TOWNSHIP OF KEARNY
PUBLIC LIBRARY
ENERGY ASSESSMENT

for

NEW JERSEY
BUREAU OF PUBLIC UTILITIES

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CHA PROJECT NO. 20711

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1.0 INTRODUCTION & BACKGROUND

This report summarizes the energy audit for the main public library and museum located in Kearny, NJ. The first floor of the 14,000 square foot, two story facility houses the main lobby, book shelves, and offices. The second floor is smaller in footprint and contains the museum. The finished basement is occupied with several activity rooms, staff room, storage spaces, and restrooms.

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 energy audit for the 14,000 square foot main public library and museum located in Kearny, NJ. The first floor of the two story building houses the library, and the second floor contains the museum. The basement has activity rooms, a staff room, and storage spaces. The following areas were evaluated for energy conservation measures:

- Boiler replacement
- Night setback
- Door seals
- Lighting replacements
- Occupancy sensors
- Window AC unit replacement

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Measures which are recommended for implementation have a payback of 10 years or less. This threshold is considered a viable return on investment. Potential annual savings of $16,300 for the recommended ECMs may be realized with a payback of 5.8 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 Smart Start Buildings Program. A summary of the costs, savings, and paybacks for the recommended ECMs follows:

ECM-1 Replace Boiler

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
33,000	0	0	1,700	4,500	3.1	2,200	7.3	6.8

* Incentive shown is per the New Jersey Smart Start Program, 2010 Gas Heating Application. Incentive is based on the purchase of 1,275 MBH steam boiler.

ECM-2 Night Setback

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
24,900	0	3,680	1,900	5,700	2.4	NA	4.4	NA

* The ECM is not eligible for New Jersey's Smart Start Incentive of the 2010 Application.

ECM – 4 Install Door Seals

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
600	0	90	70	200	2.3	NA	3.0	NA

* The ECM is not eligible for New Jersey's Smart Start Incentive of the 2010 Application.

ECM-5 Lighting Replacements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
35,300	10.3	33,170	0	5,700	1.4	3,500	6.2	5.6

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

ECM-6 Install Occupancy Sensors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
700	0.0	1,310	0	200	3.3	100	3.5	3.0

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

3.0 EXISTING CONDITIONS

3.1 Building General

3.1.1 Structure

The main public library and museum (library) is a two story building constructed in 1907 and expanded in 1928. The building is well maintained, and over the years underwent renovations, including replacement of windows and addition of a cooling system. The first floor houses a main lobby, rows of book shelves, public computer station, office spaces, and a children's section. The second floor houses a museum display. The basement houses several activity rooms, storage rooms, office space, staff room with kitchen, restrooms, and mechanical room.

The building's walls are constructed of double layers of brick and have an interior plaster finish. About 30% of the walls consist of windows, which are double pane glass. The roof is mainly flat with low slopes around the perimeter of the building. It is finished with architectural shingles and, according to the staff, is insulated.

3.1.2 Occupancy and Operating Hours

The library is open 12 hours per day, Monday through Thursday, 10 hours on Friday, and four hours on Saturday. The building is closed on Sunday and holidays; and on Saturdays during July and August. The building is occupied by 15 staff people, and the maximum occupancy for the first floor is about 150 people. The second floor is typically open to the public on Saturdays from 10:00 AM to 12:00 noon and on Wednesdays from 6:30 PM to 7:30 PM.

3.2 Utility Usage

The building uses electricity, natural gas, #2 fuel oil, municipal water, and is connected to the town's municipal sewage system.

Electricity is purchased from Direct Energy and is delivered by the Public Service Electric and Gas Company (PSE&G). Natural gas is purchased from Sprague Energy and delivered by PSE&G. For 2008, the building had an annual electricity consumption of 127,000 kWh at a cost of $22,900, natural gas usage of 200 therms at a cost of $400, and a #2 fuel oil usage of 8,900 gallons at cost of $23,600.

Water usage data was not provided; however, the building is not charged for water use.

The primary sources of energy for the library are electricity and #2 fuel oil. The electricity has an average blended rate of $0.18 per kWh. Electricity usage is most prevalent in the summer due to air conditioning; fuel oil used for heating is higher between November and April. The average blended rate for #2 fuel oil was $2.64 per gallon. The natural gas supply line, which is of low capacity, is used only for production of domestic hot water (DHW).

Utility data is provided in Appendix A.

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, as is the case with the library. Since contract terms and rates can vary among suppliers, it is important to review all options on a regular basis to ensure the building is receiving the best possible price. A list of approved electrical and natural gas energy commodity suppliers can be found in Appendix A.

3.3 HVAC Systems

The heat for the building is provided by a #2 fuel oil fired steam boiler. The boiler is about 30 years' old and was manufactured by IBR Company. The boiler is rated at 2,148 MBH and produces steam at 7.5 psig. The heating steam is provided to about 36 radiators/convectors located throughout the building.

The building is cooled by the use of 13 split systems rated from 1.5 tons to 3 tons each, and six window AC units averaging one ton of cooling capacity.

3.4 Lighting/Electrical Systems

The lighting systems within the building are manually controlled by individual switches or pull strings in the spaces and are in use with occupancy. Two fixtures in the front lobby next to the front desk remain on 24 hours a day for security. Most of the lighting within the main library area is provided by large 400 watt metal halide uplight fixtures. The lighting in the basement is predominantly fluorescent and has been upgraded, using F32T8 32 watt lamps or 22 and 32 watt circuline lamps. There are about eight fluorescent fixtures in the basement that still utilize inefficient F34T12 34 watt lamps. Secondary lighting for the book cases in the central part of the library is provided by F34T12 lamps; however, these lights are very seldom utilized. Approximately 11 incandescent lamps are in use throughout the building; about 10 incandescent fixtures have been replaced with 42 watt compact fluorescent bulbs. All exit signs have been upgraded to efficient LED technology.

The building's exterior lighting consists of a mixture of metal halide and incandescent fixtures controlled by timers.

3.5 Control Systems

Several nonprogrammable heating thermostats are located throughout the building. The cooling is controlled at the fan units.

3.6 Domestic Hot Water Systems

Hot water is produced and stored by a gas fired Rheem Model 21V40-38 domestic hot water heater installed in 2003. The heater is rated at 38MBH input and has capacity of 40 gallons.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Replace Boiler

The heating for the building is provided by a 30 year old steam boiler rated at 2148 MBH. Based on the size of the building and envelope conditions, the existing boiler appears to be oversized, which typically results in lower efficiency operation. The existing boiler's average efficiency was estimated at 68%. A new boiler would provide higher efficiency and, therefore, energy savings. Additionally, a new boiler will require less maintenance repair costs.

