SPRINGFIELD TOWNSHIP
MUNICIPAL BUILDING
ENERGY ASSESSMENT

for

NEW JERSEY
BUREAU OF PUBLIC UTILITIES

CHA PROJECT NO. 20812

March 2010

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1.0 INTRODUCTION & BACKGROUND

This report summarizes the energy audit performed at the Springfield Township municipal building located at 2159 Jackson-Jobstown Road, Jobstown, NJ. Constructed in 1980, the building is a 5,280 square foot, single story structure. In addition to the police department and court room, the building houses municipal offices including the treasurer, tax, building permits, court office, town clerk, and land zoning offices.

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 5,280 square foot, single story Springfield Township municipal building. The facility houses the police department and court room; and treasurer, tax, building permits, court office, town clerk, and zoning municipal offices. The following areas were evaluated for energy conservation measures:

- Lighting replacement with occupancy sensors
- Door seal replacement
- Night setback
- Domestic hot water heater replacement
- Demand control ventilation
- Economizers

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Measures which are recommended for implementation have a payback of 10 years or less. This threshold is considered a viable return on investment. Potential annual savings of $5,800 for the recommended ECMs may be realized with a payback of 3.9 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 Combined Lighting Replacements with Occupancy Sensors

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
10,200	4.4	8,220	0	1,800	1.6	900	5.7	5.2

* Incentive shown is per the New Jersey Smart Start program's Prescriptive Lighting and Lighting Controls Applications.

ECM-4 Install Door Seals

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
700	0	30	70	100	0.3	NA	7.0	NA

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

ECM-6 Night Setback

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
2,000	0	280	630	800	5.2	NA	2.5	NA

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

ECM – 8 Replace Domestic Hot Water Heater

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
3,800	9	2,000	(40)	1,800	8.6	50	2.1	2.0

* Incentive shown is per the New Jersey Smart Start program's Gas Water Heating Application.

ECM-9 Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
7,100	0	1,000	900	1,300	1.7	NA	5.6	NA

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

3.0 EXISTING CONDITIONS

3.1 Building General

The Springfield Township municipal building, constructed in 1980, is a 5,280 square foot, single story structure. The building houses the police department, court room, and municipal offices for the treasurer, tax department, town clerk, building, and zoning.

The police department is operational 24 hours a day year round. Occupancy ranges from about eight people during peak hours to one person at off peak times. Municipal offices within the administrative area have specific hours during which they are open to the public. Typical average occupancy is about 13 people from 9:00 AM to 4:00 PM, Monday through Friday. In addition, the courtroom holds sessions starting at 5:15 PM for two hours twice per month. The court also serves as a large meeting room when required. Average occupancy of the courtroom is about 15 people.

The building's exterior shell appears to be in good condition. The walls consist of 4" face brick; 8" concrete block, 2.5" rigid board insulation, and are finished with 1/2" gypsum board. The roof is constructed of architectural shingles on top of felt paper, 3/4" sheathing, R-25 batt insulation, and finished with acoustical ceiling tiles. Exterior windows are wood frame double hung 1/4" pane glass and most are in good condition. Exterior doors are aluminum with tempered safety glass.

3.2 Utility Usage

Utilities include electricity, natural gas, and potable water. Electricity and natural gas are purchased from Public Service Electric & Gas Company (PSE&G); potable water is provided by an on-site well and filtration system.

During the period of October 2008 to September 2009, electric usage was approximately 73,600 kWh at a total cost of $12,900. Review of electricity bills during this period determined the building was charged a supply unit cost of $0.1235 per kWh, demand unit cost of $15.09 per kW, and blended unit cost of $0.175 per kWh. Electrical usage was highest is the summer months due to the use of cooling equipment. During the same 2008-2009 timeframe, the building heating produced by natural gas-fired equipment required 2,540 therms. Based on the annual cost of about $3,150, the blended price for natural gas was $1.24 per therm. Natural gas consumption is highest in the winter months required to produce building heat. Water consumption is not recorded; therefore, is not included in the utility analysis. Utility data can be found in Appendix A.

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

3.3. HVAC Systems

Ventilation and air conditioning are provided by three air handling units (AHUs) located in the attic area, which serve the main building, police department, and court area. Each AHU is coupled with a remote condenser located on grade along the side of the building. In total, the three units supply 7,200 CFM air, including 675 CFM of outdoor air (OA).

Hot water coil heating and direct expansion (DX) cooling are provided to the perimeter of the facility by eight wall penetrating unit ventilators with an estimated outdoor air inflow of 400 CFM.

Heat is primarily generated by one original 245,000 Btu natural gas fired Weil McLain boiler distributing hot water to heating coils to the three AHUs, seven unit ventilators, and one cabinet heater. Supplemental heating was added in the men's and women's restrooms. One 10 foot electric resistance wall mounted heater was added to each restroom and has an integral thermostat mounted on each unit.
There is one exhaust fan serving the restrooms.

3.4 Lighting/Electrical Systems

The lighting fixtures throughout the municipal building utilize two or four lamp inefficient T-12 fluorescent lamps with magnetic ballasts. All exit signs and traditional bulbs within the building are illuminated with inefficient incandescent lamps. Exterior lighting, located at the exterior doors at the underside of the roof overhang, consists of three fixtures using 75 watt incandescent lamps. The facility also includes six poles equipped with 250 watt metal halide lamps.

Emergency power is provided by a 60 kW, gas-fired, Kohler generator located outside at the northwest corner of the building.

3.5 Control Systems

3.5.1 HVAC Controls

Originally, the building utilized a Honeywell control system with the capability of controlling all AHU air dampers, boiler operation, as well as space temperatures throughout the facility. This system has been disabled for many years due to the cost of sustained maintenance.

Currently, AHUs, boiler, and finned tube radiant heating are controlled by wall-mounted, non-programmable thermostats. Thermostats controlling AHUs 1, 2, and 3 are standard proportional units. The ventilators serving the perimeter walls utilize hot water coil and DX cooling, and are manually controlled. There is no night setback capability available in the present system.

Exhaust fan serving the restrooms and holding area are operated by a wall-mounted controller.

3.5.2 Lighting Controls

Most lighting in the municipal building is controlled by manual wall switches. Additional controls include a manual dimmer switch for courtroom lighting, and a photocell or timers to operate exterior lighting.

3.6 Plumbing Systems

Domestic hot water is produced by a 30 gallon, 9 kW electric, Bradford White water heater located in the mechanical room. Plumbing fixtures include standard-flow toilets and wall-mounted restroom sinks and urinals.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Lighting Replacements

The lighting fixtures throughout the municipal building utilize two or four lamp inefficient T-12 fluorescent lamps with magnetic ballasts. All exit signs and bulbs are illuminated with inefficient incandescent lamps.

The following lighting upgrades were also considered where appropriate:

- T-12 34-watt 2 & 4 lamp with magnetic ballast retrofitted to T-8 28-watt lamps and electronic ballasts
- Incandescent lamps to efficient compact fluorescent lamps
- Incandescent exit signs replaced with LED high efficiency fixtures

Energy savings for this measure were calculated by applying the existing and proposed fixture wattages to the estimated time of operation. The difference resulted in an annual savings of 7,780 kWh per year, in addition to a 4.4 kW reduction in demand. Supporting calculations, including all assumptions for lighting hours and the annual energy usage for each fixture are provided in Appendix B.

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 116,700 kWh and $25,900.

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

ECM-1 Lighting Replacements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
9,800	4.4	7,780	0	1,700	1.63	900	5.8	5.2

* Incentive shown is per the New Jersey Smart Start program's Prescriptive Lighting Application.

This measure is not recommended in lieu of ECM-3.

4.2 ECM-2 Install Occupancy Sensors

Currently, occupancy sensors are not utilized. It is proposed that occupancy sensors be installed in selected rooms to turn off the lights when the area is unoccupied. A lighting survey was conducted of all fixtures in the building to determine the average time that the lights are presently on in each space. An analysis was performed to determine the benefits of utilizing occupancy sensors to turn off lighting while the space is not in use. Occupancy sensors were not considered in mechanical areas and hallways due to safety concerns. Other areas were not considered due to the proposed location of the occupancy sensor. If the sensor would not have a clear view of the occupants in the space, it may darken even with people utilizing the space.

The weekly occupied times for each space was determined by taking into account typical traffic patterns for individual spaces. Applying the existing and proposed operating times to the combined wattage requirements for each room's lighting fixtures, it was determined that 520 kWh can be saved through

implementation of this ECM. Supporting calculations, including the proposed rooms to install occupancy sensors; assumptions for lighting hours in each space; annual energy usage for each fixture; and the type of occupancy sensor recommended is included in Appendix C.

Occupancy sensors have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 7,770 kWh and $900.

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

ECM-2 Install Occupancy Sensors

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
400	0	520	0	100	1.6	100	4.0	3.0

* Incentive shown is per the New Jersey Smart Start program's Lighting Controls Application.

This measure is not recommended in lieu of ECM-3.

4.3 ECM-3 Combined Lighting Replacements with Occupancy Sensors

Due to interactive effects, the energy and cost savings for occupancy sensors and lighting upgrades are not cumulative. This measure is a combination of ECM-1 and ECM-2 to allow for maximum energy and demand reduction.

Lighting and occupancy sensors have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 123,360 kWh and $26,800.

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

ECM-3 Combined Lighting Replacements with Occupancy Sensors

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
10,200	4.4	8,220	0	1,800	1.6	900	5.7	5.2

* Incentive shown is per the New Jersey Smart Start program's Prescriptive Lighting and Lighting Controls Applications.

This measure is recommended.

4.4 ECM-4 Door Seal Replacement

The door seals at the facility are in fair condition. Installing new door seals will reduce outdoor air infiltration and reduce heating and cooling costs.

This ECM calculation was developed by reducing the calculated infiltration CFM created by the existing door seals and reducing the amount of outdoor air bypassing the existing door seals by 80%. Following implementation of this measure, it is expected the building's annual natural gas and electricity consumption will be reduced by approximately 70 therms and 30 kWh, respectively.

Door seals an expected life of 10 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 660 therms, 300 kWh, and $900.

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

ECM-4 Install Door Seals

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
700	0	30	70	100	0.3	NA	7.0	NA

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

This measure is recommended.

4.5 ECM-5 Window Replacements

The windows at the Springfield municipal building are operable double hung, single pane 1/4" glass, wood frame and original to building construction. The windows are in good condition and most windows observed were tight and not excessively leaking. This style of window inherently has increased outdoor air infiltration creating cold drafts, and heating and cooling losses. This ECM evaluates replacement with new energy efficient windows that incorporate double pane argon filled low-e window glazing with wood frame construction.

This measure calculated the square footage and perimeter length of the single pane windows. The building has over 143 square feet of window area. Weather bin data determined heating and cooling hours and associated energy savings. Window replacement is not recommended due to the long payback; however, additional considerations may be improved comfort and appearance.

Windows have an expected life of 20 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 1,000 kWh, 4,360 therms and $5,600.

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

ECM – 5 Replace Windows

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas baton and	Total				
$	kW	kWh	Therms	$		$	Years	Years
13,300	0.0	50	220	300	(0.6)	NA	>25	NA

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

This measure is not recommended.

4.6 ECM-6 Night Setback

As previously noted, the original Honeywell control system was disabled many years ago due to the cost of maintenance. The AHUs, boiler, and finned tube radiant heating are controlled by a wall-mounted, nonprogrammable thermostat. Night setback is not utilized.

This ECM evaluates adjusting the unoccupied heating to 60°F and cooling setpoint to 80°F in all areas except the police department that is utilized 24 hours per day, seven days per week.

To calculate the benefits of night setback, a block load building model was created to approximate the existing energy load for the spaces served by each air handler. The block loads model the maximum overall cooling and heating loads for each space, taking into account various parameters such as roof, wall, and window construction; total envelope surface area; ventilation and infiltration loads; building occupancy; internal heat generation; and other sources of heat gain and loss. By entering these calculated maximum loads into a spreadsheet containing bin temperature data, the total accumulated year-round cooling and heating energy requirements were determined for each area. Bin data for Springfield, NJ was not available; therefore, data from nearby Newark, NJ was used. The bin temperature spreadsheets are included in Appendix F.

To determine the proposed energy usage in each area during temperature setback, a second bin spreadsheet was created for the new accumulated heating and cooling loads, which was identical to the existing usage spreadsheets except the unoccupied temperatures were adjusted. The difference in heating therms and cooling kWh between the two models is taken as the savings. Heating and cooling night setback in the police department was not considered. Following implementation of this measure, it is expected the building's annual natural gas will be reduced by 630 therms and electricity by 280 kWh.

Programmable thermostats have an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 9,430 therms, 4,240 kWh and $12,400.

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

ECM-6 Night Setback

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
2,000	0	280	630	800	5.2	NA	2.5	NA

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

This measure is recommended.

4.7 ECM-7 Condensing Boiler Installation

As previously noted, heat is primarily generated by one original 245,000 Btu natural gas fired Weil McLain boiler. There are currently more efficient units such as condensing boilers that can provide efficiencies of 93%. The energy saved is determined by comparing the difference in the energy used by the existing gas fired boiler and proposed condensing boiler for hot water heating.

Condensing boilers work on the principle of recovering as much waste heat as possible, which is normally ejected into the atmosphere from the flue of a conventional (non-condensing) boiler. This design maximizes the heat transfer from the burner and recovers useful heat which would normally be lost with the flue gases. When in condensing mode, (condensing boilers do not condense continually) the flue gases give up their latent heat which is then recovered by the heat exchanger within the boiler. As a result, the temperature of the gases exiting the flue of a condensing boiler is typically 120-140°F; the temperature in a current non-condensing boiler stack is higher.

Following implementation of this measure, it is expected the building's annual natural gas consumption will be reduced by approximately 470 therms.

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 9,380 therms and $11,600.

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

ECM – 7 Condensing Boiler Installation

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
7,200	0	0	470	600	0.6	400	12.3	11.6

* Incentive shown is per the New Jersey Smart Start program's Gas Heating Application.

This measure is not recommended.

4.8 ECM-8 Replace Domestic Hot Water Heater

Presently domestic hot water is produced utilizing electric hot water heater and storage tank. This unit has (2) 4.5 kW heating elements immersed in a 30 gallon storage tank. It is proposed this unit be replaced

with a tankless, instantaneous, condensing gas-fired domestic hot water heater. Gas line modification as well as flue gas modifications would be needed to consider this type of upgrade.

Following implementation of this measure, it is expected the building's annual electrical energy consumption will be reduced by approximately 1,990 kWh and will need to consume about 40 therms of natural gas in the proposed natural gas burning configuration.

Condensing domestic hot water heaters have an expected life of 20 years, according to ASHRAE, and total energy savings over the life of the project are estimated at by approximately 39,830 kWh and will consume 860 therms, totaling $36,500.

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

ECM – 8 Replace Domestic Hot Water Heater

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
3,800	9	2,000	(40)	1,800	8.6	50	2.1	2.0

* Incentive shown is per the New Jersey Smart Start program's Gas Water Heating Application.

This measure is recommended.

4.9 ECM-9 Demand Control Ventilation

As previously noted, the original Honeywell control system was disabled many years ago due to the cost of maintenance. The AHUs, boiler, and finned tube radiant heating are controlled by a wall-mounted, nonprogrammable thermostat. All air handlers were observed to have their outdoor air dampers permanently affixed in the minimum volume setting. The amount of outside air to the building does not vary based on occupancy and can potentially over-ventilate the building. Energy usage can be reduced by matching the amount of ventilation to the occupancy.

The facility is served by three air handling units; AHU-1 serves the police station, AHU-2 the main area, and AHU-3 the court room. The combined supply air rate is 7,200 CFM, including 675 CFM of outdoor air (OA). Each AHU draws fresh air in through an OA intake and blends it with return air prior to being treated and discharged into each space. Since there is no control on the fresh air intake, the same amount of OA is treated regardless of the ventilation demand determined by space occupancy. Utilizing demand control ventilation (DCV), the system would regulate the amount of OA induced into the space based on the CO_2 levels detected within the room or return air duct. A DCV system is based on the principle that the number of people within the space is proportional to the concentration of CO_2. This ECM evaluates providing only the required fresh air to the space, decreasing the amount of OA to be treated, and reducing the annual heating and cooling loads. Due to the fact that the present outdoor air louvers have been permanently set at the minimum outdoor air volume the savings derived from this ECM will be limited to the decrease in volume of the present minimum setting to reduced volume requirement based on CO_2 levels.

Implementation of this measure requires installation of OA controls on the three AHUs serving the facility. This includes installing a CO_2 sensor within the return air duct and upgrades to the OA damper

actuators for each unit. Additionally, a programmable logic controller (PLC) will be necessary to control the OA damper positions based on the CO_2 readings.

DCV equipment has an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 2,760 therms, 2,160 kWh and $3,800.

