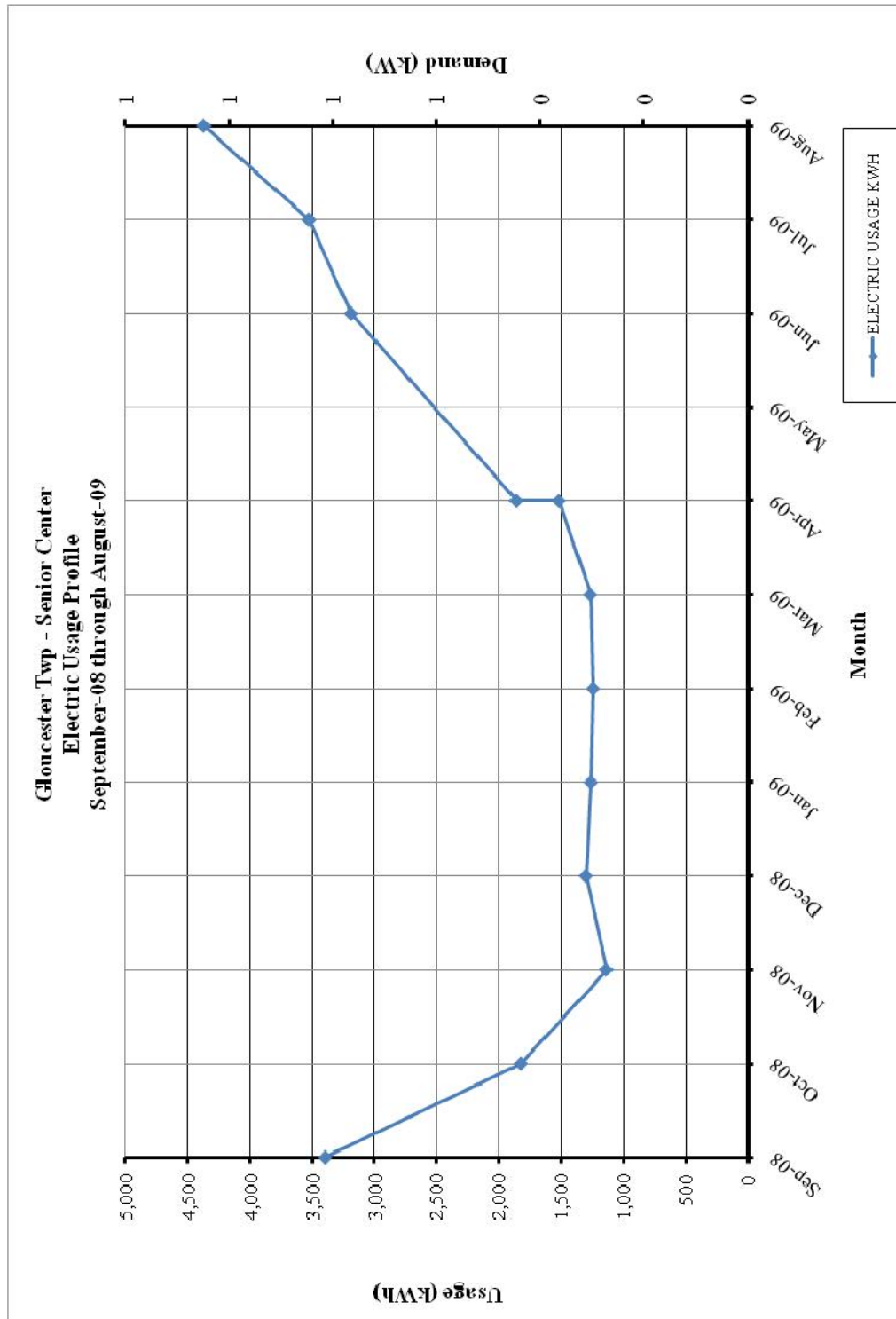
The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

**Table 1
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: PSE&G			
Rate: GLP			
Meter No: 626007783			
Customer ID No: 6663742108 (Account #)			
Third Party Utility Provider:			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
24-Sep-08	3,396	0.0	\$824
23-Oct-08	1,824	0.0	\$402
21-Nov-08	1,134	0.0	\$283
21-Dec-08	1,302	0.0	\$287
19-Jan-09	1,260	0.0	\$285
14-Feb-09	1,242	0.0	\$289
15-Mar-09	1,266	0.0	\$294
18-Apr-09	1,518	0.0	\$335
30-Apr-09	1,860	0.0	\$397
22-Jun-09	3,192	0.0	\$772
23-Jul-09	3,528	0.0	\$857
21-Aug-09	4,374	0.0	\$960
Totals	25,896	0.0 Max	\$5,985
AVERAGE DEMAND		0.0 KW average	
AVERAGE RATE		\$0.231 \$/kWh	

Demand data was not available for this facility.

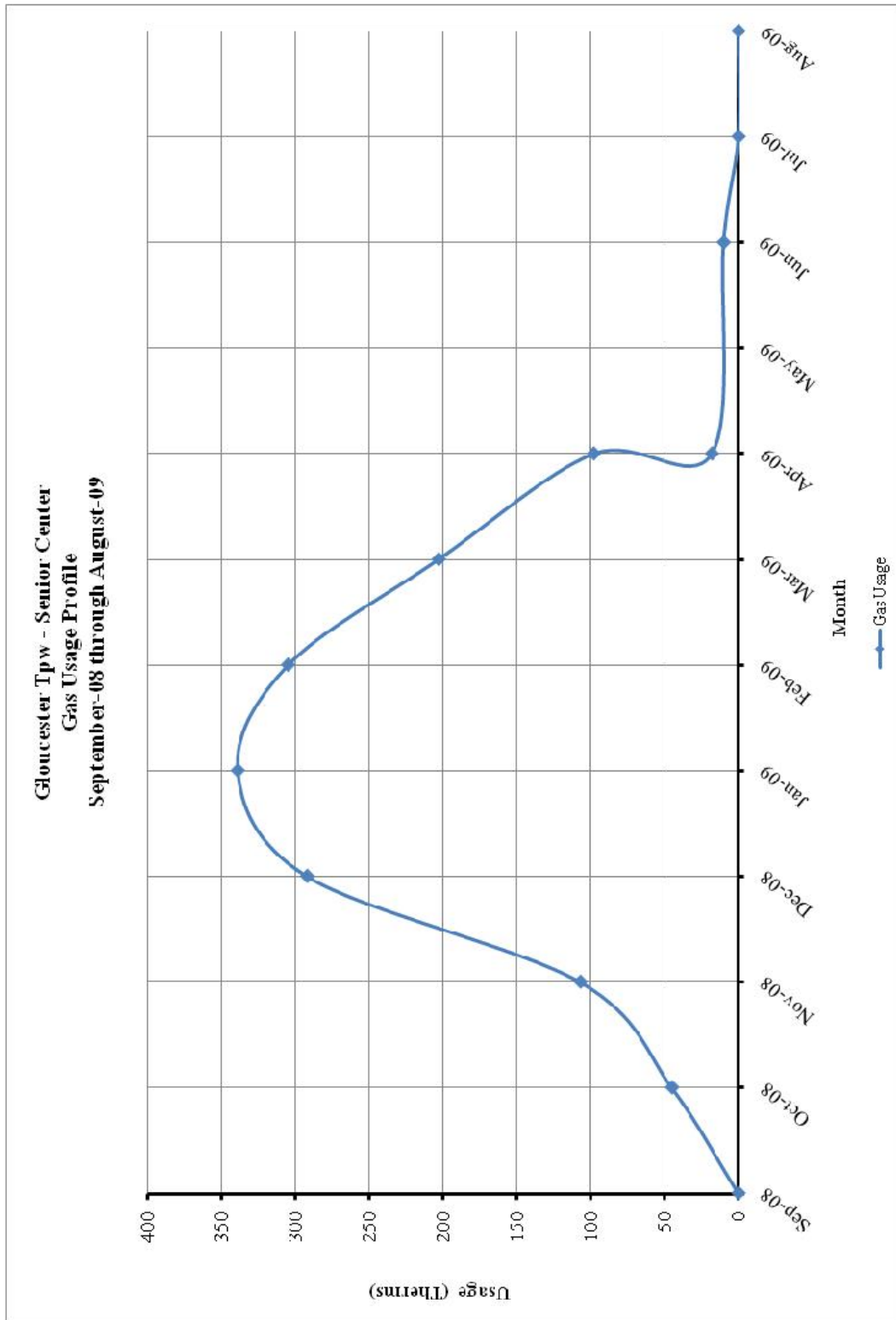
**Figure 1
Electricity Usage Profile**



**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas		
Rate: GSG		
Meter No:		
Point of Delivery ID:		
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
24-Sep-08	0.00	\$19.97
23-Oct-08	45.00	\$82.77
21-Nov-08	107.00	\$168.20
21-Dec-08	292.00	\$476.42
19-Jan-09	339.00	\$545.48
14-Feb-09	305.00	\$490.72
15-Mar-09	203.00	\$330.63
18-Apr-09	98.00	\$169.45
30-Apr-09	18.00	\$45.98
22-Jun-09	10.00	\$36.75
23-Jul-09	0.00	\$19.97
21-Aug-09	0.00	\$18.10
TOTALS	1,417.00	\$2,404.44
AVERAGE RATE:	\$1.70	\$/THERM

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Gloucester Township Senior Community Center is located on 1261 Chews Landing Road in Gloucester Township, New Jersey. The 4,000 SF Senior Community Center was built in 1990 with no renovations. The building is a single story facility comprised of a kitchen, lobby and community room.

Occupancy Profile

The typical hours of operation for the Senior Community Center vary according to community activities which are planned. The building is typically used every other day on average for approximately 8 hours per day. The Senior Community Center's occupancy can vary during the day. The Senior Center employs 2 people.

Building Envelope

Exterior walls for the Senior Community Center are brick faced with a concrete block construction. The amount of insulation within the walls is unknown. The windows throughout the Senior Community Center are in good condition and appear to be maintained. Typical windows throughout the Senior Community Center are single pane, 1/4" clear glass with wood frames and single pane storm windows on the exterior. Blinds are utilized in the community room of the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is a sloped, shingled roof which has bathroom and kitchen exhausters penetrating its surface. The amount of insulation below the roofing is unknown, however estimated to be standard batt insulation within the joist spaces approximately R-19 to R-30 insulation value.

HVAC Systems

The Senior Community Center is conditioned by two (2) Carrier gas furnaces and one (1) Carrier air conditioning only unit. The two Carrier indoor gas furnaces have a 132 MBH input for heating and also have A-coils installed which are connected to two (2) five ton condensing units located on the perimeter of the building. There is also a single cooling only Carrier air handling unit, connected to a 5 ton condensing unit on the perimeter. This unit serves also serves the community center as the second stage of cooling.

Exhaust System

Air is exhausted from the toilet rooms and kitchen through the roof exhausters. The toilet room exhaust fan is controlled by a manual wall switch. The kitchen exhausters are manually controlled and only used when the kitchen is used.

HVAC System Controls

The HVAC systems within the Senior Community Center are controlled through a non-programmable thermostat. One thermostat is used to control the two primary heating and cooling split systems. The same thermostat utilizes its second stage of cooling to control the cooling only split system. Currently, the Senior Community Center is not one of the buildings controlled via

the building management system in the Department of Public Works office. The facility has a varied schedule and thermostats are controlled manually. The set points are usually held at the 72°F for cooling and 72°F for heating continuously.

Domestic Hot Water

Domestic hot water for the restrooms and kitchen is provided by a 50 gallon State gas-fired hot water heater, capacity of 65 MBH.

Lighting

Refer to the Investment Grade lighting Audit Appendix for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. MAJOR EQUIPMENT LIST

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

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

IV. ENERGY CONSERVATION MEASURES

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

**Table 1
ECM Financial Summary**

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	Lighting Upgrade	\$860	\$221	3.9	285.5%
ECM #2	Lighting Controls	\$245	\$338	0.7	1969.4%
ECM #3	Split AC Unit Upgrades	\$28,620	\$1,164	24.6	-39.0%
ECM #4	Programmable Thermostat	\$300	\$1,579	0.2	7795.0%
ECM #5	Condensing Furnace Upgrade	\$4,400	\$372	11.8	26.8%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	18.4 kW Photovoltaic System	\$165,600	\$13,060	12.7	97.2%
Notes:	A. Cost takes into consideration applicable NJ Smart Start™ incentives.				
	B. Savings takes into consideration applicable maintenance savings.				

**Table 2
ECM Energy Summary**

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade	0.4	958	0
ECM #2	Lighting Controls	0.6	1,464	0
ECM #3	Split AC Unit Upgrades	14.5	5,063	0
ECM #4	Programmable Thermostat	0.0	3,400	467
ECM #5	Condensing Furnace Upgrade	0.0	0	219
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	18.4 kW Photovoltaic System	18.4	22,478	0

**Table 3
Facility Project Summary**

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Lighting Upgrade	\$221	\$860	\$0	\$860	3.9
Lighting Controls	\$338	\$300	\$55	\$245	0.7
Split AC Unit Upgrades	\$1,164	\$30,000	\$1,380	\$28,620	24.6
Programmable Thermostat	\$1,579	\$300	\$0	\$300	0.2
Condensing Furnace Upgrade	\$372	\$5,000	\$600	\$4,400	11.8
<i>Design / Construction Extras (15%)</i>		<i>\$5,469</i>		<i>\$5,469</i>	
Total Project	\$3,674	\$41,929	\$1,980	\$39,894	10.9

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade

Description:

The majority of the lighting at the Senior Center is 32 watt T-8 bulbs with electronic ballasts. The existing T-8 lamps are 700 series which are efficient; however there have been improvements in lamp technology. All exit signs throughout the building are currently high efficiency LED exit signs.

This ECM includes switching out all existing 32 watt T-8 lamps with “SuperSaver” 28 watt T-8 lamps. The new lamp technology provides equivalent lighting with reduced input wattage, while utilizing the existing electronic ballast. Several electronic ballasts were checked for compatibility with 28 watt lamps to verify the applicability of this ECM.

This ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

Energy Savings Calculations:

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

No incentives are available for this ECM.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$860
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$860
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$221
Total Yearly Savings (\$/Yr):	\$221
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.9
Simple Lifetime ROI	285.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$3,315
Internal Rate of Return (IRR)	25%
Net Present Value (NPV)	\$1,778.28

ECM #2: Lighting Controls

Description:

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

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy sensors.

This ECM includes replacement of standard wall switches with sensors wall switches for the office, lunch room, and bathrooms. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) as well as other details are shown in the **Investment Grade Lighting Audit Appendix**.

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

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

$$\begin{aligned} \text{Smart Start® Incentive} &= (\# \text{ of wall mount} \times \$ 20) + (\# \text{ of ceiling mount} \times 35) \\ &= (1 \times \$20) + (1 \times \$35) = \$55 \end{aligned}$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$300
NJ Smart Start Equipment Incentive (\$):	\$55
Net Installation Cost (\$):	\$245
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$338
Total Yearly Savings (\$/Yr):	\$338
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.7
Simple Lifetime ROI	1969.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$5,070
Internal Rate of Return (IRR)	138%
Net Present Value (NPV)	\$3,790.02

ECM #3: Air Conditioning Unit Upgrades

Description:

The Senior Center is air conditioned by two (2) split system furnace units and one (1) split system AC only unit. In this case these units are older and in need of replacement. In cooling, the 5 ton units have a seasonal energy efficiency rating (SEER) of 7. The units currently installed are past their ASHRAE service life and can be replaced with new units with much higher efficiency. New air conditioners provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and refrigerants.

This ECM includes one-to-one replacement of the older air conditioning units with new higher efficiency systems. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of this ECM can be found in the table below:

IMPLEMENTATION SUMMARY					
ECM INPUTS	SERVICE FOR	NUMBER OF UNITS	COOLING CAPACITY, BTU/HR	TOTAL CAPACITY, TONS	REPLACE UNIT WITH
Carrier	Main Area	3	60,000	15.0	5 Ton Trane - XL20i
Total		3	60,000	15.0	

The basis for the split system air conditioner is the Trane XL20i Series split system with R410a refrigerant. In addition to the replacement of the condensing units, there are two (2) A-coils within the ducts which also need to be replaced, as well as the cooling coil for the indoor cooling only unit. This ECM includes replacement of the outdoor condensing units only.

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	EXISTING UNITS SEER	SPLIT UNITS SEER	# OF UNITS	ENERGY SAVINGS kWh	DEMAND SAVINGS kW
Carrier	60,000	350	7	16	3	5,063	14.5
Total					3	5,063	14.5

Due to the infrequent use of this facility, the annual cooling hours have been reduced to better match the utility bills that were provided.

Project Cost, Incentives and Maintenance Savings

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

$$\text{SmartStart}^{\text{®}} \text{ Incentive} = (\text{CoolingTons} \times \text{\$/TonIncentive})$$

SPLIT SYSTEM AC UNITS REBATE SUMMARY				
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE \$/TON	PROPOSED CAPACITY TONS	TOTAL REBATE \$
5.4 tons or less Unitary AC and Split System	≥14 SEER	\$92	15.0	\$1,380
TOTAL			15	\$1,380

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

COST & SAVINGS SUMMARY							
ECM INPUTS	INSTALLED COST	# OF UNITS	TOTAL COST	REBATES	NET COST	ENERGY SAVING	PAY BACK YEARS
Carrier	\$10,000	3	\$30,000	\$1,380	\$28,620	\$1,164	24.6
Total		3	\$30,000	\$1,380	\$28,620	\$1,164	24.6

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

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$30,000
NJ Smart Start Equipment Incentive (\$):	\$1,380
Net Installation Cost (\$):	\$28,620
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,164
Total Yearly Savings (\$/Yr):	\$1,164
Estimated ECM Lifetime (Yr):	15
Simple Payback	24.6
Simple Lifetime ROI	-39.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$17,460
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	(\$14,724.24)

ECM #4: Programmable Thermostats

Description:

The Senior Center utilizes two AC split systems with gas fired furnaces for heat. The thermostats controlling the units are non programmable thermostats. The occupancy of the facility varies considerably based on the scheduled events. Typical occupancy for the Senior Center is every other day for approximately 8 hrs per day. On the weekends, the facility is typically not occupied.

Due to the continuously changing occupancy schedules, the existing thermostats are rarely set back because this requires changing the setting manually. New programmable thermostats have the capability to set back automatically based on pre-set schedules. When the temperature is changed by the occupants, the thermostat will hold the new setting only until the next scheduled setting. This provides a significant benefit for facilities occupied by multiple people at different times since the thermostat will always revert back to the original settings after the thermostat has been changed by the occupants. New programmable thermostats also have the ability to track seasons and adjust for morning warm up to ensure the space temperatures are met by the scheduled time period. This feature provides significantly improved occupant comfort and helps to prevent complaints.

This ECM includes installation of programmable thermostats to control the two AC split systems / furnaces as well as the third AC unit for supplemental (second stage) cooling. The basis for this ECM is a Honeywell Vision Pro Series thermostat or equivalent. The recommended thermostat set points for heating and cooling in the offices are as follows:

Occupied Heating =	70° F
Unoccupied Heating =	60° F
Occupied Cooling =	72° F
Unoccupied Cooling =	82° F

Energy Savings Calculations:

Energy savings calculations are based on percent savings through heating degree days for standard base temperatures and set-back temperatures. The reduced heating degree days represents a lower heating load for the portion of hours that the thermostat is in night set-back. Based on information provided by the operations personnel, the existing thermostat is non programmable and set-back of the space temperatures is manual which is rarely implemented. The estimated savings is based on the set back temperatures shown above for the entire facility.

Cooling energy savings is based on the capacity of the cooling equipment installed and the percent savings through the cooling degree days for standard base temperatures and set back temperatures. Since the night time cooling hours are typically at or below the occupied cooling set point, the cooling set back savings is based only on the unoccupied daytime hours. The

Senior Center represents considerable potential for day time set back capability. Savings are estimated based on unoccupied setting to be applied every other day (50% of the cooling season).

It is important to note that the savings are based on all unoccupied hours having the thermostat set to the “Unoccupied” heating and cooling set points. In order to achieve this savings through the use of a local programmable thermostat, the settings should be set to hold the unoccupied settings for both day and night hours. The occupants would override the setting temporarily when the facility is in use, and the programmable thermostat will automatically re-set to the unoccupied setting at the next scheduled time interval. This allows for maximum savings as shown below however the occupants will have to adjust the temperature when events are held at the Senior Center.

If Gloucester townships

Heating Energy Savings:

Baseline Hot Water Gas Use: 2.5 Therms (Average June through Sept)

Existing Heating Natural Gas: 2,783 Therms – (2.5 Therms X 12 Months)
1,387 Therms

$$\text{Set Back Heating Energy} = \text{Existing Gas (Therms)} \times \frac{\text{HDD}_{55^{\circ}\text{F}}}{\text{HDD}_{65^{\circ}\text{F}}} \times \frac{\text{Set Back Hrs Per Week}}{168 \text{ Hrs per Week}}$$

$$\text{Non Set Back Heating Energy} = \text{Existing Gas (Therms)} \times \frac{\text{Non Set Back Hrs Per Week}}{168 \text{ Hrs per Week}}$$

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

Energy savings calculations are summarized in the table below.

PROGRAMMABLE THERMOSTAT HEATING ENERGY CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Standard on-board thermostat controls	Programmable Thermostats (10°F Setback)	
Total Heating Energy (Therms)	1,387	1,387	
Heating Degree Days (65°F / 55°F)	5,154	3,072	2,082
Hours of setback per week	0	140	
Heating Fuel Value	100,000	100,000	
Gas Cost (\$/Therm)	\$1.70	\$1.70	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Heating Energy, Therms (non setback)	1,387	920	
Heating Energy Cost (\$)	\$2,358	\$1,564	\$794
COMMENTS:	Degree Days based on McQuire AFB,NJ.		

Cooling Energy Savings:

$$\text{Cooling Energy kWh} = \text{Cooling Capacity, } \frac{\text{BTU}}{\text{Hr}} \times \left(\frac{1}{\text{EER}} \right) \times \frac{\text{Full Load Hrs}}{1000} \frac{\text{W}}{\text{kWh}}$$

$$\text{Set Back Cooling Energy} = \text{Cooling Energy (kWh)} \times \frac{\text{HDD}_{82^{\circ}\text{F}}}{\text{HDD}_{72^{\circ}\text{F}}} \times \frac{\text{Set Back Hrs Per Week}}{168 \text{ Hrs per Week}}$$

$$\text{Non Set Back Cooling Energy} = \text{Cooling Energy (kWh)} \times \frac{\text{Non Set Back Hrs Per Week}}{168 \text{ Hrs per Week}}$$

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

PROGRAMMABLE THERMOSTAT COOLING ENERGY CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Standard on-board thermostat controls	Programmable Thermostats (10°F Setback)	
Cooling Capacity (Tons)	15	15	
Cooling Efficiency (EER)	7.0	7.0	
Full Load Cooling Hrs	350	350	
Cooling Energy, kWh (Non Set Back)	9,000	9,000	
Cooling Degree Days (82°F / 72°F)	761	186	575
Hours of setback per week	0	84	
Electric Cost (\$/kWh)	\$0.231	\$0.231	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Cooling Energy kWh	9,000	5,600	
Electric Energy Cost (\$)	\$2,079	\$1,294	\$785
COMMENTS:	Degree Days based on McQuire AFB,NJ.		

Cost

Installed cost of programmable thermostats is \$300/Unit. This ECM requires the installation of one programmable thermostat to control the 3 existing AC systems.

Total cost of implementation of this ECM is \$300.

Note: Gloucester Township is planning to include the library with the central control system at the DPW building. With the installation of central controls that include night setback as indicated above and if the control system operator manually sets the facility into occupied mode only for occupied periods, then the savings shown in this ECM would be realized.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$300
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$300
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,579
Total Yearly Savings (\$/Yr):	\$1,579
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.2
Simple Lifetime ROI	7795.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$23,685
Internal Rate of Return (IRR)	526%
Net Present Value (NPV)	\$18,550.00

ECM #5: Condensing Furnace Installation

Description:

The central heating system consists of two Carrier gas-fired furnaces that serve the entire building. The existing furnaces were installed in 1990 (approximately). The furnaces are past the typical ASHRAE service life of 20 years.

New condensing furnaces could substantially improve the operating efficiency of the heating system of the building. The typical operating efficiency of the condensing furnace is approximately 95%. The existing furnace's efficiency is approximately 80%, which makes the condensing furnace a 15% increase in overall efficiency for the heating system at the Senior Center.

This ECM includes installation of two condensing gas fired furnaces to replace the existing furnaces located in the original mechanical room. The basis for this ECM is Carrier, 58UVB Performance 96 series gas fired condensing furnace or equivalent. The furnace installation is based on a one for one replacement based on capacity of the existing furnace.

Energy Savings Calculations:

Baseline HW Gas Use: 2.5 Therms (Ave June through Sept)

Existing Heating Natural Gas: 1,417 Therms – (2.5 Therms X 12 Months)
1,387 Therms

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

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

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

CONDENSING FURNACE CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Gas Fired Furnace	New Condensing Furnace	
Existing Nat Gas (Therms)	1,387		
Furnace Efficiency (%)	80%	95%	15%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	111	111	
Gas Cost (\$/Therm)	1.70	1.70	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Natural Gas Usage (Therms)	1,387	1,168	219
Energy Cost (\$)	\$2,358	\$1,986	\$372
COMMENTS:			

Installation cost of the one new Carrier 120 MBH condensing furnace, demolition, flue piping, gas piping modifications, electric, etc. is estimated to be \$2,500.

From the **NJ Smart Start Appendix**, the installation of new furnace warrants the following incentive: \$300 per Furnace.

Smart Start® *Incentive* = \$300 X 2 = \$600

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$5,000
NJ Smart Start Equipment Incentive (\$):	\$600
Net Installation Cost (\$):	\$4,400
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$372
Total Yearly Savings (\$/Yr):	\$372
Estimated ECM Lifetime (Yr):	15
Simple Payback	11.8
Simple Lifetime ROI	26.8%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$5,580
Internal Rate of Return (IRR)	3%
Net Present Value (NPV)	\$40.91

V. ADDITIONAL RECOMMENDATIONS

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

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- E. Initiate a temperature set-back program to motivate the facility users to set back the thermostats when the space is unoccupied (only necessary if programmable thermostat ECM is not implemented)

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

Gloucester Township - Senior Community Center

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1 + IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1 + DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Lighting Upgrade	\$860	\$0	\$0	\$860	\$221	\$0	\$221	15	\$3,315	\$0	285.5%	3.9	24.77%	\$1,778.28
ECM #2	Lighting Controls	\$300	\$0	\$55	\$245	\$338	\$0	\$338	15	\$5,070	\$0	1969.4%	0.7	137.96%	\$3,790.02
ECM #3	Split AC Unit Upgrades	\$21,000	\$9,000	\$1,380	\$28,620	\$1,164	\$0	\$1,164	15	\$17,460	\$0	-39.0%	24.6	-5.62%	(\$14,724.24)
ECM #4	Programmable Thermostat	\$150	\$150	\$0	\$300	\$1,579	\$0	\$1,579	15	\$23,685	\$0	7795.0%	0.2	526.33%	\$18,550.00
ECM #5	Condensing Furnace Upgrade	\$3,000	\$2,000	\$600	\$4,400	\$372	\$0	\$372	15	\$5,580	\$0	26.8%	11.8	3.13%	\$40.91
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	18.4 kW Photovoltaic System	\$165,600	\$0	\$0	\$165,600	\$5,192	\$7,867	\$13,060	25	\$326,493	\$196,683	97.2%	12.7	6.09%	\$61,810.80

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



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SmartStart Building Incentives

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

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

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

Desiccant Systems

\$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture
HID \geq 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID \geq 100w Replacement with new HID \geq 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

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



STATEMENT OF ENERGY PERFORMANCE

Gloucester Twp - Senior Center

Building ID: 2555171
For 12-month Period Ending: August 31, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: January 17, 2011

Facility

Gloucester Twp - Senior Center
 1261 Chews Landing Road
 Blackwood, NJ 08012

Facility Owner

Gloucester Township
 1261 chews landing road
 Gloucester Township, NJ 08012

Primary Contact for this Facility

Tom Cardis
 1261 chews landing road
 Gloucester Township, NJ 08012

Year Built: 1990

Gross Floor Area (ft²): 4,000

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	88,357
Natural Gas (kBtu) ⁴	141,700
Total Energy (kBtu)	230,057

Energy Intensity⁵

Site (kBtu/ft ² /yr)	58
Source (kBtu/ft ² /yr)	111

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	21
---	----

Electric Distribution Utility

Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	52
National Average Source EUI	102
% Difference from National Average Source EUI	9%
Building Type	Social/Meeting

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

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

Michael Fischette
 520 South Burnt Mill Road
 Voorhees, NJ 08043

Notes:

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Senior Community Center

HVAC Units

Tag	AHU	AHU	
Unit Type	Split Air Handling Unit with Gas Furnace	Split Air Handling Unit	
Qty	2	1	
Location	MER	MER	
Area Served	Interior spaces	Interior spaces	
Manufacturer	Carrier	Carrier	
Indoor Unit Model & Serial	58SSC110-LC 4589A12333	40QB060300 0889H00417	
Outdoor Unit Model & Serial	38ED060306 -	38ED060306 -	
Cooling Type	Remote Condensing Unit	Remote Condensing Unit	
Cooling Capacity (Tons)	5 Tons	5 Tons	
Cooling Efficiency (SEER/EER)	7 SEER (Estimated)	7 SEER (Estimated)	
Heating Type	Induced Draft Furnace	None	
Heating Input (MBH)	132	N/A	
Efficiency	80%	N/A	
Fuel	Natural Gas	N/A	
Approx Age	21	21	
ASHRAE Service Life	15	15	
Remaining Life	(6)	(6)	
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Senior Community Center

Domestic Water Heaters

Tag	Unit 1		
Unit Type	Gas fired domestic water heater		
Qty	1		
Location	MER		
Area Served	Faucets		
Manufacturer	State Industries		
Model #	SBT 50 65 NE8 F		
Serial #	J89663373		
Size (Gallons)	50		
Input Capacity (MBH/KW)	65 MBH		
Recovery (Gal/Hr)	55.2		
Efficiency %	~80		
Fuel	Natural Gas		
Approx Age	N/A		
ASHRAE Service Life	12		
Remaining Life	N/A		
Comments			

Investment Grade Lighting Audit

CEG Job #: 9C10076

Project: Senior Center

Senior Center

KWH COST: \$0.231

Bldg. Sq. Ft.