This ECM evaluates replacing the existing boiler and installing the new smaller high efficiency boiler in the same location. Since the existing boiler is operational, it would have been feasible to install the new boiler and keep the existing for redundancy. However, the existing boiler room is small and installation of an additional boiler would not be possible. Modifications to the existing piping, electrical wiring and flue stacks would also be required. It was calculated that the new high efficiency boiler would provide energy savings of 1,700 gallons #2 fuel oil.

The new boiler has an expected life of 30 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 51,600 gallons #2 fuel oil and $135,000.

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

ECM-1 Replace Boiler

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
33,000	0	0	1,700	4,500	3.1	2,200	7.3	6.8

* Incentive shown is per the New Jersey Smart Start Program, 2010 Gas Heating Application.

This measure is recommended.

4.2 ECM-2 Night Setback

According to building maintenance personnel, night setback is not performed, and the building does not have a building management control system. Individual nonprogrammable thermostats exist; however, a constant temperature is maintained for occupied and unoccupied periods. The thermostats are, therefore, not programmed to lower the unoccupied temperature during the winter or raise the unoccupied temperature in the summer. Significant energy is expended maintaining the building at the same temperature during unoccupied periods (70°F heating, 74°F cooling). Energy savings could be achieved by setting back the temperature for unoccupied times. The following unoccupied temperature setpoints were used to calculate the savings for this measure: 60°F for heating and 80°F cooling.

To implement this energy conservation measure, the existing heating thermostats should be replaced with programmable units, and a steam boiler controller installed that will modulate boiler operations based on preprogrammed schedules and in conjunction with outside air temperatures. For cooling strategy, all existing split systems should be equipped with seven day programmable timers to turn equipment off during unoccupied hours.

To project savings for this measure, a base case building model was created that calculated heating and cooling energy consumptions under existing conditions taking into consideration outside weather, building envelope, occupancy, and operating hours. The base case model was reconciled to the average yearly energy usage of utilities. To determine the proposed energy usage, the same model was used with adjusted setpoints of temperatures for unoccupied operating hours. The difference in usage between the base case and proposed model is the energy saving. Night setback will result in annual heating and cooling savings of 1,900 gallons of #2 fuel oil and 2,500 kWh savings of electricity, respectively.

Controls equipment has an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 55,200 kWh and 28,800 gallons #2 fuel oil, totaling $85,500.

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

ECM-2 Night Setback

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
24,900	0	3,680	1,900	5,700	2.4	NA	4.4	NA

* The ECM is not eligible for New Jersey's Smart Start Incentive of the 2010 Application.

This measure is recommended.

4.3 ECM-3 Replace Window AC Units

There are six window air conditioning units located throughout the building that are approximately one ton in capacity each. In general, window AC units are inefficient. New air conditioning technology has much higher energy efficiency ratios (EER) and can save energy compared to window style units. This measure evaluates installing ductless split systems in place of the existing window air conditioners.

The energy savings were determined by comparing the window AC units' EER of 7.0 to the EER of the proposed split systems at 14.4, and based on operating hours in occupied and unoccupied modes.

Implementation of this measure would require installing the proposed split systems' fan units inside on the wall and the condenser/compressor unit on the ground outside the building. Refrigerant tubing and wiring would be installed between the outside unit and the wall mounted cooling units. Due to the location of existing window units, it was determined that four wall units could share two condensing units, and the remaining two wall units would have dedicated condensers. For this ECM, equipment specifications and costs were derived from a similar unit that the township recently purchased.

Split system AC units have an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 47,700 kWh, and $19,500.

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

ECM-3 Replace Window AC Units

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
18,900	0	3,180	1,190	1,300	0.0	NA	14.5	NA

* The ECM is not eligible for New Jersey's Smart Start Incentive of the 2010 Application.

This measure is not recommended.

4.4 ECM-4 Install Door Seals

The doors have gaps around the perimeters that are a source of air infiltration. The back door accessible via the ramp has significant gaps. Installing door seals and some additional door adjustments will reduce infiltration and save energy.

This measure determined the perimeter length and gap spacing of the doors. Infiltration reductions and the associated energy savings were then calculated by using weather bin heating and cooling hour data.

Door seals have an expected life of 10 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 900 kWh, 700 gallons #2 fuel oil and $2,000.

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

ECM – 4 Install Door Seals

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
600	0	90	70	200	2.3	NA	3.0	NA

* The ECM is not eligible for New Jersey's Smart Start Incentive of the 2010 Application.

This measure is recommended.

4.5 ECM-5 Lighting Replacements

The library contains approximately 43 uplight fixtures that utilize one 400 watt metal halide bulb each. There are also about eight fluorescent fixtures located in the basement that utilize four F34T12 34 watt lamps each, and approximately 11 inefficient incandescent bulbs throughout the building. Overall energy consumption can be reduced by retrofitting the existing T-12 fluorescent fixtures with more efficient T-8 fluorescent lamps, and replacing incandescent bulbs with compact fluorescents.

Each metal halide fixture on the first floor of the library can be replaced with new induction light fixtures that will reduce the wattage of the bulb from 400 watts to 250 watts. The replacement of metal halide fixtures to induction also applies to the exterior lighting of this building. The existing 400 watt metal halide wall pack fixtures can be replaced with two 200 watt induction wall pack fixtures, and each existing 175 watt metal halide wall pack fixture can be replaced with one 100 watt induction wall pack

fixture. Induction lighting is a newer technology, and an induction lighting specialist should be consulted for induction lighting replacements or retrofits.

To compute the annual savings for this ECM, the energy consumption of the lighting fixtures was established, and determined to be 88,870 kWh per year. To calculate the annual energy consumption utilizing replacement lamps, the proposed fixture power requirement was used with the same annual hours of operation. The difference between the existing and proposed annual energy consumption was the energy savings. Calculations are provided in Appendix F.

Existing lamps and ballasts of each fixture would be replaced with electronic ballasts T-8 fluorescent lamps; length and quantity varies based on application. Metal halide fixtures would be retrofitted to allow for induction lighting technology, and incandescent bulbs would be replaced with compact fluorescent bulbs. This ECM will provide annual savings of 33,170 kWh.

The lighting retrofits have an expected life of 15 years, according to the manufacturers, and total energy savings over the life of the project are estimated at 497,550 kWh and $85,500.