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

ECM-9 Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
7,100	0	1,000	900	1,300	1.7	NA	5.6	NA

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

This measure is recommended.

4.10 ECM-10 Install Economizer Controls

The existing systems bring in the same amount of outside air regardless of occupancy or load. Economizers would utilize cooler outside air when possible. This ECM considers installing economizer controls on the existing AHUs. This will bring in outdoor air to cool the facility without the use of mechanical refrigeration equipment. The only energy required to take advantage of this free cooling would be to run the air handling unit fans. Presently the AHU outdoor air dampers are set at a minimum setting bring in 675 CFM continuously.

Implementation of this measure requires installation of OA controls on the three AHUs serving the facility. This includes installing enthalpy sensors within the outdoor air duct and upgrades to the OA damper actuators for each unit. Additionally, a programmable logic controller (PLC) will be necessary to control the OA damper positions based on outdoor air temperature and enthalpy readings.

Economizer control equipment has an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 12,250 kWh and $2,100.

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

ECM-10 Install Economizer Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
4,300	0	800	0	100	(0.5)	NA	>25	NA

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

This measure is not recommended.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

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

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

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

5.2 Building Incentives

The Springfield Township municipal building is eligible for several incentives available under New Jersey Smart Start Programs. The total amount of all qualified incentives is about $1,400 and includes installing boiler replacement, DHW heater replacement, and upgrades to the lighting system.

When calculating the total incentive for the New Jersey Pay for Performance program, for all ECMs presented in this report all energy conservation measures are applicable as the amount received is based on building wide energy improvements. Since the overall energy reduction for the building is estimated to exceed the 15% minimum, the building is eligible for Incentives #2 and #3 as previously discussed. This would result in a total incentive of about $12,451, reducing the total project payback from 7.1 years to 5.3 years. See Appendix L for calculations.

When calculating the total incentive for the New Jersey Pay for Performance program for only the recommended energy conservation measures all energy conservation measures are applicable as the amount received is based on building wide energy improvements. Since the overall energy reduction for

the building is estimated to exceed the 15% minimum, the building is eligible for Incentives #2 and #3 as previously discussed. This would result in a total incentive of about $9,677, reducing the total project payback from 4.1 years to 2.4 years. See Appendix L for calculations.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Geothermal

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

The municipal building has one original 245,000 Btu natural gas fired Weil McLain boiler distributing hot water to heating coils in three air handling units, (7) unit ventilators, and one cabinet heater. Cooling is provided by (3) four ton condensing units serving DX coils inside each air handler. The exterior offices also have DX units in each unit ventilator to provide additional cooling. One window unit serves in the police department and is only utilized during the hottest days. To take advantage of a GHP system, the building would have to install a low temperature closed loop water source heat pump system to realize the benefit of the consistent temperature of the ground. This will also include removal of the existing heating and cooling system.

This measure is not recommended due to the high cost to replace the existing systems.

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

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

The PVWATTS solar power generation model was utilized to calculate PV power generation. The New Jersey Clean Power Estimator provided by the New Jersey Clean Energy Program is presently being updated; therefore, the site recommended use of the PVWAT solar grid analyzer version 1. The closest city available in the model is Newark, New Jersey and a fixed tilt array type was utilized to calculate energy production. The PVWAT 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 $689; this is the amount that must be paid per SERC by the high emission producers. The expected dollar amount that will be paid to the PV producer for 2009 is expected to be $600/SREC credit. Payments that will be received from the PV producer will change from year to year dependent upon supply and demand. Renewable Energy Consultants is a third party SREC broker that has been approved by the New Jersey Clean Energy Program. As stated above there is no definitive way to calculate an exact price that will be received by the PV producer per SREC over the next 15 years. Renewable Energy Consultants estimated an average of $487/ SERC per year and this number was utilized in the cash flow for this report.

The municipal building has a maximum kW demand of 25.2 kW and a minimum kW of 17.2 kW over the previous 12 months. The monthly average over the observed 12 month period was 20.9 kW. The facility's existing load should justify the use of 20 kW of installed PV solar array; therefore, a 20 kW system size was selected for the calculations. The system costs for PV installations were derived from the most recent NYSERDA (New York State Energy Research and Development Agency) estimates of total cost of system installation. It should be noted that the cost of installation is currently $10 per watt or $10,000 per kW of installed system. This has increased in the past few years due to the rise in national demand for PV power generator systems. Other cost considerations will also need to be considered. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will need to be replaced multiple times during the useful life of the PV system.

ECM-6.2.1 Photovoltaic (PV) Rooftop Solar Power Generation – 20 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
200,000	0	23,660	0	4,100	4,100	20,000	11,500	>25	11.5

*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

This measure is not recommended at this time due to the long payback period; however it could be a potentially viable renewable measure to be considered in the future if electricity rates continue to increase and if PV installation costs decline below $10 per watt.

6.2.2 Solar Thermal Domestic 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 for Springfield Municipal Building would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for domestic hot water production.

As of the writing of this report, there are no incentives available for installation of thermal solar systems. Presently there is a Federal tax credit of 30% of installation cost for the thermal applications, however the Township of Springfield does not pay Federal taxes and, therefore, would not benefit from this program.

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

ECM-6.2.2 Solar Thermal Domestic Hot Water Plant

Budgetary	Annual Utility Savings				Total	New Jersey Renewable	Payback	Payback
Cost					Savings	Energy Incentive	(without incentive)	(with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	$	$	Years	Years
27,100	0	1,280	0	200	200	NA	>25	NA

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

This measure is not recommended.

6.3 Wind

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

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

The New Jersey Clean Energy Program for small wind installations has designated numerous pre-approved wind turbines for installation in the State of New Jersey. Incentives for wind turbine installations are based on kilowatt hours saved in the first year. Systems sized under 16,000 kWh per year of production will receive a $3.20 per kWh incentive. Systems producing over 16,000 kWh will receive $51,200 for the first 16,000 kWh of production with an additional $0.50 per kWh up to a maximum cap of 750,000 kWh per year. Federal tax credits are also available for renewable energy projects up to 30%

of installation cost for systems less than 100 kW. However, as noted previously, municipalities do not pay federal taxes and is, therefore, not eligible for the tax credit incentive.

The most important part of any small wind generation project is the mean annual wind speed at the height of which the turbine will be installed. In the Springfield New Jersey area, the map indicates a mean annual wind speed of below 10 miles per hour. For the building, there are site restrictions. Parking lots, radio communication towers, trees, and local residential housing would greatly affect a tower location.

An aerial satellite image of the municipal site and wind speed map is included in Appendix M.

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

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 building has sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter. Thermal usage during the summer months is low, and thermal energy produced by the CHP plant will be wasted. An absorption chiller could be installed to utilize the heat to produce chilled water; however, there is no chilled water distribution system in the building.

The most viable option for a CHP plant would be a reciprocating engine natural gas-fired unit. However, since the building is located in a residential area, noise may be an issue.

This measure is not recommended due to not having access to use of summertime heat that will be produced by the cogeneration system.

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 the site does not have room to store the waste organic materials, noise issues, and potential emission and zoning issues.

6.6 Demand Response Curtailment

Presently, the municipal building's electricity is delivered and supplied by PSE&G. Utility curtailment is an agreement with the regional transmission organization and an approved Curtailment Service Providers (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 their 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 their emergency generators with notice to test the system. A minimum of 100 kW of curtailable load is required to enter the program. Discussions with the EnerNoc Corporation, an approved CSP, indicate that most if not all existing emergency generators will not pass the emissions requirements to enter the NJ program.

Presently, the municipal building has an average kW during the observed period of 20.9 kW per month well below the 100 kW minimum requested by CSP organizations. The bulk of the electricity usage is needed during any request to reduce electrical load.

This is not recommended because the building load cannot be substantially reduced during a planned Demand Response Curtailment event.

7.0 EPA PORTFOLIO MANAGER

The United State Energy 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 building includes office areas. Since more than 10% of the space is Other (i.e., Police Department), the building does not fall under the listed space description categories needed to generate a full report and provide an energy star rating. The portfolio manager provided an Energy Use Intensity (EUI) rating of 96 kBtu/ft2.

The building's performance, however, can be compared to national EUI averages. With an EUI of 96 kBTU/ft2/year, the building is considered a moderate energy consumer per the Portfolio Manager. Reducing energy loss associated will result in a more favorable score. If all the measures recommended in this report are fully implemented, it is projected that EUI of 66 kBTU/ft2/year can be obtained. The national average for buildings of similar type is 90.

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

The user name and password for the municipal building's EPA Portfolio Manager Account has been provided to Paul Keller of Springfield Township.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Springfield Township municipal building in Jobstown, New Jersey identified potential ECMs for lighting replacement with occupancy sensors, door seal replacement, night setback, demand control ventilation, and domestic hot water heater replacement. Potential annual savings of $5,800 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-3 Combined Lighting Replacements with Occupancy Sensors

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
10,200	4.4	8,220	0	1,800	1.6	900	5.7	5.2

* Incentive shown is per the New Jersey Smart Start program's Prescriptive Lighting and Lighting Controls Applications.

ECM-4 Install Door Seals

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
700	0	30	70	100	0.3	NA	7.0	NA

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

ECM-6 Night Setback

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
2,000	0	280	630	800	5.2	NA	2.5	NA

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

ECM – 8 Replace Domestic Hot Water Heater

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
3,800	9	2,000	(40)	1,800	8.6	50	2.1	2.0

* Incentive shown is per the New Jersey Smart Start program's Gas Water Heating Application.

ECM-9 Demand Control Ventilation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
7,100	0	1,000	900	1,300	1.7	NA	5.6	NA

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

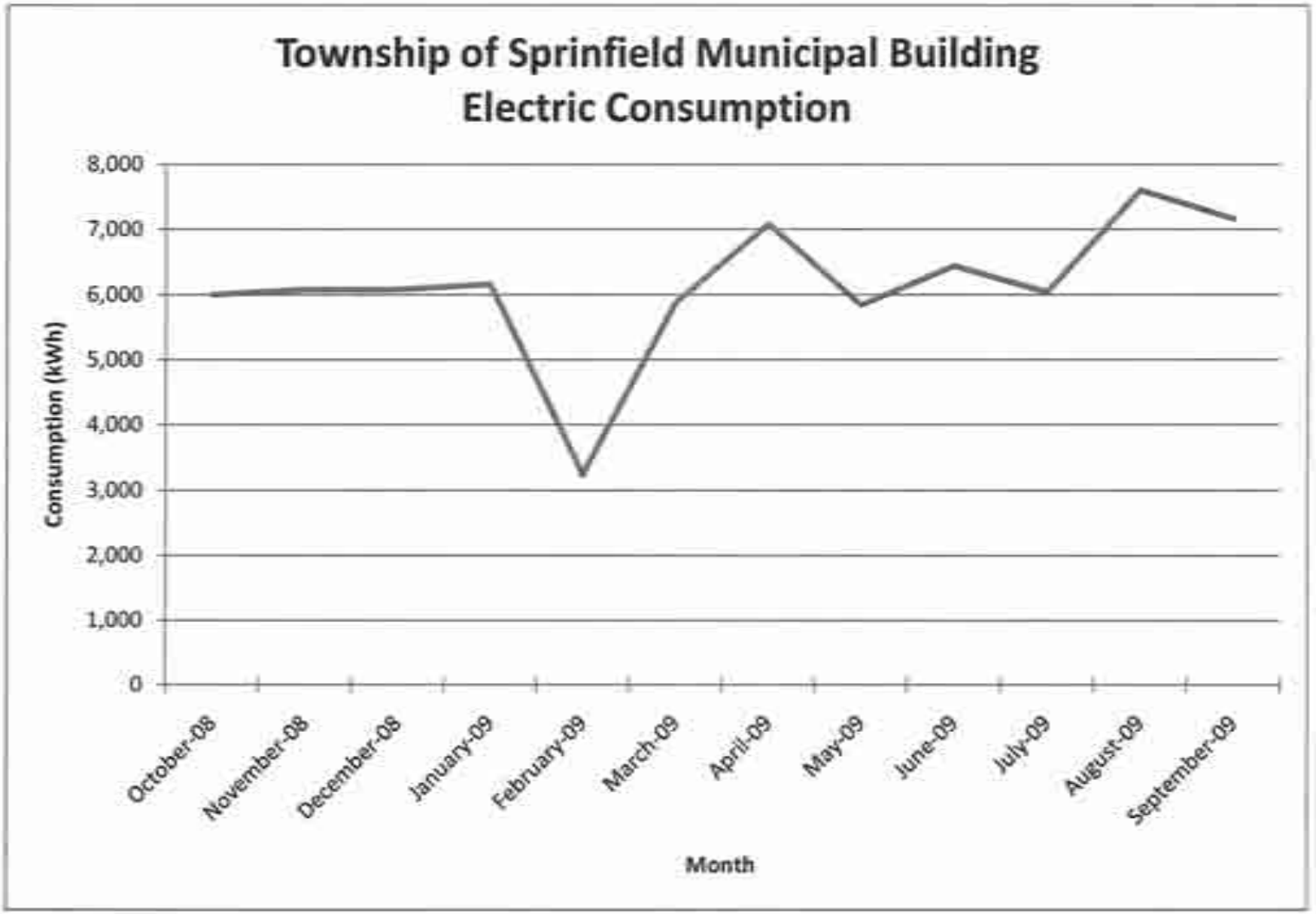
APPENDIX A

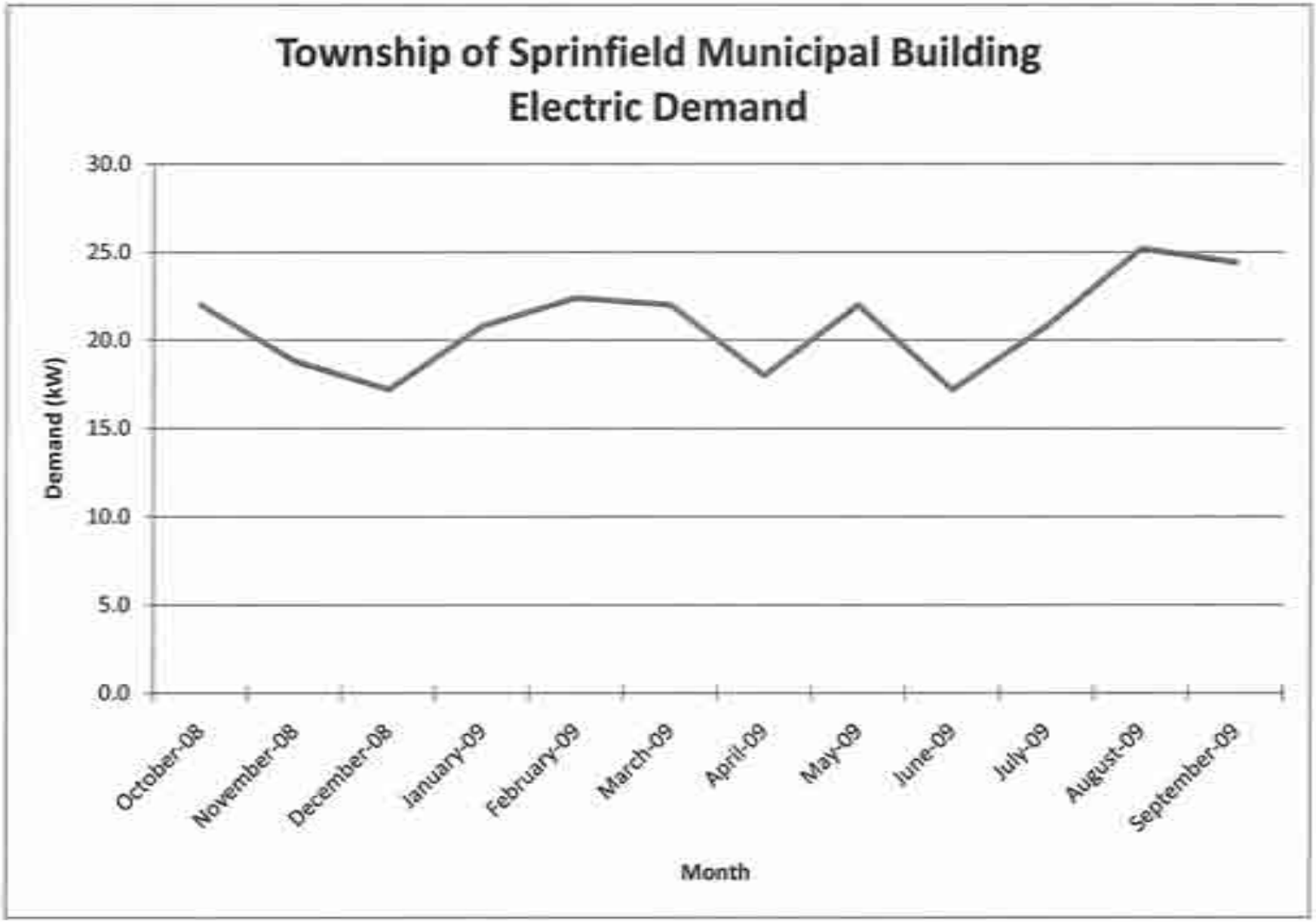
Utility Usage Analysis

New Jersey BPU Energy Audit Program
CHA Project No.: 20812
Town of Springfield
PSE&G - Electric Service