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS				
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
242.21	Assembly Room	2600	24	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	2.57	6,676.8	\$1,542.34	24	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	2.35	6115.2	\$1,412.61	\$28.00	\$672.00	0.22	561.6	\$129.73	5.18
222.21	Kitchen	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	644.8	\$148.95	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$120.12	\$14.00	\$56.00	0.05	124.8	\$28.83	1.94
617		1200	1	1	Hood Light w/Globe & Cage, 100w A19 Lamp	100	0.10	120.0	\$27.72	1	1	(1) 26w CFL Lamp	26	0.03	31.2	\$7.21	\$20.00	\$20.00	0.07	88.8	\$20.51	0.98
221.44	Utility Room	1200	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Wall Mnt., No Lens	62	0.12	148.8	\$34.37	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	\$27.72	\$14.00	\$28.00	0.02	28.8	\$6.65	4.21
221.21	Men's Rest Room	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	322.4	\$74.47	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	\$60.06	\$14.00	\$28.00	0.02	62.4	\$14.41	1.94
221.14	Custodial Closet	1200	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.06	74.4	\$17.19	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	60	\$13.86	\$14.00	\$14.00	0.01	14.4	\$3.33	4.21
221.21	Women's Rest Room	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	322.4	\$74.47	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	\$60.06	\$14.00	\$28.00	0.02	62.4	\$14.41	1.94
221.14	Closet	1200	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.06	74.4	\$17.19	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	60	\$13.86	\$14.00	\$14.00	0.01	14.4	\$3.33	4.21
725	Exterior	4400	7	1	150w HPS Wallpack	188	1.32	5,790.4	\$1,337.58	7	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
711		4400	5	1	70w HPS Bollards	92	0.46	2,024.0	\$467.54	5	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals			49	19			5.19	16,198	\$3,742	49	17			3.0	7,426	\$1,715		\$860	0.4	958	\$221	3.89

Investment Grade Lighting Audit

CEG Job #: 9C10076
 Project: Senior Center
 Address: 0
 0
 Building SF: -

Senior Center

KWH COST: \$0.231

ECM #2: Lighting Controls

EXISTING LIGHTING					PROPOSED LIGHTING CONTROLS										SAVINGS								
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
242.21	Assembly Room	2600	24	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	2.568	6676.8	\$1,542.34	24	1	Dual Tech. Occupancy Sensor w/2 Pole Powerpack - remote mount	107	2.05	20%	5341.44	\$1,233.87	\$225.00	\$225.00	0.51	1335.36	\$308.47	0.73
222.21	Kitchen	2600	4	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.248	644.8	\$148.95	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.20	20%	515.84	\$119.16	\$75.00	\$75.00	0.05	128.96	\$29.79	2.52
617		1200	1	1	Hood Light w/Globe & Cage, 100w A19 Lamp	100	0.1	120	\$27.72	1	0	No Change	100	0.10	0%	120	\$27.72	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.44	Utility Room	1200	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Wall Mnt., No Lens	62	0.124	148.8	\$34.37	2	0	No Change	62	0.12	0%	148.8	\$34.37	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.21	Men's Rest Room	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.124	322.4	\$74.47	2	0	No Change	62	0.12	0%	322.4	\$74.47	\$75.00	\$0.00	0.00	0	\$0.00	0.00
221.14	Custodial Closet	1200	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.062	74.4	\$17.19	1	0	No Change	62	0.06	0%	74.4	\$17.19	\$75.00	\$0.00	0.00	0	\$0.00	0.00
221.21	Women's Rest Room	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed	62	0.124	322.4	\$74.47	2	0	No Change	62	0.12	0%	322.4	\$74.47	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.14	Closet	1200	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.062	74.4	\$17.19	1	0	No Change	62	0.06	0%	74.4	\$17.19	\$160.00	\$0.00	0.00	0	\$0.00	0.00
725	Exterior	4400	7	1	150w HPS Wallpack	188	1.316	5790.4	\$1,337.58	7	0	No Change	188	1.32	0%	5790.4	\$1,337.58	\$0.00	\$0.00	0.00	0	\$0.00	0.00
711		4400	5	1	70w HPS Bollards	92	0.46	2024	\$467.54	5	0	No Change	92	0.46	0%	2024	\$467.54	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals			49	19			5.2	16,198.4	\$3,742	49	2			4.6		14,734.1	\$3,403.57	\$300	\$300	0.56	1,464	\$338	0.89

Project Name: LGEA Solar PV Project - Gloucester Township Senior Community Center							
Location: Clementon NJ							
Description: Photovoltaic System - Direct Purchase							
Simple Payback Analysis							
	Photovoltaic System - Direct Purchase						
Total Construction Cost	\$165,600						
Annual kWh Production	22,478						
Annual Energy Cost Reduction	\$5,192						
Annual SREC Revenue	\$7,867						
First Cost Premium	\$165,600						
Simple Payback:	12.68						Years
Life Cycle Cost Analysis							
Analysis Period (years):	25			Financing %:	0%		
Financing Term (mths):	0			Maintenance Escalation Rate:	3.0%		
Average Energy Cost (\$/kWh)	\$0.231			Energy Cost Escalation Rate:	3.0%		
Financing Rate:	0.00%			SREC Value (\$/kWh)	\$0.350		
Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	\$165,600	0	0	0	\$0	(165,600)	0
1	\$0	22,478	\$5,192	\$0	\$7,867	\$13,060	(\$152,540)
2	\$0	22,366	\$5,348	\$0	\$7,828	\$13,176	(\$139,364)
3	\$0	22,254	\$5,509	\$0	\$7,789	\$13,297	(\$126,067)
4	\$0	22,143	\$5,674	\$0	\$7,750	\$13,424	(\$112,643)
5	\$0	22,032	\$5,844	\$227	\$7,711	\$13,328	(\$99,315)
6	\$0	21,922	\$6,019	\$226	\$7,673	\$13,466	(\$85,848)
7	\$0	21,812	\$6,200	\$225	\$7,634	\$13,610	(\$72,239)
8	\$0	21,703	\$6,386	\$224	\$7,596	\$13,759	(\$58,480)
9	\$0	21,594	\$6,578	\$222	\$7,558	\$13,913	(\$44,567)
10	\$0	21,486	\$6,775	\$221	\$7,520	\$14,074	(\$30,493)
11	\$0	21,379	\$6,978	\$220	\$7,483	\$14,241	(\$16,253)
12	\$0	21,272	\$7,188	\$219	\$7,445	\$14,414	(\$1,839)
13	\$0	21,166	\$7,403	\$218	\$7,408	\$14,593	\$12,754
14	\$0	21,060	\$7,625	\$217	\$7,371	\$14,779	\$27,534
15	\$0	20,955	\$7,854	\$216	\$7,334	\$14,972	\$42,506
16	\$0	20,850	\$8,090	\$215	\$7,297	\$15,172	\$57,678
17	\$0	20,746	\$8,332	\$214	\$7,261	\$15,380	\$73,058
18	\$0	20,642	\$8,582	\$213	\$7,225	\$15,594	\$88,652
19	\$0	20,539	\$8,840	\$212	\$7,189	\$15,817	\$104,469
20	\$0	20,436	\$9,105	\$210	\$7,153	\$16,047	\$120,516
21	\$1	20,334	\$9,378	\$209	\$7,117	\$16,285	\$136,801
22	\$2	20,232	\$9,659	\$208	\$7,081	\$16,532	\$153,334
23	\$3	20,131	\$9,949	\$207	\$7,046	\$16,788	\$170,121
24	\$4	20,030	\$10,248	\$206	\$7,011	\$17,052	\$187,173
25	\$5	19,930	\$10,555	\$205	\$6,976	\$17,325	\$204,499
Totals:		529,491	\$189,312	\$4,535	\$185,322	\$370,099	\$439,449
Net Present Value (NPV)						\$204,524	
Internal Rate of Return (IRR)						7.0%	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW _{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Gloucester Township Senior Community Center	1,300	Sunpower SPR230	80	14.7	1,176	18.40	22,478	2,640	15.64



AC Energy & Cost Savings



(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	18.4 kW
DC to AC Derate Factor:	0.810
AC Rating:	14.9 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	0.2 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	2.58	1195	2.76
2	3.33	1411	3.26
3	4.31	1971	4.55
4	5.20	2245	5.19
5	5.85	2564	5.92
6	6.14	2496	5.77
7	6.06	2521	5.82
8	5.54	2317	5.35
9	4.85	1992	4.60
10	3.76	1627	3.76
11	2.65	1140	2.63
12	2.23	998	2.31
Year	4.38	22478	51.92

= Proposed PV Layout

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

**TOWNSHIP OF GLOUCESTER
ACADEMY HALL**

**27 S. BLACK HORSE PIKE
GLOUCESTER TOWNSHIP, NJ 08012**

FACILITY ENERGY REPORT

TABLE OF CONTENTS

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Appendix A – ECM Cost & Savings Breakdown

Appendix B – New Jersey Smart Start® Program Incentives

Appendix C – Portfolio Manager “Statement of Energy Performance”

Appendix D – Major Equipment List

Appendix E – Investment Grade Lighting Audit

I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider:	Public Service Electric & Gas
Electric Utility Rate Structure:	General Lighting & Power (GLP)
Third Party Supplier:	None

Natural Gas Utility Provider:	South Jersey Natural Gas
Utility Rate Structure:	Unknown
Third Party Supplier:	None

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

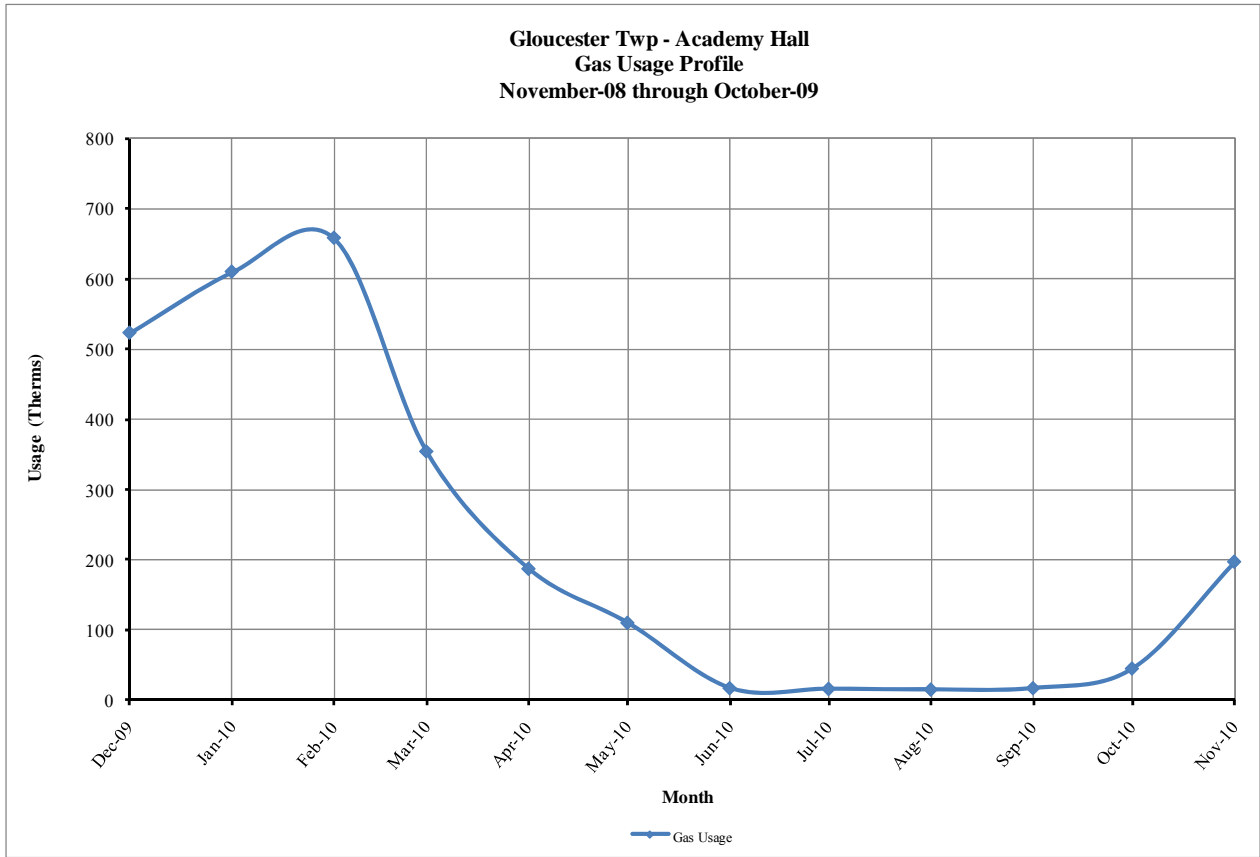
The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

**Table 1
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: PSE&G			
Rate: GLP (General Lighting and Power Service)			
Meter No: 226014030			
Customer ID No: 6504166005 (Account #)			
Third Party Utility Provider:			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
25-Nov-08	2,010	0.0	\$365
24-Dec-08	2,262	0.0	\$392
21-Jan-09	2,100	0.0	\$381
18-Feb-09	2,130	0.0	\$392
18-Mar-09	1,980	0.0	\$372
21-Apr-09	2,394	0.0	\$415
30-Apr-09	3,624	0.0	\$580
24-Jun-09	3,912	0.0	\$813
27-Jul-09	5,952	0.0	\$1,169
25-Aug-09	6,072	0.0	\$1,199
25-Sep-09	4,068	0.0	\$864
25-Oct-09	2,460	0.0	\$452
Totals	38,964	0.0 Max	\$7,393
AVERAGE DEMAND		0.0 KW average	
AVERAGE RATE		\$0.190 \$/kWh	

Highlighted cells represent estimated data where monthly meter readings were missed.
Demand data was not available for this facility

Figure 1
Electricity Usage Profile

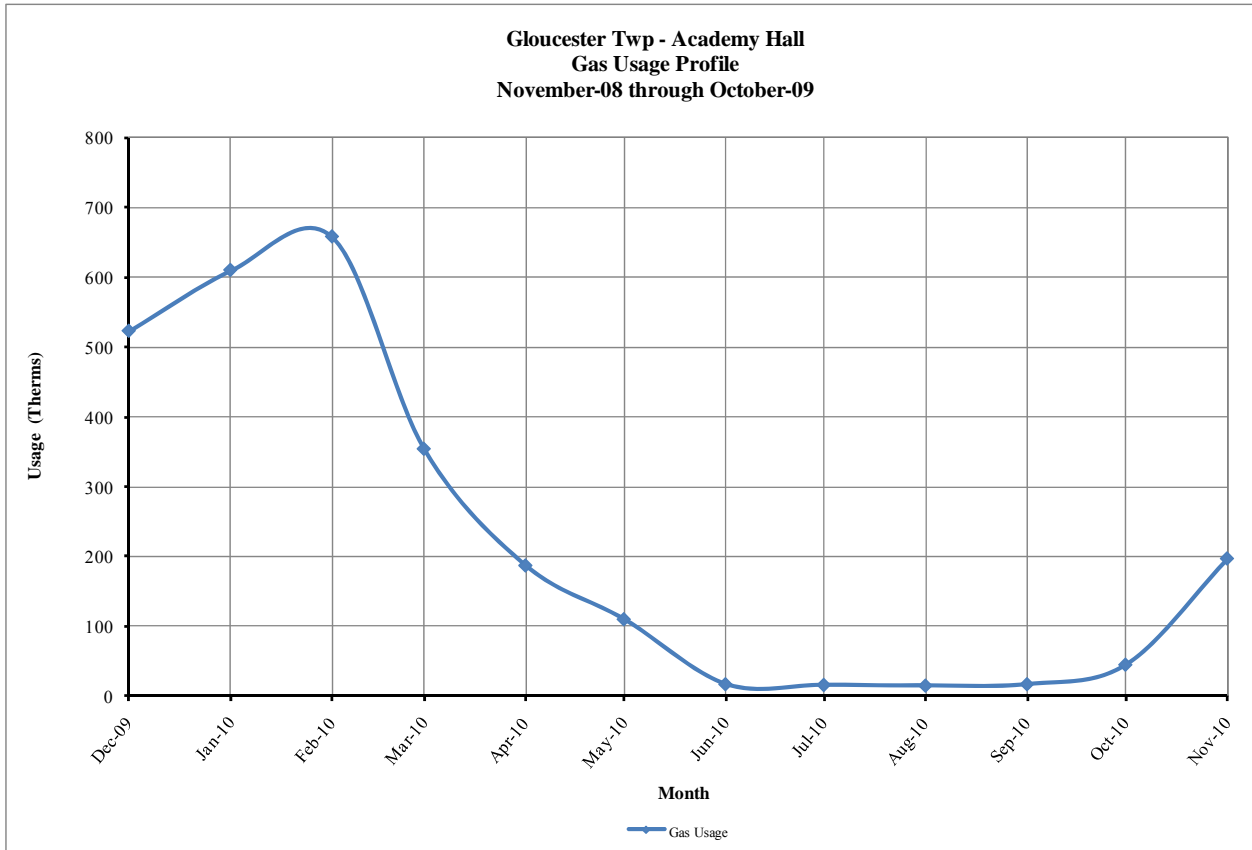


**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas		
Rate: N/A		
Meter No: 2-06-30-3000-0-0		
Point of Delivery ID: N/A		
Third Party Utility Provider: None		
TPS Meter No: None		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Nov-10	197.00	\$264.80
Oct-10	45.00	\$87.28
Sep-10	17.00	\$44.46
Aug-10	15.00	\$38.06
Jul-10	16.00	\$41.35
Jun-10	17.00	\$42.01
May-10	110.00	\$164.56
Apr-10	187.00	\$268.72
Mar-10	354.00	\$488.41
Feb-10	658.00	\$897.73
Jan-10	610.00	\$830.28
Dec-09	523.00	\$710.64
TOTALS	2,749.00	\$3,878.30
AVERAGE RATE:	\$1.41	\$/THERM

*Cost data for the natural gas bills were received manually from the Township.

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Gloucester Township Academy Hall is located on 27 South Black Horse Pike in Gloucester Township, New Jersey. The 5,376 SF Academy Hall is an older facility built in 1930, renovated in 1985. This building is a three story facility comprised of administration offices, lounges and basement mechanical room.

Occupancy Profile

The typical hours of operation for the Academy Hall are Monday through Thursday between 8:00 am and 5:30 pm. A portion of the building is rented to the state police, which is occupied until 8:00PM. The Academy Hall houses approximately 10 employees which occupy the facility.

Building Envelope

Exterior walls for the Academy Hall are brick faced with a concrete block construction. The amount of insulation within the walls is unknown. The windows in the front area of the Academy Hall (HUD section) are double pane windows with wood frame windows. There are gaps around the windows and front door. The windows in the rest of the Academy Hall are double pane windows and have aluminum frames and well sealed installation. The use of blinds is apparent in the lower levels of the building while the floors atop the building contain less coverage for the windows. Blinds are utilized through the office area of the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is a slightly sloped roof with shingles. The amount of insulation below the roofing is unknown.

HVAC Systems

The Academy Hall utilizes a gas fired boiler with hydronic baseboard for heat. The boiler serving the hydronic baseboard system is a Weil McLain gas-fired boiler, model EGH-105-PI, with an input capacity of 450 MBH and an output capacity of 360 MBH. The boiler efficiency is approximately 80%.

Cooling is provided by split system air conditioning systems comprised of several units. On the first floor there are three (3) 1.5 ton air handlers serving the office spaces (two in the ceiling on the first floor and one in the basement.) The second floor has one (1) 2 ton unit with the air handler located in a closet and one (1) 1 ton window air conditioning unit. The third floor has one (1) 3 ton unit with the air handling unit located in a closet. All of the split systems are controlled by programmable thermostats.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. The toilet room exhaust fan is controlled by the toilet room light switches.

HVAC System Controls

The HVAC systems within the Academy Hall are controlled through programmable thermostats dedicated for each system. Currently, the Academy Hall is not one of the buildings controlled via the building management system in the Department of Public Works office. The temperature set points within the HUD offices are 75°F for cooling and 73°F for heating with an 8°F set-back in unoccupied mode. The State Police offices are set to 70°F for cooling and 70°F for heating with an 8°F set-back in unoccupied mode.

Domestic Hot Water

Domestic hot water for the restrooms and office is provided by a 50 gallon Mor-Flo Industries gas-fired hot water heater, capacity of 50 MBH. The domestic hot water is circulated throughout the building by a hot water re-circ pump controlled by an aqua stat.

Lighting

Refer to the Investment Grade lighting Audit Appendix for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. MAJOR EQUIPMENT LIST

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

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

IV. ENERGY CONSERVATION MEASURES

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

**Table 1
ECM Financial Summary**

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	Lighting Upgrade	\$8,880	\$1,837	4.8	210.3%
ECM #2	Lighting Controls	\$660	\$473	1.4	975.0%
ECM #3	Computer Monitors	\$200	\$57	3.5	327.5%
ECM #4	Condensing Boiler	\$35,158	\$450	78.1	-74.4%
ECM #5	AC Unit Upgrades	\$32,126	\$813	39.5	-62.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	None	\$0	\$0	#DIV/0!	#DIV/0!
Notes:	A. Cost takes into consideration applicable NJ Smart Start TM incentives.				
	B. Savings takes into consideration applicable maintenance savings.				

**Table 2
ECM Energy Summary**

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade	4.4	9594.0	0.0
ECM #2	Lighting Controls	0.0	2490.0	0.0
ECM #3	Computer Monitors	0.1	300.0	0.0
ECM #4	Condensing Boiler	0.0	0.0	319.0
ECM #5	AC Unit Upgrades	3.6	4278.0	0.0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	None	N/A	N/A	N/A

**Table 3
Facility Project Summary**

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Lighting Upgrade	\$1,837	\$9,820	\$940	\$8,880	4.8
Lighting Controls	\$473	\$900	\$240	\$660	1.4
Computer Monitors	\$57	\$200	\$0	\$200	3.5
Condensing Boiler	\$450	\$35,952	\$795	\$35,158	78.1
AC Unit Upgrades	\$813	\$33,000	\$874	\$32,126	39.5
<i>Design / Construction Extras (15%)</i>		<i>\$11,981</i>		<i>\$11,981</i>	
Total Project	\$3,630	\$91,853	\$795	\$89,004	24.5

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade

Description:

The majority of the lighting at the Academy Hall is 34 watt T-12 lamps with magnetic ballasts. There are a few locations with existing incandescent fixtures. All exit signs throughout the building are currently high efficiency LED exit signs.

This ECM includes replacement or retrofit of all fixtures with magnetic ballasts in the facility with electronic ballasts and T-8 lamps. T-8 lamps with electronic ballasts provide energy savings as well as improved light over the existing T-12 fixtures. This ECM will also provide maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need 33% less lamps replaced per year.

This ECM includes replacement of any incandescent lamps with compact fluorescent lamps. The energy usage of an incandescent compared to a compact fluorescent is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

Energy Savings Calculations:

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

From the **NJ Smart Start Incentive Appendix**, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamps) = \$10 per fixture

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

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (94 \text{ fixtures} \times \$10) = \$940$$

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{replacement } \$ \text{ per lamp} + \text{Labor } \$ \text{ per lamp})$$

$$\text{Savings} = (2 \text{ lamps per year}) \times (\$2.00 + \$5.00) = \$14$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$9,820
NJ Smart Start Equipment Incentive (\$):	\$940
Net Installation Cost (\$):	\$8,880
Maintenance Savings (\$/Yr):	\$14
Energy Savings (\$/Yr):	\$1,823
Total Yearly Savings (\$/Yr):	\$1,837
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.8
Simple Lifetime ROI	210.3%
Simple Lifetime Maintenance Savings	\$210
Simple Lifetime Savings	\$27,555
Internal Rate of Return (IRR)	19%
Net Present Value (NPV)	\$13,049.99

ECM #2: Lighting Controls

Description:

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

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy sensors.

This ECM includes replacement of standard wall switches with sensors wall switches for the offices, and break room. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) as well as other details are shown in the **Investment Grade Lighting Audit Appendix**.

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

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

$$\begin{aligned} \text{Smart Start}^\circledast\ Incentive &= (\# \text{ of wall mount} \times \$ 20) + (\# \text{ of ceiling mount} \times 35) \\ &= (12 \times \$20) + (0 \times \$35) = \$240 \end{aligned}$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$900
NJ Smart Start Equipment Incentive (\$):	\$240
Net Installation Cost (\$):	\$660
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$473
Total Yearly Savings (\$/Yr):	\$473
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.4
Simple Lifetime ROI	975.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$7,095
Internal Rate of Return (IRR)	72%
Net Present Value (NPV)	\$4,986.64

ECM #3: Computer Monitor Replacement

Description:

The computers throughout the facility utilize a mixture of CRT computer monitors and LCD computer monitors. Computers are located throughout the facility and are becoming a larger and larger portion of a facility's energy usage. The CRT computer monitors are outdated and have several disadvantages such as; significantly increased higher energy consumption, uses large amount of desk space, poor picture quality, distortions and flickering image, secular glare problems, and high weight, and electromagnetic emissions. Many of these drawbacks are difficult to quantify except for the energy use. CRT monitors use considerably more energy than an alternative flat panel LCD monitor. Replacement of the existing CRT monitors with LCD monitors saves considerable energy as well as provides other ergonomic benefits.

Based on the site survey it was noted that there are 15 LCD monitor and 2 CRT monitors. Some of the monitors were left in screen saver mode, which is deceiving since this mode only saves the computer screen from image burn in, however it does not save on energy consumption. The average operating hours for all computers and monitors is estimated based on the site survey observations. Energy consumption of computer monitors is based on averages for power usage of various computer monitors.

This ECM includes replacement of all existing CRT monitors with LCD flat panel monitors throughout the facility. Installation costs were neglected for this ECM with the intention that this ECM would be replaced by the township. The calculations are based on the following operating assumptions:

Energy Savings Calculations:

No. of CRT Monitors:	2
Operating Weeks per Yr:	50
Hrs per Week:	60 (12 hrs per day estimated average)

$$Electric\ Usage = \frac{\#of\ Computers \times Monitor\ Power\ (W) \times Operation\ (Hrs)}{1000 \left(\frac{W}{KW} \right)}$$

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

COMPUTER MONITOR CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	CRT Monitors	LCD Monitor	
# of Computers	2	2	
Monitor Power Cons. (W)	75	25	
Operating Hrs per Week	60	60	
Operating Weeks per Yr	50	50	
Elec Cost (\$/kWh)	0.190	0.190	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Usage (kWh)	450	150	300
Energy Cost (\$)	\$86	\$29	\$57
COMMENTS:	CRT Monitor consumption based on Dell CRT monitor M/N: CRT-E771MM. Operating hours estimated.		

Installation cost of new monitors is estimated based on current pricing for a 17” LCD monitor on the market today. No labor costs were included for replacing the existing monitors with the new monitors. No incentives are available for installation of computer monitors. Net cost per monitor was estimated to be \$100.

Installation Costs: # Monitors X Cost per Monitor
 2 Monitors X \$100 per Monitor
 \$200

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$200
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$200
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$57
Total Yearly Savings (\$/Yr):	\$57
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.5
Simple Lifetime ROI	327.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$855
Internal Rate of Return (IRR)	28%
Net Present Value (NPV)	\$480.46

ECM #4: Condensing Boiler Installation

Description:

The existing cast iron boiler is used as the primary source of heat for the building. The existing boiler is standard efficiency non-condensing type boilers made by weil McLain. The boiler provides hot water to the building baseboard radiators. This boiler is Even for boilers that are close to the end of its life it is difficult to predict the point at which the boiler becomes inoperable. With the increased efficiency of the condensing boilers, the savings can be substantial.

New condensing boilers could substantially improve the operating efficiency of the heating system of the building. Condensing boiler’s peak efficiency tops out at 99% depending on return water temperature. Due to the operating conditions of the building, the annual average operating efficiency of the proposed condensing boiler is expected to be 88%. The existing boiler’s efficiency is approximately 77%, which makes the condensing boilers an 11% increase in efficiency. This ECM is based on implementation of outdoor re-set to vary the supply water temperature based on outdoor temperature.

This ECM includes installation of one condensing gas fired boilers to replace the existing cast iron boiler. The basis for this ECM is the Aerco Modulex condensing boiler model number MLX-454. The boiler installation is based on a one for one replacement based on capacity of the existing boiler.

Energy Savings Calculations:

Baseline Hot Water Gas Use: 16.25 Therms (Ave from June thru September Gas Use)

Existing Heating Natural Gas: 2,749 Therms – (16.25 Therms X 12 Months)
2,554 Therms

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

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

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

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Cast Iron Boilers	New Condensing Boilers	
Existing Nat Gas (Therms)	2,554	0	
Boiler Efficiency (%)	77%	88%	11%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	197	197	
Gas Cost (\$/Therm)	1.41	1.41	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Natural Gas Usage (Therms)	2,554	2,235	319
Energy Cost (\$)	\$3,601	\$3,151	\$450
COMMENTS:			

Installation cost of the new condensing boiler, flue piping, boiler water piping modifications, gas piping modifications, electric, etc. is estimated to be \$35,952.

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

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (\text{Boiler MBH} \times \$1.75) = (454 \times \$1.75) = \$794.50$$

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$35,952
NJ Smart Start Equipment Incentive (\$):	\$795
Net Installation Cost (\$):	\$35,158
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$450
Total Yearly Savings (\$/Yr):	\$450
Estimated ECM Lifetime (Yr):	20
Simple Payback	78.1
Simple Lifetime ROI	-74.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$9,000
Internal Rate of Return (IRR)	-11%
Net Present Value (NPV)	(\$28,462.64)

ECM #5: Air Conditioning Unit Upgrades

Description:

The Academy Hall is air conditioned with multiple split system AC units. In some cases these units are older and in need of replacement. The existing units have a range of efficiencies. Most existing units are low compared to high efficiency units today. New split air conditioners provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and refrigerants.

This ECM includes one-to-one replacement of the older air conditioning units with new higher efficiency systems. In addition, since the existing coils in the air handling units are all R-22 compatible and all the new units will have R-410a refrigerant, new coils must be installed as well. A summary of this ECM can be found in the table below:

IMPLEMENTATION SUMMARY					
ECM INPUTS	SERVICE FOR	NUMBER OF UNITS	COOLING CAPACITY, BTU/HR	TOTAL CAPACITY, TONS	REPLACE UNIT WITH
Carrier CU-1	Front Office	1	18,000	1.5	New High SEER CU
Carrier CU-2	2nd Flr Office	1	24,000	2.0	New High SEER CU
Coleman CU-3	1st Flr	1	18,000	1.5	New High SEER CU
Coleman CU-4	3rd Flr	1	36,000	3.0	New High SEER CU
Carrier CU-6	1st Flr	1	18,000	1.5	New High SEER CU
Total		5	114,000	9.5	

CU: Condensing Unit

The basis for the split system air conditioners is Trane XL15i Series split systems with R410a refrigerant.