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

ECM-5 Lighting Replacements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	- $		$	Years	Years
35,300	10.3	33,170	0	5,700	1.4	3,500	6.2	5.6

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

This measure is recommended.

4.6 ECM-6 Install Occupancy Sensors

Lighting fixtures throughout the building are manually switched on and off, and are operational with occupancy. The operating time of many of the building's interior lighting fixtures can be reduced by installing occupancy sensors in the basement movie/projector room, staff lounge, story hour room, and board room. Occupancy sensors were not considered for many areas because of safety concerns or low use situations.

Applying the same process used in the calculation of ECM-5, the existing baseline energy consumption for each fixture was determined. Typical traffic patterns for each space were then taken into account to approximate the actual occupancy hours per day. It was established that the annual energy consumption of the lighting fixtures can be reduced by 1,310 kWh. Implementing this measure in the spaces discussed above would require approximately four occupancy sensors and some standard electrical work.

Lighting controls have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 19,800 kWh, and $3,000.

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

ECM-6 Install Occupancy Sensors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
700	0.0	1,310	0	200	3.3	100	3.5	3.0

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

This measure is recommended.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance and Smart Start Programs

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

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

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

5.1.2 PSE&G Small Business Direct Install Program

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

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

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

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

Eligible energy efficiency equipment upgrades include:

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

5.2 Building Incentives

The public library is eligible for several incentives available under New Jersey Smart Start Programs. The total amount of all qualified incentives is about $5,800 towards a new boiler and upgrades to the lighting system.

When calculating the total incentive for the New Jersey Pay For Performance program, all energy conservation measures are applicable 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 $14,900, reducing the total project payback from 6.4 years to 5.6 years. See Appendix H for calculations.

Under PSE&G's direct install program, the public library is potentially eligible to receive $113,500, and would be required to repay $22,700. Incentives cannot be accepted under multiple programs.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Geothermal

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

The building uses a steam boiler and split system DX AC units to meet the HVAC requirements. This existing equipment is not compatible with a geothermal energy source. Therefore, to take advantage of a GHP system, the existing mechanical equipment would have to be completely removed and a low temperature closed loop water source heat pump system would have to be installed to realize the benefit of the consistent temperature of the ground.

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

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

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

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

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

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey solar renewable energy certificates program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission

producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. The cost of the ACP penalty for 2009 is $700; this is the amount that must be paid per SERC by the high emission producers. The expected dollar amount that will be paid to the PV producer for 2009 is expected to be $600/SREC credit. Payments that will be received from the PV producer will change from year to year dependent upon supply and demand. Renewable Energy Consultants is a third party SREC broker that has been approved by the New Jersey Clean Energy Program. As stated above there is no definitive way to calculate an exact price that will be received by the PV producer per SREC over the next 15 years. Renewable Energy Consultants estimated an average of $487/ SERC per year and this number was utilized in the cash flow for this report.

The building had a maximum electricity demand of 66.1 kW and a minimum of 27.2 kW, from January 2008 through December 2008. The monthly average over the observed 12 month period was 47.2 kW. The existing load does not justify the use of the maximum incentive cap of 50 kW of installed PV solar array; therefore, a 45 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.

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

Photovoltaic (PV) Rooftop Solar Power Generation – 45 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
450,000	0	53,240	0	9,600	9,600	45,000	25,900	>25	11.4

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

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

6.2.2 Solar Thermal Hot Water Plant

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

A standard solar hot water system is typically composed of solar collectors, heat storage vessel, piping, circulators, and controls. Systems are typically integrated to work alongside a conventional heating system that provides heat when solar resources are not sufficient. The solar collectors are usually placed

on the roof of the building, oriented south, and tilted around the site's latitude, to maximize the amount of radiation collected on a yearly basis.

Several options exist for using active solar thermal systems for space heating. The most common method involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system). The most practical system would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for domestic hot water production. DHW is presently produced by a gas-fired water heater and, therefore, this measure would offer savings in natural gas usage.

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

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

Solar Thermal Domestic Hot Water Plant

Budgetary Cost	Annual Utility Savings				Total Savings	New Jersey Renewable Energy Incentive	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	$	$	Years	Years
27,100	0	0	120	200	200	NA	>25	NA

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

This measure is not recommended.

6.3 Wind

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

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

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

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

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

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

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

6.4 Combined Heat and Power Generation (CHP)

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

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

This measure is not recommended.

6.5 Biomass Power Generation

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

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

- Wood wastes not adulterated with chemicals, glues or adhesives
- Agricultural residues (corn stover, rice hulls or nut shells, manures, poultry litter, horse manure, etc) and/or methane gases from landfills
- Food wastes

- Municipal tree trimming and grass clipping wastes
- Paper and cardboard wastes
- Non adulterated construction wood wastes, pallets

The NJDEP evaluates biomass resources not identified in the RPS.

Examples of eligible facilities for a CORE incentive include:

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

* from NJOCE Website

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

6.6 Demand Response Curtailment

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

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

A PSE&G pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. The public library had a monthly average electricity demand of 47.2 kW and a maximum demand of 66.1 kW in 2008.

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

7.0 EPA PORTFOLIO MANAGER

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

The public library is considered an above average energy consumer per the Portfolio Manager with a Site Energy Usage Index (EUI) of 118 kBTU/ft^2/year. Several factors contribute to the unfavorable EUI, including, wasted energy from inefficient boilers, excessive heating and cooling during unoccupied times, inefficient cooling and lighting systems, etc. By implementing the measures discussed in this report, it is expected that the EUI can be reduced to approximately 88 kBTU/ft^2/year; the national average for this building type is 104 kBTU/ft^2/year. The EPA Portfolio Manager did not generate an energy rating score for this building because the building type (Library) is not eligible for an energy star rating.

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

The user name and password for the public library's EPA Portfolio Manager Account has been provided to Gerry Kerr of the Township of Kearny.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the main library and museum in Kearny, New Jersey identified potential ECMs for lighting upgrades, boiler replacement, occupancy sensors, night setback, and door seals. Potential annual savings of $16,300 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-1 Replace Boiler

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
33,000	0	0	1,700	4,500	3.1	2,200	7.3	6.8

* Incentive shown is per the New Jersey Smart Start Program, 2010 Gas Heating Application. Incentive is based on the purchase of 1,275 MBH steam boiler.

ECM-2 Night Setback

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
24,900	0	3,680	1,900	5,700	2.4	NA	4.4	NA

* The ECM is not eligible for New Jersey's Smart Start Incentive of the 2010 Application.

