BURLINGTON TOWNSHIP
MUNICIPAL COMPLEX
ENERGY ASSESSMENT

for

NEW JERSEY
BUREAU OF PUBLIC UTILITIES

CHA PROJECT NO. 21062

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1.0 INTRODUCTION AND BACKGROUND

The Burlington Township Municipal Complex consists of a municipal building, athletic fields, and ancillary buildings. The municipal building was constructed in 1979 and is a two story 51,000 square foot structure, located at 851 Old York Road, Burlington Township, NJ. It is a multifaceted building which includes a public meeting room, courtroom, administrative offices, council chambers, mayor's office, treasurer, tax collector, police department, and holding cells. Also on this property are several athletic fields with outdoor lighting, walkways, snack shack, fuel pumping area, and garage area. The athletic fields have tennis courts, soccer field, and football field. The fuel dispensing area has two fuel pumps for the municipal fleet and the garage area has four bays for workshops and storage.

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

2.0 EXECUTIVE SUMMARY

This report details the results of the Burlington Township Municipal Complex in Burlington Township, NJ which consists of a municipal building, athletic fields, and ancillary buildings. The municipal building includes the courtroom, administrative offices, police department, and holding cells. The complex also houses several athletic fields with outdoor lighting, walkways, snack shack, fuel pumping area, and garage area. The following areas were evaluated for energy conservation measures:

- Premium efficiency motors
- Exterior lighting replacement
- Daylight controls
- Exit sign upgrades
- Pump upgrades
- Boiler replacement
- Variable speed drives

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Potential annual savings of $14,800 for the recommended ECMs may be realized with a payback of 5.2 years. With incentives equaling $12,300, the payback is 4.3 years.

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

ECM-3 Install Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
5,400	1.1	10,000	0	1,400	3.6	200	3.8	3.7

* Based upon New Jersey Smart Start Program

ECM-4 Replace Exit Signs with LED Type

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
3,700	0.2	3,300	0	400	(0.1)	300	9.1	8.5

* Incentive shown is per the New Jersey Smart Start Program.

ECM-5 Light Replacement

Exterior Lights

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
52,800	36	46,260	0	10,600	2	10,500	4.9	4.0

* Incentive shown is per the New Jersey Smart Start Program, 2010 Prescriptive Lighting Application.

Interior Lights

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
12,900	2.7	6,200	0	1,300	0.2	1,100	9.9	9.1

* Incentive shown is per the New Jersey Smart Start Program, 2010 Prescriptive Lighting Application.

ECM-6 Daylight Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
900	0	470	0	100	0.2	NA	9.0	NA

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

ECM-7 Shutting Off Heater in Garage

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
0	0	3,940	0	500	NA	NA	Immediate	NA

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

ECM-8 Purchase More Efficient Heat Pump

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
700	0	3,800	0	500	14.3	200	1.4	1.0

* Incentive shown is per the New Jersey Smart Start Program.

3.0 EXISTING CONDITIONS

3.1 Building - General

The municipal building is a two story 31,000 square foot structure, constructed in 1979, includes a public meeting room, courtroom, municipal administrative offices, and the Police Department. The main entrance area opens to a two story rotunda with a large dome skylight. This unique design allows an abundance of sunlight into the center of the entrance lobby. The municipal offices are open to the public from 9:00 AM to 5:00 PM five days a week and are occupied by about 50 people.

Construction of the building's exterior walls consists of brick finish with wood framed studs and furred out on the interior with a plaster finish or paneling. The ground floor has several windows along the building exterior; the second floor has windows spaced close together around the entire perimeter of the circle shaped area. All the windows are double pane glass and in average condition. The building's roof has a rubber membrane.

The snack shack is a single story structure that is open during the summer months only and serves drinks and ice cream. It is constructed of concrete masonry unit (CMU) block walls on a concrete foundation. There is no heating, and the building has several outdoor light fixtures.

The garage building is constructed of CMU block walls on a concrete foundation with a pitched roof. It serves as a storage area and workshop. There are small electric heaters which are turned on when occupied. One bay has a wall mounted propane heater which is turned on and off based on occupancy. There is no air conditioning.

3.2 Utility Usage

The utilities serve the entire complex and include electricity and natural gas. Both electric and gas are purchased from Public Service Electric and Gas (PSE&G). The complex does not pay for water.

From February 2009 through January 2010, electric usage was approximately 992,640 kWh at a cost of about $147,300. Analyzing electricity bills during this period, the building was charged a demand unit cost of $11.32 per kW; and a blended unit cost of $0.148 per kWh. Electricity usage varied since this building has heat pumps which consume power year around. Higher power readings occurred in the peak months during summer and winter. Annually, the building required about 6,600 therms of natural gas. Based on the annual cost of about $7,200, the blended price per therm was about $1.09. Gas consumption was the highest in the winter months to heat the building. Utility data can be found in Appendix A.

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

3.3 HVAC Systems

3.3.1 Space Heating System

The primary source of heat for the municipal building is a single cast iron Burnham boiler, Model # PF-513 which has an input of 2,580 MBH and is located in the basement. The main burner is a Webster Burner, Model # JB1G-07. The boiler was installed over 10 years ago and is in average condition. The boiler supplements a water source heat pump loop which serves 49 heat pumps located throughout the facility. During the winter, the water in the loop is supplied at 80°F and returns around 70°F. The loop has a single 3 way valve in the boiler room which directs some water into the boiler and the remaining water continues to the heat pumps. In the summer months, the water is supplied from the cooling tower at approximately 87°F and returned about 97°F. The cooling tower fan maintains the supply water setpoint. The main circulating pumps are 20 HP each and only one runs at a time. The pumps are in average condition.

The snack shack does not have heating while the garage areas have limited use electric heaters and a small propane heater.

3.3.2 Air Conditioning Systems

The air conditioning system consists of one closed loop evaporative cooling tower of approximately 95 tons and various heat pumps. The cooling tower is a two stage fan control with a single recirculation pump of 2 HP.

The heat pumps are various sizes, and controlled by a local thermostat. Some heat pumps have been changed recently, but most are in average condition.

3.3.3 Building Ventilation and Exhaust Systems

Primary ventilation is provided by the operable windows located throughout the municipal building. The building has a series of outside air ducts which run from the roof and serve the heat pumps. These ducts do not have fans and each heat pump pulls in the unconditioned outside air. At each heat pump is a motorized damper that closes when the unit is off and opens when the unit is on. However, due to increased maintenance and decreased operability of the motorized dampers, the ducts have been capped. The toilet exhaust fans operate with the light switch in each room.

3.4 Control Systems

HVAC controls in this building are at local thermostats from each heat pump interconnected to a main control panel located in the boiler room. The control panel maintains the loop setpoints through either the boiler or cooling tower, depending upon the season.

The space temperature setpoints for the occupied mode are 72°F in the heating and 72°F in the cooling seasons; setpoints for the unoccupied mode are 62°F in heating and 82°F in the summer months. The typical occupied hours are Monday through Friday 6 am – 10 pm. All other times of the week and Saturday and Sunday are unoccupied. All thermostats have a day and night schedule.

3.5 Lighting/Electrical Systems

Most of the lighting fixtures are composed of F32T-8 lamps that use 32 watts per lamp and the recessed lighting fixtures utilize compact fluorescent lamps. Some existing fixtures have T-12 lamps and magnetic ballasts. The exit lights are incandescent, and not energy efficient.

Lighting in the municipal office areas are controlled by individual switches at the entrance to each room. Lights are left on during normal business hours; generally, for eight to nine hours daily.

There are many outdoor lighting fixtures which serve the parking lot, exterior building illumination, and sports fields and are of various technologies including low pressure sodium, mercury vapor, and incandescent. Most of these fixtures are pole mounted; some are directly mounted to the building.

3.6 Plumbing Systems

Domestic hot water is generated by 18 small electric point of use hot water heaters with an input of 1.5 KW each. These units are located close to each fixture and are in good condition.

Two restrooms are located on each floor and two restrooms in the police area. All fixtures are standard high flow type.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Boiler Replacement

Space heating is provided by a single boiler and series of heat pumps. The boiler is an atmospheric type with an estimated efficiency of 75%. It was manufactured by Burnham with an input of 2,576 MBH and is fired with natural gas. There are 49 heat pumps throughout the building with a total capacity of 152 tons. The heat pumps extract the heat from the water loop in the winter months to provide heat to each area, while the boiler maintains the loop at approximately 70°F. This ECM evaluated replacing the existing atmospheric boiler with two new high efficiency condensing boilers. The condensing boilers have a high turn down ratio to allow for part load conditions and would be connected directly to the existing hot water loop.

Review of the gas utility bills determined that the existing boiler consumes about 6,590 therms annually. With estimated average efficiencies of 94%, the proposed new condensing boilers will save approximately 1,200 therms annually. The proposed boiler efficiency rating is based on the use of two MOD CON High Efficiency 94% natural gas boilers with 850 BTUH input each.

In addition to the two new boilers, other components of this measure include a new direct vent flue system, modifications to the hot water piping in the boiler room, and interconnection to the existing control panel.

Condensing boilers have an expected life of 20 years, according to ASHRAE, and total energy savings over the life of the project are estimated at over 24,000 therms and $26,000.

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

ECM-1 Boiler Replacement

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
107,300	0	0	1,200	1,300	(0.8)	3,000	>25	>25

*Based upon NJ Smart Start Gas Heating Program

This measure is not recommended.

4.2 ECM-2 Variable Speed Drive for Main Circulating Pumps

The building uses many heat pumps for heating and air conditioning. Not all compressors are on all the time due to diverse loads in the various spaces. However, the main circulating pump runs at a constant speed. Energy savings can result if the pump is allowed to slow down during part load conditions. It is proposed to install a variable speed drive (VSD) to vary the pump motor speed based on heating and cooling loads. This measure would require a control valve to be installed on each heat pump to stop the flow of water when the compressor is off. When the compressor is off, the valves will close and loop pressure will build up. The increased pressure will be sensed by a new loop pressure sensor which will then command the VSD to slow the pump to save energy.

This measure will require the existing pump motors to be changed to duty rated inverter motors to be compatible with the new VSD. Following implementation of this measure, it is expected that the building's annual electricity consumption will be reduced by approximately 18,500 kWh.

Variable speed drives have an expected life of 10 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 185,00 kWh and $27,000.

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

ECM-2 Variable Speed Drive for Main Circulating Pumps

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
75,300	0	18,500	0	2,700	(0.6)	NA	>25	NA

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

This measure is not recommended.

4.3 ECM-3 Install Premium Efficiency Motors

The municipal building uses a main water loop to provide water to all heat pumps for year round operation. During the summer months, the loop water is cooled by a cooling tower which has a separate coil to isolate the loop water from the tower water. In the winter, the boiler provides supplemental heat to maintain a 70°F loop temperature. Throughout the year, water is circulated by two pumps with one running at a time. Each pump is powered by a 20 HP standard efficiency motor. This measure will replace both motors with premium efficiency motors, which will save energy.