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	EXISTING UNITS SEER	SPLIT UNITS SEER	# OF UNITS	ENERGY SAVINGS kWh	DEMAND SAVINGS kW
Carrier CU-1	18,000	1,200	10	15	1	720	0.6
Carrier CU-2	24,000	1,200	10	15	1	960	0.8
Coleman CU-3	18,000	1,200	10	15	1	720	0.6
Coleman CU-4	36,000	1,200	10	15	1	1,440	1.2
Carrier CU-6	18,000	1,200	11.5	15	1	438	0.4
Total					5	4,278	3.6

Project Cost, Incentives and Maintenance Savings

From the NJ Smart Start® Program appendix, the replacement of split system AC units with high efficiency split system AC units falls under the category “Unitary HVAC Split System” and warrants an incentive based on efficiency (SEER) at or above 14 for this type of systems. The program incentives are calculated as follows:

Smart Start® Incentive = (Cooling Tons × \$/Ton Incentive)

DUCTLESS MINI SPLIT AC UNITS REBATE SUMMARY				
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE \$/TON	PROPOSED CAPACITY TONS	TOTAL REBATE \$
5.4 tons or less Unitary	≥14 SEER	\$92	9.5	\$874
TOTAL			9.5	\$874

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

COST & SAVINGS SUMMARY							
ECM INPUTS	INSTALLED COST	# OF UNITS	TOTAL COST	REBATES	NET COST	ENERGY SAVING	PAY BACK YEARS
Carrier CU-1	\$6,000	1	\$6,000	\$138	\$5,862	\$137	42.9
Carrier CU-2	\$7,000	1	\$7,000	\$184	\$6,816	\$182	37.4
Coleman CU-3	\$6,000	1	\$6,000	\$138	\$5,862	\$137	42.9
Coleman CU-4	\$8,000	1	\$8,000	\$276	\$7,724	\$274	28.2
Carrier CU-6	\$6,000	1	\$6,000	\$138	\$5,862	\$83	70.4
Total		5	\$33,000	\$874	\$32,126	\$813	39.5

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

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$33,000
NJ Smart Start Equipment Incentive (\$):	\$874
Net Installation Cost (\$):	\$32,126
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$813
Total Yearly Savings (\$/Yr):	\$813
Estimated ECM Lifetime (Yr):	15
Simple Payback	39.5
Simple Lifetime ROI	-62.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$12,195
Internal Rate of Return (IRR)	-10%
Net Present Value (NPV)	(\$22,420.46)

V. ADDITIONAL RECOMMENDATIONS

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

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- E. Turn off all computers when not in use. Ensure computers are not left in screen saver mode. Screen saver modes does not save energy.

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

Gloucester Twp - Academy Hall

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1 + IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1 + DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Lighting Upgrade	\$9,820	\$0	\$940	\$8,880	\$1,823	\$14	\$1,837	15	\$27,555	\$210	210.3%	4.8	19.20%	\$13,049.99
ECM #2	Lighting Controls	\$900	\$0	\$240	\$660	\$473	\$0	\$473	15	\$7,095	\$0	975.0%	1.4	71.64%	\$4,986.64
ECM #3	Computer Monitors	\$200	\$0	\$0	\$200	\$57	\$0	\$57	15	\$855	\$0	327.5%	3.5	27.78%	\$480.46
ECM #4	Condensing Boiler	\$13,947	\$22,005	\$795	\$35,158	\$450	\$0	\$450	20	\$9,000	\$0	-74.4%	78.1	-10.51%	(\$28,462.64)
ECM #5	AC Unit Upgrades	\$14,500	\$18,500	\$874	\$32,126	\$813	\$0	\$813	15	\$12,195	\$0	-62.0%	39.5	-10.22%	(\$22,420.46)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	None	\$0	\$0	\$0	\$0	\$0	\$0	\$0	15	\$0	\$0	#DIV/0!	#DIV/0!	#NUM!	\$0.00

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



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SmartStart Building Incentives

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

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

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

Desiccant Systems

\$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

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



STATEMENT OF ENERGY PERFORMANCE

Gloucester Twp - Academy Hall

Building ID: 2555188

For 12-month Period Ending: October 31, 2009¹

Date SEP becomes ineligible: N/A

Date SEP Generated: January 17, 2011

Facility

Gloucester Twp - Academy Hall
27 South Black Horse Pike
Gloucester Township, NJ 08012

Facility Owner

Gloucester Township
1261 chews landing road
Gloucester Township, NJ 08012

Primary Contact for this Facility

Tom Cardis
1261 chews landing road
Gloucester Township, NJ 08012

Year Built: 1930

Gross Floor Area (ft²): 5,376

Energy Performance Rating² (1-100) 42

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	132,945
Natural Gas (kBtu) ⁴	274,900
Total Energy (kBtu)	407,845

Energy Intensity⁵

Site (kBtu/ft ² /yr)	76
Source (kBtu/ft ² /yr)	136

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	35
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Electric Distribution Utility

Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	70
National Average Source EUI	126
% Difference from National Average Source EUI	8%
Building Type	Office

Stamp of Certifying Professional

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

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043

Notes:

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

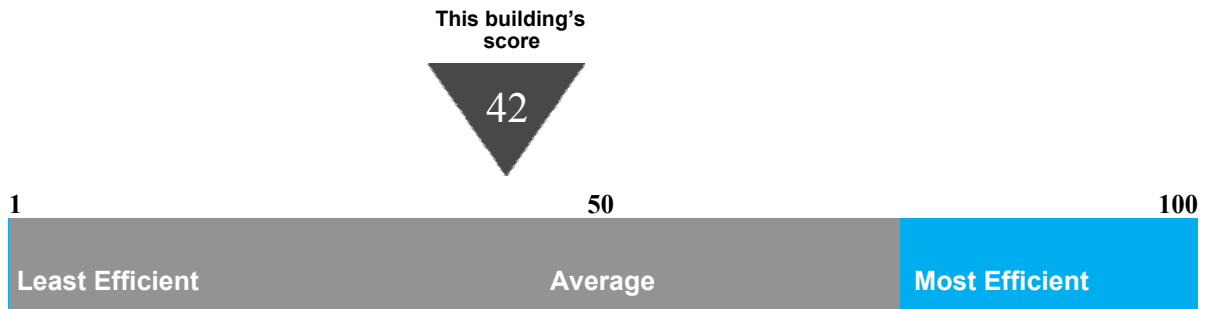
Statement of Energy Performance

2009

Gloucester Twp - Academy Hall
27 South Black Horse Pike
Gloucester Township, NJ 08012

Portfolio Manager Building ID: 2555188

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



This building uses 136 kBtu per square foot per year.*

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

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

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

Date of certification



MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Twp - Academy Hall

AC Units

Tag	CU-1	CU-2	CU-3
Unit Type	Split System AC	Split System AC	Split System AC
Qty	1	1	1
Location	Outdoor Side Entrance	Outdoor Side Entrance	Outdoor Courtyard
Area Served	Front office space	2nd Floor office	1st Floor
Manufacturer	Carrier	Carrier	Coleman
Model #	38CKC018	38CKC024	BRCS0181BD
Serial #	4399E13632	-	30307059
Cooling Type	DX	DX	DX
Cooling Capacity (Tons)	1.5	2 Tons	1.5
Cooling Efficiency (SEER/EER)	10 SEER / 9.5 EER	10 SEER	10 SEER
Heating Type	None	None	None
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	11	11	8
ASHRAE Service Life	15	15	15
Remaining Life	4	4	7
Comments			

AC Units

Tag	CU-4	CU-5	CU-6
Unit Type	Split System AC	Split System AC	Split System AC
Qty	1	1	1
Location	Outdoor Courtyard	Outdoor Courtyard	Outdoor Courtyard
Area Served	3rd Floor	1st Floor	1st Floor
Manufacturer	Coleman	York	Carrier
Model #	C036X1021G	H1RE018S06A	38CKC018330
Serial #	W0C5715043	W0E8859332	4399E13632
Cooling Type	DX	DX	DX
Cooling Capacity (Tons)	3	1.5 Tons	1.5 Tons
Cooling Efficiency (SEER/EER)	10 SEER	14 SEER	11.5 SEER
Heating Type	None	None	None
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	16	15	12
ASHRAE Service Life	15	15	15
Remaining Life	(1)	0	3
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Twp - Academy Hall

Boilers

Tag	Boiler-1		
Unit Type	Gas Fired Hot Water Boiler		
Qty	1		
Location	Basement		
Area Served	Baseboard Heaters		
Manufacturer	Weil McLain		
Model #	EGH-105-PI		
Serial #	2		
Input Capacity (MBH)	450 MBH		
Rated Output Capacity (MBH)	360 MBH		
Approx. Efficiency %	80%		
Fuel	Natural Gas		
Approx Age	26		
ASHRAE Service Life	30		
Remaining Life	4		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Twp - Academy Hall

Domestic Water Heaters

Tag	HWH-1		
Unit Type	Gas Fired Domestic Hot Water Heater		
Qty	1		
Location	Basement		
Area Served	Academy Hall		
Manufacturer	Mor-Flo Industries		
Model #	GV504T1		
Serial #	541104		
Size (Gallons)	50 Gallons		
Input Capacity (MBH/KW)	50 MBH		
Recovery (Gal/Hr)	83 Gal/Hr		
Efficiency %	80%		
Fuel	Natural Gas		
Approx Age	7		
ASHRAE Service Life	12		
Remaining Life	5		
Comments			

Investment Grade Lighting Audit

CEG Job #: 9C10076

Project: Academy Hall

27 S. Black Horse Pike

Gloucester Township, NJ

Bldg. Sq. Ft.

Academy Hall

KWH COST: \$0.190

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS				
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
127.21	Front Office/ Reception	3000	14	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	1.09	3,276.0	\$622.44	14	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.66	1974	\$375.06	\$100.00	\$1,400.00	0.43	1302	\$247.38	5.66
3015	Rest Room	1200	1	1	Wall Mnt., Glass Cover, 100w A Lamp	100	0.10	120.0	\$22.80	1	1	26w CFL Lamp	26	0.03	31.2	\$5.93	\$20.00	\$20.00	0.07	88.8	\$16.87	1.19
127.21	Det. Sergeant Office	3000	4	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.31	936.0	\$177.84	4	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.19	564	\$107.16	\$100.00	\$400.00	0.12	372	\$70.68	5.66
127.21	Hall	3000	4	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.31	936.0	\$177.84	4	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.19	564	\$107.16	\$100.00	\$400.00	0.12	372	\$70.68	5.66
127.21	Small Office - 1st Floor	3000	3	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.23	702.0	\$133.38	3	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.14	423	\$80.37	\$100.00	\$300.00	0.09	279	\$53.01	5.66
127.21	Storage Room	1200	3	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.23	280.8	\$53.35	3	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.14	169.2	\$32.15	\$100.00	\$300.00	0.09	111.6	\$21.20	14.15
127.21	Lunch Room	3000	10	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.78	2,340.0	\$444.60	10	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.47	1410	\$267.90	\$100.00	\$1,000.00	0.31	930	\$176.70	5.66
619	Men's Rest Room	1200	1	1	Ceiling Mount Globe, (1) 100w A19 Lamp	100	0.10	120.0	\$22.80	1	1	(1) 26w CFL Lamp	26	0.03	31.2	\$5.93	\$20.00	\$20.00	0.07	88.8	\$16.87	1.19
619	Women's Rest Room	1200	1	1	Ceiling Mount Globe, (1) 100w A19 Lamp	100	0.10	120.0	\$22.80	1	1	(1) 26w CFL Lamp	26	0.03	31.2	\$5.93	\$20.00	\$20.00	0.07	88.8	\$16.87	1.19
127.21	Hall	3000	2	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.16	468.0	\$88.92	2	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.09	282	\$53.58	\$100.00	\$200.00	0.06	186	\$35.34	5.66
127.21	Large Office - 1st Floor	3000	6	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.47	1,404.0	\$266.76	6	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.28	846	\$160.74	\$100.00	\$600.00	0.19	558	\$106.02	5.66
127.21	Stairway	3000	2	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.16	468.0	\$88.92	2	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.09	282	\$53.58	\$100.00	\$200.00	0.06	186	\$35.34	5.66
127.21	Office - 2nd Floor	3000	9	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.70	2,106.0	\$400.14	9	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.42	1269	\$241.11	\$100.00	\$900.00	0.28	837	\$159.03	5.66
127.21	Office - 2nd Floor	3000	5	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.39	1,170.0	\$222.30	5	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.24	705	\$133.95	\$100.00	\$500.00	0.16	465	\$88.35	5.66
127.21	Office - 2nd Floor	3000	5	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.39	1,170.0	\$222.30	5	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.24	705	\$133.95	\$100.00	\$500.00	0.16	465	\$88.35	5.66
127.21	2nd Floor Hall	3000	5	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.39	1,170.0	\$222.30	5	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.24	705	\$133.95	\$100.00	\$500.00	0.16	465	\$88.35	5.66
127.21	Break Room - 2nd Floor	3000	6	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.47	1,404.0	\$266.76	6	3	3 Lamp, 17w T8, Elect. Ballast; retrofit	47	0.28	846	\$160.74	\$100.00	\$600.00	0.19	558	\$106.02	5.66
121.11	Rest Room	1200	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.08	93.6	\$17.78	1	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.05	60	\$11.40	\$100.00	\$100.00	0.03	33.6	\$6.38	15.66
613	Closet	400	1	1	Socket, 100w A19 Lamp	100	0.10	40.0	\$7.60	1	1	(1) 26w CFL Lamp	26	0.03	10.4	\$1.98	\$20.00	\$20.00	0.07	29.6	\$5.62	3.56

Investment Grade Lighting Audit

619	Stairway	3000	1	1	Ceiling Mount Globe, (1) 100w A19 Lamp	100	0.10	300.0	\$57.00	1	1	(1) 26w CFL Lamp	26	0.03	78	\$14.82	\$20.00	\$20.00	0.07	222	\$42.18	0.47
121.11	Office - 3rd Floor	3000	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.16	468.0	\$88.92	2	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.10	300	\$57.00	\$100.00	\$200.00	0.06	168	\$31.92	6.27
613	Mech. Room - 3rd Floor	400	1	1	Socket , 100w A19 Lamp	100	0.10	40.0	\$7.60	1	1	(1) 26w CFL Lamp	26	0.03	10.4	\$1.98	\$20.00	\$20.00	0.07	29.6	\$5.62	3.56
121.11	Com Room - 3rd Floor	3000	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.08	234.0	\$44.46	1	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.05	150	\$28.50	\$100.00	\$100.00	0.03	84	\$15.96	6.27
121.11	Center Office - 3rd Floor	3000	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.16	468.0	\$88.92	2	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.10	300	\$57.00	\$100.00	\$200.00	0.06	168	\$31.92	6.27
121.11	Left Office - 3rd Floor	3000	3	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.23	702.0	\$133.38	3	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.15	450	\$85.50	\$100.00	\$300.00	0.08	252	\$47.88	6.27
121.11	Office - 3rd Floor	3000	7	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.55	1,638.0	\$311.22	7	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.35	1050	\$199.50	\$100.00	\$700.00	0.20	588	\$111.72	6.27
613	Basement	600	15	1	Socket , 100w A19 Lamp	100	1.50	900.0	\$171.00	15	1	(1) 26w CFL Lamp	26	0.39	234	\$44.46	\$20.00	\$300.00	1.11	666	\$126.54	2.37
650	Exterior	4400	10	1	Wall Mnt. Light, 18w CFL Lamp	18	0.18	792.0	\$150.48	10	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
	Totals		125	48			9.61	23,866	\$4,535	125	61			5.0	13,481	\$2,561		\$9,820	4.4	9,594	\$1,823	5.39

CEG Job #: 9C10076
 Project: Academy Hall
 Address: 27 S. Black Horse Pike
 Gloucester Township, NJ
 Building SF: -

Academy Hall

KWH COST: \$0.190

ECM #2: Lighting Controls

EXISTING LIGHTING					PROPOSED LIGHTING CONTROLS													SAVINGS					
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
127.21	Front Office/ Reception	3000	14	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	1.092	3276	\$622.44	14	0	No Change	78	1.09	0%	3276	\$622.44	\$0.00	\$0.00	0.00	0	\$0.00	0.00
3015	Rest Room	1200	1	1	Wall Mnt., Glass Cover, 100w A Lamp	100	0.1	120	\$22.80	1	0	No Change	100	0.10	0%	120	\$22.80	\$0.00	\$0.00	0.00	0	\$0.00	0.00
127.21	Det. Sergeant Office	3000	4	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.312	936	\$177.84	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.25	20%	748.8	\$142.27	\$75.00	\$75.00	0.06	187.2	\$35.57	2.11
127.21	Hall	3000	4	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.312	936	\$177.84	4	0	No Change	78	0.31	0%	936	\$177.84	\$0.00	\$0.00	0.00	0	\$0.00	0.00
127.21	Small Office - 1st Floor	3000	3	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.234	702	\$133.38	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.19	20%	561.6	\$106.70	\$75.00	\$75.00	0.05	140.4	\$26.68	2.81
127.21	Storage Room	1200	3	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.234	280.8	\$53.35	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.19	20%	224.64	\$42.68	\$75.00	\$75.00	0.05	56.16	\$10.67	7.03
127.21	Lunch Room	3000	10	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.78	2340	\$444.60	10	0	No Change	78	0.78	0%	2340	\$444.60	\$0.00	\$0.00	0.00	0	\$0.00	0.00
619	Men's Rest Room	1200	1	1	Ceiling Mount Globe, (1) 100w A19 Lamp	100	0.1	120	\$22.80	1	0	No Change	100	0.10	0%	120	\$22.80	\$0.00	\$0.00	0.00	0	\$0.00	0.00
619	Women's Rest Room	1200	1	1	Ceiling Mount Globe, (1) 100w A19 Lamp	100	0.1	120	\$22.80	1	0	No Change	100	0.10	0%	120	\$22.80	\$0.00	\$0.00	0.00	0	\$0.00	0.00
127.21	Hall	3000	2	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.156	468	\$88.92	2	0	No Change	78	0.16	0%	468	\$88.92	\$0.00	\$0.00	0.00	0	\$0.00	0.00
127.21	Large Office - 1st Floor	3000	6	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.468	1404	\$266.76	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.37	20%	1123.2	\$213.41	\$75.00	\$75.00	0.09	280.8	\$53.35	1.41
127.21	Stairway	3000	2	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.156	468	\$88.92	2	0	No Change	78	0.16	0%	468	\$88.92	\$0.00	\$0.00	0.00	0	\$0.00	0.00
127.21	Office - 2nd Floor	3000	9	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.702	2106	\$400.14	9	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.56	20%	1684.8	\$320.11	\$75.00	\$75.00	0.14	421.2	\$80.03	0.94
127.21	Office - 2nd Floor	3000	5	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.39	1170	\$222.30	5	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.31	20%	936	\$177.84	\$75.00	\$75.00	0.08	234	\$44.46	1.69
127.21	Office - 2nd Floor	3000	5	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.39	1170	\$222.30	5	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.31	20%	936	\$177.84	\$75.00	\$75.00	0.08	234	\$44.46	1.69
127.21	2nd Floor Hall	3000	5	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.39	1170	\$222.30	5	0	No Change	78	0.39	0%	1170	\$222.30	\$0.00	\$0.00	0.00	0	\$0.00	0.00
127.21	Break Room - 2nd Floor	3000	6	2	2x2, 2 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	78	0.468	1404	\$266.76	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.37	20%	1123.2	\$213.41	\$75.00	\$75.00	0.09	280.8	\$53.35	1.41
121.11	Rest Room	1200	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.078	93.6	\$17.78	1	0	No Change	78	0.08	0%	93.6	\$17.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
613	Closet	400	1	1	Socket , 100w A19 Lamp	100	0.1	40	\$7.60	1	0	No Change	100	0.10	0%	40	\$7.60	\$0.00	\$0.00	0.00	0	\$0.00	0.00
619	Stairway	3000	1	1	Ceiling Mount Globe, (1) 100w A19 Lamp	100	0.1	300	\$57.00	1	0	No Change	100	0.10	0%	300	\$57.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
121.11	Office - 3rd Floor	3000	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.156	468	\$88.92	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.12	20%	374.4	\$71.14	\$75.00	\$75.00	0.03	93.6	\$17.78	4.22
613	Mech. Room - 3rd Floor	400	1	1	Socket , 100w A19 Lamp	100	0.1	40	\$7.60	1	0	No Change	100	0.10	0%	40	\$7.60	\$0.00	\$0.00	0.00	0	\$0.00	0.00
121.11	Com Room - 3rd Floor	3000	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.078	234	\$44.46	1	0	No Change	78	0.08	0%	234	\$44.46	\$0.00	\$0.00	0.00	0	\$0.00	0.00

121.11	Center Office - 3rd Floor	3000	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.156	468	\$88.92	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.12	20%	374.4	\$71.14	\$75.00	\$75.00	0.03	93.6	\$17.78	4.22
121.11	Left Office - 3rd Floor	3000	3	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.234	702	\$133.38	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.19	20%	561.6	\$106.70	\$75.00	\$75.00	0.05	140.4	\$26.68	2.81
121.11	Office - 3rd Floor	3000	7	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.546	1638	\$311.22	7	1	Dual Technology Occupancy Sensor - Switch Mnt.	78	0.44	20%	1310.4	\$248.98	\$75.00	\$75.00	0.11	327.6	\$62.24	1.20
613	Basement	600	15	1	Socket , 100w A19 Lamp	100	1.5	900	\$171.00	15	0	No Change	100	1.50	0%	900	\$171.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
650	Exterior	4400	10	1	Wall Mnt. Light, 18w CFL Lamp	18	0.18	792	\$150.48	10	0	No Change	18	0.18	0%	792	\$150.48	\$0.00	\$0.00	0.00	0	\$0.00	0.00
	Totals		125	48			9.6	23,866.4	\$4,535	125	12			8.8		21,376.6	\$4,061.56	\$900	\$900	0.86	2,490	\$473	1.90

**TOWNSHIP OF GLOUCESTER
MUNICIPAL BUILDING**

**1261 CHEWS LANDING ROAD
GLOUCESTER TOWNSHIP, NJ 08012**

FACILITY ENERGY REPORT

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I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider: Public Service Electric & Gas
Electric Utility Rate Structure: Large Power Lighting Service (LPLS)
Third Party Supplier: None

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

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

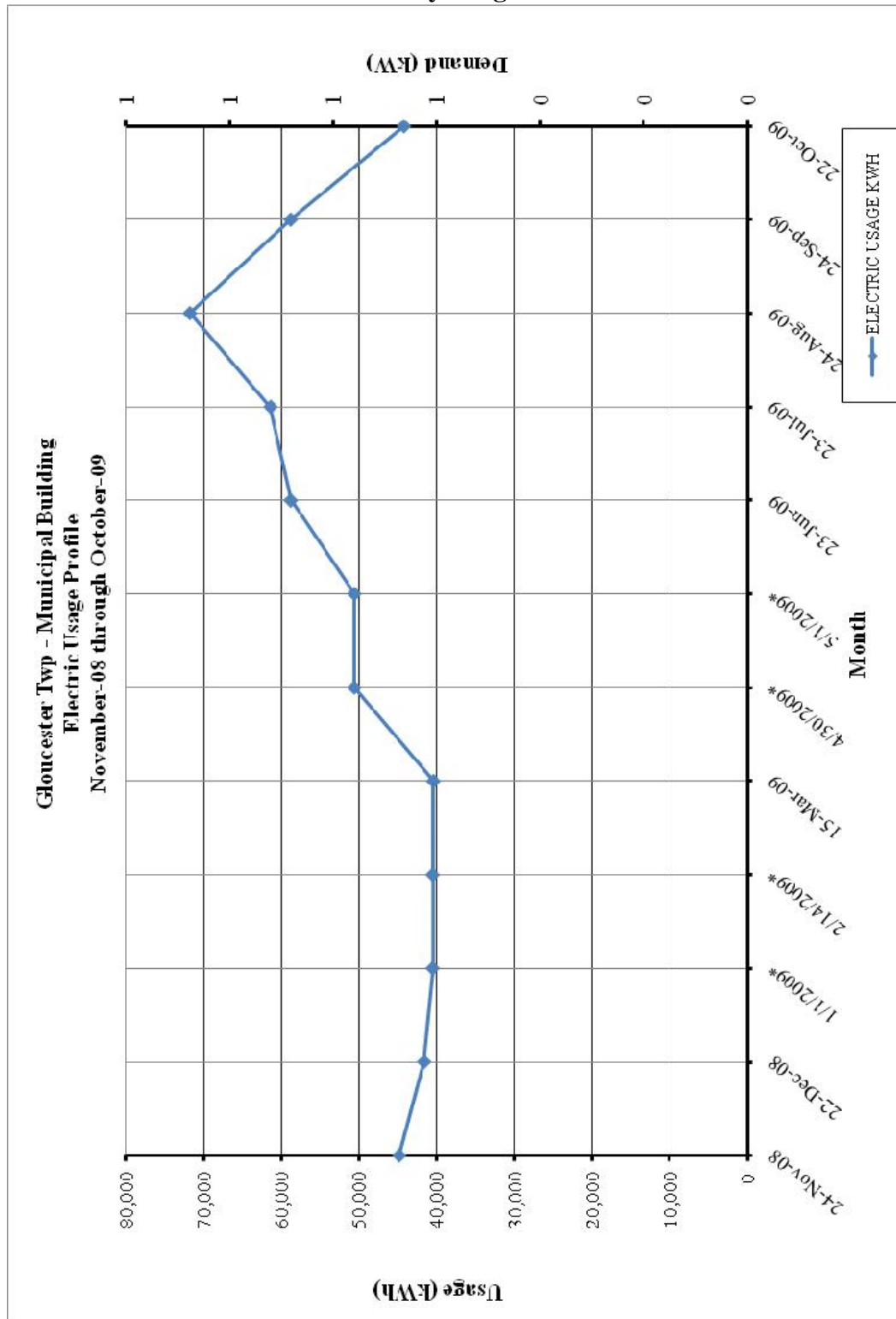
The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

**Table 1
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: PSE&G			
Rate: LPLS (Large Power and Lighting Service)			
Meter No: 778005122			
Customer ID No: 4200960605 (Account #)			
Third Party Utility Provider:			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
24-Nov-08	44,800	0.0	\$6,531
22-Dec-08	41,600	0.0	\$6,174
<i>1/1/2009*</i>	<i>40,500</i>	<i>0.0</i>	<i>\$6,014</i>
<i>2/14/2009*</i>	<i>40,500</i>	<i>0.0</i>	<i>\$6,014</i>
15-Mar-09	40,400	0.0	\$6,373
<i>4/30/2009*</i>	<i>50,600</i>	<i>0.0</i>	<i>\$7,762</i>
<i>5/1/2009*</i>	<i>50,600</i>	<i>0.0</i>	<i>\$7,762</i>
23-Jun-09	58,800	0.0	\$11,764
23-Jul-09	61,400	0.0	\$11,586
24-Aug-09	71,800	0.0	\$13,257
24-Sep-09	58,800	0.0	\$11,065
22-Oct-09	44,200	0.0	\$7,080
Totals	604,000	0.0 Max	\$101,382
AVERAGE DEMAND		0.0 KW average	
AVERAGE RATE		\$0.168 \$/kWh	

***Note:** Data marked with an asterisk has been estimated due to missed meter readings for every month. Data for 2 months was combined into 1 month; therefore an estimate was made by dividing the monthly usage in half. Demand data was not available for this facility.

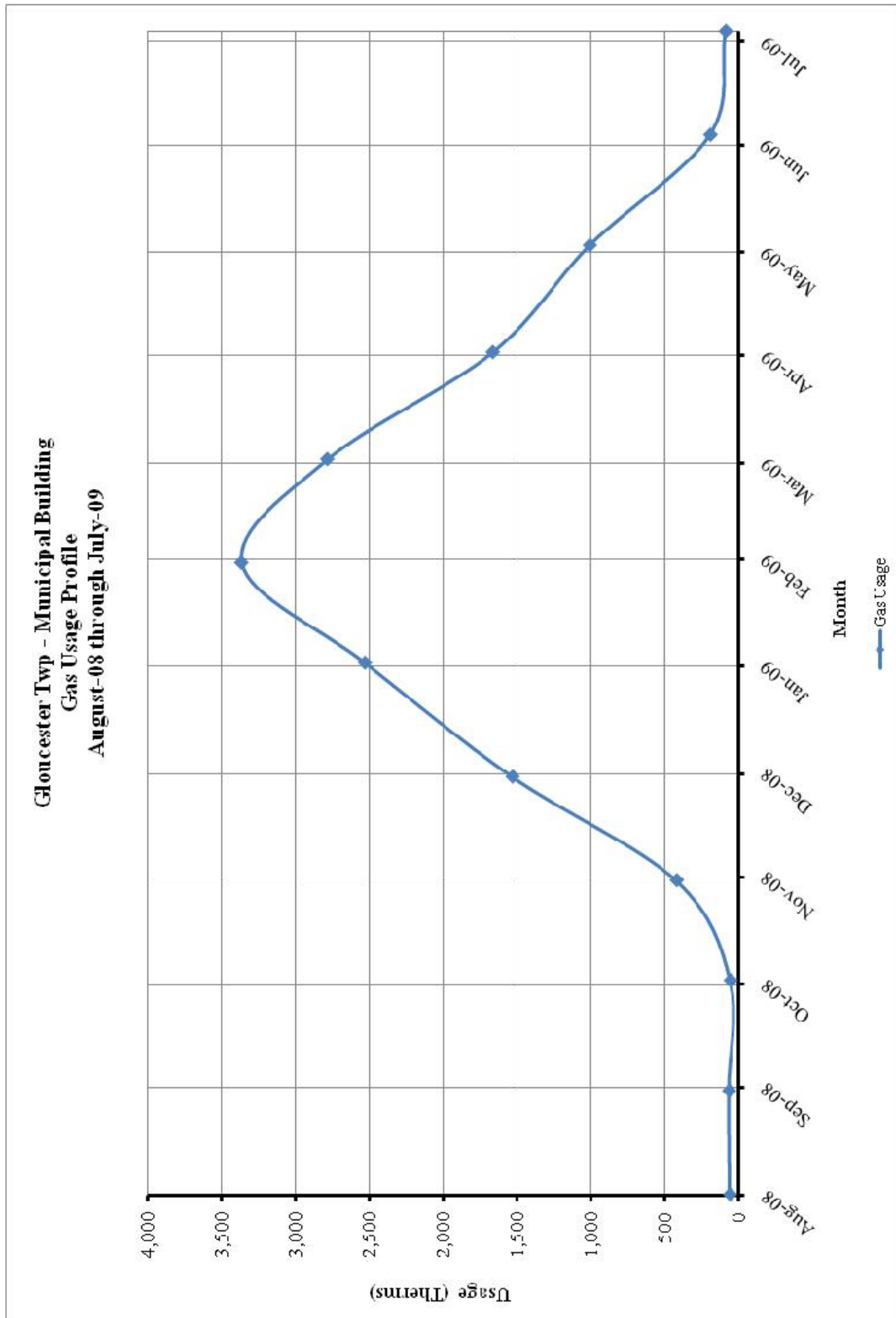
**Figure 1
Electricity Usage Profile**



**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas		
Rate: GSG		
Meter No:		
Point of Delivery ID:		
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
05-Aug-08	61.00	\$135.22
04-Sep-08	67.00	\$142.55
06-Oct-08	57.00	\$120.67
04-Nov-08	422.00	\$618.07
04-Dec-08	1,531.00	\$2,519.19
06-Jan-09	2,529.00	\$4,176.80
04-Feb-09	3,364.00	\$5,584.33
06-Mar-09	2,784.00	\$4,614.11
06-Apr-09	1,665.00	\$2,774.54
07-May-09	1,009.00	\$1,708.15
08-Jun-09	194.00	\$360.84
08-Jul-09	90.00	\$187.78
TOTALS	13,773.00	\$22,942.25
AVERAGE RATE:	\$1.67	\$/THERM

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Gloucester Township Municipal Building is located on 1261 Chews Landing Road in Gloucester Township, New Jersey. The 43,000 SF Municipal Facility encompasses both a municipal office building and a police department building which are connected to one another. The facility was built in two phases; the office building was completed in 1973 while the police building was completed in 1976. Both buildings are two story facilities comprised of administration offices, lounges, holding areas, surveillance areas and court rooms.