ECM – 4 Install Door Seals

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
600	0	90	70	200	2.3	NA	3.0	NA

* The ECM is not eligible for New Jersey's Smart Start Incentive of the 2010 Application.

ECM-5 Lighting Replacements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
35,300	10.3	33,170	0	5,700	1.4	3,500	6.2	5.6

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

ECM-6 Install Occupancy Sensors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
700	0.0	1,310	0	200	3.3	100	3.5	3.0

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

APPENDIX A

Utility Usage Analysis

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

Public Library - 318 Kearny Ave.
Account No.: 11 857 046 04
Meter No.: 728000311

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
January-08	8,080	31.2	$1,113.55	$236.99	$876.56	0.1378	0.1085	7.60
February-08	8,080	27.2	$1,126.44	$221.64	$904.80	0.1394	0.1120	8.15
March-08	8,640	28.8	$1,170.50	$227.88	$942.62	0.1355	0.1091	7.91
April-08	7,840	39.2	$1,109.43	$268.38	$841.05	0.1415	0.1073	6.85
May-08	10,720	50.4	$1,477.03	$311.99	$1,165.04	0.1378	0.1087	6.19
June-08	14,560	60.8	$3,019.56	$973.35	$2,046.21	0.2074	0.1405	16.01
July-08	12,880	62.4	$2,848.94	$997.19	$1,851.75	0.2212	0.1438	15.98
August-08	14,560	63.2	$3,189.11	$1,006.10	$2,183.01	0.2190	0.1499	15.92
September-08	13,840	65.6	$3,022.01	$1,032.78	$1,989.23	0.2184	0.1437	15.74
October-08	10,880	58.4	$1,786.39	$532.94	$1,253.45	0.1642	0.1152	9.13
November-08	7,680	30.4	$1,293.99	$423.90	$870.09	0.1685	0.1133	13.94
December-08	8,160	34.4	$1,351.93	$439.48	$912.45	0.1657	0.1118	12.78
Most Recent Yr	125,920	65.6	$22,508.88	$6,672.62	$15,836.26	0.1788	0.1258	12.09

Public Library (Museum) - 318 Kearny Ave.
Account No.: 11 857 047 01
Meter No.: 166003056

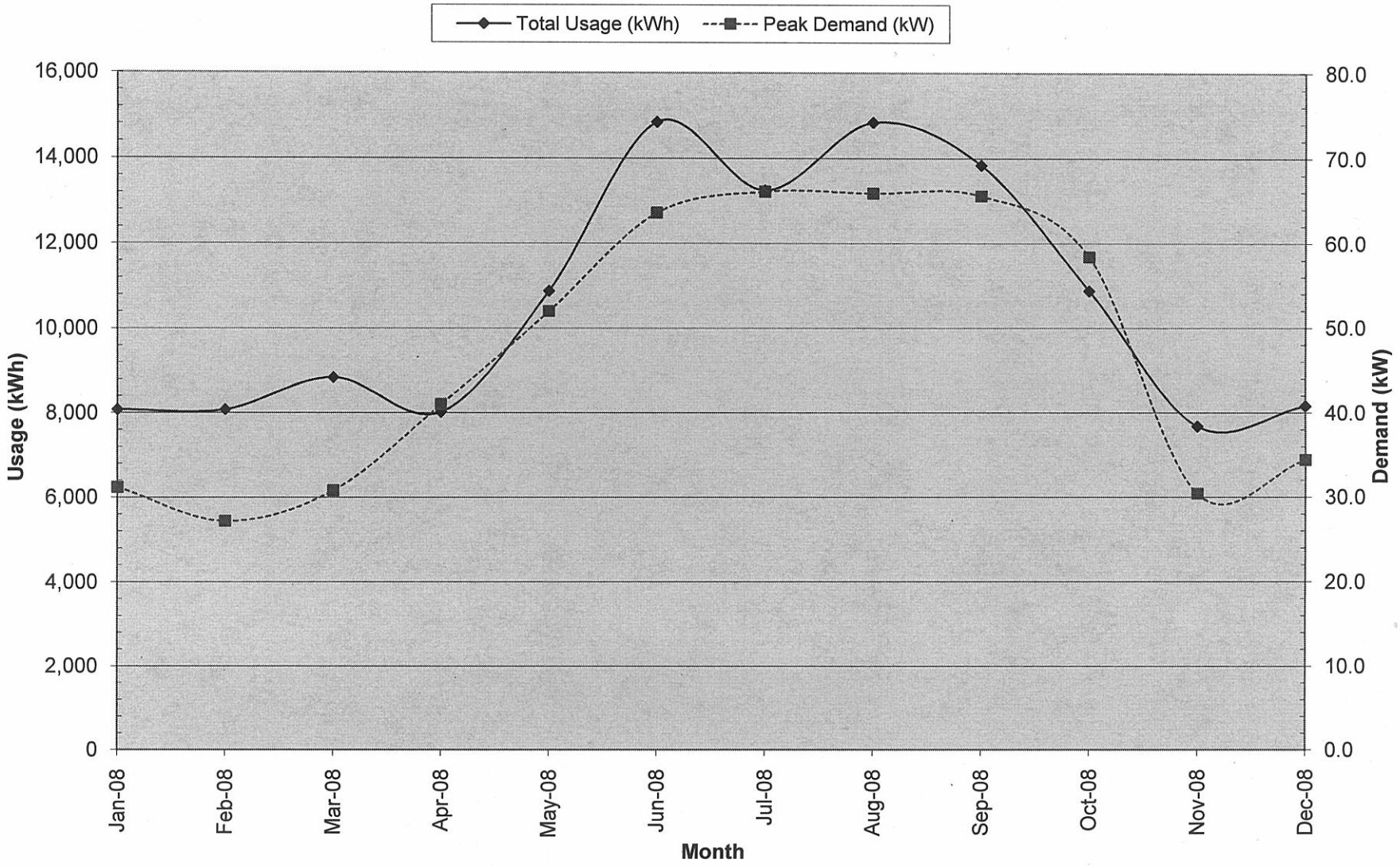
			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
January-08								
February-08								
March-08	200	2.0	$40.60	$14.64	$25.96	0.2030	0.1298	7.32
April-08	180	1.8	$37.32	$13.86	$23.46	0.2073	0.1303	7.70
May-08	158	1.6	$34.44	$13.08	$21.36	0.2180	0.1352	8.18
June-08	283	2.8	$95.14	$51.22	$43.92	0.3362	0.1552	18.29
July-08	370	3.7	$119.00	$61.67	$57.33	0.3216	0.1549	16.67
August-08	274	2.7	$95.77	$50.54	$45.23	0.3495	0.1651	18.72
September-08								
October-08								
November-08								
December-08								
Most Recent Yr	1,465	3.7	$422.27	$205.01	$217.26	0.2882	0.1483	14.04

* Electric bills not available for shaded months.