The energy savings were calculated by applying the existing and proposed motor efficiencies to the annual operating hours. The difference resulted in an annual savings of 10,000 kWh per year. Supporting calculations, including all assumptions and the annual energy usage is provided in Appendix D.

New motors have an expected life of 18 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 180,000 kWh, totaling $25,200.

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

ECM-3 Install Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
5,400	1.1	10,000	0	1,400	3.6	200	3.8	3.7

* Based upon New Jersey Smart Start Program.

This measure is recommended.

4.4 ECM-4 Replace Exit Signs with LED Type

The building has approximately 17 interior exit signs with incandescent bulbs which are on continuously. Replacing these signs with newer LED technology will save energy. In addition, the LED signs require less maintenance since LEDs have a typical life of 100,000 hours.

The energy saving for this measure was calculated by applying the existing and proposed fixture wattages to the estimated times of operation. The difference resulted in an annual savings of 3,300 kWh per year. Supporting calculations, including all assumptions for lighting hours and the annual energy usage for each fixture is provided in Appendix E.

The signs have an expected life of 10 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 33,000 kWh, totaling $4,000.

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

ECM-4 Replace Exit Signs with LED Type

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
3,700	0.2	3,300	0	400	10.11	300	9.3	8.5

* Incentive shown is per the New Jersey Smart Start Program.

This measure is recommended.

4.5 ECM-5 Light Replacement

A comprehensive fixture survey was conducted of the building and grounds. The exterior lighting for the parking lots and walkways consisted of older technology high pressure sodium and metal halide lamps. Upgrading the outside fixtures to induction type lighting was assessed. Some interior fixtures contained T-12 lamps and older style ballasts. Newer technology T-8 lamps and electronic ballasts are proposed for the older interior fixtures.

The total energy saving for this measure was calculated by applying the existing and proposed fixture wattages to the estimated times of operation. The difference resulted in an annual savings of 53,260 kWh per year. Supporting calculations, including all assumptions for lighting hours and the annual energy usage for each fixture is provided in Appendix F.

Lighting has an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 798,900 kWh, totaling $180,000

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

ECM-5 Light Replacement

Exterior Lights

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
52,800	36	46,260	0	10,000	2	10,500	4.9	4.0

* Incentive shown is per the New Jersey Smart Start Program, 2010 Prescriptive Lighting Application.

Interior Lights

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
12,900	2.7	6,200	0	1,300	0.2	1,100	9.9	9.1

* Incentive shown is per the New Jersey Smart Start Program, 2010 Prescriptive Lighting Application.

This measure is recommended.

4.6 ECM-6 Daylight Controls

The center atrium area has a large dome skylight which allows sunlight to illuminate much of this area. On a sunny day, the entire rotunda is filled with natural light and is very bright. There are approximately 19 wall mounted light fixtures that surround and illuminate the rotunda. These lights are higher efficiency compact fluorescent bulbs; however, they are left on when the area is sufficiently illuminated by natural light. This measure assessed controlling these fixtures with photovoltaic sensors to reduce energy.

The energy savings for this measure was calculated by applying the fixture wattages to the times the fixtures could be shut off during the day. The annual savings resulted in 470 kWh per year. Supporting calculations, including lighting hours and annual energy usage are provided in Appendix G.

It is intended to install a photovoltaic sensor in the rotunda to shut off the fixtures during periods of ample sunlight. The sensor will be wired to the light circuits and will automatically turn the lights off based upon the amount of sunlight.

Photovoltaic sensors have an expected life of 15 years, according to the manufacturer. The total energy savings over the life of the project are estimated at 7,050 kWh, and $1,500.

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

ECM-6 Daylight Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
900	0	470	0	100	0.2	NA	9.0	NA

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

This measure is recommended.

4.7 ECM-7 Shutting Off Heater in Garage

The outside garage building had one bay that was devoted at one time to garden supplies and liquids that could freeze. An electric heater was installed to keep the bay temperature around 45°F . The garage is no longer storing the chemicals so the heater can be turned off during the winter.

The energy saving was calculated by applying the electrical requirements of the heater (4.5 kW) to the estimated time of annual operation. The annual savings resulted in 3,940 kWh per year. Supporting calculations, including all assumptions for lighting hours and the annual energy usage is provided in Appendix H.

This measure does not have a life expectancy because it involves decommissioning an existing system.

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

ECM-7 Shutting Off Heater in Garage

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
0	0	3,940	0	500	NA	NA	Immediate	NA

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

This measure is recommended.

4.8 ECM-8 Purchase More Efficient Heat Pumps

The facility directly purchases the heat pumps to replace older, broken units. This measure evaluated the purchase of more efficient models as opposed to standard efficiency units.

The energy savings for this measure was calculated by taking the change in efficiency from 10 EER to 15 EER and applying the annual run time for a typical 3 ton unit. The difference resulted in an annual savings of 3,800 kWh per year per heat pump replaced, the budgetary cost is the incremental cost between a standard and higher efficiency heat pumps. Supporting calculations, including all assumptions for the annual energy usage for is provided in Appendix I.

The heat pumps have an expected life of 19 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 72,200 kWh, totaling $9,500.

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

ECM-8 Purchase More Efficient Heat Pump

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
700	0	3,800	0	800	14.5	200	1.4	1.0

* Incentive shown is per the New Jersey Smart Start Program

This measure is recommended.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance Program

The building will be eligible for incentives from the New Jersey Office of Clean Energy. The most significant incentives will be from the New Jersey Pay for Performance (P4P) Program. The P4P program is designed for qualified energy conservation projects in facilities whose demand in any of the preceding 12 months exceeds 200 kW. However, the 200 kW/month average minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations. Facilities that meet this criterion must also achieve a minimum performance target of 15% energy reduction by using the EPA Portfolio Manager benchmarking tool before and after implementation of the measure(s). If the participant is a municipal electric company customer, and a customer of a regulated gas New Jersey Utility, only gas measures will be eligible under the Program. American Recovery and Reinvestment Act (ARRA) funding, when available, may allow oil, propane and municipal electric customers to be eligible for the P4P Program. Available incentives are as follows:

Incentive #1: Energy Reduction Plan – This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP). The standard incentive pays $0.10 per square foot, up to a maximum of $50,000, not to exceed 50% of facility annual energy cost, paid after approval of application. For building audits funded by the New Jersey Board of Public Utilities, which receive an initial 75% incentive toward performance of the energy audit, facilities are only eligible for an additional $0.05 per square foot, up to a maximum of $25,000, rather than the standard incentive noted above.

Incentive #2: Installation of Recommended Measures – This incentive is based on projected energy saving and designed to pay approximately 60% of the total performance-based incentive. Base incentives deliver $0.11/kWh and $1.10/therm not to exceed 30% of total project cost.

Incentive #3: Post-Construction Benchmarking Report – This incentive is paid after acceptance of a report proving energy savings over one year utilizing the Environmental Protection Agency (EPA) Portfolio Manager benchmarking tool. Incentive #3 base incentives deliver $0.07/kWh and $0.70/therm not to exceed 20% of total project cost.

Combining incentives #2 and #3 will provide a total of $0.18/ kWh and $1.8/therm not to exceed 50% of total project cost. Additional incentives for #2 and #3 are increased by $0.005/kWh and $0.05/therm for each percentage increase above the 15% minimum target to 20%, calculated with the EPA Portfolio Manager benchmarking tool, not to exceed 50% of total project cost.

5.1.2 New Jersey Smart Start Program

For this program, specific incentives for energy conservation measures are calculated on an individual basis utilizing the 2010 New Jersey Smart Start incentive program. This program provides incentives dependent upon mechanical and electrical equipment. If applicable, incentives from this program are reflected in the ECM summaries and attached appendices.

If the building qualifies and enters into the New Jersey Pay for Performance Program, all energy savings will be included in the total building energy reduction, and savings will be applied towards the Pay for Performance incentive. A project is not applicable for both New Jersey incentive programs.

5.1.3 Energy Efficient and Conservation Block Grant

Following is a brief summary of the Energy Efficient and Conservation Block Grant (EECBG) program. The Energy Efficiency and Conservation Block Grant Complete Program Application Package should be consulted for rules and regulations.

Additional funding is available to local government entities through the EECBG, a part of New Jersey's Clean Energy program (NJCEP). The grant is for local government entities only, and can offset the cost of energy reduction implementation to a maximum of $20,000 per building.

This program is provided in conjunction with NJCEP funding and any utility incentive programs; the total amount of the three incentives combined cannot exceed 100% of project cost. Funds shall first be provided by NJCEP, followed by the EECBG and any utility incentives available to the customer. The total amount of the incentive shall be determined by TRC Solutions, a third party technical consulting firm for the NJCEP.

In order to receive EECBG incentives, local governments must not have received a Direct Block Grant from the US Department of Energy. A list of the 512 qualifying municipalities and counties is provided on the NJCEP website. Qualifying municipalities must participate in at least one eligible Commercial & Industrial component of the NJCEP, utility incentive programs, or install building shell measures recommended by the Local Government Energy Audit Program. Eligible conservation programs through NJCEP include:

- Pay for Performance
- NJ SmartStart Buildings for measures recommended by a Local Government Energy Audit (LGEA) or an equivalent audit completed within the last 12 months
- Applicants may propose to independently install building shell measures recommended by a LGEA or an equivalent audit. The audit must have been completed within the past 12 months.
- Any eligible utility energy efficiency incentive program

Most facilities owned or leased by an eligible local government within the State of New Jersey are eligible for this grant. Ineligible facilities include casinos or other gambling establishments, aquariums, zoos, golf courses, swimming pools, and any building owned or leased by the United States Federal Government. New construction is also ineligible.

5.1.4 ARRA Initiative "Energy Efficiency Programs through the Clean Energy Program"

The American Recovery and Reinvestment Act (ARRA) Initiative is available to New Jersey oil, propane, cooperative and municipal electric customers who do not pay the Societal Benefits Charge. This charge can be seen on any electric bill as the line item "SBC Charge." Applicants can participate in this program in conjunction with other New Jersey Clean Energy Program initiatives including Pay for Performance, Local Government Energy Audits, and Direct Install programs.

Funding for this program is dispersed on a first come, first serve basis until all funds are exhausted. The program does not limit the municipality to a minimum or maximum incentive, and the availability of funding cannot be determined prior to application. If the municipality meets all qualifications, the

application must be submitted to TRC Energy Solutions for review. TRC will then determine the amount of the incentive based on projected energy savings of the project. It is important to note that all applications for this incentive must be submitted before implementation of energy conservation measures.

Additional information is available on New Jersey's Clean Energy Program website.