Occupancy Profile

The typical hours of operation for the municipal offices building are Monday through Thursday between 8:00 am and 5:45 pm. The police department building (approximately 1/3 of the facility) is in use 24 hours a day, 7 days a week. The municipal facility, police building and municipal offices are occupied by approximately 120 employees total.

Building Envelope

Exterior walls for both of the office areas are brick faced with a concrete block construction. The amount of insulation within the walls is unknown. The windows throughout both facilities are in average condition. Typical windows throughout both facilities are single pane, 1/4" clear glass with aluminum frames. Blinds are utilized through the office areas of the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof is mostly flat, built up rubber roof, where the majority of the HVAC equipment is located. There are parts of the roof, near the edges, where it is drastically sloped with shingles. The amount of insulation below the roofing is unknown.

HVAC Systems

The Municipal Complex is heated mainly through baseboard heat and hot water fan coil units which are provided hot water by a central boiler plant located beneath the police building. The hot water system was installed as part of the original building which is now used by the police department. The building addition (currently used for municipal offices) was added to the facility which originally utilized air source heat pumps and electric heat. Since the original construction the hot water heating system was extended to the addition and baseboards were installed. The air source heat pumps within the addition were slowly replaced at the end of their life to cooling only AC units with electric supplemental heat for the baseboard system.

The boiler plant consists of one (1) Weil McLain gas-fired boiler, model 88, with an input capacity of 2,049 MBH and an output capacity of 1,632 MBH. The boiler efficiency is approximately 80%. There are five (5) Bell & Gossett circulator pumps ranging from 1.5 HP to 5 HP. The baseboards and unit ventilators are primarily located on the perimeter of the building. The original building also includes packaged rooftop units with natural gas heat exchangers for heat. The building addition utilizes baseboard heat as well as electric heat within the AC units as a source of backup heating, to assist with morning warm up in extreme cold conditions. It was also apparent that some personnel located in the interior offices were utilizing space heaters for supplemental heat.

The cooling for the original building (Police Bldg) utilizes two (2) 20 ton Drake Refrigeration Inc. air cooled chillers which supply the fan coil units. The court room and hallways are cooled by one (1) 5 ton York packaged A/C unit with 125 MBH of gas heat, one (1) 20 ton packaged A/C unit with 400 MBH of gas heat, and one (1) 13 ton packaged A/C unit with 250 MBH of gas heat. The communications room is supplied by a cooling only 3 ton York condensing unit. The server room is served by one (1) 2.5 ton Fujitsu split system.

Cooling for the building addition (municipal offices) is provided through 11 Coleman cooling units with 7 KW electric heat strips having the following capacities: one (1) 2 ton unit, eight (8) 2.5 ton units, and two (2) 3 ton units. In addition there are two (2) Trane 15 ton split systems condensing units, which provides cooling for the large air handling unit that serve the council room. The 1st floor common areas are served by a General Electric 2 ton split system that is 34 years old and in very poor condition. The electric heat in the GE split system is broken and was not functioning at the time of the survey. The second floor common areas for the municipal offices are served by a 5 ton GE heat pump. Another heat pump condensing unit is located on the roof, however it was turned off at the time of the survey.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. The toilet room exhaust fans are controlled by light switches.

HVAC System Controls

The HVAC systems within the facility are controlled through an antiquated building management system. Programming of temperature set-points for this building are set around 72°F for cooling and 70°F for heating in occupied mode. The unoccupied setting is estimated to be set back 8°F. The boiler plant utilizes a hot water reset schedule which modulates the temperature of the hot water to the terminal units based on the outside air temperature. Air handlers run continuously in an occupied setting and cycle in unoccupied mode. The building addition (Municipal offices) utilizes the back-up electric within the AC systems as an auxiliary heat source only occasionally in morning warm up mode in extremely cold conditions.

Domestic Hot Water

Domestic hot water for the municipal office restrooms and lounges is provided by a 30 gallon Bradford White electric hot water heater with a capacity of 4500 Watts, located in the hallway closet and a 40 gallon Bradford White electric hot water heater with a capacity of 4500 Watts, located in the mayor's office. The domestic hot water piping insulation appeared to be in good condition.

Domestic hot water for the police station restrooms and lounges is provided by a 100 gallon A.O. Smith BT100 gas fired domestic hot water heater, with an input capacity of 80 MBH.

Lighting

Refer to the Investment Grade lighting Audit Appendix for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. MAJOR EQUIPMENT LIST

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

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

IV. ENERGY CONSERVATION MEASURES

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

**Table 1
ECM Financial Summary**

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	Lighting Upgrade	\$16,546	\$7,319	2.3	563.5%
ECM #2	Lighting Controls	\$3,535	\$2,456	1.4	942.1%
ECM #3	Computer Monitors	\$500	\$126	4.0	278.0%
ECM #4	AC Unit Replacements	\$151,851	\$8,862	17.1	-12.5%
ECM #5	Boiler Replacement	\$90,500	\$3,194	28.3	-29.4%
Notes: A. Cost takes into consideration applicable NJ Smart Start TM incentives. B. Savings takes into consideration applicable maintenance savings.					

**Table 2
ECM Energy Summary**

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade	11.9	43317.0	0.0
ECM #2	Lighting Controls	0.0	14616.0	0.0
ECM #3	Computer Monitors	0.0	750.0	0.0
ECM #4	AC Unit Replacements	31.4	52749.0	0.0
ECM #5	Boiler Replacement	0.0	0.0	1913.0

**Table 3
Facility Project Summary**

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Lighting Upgrade	\$7,319	\$16,726	\$180	\$16,546	2.3
Lighting Controls	\$2,456	\$4,590	\$1,055	\$3,535	1.4
Computer Monitors	\$126	\$500	\$0	\$500	4.0
AC Unit Replacements	\$8,862	\$160,600	\$8,749	\$151,851	17.1
Boiler Replacement	\$3,194	\$92,500	\$2,000	\$90,500	28.3
<i>Design / Construction Extras (15%)</i>		<i>\$41,237</i>		<i>\$41,237</i>	
Total Project	\$21,957	\$316,153	\$10,929	\$304,169	13.9

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade

Description:

The majority of the lighting at the Municipal Building is 32 watt T-8 bulbs with electronic ballasts. There are a few locations with T-12 lamps and magnetic ballasts. The existing T-8 lamps are 700 series which are efficient; however there have been improvements in lamp technology. There are also a few locations with incandescent fixtures. All exit signs throughout the building are currently high efficiency LED exit signs.

This ECM includes replacement or retrofit of all fixtures with magnetic ballasts in the facility with electronic ballasts and T-8 lamps. T-8 lamps with electronic ballasts provide energy savings as well as improved light over the existing T-12 fixtures. This ECM will also provide maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need 33% less lamps replaced per year.

This ECM also includes switching out all existing 32 watt T-8 lamps with “SuperSaver” 28 watt T-8 lamps. The new lamp technology provides equivalent lighting with reduced input wattage, while utilizing the existing electronic ballast. Several electronic ballasts were checked for compatibility with 28 watt lamps to verify the applicability of this ECM.

This ECM also includes replacement of any incandescent lamps with compact fluorescent lamps or LED fixtures. The energy usage of an incandescent compared to a compact fluorescent / LED is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours (over 50,000 burn-hours for LED fixtures), compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

Energy Savings Calculations:

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

From the **NJ Smart Start Incentive Appendix**, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamps) = \$10 per fixture

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

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (18 \text{ fixtures} \times \$10) = \$180$$

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{replacement } \$ \text{ per lamp} + \text{Labor } \$ \text{ per lamp})$$

$$\text{Savings} = (6 \text{ lamps per year}) \times (\$2.00 + \$5.00) = \$42$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$16,726
NJ Smart Start Equipment Incentive (\$):	\$180
Net Installation Cost (\$):	\$16,546
Maintenance Savings (\$/Yr):	\$42
Energy Savings (\$/Yr):	\$7,277
Total Yearly Savings (\$/Yr):	\$7,319
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.3
Simple Lifetime ROI	563.5%
Simple Lifetime Maintenance Savings	\$630
Simple Lifetime Savings	\$109,785
Internal Rate of Return (IRR)	44%
Net Present Value (NPV)	\$70,827.75

ECM #2: Lighting Controls

Description:

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

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy sensors.

This ECM includes replacement of standard wall switches with sensors wall switches for the individual offices, conference rooms, storage rooms, break rooms, kitchenette, and bathrooms for both the Municipal Building and Police Building. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) as well as other details are shown in the **Investment Grade Lighting Audit Appendix**.

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

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

$$Smart\ Start\ Incentive = (\#\ of\ wall\ mount \times \$20) + (\#\ of\ ceiling\ mount \times 35) \\ = (37 \times \$20) + (9 \times \$35) = \$1055$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$4,590
NJ Smart Start Equipment Incentive (\$):	\$1,055
Net Installation Cost (\$):	\$3,535
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$2,456
Total Yearly Savings (\$/Yr):	\$2,456
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.4
Simple Lifetime ROI	942.1%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$36,840
Internal Rate of Return (IRR)	69%
Net Present Value (NPV)	\$25,784.57

ECM #3: Computer Monitor Replacement

Description:

The computers throughout the facility utilize a mixture of CRT computer monitors and LCD computer monitors. Computers are located throughout the facility and are becoming a larger and larger portion of a facility's energy usage. The CRT computer monitors are outdated and have several disadvantages such as; significantly increased higher energy consumption, uses large amount of desk space, poor picture quality, distortions and flickering image, secular glare problems, and high weight, and electromagnetic emissions. Many of these drawbacks are difficult to quantify except for the energy use. CRT monitors use considerably more energy than an alternative flat panel LCD monitor. Replacement of the existing CRT monitors with LCD monitors saves considerable energy as well as provides other ergonomic benefits.

Based on the site survey it was noted that there are 134 LCD monitor and 5 CRT monitors. Some of the monitors were left in screen saver mode, which is deceiving since this mode only saves the computer screen from image burn in, however it does not save on energy consumption. The average operating hours for all computers and monitors is estimated based on the site survey observations. Energy consumption of computer monitors is based on averages for power usage of various computer monitors.

This ECM includes replacement of all existing CRT monitors with LCD flat panel monitors throughout the facility. Installation costs were neglected for this ECM with the intention that this ECM would be replaced by the township. The calculations are based on the following operating assumptions:

Energy Savings Calculations:

No. of CRT Monitors:	5
Operating Weeks per Yr:	50
Hrs per Week:	60 (12 hrs per day estimated average)

$$\text{Electric Usage} = \frac{\# \text{ of Computers} \times \text{Monitor Power (W)} \times \text{Operation (Hrs)}}{1000 \left(\frac{W}{KW} \right)}$$

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

COMPUTER MONITOR CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	CRT Monitors	LCD Monitor	
# of Computers	5	5	
Monitor Power Cons. (W)	75	25	
Operating Hrs per Week	60	60	
Operating Weeks per Yr	50	50	
Elec Cost (\$/kWh)	0.168	0.168	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Usage (kWh)	1,125	375	750
Energy Cost (\$)	\$189	\$63	\$126
COMMENTS:	CRT Monitor consumption based on Dell CRT monitor M/N: CRT-E771MM. Operating hours estimated.		

Installation cost of new monitors is estimated based on current pricing for a 17” LCD monitor on the market today. No labor costs were included for replacing the existing monitors with the new monitors. No incentives are available for installation of computer monitors. Net cost per monitor was estimated to be \$100.

Installation Costs: # Monitors X Cost per Monitor
 5 Monitors X \$100 per Monitor
 \$500

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$500
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$500
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$126
Total Yearly Savings (\$/Yr):	\$126
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.0
Simple Lifetime ROI	278.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$1,890
Internal Rate of Return (IRR)	24%
Net Present Value (NPV)	\$1,004.18

ECM #4: Air Conditioning Unit Upgrades

Description:

The Municipal Building is air conditioned by split system AC units and packaged rooftop units with electric heat. In this case these units are older and in need of replacement. The units currently installed are past their ASHRAE service life and can be replaced with new units with much higher efficiency. New air conditioners provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and refrigerants.

This ECM includes one-to-one replacement of the older air conditioning units with new higher efficiency systems. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of this ECM can be found in the table below:

IMPLEMENTATION SUMMARY					
ECM INPUTS	SERVICE FOR	NUMBER OF UNITS	COOLING CAPACITY, BTU/HR	TOTAL CAPACITY, TONS	REPLACE UNIT WITH
York RTUs	Various Offices	2	36,000	6.0	Carrier 50XL-A
York RTUs	Various Offices	8	30,000	20.0	Carrier 50XL-A
Trane CU	GE Air Handler	2	180,000	30.0	York Series YC
GE CU	Hallway HP's	2	30,000	5.0	Trane Series 4TW
GE CU	Mayors Office	1	60,000	5.0	Carrier 50XL-A
Packaged York	Court Room	1	60,000	5.0	Carrier 50XL-A
Packaged Snyder	Upper Corridor	1	240,000	20.0	20 Ton Carrier - 38AUZ
Packaged RTU	Lower Corridor	1	156,000	13.0	Trane Odyssey
Total		18	792,000	104.0	

The manufacturers used as the basis for design are Trane, Carrier and York. This ECM includes replacement of the outdoor condensing units and associated coils and packaged rooftop systems.

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	EXISTING UNITS (S)EER	SPLIT UNITS (S)EER	# OF UNITS	ENERGY SAVINGS kWh	DEMAND SAVINGS kW
York RTUs	36,000	1,200	10 SEER	15 SEER	2	2,880	2.4
York RTUs	30,000	1,200	10 SEER	15 SEER	8	9,600	8.0
Trane CU	180,000	1,200	9.5 EER	11.7 EER	2	8,551	7.1
GE CU	30,000	1,200	11 SEER	14 SEER	2	1,403	1.2
GE CU	60,000	1,200	11 SEER	14 SEER	1	1,403	1.2
Packaged York	60,000	2,500	10 SEER	15 SEER	1	5,000	2.0
Packaged Snyder	240,000	2,500	9 EER	11.5 EER	1	14,493	5.8
Packaged RTU	156,000	2,500	9 EER	11.5 EER	1	9,420	3.8
Total					18	52,749	31.4

Project Cost, Incentives and Maintenance Savings

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

$$\text{SmartStart® Incentive} = (\text{CoolingTons} \times \$/\text{TonIncentive})$$

SPLIT SYSTEM AC UNITS REBATE SUMMARY				
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE \$/TON	PROPOSED CAPACITY TONS	TOTAL REBATE \$
≥20 to 30 tons	10.5 EER	79	20	\$1,580
≥ 11.25 to < 20 tons	11.5 EER	79	43	\$3,397
5.4 tons or less Unitary AC and Split System	≥14 SEER	\$92	41.0	\$3,772
TOTAL			104	\$8,749

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

COST & SAVINGS SUMMARY							
ECM INPUTS	INSTALLED COST	# OF UNITS	TOTAL COST	REBATES	NET COST	ENERGY SAVING	PAY BACK YEARS
York RTUs	\$8,000	2	\$16,000	\$552	\$15,448	\$484	31.9
York RTUs	\$5,340	8	\$42,720	\$1,840	\$40,880	\$1,613	25.3
Trane CU	\$22,000	2	\$44,000	\$2,370	\$41,630	\$1,437	29.0
GE CU	\$5,340	2	\$10,680	\$460	\$10,220	\$236	43.4
GE CU	\$9,500	1	\$9,500	\$460	\$9,040	\$236	38.4
Packaged York	\$6,500	1	\$6,500	\$460	\$6,040	\$840	7.2
Packaged	\$18,200	1	\$18,200	\$1,580	\$16,620	\$2,435	6.8
Packaged RTU	\$13,000	1	\$13,000	\$1,027	\$11,973	\$1,583	7.6
Total		18	\$160,600	\$8,749	\$151,851	\$8,862	17.1

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

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$160,600
NJ Smart Start Equipment Incentive (\$):	\$8,749
Net Installation Cost (\$):	\$151,851
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$8,862
Total Yearly Savings (\$/Yr):	\$8,862
Estimated ECM Lifetime (Yr):	15
Simple Payback	17.1
Simple Lifetime ROI	-12.5%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$132,930
Internal Rate of Return (IRR)	-2%
Net Present Value (NPV)	(\$46,057.02)

ECM #5: Condensing Boiler Installation

Description:

The existing cast iron boiler is used in conjunction with packaged rooftop units as the primary source of heat for the building. The existing boiler is standard efficiency non-condensing type boilers made by Weil McLain. The boiler provides hot water to the building baseboard radiators. This boiler is past its ASHRAE service life of 35 years. With the increased efficiency of the condensing boilers, the savings can be substantial.

A new condensing boiler could substantially improve the operating efficiency of the heating system of the building. Condensing boiler's peak efficiency tops out at 99% depending on return water temperature. Due to the operating conditions of the building, the annual average operating efficiency of the proposed condensing boiler is expected to be 88%. The existing boiler's efficiency is approximately 75%, which makes the condensing boilers an 13% increase in efficiency. This ECM is based on implementation of outdoor re-set to vary the supply water temperature based on outdoor temperature.

This ECM includes installation of one condensing gas fired boilers to replace the existing cast iron boiler. The basis for this ECM is the Aerco condensing boiler model number BMK-2.0. The boiler installation is based on a one for one replacement based on capacity of the existing boiler.

Energy Savings Calculations:

Baseline Hot Water Gas Use: 68.75 Therms (Ave from July thru October Gas Use)

Existing Heating Natural Gas: 13,773 Therms – (68.75 Therms X 12 Months)
12,948 Therms

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

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

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

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Existing Cast Iron Boilers	New Condensing Boilers	
Existing Nat Gas (Therms)	12,948	0	
Boiler Efficiency (%)	75%	88%	13%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	971	971	
Gas Cost (\$/Therm)	1.67	1.67	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Natural Gas Usage (Therms)	12,948	11,035	1,913
Energy Cost (\$)	\$21,623	\$18,429	\$3,194
COMMENTS:			

Installation cost of the new condensing boiler, flue piping, boiler water piping modifications, gas piping modifications, electric, etc. is estimated to be \$92,500.

From the **NJ Smart Start Appendix**, the installation of new condensing boilers warrants the following incentive: \$1.00 per MBH.

$$\text{Smart Start}^{\circledR} \text{ Incentive} = (\text{Boiler MBH} \times \$1.00) = (2,000 \times \$1.75) = \$2,000$$

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$92,500
NJ Smart Start Equipment Incentive (\$):	\$2,000
Net Installation Cost (\$):	\$90,500
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$3,194
Total Yearly Savings (\$/Yr):	\$3,194
Estimated ECM Lifetime (Yr):	20
Simple Payback	28.3
Simple Lifetime ROI	-29.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$63,880
Internal Rate of Return (IRR)	-3%
Net Present Value (NPV)	(\$42,981.35)

V. ADDITIONAL RECOMMENDATIONS

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

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- E. Turn off all computers when not in use. Ensure computers are not set to screen saver mode which does not save energy.

In addition to the recommendations above, implementing Retro-Commissioning would be beneficial for this facility. Retro-Commissioning is a means to verify your current equipment is operating at its designed efficiency, capacity, airflow, and overall performance. Retro-Commissioning provides valuable insight into systems or components not performing correctly or efficiently. The commissioning process defines the original system design parameters and recommends revisions to the current system operating characteristics. This is important for a facility like the Municipal building since various systems exist such as hot water heat, electric heat, natural gas heat, etc. These facility additions have caused the existing systems to be expanded or altered since the original design. Retro-Commissioning is highly recommended for this facility to ensure proper and efficient operation.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Gloucester Township - Municipal Building

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1 + IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1 + DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Lighting Upgrade	\$16,726	\$0	\$180	\$16,546	\$7,277	\$42	\$7,319	15	\$109,785	\$630	563.5%	2.3	44.05%	\$70,827.75
ECM #2	Lighting Controls	\$4,590	\$0	\$1,055	\$3,535	\$2,456	\$0	\$2,456	15	\$36,840	\$0	942.1%	1.4	69.45%	\$25,784.57
ECM #3	Computer Monitors	\$500	\$0	\$0	\$500	\$126	\$0	\$126	15	\$1,890	\$0	278.0%	4.0	24.23%	\$1,004.18
ECM #4	AC Unit Replacements	\$93,400	\$67,200	\$8,749	\$151,851	\$8,862	\$0	\$8,862	15	\$132,930	\$0	-12.5%	17.1	-1.62%	(\$46,057.02)
ECM #5	Boiler Replacement	\$38,800	\$53,700	\$2,000	\$90,500	\$3,194	\$0	\$3,194	20	\$63,880	\$0	-29.4%	28.3	-3.11%	(\$42,981.35)

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



Concord Engineering Group, Inc.

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SmartStart Building Incentives

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

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

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

Desiccant Systems

\$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

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



STATEMENT OF ENERGY PERFORMANCE

Gloucester Twp - Municipal Building

Building ID: 2555084
 For 12-month Period Ending: October 31, 2009¹
 Date SEP becomes ineligible: N/A

Date SEP Generated: January 17, 2011

Facility
 Gloucester Twp - Municipal Building
 1261 Chews Landing Road
 Blackwood, NJ 08012

Facility Owner
 Gloucester Township
 1261 chews landing road
 Gloucester Township, NJ 08012

Primary Contact for this Facility
 Tom Cardis
 1261 chews landing road
 Gloucester Township, NJ 08012

Year Built: 1973
Gross Floor Area (ft²): 43,000

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	2,060,848
Natural Gas (kBtu) ⁴	1,374,100
Total Energy (kBtu)	3,434,948

Energy Intensity⁵

Site (kBtu/ft ² /yr)	80
Source (kBtu/ft ² /yr)	194

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	387
---	-----

Electric Distribution Utility

Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	77
National Average Source EUI	182
% Difference from National Average Source EUI	6%
Building Type	Office

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

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
 Michael Fischette
 520 South Burnt Mill Road
 Voorhees, NJ 08043

Notes:

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Municipal Building

Rooftop / AC Units

Tag			
Unit Type	Packaged Rooftop Unit	Packaged Rooftop Unit	Split System Condensers
Qty	2	8	2
Location	East Municipal Rooftop	East Municipal Rooftop	Roof above council room
Area Served	Various Municipal Office Areas	Various Municipal Office Areas	GE Outdoor Air Handler
Manufacturer	York	York	Trane
Model #	DAPB-F036AB	DAPB-F030AB	TTA180B300CC
Serial #	NDMM03590	NDMM039603	M253WFJAH
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	3 Tons	2.5 Tons	15 Tons
Cooling Efficiency (SEER/EER)	9.5 EER	9 EER	9.5 EER
Heating Type	Electric	Electric	N/A
Heating Input (MBH)	7.5 KW	7.5 KW	N/A
Efficiency	100%	100%	N/A
Fuel	Electric	Electric	N/A
Approx Age	10	10	14
ASHRAE Service Life	15	15	15
Remaining Life	5	5	1
Comments			

Rooftop / AC Units

Tag			
Unit Type	Split System Air Handler	Split System Heat Pump	Split System Heat Pump
Qty	1	2	1
Location	Roof above court room	Rooftop council room/ mayor's office	Rooftop council room/ mayor's office
Area Served	Court Room	Hallways	Mayor's office
Manufacturer	General Electric	General Electric	General Electric
Model #	BRB008H52C	Weathertron BWB930	BWC06C0300B0
Serial #	2890031	2127118	258053815
Cooling Type	DX, R-22	DX	DX, R-22
Cooling Capacity (Tons)	30 Ton	2.5 Ton	5 Tons
Cooling Efficiency (SEER/EER)	11 SEER (Est)	11 SEER (Est)	11 SEER (Est)
Heating Type	None	None	None
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	30	22	20
ASHRAE Service Life	15	15	15
Remaining Life	(15)	(7)	(5)
Comments			

Rooftop / AC Units

Tag			
Unit Type	Split system A/C	Packaged A/C with Gas Heat	Packaged A/C with Gas Heat
Qty	1	1	1
Location	Computer Room	Police Building Roof	Police Building Roof
Area Served	Computer Room	Court Room	Upper Level Corridor Police Bldg
Manufacturer	Fujitsu	York	Snyder General
Model #	Indoor ASU30CLX / Outdoor AOU30CLX	D6CG060N09925A	R200D0N401
Serial #	DEA008053	NDDM027170	R883000009
Cooling Type	DX	DX, R-22	DX, R-22
Cooling Capacity (Tons)	2.5 Tons	5 Tons	20 Tons
Cooling Efficiency (SEER/EER)	16.5 SEER / 9.5 EER	10 SEER / 9.10 EER	9 EER
Heating Type	None	Gas HX	Gas HX
Heating Input (MBH)	N/A	125 MBH	400 MBH
Efficiency	N/A	80%	81%
Fuel	N/A	Natural Gas	Natural Gas
Approx Age	5	16	23
ASHRAE Service Life	15	15	15
Remaining Life	10	(1)	(8)
Comments			

Rooftop / AC Units

Tag			
Unit Type	Split System Condenser		
Qty	1		
Location	Roof Above Police Bldg		
Area Served	Communications Room		
Manufacturer	York		
Model #	AC036X1322A		
Serial #	W0E6360060		
Cooling Type	DX, R-22		
Cooling Capacity (Tons)	3 Tons		
Cooling Efficiency (SEER/EER)	11.6 EER		
Heating Type	None		
Heating Input (MBH)	N/A		
Efficiency	N/A		
Fuel	N/A		
Approx Age	5		
ASHRAE Service Life	15		
Remaining Life	10		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Municipal Building

Boilers

Tag	Boiler-1		
Unit Type	Gas Fired Hot Water Heater		
Qty	1		
Location	Central Boiler Plant		
Area Served	Baseboard Heat		
Manufacturer	Weil McLain		
Model #	788		
Serial #	-		
Input Capacity (MBH)	2,049 MBH		
Rated Output Capacity (MBH)	1,632 MBH		
Approx. Efficiency %	80%		
Fuel	Natural Gas		
Approx Age	32		
ASHRAE Service Life	30		
Remaining Life	(2)		
Comments	Power Flame Burner		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Municipal Building

Chiller

Tag	CH-1,2		
Unit Type	Air Cooled Chiller		
Qty	2		
Location	Outside Mechanical Room on Grade		
Area Served	Police Building Air Handling Units		
Manufacturer	Drake Refrigeration, Inc		
Model #	PAC240D2-T3-Z		
Serial #	D06E0323		
Refrigerant	R-22		
Cooling Capacity (Tons)	20 Ton		
Cooling Efficiency (EER)	12.8 EER		
Volts / Phase / Hz	208/230/3ph/60hz		
Fuel	-		
Chilled Water GPM / ΔT	-		
Condenser Water GPM / ΔT	-		
Approx Age	9		
ASHRAE Service Life	23		
Remaining Life	14		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Municipal Building

Domestic Water Heaters

Tag	HWH-1	HWH-2	HWH-3
Unit Type	Electric Domestic Hot Water Heater	Electric Domestic Hot Water Heater	Gas Fired Domestic Hot Water Heater
Qty	1	1	1
Location	Janitor Closet in near front desk	Mayor's Office Closet	Central Boiler Room
Area Served	Municipal Office Area	Mayor's Office	Police Building
Manufacturer	Bradford White	Bradford White	A.O. Smith
Model #	MI30R5DSS13	M240S6DS5	BT 100 930
Serial #	KG1850379	CC7425327	MB89-0026191-930
Size (Gallons)	30 Gallons	40 Gallons	100 Gallons
Input Capacity (MBH/Watts)	4500 Watts	4500 Watts	80 MBH
Recovery (Gal/Hr)	N/A	N/A	72.7 Gal/Hr
Efficiency %	100%	100%	80%
Fuel	Electric	Electric	Natural Gas
Approx Age	18	5	21
ASHRAE Service Life	12	12	12
Remaining Life	(6)	7	(9)
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Municipal Building

Pumps

Tag	HWP-1,2	CHWP-1 & 2	
Unit Type	In-Line Pump	In-Line Pump	
Qty	2	2	
Location	Central Boiler Plant	Central Boiler Plant	
Area Served	N/A	N/A	
Manufacturer	Bell & Gossett	Bell & Gossett	
Model #	N/A	N/A	
Serial #	N/A	N/A	
Horse Power	1.5 HP	1.5 HP	
Flow	N/A	N/A	
Motor Info	Marathon Electric	A.O Smith Century	
Electrical Power	200-230/460	460/200-230	
RPM	1725 RPM	1735 RPM	
Motor Efficiency %	82.5%	82.5%	
Approx Age	N/A	N/A	
ASHRAE Service Life	20	20	20
Remaining Life			
Comments			

Investment Grade Lighting Audit

CEG Job #: 9C10076

Project: Municipal Building

1261 Chews Landing Road

Gloucester Township, NJ

Bldg. Sq. Ft.