Total (Both Meters):

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
January-08	8,080	31.2	$1,113.55	$236.99	$876.56	0.1378	0.1085	7.60
February-08	8,080	27.2	$1,126.44	$221.64	$904.80	0.1394	0.1120	8.15
March-08	8,840	30.8	$1,211.10	$242.52	$968.58	0.1370	0.1096	7.87
April-08	8,020	41.0	$1,146.75	$282.24	$864.51	0.1430	0.1078	6.88
May-08	10,878	52.0	$1,511.47	$325.07	$1,186.40	0.1389	0.1091	6.25
June-08	14,843	63.6	$3,114.70	$1,024.57	$2,090.13	0.2098	0.1408	16.11
July-08	13,250	66.1	$2,967.94	$1,058.86	$1,909.08	0.2240	0.1441	16.02
August-08	14,834	65.9	$3,284.88	$1,056.64	$2,228.24	0.2214	0.1502	16.03
September-08	13,840	65.6	$3,022.01	$1,032.78	$1,989.23	0.2184	0.1437	15.74
October-08	10,880	58.4	$1,786.39	$532.94	$1,253.45	0.1642	0.1152	9.13
November-08	7,680	30.4	$1,293.99	$423.90	$870.09	0.1685	0.1133	13.94
December-08	8,160	34.4	$1,351.93	$439.48	$912.45	0.1657	0.1118	12.78
Most Recent Yr	127,385	66.1	$22,931.15	$6,877.63	$16,053.52	0.1800	0.1260	12.14

Electric Usage - Town of Kearny Public Library



Utility Data - Kearny Library(rev-2).xls
Electricity Chart

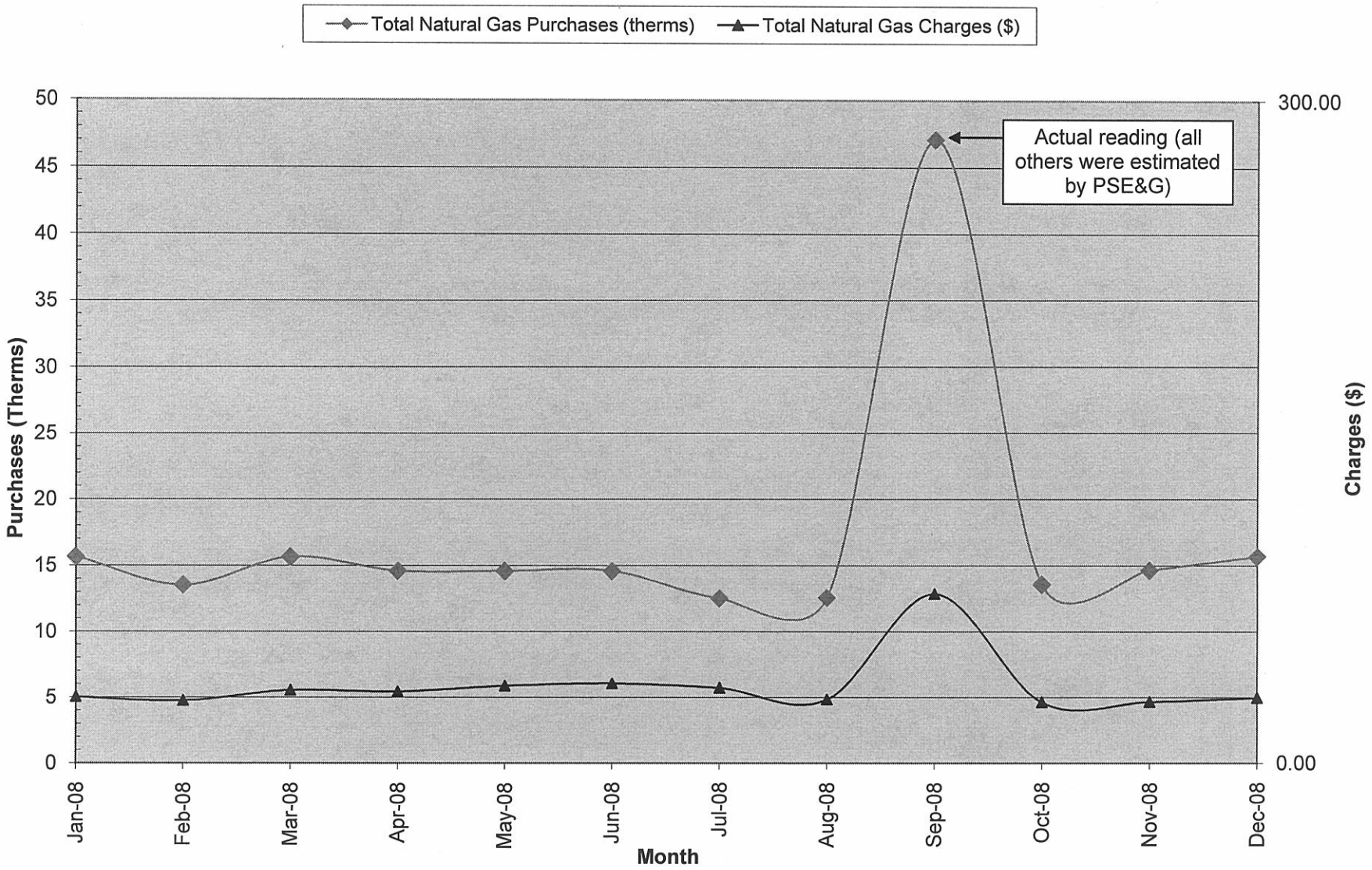
New Jersey BPU Energy Audit Program
CHA Project No.: 20711
Town of Kearny
PSE&G - Natural Gas Service

Public Library - 318 Kearny Ave.
Account No.: 11 857 046 04
Meter No.: 2905252

Month	Therms	Charges ($)	($/Therm)
January-08	16	30.24	1.932
February-08	14	28.56	2.108
March-08	16	33.31	2.128
April-08	15	32.65	2.235
May-08	15	35.28	2.418
June-08	15	36.30	2.487
July-08	13	34.32	2.736
August-08	13	29.04	2.308
September-08	47	77.20	1.639
October-08	14	27.84	2.049
November-08	15	27.99	1.911
December-08	16	29.80	1.902