5.2 Building Incentives

5.2.1 New Jersey Pay For Performance Program

Under incentive #1 of the New Jersey Pay for Performance Program, the 51,000 square foot building is eligible for about $2,600 towards the development of an Energy Reduction Plan. When calculating the total amount under Incentives #2 and #3, all energy conservation measures are applicable as the amount received is based on building wide energy improvements. However, since the overall energy reduction for the building is less than the 15% minimum, the building is not eligible to receive monies based as discussed above in section 5.1.1.

5.2.2 New Jersey Smart Start Program

The Burlington Municipal Complex is eligible for several incentives available under New Jersey Smart Start Programs. The total amount of all qualified incentives is about $13,000 and includes installing new premium efficiency motors and upgrades to the lighting system.

Under the Local Government Energy Audit Program that Burlington Township has entered into, this report was paid for by NJBPU. However, applicants not installing a specified level of measures within one year after the Audit Report is approved must pay back to the Program, 25% of the incentive received.

Incentives cannot be accepted under multiple NJCEP programs.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Geothermal

Geothermal heat pumps (GHP) transfer heat between the constant temperature of the earth and the building to maintain the building's interior space conditions. Below the surface of the earth throughout New Jersey the temperature remains in the low 50°F range throughout the year. This stable temperature provides a source for heat in the winter and a means to reject excess heat in the summer. With GHP systems, water is circulated between the building and the piping buried in the ground. The ground heat exchanger in a GHP system is made up of a closed or open loop pipe system. Most common is the closed loop in which high density polyethylene pipe is buried horizontally at 4-6 feet deep or vertically at 400-500 feet deep. These pipes are filled with an environmentally friendly antifreeze/water solution that acts as a heat exchanger. In the summer, the water picks up heat from the building and moves it to the ground. In the winter the system reverses and fluid picks up heat from the ground and moves it to the building. Heat pumps make collection and transfer of this heat to and from the building possible.

This building uses water source heat pumps to meet the HVAC requirements. Local companies were contacted for preliminary pricing on the well drilling and the estimated cost for drilling and installing the bore holes and associated equipment is around $500,000. This price is based upon drilling for the bores, installation of vertical piping down to 400 feet, grout and installation of a manifold vault located outside of approximately 6'x8'x12' to combine all the piping. The new piping would then be routed to the cooling tower location. At this point, the new supply and return well piping would connect to the existing supply and return piping to the cooling tower on the outside of the building. The cooling tower will be removed. Any casing needed would be additional costs.

Due to the long payback period, this measure is not recommended.

GEOTHERMAL SCREENING

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh		$		$	Years	Years
500,000	0	11,560	6,500	5,500	NA	NA	>25	>25

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

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

The Municipal Building was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter.

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

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

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

The building had a maximum electricity demand of 350 kW and a minimum of 151 kW, from February 2009 through January 2010. The monthly average over the observed 12 month period was 190 kW. It should be noted that the estimated cost of installation is about $8,000 per kW of installed system. This has increased in the past few years due to the rise in national demand for PV power generator systems. Other cost considerations will also need to be considered. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will need to be replaced multiple times during the useful life of the PV system.

The below chart shows preliminary cost and savings for a sample 100 kW system. The unobstructed roof area would be approximately 15,000 square feet. Refer to Appendix K for further information.

Photovoltaic (PV) Rooftop Solar Power Generation – 100 kW System

Budgetary Cost	Annual Utility Savings				Total Savings	New Jersey Renewable Energy Incentive*	New Jersey Renewable SREC**	Payback (without incentive)	Payback (with incentives)
	Electricity		Natural Gas	Total					
$	kW	kWh	Therms	$	$	$	$	Years	Years
800,000	0	120,000	0	13,100	13,100	100,000	58,700	>25	>25

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

The costs and savings were estimated and although the payback period listed above is greater than 25 years, it is recommended to pursue this technology further and secure firm vendor quotes.

6.2.2 Solar Thermal Hot Water Plant

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

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

Several options exist for using active solar thermal systems for space heating. The most common method involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system). The most practical system would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for heating.

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

It is not recommended at this time because of the high initial cost of installation vs actual use of hot water.

6.3 Wind

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

rings that connect the wind turbine, which rotates as it points into changing wind directions, and the fixed tower wiring. The tail aligns the rotor into the wind.

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

The New Jersey Clean Energy Program for small wind installations has designated numerous pre-approved wind turbines for installation in the State of New Jersey. Incentives for wind turbine installations are based on kilowatt hours saved in the first year. Systems sized under 16,000 kWh per year of production will receive a $3.20 per kWh incentive. Systems producing over 16,000 kWh will receive $51,200 for the first 16,000 kWh of production with an additional $0.50 per kWh up to a maximum cap of 750,000 kWh per year. Federal tax credits are also available for renewable energy projects up to 30% of installation cost for systems less than 100 kW. However, as noted previously, municipalities do not pay federal taxes and is, therefore, not eligible for the tax credit incentive.
The most important part of any small wind generation project is the mean annual wind speed at the height of which the turbine will be installed. In the Burlington, NJ area, the map indicates a mean annual wind speed of just under 10 miles per hour. For the municipal building, there are site restrictions. Parking lots, trees and surrounding structures would greatly affect a tower location.

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

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

6.4 Combined Heat and Power Generation (CHP)

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

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. The municipal building does not have sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter, thermal usage during the summer months is low. Thermal energy produced by the CHP plant in the warmer months will be wasted. Purchasing the CHP equipment and performing modifications to the existing HVAC and electrical systems would greatly outweigh the savings over the life of the equipment; hence this measure is not recommended.

6.5 Biomass Power Generation

Biomass power generation is a process in which waste organic materials are used to produce electricity or thermal energy. These materials would otherwise be sent to the landfill or expelled to the atmosphere. To

participate in NJCEP's Customer On-Site Renewable Energy program, participants must install an on-site sustainable biomass or fuel cell energy generation system. Incentives for bio-power installations are available to support up to 1MW-dc of rated capacity.

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

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

The NJDEP evaluates biomass resources not identified in the RPS.

Examples of eligible facilities for a CORE incentive include:

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

* from NJOCE Website

This measure is not recommended because of noise issues, potential zoning issues, and because the municipal building does not have a steady waste stream to fuel the power generation system. Additionally, purchasing this system and performing modifications to the existing HVAC and electrical systems would greatly outweigh the savings over the life of the equipment.

6.6 Demand Response Curtailment

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

Utility Curtailment is an agreement with the PSE&G regional transmission organization and an approved Curtailment Service Provider (CSP) to shed electrical load by either turning major equipment off or energizing all or part of a facility utilizing an emergency generator; therefore, reducing the electrical demand on the utility grid. This program is to benefit the utility company during high demand periods and PSE&G offers incentives to the CSP to participate in this program. Enrolling in the program will require program participants to drop electrical load or turn on emergency generators during high electrical demand conditions or during emergencies. Part of the program also will require that program participants reduce their required load or run emergency generators with notice to test the system. This measure is not recommended because the facility does not have reserve capacity to shed electrical loads.

7.0 EPA PORTFOLIO MANAGER

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

The Municipal Building is considered a high energy consumer per the Portfolio Manager with a Site Energy Usage Index (EUI) of 79 kBTU/ft2/year and overall score of 40. By implementing the measures discussed in this report, it is expected that the EUI can be reduced to approximately 71 kBTU//ft2/year. A full EPA Energy Star Portfolio Manager Report is located in Appendix N.

The user name and password for the municipal complex's EPA Portfolio Manager Account has been provided to Gary Snyder, General Supervisor at Burlington Township.

8.0 CONCLUSION AND RECOMMENDATIONS

The energy audit conducted by CHA at the Burlington Township Municipal Complex in Burlington Township, New Jersey identified potential ECMs for motor upgrade, premium efficiency motors, lighting replacement, daylight controls, pump upgrades, and exit sign upgrades. Potential annual savings of $14,800 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-3 Install Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
5,400	1.1	10,000	0	1,400	3.6	200	3.8	3.7

* Based upon New Jersey Smart Start Program.

ECM-4 Replace Exit Signs with LED Type

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
3,700	0.2	3,300	0	400	(0.1)	300	0.3	8.5

* Incentive shown is per the New Jersey Smart Start Program.

ECM-5 Light Replacement

Exterior Lights

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
52,800	36	46,260	0	10,600	2	10,800	4.9	4.9

* Incentive shown is per the New Jersey Smart Start Program, 2010 Prescriptive Lighting Application.

Interior Lights

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
12,900	2.7	6,200	0	1,300	0.2	1,100	9.9	9.1

* Incentive shown is per the New Jersey Smart Start Program, 2010 Prescriptive Lighting Application.

ECM-6 Daylight Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
900	0	470	0	100	0.2	NA	9.0	NA

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

ECM-7 Shutting Off Heater in Garage

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
0	0	3,940	0	500	NA	NA	Immediate	NA

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

ECM-8 Purchase More Efficient Heat Pump

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
700	0	3,800	0	500	14.3	200	1.4	1.0