Municipal Building

KWH COST: \$0.168

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS				
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
227.21	Open Office - 1st Floor	2600	36	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	2.34	6,084.0	\$1,022.11	36	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	1.76	4586.4	\$770.52	\$24.00	\$864.00	0.58	1497.6	\$251.60	3.43
227.21	Counter Area	2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338.0	\$56.78	2	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	254.8	\$42.81	\$24.00	\$48.00	0.03	83.2	\$13.98	3.43
227.21	Tax Collector	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
227.21	Muni. Assessors Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
227.21	Side Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$170.35	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	764.4	\$128.42	\$24.00	\$144.00	0.10	249.6	\$41.93	3.43
227.21	Side Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$170.35	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	764.4	\$128.42	\$24.00	\$144.00	0.10	249.6	\$41.93	3.43
227.21	Corner Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$170.35	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	764.4	\$128.42	\$24.00	\$144.00	0.10	249.6	\$41.93	3.43
227.21	Printer/ Copy Room	2600	12	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.78	2,028.0	\$340.70	12	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.59	1528.8	\$256.84	\$24.00	\$288.00	0.19	499.2	\$83.87	3.43
237.22		2600	1	3	2x2, 3 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	92	0.09	239.2	\$40.19	1	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	File Storage/ Break Room	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$170.35	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	764.4	\$128.42	\$24.00	\$144.00	0.10	249.6	\$41.93	3.43
227.21	Rear Exit	2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338.0	\$56.78	2	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	254.8	\$42.81	\$24.00	\$48.00	0.03	83.2	\$13.98	3.43
227.21	Lobby	4400	7	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.46	2,002.0	\$336.34	7	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.34	1509.2	\$253.55	\$24.00	\$168.00	0.11	492.8	\$82.79	2.03
227.21	Men's Rest Room	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	\$28.39	1	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.05	127.4	\$21.40	\$24.00	\$24.00	0.02	41.6	\$6.99	3.43

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221.41		2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.25	644.8	\$108.33	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$87.36	\$14.00	\$56.00	0.05	124.8	\$20.97	2.67
221.14	Custodial Closet	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.12	148.8	\$25.00	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	\$20.16	\$14.00	\$28.00	0.02	28.8	\$4.84	5.79
227.21	Woman's Rest Room	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	\$28.39	1	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.05	127.4	\$21.40	\$24.00	\$24.00	0.02	41.6	\$6.99	3.43
221.41		2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.25	644.8	\$108.33	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$87.36	\$14.00	\$56.00	0.05	124.8	\$20.97	2.67
227.21	Corridor	4400	9	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.59	2,574.0	\$432.43	9	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.44	1940.4	\$325.99	\$24.00	\$216.00	0.14	633.6	\$106.44	2.03
227.21	Twp. Clerk	2600	15	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.98	2,535.0	\$425.88	15	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.74	1911	\$321.05	\$24.00	\$360.00	0.24	624	\$104.83	3.43
227.21	Conference/ Lunch Room	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
227.21	File Room	2600	8	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.52	1,352.0	\$227.14	8	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.39	1019.2	\$171.23	\$24.00	\$192.00	0.13	332.8	\$55.91	3.43
227.21	Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$170.35	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	764.4	\$128.42	\$24.00	\$144.00	0.10	249.6	\$41.93	3.43
227.21	Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$170.35	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	764.4	\$128.42	\$24.00	\$144.00	0.10	249.6	\$41.93	3.43
221.41	Rear Stairwell	4400	5	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.31	1,364.0	\$229.15	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	1100	\$184.80	\$14.00	\$70.00	0.06	264	\$44.35	1.58
227.21	Mayor's Office	2600	10	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.65	1,690.0	\$283.92	10	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.49	1274	\$214.03	\$24.00	\$240.00	0.16	416	\$69.89	3.43
227.21	Mayor's Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$170.35	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	764.4	\$128.42	\$24.00	\$144.00	0.10	249.6	\$41.93	3.43
227.21	Lunch Room Area	2600	3	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.20	507.0	\$85.18	3	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.15	382.2	\$64.21	\$24.00	\$72.00	0.05	124.8	\$20.97	3.43
221.41	Rest Room	1200	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.06	74.4	\$12.50	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	60	\$10.08	\$14.00	\$14.00	0.01	14.4	\$2.42	5.79
221.41	Rest Room	1200	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.06	74.4	\$12.50	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	60	\$10.08	\$14.00	\$14.00	0.01	14.4	\$2.42	5.79
227.21	Vital Statistics - Front Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43

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227.21	Vital Statistics - Rear Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
227.21	Personnel	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
221.14	Personnel Storage	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.12	148.8	\$25.00	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	\$20.16	\$14.00	\$28.00	0.02	28.8	\$4.84	5.79
227.21		1200	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	156.0	\$26.21	2	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	117.6	\$19.76	\$24.00	\$48.00	0.03	38.4	\$6.45	7.44
227.21	A110 Storage	1200	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	468.0	\$78.62	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	352.8	\$59.27	\$24.00	\$144.00	0.10	115.2	\$19.35	7.44
221.14	A111 Electrical Room	2600	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.37	967.2	\$162.49	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	\$131.04	\$14.00	\$84.00	0.07	187.2	\$31.45	2.67
227.21	A109 Council Room	1200	46	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	2.99	3,588.0	\$602.78	46	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	2.25	2704.8	\$454.41	\$24.00	\$1,104.00	0.74	883.2	\$148.38	7.44
221.22		4400	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.37	1,636.8	\$274.98	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	1320	\$221.76	\$14.00	\$84.00	0.07	316.8	\$53.22	1.58
227.21	A109-4 Conference Room	2600	8	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.52	1,352.0	\$227.14	8	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.39	1019.2	\$171.23	\$24.00	\$192.00	0.13	332.8	\$55.91	3.43
221.14	A109-3 Storage	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.12	148.8	\$25.00	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	\$20.16	\$14.00	\$28.00	0.02	28.8	\$4.84	5.79
227.21	A109-2 Lunch/ Kitchen	2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338.0	\$56.78	2	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	254.8	\$42.81	\$24.00	\$48.00	0.03	83.2	\$13.98	3.43
221.14	A201 Phone Room	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.12	322.4	\$54.16	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	\$43.68	\$14.00	\$28.00	0.02	62.4	\$10.48	2.67
227.21	Construction Office	2600	40	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	2.60	6,760.0	\$1,135.68	40	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	1.96	5096	\$856.13	\$24.00	\$960.00	0.64	1664	\$279.55	3.43
227.21	Corner Office - Lechner	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
227.21	Zoning Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
227.21	Side Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
227.21	Kitchenette	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$170.35	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	764.4	\$128.42	\$24.00	\$144.00	0.10	249.6	\$41.93	3.43

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227.21	File Storage	2600	5	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.33	845.0	\$141.96	5	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.25	637	\$107.02	\$24.00	\$120.00	0.08	208	\$34.94	3.43
111.15		2600	6	1	6"x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., White Diffuser	48	0.29	748.8	\$125.80	6	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	0.15	390	\$65.52	\$80.00	\$480.00	0.14	358.8	\$60.28	7.96
221.14	A203 Roof Access	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.12	148.8	\$25.00	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	\$20.16	\$14.00	\$28.00	0.02	28.8	\$4.84	5.79
221.41	Men's Rest Room	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.12	322.4	\$54.16	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	\$43.68	\$14.00	\$28.00	0.02	62.4	\$10.48	2.67
221.41	Woman's Rest Room	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.12	322.4	\$54.16	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	\$43.68	\$14.00	\$28.00	0.02	62.4	\$10.48	2.67
227.21	2nd Floor Hall	4400	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,716.0	\$288.29	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	1293.6	\$217.32	\$24.00	\$144.00	0.10	422.4	\$70.96	2.03
227.21	2nd Floor Connecting Corridor	4400	10	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.65	2,860.0	\$480.48	10	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.49	2156	\$362.21	\$24.00	\$240.00	0.16	704	\$118.27	2.03
Police Building																						
227.21	213 Police Operations Center	8760	8	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.52	4,555.2	\$765.27	8	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.39	3433.92	\$576.90	\$24.00	\$192.00	0.13	1121.28	\$188.38	1.02
227.21	2nd Floor Corridor	8760	17	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	1.11	9,679.8	\$1,626.21	17	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.83	7297.08	\$1,225.91	\$24.00	\$408.00	0.27	2382.72	\$400.30	1.02
227.21	Men's Rest Room	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	\$28.39	1	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.05	127.4	\$21.40	\$24.00	\$24.00	0.02	41.6	\$6.99	3.43
227.21	Woman's Rest Room	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	\$28.39	1	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.05	127.4	\$21.40	\$24.00	\$24.00	0.02	41.6	\$6.99	3.43
227.21	217 Conference Room	2600	23	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	1.50	3,887.0	\$653.02	23	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	1.13	2930.2	\$492.27	\$24.00	\$552.00	0.37	956.8	\$160.74	3.43
227.21	218-219 Office	2600	12	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.78	2,028.0	\$340.70	12	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.59	1528.8	\$256.84	\$24.00	\$288.00	0.19	499.2	\$83.87	3.43
227.21	210 Police Records	2600	11	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.72	1,859.0	\$312.31	11	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.54	1401.4	\$235.44	\$24.00	\$264.00	0.18	457.6	\$76.88	3.43
227.21	Lt Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
227.21	Office/ Files	2600	10	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.65	1,690.0	\$283.92	10	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.49	1274	\$214.03	\$24.00	\$240.00	0.16	416	\$69.89	3.43

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227.21	206 Tech. Services	8760	10	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.65	5,694.0	\$956.59	10	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.49	4292.4	\$721.12	\$24.00	\$240.00	0.16	1401.6	\$235.47	1.02
142.21	Storage Closet	1200	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.16	187.2	\$31.45	1	3	3 Lamp , 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.09	103.2	\$17.34	\$100.00	\$100.00	0.07	84	\$14.11	7.09
227.21	Kitchenette	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	\$28.39	1	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.05	127.4	\$21.40	\$24.00	\$24.00	0.02	41.6	\$6.99	3.43
563	Dispatch	8760	8	1	Recessed Down Light, 26w PL Lamp	26	0.21	1,822.1	\$306.11	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
564		8760	12	1	Recessed Down Light, 50w MR16 Lamp	50	0.60	5,256.0	\$883.01	12	1	LED MR16 4w Dimmable Lamp	4	0.05	420.48	\$70.64	\$35.00	\$420.00	0.55	4835.52	\$812.37	0.52
142.22	Storage/ Server Room	1200	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	156	0.16	187.2	\$31.45	1	3	Delamp 1, Reballast & Relamp; (3) Sylvania Lamp FO28/841/SS/ECO	72	0.07	86.4	\$14.52	\$100.00	\$100.00	0.08	100.8	\$16.93	5.91
227.21	Kitchenette	8760	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	1,138.8	\$191.32	2	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	858.48	\$144.22	\$24.00	\$48.00	0.03	280.32	\$47.09	1.02
227.21	Stairway	8760	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	569.4	\$95.66	1	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.05	429.24	\$72.11	\$24.00	\$24.00	0.02	140.16	\$23.55	1.02
221.41		8760	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.12	1,086.2	\$182.49	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	876	\$147.17	\$14.00	\$28.00	0.02	210.24	\$35.32	0.79
227.21	Identification Room	8760	5	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.33	2,847.0	\$478.30	5	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.25	2146.2	\$360.56	\$24.00	\$120.00	0.08	700.8	\$117.73	1.02
227.21	Police Chief - Front	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$170.35	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	764.4	\$128.42	\$24.00	\$144.00	0.10	249.6	\$41.93	3.43
227.21	Police Chief Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,014.0	\$170.35	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	764.4	\$128.42	\$24.00	\$144.00	0.10	249.6	\$41.93	3.43
3520	Police Chief Storage	1200	2	2	White Globe Fixture, (2) 100w A Lamps	200	0.40	480.0	\$80.64	2	2	26w CFL Lamp	52	0.10	124.8	\$20.97	\$40.00	\$80.00	0.30	355.2	\$59.67	1.34
227.21	Deputy Chief	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
227.21	205 Grants	2600	10	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.65	1,690.0	\$283.92	10	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.49	1274	\$214.03	\$24.00	\$240.00	0.16	416	\$69.89	3.43
227.21	204 Court Clerks	2600	29	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	1.89	4,901.0	\$823.37	29	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	1.42	3694.6	\$620.69	\$24.00	\$696.00	0.46	1206.4	\$202.68	3.43
227.21	204 Files Area	2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338.0	\$56.78	2	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	254.8	\$42.81	\$24.00	\$48.00	0.03	83.2	\$13.98	3.43
227.21	204 Corner Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43

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227.21	202 Storage	1200	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	156.0	\$26.21	2	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	117.6	\$19.76	\$24.00	\$48.00	0.03	38.4	\$6.45	7.44
227.21	Woman's Rest Room	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676.0	\$113.57	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	509.6	\$85.61	\$24.00	\$96.00	0.06	166.4	\$27.96	3.43
227.21	Men's Rest Room	2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338.0	\$56.78	2	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	254.8	\$42.81	\$24.00	\$48.00	0.03	83.2	\$13.98	3.43
227.21	Police Entrance	8760	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	2,277.6	\$382.64	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	1716.96	\$288.45	\$24.00	\$96.00	0.06	560.64	\$94.19	1.02
142.25	Watch Desk/ Command	8760	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	156	0.62	5,466.2	\$918.33	4	3	Delamp 1, Reballast & Relamp; (3) Sylvania Lamp FO28/841/SS/ECO	72	0.29	2522.88	\$423.84	\$100.00	\$400.00	0.34	2943.36	\$494.48	0.81
227.21		8760	12	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.78	6,832.8	\$1,147.91	12	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.59	5150.88	\$865.35	\$24.00	\$288.00	0.19	1681.92	\$282.56	1.02
242.21		8760	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	1,874.6	\$314.94	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	1716.96	\$288.45	\$28.00	\$56.00	0.02	157.68	\$26.49	2.11
227.21	106 Hall	8760	5	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.33	2,847.0	\$478.30	5	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.25	2146.2	\$360.56	\$24.00	\$120.00	0.08	700.8	\$117.73	1.02
227.212	Squad Room	8760	16	2	2x2, 2 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	60	0.96	8,409.6	\$1,412.81	16	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	122 Booking	8760	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	1,138.8	\$191.32	2	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	858.48	\$144.22	\$24.00	\$48.00	0.03	280.32	\$47.09	1.02
227.212	Interview Room	2600	2	2	2x2, 2 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	60	0.12	312.0	\$52.42	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.212	Office	2600	4	2	2x2, 2 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	60	0.24	624.0	\$104.83	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Briefing Room	4400	12	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.78	3,432.0	\$576.58	12	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.59	2587.2	\$434.65	\$24.00	\$288.00	0.19	844.8	\$141.93	2.03
613.1	Boiler Room	2600	4	1	Industrial Fixture, 170w A19 Lamp	170	0.68	1,768.0	\$297.02	4	1	(1) 42w CFL Lamp	42	0.17	436.8	\$73.38	\$20.00	\$80.00	0.51	1331.2	\$223.64	0.36
227.212	Work Out Room	2600	4	2	2x2, 2 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	60	0.24	624.0	\$104.83	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
284.21	Court Room	2600	12	8	4x4, 8 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	214	2.57	6,676.8	\$1,121.70	12	8	Relamp - Sylvania Lamp FO28/841/SS/ECO	192	2.30	5990.4	\$1,006.39	\$56.00	\$672.00	0.26	686.4	\$115.32	5.83
142.21		2600	6	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.94	2,433.6	\$408.84	6	3	3 Lamp, 32w T8, Elect. Ballast, Specular Reflector; retrofit	86	0.52	1341.6	\$225.39	\$100.00	\$600.00	0.42	1092	\$183.46	3.27

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242.21		2600	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.21	556.4	\$93.48	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	509.6	\$85.61	\$28.00	\$56.00	0.02	46.8	\$7.86	7.12
227.212	Kitchenette	1200	4	2	2x2, 2 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	60	0.24	288.0	\$48.38	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Detective Offices	4400	20	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	1.30	5,720.0	\$960.96	20	2	Sylvania Lamp FBO30/841XP/6//SS/ECO	49	0.98	4312	\$724.42	\$24.00	\$480.00	0.32	1408	\$236.54	2.03
725		4400	16	1	150w HPS Wallpack	188	3.01	13,235.2	\$2,223.51	16	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
713	Exterior	4400	12	1	100w HPS 1x1 w/Prismatic Lens	125	1.50	6,600.0	\$1,108.80	12	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
	Totals		707	219			51.54	186,767	\$31,377	707	199			33.0	111,297	\$18,698		\$16,726	11.9	43,317	\$7,277	2.30

CEG Job #: 9C10076
 Project: Municipal Building
 Address: 1261 Chews Landing Road
 Gloucester Township, NJ
 Building SF: -

Municipal Building

KWH COST: \$0.168

ECM #2: Lighting Controls

EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
227.21	Open Office - 1st Floor	2600	36	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	2.34	6084	\$1,022.11	36	0	No Change	65	2.34	0%	6084	\$1,022.11	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Counter Area	2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338	\$56.78	2	0	No Change	65	0.13	0%	338	\$56.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Tax Collector	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	Muni. Assessors Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	Side Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$170.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$136.28	\$75.00	\$75.00	0.08	202.8	\$34.07	2.20
227.21	Side Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$170.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$136.28	\$75.00	\$75.00	0.08	202.8	\$34.07	2.20
227.21	Corner Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$170.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$136.28	\$75.00	\$75.00	0.08	202.8	\$34.07	2.20
227.21	Printer/ Copy Room	2600	12	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.78	2028	\$340.70	12	1	Dual Technology Occupancy Sensor - Remote Mnt.	65	0.62	20%	1622.4	\$272.56	\$160.00	\$160.00	0.16	405.6	\$68.14	2.35
237.22		2600	1	3	2x2, 3 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	92	0.092	239.2	\$40.19	1	0	No Change	92	0.09	0%	239.2	\$40.19	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	File Storage/ Break Room	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$170.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$136.28	\$75.00	\$75.00	0.08	202.8	\$34.07	2.20
227.21	Rear Exit	2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338	\$56.78	2	0	No Change	65	0.13	0%	338	\$56.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Lobby	4400	7	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.455	2002	\$336.34	7	0	No Change	65	0.46	0%	2002	\$336.34	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Men's Rest Room	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.065	169	\$28.39	1	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.05	20%	135.2	\$22.71	\$75.00	\$75.00	0.01	33.8	\$5.68	2.74
221.41		2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.248	644.8	\$108.33	4			62	0.20	20%	515.84	\$86.66		\$0.00	\$0.00	0.05	128.96	
221.14	Custodial Closet	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.124	148.8	\$25.00	2	0	No Change	62	0.12	0%	148.8	\$25.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Woman's Rest Room	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.065	169	\$28.39	1	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.05	20%	135.2	\$22.71	\$75.00	\$75.00	0.01	33.8	\$5.68	2.74

221.41		2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.248	644.8	\$108.33	4			62	0.20	20%	515.84	\$86.66		\$0.00	0.05	128.96	\$21.67	
227.21	Corridor	4400	9	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.585	2574	\$432.43	9	0	No Change	65	0.59	0%	2574	\$432.43	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Twp. Clerk	2600	15	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.975	2535	\$425.88	15	1	Dual Technology Occupancy Sensor - Remote Mnt.	65	0.78	20%	2028	\$340.70	\$160.00	\$160.00	0.20	507	\$85.18	1.88
227.21	Conference/ Lunch Room	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	File Room	2600	8	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.52	1352	\$227.14	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.42	20%	1081.6	\$181.71	\$75.00	\$75.00	0.10	270.4	\$45.43	1.65
227.21	Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$170.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$136.28	\$75.00	\$75.00	0.08	202.8	\$34.07	2.20
227.21	Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$170.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$136.28	\$75.00	\$75.00	0.08	202.8	\$34.07	2.20
221.41	Rear Stairwell	4400	5	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.31	1364	\$229.15	5	0	No Change	62	0.31	0%	1364	\$229.15	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Mayor's Office	2600	10	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.65	1690	\$283.92	10	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.52	20%	1352	\$227.14	\$75.00	\$75.00	0.13	338	\$56.78	1.32
227.21	Mayor's Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$170.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$136.28	\$75.00	\$75.00	0.08	202.8	\$34.07	2.20
227.21	Lunch Room Area	2600	3	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.195	507	\$85.18	3	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.16	20%	405.6	\$68.14	\$75.00	\$75.00	0.04	101.4	\$17.04	4.40
221.41	Rest Room	1200	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.062	74.4	\$12.50	1	0	No Change	62	0.06	0%	74.4	\$12.50	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.41	Rest Room	1200	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.062	74.4	\$12.50	1	0	No Change	62	0.06	0%	74.4	\$12.50	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Vital Statistics - Front Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	Vital Statistics - Rear Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	Personnel	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
221.14	Personnel Storage	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.124	148.8	\$25.00	2	0	No Change	62	0.12	0%	148.8	\$25.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21		1200	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	156	\$26.21	2	0	No Change	65	0.13	0%	156	\$26.21	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	A110 Storage	1200	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	468	\$78.62	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	374.4	\$62.90	\$75.00	\$75.00	0.08	93.6	\$15.72	4.77
221.14	A111 Electrical Room	2600	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.372	967.2	\$162.49	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	62	0.30	20%	773.76	\$129.99	\$75.00	\$75.00	0.07	193.44	\$32.50	2.31

227.21	A109 Council Room	1200	46	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	2.99	3588	\$602.78	46	0	No Change	65	2.99	0%	3588	\$602.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.22		4400	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.372	1636.8	\$274.98	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.30	20%	1309.44	\$219.99	\$160.00	\$160.00	0.07	327.36	\$55.00	2.91
227.21	A109-4 Conference Room	2600	8	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.52	1352	\$227.14	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.42	20%	1081.6	\$181.71	\$75.00	\$75.00	0.10	270.4	\$45.43	1.65
221.14	A109-3 Storage	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.124	148.8	\$25.00	2	0	No Change	62	0.12	0%	148.8	\$25.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	A109-2 Lunch/Kitchen	2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338	\$56.78	2	0	No Change	65	0.13	0%	338	\$56.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.14	A201 Phone Room	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.124	322.4	\$54.16	2	0	No Change	62	0.12	0%	322.4	\$54.16	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Construction Office	2600	40	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	2.6	6760	\$1,135.68	40	3	Dual Technology Occupancy Sensor - Remote Mnt.	65	2.08	20%	5408	\$908.54	\$160.00	\$480.00	0.52	1352	\$227.14	2.11
227.21	Corner Office - Lechner	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	Zoning Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	Side Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	Kitchenette	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$170.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$136.28	\$75.00	\$75.00	0.08	202.8	\$34.07	2.20
227.21	File Storage	2600	5	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.325	845	\$141.96	5	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.26	20%	676	\$113.57	\$75.00	\$75.00	0.07	169	\$28.39	1.40
111.15		2600	6	1	6"x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., White Diffuser	48	0.288	748.8	\$125.80	6		48	0.23	20%	599.04	\$100.64	0.06			149.76	\$25.16		
221.14	A203 Roof Access	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., No Lens	62	0.124	148.8	\$25.00	2	0	No Change	62	0.12	0%	148.8	\$25.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.41	Men's Rest Room	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.124	322.4	\$54.16	2	0	No Change	62	0.12	0%	322.4	\$54.16	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.41	Woman's Rest Room	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.124	322.4	\$54.16	2	0	No Change	62	0.12	0%	322.4	\$54.16	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	2nd Floor Hall	4400	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1716	\$288.29	6	0	No Change	65	0.39	0%	1716	\$288.29	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	2nd Floor Connecting Corridor	4400	10	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.65	2860	\$480.48	10	0	No Change	65	0.65	0%	2860	\$480.48	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Police Building					0	0	0	\$0.00	0	0	No Change	0	0.00	0%	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
227.21	213 Police Operations Center	8760	8	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.52	4555.2	\$765.27	8	0	No Change	65	0.52	0%	4555.2	\$765.27	\$0.00	\$0.00	0.00	0	\$0.00	0.00

227.21	2nd Floor Corridor	8760	17	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	1.105	9679.8	\$1,626.21	17	0	No Change	65	1.11	0%	9679.8	\$1,626.21	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Men's Rest Room	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.065	169	\$28.39	1	0	No Change	65	0.07	0%	169	\$28.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Woman's Rest Room	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.065	169	\$28.39	1	0	No Change	65	0.07	0%	169	\$28.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	217 Conference Room	2600	23	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	1.495	3887	\$653.02	23	1	Dual Technology Occupancy Sensor - Remote Mnt.	65	1.20	20%	3109.6	\$522.41	\$160.00	\$160.00	0.30	777.4	\$130.60	1.23
227.21	218-219 Office	2600	12	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.78	2028	\$340.70	12	2	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.62	20%	1622.4	\$272.56	\$75.00	\$150.00	0.16	405.6	\$68.14	2.20
227.21	210 Police Records	2600	11	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.715	1859	\$312.31	11	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.57	20%	1487.2	\$249.85	\$75.00	\$75.00	0.14	371.8	\$62.46	1.20
227.21	Lt Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	Office/ Files	2600	10	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.65	1690	\$283.92	10	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.52	20%	1352	\$227.14	\$75.00	\$75.00	0.13	338	\$56.78	1.32
227.21	206 Tech. Services	8760	10	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.65	5694	\$956.59	10	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.52	20%	4555.2	\$765.27	\$75.00	\$75.00	0.13	1138.8	\$191.32	0.39
142.21	Storage Closet	1200	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Prismatic Lens	156	0.156	187.2	\$31.45	1	0	No Change	156	0.16	0%	187.2	\$31.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Kitchenette	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.065	169	\$28.39	1	0	No Change	65	0.07	0%	169	\$28.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00
563	Dispatch	8760	8	1	Recessed Down Light, 26w PL Lamp	26	0.208	1822.08	\$306.11	8	0	No Change	26	0.21	0%	1822.08	\$306.11	\$0.00	\$0.00	0.00	0	\$0.00	0.00
564		8760	12	1	Recessed Down Light, 50w MR16 Lamp	50	0.6	5256	\$883.01	12	0	No Change	50	0.60	0%	5256	\$883.01	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.22	Storage/ Server Room	1200	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	156	0.156	187.2	\$31.45	1	0	No Change	156	0.16	0%	187.2	\$31.45	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Kitchenette	8760	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	1138.8	\$191.32	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.10	20%	911.04	\$153.05	\$75.00	\$75.00	0.03	227.76	\$38.26	1.96
227.21	Stairway	8760	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.065	569.4	\$95.66	1	0	No Change	65	0.07	0%	569.4	\$95.66	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.41		8760	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Wall Mnt., Prismatic	62	0.124	1086.24	\$182.49	2	0	No Change	62	0.12	0%	1086.24	\$182.49	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Identification Room	8760	5	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.325	2847	\$478.30	5	0	No Change	65	0.33	0%	2847	\$478.30	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Police Chief - Front	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$170.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$136.28	\$75.00	\$75.00	0.08	202.8	\$34.07	2.20
227.21	Police Chief Office	2600	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1014	\$170.35	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.31	20%	811.2	\$136.28	\$75.00	\$75.00	0.08	202.8	\$34.07	2.20

3520	Police Chief Storage	1200	2	2	White Globe Fixture, (2) 100w A Lamps	200	0.4	480	\$80.64	2	0	No Change	200	0.40	0%	480	\$80.64	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Deputy Chief	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	205 Grants	2600	10	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.65	1690	\$283.92	10	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.52	20%	1352	\$227.14	\$75.00	\$75.00	0.13	338	\$56.78	1.32
227.21	204 Court Clerks	2600	29	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	1.885	4901	\$823.37	29	2	Dual Technology Occupancy Sensor - Remote Mnt.	65	1.51	20%	3920.8	\$658.69	\$160.00	\$320.00	0.38	980.2	\$164.67	1.94
227.21	204 Files Area	2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338	\$56.78	2	0	No Change	65	0.13	0%	338	\$56.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	204 Corner Office	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	202 Storage	1200	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	156	\$26.21	2	0	No Change	65	0.13	0%	156	\$26.21	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Woman's Rest Room	2600	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	676	\$113.57	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	540.8	\$90.85	\$75.00	\$75.00	0.05	135.2	\$22.71	3.30
227.21	Men's Rest Room	2600	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	338	\$56.78	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.10	20%	270.4	\$45.43	\$75.00	\$75.00	0.03	67.6	\$11.36	6.60
227.21	Police Entrance	8760	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	2277.6	\$382.64	4	0	No Change	65	0.26	0%	2277.6	\$382.64	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.25	Watch Desk/Command	8760	4	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	156	0.624	5466.24	\$918.33	4	0	No Change	156	0.62	0%	5466.24	\$918.33	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21		8760	12	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.78	6832.8	\$1,147.91	12	0	No Change	65	0.78	0%	6832.8	\$1,147.91	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.21		8760	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	0.214	1874.64	\$314.94	2	0	No Change	107	0.21	0%	1874.64	\$314.94	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	106 Hall	8760	5	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.325	2847	\$478.30	5	0	No Change	65	0.33	0%	2847	\$478.30	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.212	Squad Room	8760	16	2	2x2, 2 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	60	0.96	8409.6	\$1,412.81	16	2	Dual Technology Occupancy Sensor - Switch Mnt.	60	0.77	20%	6727.68	\$1,130.25	\$75.00	\$150.00	0.19	1681.92	\$282.56	0.53
227.21	122 Booking	8760	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	1138.8	\$191.32	2	0	No Change	65	0.13	0%	1138.8	\$191.32	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.212	Interview Room	2600	2	2	2x2, 2 Lamp, 31w T8 Ulamp, Elect. Ballast, Recessed Mnt., Prismatic Lens	60	0.12	312	\$52.42	2	0	No Change	60	0.12	0%	312	\$52.42	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals			707	219			39.8	144,809.4	\$24,328	611	51			35.0		130,193.2	\$21,872.46	\$4,590	\$4,590	4.79	14,616	\$2,456	1.87