Most Recent Yr	205	423	2.063

Natural Gas Usage - Town of Kearny Public Library



Utility Data - Kearny Library(rev-2).xls
Natural Gas Chart

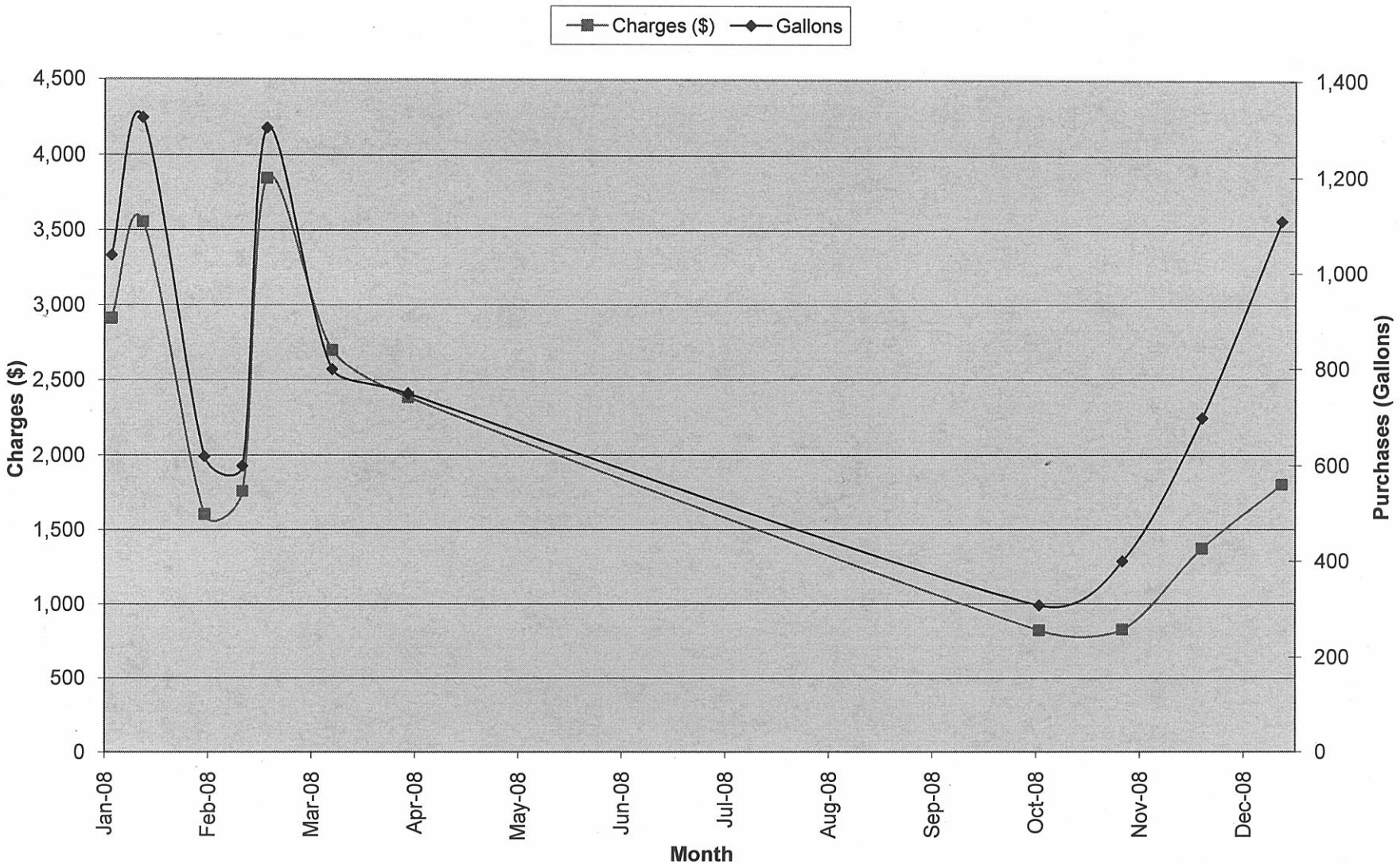
New Jersey BPU Energy Audit Program
CHA Project No.: 20711
Town of Kearny
National Term Inc. - #2 Fuel Oil

Public Library - 318 Kearny Ave.
Account No.: **n/a**
Meter No.: **n/a**

Month	Gallons	Charges ($)	($/Gallon)
1/15/08	1,037	2,912	2.81
1/24/08	1,321	3,557	2.69
2/11/08	620	1,604	2.59
2/22/08	600	1,759	2.93
2/29/08	1,300	3,847	2.96
3/19/08	800	2,697	3.37
4/10/08	750	2,388	3.18
10/10/08	308	824	2.67
11/3/08	400	829	2.07
11/26/08	699	1,371	1.96
12/19/08	1,109	1,801	1.62

Most Recent Yr	8,944	23,590	2.64

#2 Fuel Oil Usage - Town of Kearny Public Library



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.greateasterngas.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 Replace Boiler

Kearny NJ
CHA #20711
Building: Public Library

ECM-1 Boiler Replacement

Existing Fuel	#2 Oil
Proposed Fuel	#2 Oil

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 2.64		
Proposed Fuel Cost	$ 2.64		
Baseline Fuel Use	9,021	Gals #2	Based on historical utility data
Existing Boiler Plant Efficiency	68%		Estimated (boiler is olde and oversized, works on lower efficiency)
Baseline Boiler Load	850,785	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 138.7 Mbtu/Gals #2
Baseline Fuel Cost	$ 23,814		
Proposed Boiler Plant Efficiency	84%		New Boiler Efficiency
Proposed Fuel Use	7,302	Gals #2	Baseline Boiler Load / Proposed Efficiency / 138.7 Mbtu/Gals #2
Proposed Fuel Cost	$ 19,278		
Annual Savings	1,718	Gals #2	
Annual Savings	**$ 4,536**	**/yr**	

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

Kearny NJ
CHA #20711
Building: Public Library

ECM-1 Boiler Replacement

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Boiler Removal	1	ea		$ 1,100		$ -	$ 1,331	$ -	$ 1,331	
Oil Fired Steam Boiler (1,275MBH)	1	ea	$ 13,900	$ 4,425		$ 13,622	$ 5,354	$ -	$ 18,976	
Piping connections	1	ls	$ 450	$ 650		$ 441	$ 787	$ -	$ 1,228	
Flue Attachment	1	ls	$ 450	$ 240		$ 441	$ 290	$ -	$ 731	
Miscellaneous Electrical	1	ea	$ 300	$ 500		$ 294	$ 605	$ -	$ 899	
Misc controls	1	ls	$ 250	$ 500		$ 245	$ 605	$ -	$ 850	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