Town Hall - 2159 Jobstown Road.
Account No.: 66 986 794 02
Meter No.: 728001095

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
October-08	6,000	22.0	$1,027.18	$228.56	$798.62	0.1712	0.1331	10.39
November-08	6,080	18.8	$905.28	$218.88	$686.40	0.1489	0.1129	11.64
December-08	6,080	17.2	$883.85	$215.53	$668.32	0.1454	0.1099	12.53
January-09	6,160	20.8	$902.26	$242.37	$659.89	0.1465	0.1071	11.65
February-09	3,240	22.4	$941.12	$255.46	$685.66	0.2905	0.2116	11.40
March-09	5,880	22.0	$928.12	$236.63	$691.49	0.1578	0.1176	10.76
April-09	7,080	18.0	$1,042.61	$260.39	$782.22	0.1473	0.1105	14.47
May-09	5,840	22.0	$902.00	$243.39	$658.61	0.1545	0.1128	11.06
June-09	6,440	17.2	$1,119.45	$404.97	$714.48	0.1738	0.1109	23.54
July-09	6,040	20.8	$1,233.82	$432.36	$801.46	0.2043	0.1327	20.79
August-09	7,600	25.2	$1,534.24	$532.38	$1,001.86	0.2019	0.1318	21.13
September-09	7,160	24.4	$1,451.38	$513.82	$937.56	0.2027	0.1309	21.06
Most Recent Yr	73,600	25.2	$12,871.31	$3,784.74	$9,086.57	0.1749	0.1235	15.09


Township of Sprinfield Municipal Building
Electric Consumption
Consumption (kWh)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
October-08
November-08
December-08
January-09
February-09
March-09
April-09
May-09
June-09
July-09
August-09
September-09
Month

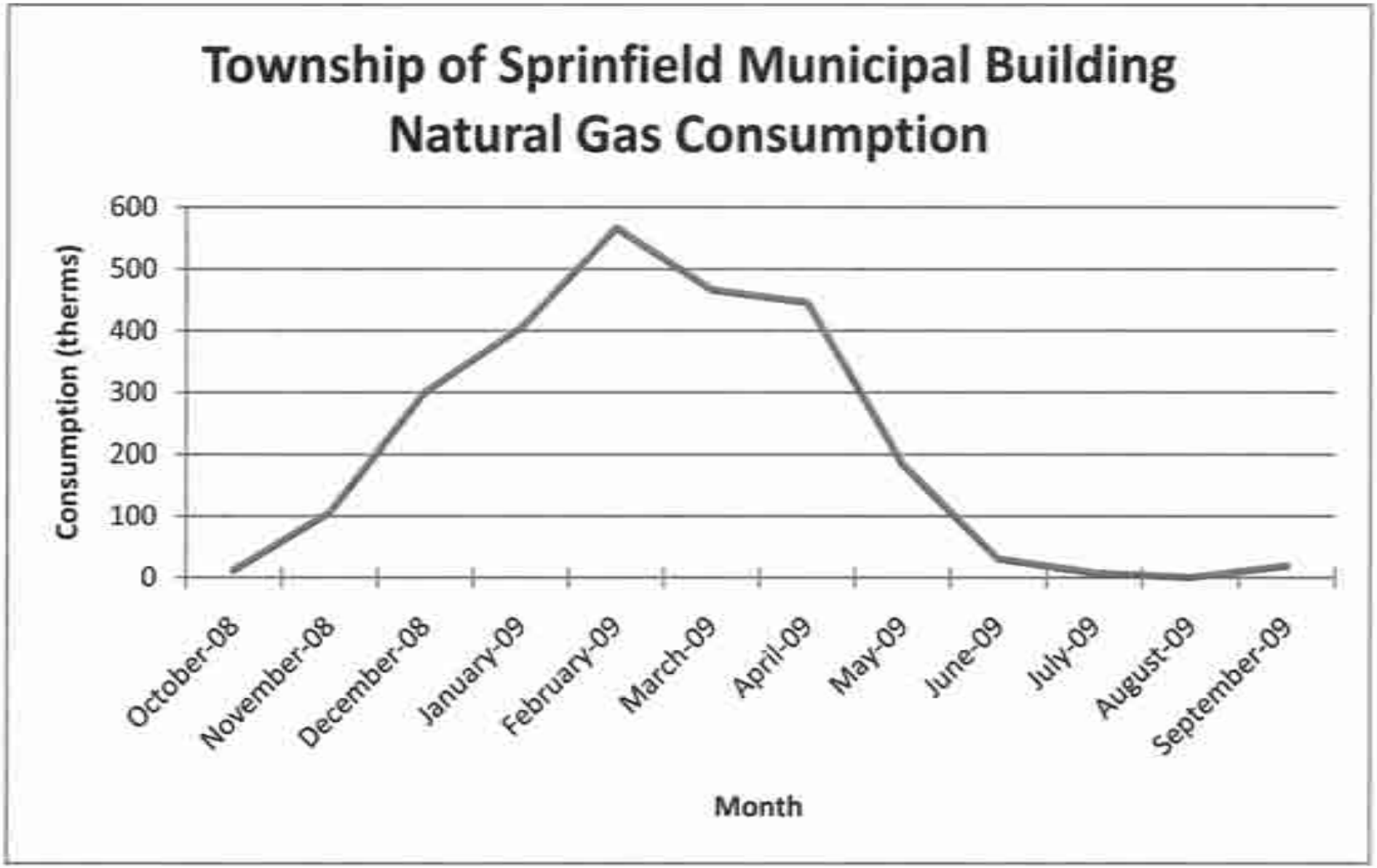

Township of Sprinfield Municipal Building
Electric Demand
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Demand (kW)
October-08
November-08
December-08
January-09
February-09
March-09
April-09
May-09
June-09
July-09
August-09
September-09
Month

New Jersey BPU Energy Audit Program
CHA Project No.: 20812
Town of Springfield
PSE&G - Natural Gas Service

Town Hall - 2159 Jobstown Road.
Account No.: 66 986 794 02
Meter No.: 3152283

Month	Therms	Charges ($)	($/Therm)
October-08	12	26.17	2.274
November-08	106	159.92	1.515
December-08	300	406.13	1.352
January-09	404	563.33	1.394
February-09	566	742.18	1.311
March-09	466	539.26	1.157
April-09	445	446.63	1.003
May-09	184	176.43	0.961
June-09	30	36.59	1.215
July-09	7	16.66	2.282
August-09	0	10.12	
September-09	19	26.53	1.414

Most Recent Yr	2,539	3,150	1.241


Township of Sprinfield Municipal Building
Natural Gas Consumption
Consumption (therms)
600
500
400
300
200
100
0
October-08
November-08
December-08
January-09
February-09
March-09
April-09
May-09
June-09
July-09
August-09
September-09
Month

ELECTRIC MARKETERS LIST

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Jan 14, 2009

GAS MARKETERS LIST

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

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

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

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

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

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

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

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

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

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

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

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

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

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

RPL Holdings, Inc
601 Carlson Pkwy
Minnetonka, MN 55305

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

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

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

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

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

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

APPENDIX B

ECM-1 Lighting Replacements

Energy Audit of Springfield Township
CHA Project No. - Municipal Building
ECM-1 Lighting Replacements

Cost of Electricity: [illegible]

	EXISTING CONDITIONS									NEW/PROPOSED CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code:	HYBRID Fixture Code:	Watts per Fixture	kW/Space	Color Controls	Operation Hours	Annual kWh	Number of Fixtures	Standard Fixture Code:	Fixture Code:	Watts per Fixture	kW/Space	Vacancy Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Rebate/ Cost	% Lighting Incentive	Simple Payback With Cost Incentive	Simple Payback
Field Code	Unique description of the room(s) from number/Room name; Floor number (if applicable)	No. of fixtures before the switch	"Lighting Fixture Code" Example: 2T-40-RPS2 - 2x2' Troff 40 w Recess, Prism 2 Lamps (1 ballast	Code from "Table of Standard Fixture Wattages"	Wattage from Table of Standard Fixture Wattages	Watts/Ft2 * Fixture	Pre-site control device	Estimated hours per Occupancy Group for the Area	kWh/space * Annual Hours	No. of fixtures after the switch	"Lighting Fixture Code" Example: 2T-40-RPS2 - 2x2' Troff 40 w Recess, Prism 2 Lamps (1 ballast	Code from "Table of Standard Fixture Wattages"	Wattage from Table of Standard Fixture Wattages	Watts/Ft2 * Number of Fixtures	Control Device	Estimated Annual Hours for the Area	Annual kWh (Annual Hours)	Original (Baseline) kWh - Retrofit kWh	Original (Baseline) kW - Retrofit kW	Annual $ Saved ($/kWh)	Cost to Implement Lighting Upgrade	Prescriptive Lighting Rebate	Length of time for implementation cost to be recovered	Length of time for implementation cost to be recovered
102	Main Entrance	4	W 40 CP 2 SND	PH2S	92	0.4	Off	3000	552	4	W 20 CP 1	PH2SELL	46	0.2	Off	3000	276	276	0.2	$ 70.68	$ 429.20	$ 0.0	0.0	
126	Main Entrance	1	ST 70 W T	ST 70	9	0.0	Shutter	3750	675	1	E 13 SC 13 SND	SHSTSEL	9	0.0	Occupancy	3750	34	641	0.1	$ 164.35	$ 0.0	$ 0.0	0.0	
104	Main Hall	11	ST 70 W T	ST 70	79	0.9	Shutter	3750	7,751	11	E 13 SC 13 SND	SHSTSEL	79	0.9	Occupancy	3750	7,751	0	0.0	$ 0.00	$ 0.00	$ 0.0	0.0	
105	Main Hall	4	W 40 CP 2 SND	PH2S	92	0.4	Off	3000	1,104	4	W 20 CP 1	PH2SELL	46	0.2	Off	3000	552	552	0.2	$ 141.36	$ 429.20	$ 0.0	0.0	
106	Main Court	6	W 40 CP 2 SND	PH2S	92	0.4	Off	3000	1,656	6	W 20 CP 1	PH2SELL	46	0.2	Off	3000	828	828	0.3	$ 212.04	$ 643.80	$ 0.0	0.0	
9	Front Desk	2	T 8 W R P 2 SND	PH2S	144	0.6	Off	3000	864	2	T 8 W R P 2	PH2SELL	58	0.2	Off	3000	348	516	0.4	$ 132.10	$ 262.50	$ 0.0	0.0	
108	Finance	5	W 40 CP 2 SND	PH2S	92	0.5	Off	3000	1,380	5	W 20 CP 1	PH2SELL	46	0.2	Off	3000	690	690	0.3	$ 176.70	$ 536.50	$ 0.0	0.0	
109	Tax	3	W 40 CP 2 SND	PH2S	92	0.3	Off	3000	828	3	W 20 CP 1	PH2SELL	46	0.1	Off	3000	414	414	0.2	$ 106.02	$ 322.50	$ 0.0	0.0	
8	Data Room	3	T 8 W R P 2 SND	PH2S	72	0.3	Off	3000	648	3	T 8 W R P 2	PH2SELL	58	0.2	Off	3000	522	126	0.1	$ 32.27	$ 78.75	$ 0.0	0.0	
AA	Mechanical Room	1	1 Lite	HB2S	100	0.1	Off	3000	300	1	2T 40	PH2SELL	92	0.1	Off	3000	276	24	0.0	$ 6.14	$ 75.00	$ 0.0	0.0	
6	Corridor	4	T 8 W R P 2 SND	PH2S	144	0.6	Off	3000	1,728	4	T 8 W R P 2	PH2SELL	58	0.2	Off	3000	696	1,032	0.8	$ 264.20	$ 525.00	$ 0.0	0.0	
110	Police Hall	1	ST 70 W T	ST 70	9	0.0	Shutter	3750	169	1	E 13 SC 13 SND	SHSTSEL	9	0.0	Occupancy	3750	34	135	0.0	$ 34.54	$ 0.00	$ 0.0	0.0	
111	Police Hall	1	ST 70 W T	ST 70	79	0.1	Shutter	3750	296	1	E 13 SC 13 SND	SHSTSEL	9	0.0	Occupancy	3750	34	262	0.1	$ 67.03	$ 0.00	$ 0.0	0.0	
9	Police Hall	11	T 8 W R P 2 SND	PH2S	144	1.6	Off	3750	5,940	11	T 8 W R P 2	PH2SELL	58	0.6	Off	3750	2,393	3,548	1.0	$ 907.68	$ 1,443.75	$ 0.0	1.6	
112	Police Main	3	W 40 CP 2 SND	PH2S	92	0.3	Off	3750	1,035	3	W 20 CP 1	PH2SELL	46	0.1	Off	3750	431	604	0.2	$ 154.56	$ 402.50	$ 0.0	0.0	
113	Police Mail Area	3	W 40 CP 2 SND	PH2S	92	0.3	Off	3750	1,035	3	W 20 CP 1	PH2SELL	46	0.1	Off	3750	431	604	0.2	$ 154.56	$ 402.50	$ 0.0	0.0	
9	Police Main	3	T 8 W R P 2 SND	PH2S	144	0.5	Off	3750	1,620	3	T 8 W R P 2	PH2SELL	58	0.2	Off	3750	652	968	0.3	$ 247.68	$ 393.75	$ 0.0	0.0	
9	Chief Office	2	T 8 W R P 2 SND	PH2S	144	0.5	Off	3000	1,080	2	T 8 W R P 2	PH2SELL	58	0.2	Off	3000	348	732	0.3	$ 187.39	$ 262.50	$ 0.0	0.0	
9	Dispatch	3	T 8 W R P 2 SND	PH2S	144	0.5	Off	3000	1,620	3	T 8 W R P 2	PH2SELL	58	0.2	Off	3000	522	1,098	0.3	$ 281.08	$ 393.75	$ 0.0	0.0	
108	Police Store Room	1	W 40 CP 2 SND	PH2S	92	0.1	Off	3000	276	1	W 20 CP 1	PH2SELL	46	0.0	Off	3000	138	138	0.1	$ 35.34	$ 107.50	$ 0.0	0.0	
121	Cells	4	W 34 WP 2 SWD	PH2S	72	0.3	Off	3000	864	4	W 18 WP 1	PH2SELL	36	0.1	Off	3000	432	432	0.1	$ 110.59	$ 322.00	$ 0.0	0.0	
9	Cell	4	T 8 W R P 2 SND	PH2S	144	0.6	Off	3000	1,728	4	T 8 W R P 2	PH2SELL	58	0.2	Off	3000	696	1,032	0.4	$ 264.20	$ 525.00	$ 0.0	0.0	
9	Cell	6	T 8 W R P 2 SND	PH2S	144	0.9	Off	3000	2,592	6	T 8 W R P 2	PH2SELL	58	0.3	Off	3000	1,044	1,548	0.6	$ 396.30	$ 1,181.25	$ 0.0	0.0	
9	Cell	4	T 8 W R P 2 SND	PH2S	144	0.6	Off	3000	1,728	4	T 8 W R P 2	PH2SELL	58	0.2	Off	3000	696	1,032	0.4	$ 264.20	$ 525.00	$ 0.0	0.0	
9	Men's Room	1	T 8 W R P 2 SND	PH2S	144	0.1	Off	3000	432	1	T 8 W R P 2	PH2SELL	58	0.1	Off	3000	174	258	0.1	$ 66.05	$ 196.88	$ 0.0	0.0	
10	Store Closet	1	1 Lite	HB2S	100	0.1	Off	3000	300	1	2T 40	PH2SELL	92	0.1	Off	3000	276	24	0.0	$ 6.14	$ 75.00	$ 0.0	0.0	
9	Women's Bathroom	1	T 8 W R P 2 SND	PH2S	144	0.1	Off	3000	432	1	T 8 W R P 2	PH2SELL	58	0.1	Off	3000	174	258	0.1	$ 66.05	$ 196.88	$ 0.0	0.0	
9	Court Admin	3	T 8 W R P 2 SND	PH2S	144	0.5	Off	3000	1,620	3	T 8 W R P 2	PH2SELL	58	0.2	Off	3000	522	1,098	0.3	$ 281.08	$ 393.75	$ 0.0	0.0	
9	Judge's Chamber	2	T 8 W R P 2 SND	PH2S	144	0.3	Off	3000	1,080	2	T 8 W R P 2	PH2SELL	58	0.1	Off	3000	348	732	0.2	$ 187.39	$ 262.50	$ 0.0	0.0	
10	Attic Area Main	1	1 Lite	HB2S	100	0.1	Off	3000	300	1	2T 40	PH2SELL	92	0.1	Off	3000	276	24	0.0	$ 6.14	$ 75.00	$ 0.0	0.0	
10	Attic Area Rear	1	1 Lite	HB2S	100	0.1	Off	3000	300	1	2T 40	PH2SELL	92	0.1	Off	3000	276	24	0.0	$ 6.14	$ 75.00	$ 0.0	0.0	
116	Outdoor Lighting	4	MH1 200	MH2S	236	0.9	Timed	4380	4,132	4	MH1 200	STDSELL	236	0.9	Timed	4,380	4,132	0	0.0	$ 0.00	$ 0.00	$ 0.0	0.0	
10	Outdoor Lighting Under Overhang	2	1 Lite	HB2S	100	0.2	Off	3000	600	2	2T 40	STDSELL	92	0.2	Off	3000	552	48	0.0	$ 12.27	$ 150.00	$ 0.0	0.0	
10	Outdoor Lighting Side of building	4	1 Lite	HB2S	100	0.4	Off	3000	1,200	4	2T 40	STDSELL	92	0.4	Off	3000	1,104	96	0.0	$ 24.54	$ 300.00	$ 0.0	0.0	
109	Flag Pole Light	1	ST 70 CP T	HB2S	92	0.1	Timed	4380	403	1	2T 40	STDSELL	92	0.1	Timed	4,380	403	0	0.0	$ 0.00	$ 0.00	$ 0.0	0.0	
	Total	97				11.6			55,980	97			2,231	4			18,110	7,780	4.6	$ 1,769	$ 9,425	$ 0.0		
																	Demand Savings			4.6	27%			
																	kWh Savings			7,780	28%			
																	Total savings				$1,769		5.3	5.3