**TOWNSHIP OF GLOUCESTER
DEPARTMENT OF PUBLIC WORKS**

**1729 ERIAL ROAD
GLOUCESTER TOWNSHIP, NJ 08012**

FACILITY ENERGY REPORT

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I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider: Atlantic City Electric
Electric Utility Rate Structure: Monthly General Service (MGS)
Third Party Supplier: None

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

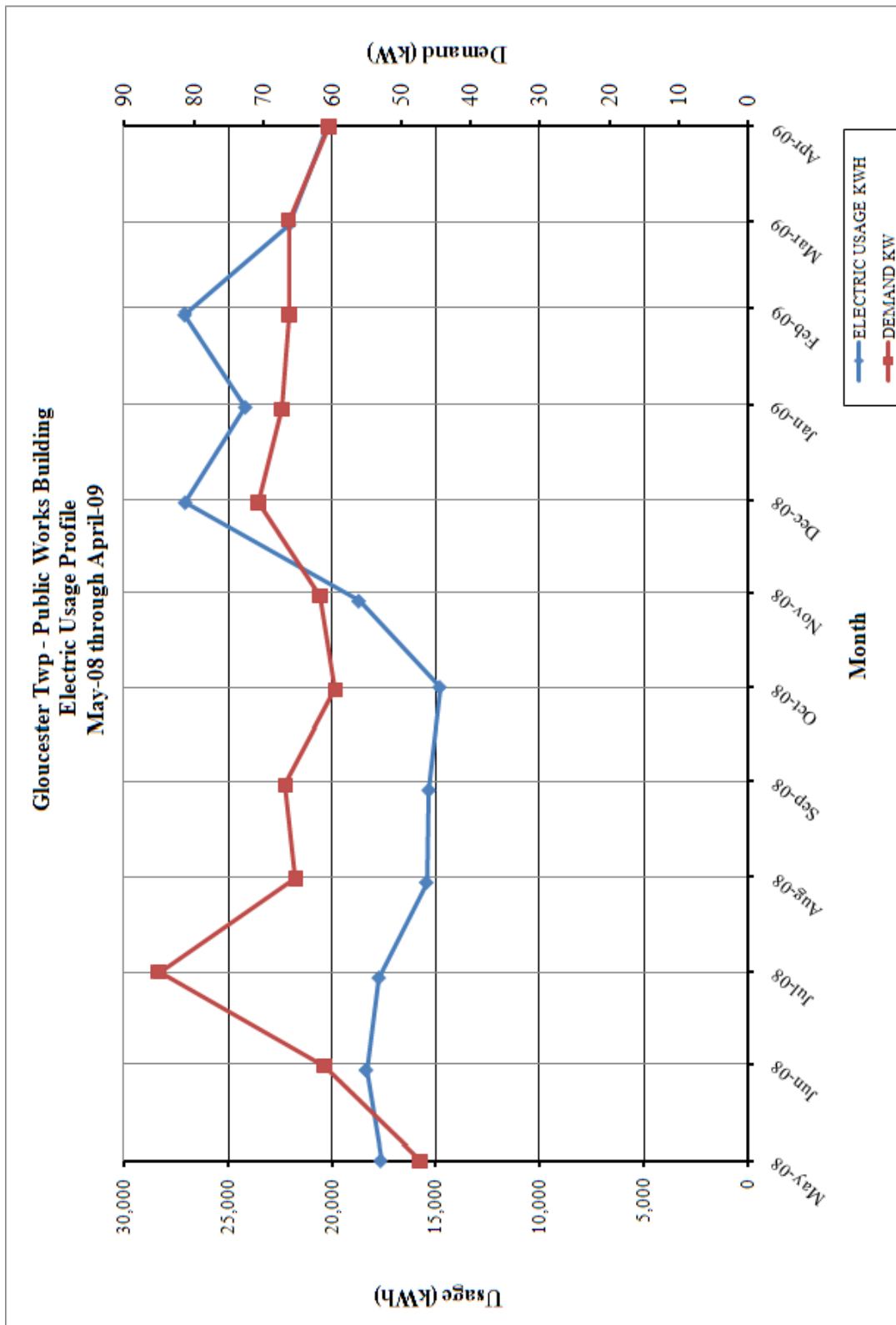
The electric usage profile represents the actual electrical usage for the facility. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts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

The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

**Table 1
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: Atlantic City Electric			
Rate: MGS			
Meter No:			
Customer ID No:			
Third Party Utility Provider:			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
27-May-08	17,642	47.3	\$2,641
25-Jun-08	18,353	61.1	\$3,313
25-Jul-08	17,733	85.0	\$3,273
25-Aug-08	15,437	65.3	\$2,851
24-Sep-08	15,320	66.8	\$2,829
27-Oct-08	14,794	59.6	\$2,459
24-Nov-08	18,703	61.8	\$2,832
26-Dec-08	27,085	70.7	\$4,042
26-Jan-09	24,184	67.3	\$3,641
25-Feb-09	27,112	66.2	\$4,013
26-Mar-09	22,054	66.3	\$3,309
27-Apr-09	20,249	60.5	\$3,098
Totals	238,666	85.0 Max	\$38,303
AVERAGE DEMAND		64.8 KW average	
AVERAGE RATE		\$0.160 \$/kWh	

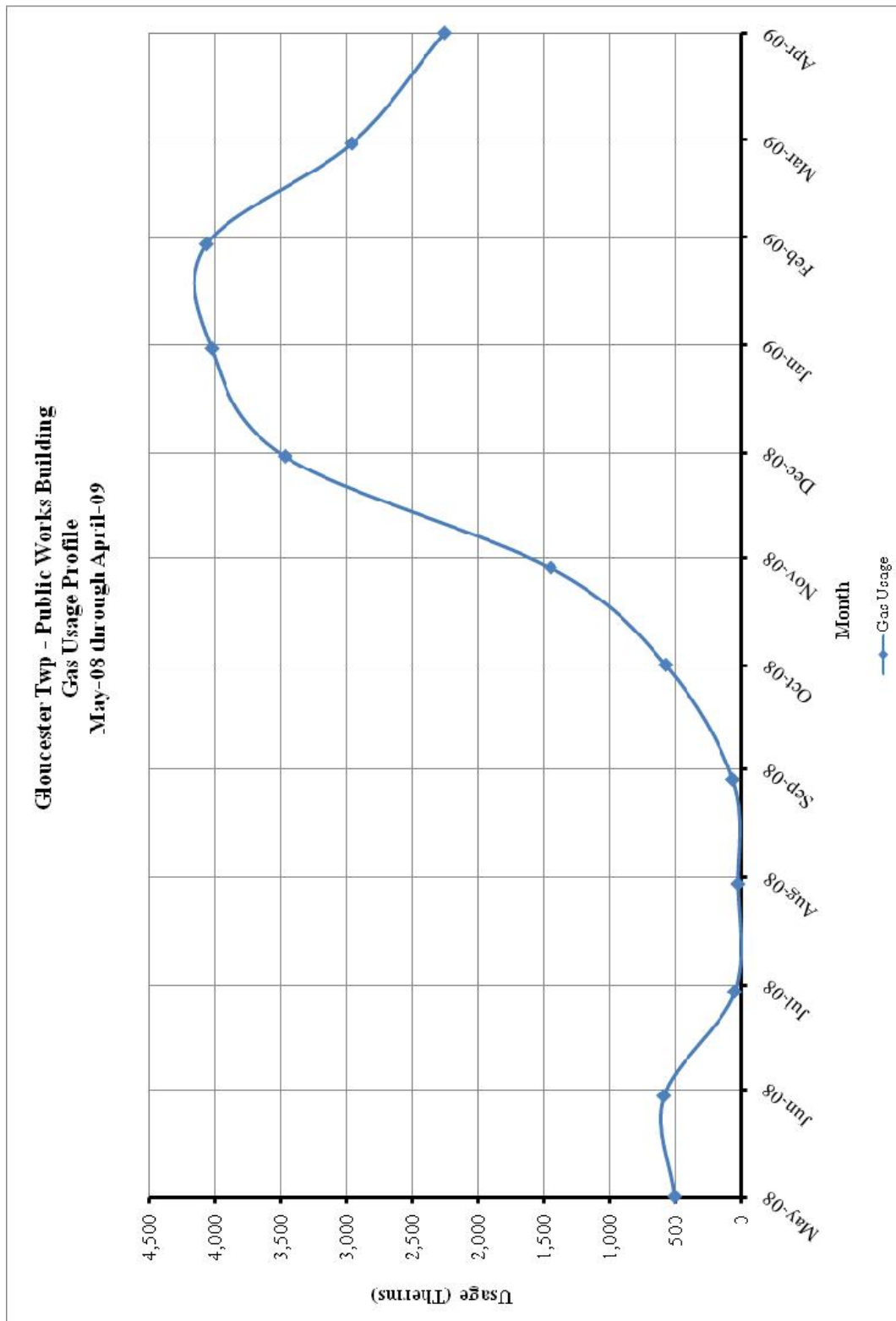
Figure 1
Electricity Usage Profile



**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas		
Rate: GSG		
Meter No:		
Point of Delivery ID:		
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
27-May-08	505.10	\$729.37
25-Jun-08	586.10	\$1,271.21
25-Jul-08	50.10	\$181.57
25-Aug-08	25.10	\$83.18
24-Sep-08	64.10	\$136.92
27-Oct-08	571.10	\$849.27
24-Nov-08	1,447.10	\$2,054.79
26-Dec-08	3,462.10	\$5,528.42
26-Jan-09	4,017.10	\$6,420.49
25-Feb-09	4,059.10	\$6,477.63
26-Mar-09	2,956.10	\$4,660.74
27-Apr-09	2,253.10	\$3,567.15
TOTALS	19,996.20	\$31,960.79
AVERAGE RATE:	\$1.60	\$/THERM

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Gloucester Township Department of Public Works is located on 1729 Erial Road in Gloucester Township, New Jersey. The 26,500 SF Department of Public Works has two buildings, an older facility built in 1968, renovated in 1985, and a new facility built in 2004. Both buildings are a single story facilities comprised of an administration office and multiple garages for vehicle storage and maintenance.

Occupancy Profile

The typical hours of operation for the new facility are Monday through Thursday between 7:00 AM and 5:30 PM, but additional hours are observed for the removal of snow during certain times of the year. The old public works building is currently being utilized for its garage space; the offices are unoccupied and are used for records storage. The new public works facility houses approximately 50 employees which occupy the facility. Gloucester Township has plans to renovate the old public works building with new heating, electric, lighting, and plumbing systems. The intent of the renovation is to extend the services from the new building to the renovated building, which will eliminate the utility services to the existing old public works building.

Building Envelope

Exterior walls for both of the office areas are brick faced with a concrete block construction. The exterior walls for the garage areas are concrete block construction. The amount of insulation within the Old DPW building walls is approximately R-13 insulation value. The new building is estimated to include R-19 insulation within the walls. The windows throughout the new public works facility are in good condition and appear to be maintained. In Contrast, the windows throughout the old public works are in decent condition and are not maintained due to lack of occupancy. Typical windows throughout the new public works facility are double pane, 1/4" clear glass with aluminum frames, while the old public works maintains double pane, 1/4" clear glass with wooden frames. Blinds are utilized through the office area of the facility per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The roof above the office area in the new DPW building is a flat, built up rubber roof with approximately 2" rigid insulation. The roof above the Old DPW garages is slightly sloped, standing seam metal roofing with approximately 1" of fiberboard. The Old DPW building is planned to be renovated with new higher insulation on the roof and walls.

HVAC Systems

The Department of Public works facility is conditioned by air handling units with hot water and direct expansion coils. There are two (2) gas-fired condensing boilers manufactured by Gas Master Industries Inc. which provide the hot water for the HVAC system. These boilers have an input capacity of 4,000 MBH and an output capacity of 3,800 MBH, with an approximate efficiency of 95%. The boiler plant includes a hot water reset schedule which controls the hot water supply temperature based on the outside air temperature. The burners attached to these boilers are Riello RS Series Power Gas Burners. The owner stated that the burners have been

causing numerous problems and have not been firing properly since they installed them. The air handling units have a heating set-point of 70°F for the winter months.

The air handling units are also paired up with five (5) condensing units which are installed outside on grade as the source of cooling for the DX coils. The condensing units are all manufactured by Trane with capacities ranging from 2 ½ to 7 ½ Tons. Air handling unit DX coils are set at a cooling set-point of 72°F in the summer.

Hot water heating and ventilation units as well as hot water unit heaters are utilized to condition the garage areas. Supply air sensors are used on the heating and ventilation units to monitor supply air temperature for optimized system operation. It interfaces to the relay board of the management system to monitor the temperatures.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. The toilet room exhaust fan is controlled by the occupancy schedule through the BMS.

HVAC System Controls

The HVAC systems within the facility are controlled through an antiquated building management system. Programming of temperature set-points for this building are set around 72°F for cooling and 70°F for heating. All of the HVAC equipment in the building is controlled through the BMS. Air handlers run continuously in an occupied mode and cycle in unoccupied mode.

Domestic Hot Water

Domestic hot water for the restrooms and office is provided by a high efficiency 100 gallon A.O. Smith Cyclone XHE gas-fired hot water heater, capacity of 240 MBH. The domestic hot water is circulated throughout the building by a hot water re-circ pump.

Lighting

Refer to the Investment Grade lighting Audit Appendix for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. MAJOR EQUIPMENT LIST

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

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

IV. ENERGY CONSERVATION MEASURES

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

**Table 1
ECM Financial Summary**

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	Lighting Upgrade	\$12,976	\$4,570	2.8	428.3%
ECM #2	Lighting Controls	\$1,345	\$578	2.3	544.6%
ECM #3	Computer Monitors	\$100	\$24	4.2	260.0%
ECM #4	AC Unit Upgrades	\$25,616	\$1,180	21.7	-30.9%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	210 kW Photovoltaic System	\$1,395,180	\$98,668	14.1	6.1%
Notes:	A. Cost takes into consideration applicable NJ Smart Start TM incentives.				
	B. Savings takes into consideration applicable maintenance savings.				

**Table 2
ECM Energy Summary**

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade	8.2	28,478	0
ECM #2	Lighting Controls	1.3	3,613	0
ECM #3	Computer Monitors	0.0	150	0
ECM #4	AC Unit Upgrades	6.1	7,375	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	210 kW Photovoltaic System	155.0	189,381	0

**Table 3
Facility Project Summary**

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Lighting Upgrade	\$4,570	\$13,336	\$360	\$12,976	2.8
Lighting Controls	\$578	\$1,740	\$395	\$1,345	2.3
Computer Monitors	\$24	\$100	\$0	\$100	4.2
AC Unit Upgrades	\$1,180	\$27,180	\$1,564	\$25,616	21.7
<i>Design / Construction Extras (15%)</i>		\$6,353		\$6,353	
Total Project	\$6,352	\$48,709	\$1,924	\$46,390	7.3

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade

Description:

The majority of the lighting at the Public Works Building is 32 watt T-8 bulbs with electronic ballasts. There are a few locations with T-12 lamps and magnetic ballasts. The existing T-8 lamps are 700 series which are efficient; however there have been improvements in lamp technology. There are also a few locations with incandescent fixtures. All exit signs throughout the building are currently high efficiency LED exit signs.

This ECM includes replacement or retrofit of all fixtures with magnetic ballasts in the facility with electronic ballasts and T-8 lamps. T-8 lamps with electronic ballasts provide energy savings as well as improved light over the existing T-12 fixtures. This ECM will also provide maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need 33% less lamps replaced per year.

This ECM also includes switching out all existing 32 watt T-8 lamps with “SuperSaver” 28 watt T-8 lamps. The new lamp technology provides equivalent lighting with reduced input wattage, while utilizing the existing electronic ballast. Several electronic ballasts were checked for compatibility with 28 watt lamps to verify the applicability of this ECM.

This ECM also includes replacement of any incandescent lamps with compact fluorescent lamps or LED fixtures. The energy usage of an incandescent compared to a compact fluorescent / LED is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours (over 50,000 burn-hours for LED fixtures), compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

Energy Savings Calculations:

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

From the **NJ Smart Start Incentive Appendix**, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamps) = \$10 per fixture

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

$$\text{Smart Start } \textcircled{\text{R}} \text{ Incentive} = (36 \text{ fixtures} \times \$10) = \$360$$

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{replacement } \$ \text{ per lamp} + \text{Labor } \$ \text{ per lamp})$$

$$\text{Savings} = (2 \text{ lamps per year}) \times (\$2.00 + \$5.00) = \$14$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$13,336
NJ Smart Start Equipment Incentive (\$):	\$360
Net Installation Cost (\$):	\$12,976
Maintenance Savings (\$/Yr):	\$14
Energy Savings (\$/Yr):	\$4,556
Total Yearly Savings (\$/Yr):	\$4,570
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.8
Simple Lifetime ROI	428.3%
Simple Lifetime Maintenance Savings	\$210
Simple Lifetime Savings	\$68,550
Internal Rate of Return (IRR)	35%
Net Present Value (NPV)	\$41,580.36

ECM #2: Lighting Controls

Description:

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

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy sensors.

This ECM includes replacement of standard wall switches with sensors wall switches for the individual offices, hallways, conference rooms, storage rooms, locker rooms, and bathrooms. The scope for this ECM is limited to the office spaces and excludes the “Old Public Works Building” since the hours of operation are very low. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) as well as other details are shown in the **Investment Grade Lighting Audit Appendix**.

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

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

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

$$Smart\ Start^{\circledR}\ Incentive = (\#\ of\ wall\ mount \times \$\ 20) + (\#\ of\ ceiling\ mount \times 35) \\ = (4 \times \$20) + (9 \times \$35) = \$395$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,740
NJ Smart Start Equipment Incentive (\$):	\$395
Net Installation Cost (\$):	\$1,345
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$578
Total Yearly Savings (\$/Yr):	\$578
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.3
Simple Lifetime ROI	544.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$8,670
Internal Rate of Return (IRR)	43%
Net Present Value (NPV)	\$5,555.13

ECM #3: Computer Monitor Replacement

Description:

The computers throughout the facility utilize a mixture of CRT computer monitors and LCD computer monitors. Computers are located throughout the facility and are becoming a larger and larger portion of a facility’s energy usage. The CRT computer monitors are outdated and have several disadvantages such as; significantly increased higher energy consumption, uses large amount of desk space, poor picture quality, distortions and flickering image, secular glare problems, and high weight, and electromagnetic emissions. Many of these drawbacks are difficult to quantify except for the energy use. CRT monitors use considerably more energy than an alternative flat panel LCD monitor. Replacement of the existing CRT monitors with LCD monitors saves considerable energy as well as provides other ergonomic benefits.

Based on the site survey it was noted that there are 9 LCD monitor and 1 CRT monitors. Some of the monitors were left in screen saver mode, which is deceiving since this mode only saves the computer screen from image burn in, however it does not save on energy consumption. The average operating hours for all computers and monitors is estimated based on the site survey observations. Energy consumption of computer monitors is based on averages for power usage of various computer monitors.

This ECM includes replacement of all existing CRT monitors with LCD flat panel monitors throughout the facility. Installation costs were neglected for this ECM with the intention that this ECM would be replaced by the township. The calculations are based on the following operating assumptions:

Energy Savings Calculations:

No. of CRT Monitors: 1
 Operating Weeks per Yr: 50
 Hrs per Week: 60 (12 hrs per day estimated average)

$$Electric\ Usage = \frac{\#of\ Computers \times Monitor\ Power\ (W) \times Operation\ (Hrs)}{1000 \left(\frac{W}{KW} \right)}$$

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

COMPUTER MONITOR CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	CRT Monitors	LCD Monitor	
# of Computers	1	1	
Monitor Power Cons. (W)	75	25	
Operating Hrs per Week	60	60	
Operating Weeks per Yr	50	50	
Elec Cost (\$/kWh)	0.160	0.160	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Electric Usage (kWh)	225	75	150
Energy Cost (\$)	\$36	\$12	\$24
COMMENTS:	CRT Monitor consumption based on Dell CRT monitor M/N: CRT-E771MM. Operating hours estimated.		

Installation cost of new monitors is estimated based on current pricing for a 17” LCD monitor on the market today. No labor costs were included for replacing the existing monitors with the new monitors. No incentives are available for installation of computer monitors. Net cost per monitor was estimated to be \$100.

Installation Costs: # Monitors X Cost per Monitor
 1 Monitors X \$100 per Monitor
 \$100

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$100
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$100
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$24
Total Yearly Savings (\$/Yr):	\$24
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.2
Simple Lifetime ROI	260.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$360
Internal Rate of Return (IRR)	23%
Net Present Value (NPV)	\$186.51

ECM #4: Air Conditioning Unit Upgrades

Description:

The Department of Public Works is air conditioned with multiple split system AC units. In some cases these units are older and in need of replacement. The existing units have a range of efficiencies. Although the units installed are only 6-7 years old, most existing units are low compared to high efficiency units today. New split air conditioners provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and refrigerants.

This ECM includes one-to-one replacement of the older air conditioning units with new higher efficiency systems. The existing 6 ton split system is proposed to be replaced with a 5 ton split system to allow for a high efficiency unit to be installed. The reduction in capacity will potentially reduce the cooling and be inadequate for the cooling needs. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of this ECM can be found in the table below:

IMPLEMENTATION SUMMARY					
ECM INPUTS	SERVICE FOR	NUMBER OF UNITS	COOLING CAPACITY, BTU/HR	TOTAL CAPACITY, TONS	REPLACE UNIT WITH
Trane CU-2	-	1	30,000	2.5	2.5 Ton Trane - XR15
Trane CU-1		1	42,000	3.5	3.5 Ton Trane - XR15
Trane CU-4		1	60,000	5.0	5.0 Ton Trane - XR15
Trane CU-5 *		1	72,000	6.0	5.0 Ton Trane - XR15
Total		4	204,000	17.0	

* CU-5 existing capacity is 6.0 tons. This ECM is based on installation of high efficiency 5.0 ton unit.

The basis for the split system air conditioners is Trane XR15 Series split systems with R410a refrigerant. This ECM includes replacement of the indoor air handling units and outdoor condensing units.

Energy Savings Calculations:

Cooling Energy Savings:

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

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

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

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

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	COOLING CAPACITY, BTU/Hr	ANNUAL COOLING HOURS	EXISTING UNITS SEER	SPLIT UNITS SEER	# OF UNITS	ENERGY SAVINGS kWh	DEMAND SAVINGS kW
Trane CU-2	30,000	1,200	10	15	1	1,200	1.0
Trane CU-1	42,000	1,200	10	15	1	1,680	1.4
Trane CU-4	60,000	1,200	10	15	1	2,400	2.0
Trane CU-5 *	72,000	1,200	11	15	1	2,095	1.7
Total					4	7,375	6.1

Project Cost, Incentives and Maintenance Savings

From the NJ Smart Start® Program appendix, the replacement of split system AC units with high efficiency split system AC units falls under the category “Unitary HVAC Split System” and warrants an incentive based on efficiency (SEER) at or above 14 for this type of systems. The program incentives are calculated as follows:

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

SPLIT SYSTEM AC UNITS REBATE SUMMARY				
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE \$/TON	PROPOSED CAPACITY TONS	TOTAL REBATE \$
5.4 tons or less Unitary	≥14 SEER	\$92	17.0	\$1,564
TOTAL			17	\$1,564

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

COST & SAVINGS SUMMARY							
ECM INPUTS	INSTALLED COST	# OF UNITS	TOTAL COST	REBATES	NET COST	ENERGY SAVING	PAY BACK YEARS
Trane CU-2	\$5,340	1	\$5,340	\$230	\$5,110	\$192	26.6
Trane CU-1	\$6,340	1	\$6,340	\$322	\$6,018	\$269	22.4
Trane CU-4	\$7,750	1	\$7,750	\$460	\$7,290	\$384	19.0
Trane CU-5 *	\$7,750	1	\$7,750	\$552	\$7,198	\$335	21.5
Total		4	\$27,180	\$1,564	\$25,616	\$1,180	21.7

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

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$27,180
NJ Smart Start Equipment Incentive (\$):	\$1,564
Net Installation Cost (\$):	\$25,616
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,180
Total Yearly Savings (\$/Yr):	\$1,180
Estimated ECM Lifetime (Yr):	15
Simple Payback	21.7
Simple Lifetime ROI	-30.9%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$17,700
Internal Rate of Return (IRR)	-4%
Net Present Value (NPV)	(\$11,529.24)

Alternative Fuel Consideration: CNG Van Conversion Calculation

Description:

In 2000 Gloucester Twp has shown leadership with green initiatives through the use of Compressed Natural Gas (CNG) vehicles. When this program was implemented, the primary motivation was for the environmental benefits with the use of CNG as an alternative fuel to gasoline and diesel. Since this implementation, petroleum fuel costs have increased substantially. The current price for Regular Conventional gasoline in the U.S. is \$3.052/gallon based on the U.S. Energy Information Administration (EIA). Petroleum retail costs are extremely volatile while natural gas costs are considerably more stable.

The use of alternative fuels for transportation and utility vehicle use is becoming more and more desirable and financially justified. The current cost of natural gas at the DPW building compared to the current cost of gasoline represents approximately 50% less cost to fuel the service vehicles at Gloucester Twp.

This calculation shows the savings per service van utilizing natural gas as an alternative to gasoline. The following fuel economy and annual mileage were used:

Utility Van Fuel Economy - 15 MPG
 Annual Mileage - 9000 Miles

Energy Savings Calculations:

Cost Savings:

$$\text{Annual Gasoline Usage (Gallons)} = \frac{\text{Annual Mileage per Service Van (Miles)}}{\text{Fuel Economy} \left(\frac{\text{Miles}}{\text{Gallon}} \right)}$$

$$\begin{aligned} \text{Natural Gas Usage (Therms)} \\ = \text{Annual Gasoline Usage (Gallons)} \times \frac{\text{Gasoline Heat Value} \left(\frac{\text{BTU}}{\text{Gallon}} \right)}{\text{Nat Gas Heat Value} \left(\frac{\text{BTU}}{\text{Therm}} \right)} \end{aligned}$$

$$\text{Gasoline Fuel Cost} = \text{Fuel Usage (Gallons)} \times \text{Cost of Fuel} \left(\frac{\$}{\text{Gallon}} \right)$$

$$\text{Nat Gas Fuel Cost} = \text{Fuel Usage (Therms)} \times \text{Cost of Fuel} \left(\frac{\$}{\text{Therm}} \right)$$

GASOLINE TO CNG VAN CONVERSION CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Gasoline Service Van	CNG Service Van	
Annual Service Van Mileage	9,000	9,000	
Service Van Fuel Economy (MPG)	15	15	
Gasoline Heat Value (Btu/Gallon)	114,000	114,000	
Nat Gas Heat Value (Btu/Therm)	100,000	100,000	
Gasoline Cost (\$/Gallon)	\$3.05	\$3.05	
Nat Gas Cost (\$/Therm)	\$1.60	\$1.60	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Annual Gasoline Usage (Gallons)	600	0	
Equivalent Nat Gas Usage (Therms)	0	684	
Energy Cost per Service Van (\$)	\$1,831	\$1,094	\$737
COMMENTS:			

Gloucester Twp should consult the vehicle manufacturer for any maintenance cost or savings associated with The annual maintenance cost and service costs were There is no significant maintenance savings due to implementation of this ECM.

Energy Savings Summary:

The use of CNG service vanes represents an annual savings of \$ over service vans fueled with gasoline. Based on the additional cost to purchase natural gas ready vehicles, which was not evaluated in the analysis, Gloucester Twp should strongly consider switching additional vehicles to CNG. In addition to the savings on vehicle fuel, utilization of natural gas year round provide a more advantageous natural gas load profile for energy purchasing through a third party supplier. See the Energy Purchasing and Procurement Section within the Gloucester Township Executive Summary Report.

V. ADDITIONAL RECOMMENDATIONS

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

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Clean all light fixtures to maximize light output.
- D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- E. Ensure lighting is turned off in unoccupied spaces particularly within the seldom used “Old” DPW building.
- F. Turn off all computers when not in use. Ensure computers are not set to screen saver mode which does not save energy.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Gloucester Township - Public Works Building

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1+DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Lighting Upgrade	\$13,336	\$0	\$360	\$12,976	\$4,556	\$14	\$4,570	15	\$68,550	\$210	428.3%	2.8	34.82%	\$41,580.36
ECM #2	Lighting Controls	\$1,740	\$0	\$395	\$1,345	\$578	\$0	\$578	15	\$8,670	\$0	544.6%	2.3	42.77%	\$5,555.13
ECM #3	Computer Monitors	\$100	\$0	\$0	\$100	\$24	\$0	\$24	15	\$360	\$0	260.0%	4.2	22.91%	\$186.51
ECM #4	AC Unit Upgrades	\$15,780	\$11,400	\$1,564	\$25,616	\$1,180	\$0	\$1,180	15	\$17,700	\$0	-30.9%	21.7	-4.30%	(\$11,529.24)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	210 kW Photovoltaic System	\$1,395,180	\$0	\$0	\$1,395,180	\$32,384	\$66,283	\$98,668	15	\$1,480,013	\$994,250	6.1%	14.1	0.75%	(\$217,293.78)

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



Concord Engineering Group, Inc.