* Incentive shown is per the New Jersey Smart Start Program

APPENDIX A

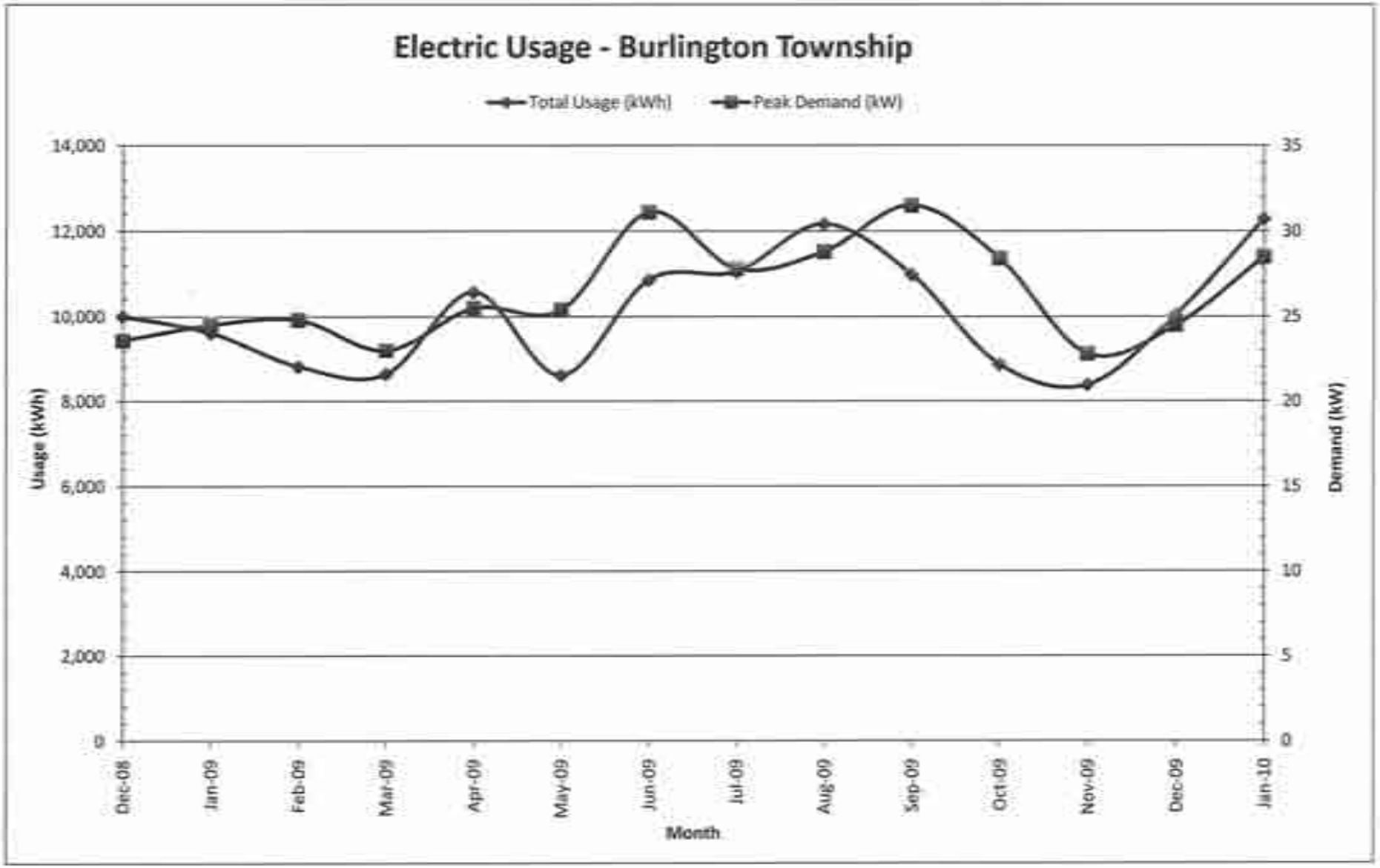
Utility Usage Analysis

New Jersey BPU Energy Audit Program
CHA #21062
Burlington Township
Municipal Building

Account Number: 64-099-133-11
PSE&G - Electric Service

Meter #: 778010663

			Charges			Unit Costs		
Date	Consumption (kWh)	Demand (kW)	Total ($)	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
2/1/2009	157,440	190.0	$20,364.00	$2,452.00	$17,912.00	0.1293	0.1138	12.91
3/1/2009	71,760	180.0	$10,241.00	$1,578.00	$8,663.00	0.1427	0.1207	8.77
4/1/2009	82,320	192.0	$11,231.00	$1,617.00	$9,614.00	0.1364	0.1168	8.42
5/1/2009	61,920	350.0	$8,823.00	$1,563.00	$7,260.00	0.1425	0.1172	4.47
6/1/2009	75,600	156.0	$11,534.00	$2,719.00	$8,815.00	0.1526	0.1166	17.43
7/1/2009	78,480	168.0	$13,502.00	$2,944.00	$10,558.00	0.1720	0.1345	17.52
8/1/2009	79,200	178.0	$13,995.00	$3,049.00	$10,946.00	0.1767	0.1382	17.13
9/1/2009	84,240	187.0	$14,727.00	$3,155.00	$11,572.00	0.1748	0.1374	16.87
10/1/2009	79,920	170.0	$12,089.00	$1,663.00	$10,426.00	0.1513	0.1305	9.78
11/1/2009	61,440	160.0	$8,881.00	$1,643.00	$7,238.00	0.1445	0.1178	10.27
12/1/2009	68,400	151.0	$9,597.00	$1,611.00	$7,986.00	0.1403	0.1168	10.67
1/1/2010	91,920	192.0	$12,337.00	$1,758.00	$10,579.00	0.1342	0.1151	9.16
Total	992,640	350.0	$147,321.00	$25,752.00	$121,569.00	0.1484	0.1225	11.32
Most Recent Yr	992,640	350.0	$147,321.00	$25,752.00	$121,569.00	0.1484	0.1225	11.32


Electric Usage - Burlington Township
Total Usage (kWh)
Peak Demand (kW)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Usage (kWh)
35
30
25
20
15
10
5
0
Demand (kW)
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
Oct-09
Nov-09
Dec-09
Jan-10
Month

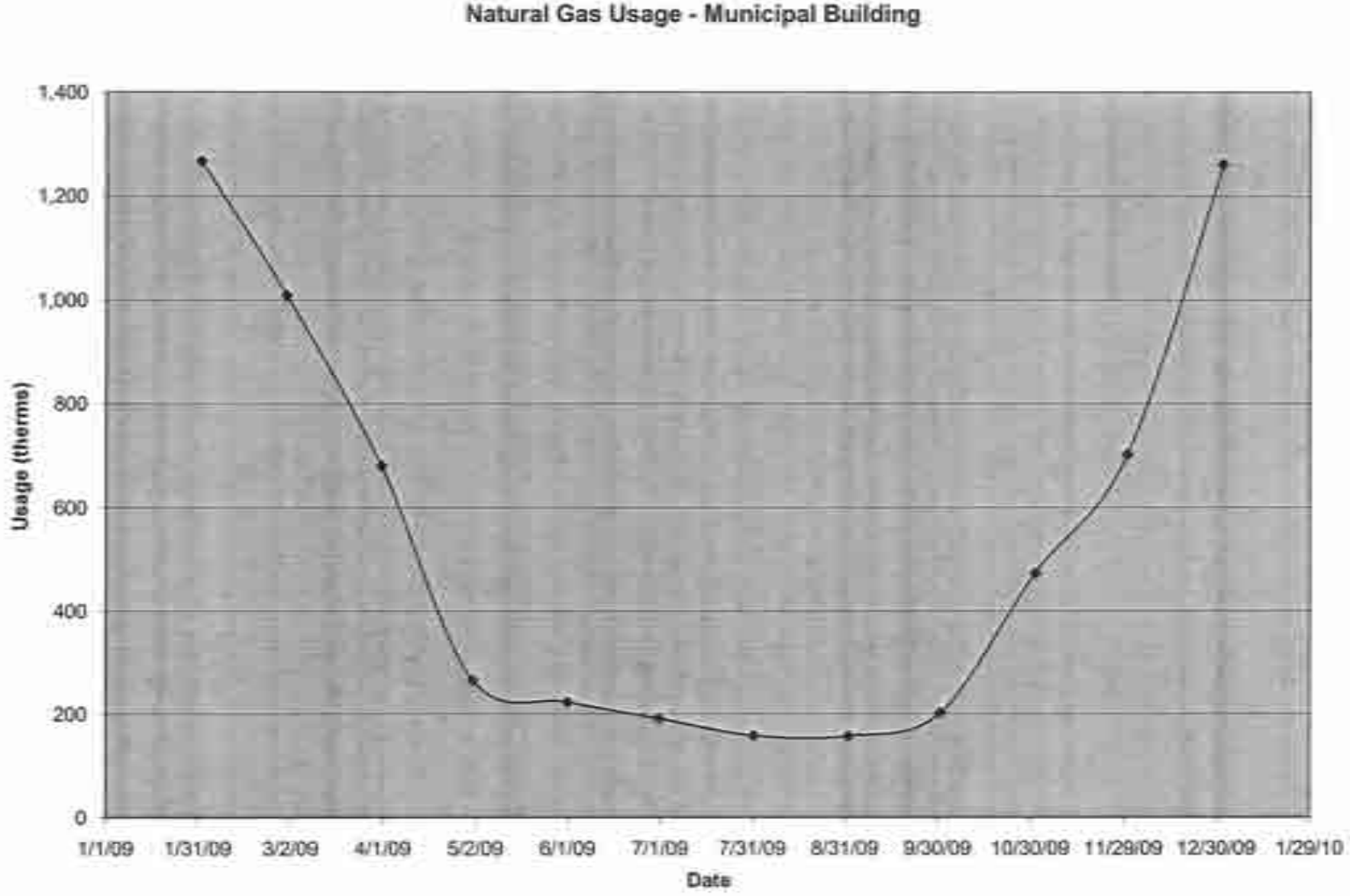
New Jersey BPU Energy Audit Program
CHA #21062
Burlington Township
Municipal Building

Account Number: 64-099-133-11
PSE&G - Natural Gas Service

Meter #: 2599802

Date	Therms	Cost	($/Therm)
2/1/2009	1,267	$1,637.00	1.292
3/1/2009	1,009	$1,135.00	1.125
4/1/2009	680	$674.00	0.991
5/1/2009	266	$251.00	0.944
6/1/2009	223	$206.00	0.924
7/1/2009	191	$182.00	0.953
8/1/2009	158	$157.00	0.994
9/1/2009	157	$147.00	0.936
10/1/2009	202	$180.00	0.891
11/1/2009	473	$479.00	1.013
12/1/2009	702	$757.00	1.078
1/1/2010	1,261	$1,428.00	1.131

Total	6,589	$7,231.00	1.097
Most Recent Yr	6,589	$7,231.00	1.097


Natural Gas Usage - Municipal Building
1,400
1,200
1,000
800
600
400
200
0
Usage (therms)
1/1/09
1/31/09
3/2/09
4/1/09
5/2/09
6/1/09
7/1/09
7/31/09
8/31/09
9/30/09
10/30/09
11/29/09
12/30/09
1/29/10
Date

GAS MARKETERS LIST

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

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

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

RPL Holdings, Inc
601 Carlson Pkwy
Minnetonka, MN 55305

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ELECTRIC MARKETERS LIST

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

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

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

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

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

Gexa Energy LLC New Jersey
20 Greenway Plaza, Suite 600
Houston, TX 77046
(866) 394-GEXA
Bath.millions@gexaenergy.com

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Jan 14, 2009

APPENDIX B

ECM-1 Boiler Replacement

Burlington,NJ
CHA #21062
Building: Municipal Building

ECM-1 Boiler Replacement

Existing Fuel	Nat Gas
Proposed Fuel	Nat Gas

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 1.10		
Proposed Fuel Cost	$ 1.10		
Baseline Fuel Use	6,589	Therms	Based on historical utility data
Existing Boiler Plant Efficiency	75%		Estimated or Measured
Baseline Boiler Load	494,175	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 100 Mbtu/Therms
Baseline Fuel Cost	$ 7,231		
Proposed Boiler Plant Efficiency	92%		New Boiler Efficiency
Proposed Fuel Use	5,371	Therms	Baseline Boiler Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Fuel Cost	$ 5,895		
Annual Savings	1,215	Therms	
Annual Savings	$ 1,336	/yr	

*Note to engineer: Link savings back to summary sheet in appropriate column.