New Jersey Smart Start Incentive	QTY	UNIT	$ / UNIT	TOTAL SAVINGS	Cost W/O INCENTIVE	Cost W/ INCENTIVE
					$ -	$ -
<300 MBH	1275	MBH	$2	$2,231	$ 18,976	$ 16,745
						$ -
				$2,231	$18,976	$16,745

Total ECM Cost w/ Incentives	**$30,910**

$ 24,015	Subtotal	
$ 4,803	20%	Contingency
$ 4,323	15%	Contractor O&P
$ -		Engineering
$ 33,141	**Total**	

APPENDIX C

ECM-2 Night Setback

Kearny NJ
CHA #20711
Building: Public Library

ECM-2 Night Setback

Building Footprint	33,408	SF	Ex Occupied Clng Temp.	74	*F	Ex Occupied Htg Temp.	70	*F	**Heating Energy Savings**	1,920	**gallons**
Heating Efficiency	68%		Ex Unoccupied Clng Temp.	74	*F	Ex Unoccupied Htg Temp.	70	*F	**Cooling Energy Savings**	3,682	**kWh**
Cooling Efficiency	1.2	kW/ton	Prop Occupied Clng Temp.	74	*F	Prop Occupied Htg Temp.	70	*F			
Building Balance Temp.	60	*F	Prop Unoccupied Clng Temp.	80	*F	Prop Unoccupied Htg Temp.	60	*F			
Internal Gains	156,825	btu/h	Occupied Cooling UA	-11,557	btu/hr/°F	Occupied Heating UA	4,211	btu/hr/°F			
Unoc Internal Gain factor	0.03		Unoccupied Cooling UA	-8,232	btu/hr/°F	Unoccupied Heating UA	4,211	btu/hr/°F			
Ave Occ Internal Gain Factor	0.7		Cooling Occ Enthalpy Setpoint	27.5	Btu/lb						
			Cooling Unocc Enthalpy Setpoint	27.5	Btu/lb						

Heating and cooling energy are unrelated in this model. If the building being analyzed is not cooled, disregard cooling energy calculations

					EXISTING LOADS						PROPOSED LOADS									
					Occupied			Unoccupied			Occupied			Unoccupied						
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy gallons	Proposed Heating Energy gallons
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	-329,388	-499,475	-109,778	-234,601	-134,975	-4,705	-329,388	-499,475	-109,778	-185,211	-134,975	-4,705	0	0	0	0
97.5	42.5	3	1	2	-271,600	-346,858	-109,778	-193,443	-93,733	-4,705	-271,600	-346,858	-109,778	-144,053	-93,733	-4,705	136	127	0	0
92.5	39.5	34	13	21	-213,813	-277,486	-109,778	-152,285	-74,986	-4,705	-213,813	-277,486	-109,778	-102,895	-74,986	-4,705	1,252	1,146	0	0
87.5	36.6	131	48	83	-156,026	-210,427	-109,778	-111,127	-56,864	-4,705	-156,026	-210,427	-109,778	-61,737	-56,864	-4,705	3,730	3,322	0	0
82.5	34	500	185	315	-98,238	-150,305	-109,778	-69,969	-40,617	-4,705	-98,238	-150,305	-109,778	-20,579	-40,617	-4,705	10,249	8,691	0	0
77.5	31.6	620	229	391	-40,451	-94,808	-109,778	-28,811	-25,620	-4,705	-40,451	-94,808	-109,778	0	0	-4,705	7,920	5,791	0	0
72.5	29.2	664	245	419	0	0	-109,778	0	0	-4,705	0	0	-109,778	0	0	-4,705	2,887	2,887	0	0
67.5	27	854	315	539	10,527	13,874	-109,778	10,527	3,749	-4,705	10,527	13,874	-109,778	0	0	-4,705	2,691	2,944	0	0
62.5	24.5	927	342	585	31,581	41,623	-109,778	31,581	11,248	-4,705	31,581	41,623	-109,778	0	0	-4,705	1,251	1,526	0	0
57.5	21.4	600	221	379	52,635	69,372	-109,778	52,635	18,747	-4,705	52,635	69,372	-109,778	10,527	3,749	-4,705	0	0	296	67
52.5	18.7	610	225	385	73,688	97,120	-109,778	73,688	26,245	-4,705	73,688	97,120	-109,778	31,581	11,248	-4,705	0	0	534	301
47.5	16.2	611	225	386	94,742	124,869	-109,778	94,742	33,744	-4,705	94,742	124,869	-109,778	52,635	18,747	-4,705	0	0	769	535
42.5	14.4	656	242	414	115,796	152,617	-109,778	115,796	41,242	-4,705	115,796	152,617	-109,778	73,688	26,245	-4,705	0	0	1,076	825
37.5	12.6	1,023	378	645	136,850	180,366	-109,778	136,850	48,741	-4,705	136,850	180,366	-109,778	94,742	33,744	-4,705	0	0	2,068	1,677
32.5	10.7	734	271	463	157,904	208,115	-109,778	157,904	56,240	-4,705	157,904	208,115	-109,778	115,796	41,242	-4,705	0	0	1,764	1,484
27.5	8.6	334	123	211	178,957	235,863	-109,778	178,957	63,738	-4,705	178,957	235,863	-109,778	136,850	48,741	-4,705	0	0	930	803
22.5	6.8	252	93	159	200,011	263,612	-109,778	200,011	71,237	-4,705	200,011	263,612	-109,778	157,904	56,240	-4,705	0	0	798	702
17.5	5.5	125	46	79	221,065	291,360	-109,778	221,065	78,735	-4,705	221,065	291,360	-109,778	178,957	63,738	-4,705	0	0	444	396
12.5	4.1	47	17	30	242,119	319,109	-109,778	242,119	86,234	-4,705	242,119	319,109	-109,778	200,011	71,237	-4,705	0	0	185	167
7.5	2.6	22	8	14	263,173	346,858	-109,778	263,173	93,733	-4,705	263,173	346,858	-109,778	221,065	78,735	-4,705	0	0	95	86
2.5	1	13	5	8	284,227	374,606	-109,778	284,227	101,231	-4,705	284,227	374,606	-109,778	242,119	86,234	-4,705	0	0	61	56
-2.5	0	0	0	0	305,280	402,355	-109,778	305,280	108,730	-4,705	305,280	402,355	-109,778	263,173	93,733	-4,705	0	0	0	0
-7.5	-1.5	0	0	0	326,334	430,103	-109,778	326,334	116,228	-4,705	326,334	430,103	-109,778	284,227	101,231	-4,705	0	0	0	0
TOTALS		**8,760**	**3,233**	**5,527**													**30,116**	**26,433**	**9,021**	**7,100**