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

SmartStart Building Incentives

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

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

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

Desiccant Systems

\$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

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



STATEMENT OF ENERGY PERFORMANCE

Gloucester Twp - Department of Public Works

Building ID: 2555205
 For 12-month Period Ending: April 30, 2009¹
 Date SEP becomes ineligible: N/A

Date SEP Generated: January 17, 2011

Facility

Gloucester Twp - Department of Public Works
 1729 Erial Road
 Gloucester Township, NJ 08012

Facility Owner

Gloucester Township
 1261 chews landing road
 Gloucester Township, NJ 08012

Primary Contact for this Facility

Tom Cardis
 1261 chews landing road
 Gloucester Township, NJ 08012

Year Built: 1968

Gross Floor Area (ft²): 26,500

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	46,765
Natural Gas (kBtu) ⁴	1,999,620
Total Energy (kBtu)	2,046,385

Energy Intensity⁵

Site (kBtu/ft ² /yr)	77
Source (kBtu/ft ² /yr)	85

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	114
---	-----

Electric Distribution Utility

Pepeco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	77
National Average Source EUI	150
% Difference from National Average Source EUI	-43%
Building Type	Service (Vehicle Repair/Service, Postal Service)

Stamp of Certifying Professional

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

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

Michael Fischette
 520 South Burnt Mill Road
 Voorhees, NJ 08043

Notes:

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Department of Public Works

Rooftop / AC Units

Tag	CU-1	CU-2	CU-3
Unit Type	Condensing Unit	Condensing Unit	Condensing Unit
Qty	1	1	1
Location	Southeast Side of building outside	Southeast Side of building outside	Southeast Side of building outside
Area Served	Indoor Air Handling Unit	Indoor Air Handling Unit	Indoor Air Handling Unit
Manufacturer	Trane	Trane	Trane
Model #	XB-10 / 2TTB0042A1000AA	XB-10 / 2TTB0030A1000AA	Odyssey / TTA090A300FA
Serial #	34641WE3F	4094WAS5F	40920EGAD
Cooling Type	DX, R-22	DX, R-22	DX, R-22
Cooling Capacity (Tons)	3.5 Tons	2.5 Tons	7.5 Tons
Cooling Efficiency (SEER/EER)	10 SEER	10 SEER	-
Heating Type	N/A	N/A	N/A
Heating Input (MBH)	N/A	N/A	N/A
Efficiency	N/A	N/A	N/A
Fuel	N/A	N/A	N/A
Approx Age	7	6	6
ASHRAE Service Life	15	15	15
Remaining Life	8	9	9
Comments			

Rooftop / AC Units

Tag	CU-4	CU-5	
Unit Type	Condensing Unit	Condensing Unit	
Qty	1	1	
Location	Northwest side of building outside	Northwest side of building outside	
Area Served	Indoor Air Handling Unit	Indoor Air Handling Unit	
Manufacturer	Trane	Trane	
Model #	XB-10 / 2TTB0060A1000AA	2TTA0072A3000AA	
Serial #	40857HM3F	3434UKF2F	
Cooling Type	DX, R-22	DX, R-22	
Cooling Capacity (Tons)	5 Tons	6 Tons	
Cooling Efficiency (SEER/EER)	10 SEER	11 SEER	
Heating Type	N/A	N/A	
Heating Input (MBH)	N/A	N/A	
Efficiency	N/A	N/A	
Fuel	N/A	N/A	
Approx Age	6	7	
ASHRAE Service Life	15	15	
Remaining Life	9	8	
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Department of Public Works

Boilers

Tag	Boiler-1 & 2		
Unit Type	Gas Fired Boiler		
Qty	2		
Location	Mechanical Room		
Area Served	DPW Air Handling Units		
Manufacturer	Gas Master Industries Inc.		
Model #	GMI 4M		
Serial #	16005		
Input Capacity (MBH)	4,000		
Rated Output Capacity (MBH)	3,800		
Approx. Efficiency %	95%		
Fuel	Nat Gas		
Approx Age	6		
ASHRAE Service Life	30		
Remaining Life	24		
Comments	Burner: Riello RS Series Power Gas Burner; Model RS100/M; 2.5 HP Fan		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Department of Public Works

Domestic Water Heaters

Tag	DHW-1		
Unit Type	Gas Fired Domestic Hot Water Heater		
Qty	1		
Location	Mechanical Room		
Area Served	Public Works Offices		
Manufacturer	A.O. Smith		
Model #	Cyclone XHE - BTH 250A 970		
Serial #	MC040011829		
Size (Gallons)	100 Gallons		
Input Capacity (MBH/KW)	240 MBH		
Recovery (Gal/Hr)	273.45 Gal/Hr		
Efficiency %	95%		
Fuel	Nat Gas		
Approx Age	6		
ASHRAE Service Life	12		
Remaining Life	6		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Department of Public Works

Pumps

Tag	HWP-1,2		
Unit Type	End Suction Pumps		
Qty	2		
Location	Mechanical Room		
Area Served	Boilers 1&2		
Manufacturer	Bell & Gossett		
Model #	Size 1510		
Serial #	N/A		
Horse Power	20 HP		
Flow	355 GPM @ 80 FT HD		
Motor Info	AO Smith Century		
Electrical Power	230/460V/3/60		
RPM	1765 RPM		
Motor Efficiency %	93.6%		
Approx Age	6		
ASHRAE Service Life	20		
Remaining Life	14		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Department of Public Works

Unit Heaters

Tag			
Unit Type	Hot Water Unit Heater		
Qty	15		
Location	Garages		
Area Served	Garages		
Manufacturer	Trane		
Model #	UHSA060S8EAA1T0B AD00		
Serial #	F03M41828		
Heating Type	Hot Water		
Heating Capacity (MBH)	60 MBH		
CFM	815 CFM		
RPM/HP	1/20 HP		
GPM	-		
Approx Age	7		
Ashrae Service Life	20		
Remaining Life	13		
Comments			

Investment Grade Lighting Audit

CEG Job #: 9C10076

Project: Public Works Building
1729 Erial Road
Gloucester Township, NJ
Bldg. Sq. Ft.

Public Works Building

KWH COST: \$0.160

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS				
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
237.22	Front Office	2600	14	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	1.54	4,004.0	\$640.64	14	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Hall	3000	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	780.0	\$124.80	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	588	\$94.08	\$24.00	\$96.00	0.06	192	\$30.72	3.13
237.22	Lobby	3000	4	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	0.44	1,320.0	\$211.20	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
563		3000	3	1	Recessed Down Light, 26w PL Lamp	26	0.08	234.0	\$37.44	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
237.22	Vestibule	3000	2	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	0.22	660.0	\$105.60	2	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.34	Mechanical Room	1200	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.25	297.6	\$47.62	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	240	\$38.40	\$14.00	\$56.00	0.05	57.6	\$9.22	6.08
227.21	Hall	3000	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	780.0	\$124.80	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	588	\$94.08	\$24.00	\$96.00	0.06	192	\$30.72	3.13
237.21	Conference Room	2600	6	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	0.66	1,716.0	\$274.56	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
237.21	105 Director's Office	2600	6	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	0.66	1,716.0	\$274.56	6	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Electrical Room	800	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	104.0	\$16.64	2	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.10	78.4	\$12.54	\$24.00	\$48.00	0.03	25.6	\$4.10	11.72
227.21	Hall	3000	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	780.0	\$124.80	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	588	\$94.08	\$24.00	\$96.00	0.06	192	\$30.72	3.13
237.22	Supervisor's Office	2600	8	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	0.88	2,288.0	\$366.08	8	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	110 Lunch Room	2600	15	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.98	2,535.0	\$405.60	15	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.74	1911	\$305.76	\$24.00	\$360.00	0.24	624	\$99.84	3.61

Investment Grade Lighting Audit

227.21	Hall	3000	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1,170.0	\$187.20	6	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.29	882	\$141.12	\$24.00	\$144.00	0.10	288	\$46.08	3.13
746	M109 Building Maintenance	2600	4	1	250w MH LoBay w/Prismatic Lens	295	1.18	3,068.0	\$490.88	4	3	2x4 54w T5HO 3 Lamp, Prismatic Lens	177	0.71	1840.8	\$294.53	\$220.00	\$880.00	0.47	1227.2	\$196.35	4.48
221.34	Mezzanine	1200	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.25	297.6	\$47.62	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	240	\$38.40	\$14.00	\$56.00	0.05	57.6	\$9.22	6.08
221.34	Parts - Under Mezzanine	2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.25	644.8	\$103.17	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$83.20	\$14.00	\$56.00	0.05	124.8	\$19.97	2.80
227.21	Men's Locker Room	3000	5	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.33	975.0	\$156.00	5	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.25	735	\$117.60	\$24.00	\$120.00	0.08	240	\$38.40	3.13
227.21	Men's Showers	3000	3	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.20	585.0	\$93.60	3	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.15	441	\$70.56	\$24.00	\$72.00	0.05	144	\$23.04	3.13
227.21	Women's Locker Room & Showers	3000	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	780.0	\$124.80	4	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.20	588	\$94.08	\$24.00	\$96.00	0.06	192	\$30.72	3.13
746	Tool Storage	2600	6	1	250w MH LoBay w/Prismatic Lens	295	1.77	4,602.0	\$736.32	6	3	2x4 54w T5HO 3 Lamp, Prismatic Lens	177	1.06	2761.2	\$441.79	\$220.00	\$1,320.00	0.71	1840.8	\$294.53	4.48
221.34	Mezzanine	2600	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.37	967.2	\$154.75	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	780	\$124.80	\$14.00	\$84.00	0.07	187.2	\$29.95	2.80
221.34	Parts - Under Mezzanine	2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.25	644.8	\$103.17	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	\$83.20	\$14.00	\$56.00	0.05	124.8	\$19.97	2.80
232.21	Restroom	2600	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.09	223.6	\$35.78	1	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	74	0.07	192.4	\$30.78	\$21.00	\$21.00	0.01	31.2	\$4.99	4.21
746	Vehicle Maintenance	3000	19	1	250w MH LoBay w/Prismatic Lens	295	5.61	16,815.0	\$2,690.40	19	3	2x4 54w T5HO 3 Lamp, Prismatic Lens	177	3.36	10089	\$1,614.24	\$220.00	\$4,180.00	2.24	6726	\$1,076.16	3.88
221.34		3000	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.37	1,116.0	\$178.56	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	900	\$144.00	\$14.00	\$84.00	0.07	216	\$34.56	2.43
232.21	M105 Supervisor's Office	3000	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.09	258.0	\$41.28	1	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	74	0.07	222	\$35.52	\$21.00	\$21.00	0.01	36	\$5.76	3.65
227.21		3000	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	195.0	\$31.20	1	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.05	147	\$23.52	\$24.00	\$24.00	0.02	48	\$7.68	3.13
221.34	Compressor Room	3000	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.12	372.0	\$59.52	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	300	\$48.00	\$14.00	\$28.00	0.02	72	\$11.52	2.43
746	Parts Bay	3000	2	1	250w MH LoBay w/Prismatic Lens	295	0.59	1,770.0	\$283.20	2	3	2x4 54w T5HO 3 Lamp, Prismatic Lens	177	0.35	1062	\$169.92	\$220.00	\$440.00	0.24	708	\$113.28	3.88
221.34		3000	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.06	186.0	\$29.76	1	0	Remove Fixture	0	0.00	0	\$0.00	\$40.00	\$40.00	0.06	186.0	\$29.76	1.34
221.45	M103 Janitor	800	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Wall Mnt., No Lens	62	0.06	49.6	\$7.94	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	40	\$6.40	\$14.00	\$14.00	0.01	9.6	\$1.54	9.11
227.21	Men's Restroom	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	\$27.04	1	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.05	127.4	\$20.38	\$24.00	\$24.00	0.02	41.6	\$6.66	3.61

Investment Grade Lighting Audit

227.21	Women's Restroom	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.07	169.0	\$27.04	1	2	Sylvania Lamp FBO30/841XP/6/SS/ECO	49	0.05	127.4	\$20.38	\$24.00	\$24.00	\$24.00	0.02	41.6	\$6.66	3.61
711	Exterior	4400	4	1	70w HPS Bollards	92	0.37	1,619.2	\$259.07	4	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
750		4400	19	1	250w HPS Wallpack	295	5.61	24,662.0	\$3,945.92	19	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
767		4400	30	1	400w Probe Start MH "Shoobox" Parking Lot Light	460	13.80	60,720.0	\$9,715.20	30	1	Venture Lighting Optiwave Ballast V90U7421K and 320w MH Lamp	349	10.47	46068	\$7,370.88	\$160.00	\$4,800.00	\$4,800.00	3.33	14652	\$2,344.32	2.05
Old Public Works Building																							
242.11	Lobby	800	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	171.2	\$27.39	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	156.8	\$25.09	\$28.00	\$56.00	\$56.00	0.02	14.4	\$2.30	24.31
242.11	Hall	800	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	171.2	\$27.39	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	156.8	\$25.09	\$28.00	\$56.00	\$56.00	0.02	14.4	\$2.30	24.31
3015	Restroom	200	1	1	Wall Mnt., Glass Cover, 100w A Lamp	100	0.10	20.0	\$3.20	1	1	26w CFL Lamp	26	0.03	5.2	\$0.83	\$20.00	\$20.00	\$20.00	0.07	14.8	\$2.37	8.45
242.11	Reception	800	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	171.2	\$27.39	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	156.8	\$25.09	\$28.00	\$56.00	\$56.00	0.02	14.4	\$2.30	24.31
625	Restroom	200	1	2	Fan/Light Combo (2) 100w A Lamp	200	0.20	40.0	\$6.40	1	2	(1) 18w CFL Lamp	36	0.04	7.2	\$1.15	\$20.00	\$20.00	\$20.00	0.16	32.8	\$5.25	3.81
142.11	Front Office	800	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.31	249.6	\$39.94	2	3	Delamp 1, Reballast & Relamp; (3) Sylvania Lamp FO28/841/SS/ECO	72	0.14	115.2	\$18.43	\$100.00	\$200.00	\$200.00	0.17	134.4	\$21.50	9.30
551	Utility Room	200	1	1	Recessed Down Light, 100w A Lamp	100	0.10	20.0	\$3.20	1	1	26w CFL Lamp	26	0.03	5.2	\$0.83	\$20.00	\$20.00	\$20.00	0.07	14.8	\$2.37	8.45
242.11	Locker/ Lunch Room	800	6	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.64	513.6	\$82.18	6	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.59	470.4	\$75.26	\$28.00	\$168.00	\$168.00	0.05	43.2	\$6.91	24.31
142.11		800	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.78	624.0	\$99.84	5	3	Delamp 1, Reballast & Relamp; (3) Sylvania Lamp FO28/841/SS/ECO	72	0.36	288	\$46.08	\$100.00	\$500.00	\$500.00	0.42	336	\$53.76	9.30
625	Restroom	200	1	2	Fan/Light Combo (2) 100w A Lamp	200	0.20	40.0	\$6.40	1	2	(1) 18w CFL Lamp	36	0.04	7.2	\$1.15	\$20.00	\$20.00	\$20.00	0.16	32.8	\$5.25	3.81
142.11	Files	800	8	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	1.25	998.4	\$159.74	8	3	Delamp 1, Reballast & Relamp; (3) Sylvania Lamp FO28/841/SS/ECO	72	0.58	460.8	\$73.73	\$100.00	\$800.00	\$800.00	0.67	537.6	\$86.02	9.30
3015	Restroom	200	1	1	Wall Mnt., Glass Cover, 100w A Lamp	100	0.10	20.0	\$3.20	1	1	26w CFL Lamp	26	0.03	5.2	\$0.83	\$20.00	\$20.00	\$20.00	0.07	14.8	\$2.37	8.45
142.11	Garage Bay	1200	8	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	1.25	1,497.6	\$239.62	8	3	Delamp 1, Reballast & Relamp; (3) Sylvania Lamp FO28/841/SS/ECO	72	0.58	691.2	\$110.59	\$100.00	\$800.00	\$800.00	0.67	806.4	\$129.02	6.20
121.14	Large Garage Bays	1200	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.08	93.6	\$14.98	1	2	2 Lamp, 32w T8, Elect. Ballast; retrofit	58	0.06	69.6	\$11.14	\$100.00	\$100.00	\$100.00	0.02	24	\$3.84	26.04
128.14		1200	12	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Surface Mnt., No Lens	142	1.70	2,044.8	\$327.17	12	4	(2) 8' Lamps to (4) 4' Lamps - 28w T8, Elect Ballast; retrofit	96	1.15	1382.4	\$221.18	\$100.00	\$1,200.00	\$1,200.00	0.55	662.4	\$105.98	11.32
Totals			211	74			38.80	139,273	\$22,284	211	59			20.1	72,577	\$11,612		\$13,336		8.2	28,478	\$4,556	2.93

CEG Job #: 9C10076
 Project: Public Works Building
 Address: 1729 Erial Road
 Gloucester Township, NJ
 Building SF: -

Public Works Building

KWH COST: \$0.160

ECM #2: Lighting Controls

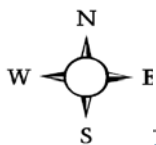
EXISTING LIGHTING										PROPOSED LIGHTING CONTROLS										SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
237.22	Front Office	2600	14	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	1.54	4004	\$640.64	14	1	Dual Technology Occupancy Sensor - Remote Mnt.	110	1.23	20%	3203.2	\$512.51	\$160.00	\$160.00	0.31	800.8	\$128.13	1.25
227.21	Hall	3000	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	780	\$124.80	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	65	0.21	20%	624	\$99.84	\$160.00	\$160.00	0.05	156	\$24.96	6.41
237.22	Lobby	3000	4	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	0.44	1320	\$211.20	4	0	No Change	110	0.44	0%	1320	\$211.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
563		3000	3	1	Recessed Down Light, 26w PL Lamp	26	0.078	234	\$37.44	3	0	No Change	26	0.08	0%	234	\$37.44	\$0.00	\$0.00	0.00	0	\$0.00	0.00
237.22	Vestibule	3000	2	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	0.22	660	\$105.60	2	0	No Change	110	0.22	0%	660	\$105.60	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.34	Mechanical Room	1200	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt. No Lens	62	0.248	297.6	\$47.62	4	0	No Change	62	0.25	0%	297.6	\$47.62	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Hall	3000	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	780	\$124.80	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	65	0.21	20%	624	\$99.84	\$160.00	\$160.00	0.05	156	\$24.96	6.41
237.21	Conference Room	2600	6	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	0.66	1716	\$274.56	6	1	Dual Technology Occupancy Sensor - Switch Mnt.	110	0.53	20%	1372.8	\$219.65	\$75.00	\$75.00	0.13	343.2	\$54.91	1.37
227.21	Electrical Room	800	2	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.13	104	\$16.64	2	0	No Change	65	0.13	0%	104	\$16.64	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Hall	3000	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	780	\$124.80	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	65	0.21	20%	624	\$99.84	\$160.00	\$160.00	0.05	156	\$24.96	6.41
237.22	Supervisor's Office	2600	8	3	2x2, 3 Lamp, FT40DL/835/RS 40w CFL, Elect. Ballast, Recessed Mnt., Parabolic Lens	110	0.88	2288	\$366.08	8	1	Dual Technology Occupancy Sensor - Switch Mnt.	110	0.70	20%	1830.4	\$292.86	\$75.00	\$75.00	0.18	457.6	\$73.22	1.02
227.21	110 Lunch Room	2600	15	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.975	2535	\$405.60	15	1	Dual Technology Occupancy Sensor - Remote Mnt.	65	0.78	20%	2028	\$324.48	\$160.00	\$160.00	0.20	507	\$81.12	1.97
227.21	Hall	3000	6	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.39	1170	\$187.20	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	65	0.31	20%	936	\$149.76	\$160.00	\$160.00	0.08	234	\$37.44	4.27
746	M109 Building Maintenance	2600	4	1	250w MH LoBay w/Prismatic Lens	295	1.18	3068	\$490.88	4	0	No Change	295	1.18	0%	3068	\$490.88	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.34	Mezzanine	1200	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt. No Lens	62	0.248	297.6	\$47.62	4	0	No Change	62	0.25	0%	297.6	\$47.62	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.34	Parts - Under Mezzanine	2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt. No Lens	62	0.248	644.8	\$103.17	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.20	20%	515.84	\$82.53	\$160.00	\$160.00	0.05	128.96	\$20.63	7.75

227.21	Men's Locker Room	3000	5	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.325	975	\$156.00	5	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.26	20%	780	\$124.80	\$75.00	\$75.00	0.07	195	\$31.20	2.40
227.21	Men's Showers	3000	3	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.195	585	\$93.60	3	0	No Change	65	0.20	0%	585	\$93.60	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Women's Locker Room & Showers	3000	4	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.26	780	\$124.80	4	1	Dual Technology Occupancy Sensor - Switch Mnt.	65	0.21	20%	624	\$99.84	\$75.00	\$75.00	0.05	156	\$24.96	3.00
746	Tool Storage	2600	6	1	250w MH LoBay w/Prismatic Lens	295	1.77	4602	\$736.32	6	0	No Change	295	1.77	0%	4602	\$736.32	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.34	Mezzanine	2600	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.372	967.2	\$154.75	6	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.30	20%	773.76	\$123.80	\$160.00	\$160.00	0.07	193.44	\$30.95	5.17
221.34	Parts - Under Mezzanine	2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.248	644.8	\$103.17	4	1	Dual Technology Occupancy Sensor - Remote Mnt.	62	0.20	20%	515.84	\$82.53	\$160.00	\$160.00	0.05	128.96	\$20.63	7.75
232.21	Restroom	2600	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.086	223.6	\$35.78	1	0	No Change	86	0.09	0%	223.6	\$35.78	\$0.00	\$0.00	0.00	0	\$0.00	0.00
746	Vehicle Maintenance	3000	19	1	250w MH LoBay w/Prismatic Lens	295	5.605	16815	\$2,690.40	19	0	No Change	295	5.61	0%	16815	\$2,690.40	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.34		3000	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.372	1116	\$178.56	6	0	No Change	62	0.37	0%	1116	\$178.56	\$0.00	\$0.00	0.00	0	\$0.00	0.00
232.21	M105 Supervisor's Office	3000	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.086	258	\$41.28	1	0	No Change	86	0.09	0%	258	\$41.28	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21		3000	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.065	195	\$31.20	1	0	No Change	65	0.07	0%	195	\$31.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.34	Compressor Room	3000	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.124	372	\$59.52	2	0	No Change	62	0.12	0%	372	\$59.52	\$0.00	\$0.00	0.00	0	\$0.00	0.00
746	Parts Bay	3000	2	1	250w MH LoBay w/Prismatic Lens	295	0.59	1770	\$283.20	2	0	No Change	295	0.59	0%	1770	\$283.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.34		3000	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	62	0.062	186	\$29.76	1	0	No Change	62	0.06	0%	186	\$29.76	\$0.00	\$0.00	0.00	0	\$0.00	0.00
221.45	M103 Janitor	800	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Wall Mnt., No Lens	62	0.062	49.6	\$7.94	1	0	No Change	62	0.06	0%	49.6	\$7.94	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Men's Restroom	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.065	169	\$27.04	1	0	No Change	65	0.07	0%	169	\$27.04	\$0.00	\$0.00	0.00	0	\$0.00	0.00
227.21	Women's Restroom	2600	1	2	2x2, 2 Lamp, 32w 700 series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	65	0.065	169	\$27.04	1	0	No Change	65	0.07	0%	169	\$27.04	\$0.00	\$0.00	0.00	0	\$0.00	0.00
711	Exterior	4400	4	1	70w HPS Bollards	92	0.368	1619.2	\$259.07	4	0	No Change	92	0.37	0%	1619.2	\$259.07	\$0.00	\$0.00	0.00	0	\$0.00	0.00
750		4400	19	1	250w HPS Wallpack	295	5.605	24662	\$3,945.92	19	0	No Change	295	5.61	0%	24662	\$3,945.92	\$0.00	\$0.00	0.00	0	\$0.00	0.00
767		4400	30	1	400w Probe Start MH "Shoobox" Parking Lot Light	460	13.8	60720	\$9,715.20	30	0	No Change	460	13.80	0%	60720	\$9,715.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Old Public Works Building				0	0	0	0	\$0.00	0	0	No Change	0	0.00	0%	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00	
242.11	Lobby	800	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.214	171.2	\$27.39	2	0	No Change	107	0.21	0%	171.2	\$27.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.11	Hall	800	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.214	171.2	\$27.39	2	0	No Change	107	0.21	0%	171.2	\$27.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00
3015	Restroom	200	1	1	Wall Mnt., Glass Cover, 100w A Lamp	100	0.1	20	\$3.20	1	0	No Change	100	0.10	0%	20	\$3.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00

242.11	Reception	800	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.214	171.2	\$27.39	2	0	No Change	107	0.21	0%	171.2	\$27.39	\$0.00	\$0.00	0.00	0	\$0.00	0.00
625	Restroom	200	1	2	Fan/Light Combo (2) 100w A Lamp	200	0.2	40	\$6.40	1	0	No Change	200	0.20	0%	40	\$6.40	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.11	Front Office	800	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.312	249.6	\$39.94	2	0	No Change	156	0.31	0%	249.6	\$39.94	\$0.00	\$0.00	0.00	0	\$0.00	0.00
551	Utility Room	200	1	1	Recessed Down Light, 100w A Lamp	100	0.1	20	\$3.20	1	0	No Change	100	0.10	0%	20	\$3.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
242.11	Locker/ Lunch Room	800	6	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.642	513.6	\$82.18	6	0	No Change	107	0.64	0%	513.6	\$82.18	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.11		800	5	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.78	624	\$99.84	5	0	No Change	156	0.78	0%	624	\$99.84	\$0.00	\$0.00	0.00	0	\$0.00	0.00
625	Restroom	200	1	2	Fan/Light Combo (2) 100w A Lamp	200	0.2	40	\$6.40	1	0	No Change	200	0.20	0%	40	\$6.40	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.11	Files	800	8	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	1.248	998.4	\$159.74	8	0	No Change	156	1.25	0%	998.4	\$159.74	\$0.00	\$0.00	0.00	0	\$0.00	0.00
3015	Restroom	200	1	1	Wall Mnt., Glass Cover, 100w A Lamp	100	0.1	20	\$3.20	1	0	No Change	100	0.10	0%	20	\$3.20	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.11	Garage Bay	1200	8	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	1.248	1497.6	\$239.62	8	0	No Change	156	1.25	0%	1497.6	\$239.62	\$0.00	\$0.00	0.00	0	\$0.00	0.00
121.14	Large Garage Bays	1200	1	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.078	93.6	\$14.98	1	0	No Change	78	0.08	0%	93.6	\$14.98	\$0.00	\$0.00	0.00	0	\$0.00	0.00
128.14		1200	12	2	8' Channel, 2 Lamp, 75w T12, Mag. Ballast, Surface Mnt., No Lens	142	1.704	2044.8	\$327.17	12	0	No Change	142	1.70	0%	2044.8	\$327.17	\$0.00	\$0.00	0.00	0	\$0.00	0.00
	Totals		211	74			45.5	144,232.6	\$23,077	258	13			44.2		140,619.6	\$22,499.14		\$1,740	1.34	3,613	\$578	3.01

Project Name: LGEA Solar PV Project - Gloucester Township Public Works Building							
Location: Blackwood, NJ							
Description: Photovoltaic System - Direct Purchase							
Simple Payback Analysis							
	Photovoltaic System - Direct Purchase						
Total Construction Cost	\$1,395,180						
Annual kWh Production	189,381						
Annual Energy Cost Reduction	\$32,384						
Annual SREC Revenue	\$66,283						
First Cost Premium	\$1,395,180						
Simple Payback:	14.14						Years
Life Cycle Cost Analysis							
Analysis Period (years):	25			Financing %:	0%		
Financing Term (mths):	0			Maintenance Escalation Rate:	3.0%		
Average Energy Cost (\$/kWh)	\$0.171			Energy Cost Escalation Rate:	3.0%		
Financing Rate:	0.00%			SREC Value (\$/kWh)	\$0.350		
Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Net Cash Flow	Cumulative Cash Flow
0	\$1,395,180	0	0	0	\$0	(1,395,180)	0
1	\$0	189,381	\$32,384	\$0	\$66,283	\$98,668	(\$1,296,512)
2	\$0	188,434	\$33,356	\$0	\$65,952	\$99,308	(\$1,197,205)
3	\$0	187,492	\$34,356	\$0	\$65,622	\$99,979	(\$1,097,226)
4	\$0	186,554	\$35,387	\$0	\$65,294	\$100,681	(\$996,545)
5	\$0	185,622	\$36,449	\$1,912	\$64,968	\$99,504	(\$897,041)
6	\$0	184,694	\$37,542	\$1,902	\$64,643	\$100,283	(\$796,758)
7	\$0	183,770	\$38,668	\$1,893	\$64,320	\$101,095	(\$695,663)
8	\$0	182,851	\$39,828	\$1,883	\$63,998	\$101,943	(\$593,720)
9	\$0	181,937	\$41,023	\$1,874	\$63,678	\$102,827	(\$490,893)
10	\$0	181,027	\$42,254	\$1,865	\$63,360	\$103,749	(\$387,144)
11	\$0	180,122	\$43,522	\$1,855	\$63,043	\$104,709	(\$282,435)
12	\$0	179,222	\$44,827	\$1,846	\$62,728	\$105,709	(\$176,726)
13	\$0	178,325	\$46,172	\$1,837	\$62,414	\$106,749	(\$69,977)
14	\$0	177,434	\$47,557	\$1,828	\$62,102	\$107,831	\$37,855
15	\$0	176,547	\$48,984	\$1,818	\$61,791	\$108,957	\$146,811
16	\$0	175,664	\$50,453	\$1,809	\$61,482	\$110,126	\$256,938
17	\$0	174,786	\$51,967	\$1,800	\$61,175	\$111,342	\$368,280
18	\$0	173,912	\$53,526	\$1,791	\$60,869	\$112,604	\$480,883
19	\$0	173,042	\$55,132	\$1,782	\$60,565	\$113,914	\$594,798
20	\$0	172,177	\$56,786	\$1,773	\$60,262	\$115,274	\$710,072
21	\$1	171,316	\$58,489	\$1,765	\$59,961	\$116,685	\$826,757
22	\$2	170,459	\$60,244	\$1,756	\$59,661	\$118,149	\$944,907
23	\$3	169,607	\$62,051	\$1,747	\$59,363	\$119,667	\$1,064,574
24	\$4	168,759	\$63,913	\$1,738	\$59,066	\$121,240	\$1,185,814
25	\$5	167,915	\$65,830	\$1,730	\$58,770	\$122,871	\$1,308,685
Totals:	4,461,050	4,461,050	\$1,180,702	\$38,205	\$1,561,367	\$2,703,865	(\$1,051,475)
Net Present Value (NPV)						\$1,308,710	
Internal Rate of Return (IRR)						5.6%	

Building	Roof Area (sq ft)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW _{DC}	Total Annual kWh	Panel Weight (33 lbs)	W/SQFT
Gloucester Township Public Works Building	11000	Sunpower SPR230	674	14.7	9,911	155.02	189,381	22,242	15.64



PV Walls AC Energy & Cost Savings



(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	155.0 kW
DC to AC Derate Factor:	0.810
AC Rating:	125.6 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	0.2 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	2.58	10070	17.22
2	3.33	11891	20.33
3	4.31	16606	28.40
4	5.20	18916	32.35
5	5.85	21604	36.94
6	6.14	21028	35.96
7	6.06	21242	36.32
8	5.54	19521	33.38
9	4.85	16785	28.70
10	3.76	13706	23.44
11	2.65	9603	16.42
12	2.23	8410	14.38
Year	4.38	189381	323.84

= Proposed PV Layout

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

**TOWNSHIP OF GLOUCESTER
MONROE SWIMMING FACILITY**

**MONROE DRIVE
GLOUCESTER TOWNSHIP, NJ 08012**

FACILITY ENERGY REPORT

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Appendix A – ECM Cost & Savings Breakdown