APPENDIX C

ECM-2 Install Occupancy Sensors

Energy Audit of Springfield Township
CHA Project No. - Municipal Building
ECM-2 Install Occupancy Sensors

Cost of Electricity: $0.104 /kWh
$10.00 /kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS							COST & SAVINGS ANALYSIS						
Area Code	Area Description	No. of Fixtures	Standard Fixture Code	HYDROMIL Fixture Code	Watts per Fixture	kW/Fixture	Solar Observe	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Fixture	Remote Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	ALL Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
100	Main Entrance	4	W4CCP13WHG	P4250	56	0.4	Dirt	3500	784.0	4	W4CCP13WHG	P4250	56	0.4	None	3500	784.0	0.0	0.0	$0.00	$0.00	$0.00		
116	Main Entrance	1	S1T8R1	S1T8R1	4	0.0	Shelter	3750	15.0	1	S1T8R1	S1T8R1	4	0.0	None	3750	15.0	0.0	0.0	$0.00	$0.00	$0.00		
104	Main Hall	1	S1T8R1E	S1T8R1	22	0.0	Shelter	3750	82.5	1	S1T8R1E	S1T8R1	22	0.0	None	3750	82.5	0.0	0.0	$0.00	$0.00	$0.00		
100	Main Hall	3	W4CCP13WHG	P4250	56	0.2	Dirt	3500	705.0	3	W4CCP13WHG	P4250	56	0.2	None	3500	705.0	0.0	0.0	$0.00	$0.00	$0.00		
100	Main Hall	2	W4CCP13WHG	P4250	56	0.1	Dirt	3500	392.0	2	W4CCP13WHG	P4250	56	0.1	None	3500	392.0	0.0	0.0	$0.00	$0.00	$0.00		
8	Chair Desk	2	T8R1P13WHG	P4250	144	0.3	Dirt	3500	576.0	2	T8R1P13WHG	P4250	144	0.3	None	3500	576.0	0.0	0.0	$0.00	$0.00	$0.00		
100	Printers	1	W4CCP13WHG	P4250	56	0.1	Dirt	3500	196.0	1	W4CCP13WHG	P4250	56	0.1	None	3500	196.0	0.0	0.0	$0.00	$0.00	$0.00		
100	File	3	W4CCP13WHG	P4250	56	0.2	Dirt	3500	588.0	3	W4CCP13WHG	P4250	56	0.2	None	3500	588.0	0.0	0.0	$0.00	$0.00	$0.00		
2	Copy Room	3	T8R1P13WHG	P4250	56	0.2	Dirt	3500	588.0	3	T8R1P13WHG	P4250	56	0.2	None	3500	588.0	0.0	0.0	$0.00	$0.00	$0.00		
10	Restaurant Room	4	LV8	LV8	144	0.6	Dirt	3500	2016.0	4	LV8	LV8	144	0.6	None	3500	2016.0	0.0	0.0	$0.00	$0.00	$0.00		
8	Corridor	4	T8R1P13WHG	P4250	144	0.6	Dirt	3500	2016.0	4	T8R1P13WHG	P4250	144	0.6	None	3500	2016.0	0.0	0.0	$0.00	$0.00	$0.00		
116	Welcome	1	S1T8R1	S1T8R1	4	0.0	Shelter	3750	15.0	1	S1T8R1	S1T8R1	4	0.0	None	3750	15.0	0.0	0.0	$0.00	$0.00	$0.00		
104	Welcome	1	S1T8R1E	S1T8R1	22	0.0	Shelter	3750	82.5	1	S1T8R1E	S1T8R1	22	0.0	None	3750	82.5	0.0	0.0	$0.00	$0.00	$0.00		
8	Police Hall	11	T8R1P13WHG	P4250	144	0.6	Dirt	3750	1,620.0	11	T8R1P13WHG	P4250	144	0.6	None	3750	1,620.0	0.0	0.0	$0.00	$0.00	$0.00		
100	Police Main Area	1	W4CCP13WHG	P4250	56	0.1	Dirt	3750	210.0	1	W4CCP13WHG	P4250	56	0.1	None	3750	210.0	0.0	0.0	$0.00	$0.00	$0.00		
8	Prosecutor	2	T8R1P13WHG	P4250	144	0.3	Dirt	3750	810.0	2	T8R1P13WHG	P4250	144	0.3	None	3750	810.0	0.0	0.0	$0.00	$0.00	$0.00		
8	Chief Office	1	T8R1P13WHG	P4250	144	0.1	Dirt	3750	405.0	1	T8R1P13WHG	P4250	144	0.1	None	3750	405.0	0.0	0.0	$0.00	$0.00	$0.00		
8	Dispatch	1	T8R1P13WHG	P4250	144	0.1	Dirt	3750	405.0	1	T8R1P13WHG	P4250	144	0.1	None	3750	405.0	0.0	0.0	$0.00	$0.00	$0.00		
100	Police Side Room	1	W4CCP13WHG	P4250	56	0.1	Dirt	3500	196.0	1	W4CCP13WHG	P4250	56	0.1	None	3500	196.0	0.0	0.0	$0.00	$0.00	$0.00		
101	Cells	3	W3HBP13WHG	P4250	72	0.2	Dirt	3750	810.0	3	W3HBP13WHG	P4250	72	0.2	None	3750	810.0	0.0	0.0	$0.00	$0.00	$0.00		
8	Cells	4	T8R1P13WHG	P4250	144	0.6	Dirt	3750	2160.0	4	T8R1P13WHG	P4250	144	0.6	None	3750	2160.0	0.0	0.0	$0.00	$0.00	$0.00		
8	Cells	5	T8R1P13WHG	P4250	144	0.7	Dirt	3750	2700.0	5	T8R1P13WHG	P4250	144	0.7	None	3750	2700.0	0.0	0.0	$0.00	$0.00	$0.00		
8	Cells	6	T8R1P13WHG	P4250	144	0.8	Dirt	3750	3240.0	6	T8R1P13WHG	P4250	144	0.8	None	3750	3240.0	0.0	0.0	$0.00	$0.00	$0.00		
6	Men's Room	11	T8R1P13WHG	P4250	144	0.7	Dirt	1500	1188.0	11	T8R1P13WHG	P4250	144	0.7	None	1500	1188.0	0.0	0.0	$0.00	$0.00	$0.00		
50	Shop Chain	1	LV8	LV8	144	0.1	Dirt	1500	108.0	1	LV8	LV8	144	0.1	None	1500	108.0	0.0	0.0	$0.00	$0.00	$0.00		
8	Women's Bathroom	11	T8R1P13WHG	P4250	144	0.7	Dirt	1500	1188.0	11	T8R1P13WHG	P4250	144	0.7	None	1500	1188.0	0.0	0.0	$0.00	$0.00	$0.00		
8	Court Admin	8	T8R1P13WHG	P4250	144	0.5	Dirt	3500	1,512.0	8	T8R1P13WHG	P4250	144	0.5	None	3500	1,512.0	0.0	0.0	$0.00	$0.00	$0.00		
4	Judge's Chamber	2	T8R1P13WHG	P4250	144	0.3	Dirt	1500	432.0	2	T8R1P13WHG	P4250	144	0.3	None	1500	432.0	0.0	0.0	$0.00	$0.00	$0.00		
50	Attic Area Main	1	LV8	LV8	144	0.1	Dirt	500	72.0	1	LV8	LV8	144	0.1	None	500	72.0	0.0	0.0	$0.00	$0.00	$0.00		
50	Attic Add Area	1	LV8	LV8	144	0.1	Dirt	500	72.0	1	LV8	LV8	144	0.1	None	500	72.0	0.0	0.0	$0.00	$0.00	$0.00		
107	Outdoor Lighting	6	MH400	MH400	458	0.5	Timer	4380	12,056.4	6	MH400	MH400	458	0.5	None	4380	12,056.4	0.0	0.0	$0.00	$0.00	$0.00		
50	Outdoor Lighting Under Overhang	1	LV8	LV8	72	0.1	Dirt	4380	315.4	1	LV8	LV8	72	0.1	None	4380	315.4	0.0	0.0	$0.00	$0.00	$0.00		
50	Outdoor Lighting Side of Building	4	LV8	LV8	144	0.6	Dirt	4380	2523.4	4	LV8	LV8	144	0.6	None	4380	2523.4	0.0	0.0	$0.00	$0.00	$0.00		
220	Flag Floodlight	1	R150CO1	LV8	72	0.1	Timer	4380	315.4	1	R150CO1	LV8	72	0.1	None	4380	315.4	0.0	0.0	$0.00	$0.00	$0.00		
Total		97				11.0			38,886	97				10.1			36,372	2514	0	$261	$2,514	$0		
																	Demand Savings		11.0		kW			
																	kWh Savings		2514		kWh			
																	Total Savings				$261		9.6	9.6

APPENDIX D

ECM-3 Lighting Replacements And Occupancy Sensors

Energy Audit of Springfield Township
CHA Project No. - Municipal Building
ECM-1 Lighting Replacements with Occupancy Sensors

Cost of Electricity: $0.101 /kWh
$15.00 /kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Installed Fixture Code*	HYBRIMA Fixture Code*	Watts per Fixture	kW/Fixture	Ctrl/Sc Controls	Annual Hours	Annual kWH	Number of Fixtures	Selected Fixture Code	Fixture Code	Watts per Fixture	kW/Fixture	Ctrl/Sc Controls	Annual Hours	Annual kWH	Annual kWH Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	N.J. Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique Description of the Exterior Room Number/Room Name/ Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example: 2T-42-R-P-EC = 2 Tube T42 Recessed Parabolic Fixture with Occupancy Sensor	Code from "Table of Standard Fixture Wattages"	Watts per Fixture (W/FIX)	kW/Fixture (W/FIX)	Fixture control device	Estimated operating hours for the usage group	kW-hours/ Annual Hours	No. of fixtures after the retrofit	"Lighting Fixture Code" Example: 2T-42-R-P-EC = 2 Tube T42 Recessed Parabolic Fixture with Occupancy Sensor	Code from "Table of Standard Fixture Wattages"	Watts per Fixture	kW/Fixture	Number of Controls	Annual Hours	kW-hours/ Annual Hours	(Original Annual kWH - Retrofit Annual kWH)	(Original Annual kW - Retrofit Annual kW)	(kWH Saved)	Cost for miscellaneous lighting system	Prescriptive Lighting Rebates	Length of time for incentive cost to be recovered	Length of time for retrofit cost to be recovered
1700	Main Entrance	4	W-4-CF-P-EMG	FW26	34	0.0	Dim	3570	121	4	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	121	0	0	$ -	$ 400.00	$ -	3.3	3.3
1710	Main Entrance	1	2LT-R-P-EMG	2LT42	42	0.0	Shower	3570	150	1	2LT-R-P-EC	2LT42EL	42	0.0	None	3,570	150	29	0	$ 2.94	$ 100.00	$ -	34.0	34.0
1704	Main Hall	3	2LT-R-P-EMG	2LT42	42	0.0	Shower	3570	150	3	2LT-R-P-EC	2LT42EL	42	0.0	None	3,570	150	29	0	$ 2.94	$ 300.00	$ -	10.2	10.2
1705	Main Hall	4	W-4-CF-P-EMG	FW26	34	0.0	Dim	3570	121	4	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	121	0	0	$ -	$ 400.00	$ -	3.3	3.3
1706	Main Court	6	W-4-CF-P-EMG	FW26	34	0.0	Dim	3570	242	6	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	242	0	0	$ -	$ 600.00	$ -	3.3	3.3
5	Chief Clerk	1	2LT-R-P-EMG	2LT42	42	0.0	Dim	3570	150	1	2LT-R-P-EC	2LT42EL	42	0.0	None	3,570	150	29	0	$ 2.94	$ 100.00	$ 40	30.6	30.6
1708	Finance	3	W-4-CF-P-EMG	FW26	34	0.0	Dim	3570	364	3	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	364	0	0	$ -	$ 900.00	$ -	3.3	3.3
1709	Tax	3	W-4-CF-P-EMG	FW26	34	0.0	Dim	3570	364	3	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	364	0	0	$ -	$ 900.00	$ -	3.3	3.3
2	Data Room	2	2LT-R-P-EMG	2LT42	42	0.0	Dim	3570	300	2	2LT-R-P-EC	2LT42EL	42	0.0	None	3,570	300	58	0	$ 5.88	$ 200.00	$ 80	17.0	17.0
30	Maintenance Room	1	1LT-R	1LT32	32	0.0	Dim	3570	114	1	CF-26	CF26EL	26	0.0	None	3,570	93	21	0	$ 2.10	$ 75.00	$ -	35.7	35.7
9	Conference	4	2LT-R-P-EMG	FW26	34	0.0	Dim	3570	485	4	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	485	0	0	$ -	$ 1,200.00	$ -	3.3	3.3
116	Police Hall	1	2LT-R-P-EMG	2LT42	42	0.0	Shower	3570	150	1	2LT-R-P-EC	2LT42EL	42	0.0	None	3,570	150	29	0	$ 2.94	$ 100.00	$ -	34.0	34.0
104	Police Hall	1	2LT-R-P-EMG	2LT42	42	0.0	Shower	3570	150	1	2LT-R-P-EC	2LT42EL	42	0.0	None	3,570	150	29	0	$ 2.94	$ 100.00	$ -	34.0	34.0
6	Police Hall	1	2LT-R-P-EMG	FW26	34	0.0	Dim	3570	121	1	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	121	0	0	$ -	$ 300.00	$ -	3.3	3.3
106	Police Main	3	W-4-CF-P-EMG	FW26	34	0.0	Dim	3570	364	3	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	364	0	0	$ -	$ 900.00	$ -	3.3	3.3
108	Police Main Area	3	W-4-CF-P-EMG	FW26	34	0.0	Dim	3570	1,047	3	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	364	0	0	$ -	$ 900.00	$ -	3.3	3.3
4	Police Main	7	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	1,050	7	2LT-R-P-EC	FW26EL	42	0.0	None	3,570	1,050	203	0	$ 20.58	$ 700.00	$ 280	3.3	3.3
8	Chief Office	1	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	175	1	2LT-R-P-EC	FW26EL	42	0.0	None	3,570	150	29	0	$ 2.94	$ 100.00	$ 40	30.6	30.6
3	Dispatch	1	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	175	1	2LT-R-P-EC	FW26EL	42	0.0	None	3,570	150	29	0	$ 2.94	$ 100.00	$ 40	30.6	30.6
180	Police Store Room	1	W-4-CF-P-EMG	FW26	34	0.0	Dim	3570	121	1	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	121	0	0	$ -	$ 300.00	$ -	3.3	3.3
171	Cells	4	W-2-CF-P-EMG	FW26	34	0.0	Dim	3570	485	4	W-2-CF-P-EC	FW26EL	34	0.0	None	3,570	485	0	0	$ -	$ 1,200.00	$ -	3.3	3.3
8	Desk	4	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	597	4	2LT-R-P-EC	FW26EL	42	0.0	None	3,570	597	116	0	$ 11.76	$ 400.00	$ 160	11.9	11.9
9	Desk	6	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	896	6	2LT-R-P-EC	FW26EL	42	0.0	None	3,570	896	174	0	$ 17.64	$ 600.00	$ 240	11.9	11.9
10	Desk	6	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	896	6	2LT-R-P-EC	FW26EL	42	0.0	None	3,570	896	174	0	$ 17.64	$ 600.00	$ 240	11.9	11.9
4	Mens Room	1	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	150	1	2LT-R-P-EC	FW26EL	42	0.0	None	3,570	150	29	0	$ 2.94	$ 100.00	$ 40	30.6	30.6
60	Boss Office	1	1LT-R	1LT32	32	0.0	Dim	3570	114	1	CF-26	CF26EL	26	0.0	None	3,570	93	21	0	$ 2.10	$ 75.00	$ -	35.7	35.7
3	Women's Bathroom	1	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	150	1	2LT-R-P-EC	FW26EL	42	0.0	None	3,570	150	29	0	$ 2.94	$ 100.00	$ 40	30.6	30.6
5	Court Admin	4	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	1,021	4	2LT-R-P-EC	FW26EL	42	0.0	None	3,570	1,021	174	0	$ 17.64	$ 600.00	$ 160	11.9	11.9
4	Judges Chamber	2	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	300	2	2LT-R-P-EC	FW26EL	42	0.0	None	3,570	300	58	0	$ 5.88	$ 200.00	$ 80	17.0	17.0
90	Attic Area Main	1	1LT-R	1LT32	32	0.0	Dim	3570	457	1	CF-26	CF26EL	26	0.0	None	3,570	93	21	0	$ 2.10	$ 75.00	$ -	35.7	35.7
90	Attic NW Area	1	1LT-R	1LT32	32	0.0	Dim	3570	457	1	CF-26	CF26EL	26	0.0	None	3,570	93	21	0	$ 2.10	$ 75.00	$ -	35.7	35.7
147	Outdoor Lighting	8	MH150P	MH150P	175	0.2	Timers	4345	6,100	8	MH-150	MH150P	200	0.2	None	4,345	7,000	0	0	$ -	$ -	$ -	0.0	0.0
90	Outdoor Lighting under Overhang	3	1 PL	PL	75	0.1	Dim	3570	263	3	CF-26	CF26EL	26	0.0	None	3,570	263	0	0	$ -	$ 75.00	$ -	0.0	0.0
90	Outdoor Lighting Side of building	4	1 PL	PL	75	0.1	Dim	3570	350	4	CF-26	CF26EL	26	0.0	None	3,570	350	0	0	$ -	$ 100.00	$ -	0.0	0.0
230	Flag Pole Light	1	2LT-R-P-EMG	FW26	42	0.0	Dim	3570	150	1	CF-26	CF26EL	26	0.0	None	3,570	93	57	0	$ 5.88	$ 75.00	$ -	12.8	12.8
Totals		90			1,116			32,000	10,000	87			1,116	0.0		32,000	10,000	1,000	0.0	$ 101.00	$ 10,000	$ 940		
																		Demand Savings		4.4	1,870	$ 18,700			
																		kWh Savings			10,000	$ 1,000			
																		Total Savings				$ 19,700		8.9	8.9