Burlington,NJ
CHA #21062
Building: Municipal Building

ECM-1 Boiler Replacement

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
New Condensing Boiler	2		$ 25,000			$ 49,000	$ -	$ -	$ 49,000	MOD CON 850
Flue Piping	1		$ 1,500	$ 1,000		$ 1,470	$ 1,210	$ -	$ 2,680	
Gas and water piping	1		$ 5,000	$ 3,500		$ 4,900	$ 4,235	$ -	$ 9,135	
Electrical power wiring, control wiring and new control module.	1		$ 6,000	$ 5,000		$ 5,880	$ 6,050	$ -	$ 11,930	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
remove old boiler and piping	1			$ 10,000		$ -	$ 12,100	$ -	$ 12,100	

$	84,845	Subtotal
$	12,727	15% Contingency
$	9,757	10% Contractor O&P
$	-	0% Engineering
$	**107,329**	**Total**

APPENDIX C

ECM-2 Variable Speed Drive for Main Circulator Pumps

Burlington,NJ
CHA #21062
Building: Municipal Building

ECM-2a Variable Speed Drive - Winter Operation

Heating "On" Pt.	55
VFD Eff.	98.5%

Summary

Pumps P-1 and P-2 provide both hot water and condenser water to the heat pumps located throughout the Building. These units currently operate in leading fashion with only one pump operating at a time. None of the heat pumps served by these pumps are equipped with 2-way control valves. The intent is to install a single VFD in the boiler room and 2 way valves on each air handler to control one pump at a time. New motors are recommended for each pump.

Pump ID	Qty	HP	Total HP	Existing Motor Motor Eff.	New Motor Motor Eff.	Exist. Motor kW Note 1	New Motor kW Note 2
Main Pump	1	20.0	20.0	88.5%	96.5%	15.00	15.00
					Total:	15.00	15.00

OAT - DB Avg Temp F	OAT - WB Avg Temp F	Annual Hours in Bin	Heating Hours Bin	Pump Load %	Existing Pump kWh	Proposed Pump kW	Proposed Pump kWh	Proposed Savings kWh
(A)	(B)	(C)	(D) =IF(A>TP,8,C)	(E) =0.5+0.5*(50-A)/(50-10)) See Note 4	(F) =D*AA	(G) =BB*E^2.5/CC See Note 3	(H) =D*G	(I) =F-H
97.5	75	1	0	0%	0	0.0	0	0
92.5	74	18	0	0%	0	0.0	0	0
87.5	72	62	0	0%	0	0.0	0	0
82.5	69	238	0	0%	0	0.0	0	0
77.5	67	295	0	0%	0	0.0	0	0
72.5	64	316	0	0%	0	0.0	0	0
67.5	62	401	0	0%	0	0.0	0	0
62.5	58	441	0	0%	0	0.0	0	0
57.5	53	386	0	0%	0	0.0	0	0
52.5	47	290	290	53%	4,397	3.1	889	3,508
47.5	43	291	291	58%	5,364	4.0	1,152	4,213
42.5	38	312	312	64%	6,656	5.0	1,552	5,104
37.5	34	467	467	69%	7,307	6.1	2,881	4,326
32.5	30	350	350	75%	6,243	7.4	2,593	3,650
27.5	25	159	159	81%	2,386	8.9	1,411	975
22.5	20	120	120	86%	1,800	10.5	1,257	543
17.5	16	60	60	92%	903	12.3	729	164
12.5	11	22	22	97%	336	14.2	318	18
7.5	6	10	10	100%	157	15.2	160	-2
		4,166	3,103		31,329		13,647	19,481

Notes:
1) Existing motor power was estimated.
2) New motor power is the same as Existing motor power for this ecm only.
3) The pump load is estimated at 100% at 10 deg. OAT and 50% at 60 deg. OAT and varies linearly in between.
4) The required VFD motor draw is based on a 2.5 power relationship to load.

Burlington,NJ
CHA #21062
Municipal Building

ECM-2b Variable Speed Drive - Summer Operation

Cooling "On" Pt.	60
VFD Eff.	98.5%
Elect. Cost / kWh	$0.11

Summary:

Pump ID	Qty	HP	Total HP	Existing Motor Motor Eff.	New Motor Motor Eff.	Exist. Motor kW Note 1	New Motor kW Note 2	
Main Pump	1	20.0	20.0	86.5%	86.5%	15.00	15.00	(Only one pump operates at a time)
					Total:	15.00	15.00	

OAT - DB Avg Temp F	OAT - WB Avg Temp F	Annual Hours in Bin	Cooling Hours Bin	Pump Load %	Existing Pump kWh	Proposed Pump kW	Proposed Pump kWh	Proposed Savings kWh
(A) See Note 3	(B) See Note 3	(C) See Note 3	(D) =IF(A<TP,0,C)	(E) =0.5+0.5*(A-TP)/(97-TP)) See Note 4	(F) =D*AA	(G) =BB*E^2.5/CC See Note 5	(H) =D*G	(I) =F-H
97.5	75	1	1	100%	21	15.2	22	0
92.5	74	16	16	94%	243	13.0	211	33
87.5	72	62	62	87%	936	10.8	674	262
82.5	69	238	238	80%	3,571	8.8	2,102	1,469
77.5	67	295	295	74%	4,429	7.1	2,093	2,336
72.5	64	316	316	67%	4,743	5.8	1,762	2,981
67.5	62	407	407	60%	6,102	4.3	1,737	4,365
62.5	58	441	441	53%	6,621	3.2	1,399	5,222
57.5	53	366	0	0%	0	0.0	0	0
52.5	47	300	0	0%	0	0.0	0	0
47.5	43	291	0	0%	0	0.0	0	0
42.5	38	312	0	0%	0	0.0	0	0
37.5	34	467	0	0%	0	0.0	0	0
32.5	30	350	0	0%	0	0.0	0	0
27.5	25	159	0	0%	0	0.0	0	0
22.5	20	120	0	0%	0	0.0	0	0
17.5	16	60	0	0%	0	0.0	0	0
12.5	11	22	0	0%	0	0.0	0	0
7.5	6	10	0	0%	0	0.0	0	0
		4,163	1,778		28,664		9,999	18,665

Notes:
1) The required VFD motor draw is based on a 2.5 power relationship to load.

Savings Summary:

Utility	Energy Savings
kW	0.0
On-Peak kWh *	5,600
Off-Peak kWh	13,066
Total kWh	18,665

* On-Peak kWh Savings = Total kWh Savings x 30%

Burlington,NJ
CHA #21062
Building: Municipal Building

ECM-2 Variable Speed Drive for Main Circulating Pumps

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
VFD	1	ea	$ 3,500	$ 1,500		$ 3,430	$ 1,815	$ -	$ 5,245	
Controls for switch over										
and pressure sensor	1	ls	$ 4,000	$ 2,500		$ 3,920	$ 3,025	$ -	$ 6,945	
						$ -	$ -	$ -	$ -	
2 way valves	50	ea	$ 250	$ 500		$ 12,250	$ 30,250	$ -	$ 42,500	
w electrical Interconnection						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 54,690	Subtotal
$ 10,938	20% Contingency
$ 9,844	15% Contractor O&P
$ -	0% Engineering
$ 75,472	**Total**

APPENDIX D

ECM-3 Install Premium Efficiency Motors

Burlington,NJ
DSA #21555
Building: Municipal Building

ECM-2 Install Occupancy Efficiency Motors

Savings Analysis

Demand	
Cost	
$ 0.00 per kW	

Energy	
Unit	
0.00/kWh	

Multiplier		
Materials	Labor	Equipment

Cost Estimates

#	Description	Location	Quantity HP	Load Factor	Existing Efficiency	Existing kW	New HP	New Load Factor	New Efficiency	New kW	Demand Savings	Demand Savings $	Annual Hours	kWh Savings	$ kWh Savings	Total $ Savings	Estimated Cost	Payback Years	Unit Costs: Materials	Unit Costs: Labor	Unit Costs: Equipment	Subtotals: Materials	Subtotals: Labor	Subtotals: Equipment	Total Cost	Remarks
1	Main Circulating Pump	Basement	10	0.9	0.880	9.55	10	0.9	0.910	9.23	0.31	$ 109	6,760	2,095	$ 314	$ 314	$ 1,485	4.7	$ 1,485	$ 1,000	$ -	$ 1,485	$ 1,000	$ -	$ 2,485	Verify accurate Hp (1 here and
2																										
3																										
4																										
5																										
6																										
7																										
8																										
9																										
10																										
11																										
12																										
		Total	10			10.8	10			10.4	0.44	$ 109		2,095	$ 314	$ 314	$ 1,485	4.7								

Notes:

a. Existing and new efficiencies should be entered if known. If not known, use [unclear] values (approximate).

b. Derive as existing HP values required to better match load.

APPENDIX E

ECM-4 Replace Exit Signs with LED Type

Burlington,NJ
CHA #21062
Building: Municipal Building

ECM-4 Replace EXIT signs with LED type

Analysis

Scheme of Data

Ground Area
Night Electrical Use

Signs

	Interior	Later
Quantities		
New Sign Install		

Configuration
Conversion EXIT
Relamping

Replacement Power

Sign Type	Wattage Per Sign	Sales	Quantity
A			
B			
C			

Results

Utility Savings	Electrical	kWh
	Demand	kW
	Steam	Mlbs
Savings		
Implementation Cost		
Simple Payback (Yrs)		

Calculations

Current Power Consumption = ( ) Watts x Lamps/Fixture x Fixtures = ( ) Watts x Lamps/Fixture x Fixtures / Watts/kW x Hours/Year

= kW x Hours/yr

= kWh

Proposed Power Consumption = ( ) Watts x Lamps/Fixture x Fixtures / Watts/kW x Hours/Year

= kW x Hours/yr

= kWh

Burlington,NJ
CHA # 21062
Building: Municipal Building

ECM-4 Replace EXIT signs with LED type

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT	LABOR	EQUIP	MAT	LABOR	EQUIP		
						$ -	$ -	$ -	$ -	
Demolition	17	Ea		$ 20		$ -	$ 411	$ -	$ 411	
New Sign Install	17	Ea	$140	$ 50		$ 2,332	$ 1,029	$ -	$ 3,361	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 3,772	Subtotal
$ -	0% Contingency
$ -	0% Contractor O&P
$ -	0% Engineering
$ 3,772	Total