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Appendix C – Portfolio Manager “Statement of Energy Performance”

Appendix D – Major Equipment List

Appendix E – Investment Grade Lighting Audit

I. HISTORIC ENERGY CONSUMPTION/COST

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

Electric Utility Provider:	Public Service Electric & Gas
Electric Utility Rate Structure:	General Lighting & Power (GLP)
Third Party Supplier:	None

Natural Gas Utility Provider:	South Jersey Natural Gas
Utility Rate Structure:	Unknown
Third Party Supplier:	None

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

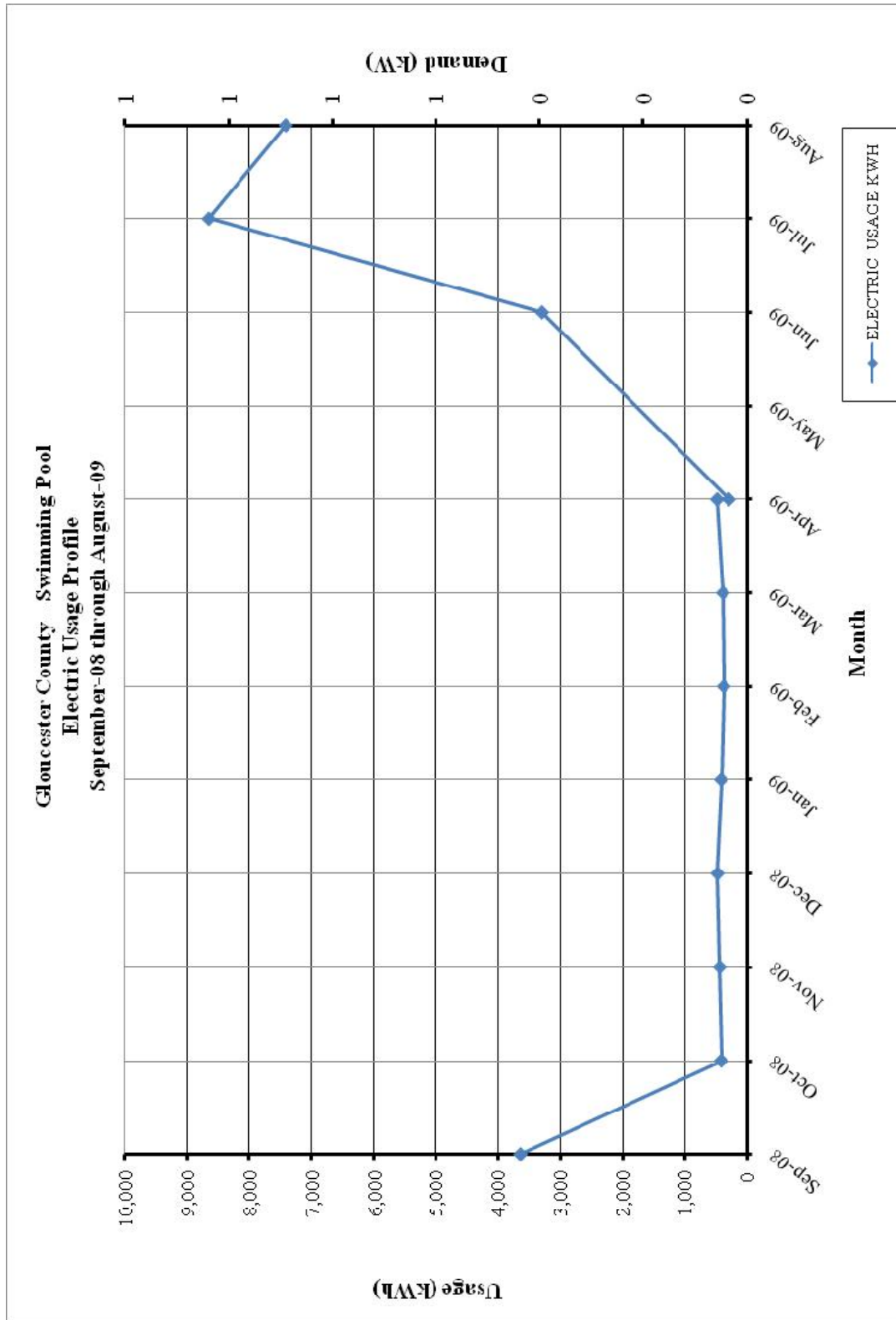
The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

**Table 1
Electricity Billing Data**

ELECTRIC USAGE SUMMARY			
Utility Provider: PGS&G			
Rate: GLP			
Meter No: 626032163			
Customer ID No: 6572744205 (Account #)			
Third Party Utility Provider:			
TPS Meter / Acct No:			
MONTH OF USE	CONSUMPTION KWH	DEMAND	TOTAL BILL
24-Sep-08	3,642	0.0	\$768
23-Oct-08	414	0.0	\$137
21-Nov-08	438	0.0	\$134
22-Dec-08	474	0.0	\$139
19-Jan-09	414	0.0	\$133
14-Feb-09	372	0.0	\$130
15-Mar-09	384	0.0	\$132
18-Apr-09	480	0.0	\$142
30-Apr-09	288	0.0	\$119
22-Jun-09	3,294	0.0	\$698
23-Jul-09	8,652	0.0	\$1,522
21-Aug-09	7,416	0.0	\$1,330
Totals	26,268	0.0 Max	\$5,383
AVERAGE DEMAND		0.0 KW average	
AVERAGE RATE		\$0.205 \$/kWh	

Demand data was not available for this facility

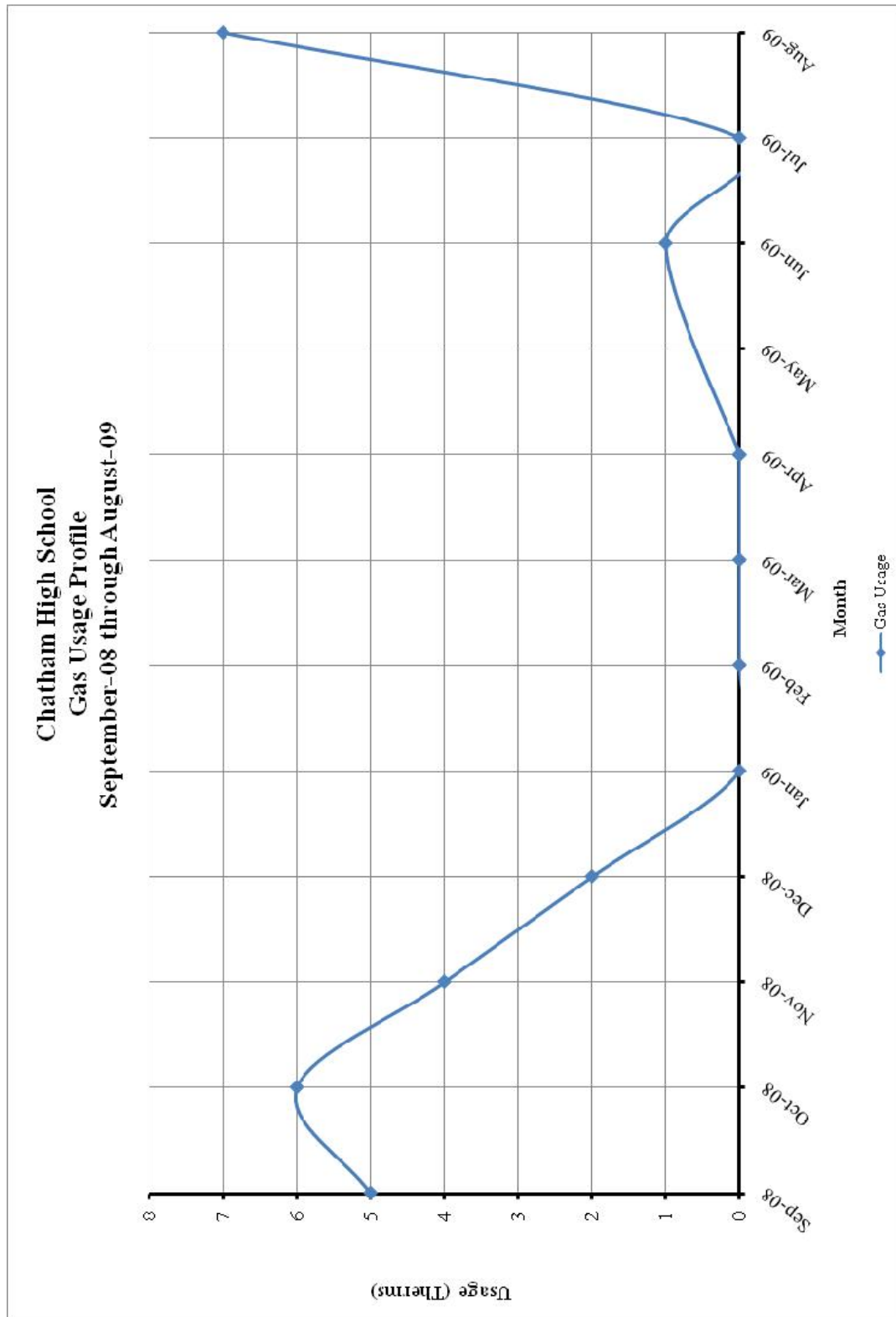
Figure 1
Electricity Usage Profile



**Table 4
Natural Gas Billing Data**

NATURAL GAS USAGE SUMMARY		
Utility Provider: South Jersey Gas		
Rate:		
Meter No:		
Point of Delivery ID: 2-05-31-2550-14		
Third Party Utility Provider:		
TPS Meter No:		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
24-Sep-08	5.00	\$26.97
23-Oct-08	6.00	\$27.81
21-Nov-08	4.00	\$23.11
22-Dec-08	2.00	\$22.40
19-Jan-09	0.00	\$21.85
14-Feb-09	0.00	\$18.10
15-Mar-09	0.00	\$18.10
18-Apr-09	0.00	\$18.73
30-Apr-09	0.00	\$19.35
22-Jun-09	1.00	\$20.91
23-Jul-09	0.00	\$0.00
21-Aug-09	7.00	\$0.00
TOTALS	25.00	\$217.33
AVERAGE RATE:	\$8.69	\$/THERM

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The Monroe Drive Swimming Facility is located on Monroe Drive in Gloucester Township, New Jersey. The 1,460 SF Public Pool Facility encompasses a mechanical room, bathrooms and outdoor pool area. The pool facility was built in 1970.

Occupancy Profile

The Monroe Drive Swimming Facility is open between Memorial Day and Labor Day. This facility is only open during the summer time and therefore has a reduced amount of operational hours during the year for all of the equipment at the facility. During the summer this facility employs approximately 6 employees.

Building Envelope

Exterior walls for the small structure are brick faced with a concrete block construction. There is no insulation within the walls. There are no windows at this facility. The roof area is a sloped roof with shingles. The amount of insulation below the roofing is minimal.

Pumping System

There are two (2) 5 HP filter pumps that circulate water for the main swimming pools. Two (2) 1 HP pumps are installed for the sewage ejection system. One (1) ½ HP filter pump is dedicated for the baby pool. These pumps run continuously in the summer. Currently all pumps are operated manually without controls.

Exhaust System

Air is exhausted from the toilet rooms through the side wall penetrations.

Domestic Hot Water

Domestic hot water for the restrooms is provided by a 75 gallon Bradford White gas-fired hot water heater, capacity of 80 MBH. The domestic hot water is circulated throughout the building by a hot water re-circ pump. The domestic hot water piping insulation appeared to be in good condition.

Lighting

Refer to the Investment Grade lighting Audit Appendix for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. MAJOR EQUIPMENT LIST

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

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

IV. ENERGY CONSERVATION MEASURES

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

**Table 1
ECM Financial Summary**

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST^A	ANNUAL SAVINGS^B	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
ECM #1	Lighting Upgrade	\$588	\$406	1.4	935.7%
ECM #2	Lighting Controls	\$220	\$774	0.3	5177.3%
ECM #3	Pool Pump Controls	\$750	\$1,783	0.4	3466.0%
ECM #4	Hot Water Heater Replacement	\$1,530	\$105	14.6	-17.6%

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

**Table 2
ECM Energy Summary**

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Upgrade	0.6	2230.0	0.0
ECM #2	Lighting Controls	0.0	2230.0	0.0
ECM #3	Pool Pump Controls	0.0	8696.0	0.0
ECM #4	Hot Water Heater Replacement	(4.5)	(549.0)	25.0

**Table 3
Financial Project Summary**

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Lighting Upgrade	\$406	\$628	\$40	\$588	1.4
Lighting Controls	\$774	\$300	\$80	\$220	0.3
Pool Pump Controls	\$1,783	\$750	\$0	\$750	0.4
Hot Water Heater Replacement	\$105	\$1,530	\$0	\$1,530	14.6
<i>Design / Construction Extras (15%)</i>		<i>\$481</i>		<i>\$481</i>	
Total Project	\$3,068	\$3,689	\$120	\$3,569	1.2

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade**Description:**

The lighting at the Pool facility is a mixture of 32 watt T-8 bulbs with electronic ballasts and 34 watt T-12 bulbs with magnetic ballasts. The existing T-12 fixtures with magnetic ballasts are inefficient compared to modern T-8 fixtures. The existing T-8 lamps are 700 series which are efficient; however there have been improvements in lamp technology. There are also a few locations with incandescent fixtures. All exit signs throughout the building are currently high efficiency LED exit signs.

This ECM includes replacement or retrofit of all fixtures with magnetic ballasts in the facility with electronic ballasts and T-8 lamps. T-8 lamps with electronic ballasts provide energy savings as well as improved light over the existing T-12 fixtures. This ECM will also provide maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need 33% less lamps replaced per year.

This ECM also includes switching out all existing 32 watt T-8 lamps with “SuperSaver” 28 watt T-8 lamps. The new lamp technology provides equivalent lighting with reduced input wattage, while utilizing the existing electronic ballast. Several electronic ballasts were checked for compatibility with 28 watt lamps to verify the applicability of this ECM.

This ECM also includes replacement of any incandescent lamps with compact fluorescent lamps or LED fixtures. The energy usage of an incandescent compared to a compact fluorescent is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours, compared to incandescent fixtures ranging from 750 to 1000 burn-hours.

Energy Savings Calculations:

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

From the **NJ Smart Start Incentive Appendix**, the replacement of a T-12 fixture to a T-5 or T-8 fixture warrants the following incentive: T-5 or T-8 (1-4 lamps) = \$10 per fixture

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

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

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{replacement } \$ \text{ per lamp} + \text{Labor } \$ \text{ per lamp})$$

$$\text{Savings} = (1 \text{ lamps per year}) \times (\$2.00 + \$5.00) = \$7$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$628
NJ Smart Start Equipment Incentive (\$):	\$40
Net Installation Cost (\$):	\$588
Maintenance Savings (\$/Yr):	\$7
Energy Savings (\$/Yr):	\$399
Total Yearly Savings (\$/Yr):	\$406
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.4
Simple Lifetime ROI	935.7%
Simple Lifetime Maintenance Savings	\$105
Simple Lifetime Savings	\$6,090
Internal Rate of Return (IRR)	69%
Net Present Value (NPV)	\$4,258.80

ECM #2: Lighting Controls

Description:

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

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

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

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

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of the total light energy controlled by occupancy sensors.

This ECM includes replacement of standard wall switches with sensors wall switches for the office, rest rooms, snack stand and pump room. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent.

The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

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

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

Installation cost per dual-technology sensors (Basis: Sensor switch or equivalent) as well as other details are shown in the **Investment Grade Lighting Audit Appendix**.

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

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

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

$$= (4 \times \$20) + (0 \times \$35) = \$80$$

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$300
NJ Smart Start Equipment Incentive (\$):	\$80
Net Installation Cost (\$):	\$220
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$774
Total Yearly Savings (\$/Yr):	\$774
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.3
Simple Lifetime ROI	5177.3%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$11,610
Internal Rate of Return (IRR)	352%
Net Present Value (NPV)	\$9,019.96

ECM #3: Pool Pump Controls

Description:

The Monroe Drive Swimming Facility is an outdoor pool facility open from the end of May to the beginning of September (roughly Memorial Day throughout Labor Day). When the facility is open the pool filter pumps run continuously (24/7). The facility utilizes two 5 HP filter pumps for the main pools and one ½ HP filter pump for the small pool. The filter pumps are required to be running when the facility is open, however significant energy could be saved when the pool is closed by turning the pool pump off.

Pool facilities require a minimum pool water “turnover rate” to maintain adequate filtration for the pools. The turnover rate is the time to cycle the full volume of pool water through the filters. The range of typical turnovers is approximately 4 – 6 hours per turnover. In some instances commercial pools are recommended to operate 24/7 to ensure adequate filtration of the pools. Turnover rate is typically much lower (more turnovers) for shallow pools or baby pools to remove higher levels of contaminants. In many cases baby pools are recommended to operate 24/7. It is recommended to review the requirements for this facility through a pool specialist.

This ECM includes installation of a time clock on the two 5 HP main pool pumps to reduce energy consumption when the pool facility is closed. The calculations are based on the following operating schedule for both 5 HP filter pumps operating simultaneously:

Pump Run Hrs - 10:00AM to 10:00PM (2 hours before and after pool schedule)

The operating hours above should be verified with a pool specialist before proceeding with this ECM.

Energy Savings Calculations:

Energy Savings:

$$\text{Energy Use, kWh} = \frac{\text{Pump HP} \times 0.746 \frac{\text{kW}}{\text{HP}} \times \text{Operating Hrs} \times \text{Load Factor}}{\text{Motor Efficiency \%}}$$

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

POOL PUMP CONTROL CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Continuous Operation	Pump Time Clock Control	
Pump Power (HP)	10	10	
Estimated Load Factor (%)	85%	85%	
Conversion Factor (kW/HP)	0.746	0.746	
Operating Hrs	2,400	1,200	1,200
Motor Efficiency	87.5%	87.5%	
Elec Cost (\$/kWh)	\$0.205	\$0.205	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Energy Use (kWh)	17,392	8,696	8,696
Energy Cost (\$)	\$3,565	\$1,783	\$1,783
COMMENTS:			

Installation cost of the time clock and associated wiring is estimated to be \$750 (\$250 Materials)

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

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$750
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$750
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$1,783
Total Yearly Savings (\$/Yr):	\$1,783
Estimated ECM Lifetime (Yr):	15
Simple Payback	0.4
Simple Lifetime ROI	3466.0%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$26,745
Internal Rate of Return (IRR)	238%
Net Present Value (NPV)	\$20,535.34

ECM #4: Hot Water Heater Replacement

Description:

The Monroe Drive Swimming Facility utilizes a 75 gallon gas hot water heater for the facility lavatories and showers. The hot water heater is the only load on the natural gas service which makes the overall natural gas use very small. Since the natural gas service includes a minimum charge for the service to be available typically called the “meter charge,” the effective cost for natural gas is extremely high at \$8.69 per therm.

Replacement of the existing gas hot water heater to an electric hot water heater would save operating cost by avoiding relatively high supplemental charges for a gas serviced dedicated to a very small load.

This ECM includes installing an 80 gallon electric hot water heater in place of the existing natural gas hot water heater. The calculations are based on the existing natural gas consumption to establish the total hot water heating energy for the facility.

The electrical service, electric panel capacity, and installation requirements should be verified before proceeding with this ECM.

Energy Savings Calculations:

Energy Savings:

Hot Water Energy (BTU)

$$= \text{Existing Gas (Therms)} \times \text{HWH Efficiency \%} \times \text{Heat Value} \left(\frac{\text{Btu}}{\text{Therm}} \right)$$

$$\text{Energy Use (kWh)} = \frac{\text{Hot Water Energy (Btu)}}{\text{Heat Value} \left(\frac{\text{Btu}}{\text{kWh}} \right) \times \text{HWH Efficiency \%}}$$

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

HOT WATER HEATER CALCULATIONS			
ECM INPUTS	EXISTING	PROPOSED	SAVINGS
ECM INPUTS	Nat Gas HWH	Electric HWH	
Existing Gas Use (Therms)	25		
HWH Efficiency (%)	75%	100%	
Nat Gas Heat Value (Btu/Therm)	100,000	100,000	
Elec Heat Value (Btu/kWh)	3,413	3,413	
Hot Water Energy Use (Btu)	1,875,000	1,875,000	
Nat Gas Cost (\$/Therm)	\$8.69	\$8.69	
Elec Cost (\$/kWh)	\$0.205	\$0.205	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	EXISTING	PROPOSED	SAVINGS
Nat Gas Energy Use (Therms)	25	0	
Electric Energy Use (kWh)	0	549	
Energy Cost (\$)	\$217	\$113	\$105
COMMENTS:			

Installation cost of the electric hot water heater and associated wiring is estimated to be \$1530 (\$1030 Materials)

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

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,530
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$1,530
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$105
Total Yearly Savings (\$/Yr):	\$105
Estimated ECM Lifetime (Yr):	12
Simple Payback	14.6
Simple Lifetime ROI	-17.6%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$1,260
Internal Rate of Return (IRR)	-3%
Net Present Value (NPV)	(\$484.83)

V. ADDITIONAL RECOMMENDATIONS

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

- A. Maintain filter pump motors and grease bearings regularly to ensure efficient operation. Operate all equipment per manufacturer's recommendations.

ECM COST & SAVINGS BREAKDOWN
CONCORD ENGINEERING GROUP

Gloucester Township - Pool

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME (Yr)	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^N \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^N \frac{C_n}{(1+DR)^n}$
		(\$)	(\$)	(\$)	(\$)	(\$/Yr)	(\$/Yr)	(\$/Yr)		(\$)	(\$)	(%)	(Yr)	(\$)	(\$)
ECM #1	Lighting Upgrade	\$628	\$0	\$40	\$588	\$399	\$7	\$406	15	\$6,090	\$105	935.7%	1.4	69.02%	\$4,258.80
ECM #2	Lighting Controls	\$300	\$0	\$80	\$220	\$774	\$0	\$774	15	\$11,610	\$0	5177.3%	0.3	351.82%	\$9,019.96
ECM #3	Pool Pump Controls	\$250	\$500	\$0	\$750	\$1,783	\$0	\$1,783	15	\$26,745	\$0	3466.0%	0.4	237.73%	\$20,535.34
ECM #4	Hot Water Heater Replacement	\$1,030	\$500	\$0	\$1,530	\$105	\$0	\$105	12	\$1,260	\$0	-17.6%	14.6	-2.87%	(\$484.83)

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



Concord Engineering Group, Inc.

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VOORHEES, NEW JERSEY 08043
PHONE: (856) 427-0200
FAX: (856) 427-6508

SmartStart Building Incentives

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

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Cooling

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

Desiccant Systems

\$1.00 per cfm – gas or electric

Electric Unitary HVAC

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

Gas Heating

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

Variable Frequency Drives

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

Natural Gas Water Heating

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

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-2 lamps) \$30 per fixture (3-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$42 per 5 foot \$65 per 6 foot

Lighting Controls – Occupancy Sensors

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

Lighting Controls – HID or Fluorescent Hi-Bay Controls

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

Premium Motors

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

Other Equipment Incentives

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



STATEMENT OF ENERGY PERFORMANCE

Gloucester Twp - Monroe Drive Swimming Facility

Building ID: 2555199
For 12-month Period Ending: August 31, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: January 17, 2011

Facility	Facility Owner	Primary Contact for this Facility
Gloucester Twp - Monroe Drive Swimming Facility	Gloucester Township	Tom Cardis
Monroe Drive	1261 chews landing road	1261 chews landing road
Gloucester Township, NJ 08012	Gloucester Township, NJ 08012	Gloucester Township, NJ 08012

Year Built: 1970
Gross Floor Area (ft²): 0

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	89,626
Natural Gas (kBtu) ⁴	2,500
Total Energy (kBtu)	92,126

Energy Intensity⁵

Site (kBtu/ft ² /yr)	
Source (kBtu/ft ² /yr)	N/A

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	14
---	----

Electric Distribution Utility

Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	0
National Average Source EUI	0
% Difference from National Average Source EUI	0%
Building Type	

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

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
Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043

Notes:

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Monroe Drive Swimming Facility

Domestic Water Heaters

Tag			
Unit Type	Gas Fired Hot Water Heater		
Qty	1		
Location	MER		
Area Served	Bathrooms		
Manufacturer	Bradfort White		
Model #	75T803N		
Serial #	6300044		
Size (Gallons)	75		
Input Capacity (MBH/KW)	80 MBH		
Recovery (Gal/Hr)	72.7		
Efficiency %	80%		
Fuel	Natural Gas		
Approx Age	10		
ASHRAE Service Life	12		
Remaining Life	2		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Gloucester Township - Monroe Drive Swimming Facility

Pumps

Tag	Pump	Pump	Pump
Unit Type	Filter Pump	Sewage Incejtion	Filter Pump
Qty	2	2	1
Location	MER	MER	MER
Area Served	Pool Water Filtration	Sewage	Pool Water Filtration
Manufacturer	Purex Pool Systems	N/A	N/A
Model #	0M-50	N/A	N/A
Serial #	0595-008	N/A	N/A
Horse Power	5	1	1/2
Flow	N/A	N/A	N/A
Motor Info	Marathon	N/A	N/A
Electrical Power	N/A	N/A	N/A
RPM	3510	N/A	N/A
Motor Efficiency %	87.5% (Est)	N/A	N/A
Approx Age	15	N/A	N/A
ASHRAE Service Life	20	15	15
Remaining Life	5	N/A	N/A
Comments			

Investment Grade Lighting Audit

CEG Job #: 9C10076
Project: Pool

Pool

KWH COST: \$0.179

Bldg. Sq. Ft.

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING								SAVINGS				
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
142.11	Office	1100	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.16	171.6	\$30.72	1	3	Delamp 1, Reballast & Relamp; (3) Sylvania Lamp FO28/841/SS/ECO	85	0.09	93.5	\$16.74	\$100.00	\$100.00	0.07	78.1	\$13.98	7.15
142.11	Men's Rest Room	4400	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.31	1,372.8	\$245.73	2	3	Delamp 1, Reballast & Relamp; (3) Sylvania Lamp FO28/841/SS/ECO	85	0.17	748	\$133.89	\$100.00	\$200.00	0.14	624.8	\$111.84	1.79
242.11		4400	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.11	470.8	\$84.27	1	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.10	431.2	\$77.18	\$28.00	\$28.00	0.01	39.6	\$7.09	3.95
142.11	Women's Rest Room	4400	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.16	686.4	\$122.87	1	3	Delamp 1, Reballast & Relamp; (3) Sylvania Lamp FO28/841/SS/ECO	85	0.09	374	\$66.95	\$100.00	\$100.00	0.07	312.4	\$55.92	1.79
242.11		4400	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.32	1,412.4	\$252.82	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	1293.6	\$231.55	\$28.00	\$84.00	0.03	118.8	\$21.27	3.95
242.11	Snack Stand	4400	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.21	941.6	\$168.55	2	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.20	862.4	\$154.37	\$28.00	\$56.00	0.02	79.2	\$14.18	3.95
613	Pump Room	4400	2	1	Socket , 100w A19 Lamp	100	0.20	880.0	\$157.52	2	1	(1) 26w CFL Lamp	26	0.05	228.8	\$40.96	\$20.00	\$40.00	0.15	651.2	\$116.56	0.34
619	Exterior	4400	1	1	Ceiling Mount Globe, (1) 100w A19 Lamp	100	0.10	440.0	\$78.76	1	1	(1) 26w CFL Lamp	26	0.03	114.4	\$20.48	\$20.00	\$20.00	0.07	325.6	\$58.28	0.34
710		4400	3	1	100w HPS Flood Light	125	0.38	1,650.0	\$295.35	3	0	No Change	0	0.00	0	\$0.00	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals			16	27			1.94	8,026	\$1,437	16	23			1.0	4,146	\$742		\$628	0.6	2,230	\$399	1.57

CEG Job #: 9C10076
 Project: Pool
 Address: 0
 Building SF: 0

Pool

KWH COST: \$0.179

ECM #2: Lighting Controls

EXISTING LIGHTING					PROPOSED LIGHTING CONTROLS										SAVINGS								
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly \$ Cost	No. Fixts	No. Cont.	Controls Description	Watts Used	Total kW	Reduction (%)	kWh/Yr Fixtures	Yearly \$ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly \$ Savings	Yearly Simple Payback
142.11	Office	1100	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.156	171.6	\$30.72	1	0	No Change	156	0.16	0%	171.6	\$30.72	\$0.00	\$0.00	0.00	0	\$0.00	0.00
142.11	Men's Rest Room	4400	2	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.312	1372.8	\$245.73	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	156	0.08	75%	343.2	\$61.43	\$75.00	\$75.00	0.23	1029.6	\$184.30	0.30
242.11		4400	1	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic	107	0.107	470.8	\$84.27	1			107	0.03	75%	117.7	\$21.07			0.08	353.1	\$63.20	
142.11	Women's Rest Room	4400	1	4	2x4, 4 Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	156	0.156	686.4	\$122.87	1	1	Dual Technology Occupancy Sensor - Switch Mnt.	156	0.04	75%	171.6	\$30.72	\$75.00	\$75.00	0.12	514.8	\$92.15	0.27
242.11		4400	3	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.321	1412.4	\$252.82	3			107	0.08	75%	353.1	\$63.20			0.24	1059.3	\$189.61	
242.11	Snack Stand	4400	2	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	107	0.214	941.6	\$168.55	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	107	0.05	75%	235.4	\$42.14	\$75.00	\$75.00	0.16	706.2	\$126.41	0.59
613	Pump Room	4400	2	1	Socket, 100w A19 Lamp	100	0.2	880	\$157.52	2	1	Dual Technology Occupancy Sensor - Switch Mnt.	100	0.05	75%	220	\$39.38	\$75.00	\$75.00	0.15	660	\$118.14	0.63
619	Exterior	4400	1	1	Ceiling Mount Globe, (1) 100w A19 Lamp	100	0.1	440	\$78.76	1	0	No Change	100	0.10	0%	440	\$78.76	\$0.00	\$0.00	0.00	0	\$0.00	0.00
710		4400	3	1	100w HPS Flood Light	125	0.375	1650	\$295.35	3	0	No Change	125	0.38	0%	1650	\$295.35	\$0.00	\$0.00	0.00	0	\$0.00	0.00
Totals			16	27			1.9	8,025.6	\$1,437	16	4			1.0		3,702.6	\$662.77		\$300	0.98	4,323	\$774	0.39