APPENDIX E

ECM-4 Install Door Seals

NJBPU Energy Audit Program
CHA Project No. 29012
Building: Springfield Municipal Building

ECM – 4 **Install Door Seals**

Existing: Some or Door Seals need & excessive heat loss and infiltration
Proposed: Install new doors and/or weather-stripping to eliminate door infiltration

Building Footprint	[redacted] ft²	Occupied Htg Temp	[redacted] °F	Occupied Htg Temp	[redacted] °F
Heating System Efficiency	[redacted]	Unoccupied Htg Temp	[redacted] °F	Unoccupied Htg Temp	[redacted] °F
Cooling System Efficiency	[redacted] kW/ton	Prop Occupied Htg Temp	[redacted] °F	Prop Occupied Htg Temp	[redacted] °F
Interior Qpeo	[redacted] Btu/h	Prop Unoccupied Htg Temp	[redacted] °F	Prop Unoccupied Htg Temp	[redacted] °F
Unocc Interior Qpeo Spec	[redacted]	Occupied Cooling Lift	[redacted] Btu/hr/ft²	Occupied Heating Lift	[redacted] Btu/hr/ft²
Ave Occ Internal Gain Enrtn	[redacted]	Unoccupied Cooling Lift	[redacted] Btu/hr/ft²	Unoccupied Heating Lift	[redacted] Btu/hr/ft²
		Cooling Occ Enthalpy Set point	[redacted] Btu/lb		
		Cooling Unocc Enthalpy Set point	[redacted] Btu/lb		

					EXISTING LOADS						PROPOSED LOADS									
					Occupied			Unoccupied			Occupied			Unoccupied						
Avg Outdoor Air Temp. Bins (°F	Avg Outdoor Air Enthalpy	Existing Equipment Op Hours	Occupied Equipment Op Hours	Unoccupied Equipment Op Hours	Envelope Load (BTUH	Ventilation Load (BTUH	Internal Gain (BTUH	Unoccupied Envelope Load (BTUH	Ventilation Load (BTUH	Internal Gain (BTUH	Envelope Load (BTUH	Ventilation Load (BTUH	Internal Gain (BTUH	Unoccupied Envelope Load (BTUH	Ventilation Load (BTUH	Internal Gain (BTUH	Existing Cooling Energy (kWh	Proposed Cooling Energy (kWh	Existing Heating Energy (therms	Proposed Heating Energy (therms
A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	K	L	M	N
102.5	49.1	0	0	0	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
92.5	42.9	0	0	0	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
82.5	38.6	16	12	12	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
72.5	36.4	132	47	24	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	773	703	0	0
62.5	24.6	105	179	221	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2,329	3,179	0	0
77.5	31.6	505	221	259	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	1,845	1,570	0	0
72.5	30.2	484	231	327	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	659	681	0	0
67.5	27.5	654	305	546	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	911	932	0	0
62.5	24.6	567	291	588	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	555	565	0	0
57.5	21.4	505	314	588	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	194	165	0	0
52.5	18.7	419	278	546	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	148	142
47.5	16.2	311	210	483	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	231	214
42.5	14.4	606	229	903	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	310	286
37.5	12.6	1,023	366	903	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	613	561
32.5	10.7	734	260	615	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	527	514
27.5	8.8	294	119	210	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	219	210
22.5	6.8	182	98	140	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	231	232
17.5	5.0	133	46	63	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	54	151
12.5	4.1	91	17	63	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	98	95
7.5	3.0	42	6	14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	28	28
2.5	1.2	17	6	9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	14	14
-2.5	0.3	0	0	0	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
-7.5	0.0	0	0	0	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
TOTALS		8,790	3,726	4,835													7,916	7,480	1,396	1,512

Existing Building Ventilation & Infiltration	[redacted] cfm	Savings	86 therms
Existing Unocc. Building Ventilation & Infiltration	[redacted] cfm		12 kWh
Door Infiltration	[redacted] cfm		
Proposed reduction (50%)	[redacted] cfm		
Proposed Building Ventilation & Infiltration	[redacted] cfm		
Proposed Unocc. Building Ventilation & Infiltration	[redacted] cfm		

NJBPU Energy Audit Program

CHA Project No. 20812

Building: Springfield Municipal Building

ECM - 4 Install Door Seals

Multipliers:	
	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
Door Seals (3'x7')	6	ea	$ 35	$ 50	$ -	$ 206	$ 363	$ -	$ 569	
Door Seals (double door - 6' x 7')	0	ea	$ 65	$ 100	$ -	$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 569	Subtotal
$ 57	10% Contingency
$ 63	Contractor 10% O&P
$ -	0% Engineering
$ 688	**Total**

APPENDIX F

ECM-5 Replace Windows

NJBPU Energy Audit Program
CHA Project No. 20812
Building: Springfield Municipal Building

ECM - 3 Replace Windows

Description [illegible]

Given

Occupied Cooling Hours per Week	[illegible]	Hours	
Occupied Heating Hours per Week	[illegible]	Hours	
Heating Energy Cost	[illegible]	$/therm	
Cooling Cost	[illegible]	$/kWh	
Occupied Cooling Setpoint Temperature	[illegible]	Degrees F	(Assumption)
Occupied Cooling Avg Space Air Enthalpy	[illegible]	Btu/lb Air	(Assumption)
Occupied Heating Setpoint Temperature	[illegible]	Degrees F	Occupied (Assumption)
Unoccupied Heating Setpoint Temperature	[illegible]	Degrees F	Unoccupied (Assumption)
Window Area	[illegible]	SqFt	(From window survey)
Window Perimeter	[illegible]	ft	(From window survey)
Proposed U-factor	[illegible]	Btu/(hr*sqft*degF)	(From window vendor)
Proposed Air Infiltration	[illegible]	cfm/ft	(From window vendor)
Cooling Conversion	[illegible]	Btu/ton	
Heating Btu Conversion	[illegible]	Btu/MMBtu	

Assumptions

Existing U-factor	[illegible]	Btu/(hr*sqft*degF)	(From ASHRAE Fundamentals)
Existing Air Infiltration	[illegible]	cfm/ft	(From ASHRAE Fundamentals)
Heating System Efficiency	[illegible]		
Cooling System Efficiency	[illegible]	kW/ton	

Formulas

Cooling Energy Conduction = (Existing U) x Area x (OA Temp - RA Temp) x Op Hours
Heating Energy Conduction = (Existing U) x Area x (RA Temp - OA Temp) x Op Hours
Cooling Energy Infiltration = 4.5 x Leakage x Perimeter x (OA Enthalpy - RA Enthalpy) x Op Hours
Heating Energy Infiltration = 1.08 x Leakage x Perimeter x (RA temp - OA temp) x Op Hours
Load = (Conduction + Infiltration)
Cooling Energy = (Cooling Load) / 12,000 Btu/Ton x kw/Ton
Heating Energy = (Heating Load) / (1,000,000 BtuMMBtu / Boiler Efficiency)
Energy Cost = (Energy) x (Cost/Unit)

Existing

Operation	OA Enthalpy	OA Temp	Total Hours	Cooling Occupied Hours	Heating Occupied Hours	Heating Unoccupied Hours	Cooling Occupied Conduction	Heating Occupied Conduction	Heating Unoccupied Conduction	Cooling Occupied Infiltration	Heating Occupied Infiltration	Heating Unoccupied Infiltration
Cooling	38.5	92.5	37	13.2	0.0	0.0	33,041	0	0	70,880	0	0
Cooling	35.4	87.5	131	46.8	0.0	0.0	87,004	0	0	156,305	0	0
Cooling	33.5	82.5	500	178.6	0.0	0.0	217,567	0	0	429,750	0	0
Cooling	31.6	77.5	620	221.4	0.0	0.0	127,756	0	0	406,329	0	0
Heating	30.3	72.5	864	0.0	257.1	426.9	0	49,629	82,117	0	25,985	46,227
Heating	27.9	67.5	864	0.0	308.6	[illegible]	0	204,260	427,680	0	142,130	297,528
Heating	24.6	62.5	827	0.0	231.7	595.3	0	489,060	878,920	0	274,861	494,786
Heating	21.4	57.5	900	0.0	314.3	585.7	0	433,480	818,220	0	258,271	468,468
Heating	18.7	52.5	849	0.0	312.9	536.1	0	600,714	1,081,090	0	339,139	608,796
Heating	16.3	47.5	811	0.0	273.0	538.6	0	741,928	1,334,561	0	417,498	751,496
Heating	14.2	42.5	898	0.0	334.3	461.7	0	846,480	1,703,670	0	533,821	958,578
Heating	12.1	37.5	1,022	0.0	363.4	657.6	0	1,170,260	2,076,590	0	662,799	1,703,608
Heating	10.4	32.5	734	0.0	262.1	471.9	0	1,095,222	2,011,461	0	785,451	1,413,786
Heating	8.7	27.5	334	0.0	119.3	214.7	0	771,250	1,280,470	0	400,467	720,846
Heating	7	22.5	252	0.0	90.0	162.0	0	564,409	1,048,560	0	334,628	602,348
Heating	5.4	17.5	135	0.0	44.6	80.4	0	325,490	585,276	0	182,107	327,793
Heating	3.8	12.5	47	0.0	16.8	30.2	0	132,395	238,311	0	74,532	134,157
Heating	2.3	7.5	22	0.0	7.9	14.1	0	47,011	130,610	0	37,323	67,860
Heating	1.2	2.5	13	0.0	4.6	8.4	0	40,574	73,024	0	22,867	40,141
Heating	-0.2	-2.5	0	0.0	0.0	0.0	0	0	0	0	0	0
Heating	-1.4	-7.5	0	0.0	0.0	0.0	0	0	0	0	0	0
Subtotal =			8,760	460	2,880	5,420	465,418	6,997,233	12,513,033 Btu	1,043,356	4,788,150	6,608,420 Btu

Cooling Load =	Conduction ([illegible]) + Infiltration ([illegible]) =	[illegible] Btu
Cooling Energy =	Cooling Load ([illegible]) / 12000 x [illegible] =	[illegible]
Cooling Energy Cost =	Cooling Energy ([illegible]) x Cooling Cost ([illegible]) =	$ [illegible]
Heating Load =	Conduction ([illegible]) + Infiltration ([illegible]) =	[illegible] Btu
Heating Energy =	Heating Load ([illegible]) / Heat Content ([illegible]) =	[illegible] therms
Heating Energy Cost =	Heating Energy ([illegible]) x Heating Cost ([illegible]) =	$ [illegible]

MJSPU Energy Audit Program
CHA Project No. 20012
Building: Springfield Municipal Building

Operation	DB Design	DB Temp	Total Hours	Cooling Occupied Hours	Heating Occupied Hours	Heating Unoccupied Hours	Cooling Occupied Consumption	Heating Occupied Consumption	Heating Unoccupied Consumption	Cooling Occupied Emissions	Heating Occupied Emissions	Heating Unoccupied Emissions
Cooling	68.0	80.0	37	12.0	0.0	0.0	16,290	0	0	(9,816)	0	0
Cooling	76.0	87.0	151	48.8	0.0	0.0	48,339	0	0	(68,277)	0	0
Cooling	82.0	92.0	309	108.6	0.0	0.0	225,871	0	0	(340,371)	0	0
Cooling	91.0	73.0	309	201.0	0.0	0.0	75,356	0	0	(52,139)	0	0
Heating	60.0	70.0	964	0.0	337.7	426.8	0	25,249	49,420	0	14,670	28,444
Heating	51.0	47.0	764	0.0	268.0	340.0	0	147,953	354,200	0	91,780	147,222
Heating	34.8	40.0	807	0.0	281.1	356.8	0	271,370	488,286	0	157,870	282,756
Heating	31.9	57.0	466	0.0	214.2	286.7	0	357,800	462,450	0	145,869	262,584
Heating	48.7	62.0	910	0.0	317.8	390.1	0	324,736	606,714	0	192,246	347,802
Heating	46.2	43.0	911	0.0	318.5	392.0	0	412,916	745,629	0	238,570	429,424
Heating	44.2	42.0	908	0.0	294.0	421.7	0	525,925	946,666	0	304,468	548,043
Heating	52.4	57.0	1,023	0.0	285.4	357.9	0	962,167	1,745,700	0	552,771	996,300
Heating	65.4	82.0	734	0.0	252.7	471.9	0	776,124	1,396,023	0	448,824	801,070
Heating	67	27.0	324	0.0	119.0	214.7	0	556,269	777,375	0	329,834	441,906
Heating	7	22.0	362	0.0	90.0	162.5	0	330,244	594,439	0	191,200	344,156
Heating	0.4	17.0	105	0.0	44.6	80.4	0	178,716	325,400	0	104,091	187,310
Heating	0.8	12.0	47	0.0	18.0	32.2	0	73,500	132,336	0	42,588	76,664
Heating	0.0	7.0	22	0.0	7.0	14.1	0	37,229	67,011	0	21,559	38,804
Heating	1.2	2.0	13	0.0	4.6	8.4	0	23,802	42,574	0	13,836	24,902
Heating	0.2	2.0	9	0.0	0.0	0.0	0	0	0	0	0	0
Heating	1.4	1.0	9	0.0	0.0	0.0	0	0	0	0	0	0
Subtotal =			8,760	468	2,809	4,982	352,921	4,750,540	8,587,236 kBtu	398,708	2,734,042	4,895,356 kBtu