APPENDIX F

ECM-5 Light Replacement

Energy Audit of Burlington Township
CHA Project No. 21062
Existing Lighting

Cost of Electricity: **$0.127 $/kWh**
$13.55 $/kW

		EXISTING CONDITIONS									
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Retrofit Control**	**Annual kWh**	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
1	Lobby	36	SQ 13 W CF 2 (MAG)	CFQ13/2	31	1.1	Breaker	2600	None	2,902	
1	Water Fountain	6	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.2	SW	2600	None	484	
1	Administrator Room	24	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.7	SW	2600	None	1,934	
1	Administrator Room	9	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.3	SW	2600	None	725	
1	Administrator Room	10	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.3	SW	2600	None	806	
25	Closet	2	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2600	None	146	
13	Copy/Coffee	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	File Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
25	Mayors Office	10	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.3	SW	2600	None	728	
25	Mayors Office	17	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.5	SW	2600	None	1,238	
80	Admin Wing	12	SP 96 R CF 1	CFT36/1	51	0.6	SW	2600	None	1,591	
13	Admin Wing	8	S 32 P F 2 (ELE)	F42LL	60	0.5	SW	2600	None	1,248	
13	Personnel Office	6	S 32 P F 2 (ELE)	F42LL	60	0.4	SW	2600	None	936	
59	Council Workroom	13	S 13 R CF 2	CFQ13/2-L	28	0.4	SW	2600	None	948	
59	Council Workoom	21	S 13 R CF 2	CFQ13/2-L	28	0.6	SW	2600	None	1,529	
1	Bathroom	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	SW	2600	None	81	
59	Council Chambers	5	S 13 R CF 2	CFQ13/2-L	28	0.1	SW	2600	None	364	
59	Council Chambers	31	S 13 R CF 2	CFQ13/2-L	28	0.9	SW	2600	None	2,257	
13	Admin Room	1	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	156	
13	Treasurer Office	19	S 32 P F 2 (ELE)	F42LL	60	1.1	SW	2600	None	2,964	
13	Clerks Office	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
13	Tax Collector	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
13	Open Area	17	S 32 P F 2 (ELE)	F42LL	60	1.0	SW	2600	None	2,652	
13	Storage Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
13	Assessors Office	3	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	468	
59	Reception Area	4	S 13 R CF 2	CFQ13/2-L	28	0.1	SW	2600	None	291	
59	Reception Area	3	S 13 R CF 2	CFQ13/2-L	28	0.1	SW	2600	None	218	
16	Reception Area	1	T 34 R F 2 (MAG)	F42EE	72	0.1	SW	2600	None	187	
13	Basement Open area	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Womens Room	1	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	156	
13	Womens Room	1	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	156	
1	Mens Room	1	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.0	SW	2600	None	81	
13	Janitors Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
16	Janitors Storage	1	T 34 R F 2 (MAG)	F42EE	72	0.1	SW	2600	None	187	
16	Community Room	14	T 34 R F 2 (MAG)	F42EE	72	1.0	SW	2600	None	2,621	
1	Community Room	3	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2600	None	242	
59	Open Area	7	S 13 R CF 2	CFQ13/2-L	28	0.2	SW	2600	None	510	
59	Open Area	6	S 13 R CF 2	CFQ13/2-L	28	0.2	SW	2600	None	437	
59	Basement Storage	7	S 13 R CF 2	CFQ13/2-L	28	0.2	SW	2600	None	510	
16	Basement Storage	2	T 34 R F 2 (MAG)	F42EE	72	0.1	SW	2600	None	374	
59	Stairs	5	S 13 R CF 2	CFQ13/2-L	28	0.1	SW	2600	None	364	
13	Main level Bathrooms	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
1	Main level Bathrooms	4	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2600	None	322	
59	Second Level Common Area	19	S 13 R CF 2	CFQ13/2-L	28	0.5	SW	2600	None	1,383	

Energy Audit of Burlington Township
CHA Project No. 21062
Existing Lighting

Cost of Electricity: **$0.127 $/kWh**
$13.55 $/kW

		EXISTING CONDITIONS								
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Retrofit Control**	**Annual kWh**	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
16	Library	10	T 34 R F 2 (MAG)	F42EE	72	0.7	SW	2600	None	1,872	
16	Engineering Dept	24	T 34 R F 2 (MAG)	F42EE	72	1.7	SW	2600	None	4,493	
16	Office	4	T 34 R F 2 (MAG)	F42EE	72	0.3	SW	2600	None	749	
13	Engineers Office	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
13	Storage Room	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Planning Board Storage	8	S 32 P F 2 (ELE)	F42LL	60	0.5	SW	2600	None	1,248	
13	Planning/Zoning Office	8	S 32 P F 2 (ELE)	F42LL	60	0.5	SW	2600	None	1,248	
13	Planning/Zoning Office	6	S 32 P F 2 (ELE)	F42LL	60	0.4	SW	2600	None	936	
13	License	10	S 32 P F 2 (ELE)	F42LL	60	0.6	SW	2600	None	1,560	
13	Museum	11	S 32 P F 2 (ELE)	F42LL	60	0.7	SW	2600	None	1,716	
59	Firestairs	2	S 13 R CF 2	CFQ13/2-L	28	0.1	SW	2600	None	146	
59	Firestairs	2	S 13 R CF 2	CFQ13/2-L	28	0.1	SW	2600	None	146	
59	Firestairs	2	S 13 R CF 2	CFQ13/2-L	28	0.1	SW	2600	None	146	
59	Firestairs	1	S 13 R CF 2	CFQ13/2-L	28	0.0	SW	2600	None	73	
13	Fire Dept in Basement	5	S 32 P F 2 (ELE)	F42LL	60	0.3	SW	2600	None	780	
13	Conference Room B	6	S 32 P F 2 (ELE)	F42LL	60	0.4	SW	2600	None	936	
16	Computer Training Room	1	T 34 R F 2 (MAG)	F42EE	72	0.1	SW	2600	None	187	
13	Computer Training Room	1	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	156	
13	Police Office	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
59	Long Term Storage	10	S 13 R CF 2	CFQ13/2-L	28	0.3	SW	2600	None	728	
13	Fire Dept Office	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Storage	1	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	156	
13	Open Area	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Chief + adjacent room	1	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	156	
13	Basement East hall	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Computer Room	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
16	Storage Room	2	T 34 R F 2 (MAG)	F42EE	72	0.1	SW	2600	None	374	
16	Clerks Record Storage	1	T 34 R F 2 (MAG)	F42EE	72	0.1	SW	2600	None	187	
16	Engineering Storage Room	2	T 34 R F 2 (MAG)	F42EE	72	0.1	SW	2600	None	374	
16	Police Dept Accreditation	4	T 34 R F 2 (MAG)	F42EE	72	0.3	SW	2600	None	749	
13	Purchasing Agent	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Director of Purchasing	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
1	Police Main Dispatcher	9	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.3	SW	2600	None	725	
13	Admin Room	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
13	Lieutenant Office	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Public Safety Director Office	8	S 32 P F 2 (ELE)	F42LL	60	0.5	SW	2600	None	1,248	
13	Detective	6	S 32 P F 2 (ELE)	F42LL	60	0.4	SW	2600	None	936	
13	Center Hallway	6	S 32 P F 2 (ELE)	F42LL	60	0.4	SW	2600	None	936	
13	Bathrooms	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
13	Logistics	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Police Records	6	S 32 P F 2 (ELE)	F42LL	60	0.4	SW	2600	None	936	
13	Lieutenant Office	3	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	468	
13	Court Clerk	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
16	Judges Chamber	4	T 34 R F 2 (MAG)	F42EE	72	0.3	SW	2600	None	749	

Energy Audit of Burlington Township
CHA Project No. 21062
Existing Lighting

Cost of Electricity: **$0.127 $/kWh**
$13.55 $/kW

		EXISTING CONDITIONS								
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**NYSERDA Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Retrofit Control**	**Annual kWh**	
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from: Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	Retrofit control device	(kW/space) * (Annual Hours)	Notes
13	Courtroom	3	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	468	
13	Courtroom	9	S 32 P F 2 (ELE)	F42LL	60	0.5	SW	2600	None	1,404	
16	Court Clerk Office	4	T 34 R F 2 (MAG)	F42EE	72	0.3	SW	2600	None	749	
16	Vault	2	T 34 R F 2 (MAG)	F42EE	72	0.1	SW	2600	None	374	
16	ID Booking	12	T 34 R F 2 (MAG)	F42EE	72	0.9	SW	2600	None	2,246	
1	Cells	8	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.2	SW	2600	None	645	
16	Storage	1	T 34 R F 2 (MAG)	F42EE	72	0.1	SW	2600	None	187	
16	Evidence	4	T 34 R F 2 (MAG)	F42EE	72	0.3	SW	2600	None	749	
16	Sally Port	4	T 34 R F 2 (MAG)	F42EE	72	0.3	SW	2600	None	749	
13	Police Basement	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Squad Room	8	S 32 P F 2 (ELE)	F42LL	60	0.5	SW	2600	None	1,248	
13	Report Room	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Pantry	1	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	156	
16	Mens Locker Room	11	T 34 R F 2 (MAG)	F42EE	72	0.8	SW	2600	None	2,059	
1	Mens Locker Room	2	SQ 13 W CF 2 (MAG)	CFQ13/2	31	0.1	SW	2600	None	161	
13	Memorial Hall	4	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	624	
13	Memorial Hall	10	S 32 P F 2 (ELE)	F42LL	60	0.6	SW	2600	None	1,560	
13	Site Storage	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
13	Records Storage	3	S 32 P F 2 (ELE)	F42LL	60	0.2	SW	2600	None	468	
13	Bike Storage	2	S 32 P F 2 (ELE)	F42LL	60	0.1	SW	2600	None	312	
16	Gun and Cleaning	4	T 34 R F 2 (MAG)	F42EE	72	0.3	SW	2600	None	749	
13	Street Crimes Unit	6	S 32 P F 2 (ELE)	F42LL	60	0.4	SW	2600	None	936	
13	Gym	9	S 32 P F 2 (ELE)	F42LL	60	0.5	SW	2600	None	1,248	
	Total	**678**				**33.3**				**86,567**	

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ECM-5 Fixtures Light Replacement

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	EXISTING CONDITIONS										RETROFIT CONDITIONS								COST ANALYSIS				
Area Description	Number of Fixtures	Fixture Code	Watts per Fixture	Number of Non-Operational Fixtures	Watts per Non-Operational Fixtures	kW/fixture	Cost Centre	Daily Hours	Annual Hours	Annual kWh	Number of Fixtures	New Bulbs Number	Watts per Fixture	kW/fixture	Retrofit Control	Daily Hours	Annual Hours	Annual kWh	kW Saved	Annual kWh Saved	Annual $ Saved	Total Inst. Cost	Simple Payback
Outdoor "Lobby"	16	HPS-400	465	0	425	0	Lobby	10	3,650	21,899	16	4XT8-S-SO-120V	121	1.9	Other	10	3,650	6,570	4.0	15,329	$ 2,449	$ 3,475	1.4
Outdoor "Front"	20	HPS-120	150	0	120	0.020	Lobby	10	3,650	27,322	20	2XH-S-SO-75w	75	1.5	Other	10	3,650	11,175	4	16,148	$ 2,421	$ 21,322	8.8
Pool Parking	8	HA-400	465	0	425	0.0	Lobby	10	3,650	11,899	8	T12-SO-75Sw	75	0.6	Other	10	3,650	2,190	2	9,709	$ 1,456	$ 4,380	3.0
Building Lights	16	HID	150	0	150	0.150	Lobby	10	3,650	8,219	16	2XF-SO-75w	75	1.15	Other	10	3,650	4,599	1	3,620	$ 543	$ 8,380	15.4
Yard Lamp	40	MH-400	465	0	465	0.4	Lobby	0.2	73	1,161	40			0	Other	0.2	73	-	16	1,161	$ 2,534		-
TOTALS ---	180			0		45.9				73,410	156			7.2				34,533	36.87	44,3467	$ 10,437	$ 22,010	2.0