Cooling Load =	Consumption: 352921 (kBtu)	Emissions: 398708 (kBtu)	854,667 kBtu
Cooling Energy =	Cooling Load: 854667 (kBtu)	12000 (kBtu/ton)	71.22 tons
Cooling Energy Cost =	Cooling Energy: 59.42 (tons)	Cooling Cost: $0.15 ($/kBtu)	$ 71.46
Heating Load =	Consumption: 4750540 (kBtu)	Emissions: 2734042 (kBtu)	10,484,277 kBtu
Heating Energy =	Heating Load: 10484277 (kBtu)	Heat Content: 75% (%)	279 therms
Heating Energy Cost =	Heating Energy: 2795.81 (ccf)	Heating Cost: $1.247 ($/ccf)	$ 348

Summary

EXISTING COOLING ENERGY	119.68	kWh	$ 30.72
EXISTING HEATING ENERGY	696.40	therms	$ 870.50
EXISTING ENERGY COST			$ 901.22

PROPOSED COOLING ENERGY	85.22	kWh	$ 71.46
PROPOSED HEATING ENERGY	279.01	therms	$ 348.66
PROPOSED ENERGY COST			$ 421.12

COOLING ENERGY SAVINGS	34.13	kWh	$ 8.77	19.2% of existing
COOLING ENERGY SAVINGS	0.00	kWh	$ 0.00	
HEATING ENERGY SAVINGS	517.76	therms	$ 370.19	43.0% of existing
ENERGY COST SAVINGS			$ 479.96	53.3% of existing

NJBPU Energy Audit Program
CHA Project No. 20812
Springfield Municipal Building

ECM - 5 Replace Windows

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.		
Replace Existing 3' x 4' Window Units	9	ea.	$ 375	$ 100	$ -	$ 3,308	$ 1,089	$ -	$ 4,397	
Replace Existing 3' x 1.5' Window Units	5	ea.	$ 305	$ 100	$ -	$ 1,495	$ 605	$ -	$ 2,100	
Replace Existing 2' x 3' Window Units	2	ea.	$ 305	$ 100	$ -	$ 598	$ 242	$ -	$ 840	
Remove Existing Window Unit	16	ea.	$ -	$ 50	$ -	$ -	$ 968	$ -	$ 968	
Trimwork/finishing	16	ea.	$ 50	$ 50	$ -	$ 784	$ 968	$ -	$ 1,752	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 10,056	Subtotal
$ 1,508	15% Contingency
$ 1,735	Contractor 15% O&P
$ -	0% Engineering
$ 13,299	**Total**

APPENDIX G

ECM-6 Night Setback Controls

NJBPU Energy Audit Program
CNA Project No. 33612
Building: Springfield Municipal Building

ECM - 3 Night Setback Controls

Building Footprint:	[redacted] SF	Ex Occupied Clng Temp:	[redacted] °F	Ex Occupied Htg Temp:	[redacted] °F	Heating Energy Savings:	[redacted] therms
Heating Efficiency:	[redacted]	Ex Unoccupied Clng Temp:	[redacted] °F	Ex Unoccupied Htg Temp:	[redacted] °F	Cooling Energy Savings:	[redacted] kWh
Cooling Efficiency:	[redacted] kW/ton	Prop Occupied Clng Temp:	[redacted] °F	Prop Occupied Htg Temp:	[redacted] °F		
		Prop Unoccupied Clng Temp:	[redacted]	Prop Unoccupied Htg Temp:	[redacted]		
Building Balance Temp:	[redacted] °F	Prop Unocc Neg. Clng Temp:	[redacted] °F	Prop Unoccupied Htg Temp:	[redacted] °F	Building Footprint:	[redacted] sf
Internal Gains:	[redacted] btu/sf	Occupied Cooling CR:	[redacted] cfm/ft²	Occupied Heating CR:	[redacted] cfm/ft²	Prime Station 24/7:	[redacted] sf
Lmp. Internal Gain sector:	0.04	Unoccupied Cooling CR:	[redacted] cfm/ft²	Unoccupied Heating CR:	[redacted] cfm/ft²	Remaining in Night Setback:	60%
Ave Occ Internal Gain Factor:	0.7	Cooling Occ Entheapy Setback:	[redacted] Btu/h				
		Cooling Unocc Entheapy Setback:	[redacted] Btu/h				

Heating and cooling energy are assumed to flow invalid. If the building being evaluated is not invalid, disregard existing energy calculations

		EXISTING LOADS						PROPOSED LOADS									
		Occupied			Unoccupied			Occupied			Unoccupied						
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Size Hours	Occupied Equipment Size Hours	Unoccupied Equipment Size Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
102.5	49.1	0	0	0	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
97.5	42.9	0	1	2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	27	26	0	0
92.5	39.5	34	10	25	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	205	244	0	0
87.5	36.6	206	47	84	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	773	726	0	0
82.5	34	506	116	321	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	2,323	2,240	0	0
77.5	31.8	620	231	286	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	1,545	1,441	0	0
72.5	29.2	464	231	437	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	695	1,033	0	0
67.5	27	354	403	345	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
62.5	24.9	607	231	656	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
57.5	23.4	660	234	366	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
52.5	19.7	670	318	340	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	546	0
47.5	18.2	611	318	285	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	331	144
42.5	14.4	856	234	402	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	255	232
37.5	12.6	1,070	905	859	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	670	464
32.5	10.7	734	362	472	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	827	464
27.5	9.6	254	118	215	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	276	217
22.5	8.8	222	90	107	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	244	203
17.5	8.3	125	46	58	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	136	116
12.5	4.1	47	17	33	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	96	93
7.5	3.8	31	8	14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	39	39
2.5	1	19	3	8	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	19	11
-2.5	0	0	0	0	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
-7.5	-1.8	0	0	0	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	0	0	0	0
TOTALS		6,760	3,720	5,207	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	5,942	5,704	2,366	1,663

Existing Building Ventilation & Infiltration (cfm):	1,055 cfm
Overheat Ventilation Factor:	1.00
Additional ventilation to offset overheat:	0 cfm
Existing Building Ventilation & Infiltration (cmm):	980 cfm

KUBPU Energy Audit Program
CNA Project No. 22013
Building: Springfield Municipal Building

Building Footprint	[illegible] SF	Air Occupied Clng Temp	72 °F	Air Occupied Htg Temp	70 °F
Heating (Efficiency)	[illegible]	Air Unoccupied Clng Temp	72 °F	Air Unoccupied Htg Temp	70 °F
Cooling (Efficiency)	[illegible] kW/ton	Occupied Cooling Lift	[illegible] deg F/ft	Occupied Heating Lift	700 deg F/ft
Internal Gains	[illegible] Btu/h	Unoccupied Cooling Lift	[illegible] deg F/ft	Unoccupied Heating Lift	700 deg F/ft
Occ. Internal Gain (w/sf)	0.46	Cooling Occ Enthalpy Setpoint	28 Btu/lb		
Ave Occ. Internal Gain Factor	1.0	Cooling Unocc Enthalpy Setpoint	28 Btu/lb		
Economizer available (Y/N)	No				

Heating and cooling energy are not stated in the model. If the existing being analyzed is not metric, Wrapped Cooling energy rate editing

					CONDITIONED LOADS									
					Occupied			Unoccupied						
Avg Outdoor db Temp, Base °F	Avg Outdoor Wet Enthalpy	Total Min Hours	Occupied Equipment Min Hours	Unoccupied Equipment Min Hours	Envelope Load (BTUH)	Ventilation Load (BTUH)	Internal Gain (BTUH)	Unoccupied Envelope Load (BTUH)	Ventilation Load (BTUH)	Internal Gain (BTUH)	Available Economizer Cooling (kW)	Unoccupied Cooling Energy (kW)	Cooling Cooling Energy (kWh)	Hourly
A		B	C	D	G	F	G	H	I	J	K	L	M	N
100.0	44.1	1	1	0	-44,808	-146,808	61,101	-44,782	-42,725	12,800	0	0	0	0
97.0	42.2	2	2	0	-45,084	-152,705	61,701	-37,145	-38,596	12,800	0	27	27	0
95.0	39.6	19	19	0	-36,305	-76,205	61,104	-34,800	-33,303	12,800	0	205	205	0
91.0	38.0	73	47	91	-30,881	-62,806	62,101	-32,017	-14,635	12,800	0	715	715	0
90.0	34.0	294	176	221	-17,017	-37,736	61,701	-19,407	-10,111	12,800	0	1,231	1,231	0
87.0	31.9	423	251	326	-9,373	-19,099	61,101	-8,001	-5,815	12,800	0	1,045	1,045	0
73.0	29.0	994	231	427	-1,107	-3,882	62,005	-1,107	984	12,800	0	990	990	0
87.0	27.0	854	245	542	4,758	11,251	62,701	4,038	6,091	12,800	0	911	911	0
82.0	24.0	921	231	598	9,464	23,233	61,701	9,464	7,227	12,800	0	555	555	0
83.0	22.4	899	316	699	12,113	32,040	62,100	12,113	10,384	12,800	0	109	109	0
82.0	19.7	915	315	766	15,850	39,442	62,109	15,850	14,036	12,800	0	0	0	48
81.0	15.0	911	316	850	19,201	47,443	61,701	19,201	16,977	12,800	0	0	0	251
80.0	14.0	899	304	423	20,040	50,540	61,101	20,040	18,803	12,800	0	0	0	315
77.0	12.5	1,122	382	958	20,909	60,341	62,005	20,425	22,377	12,800	0	0	0	552
32.0	10.7	734	262	472	16,818	14,088	62,100	16,818	39,117	12,800	0	0	0	227
27.0	9.0	334	114	212	14,006	35,033	61,701	14,006	33,005	12,800	0	0	0	113
22.0	6.9	201	91	100	12,998	32,501	62,101	12,998	32,442	12,800	0	0	0	101
17.0	5.0	121	40	81	11,924	101,151	62,005	11,884	30,965	12,800	0	0	0	104
12.0	4.1	47	17	30	10,215	110,750	61,701	10,072	30,703	12,800	0	0	0	56
7.0	2.6	22	9	14	10,000	110,036	61,101	10,022	41,000	12,800	0	0	0	28
2.0	1.0	10	5	4	12,701	100,000	62,101	12,701	44,048	12,800	0	0	0	10
0.0	0.0	2	1	1	10,440	135,000	62,701	10,440	40,142	12,800	0	0	0	0
0.0	1.0	1	1	1	10,120	140,011	62,101	10,120	31,250	12,800	0	0	0	0
TOTALS		8,760	3,150	4,837								7,949	7,949	2,888

Existing Building Ventilation & Infiltration (cfm)	1,800 cfm
Overhead Ventilation Factor	10%
Additional ventilation to offset overhead	0 cfm
Existing Building Ventilation & Infiltration (corrected)	982 cfm
Economizer Ventilation (from ASHRAE)	1,200 cfm

[illegible] Space Heating & Ventilation Design						
			CFM / Person		Avg kW/	
kW / Sqft kW/ft	ft	Use Factor	2.5 CFM @ 0.5 Pers	50 kW/Delivery	0 Hrs	
0.15	75		188	500	113	Meter Room
0.25	50		313	800	113	Microgen Room
			Total	1,300	227	

Cooling Season kWh vs. Heating Season kWh
(Month 4+5)

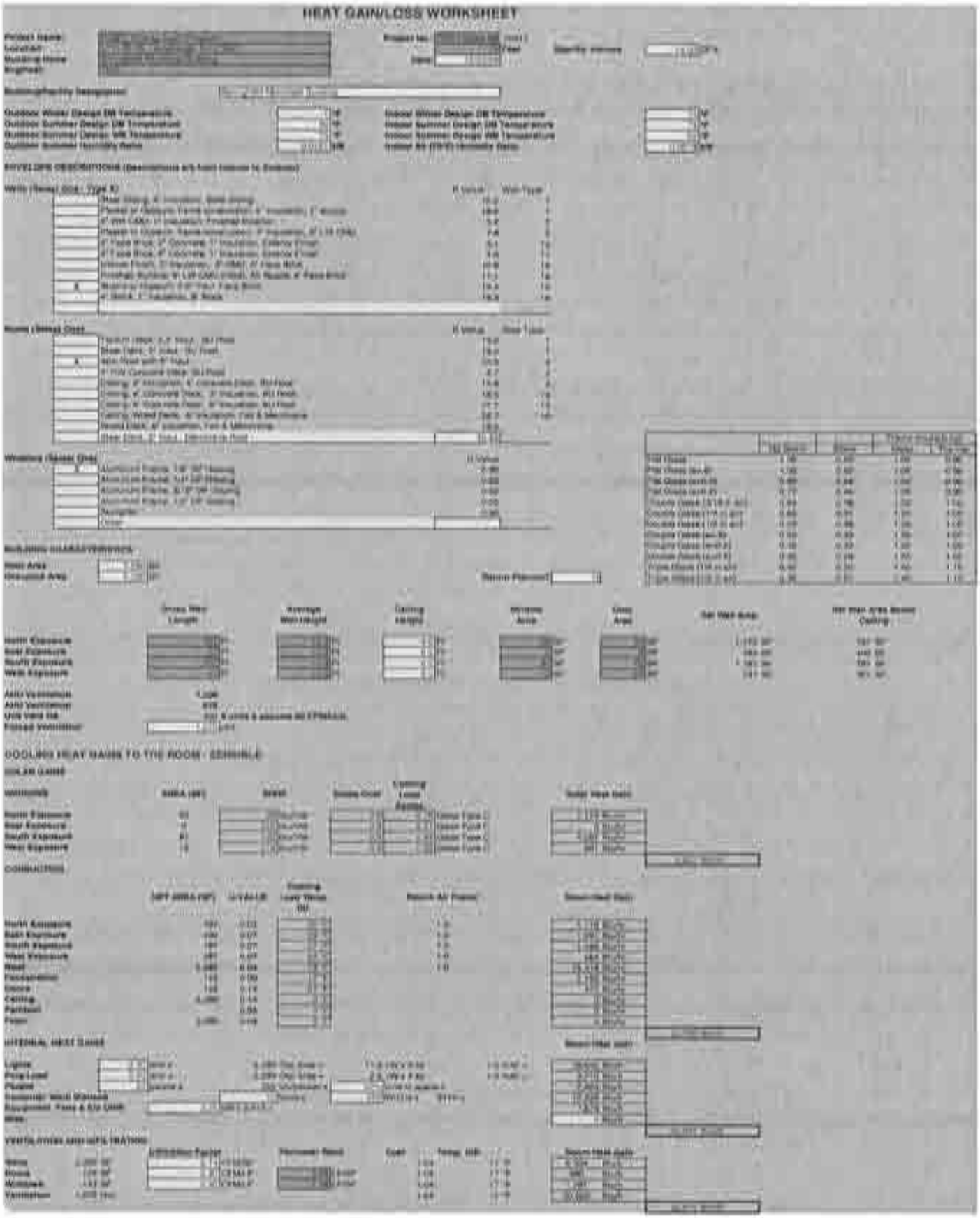
Heating Season	8,760	kWh/mo	Avg. 5 months	
Electric Heating	227	kWh/mo	Avg. 5 months	
Base Load	2,227	kWh/mo	Avg. 5 months	
Cooling Season	5,810	kWh/mo	Avg. (June-September)	
Cooling	3,583	kWh/mo	Cooling Base Cooling	
Cooling Total	11,620	kWh	June, July, Aug, Sept	

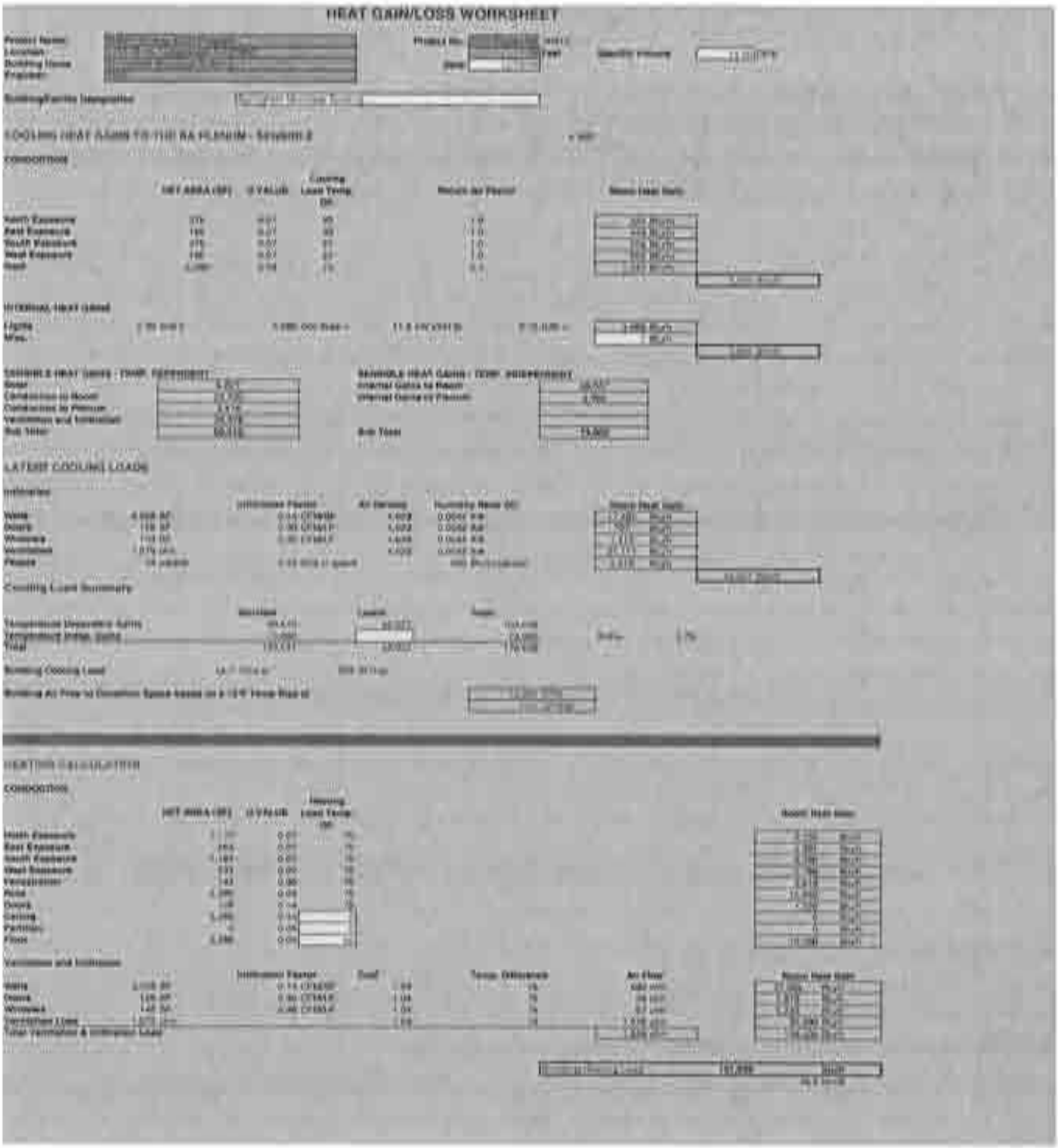
* Data shown from actual energy usage 2020-2022

	Metric Data	
Heating	3,300	Btu/sf
Electric Heating	1,300	kWh
Electric Heating kWh/sf/year	1.47	kWh/sf
Heating Thermal Electric Heat	2,300	Btu/sf
Target +/-	3,000	
	30.4%	

	Metric Data	
Cooling	3,574	
Target +/-	1,000	Derived from Cooling vs. Heating Kwh Requirements
	180.4%	

HEAT GAIN/LOSS WORKSHEET




HEAT GAIN/LOSS WORKSHEET
CONDITIONS
LATENT COOLING LOADS
Cooling Load Summary
CONDITIONS

NJBPU Energy Audit Program
CHA Project No. 20812
Building: Springfield Municipal Building

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North	3.0	7.0	3	63.0	60.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
		Sub-total	3	63.0	60.0	
East	0.0	0.0	0	0.0	0.0	
				0.0	0.0	
				0.0	0.0	
		Sub-total	0	0.0	0.0	
South	3.0	7.0	2	42.0	40.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
		Sub-total	2	42.0	40.0	
West	3.0	7.0	1	21.0	20.0	
				0.0	0.0	
		Sub-total	1	21.0	20.0	
		Total	**6**	**126.0**	**120.0**	LF/SF 0.95

NJBPU Energy Audit Program
CHA Project No. 20812
Building: Springfield Municipal Building

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North	107.0	12.0	1	1284.0	238.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	Ave. height
	107.0			1284.0	238.0	12.0
East	47.0	12.0	1	564.0	118.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	Ave. height
	47.0			564.0	118.0	12.0
South	107.0	12.0	1	1284.0	238.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	Ave. height
	107.0			1284.0	238.0	12.0
West	47.0	12.0	1	564.0	118.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	Ave. height
	47.0			564.0	118.0	12.0

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	3.0	4.0	3	36.0	42.0
	3.0	1.5	1	4.5	9.0
	1.5	3.0	2	9.0	18.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
		Sub-total	6	49.5	69.0
East				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
		Sub-total	0	0.0	0.0
South	3.0	4.0	5	60.0	70.0
	2.0	3.0	2	12.0	20.0
	1.5	3.0	2	9.0	18.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
		Sub-total	9	81.0	108.0
West	3.0	4.0	1	12.0	14.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
		Sub-total	1	12.0	14.0
		Total	**16**	**142.5**	**191.0**	LF/SF 1.34

NJBPU Energy Audit Program
CHA Project No. 20812
Springfield Municipal Building

ECM - 6 Night Setback Controls

Multipliers	
	0.96
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
										Means Mechanical-2009
Programmable Thermostat with Lockable Cover	7	ea	$ 50	$ 47		$ 343	$ 398	$ -	$ 741	
Programmable Thermostat for Unit Vents	7	ea	$ 50	$ 47		$ 343	$ 398	$ -	$ 741	
Programmable Thermostat for entrance cabinet heater	1	ea	$ 50	$ 47		$ 49	$ 57	$ -	$ 106	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 1,588	Subtotal
$ 159	10% Contingency
$ 262	15% Contractor O&P
$ -	0% Engineering
$ 2,009	**Total**

APPENDIX H

ECM-7 Replace Boiler

NJBPU Energy Audit Program
CHA Project No. 20812
Springfield Municipal Building

ECM-7 Replace Boiler

Existing Fuel	Nat.Gas
Proposed Fuel	Nat.Gas

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 1.24		
Proposed Fuel Cost	$ 1.24		
Baseline Fuel Use	2,539	Therms	Based on calculated historical utility data
Existing Boiler Plant Efficiency	75%		Estimated or Measured
Baseline Boiler Load	190,422	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 100 Mbtu/Therms
Baseline Fuel Cost	$ 3,150		
Proposed Boiler Plant Efficiency	92%		New Boiler Efficiency
Proposed Fuel Use	2,070	Therms	Baseline Boiler Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Fuel Cost	$ 2,568		
Annual Savings	469	Therms	
Annual Savings	**$ 582**	/yr	

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

NJBPU Energy Audit Program
CHA Project No. 20812
Springfield Municipal Building

ECM-7 Replace Boiler

Multipliers	
Material:	0.96
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
New high efficiency boilers (194 mBh Condensing Boiler)	1	ea.	3600	$ -	$ -	$ 3,430	$ -	$ -	$ 3,430	Historical boiler cost Data from recent CHA installations
Boiler Flues	1	ls	$ 300	$ 150		$ 294	$ 182	$ -	$ 476	
Electrical	1	ls	$ 500	$ 350		$ 490	$ 424	$ -	$ 914	
Hot water/gas piping	1	ls	$ 500	$ 300		$ 490	$ 363	$ -	$ 853	
						$ -	$ -	$ -	$ -	

$	5,672	Subtotal
$	567	10% Contingency
$	936	15% Contractor O&P
$	-	0% Engineering
$	**7,175**	**Total**

New Jersey Smart Start Incentive	QTY	UNIT	$ / UNIT	TOTAL SAVINGS	Cost W/O INCENTIV	Cost W/ INCENTIV
					$ -	$ -
NG Boilers < 300 MBH	200	MBH	$2	$400	$ 3,430	$ 3,030
					$ -	$ -
				$400	$3,430	$3,030

Total ECM Cost w/ Incentives	**$6,775**

APPENDIX I

ECM-8 Replace Domestic Hot Water Heater

NJBPU Energy Audit Program
CHA Project No. 29812
Building: Springfield Municipal Building

ECM-8: Replace DHW Heater

Summary

* Replace 9 kW, 30 Gal Gas-Fired DHW Heater w/ Instantaneous, Condensing, Gas-Fired DHW Heater

Item	Value	Units	Comments/Calculations
Occupied days per week	6	days/wk	
Water supply Temperature	50	°F	Temperature of water coming into building
Hot Water Temperature	120	°F	
Hot Water Usage per day	100	gal/day	Calculated from usage below
Annual Hot Water Energy Demand	2,843	MBTU/yr	Energy required to heat annual quantity of hot water as measured
Existing Tank Size	30	Gallons	Per nameplate per remainder
Hot Water Temperature	120	°F	Per building personnel
Average Room Temperature	70	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of rated capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	0.3	kBtu/h	
Annual Standby Hot Water Load	2,738	MBTU/yr	
Total Annual Hot Water Demand (w/ standby losses)	5,581	MBtu/yr	Building demand plus standby losses
Existing Water Heater Efficiency	98%		Per Manufacturer
Total Annual Energy Required	5,706	MBtu/yr	
Total Annual Electric Required	**1,681**	**kWh/yr**	**Electrical Savings**
Average Annual Electric Demand	0.19	kW	
Peak Electric Demand	**9.0**	**kW**	**Per Manufacturer's Nameplate (Demand Savings)**
New Tank Size	0	Gallons	Tankless
Hot Water Temperature	120	°F	
Average Room Temperature	70	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of rated capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	0.0	kBtu/h	
Annual Standby Hot Water Load	0	MBTU/yr	
Prop Annual Hot Water Demand (w/ standby losses)	2,843	MBTU/yr	
Proposed Avg. Hot water heater efficiency	82%		Based on Navien CR190 instantaneous, condensing DHW Heater
Proposed Total Annual Energy Required	3,468	MBTU/yr	
Proposed Fuel Use	**35**	**Therms/yr**	Standby Losses and inefficient DHW heater eliminated
Elec Utility Demand Unit Cost	$19.39	$/kW	
Elec Utility Supply Unit Cost	$0.13	$/kWh	
NG Utility Unit Cost	$1.24	$/Therm	
Existing Operating Cost of DHW	$1,676	$/yr	
Proposed Operating Cost of DHW	$43	$/yr	
Annual Utility Cost Savings	**$1,633**	**$/yr**	

Daily Hot Water Demand

FIXTURE	*BASE WATER USE GPM	DURATION OF USE (MIN)	USES PER DAY: MALE	USES PER DAY: FEMALE	FULL TIME OCCUPANTS** MALE	FULL TIME OCCUPANTS** FEMALE	TOTAL GAL/DAY	% HOT WATER	TOTAL HW GAL/DAY
LAVATORY (Low-Flow Lavs use 0.5 G)	2.5	0.25	3	3	12	11	43	50%	22
SHOWER	2.5	5	1	1	0	0	0	75%	0
KITCHEN SINK	2.5	0.5	1	1	0	0	0	75%	0
MOP SINK	2.5	2	1	1	0	0	0	75%	0
Dishwasher (2)	10	1	1	0	0	0	0	100%	0
						TOTAL	43		22

*GPM is per standard fixtures, adjust as necessary if actual GPM is known.
**These are the occupants that use the fixtures. If fixture does not exist change to 0's.

NJBPU Energy Audit Program
CHA Project No. 20812
Building: Springfield Municipal Building

ECM-8 Replace DHW Heater

Multipliers	
Material:	0.08
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
ELE DHW Heater Reinoval	1	LS		$ 50		$ -	$ 61	$ -	$ 61	2009 Means
Instantaneous Gas-Fired DHW Heater	1	EA	$ 1,199	$ 297		$ 1,175	$ 359	$ -	$ 1,534	Unit cost form Home Depot
Miscellaneous Electrical	1	LS	$ 500			$ 490	$ -	$ -	$ 490	2009 Means
Venting Kit	1	EA	$ 450	$ 200		$ 441	$ 242	$ -	$ 683	2009 Means
Miscellaneous Piping 3/4 in	10	LS	$ 6	$ 5		$ 59	$ 62	$ -	$ 121	2009 Means
Miscellaneous Valves 3/4 in	3	LS	$ 17	$ 20		$ 50	$ 73	$ -	$ 123	2009 Means
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 3,012	Subtotal	
$ 301	10%	Contingency
$ 497	15%	Contractor O&P
$ -	0%	Engineering
$ 3,810	**Total**	

New Jersey Smart Start Incentive	QTY	UNIT	$ / UNIT	TOTAL SAVINGS	Cost W/O INCENTIV	Cost W/ INCENTIV
					$ -	$ -
Gas Fired Water Heater	1	EA	$50	$50	$ 1,534	$ 1,484
					$ -	$ -
				$50	$1,534	$1,484

Total ECM Cost w/ Incentives	**$3,760**

APPENDIX J

ECM-9 Demand Control Ventilation

NJBPU Energy Audit Program
CHA Project No. 20812
Building: Springfield Municipal Building

ECM-9 Demand Control Ventilation

	Total CFM	O.A. CFM	O.A. %	
Org. scheduled OFM	7,200	870	9%	OA from Stock load sheet
Derated CFM	7,200	345	5%	OA required Avg of 23 people @ 15 CFM/Person
SA Enthalpy	26.4	BTU/lbms		
SA Set point, Winter	74.0	°F		
SA Set point, Summer	73.0			
Cooling System EIR	0.923	kW/Ton		(includes ancillary equipment)
Heating System Eff	75%			(includes distribution losses)

Description:
Outside air can be significantly reduced for most of the time that the building is occupied.
Savings will result from the avoided heating and cooling of excessive outside air.

Method:
The outdoor air introduced into the spaces is currently constant based on design occupancy conditions.
This ECM proposes the installation of CO2 sensors in the space to allow for reduced outdoor air flows when conditions allow.
An average reduction of 50% is assumed possible with the implementation of DCV.
The DCV system will automatically adjust the outdoor air damper position through the EMS to reduce outdoor air flows based on indoor CO2 levels.
This ECM has been interacted with the new boiler ECMs and accounts for the reduced operating hours of the unit via EMS scheduling.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
			Existing					Proposed Demand Ventilation					Savings	
Avg. Dbt Bin Temp °F	Dbt Enthalpy Btu/lb	Bin HOURS	OA CFM	Cooling Load MBH	Heating Load MBH	Cooling kWh	Heating therms	Derated O.A. CFM	Cooling Load MBH	Heating Load MBH	Cooling kWh	Heating therms	Cooling kWh	Heating therms
102.5	49.1	0	870	69	0	0	-	345	35	0	0	-	0	-
97.5	42.5	1	870	69	0	11	-	345	29	0	6	-	5	-
92.5	39.5	34	870	40	0	104	-	345	20	0	65	-	39	-
87.5	36.8	151	870	31	0	211	-	345	16	0	159	-	053	-
82.5	34	930	870	23	0	886	-	345	12	0	452	-	433	-
77.5	31.5	820	870	18	0	791	-	345	9	0	384	-	367	-
72.5	29.2	664	870	0	1	0	10	345	0	1	0	9	0	5
67.5	27	854	870	0	5	0	54	345	0	2	0	28	0	26
62.5	24.5	927	870	0	8	0	104	345	0	4	0	53	0	51
57.5	21.4	800	870	0	12	0	86	345	0	8	0	43	0	41
52.5	18.7	810	870	0	19	0	127	345	0	6	0	65	0	62
47.5	16.2	811	870	0	19	0	157	345	0	10	0	80	0	77
42.5	14.4	856	870	0	22	0	201	345	0	12	0	103	0	98
37.5	12.6	1,003	870	0	27	0	360	345	0	14	0	186	0	177
32.5	10.7	724	870	0	30	0	209	345	0	15	0	151	0	148
27.5	8.8	394	870	0	24	0	181	345	0	17	0	77	0	74
22.5	6.8	252	870	0	28	0	138	345	0	19	0	64	0	62
17.5	5.5	125	870	0	41	0	69	345	0	21	0	35	0	34
12.5	4.1	47	870	0	46	0	28	345	0	23	0	14	0	14
7.5	2.6	22	870	0	48	0	14	345	0	25	0	7	0	7
2.5	1	13	870	0	52	0	9	345	0	27	0	5	0	4
-2.5	0	0	870	0	56	0	-	345	0	29	0	-	0	-
-7.5	-1.5	0	870	0	59	0	-	345	0	30	0	-	0	-
Total		8,160		319		2962	1809		119		1064	923	1008	882

100% Energy Cost Savings
Heating Savings: 882 therms
Cooling Savings: 1008 kWh

Comments:

NJBPU Energy Audit Program

CHA Project No. 20612

Springfield Municipal Building

ECM-9 Demand Control Ventilation

Multipliers	
	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
PLC Controller w/programming	1	ea	1500	1000		$ 1,470	$ 1,210	$ -	$ 2,680	
Carbon Dioxide Sensor	1	ea	400	100		$ 392	$ 121	$ -	$ 513	
Replace damper actuator	1	ea	200	50		$ 196	$ 61	$ -	$ 257	
wiring	1	ea	1000	1000		$ 980	$ 1,210	$ -	$ 2,190	
		ea				$ -	$ -	$ -	$ -	
		ea				$ -	$ -	$ -	$ -	

$ 5,640	Subtotal
$ 564	10% Contingency
$ 931	15% Contractor O&P
$ -	0% Engineering
$ 7,134	**Total**