Energy Audit of Burlington Township
CHA Project No. 21062
ECM-5 Lighting Replacements

Cost of Electricity: [illegible]
[illegible]

	EXISTING CONDITIONS									RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
Field Code	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Energy Audit of Burlington Township
CHA Project No. 21062
ECM-5 Lighting Replacements

Cost of Electricity: $0.140 /kWh
$1.03 /therm

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	HHSSERDA Fixture Code	Watts per Fixture	kW/Space	Energy Operation	Annual Hours	Annual kWh	Number of Fixtures	Replacement Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Cleaning	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	(House description or the outdoor room number/Space name. Floor number if applicable)	No. of Fixtures (before the retrofit)	Lighting Fixture Code* Example: 2T 40 F12 ... or 2x2 Troff 40 w Recess, Prizm 3 lamps(3 ships)	Code from "Table of Standard Fixture Wattages"	Watts from "Table of Standard Fixture Wattages"	(Fixture/Pod * Qty / No.)	(Pod code number from the lookup table)	(Wattages) divided by 1000	(Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code* Example: 2T 40 F12 ... or 2x2 Troff 40 w Recess, Prizm 3 lamps(3 ships)	Code from "Table of Standard Fixture Wattages"	Watts from "Table of Standard Fixture Wattages"	(Fixture/Pod * Quantity of Fixtures)	Retrofit cleaning factor	Estimated annual hours for "as-built" fixture	(Annual Hours) * (Wattage Saved)	Original Approx kWh - Retrofit Annual kWh	Original Approx kW - Retrofit Annual kW	kWh Saved * ($/kWh)	Cost for replacement lighting fixtures	Prescriptive Lighting Incentive	Length of time for installation cost to be recovered	Simple Payback
10	Front Desk	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	2500	834	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	2,500	834	-	0.0	-	0	-	-	-
20	Locker Rooms	4	2 34 F 1 (MAG)	FIXM	74	0.3	3H	4160	1,481	4	2 34 F 1 (MAG)	FIXM	68	0.3	3H	4,160	1,481	185.211	0.0	$ 25.99	$ 400.00	$ -	$ 400.00	$ 15.4
30	Restrooms	3	2 32 F 1 (ELO)	FIXL	68	0.3	3H	3000	1,008	3	2 32 F 1 (ELO)	FIXL	68	0.3	3H	3,000	1,008	-	0.0	$ -	$ -	$ -	-	-
31	Restrooms	6	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,454	6	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,454	-	0.0	$ -	$ -	$ -	-	-
40	Court Over Office	4	2 34 F 1 (MAG)	FIXM	74	0.3	3H	4160	1,540	4	2 34 F 1 (MAG)	FIXM	68	0.3	3H	4,160	1,481	185.211	0.0	$ 25.99	$ 400.00	$ -	$ 400.00	$ 15.4
50	Vault	3	2 34 F 1 (MAG)	FIXM	74	0.3	3H	8760	2,431	3	2 34 F 1 (MAG)	FIXM	68	0.3	3H	8,760	2,431	243.000	0.0	$ 34.02	$ 300.00	$ -	$ 300.00	$ 8.8
60	2E Shooting	12	2 34 F 1 (MAG)	FIXM	74	0.9	3H	2500	2,220	12	2 34 F 1 (MAG)	FIXM	68	0.9	3H	2,500	2,088	132.000	0.0	$ 18.48	$ 1,077.00	$ 600.00	$ 477.00	$ 25.8
1	Lobby	4	SD 13 W 27 T (MHD)	DNDUS	17	0.1	3H	4160	272	4	SD 13 W 27 T (MHD)	DNDUS	17	0.1	3H	4,160	272	0.000	0.0	$ -	$ -	$ -	-	-
68	Storage	1	2 34 F 1 (MAG)	FIXM	74	0.1	3H	2500	185	1	2 34 F 1 (MAG)	FIXM	68	0.1	3H	2,500	171	14.211	0.0	$ 1.99	$ 100.00	$ -	$ 100.00	$ 8.4
69	Storage	4	2 34 F 1 (MAG)	FIXM	74	0.3	3H	2500	740	4	2 34 F 1 (MAG)	FIXM	68	0.3	3H	2,500	685	56.844	0.0	$ 7.96	$ 400.00	$ 240.00	$ 160.00	$ 8.8
48	Utility Room	1	2 34 F 2 (MAG)	FIXM	74	0.1	3H	2500	185	1	2 34 F 2 (MAG)	FIXM	68	0.1	3H	2,500	171	14.211	0.0	$ 1.99	$ 400.00	$ 240.00	$ 160.00	$ 8.4
70	Police Bathroom	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,454	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,454	-	0.0	$ -	$ -	$ -	-	-
80	Squad Room	8	2 32 F 1 (ELO)	FIXL	68	0.5	3H	4160	2,424	8	2 32 F 1 (ELO)	FIXL	68	0.5	3H	4,160	2,424	-	0.0	$ -	$ -	$ -	-	-
90	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
91	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
92	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
93	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
94	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
95	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
96	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
97	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
98	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
99	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
100	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
101	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
102	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
103	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
104	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
105	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
106	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
107	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
108	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
109	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
110	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
111	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
112	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
113	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
114	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
115	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
116	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
117	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
118	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
119	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
120	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
121	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
122	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
123	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
124	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
125	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
126	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
127	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
128	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
129	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
130	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
131	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
132	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
133	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
134	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
135	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
136	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
137	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
138	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
139	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
140	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
141	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
142	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
143	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
144	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
145	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
146	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
147	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
148	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
149	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
150	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
151	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
152	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
153	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
154	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
155	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
156	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
157	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
158	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
159	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
160	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
161	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
162	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
163	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
164	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
165	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
166	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
167	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
168	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
169	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
170	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
171	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
172	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
173	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
174	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
175	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
176	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
177	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
178	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
179	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
180	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
181	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
182	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
183	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
184	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
185	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
186	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4,160	1,212	-	0.0	$ -	$ -	$ -	-	-
187	Squad Room	4	2 32 F 1 (ELO)	FIXL	68	0.3	3H	4160	1,212	4	2 32 F 1 (ELO)	FIXL

APPENDIX G

ECM-6 Daylight Controls

Burlington,NJ
CHA #21062
Building: Municipal Building

ECM-6 Install Daylighting controls

Hours of Building Operation per week	40
Number of Lamps to be controlled	9
Wattage of Lamps	100
Hours to be turned off (weekly)	10
Annual Savings (KWhr)	468
Annual Savings ($)	$69

Burlington,NJ
CHA #21062
Building: Municipal Building

ECM-6 Install Daylighting controls

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
New Fixtures w sensor	1		$ 80	$ 175		$ 78	$ 212	$ -	$ 290	
Interconnect wiring to circuit	1		$ -	$ 400		$ -	$ 484	$ -	$ 484	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 774	Subtotal
$ 39	5% Contingency
$ 41	5% Contractor O&P
	Engineering
$ 854	**Total**

APPENDIX H

ECM-7 Shutting Off Heater in Garage

Burlington,NJ
CHA #21062
Building: Municipal Building

ECM-7 Shutting Off Electric Heater in Garage

Electric Cost	$ 0.148	/kWh
Wattage of Heater	4,500	Watts

Bin Temp (F)	Oper. (hrs)	On (%)	Usage (kWh)
48	611	0%	0
43	656	10%	295
38	1,023	20%	921
33	734	30%	991
28	334	40%	601
23	252	50%	567
18	125	60%	338
13	47	70%	148
8	22	80%	79
Total KWh saved per season			3,940
Annual Savings ($)			$ 585

APPENDIX I

ECM-8 Purchase More Efficient Heat Pumps

Burlington,NJ
CHA #21062
Building: Municipal Building

ECM-8 Purchase More Efficient Heat Pump

Cost of Electric $ 0.122 /kwh

EER	10	15
3 ton unit(BTU)	36,000	36,000
watts per ton	3,600	2,400

Temperature (F)	Bin Hrs (hrs)	Capacity (%)	Usage - 10 EER (kWh)	Usage - 15 EER (kWh)
102.5	0	100%	0	0
97.5	3	90%	10	6
92.5	34	80%	98	65
87.5	131	70%	330	220
82.5	500	60%	1,080	720
77.5	620	50%	1,116	744
72.5	664	40%	956	637
67.5	854	30%	922	615
62.5	927	20%	667	445
57.5	600	10%	216	144
52.5	610	10%	220	146
47.5	611	20%	440	293
42.5	656	30%	708	472
37.5	1,023	40%	1,473	982
32.5	734	50%	1,321	881
27.5	334	60%	721	481
22.5	252	70%	635	423
17.5	125	80%	360	240
12.5	47	90%	152	102
		Total	**11,427**	**7,618**
			Yearly Savings	3,809 kWh
			Cost Savings per unit	$466 /yr

	KWhr	75
summer only	5,396	404,676
winter only	6,031	452,331

APPENDIX J

New Jersey Incentives

Burlington Township, NJ
CHA #21062
Burlington Municipal Complex

New Jersey Pay For Performance Incentive Program

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

Total Building Area (Square Feet)	51,000
Is this audit funded by the NJ BPU (Y/N)	Yes

Bureau of Public Utilities (BPU)

Incentive #1		
Audit not funded by NJ BPU	$0.10	$/sqft
Audit is funded by NJ BPU	$0.05	$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$147,300	$7,230
Existing Usage (from utility)	992,640	6,590
Proposed Savings	84,490	1,200
Existing Total MMBtus	4,047	
Proposed Savings MMBtus	408	
% Energy Reduction	10.1%	
Proposed Annual Savings	$17,400	

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

	Incentives $		
	Elec	Gas	Total
Incentive #1	$0	$0	$2,550
Incentive #2	$0	$0	$0
Incentive #3	$0	$0	$0
Total All Incentives	$0	$0	$2,550

Total Project Cost	$248,400

		Allowable Incentive
% Incentives #1 of Utility Cost*	1.7%	$2,550
% Incentives #2 of Project Cost**	0.0%	$0
% Incentives #3 of Project Cost**	0.0%	$0
Total Eligible Incentives***	$2,550	
Project Cost w/ Incentives	$245,850	

Project Payback (years)	
w/o Incentives	w/ Incentives
14.3	14.1

* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if it is.

** Maximum allowable amount of Incentive #2 is 30% of total project cost.
Maximum allowable amount of Incentive #3 is 20% of total project cost.