APPENDIX K

ECM-10 Install Economizers

NJBPU Energy Audit Program
CHA Project No. 20812
Building: Springfield Municipal Building

ECM-10 Install Economizers

Building Footprint	[illegible] SF	Ex Occupied Clng Temp:	72 °F	Ex Occupied Htg Temp:	74 °F		
Heating Efficiency	0.70	Ex Unoccupied Clng Temp:	85 °F	Ex Unoccupied Htg Temp	55 °F		
Cooling Efficiency	0.00 kW/ton	Occupied Cooling UA	[illegible] btu/hr/°F	Occupied Heating UA	[illegible] btu/hr/°F		
Internal Gains	[illegible] btu/h	Unoccupied Cooling UA	[illegible] btu/hr/°F	Unoccupied Heating UA	[illegible] btu/hr/°F		
Unocc Internal Gain factor	0.05	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb				
Ave Occ Internal Gain Factor	0.7	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb				
Economizer available (Y/N)	Yes						

					EXISTING LOADS										
					Occupied			Unoccupied							
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Total Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Available Economizer Cooling kWh	Necessary Cooling Energy kWh	Existing Cooling Energy kWh	Hamms
A		B	C	D	E	F	G	H	I	J	K	L	M	M
102.5	49.1	-	-	-	(54,665)	(161,108)	(51,101)	(44,782)	(36,638)	(2,190)	0	0	0	0
97.5	42.5	6	2	4	(46,599)	(111,896)	(51,101)	(37,392)	(36,333)	(2,190)	0	56	56	0
92.5	39.6	40	18	29	(38,255)	(89,518)	(51,101)	(29,852)	(31,466)	(2,190)	0	356	356	0
87.5	36.6	148	52	94	(36,681)	(67,883)	(51,101)	(32,012)	(23,882)	(2,190)	0	936	936	0
82.5	34	288	106	192	(17,677)	(48,468)	(51,101)	(19,421)	(17,044)	(2,190)	0	1452	1452	0
77.5	31.6	478	170	306	(8,323)	(30,585)	(51,101)	(8,531)	(10,751)	(2,190)	0	1536	1536	0
72.5	29.2	662	237	426	1,107	2,585	(51,101)	1,107	944	(2,190)	0	862	862	0
67.5	27	740	264	476	4,798	11,837	(51,101)	4,798	4,091	(2,190)	137	703	566	0
62.5	24.5	760	273	492	8,484	20,589	(51,101)	8,484	7,237	(2,190)	462	462	0	0
57.5	21.6	733	262	471	12,173	29,546	(51,101)	12,173	10,384	(2,190)	864	580	0	0
52.5	18.7	665	239	430	15,862	38,492	(51,101)	15,862	13,530	(2,190)	0	0	0	166
47.5	16.2	659	235	424	19,551	47,443	(51,101)	19,551	16,677	(2,190)	0	0	0	243
42.5	14.4	685	245	441	23,240	56,395	(51,101)	23,240	19,823	(2,190)	0	0	0	233
37.5	12.6	730	364	475	26,929	65,347	(51,101)	26,929	22,970	(2,190)	0	0	0	447
32.5	10.7	717	256	461	30,618	74,298	(51,101)	30,618	26,117	(2,190)	0	0	0	516
27.5	8.8	543	194	349	34,306	83,250	(51,101)	34,306	29,263	(2,190)	0	0	0	456
22.5	6.8	318	114	205	37,995	92,201	(51,101)	37,995	32,410	(2,190)	0	0	0	306
17.5	5.0	245	88	158	41,684	101,153	(51,101)	41,684	35,556	(2,190)	0	0	0	268
12.5	4.1	156	56	100	45,373	110,104	(51,101)	45,373	38,703	(2,190)	0	0	0	187
7.5	2.6	93	33	59	49,062	119,056	(51,101)	49,062	41,850	(2,190)	0	0	0	121
2.5	1	36	13	23	52,751	128,008	(51,101)	52,751	44,996	(2,190)	0	0	0	52
-2.5	0	16	7	12	56,440	136,958	(51,101)	56,440	48,143	(2,190)	0	0	0	36
-7.5	-1.9	6	3	5	60,129	145,911	(51,101)	60,129	51,289	(2,190)	0	0	0	12
TOTALS		8,760	3,129	5,631							787	6,851	6,664	3,140
										Savings	738			

Existing Building Ventilation & Infiltration (acc)	[illegible] cfm
Overheat Ventilation Factor	1.00
Additional ventilation to offset overheat	[illegible] cfm
Existing Building Ventilation & Infiltration (unocc)	[illegible] cfm
Economizer Ventilation (from AHUs)	3,000 cfm

NJBPU Energy Audit Program
CHA Project No. 20812
Springfield Municipal Building

ECM-10 Install Economizers

Multipliers	
	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Enthalpy Sensor	4	ea	300	100	0	$ 1,176	$ 484	$ -	$ 1,660	
Damper Actuators	3	ea	200	50	0	$ 588	$ 182	$ -	$ 770	
Controller	3	ea	290	30	0	$ 853	$ 109	$ -	$ 962	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$	3,391	Subtotal
$	339	10% Contingency
$	560	15% Contractor O&P
$	-	0% Engineering
$	**4,290**	**Total**

APPENDIX L

New Jersey Pay For Performance Incentive Program

NJBPU Energy Audit Program
CHA Project No. 20812
Building: Springfield Municipal Building

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per December, 2009
Building must have a minimum average electric demand of 200 kW. This minimum is waived for buildings owned by local governements or non-profit organizations.
The incentive values represented below are applicable through December 31, 2010.

	Annual Utilities	
	kWh	Therms
Existing Usage (from Utility)	73,600	2,540
Proposed Savings	12,373	2,221
Existing Total MMBtus	505	
Proposed Savings MMBtus	264	
% Reduction	52.3%	
Proposed Annual Savings	$6,801	

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

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

	Incentives $		
	Elec	Gas	Total
Incentive #2	$2,722	$4,887	$7,609
Incentive #3	$1,732	$3,110	$4,842
Totals	$4,454	$7,997	$12,451

Total Project Cost	$48,585
% Incentives of Project Cost*	25.6%
Project Cost w/ Incentives*	$36,144

Project Payback (years)	
w/o Incentives	w/ Incentives
7.1	5.3

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

NJBPU Energy Audit Program
CHA Project No. 20812
Building: Springfield Municipal Building

New Jersey Pay For Performance Incentive Program Recommended Energy Conservation Measures (ECMs)

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per December 2009. Building must have a minimum average electric demand of 200 kW. This minimum is waived for buildings owned by local governments or non-profit organizations.
The incentive values represented below are applicable through December 31, 2010.

	Annual Utilities	
	kWh	Therms
Existing Usage (from utility)	73,600	2,540
Proposed Savings	11,530	1,534
Existing Total MMBtus	505	
Proposed Savings MMBtus	193	
% Reduction	38.2%	
Proposed Annual Savings	$5,739	

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

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

	Incentives $		
	Elec	Gas	Total
Incentive #2	$2,538	$3,376	$5,914
Incentive #3	$1,615	$2,148	$3,763
Totals	$4,153	$5,524	$9,677

Total Project Cost	$23,832
% Incentives of Project Cost*	40.6%
Project Cost w/ Incentives*	$14,155

Project Payback (years)	
w/o Incentives	w/ Incentives
4.1	2.4

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

APPENDIX M

Photovoltaic (PV) Rooftop Solar Power Generation

PVWatts ... AC Energy & Cost Savings

Cautions for Interpreting the Results

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	20.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	15.4 kW
Array Type:	Fixed Tilt
Array Tilt:	40.7°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	17.5 ¢/kWh

Results			
Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	3.36	1656	289.80
2	4.05	1788	312.90
3	4.58	2169	379.57
4	4.84	2119	370.82
5	5.30	2335	408.62
6	5.33	2202	385.35
7	5.27	2224	389.20
8	5.25	2201	385.18
9	5.06	2135	373.62
10	4.46	2011	351.93
11	3.15	1435	251.12
12	2.87	1384	242.20
Year	4.46	23660	4140.50

Output Hourly Performance Data

About the Hourly Performance Data

Output Results as Text

Saving Text from a Browser

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

Please send questions and comments regarding PVWATTS to Webmaster

Disclaimer and copyright notice

Cautions for Interpreting the Resul

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.

Township of Springfield
Townhall

Cost of Electricity $0.175 $/kWh

Photovoltaic (PV) Rooftop Solar Power Generation-20kW System

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	New Jersey Renewable * Energy Incentive	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$200,000	**0.0**	**23,660**	**0**	**$4,100**	**0**	**$4,100**	**$20,000**	**$11,500**	**48.8**	**11.5**

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

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

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

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

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

APPENDIX N

Solar Thermal Domestic Hot Water Plant

Home

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

Financial Help

About Us

About SECO

RAPS

Interactive Energy Calculators

RENEWABLE ENERGY THE INFINITE POWER OF TEXAS

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

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

Solar Water Heating Calculator

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

Water Heater Characteristics			
Physical		Thermal	
? Diameter (feet)	1.5	? Water Inlet Temperature (Degrees F)	55
? Capacity (gallons)	30	? Ambient Temperature (Degrees F)	70
? Surface Area (calculated - sq ft)	14.23	? Hot Water Temperature (Degrees F)	120
? Effective R-value	NaN	? Hot Water Usage (Gallons per Day)	22
Energy Use			
499.2		? Heat Delivered in Hot Water (BTU/hr)	
0		? Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		**Electric**
0.8	? Overall Efficiency	0.98
0.8	? Conversion Efficiency	0.98
611.5 BTU/hr	? Power Into Water Heater	499.2 BTU/hr
Cost		
$ 1.24 /Therm	? Utility Rates	$ .175 /kWh
$ 66.4235	? Yearly Water Heating Cost	$ 224.129
How Does Solar Compare?		
? Solar Water Heater Cost: $ 27100		? Percentage Solar: 70
582.839 years for gas	? Payback Time for Solar System	172.731 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

NJBPU Energy Audits
CHA #20612
Building: Township of Springfield Townhall

Multipliers:	
Material:	0.98
Labor:	1.21
Equipment:	1.09

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

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

APPENDIX O

Wind

Wind Resource of New Jersey

Mean Annual Wind Speed at 30 Meters

AWS Truewind

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

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


2159 Jacksonville Jobstown Rd, Jobstown, NJ 08041
Google

APPENDIX P

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Municipal Building

Building ID: 1994293
For 12-month Period Ending: September 30, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: January 08, 2010

Facility
Municipal Building
2159 Jacksonville-Jobstown Road
Jobstown, NJ 08041

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1980
Gross Floor Area (ft²): 5,280

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	251,123
Natural Gas (kBtu)[4]	253,896
Total Energy (kBtu)	505,019

Energy Intensity[5]

Site (kBtu/ft²/yr)	96
Source (kBtu/ft²/yr)	209

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	52

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	90
National Average Source EUI	189
% Difference from National Average Source EUI	11%
Building Type	Other

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	Other	Is this an accurate description of the space in question?		☐
Location	2159 Jacksonville-Jobstown Road, Jobstown, NJ 08041	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Courtroom (Courthouse)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	
Gross Floor Area	1,350 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	20 Hours	Is this the total number of hours per week that the Courthouse 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	3	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.		☐
Number of PCs	0	Is this the number of personal computers in the Courthouse?		☐
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?		☐
Office (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	

Gross Floor Area	1,030 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	60 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	10	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	9	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?		☐

Police Dept (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
Gross Floor Area	2,000 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.		☐
Number of PCs	3 (Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	168 Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	3 (Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
09/01/2009	09/30/2009	7,160.00
08/01/2009	08/31/2009	7,600.00
07/01/2009	07/31/2009	8,040.00
06/01/2009	06/30/2009	6,440.00
05/01/2009	05/31/2009	5,840.00
04/01/2009	04/30/2009	7,080.00
03/01/2009	03/31/2009	5,880.00
02/01/2009	02/28/2009	3,240.00
01/01/2009	01/31/2009	6,160.00
12/01/2008	12/31/2008	6,080.00
11/01/2008	11/30/2008	6,080.00
10/01/2008	10/31/2008	6,000.00
Electric Consumption (kWh (thousand Watt-hours))		**73,600.00**
Electric Consumption (kBtu (thousand Btu))		**251,123.20**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**251,123.20**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

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

Start Date	End Date	Energy Use (therms)
09/01/2009	09/30/2009	18.76
08/01/2009	08/31/2009	0.01
07/01/2009	07/31/2009	7.30
06/01/2009	06/30/2009	30.12
05/01/2009	05/31/2009	183.63
04/01/2009	04/30/2009	445.34
03/01/2009	03/31/2009	466.10
02/01/2009	02/28/2009	566.10
01/01/2009	01/31/2009	404.16
12/01/2008	12/31/2008	300.32

11/01/2008	11/30/2008	105.59
10/01/2008	10/31/2008	11.51
Natural Gas Consumption (therms)		**2,538.96**
Natural Gas Consumption (kBtu (thousand Btu))		**253,896.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**253,896.00**
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
2159 Jacksonville-Jobstown Road
Jobstown, NJ 08041

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Municipal Building	
Gross Floor Area Excluding Parking: (ft²)	5,280
Year Built	1980
For 12-month Evaluation Period Ending Date:	September 30, 2009

Facility Space Use Summary

Courthouse	
Space Type	Courthouse
Gross Floor Area(ft²)	1,350
Weekly operating hours	20
Workers on Main Shift	3
Number of PCs	0
Percent Cooled	50% or more
Percent Heated	50% or more

Police Dept	
Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft²)	2,000
Number of PCs[1]	3
Weekly operating hours[1]	168
Workers on Main Shift[1]	3

Office	
Space Type	Office
Gross Floor Area(ft²)	1,930
Weekly operating hours	60
Workers on Main Shift	10
Number of PCs	9
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 09/30/2009)	**Baseline** (Ending Date 09/30/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	27	N/A
Energy Intensity					
Site (kBtu/ft²)	98	98	46	80	90
Source (kBtu/ft²)	208	209	100	178	189
Energy Cost					
$/year	$ 16,021.26	$ 16,021.26	$ 7,084.89	$ 13,430.00	$ 15,074.89
$/ft²/year	$ 3.03	$ 3.03	$ 1.46	$ 2.54	$ 2.85
Greenhouse Gas Emissions					
MtCO$_2$e/year	52	53	29	44	49
kgCO$_2$e/ft²/year	10	10	5	8	9

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

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

APPENDIX Q

Equipment Inventory

NJBPU Energy Audit Program
CHA Project No. 23012
Building: Springfield Municipal Building

HVAC Systems

Type	Manufacturer	# Units	Model	Serial	Info	Equipment Condition	Run Cooling Motor Name Plate				
							HP	kWh	kWh Total	Avg. kW Utilization	Avg Kw
Emergency Generator	Kohler	1	80 kW	Cabinet locked my maintenance company	Nat Gas	Excellent					
Boiler	Weil Mclain	1	CGA-6 PGN	N/A	240 MBH input, 204MBh output, 85% AFF	Good					
Boiler Pumps	Taco	4	007-F5	N/A	1/25 Hp	Excellent	0.04	0.03	0.12	30.00%	0.04
AHU-3	Goodmen	1	ARUF486016AB	0705146540	Serves Court Area	Excellent	0.50	0.37	0.37	30.00%	0.11
AHU-2	Goodmen	1	ARUF486016AB	0707506618	Serves Main Area	Excellent	0.75	0.56	0.56	30.00%	0.17
AHU-1	Trane	1	CCDA084L0B	#L346 12ELAD	Serves Police Station Area	Excellent	1.00	1.12	1.12	100.00%	1.12
Typ Unit Vent	Trane	8	701130-AHU-003	N/A	Perimeter Walls	Good	0.03	0.05	0.20	30.00%	0.06
Unit Heater	Trane	1	UHBA-0600-AA AAC	092D-08471	Serves Attic AHU Area 90,000 Btu	Excellent			14.00	5.00%	0.70
DHW Unit	Bradford White	1	M375S6Z12	TH8101036	90 Gallon (2) 4.5 kW elements	Good			8.00	25.00%	2.00
Condensing Unit	Goodmen	1	07041R048	090130401AC	Serves Police Station EER 13.0	Excellent					
Condensing Unit	Goodmen	1	GSC130421AC	0041R0048	Serves Office Area EER 13.1	Excellent					
Condensing Unit	York	1	HH036R0000	AAAM011413	Serves Court Area EER 13.2	Excellent					
Window AC Unit	Amana	1	No Access	No Access	Assume 7500 Btu. Only used during the hottest days for a few hours	Poor					
Exhaust Fan	N/A	1	N/A	N/A	100 CFM Serves Mens And Women's Room	Excellent	0.08	0.03	0.03	100.00%	0.03
							Average Estimated kW usage for use in the Block Load model				4.76