*** Maximum allowable amount of Incentive #1 is $50,000 if not funded by NJ BPU, and $25,000 if it is.
Maximum allowable amount of Incentive #2 & #3 is $1 million per gas account and $1 million per electric account

APPENDIX K

Photovoltaic (PV) Rooftop Solar Power Generation

PVWatts

AC Energy & Cost Savings

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

Station Identification	
City:	Philadelphia
State:	Pennsylvania
Latitude:	39.88° N
Longitude:	75.25° W
Elevation:	9 m
PV System Specifications:	
DC Rating:	100.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	77.0 kW
Array Type:	Fixed Tilt
Array Tilt:	39.9°
Array Azimuth:	180.0°
Energy Specifications:	
Cost of Electricity:	10.9 ¢/kWh

Results			
Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	3.30	8100	882.90
2	4.16	9214	1004.33
3	4.74	11109	1210.88
4	5.06	11133	1213.50
5	5.20	11390	1241.51
6	5.43	11162	1216.66
7	5.51	11554	1259.39
8	5.67	11982	1306.04
9	5.07	10619	1157.47
10	4.59	10378	1131.20
11	3.37	7626	831.23
12	2.67	6355	692.51
Year	4.57	120602	13145.62

Output Hourly Performance Data

Output Results as Text

About the Hourly Performance Data

Saving Text from a Browser

Cautions for Interpreting the Results

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

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

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

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

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

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

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

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

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

APPENDIX L

Solar Thermal Domestic Hot Water Plant

lome
What Can I Do?
Electric Choice
Home Energy
FAQs
LEARN
Fact Sheets
Lesson Plans
PLAY
Calculators
NETWORK
Organizations
Businesses
Events Calendar
BROWSE
Resources
Solar
Wind
Biomass
Geothermal
Water
Projects
TX Energy - Past and Present
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RENEWABLE ENERGY
THE INFINITE POWER OF TEXAS

Interactive Energy Calculators

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

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

Solar Water Heating Calculator

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

Water Heater Characteristics			
Physical		**Thermal**	
Diameter (feet)	1.5	Water Inlet Temperature (Degrees F)	58
Capacity (gallons)	50	Ambient Temperature (Degrees F)	70
Surface Area (calculated - sq ft)	21.36	Hot Water Temperature (Degrees F)	135
Effective R-value	NaN	Hot Water Usage (Gallons per Day)	64.3
Energy Use			
1694		Heat Delivered in Hot Water (BTU/hr)	
0		Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		**Electric**
.8	Overall Efficiency	.98
NaN	Conversion Efficiency	0.98
2118 BTU/hr	Power into Water Heater	1729 BTU/hr

Cost		
$ 1.09 /Therm	Utility Rates	$ .148 /kWh
$ 202.235	Yearly Water Heating Cost	$ 656.512(
How Does Solar Compare?		
Solar Water Heater Cost: $ 21700		Percentage Solar: 70
153.286(years for gas	Payback Time for Solar System	47.2191(years for electric

More information on solar water heating:

Fact sheet - Solar Water Heaters
Fact sheet - Solar Water Heaters for Swimming Pools
Kids fact sheet - Heat from the Sun

Return to Top of Page

Send comments, questions, and suggestions to **website manager.**

Window on State Government | Privacy and Security Policy | Accessibility Policy

State Energy Conservation Office (SECO)

APPENDIX M

Wind

Wind Resource of New Jersey

Mean Annual Wind Speed at 30 Meters


bing

APPENDIX N

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Municipal Building

Building ID: 2249289
For 12-month Period Ending: January 31, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: April 07, 2010

Facility
Municipal Building
851 Old York Road
Burlington, NJ 08016

Facility Owner
Township of Burlington
851 Old York Road
Burlington, NJ 08016

Primary Contact for this Facility
Jeffrey Taylor
851 Old York Road
Burlington, NJ 08016

Year Built: 1979
Gross Floor Area (ft²): 51,000

Energy Performance Rating[2] (1-100) 40

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	3,386,751
Natural Gas (kBtu)[4]	658,900
Total Energy (kBtu)	4,045,651

Energy Intensity[5]

Site (kBtu/ft²/yr)	79
Source (kBtu/ft²/yr)	235

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	551

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	71
National Average Source EUI	212
% Difference from National Average Source EUI	11%
Building Type	Office

Stamp of Certifying Professional

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

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

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

Certifying Professional
N/A

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Municipal Building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	851 Old York Road, Burlington, NJ 08016	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does the SEP represent a single structure? SEP's cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐

Municipal Building (Office)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	61,000 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	80 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	50	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	50	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
01/01/2010	01/31/2010	91,920.00
12/01/2009	12/31/2009	88,400.00
11/01/2009	11/30/2009	81,440.00
10/01/2009	10/31/2009	79,020.00
09/01/2009	09/30/2009	84,240.00
08/01/2009	08/31/2009	79,200.00
07/01/2009	07/31/2009	78,480.00
06/01/2009	06/30/2009	76,600.00
05/01/2009	05/31/2009	61,920.00
04/01/2009	04/30/2009	82,320.00
03/01/2009	03/31/2009	71,760.00
02/01/2009	02/28/2009	157,400.00
Main Electric Consumption (kWh (thousand Watt-hours))		**902,000.00**
Main Electric Consumption (kBtu (thousand Btu))		**3,386,751.20**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**3,386,751.20**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Main Gas (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
01/01/2010	01/31/2010	1,281.00
12/01/2009	12/31/2009	702.00
11/01/2009	11/30/2009	473.00
10/01/2009	10/31/2009	202.00
09/01/2009	09/30/2009	157.00
08/01/2009	08/31/2009	158.00
07/01/2009	07/31/2009	191.00
06/01/2009	06/30/2009	223.00
05/01/2009	05/31/2009	266.00
04/01/2009	04/30/2009	680.00

03/01/2009	03/31/2009	1,009.00
02/01/2009	02/28/2009	1,267.00
Main Gas Consumption (therms)		**9,589.00**
Main Gas Consumption (kBtu (thousand Btu))		**958,900.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**958,900.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

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

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Municipal Building
851 Old York Road
Burlington, NJ 08016

Facility Owner
Township of Burlington
851 Old York Road
Burlington, NJ 08016

Primary Contact for this Facility
Jeffrey Taylor
851 Old York Road
Burlington, NJ 08016

General Information

Municipal Building	
Gross Floor Area Excluding Parking: (ft²)	51,000
Year Built	1979
For 12-month Evaluation Period Ending Date:	January 31, 2010

Facility Space Use Summary

Municipal Building	
Space Type	Office
Gross Floor Area(ft²)	51,000
Weekly operating hours	80
Workers on Main Shift	50
Number of PCs	50
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	Current (Ending Date 01/31/2010)	Baseline (Ending Date 01/31/2010)	Rating of 75	Target	National Average
Energy Performance Rating	46	46	75	N/A	50
Energy Intensity					
Site (kBtu/ft²)	79	79	53	N/A	71
Source (kBtu/ft²)	235	235	157	N/A	212
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/ft²/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
MtCO2e/year	551	551	367	N/A	496
kgCO2e/ft²/year	11	11	7	N/A	10

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

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

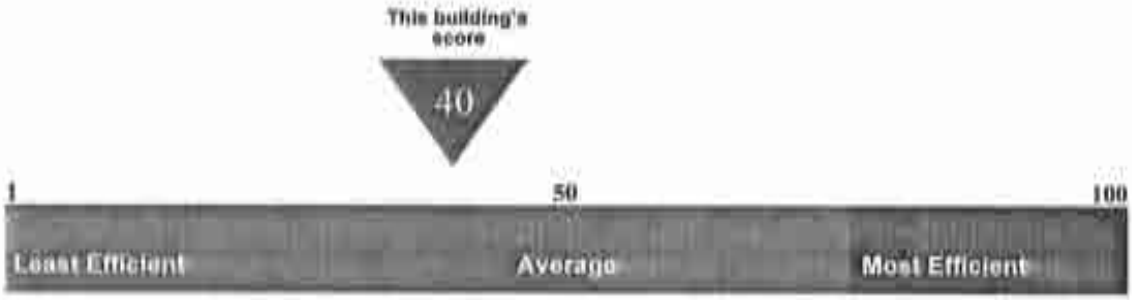
Statement of Energy Performance

2010

Municipal Building
851 Old York Road
Burlington, NJ 08016

Portfolio Manager Building ID: 2249289

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 235 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending January 2010

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

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

Date of certification

EPA United States Environmental Protection Agency

Date Generated: 04/07/2010

APPENDIX O

Equipment Inventory

Burlington BPU Energy Audit Program

Borough of Burlington, NJ

CHA021662

Borough Hall Municipal Building

Item	Qty.	Manuf.	Model No.	Serial No.	Capacity	Condition	Gas	MBH	Refrig.	Comments
Heat Pumps										
1	2		HW-09-2		9.5 MBH	G				
2	4		HW-12-2		12 MBH	G				
3	3		HW-18-3		19.5 MBH	G				
4	9		HW36-2		36 MBH	G				
5	3		HW-30-4		30 MBH	G				
6	8		HW-42-4		40 MBH	G				
7	8		HW-51-4		51 MBH	G				
8	7		HW-62-4		60 MBH	G				
9	1		HW-93-4		93 MBH	G				
Gas-Fired HW Boiler Plant										
10	1	Weil-mclain	PF-5139			G		2726		
Cooling Tower										
11	1	BAC	FXV-42M	1U5342H		G				
Split AC units										
12	1	LG	LSW24			E				evaporator (squad room)
13	1	LG	LSVD240CE			E				condensing unit (squad room)
14	1	Samsung	AS24ARC			E				evaporator (memorial hall)
15	1	Samsung	AS24			E				condensing unit
Domestic Hot Water Heater										
16	11				2.5 GALLON	E				
17	9				4 GALLON	E				
18	1				8 GALLON	E				
Generator										
19	1	Detroit Diesel	150 KW/313 kva			G				500 gallon FO tank
20	1									
Fans										
21	1					G				cooling tower hi speed
22	1					G				cooling tower low speed
23	7		Z-6		90 CFM	G				50 watts
24	1		Z-8		200 CFM	G				155 watts
25	1		Z-12		875 CFM	G				280 watts
26	1		AT-35L		845 CFM	G				1/6 hp
27	1		4R89L		165 CFM	G				1/25 hp
28	1		4R94L		465 CFM	G				1/10 hp
29	1		BT-10L		1,060 CFM	G				1/4 hp
30	1		AT24L		330 CFM	G				1/8 hp
Pumps										
31	2	Taburchon Electric	EK-2X2TTORT1088AW		400 gpm	G				main hot water circulator
32	1	DAYTON	3N918		2 HP	G				harvest sprs cooling tower

E = Excellent
G = Good
P = Poor