Existing Building Ventilation & Infiltration (occ)	**5,139**	**cfm**
Overheat Ventilation Factor	**1.00**	
Additional ventilation to offset overheat	**0**	**cfm**
Existing Building Ventilation & Infiltration (unocc)	**1,389**	**cfm**

Kearny NJ
CHA #20711
Building: Public Library

Reconcile Thermal Model

Building Footprint	33,408	SF	Ex Occupied Clng Temp.	74	*F	Ex Occupied Htg Temp.	70 *F
Heating Efficiency	68%		Ex Unoccupied Clng Temp.	74	*F	Ex Unoccupied Htg Temp.	70 *F
Cooling Efficiency	1.20	kW/ton	Occupied Cooling UA	(11,557)	btu/hr/*F	Occupied Heating UA	4,211 btu/hr/*F
Internal Gains	156,825	btu/h	Unoccupied Cooling UA	(8,232)	btu/hr/*F	Unoccupied Heating UA	4,211 btu/hr/*F
Unoc Internal Gain factor	0.03		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)	No						

Heating and cooling energy are unrelated in this model. If the building being analyzed is not cooled, disregard cooling energy calculations

					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	Existing Heating Energy gallons
A		B	C	D	E	F	G	H	I	J	K	L	M	M
102.5	49.1	0	0	0	-329,388	-499,475	-109,778	-234,601	-134,975	-4,705	0	0	0	0
97.5	42.5	3	1	2	-271,600	-346,858	-109,778	-193,443	-93,733	-4,705	0	136	136	0
92.5	39.5	34	13	21	-213,813	-277,486	-109,778	-152,285	-74,986	-4,705	0	1,252	1,252	0
87.5	36.6	131	48	83	-156,026	-210,427	-109,778	-111,127	-56,864	-4,705	0	3,730	3,730	0
82.5	34.0	500	185	315	-98,238	-150,305	-109,778	-69,969	-40,617	-4,705	0	10,249	10,249	0
77.5	31.6	620	229	391	-40,451	-94,808	-109,778	-28,811	-25,620	-4,705	0	7,920	7,920	0
72.5	29.2	664	245	419	0	0	-109,778	0	0	-4,705	0	2,887	2,887	0
67.5	27.0	854	315	539	10,527	13,874	-109,778	10,527	3,749	-4,705	0	2,691	2,691	0
62.5	24.5	927	342	585	31,581	41,623	-109,778	31,581	11,248	-4,705	0	1,251	1,251	0
57.5	21.4	600	221	379	52,635	69,372	-109,778	52,635	18,747	-4,705	0	0	0	296
52.5	18.7	610	225	385	73,688	97,120	-109,778	73,688	26,245	-4,705	0	0	0	534
47.5	16.2	611	225	386	94,742	124,869	-109,778	94,742	33,744	-4,705	0	0	0	769
42.5	14.4	656	242	414	115,796	152,617	-109,778	115,796	41,242	-4,705	0	0	0	1,076
37.5	12.6	1,023	378	645	136,850	180,366	-109,778	136,850	48,741	-4,705	0	0	0	2,068
32.5	10.7	734	271	463	157,904	208,115	-109,778	157,904	56,240	-4,705	0	0	0	1,764
27.5	8.6	334	123	211	178,957	235,863	-109,778	178,957	63,738	-4,705	0	0	0	930
22.5	6.8	252	93	159	200,011	263,612	-109,778	200,011	71,237	-4,705	0	0	0	798
17.5	5.5	125	46	79	221,065	291,360	-109,778	221,065	78,735	-4,705	0	0	0	444
12.5	4.1	47	17	30	242,119	319,109	-109,778	242,119	86,234	-4,705	0	0	0	185
7.5	2.6	22	8	14	263,173	346,858	-109,778	263,173	93,733	-4,705	0	0	0	95
2.5	1.0	13	5	8	284,227	374,606	-109,778	284,227	101,231	-4,705	0	0	0	61
-2.5	0.0	0	0	0	305,280	402,355	-109,778	305,280	108,730	-4,705	0	0	0	0
-7.5	-1.5	0	0	0	326,334	430,103	-109,778	326,334	116,228	-4,705	0	0	0	0
TOTALS		**8,760**	**3,233**	**5,527**								**30,116**	**30,116**	**9,021**
		5,954												

Existing Building Ventilation & Infiltration (occ)	**5,139**	**cfm**
Overheat Ventilation Factor	**1.00**	
Additional ventilation to offset overheat	**0**	**cfm**
Existing Building Ventilation & Infiltration (unocc)	**1,389**	**cfm**
Economizer Ventilation (from AHU's)	**3,750**	**cfm**

Energy Use Indices (calculated)

	Base Case	
Heating	9,021	gallons
Target ->	8,944	
	100.9%	

	Base Case
Cooling	30,116
Target ->	0
	#DIV/0!

HEAT GAIN/LOSS WORKSHEET

Project Name:	Kearny NJ	**Project No.:**	CHA #20711		
Location		**Site Elevation:**	460 **Feet**	**Specific Volume**	14.00 CF/#
Building Name	Public Library	**Date:**			
Engineer:	ND				

Building/Facility Designation Entire building

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

ENVELOPE DESCRIPTIONS (Descriptions are from Interior to Exterior)

Walls (Select One - Type X)

		R Value	Wall Type
	Steel Siding, 4" Insulation, Steel Siding	15.2	1
	Plaster or Gypsum, frame construction, 5" Insulation, 1" stucco	18.2	1
	4" WH CMU, 1" Insulation, Finished Exterior	5.2	2
	Plaster or Gypsum, frame construction, 3" Insulation, 8" LW CMU	7.8	5
	4" Face Brick, 2" Concrete, 1" Insulation, Exterior Finish	5.1	12
	4" Face Brick, 4" Concrete, 1" Insulation, Exterior Finish	4.0	11
	Interior Finish, 2" Insulation, 8" CMU, 4" Face Brick	10.9	16
	Finished Surface, 8" LW CMU (filled), Air Space, 4" Face Brick	11.1	16
	Stucco or Gypsum, 2.5" Insul, Face Brick	14.3	10
	4" Block, 1" insulation, 8" Block	19.9	16
x	Brick, plaster	6.0	

Roofs (Select One)

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

Windows (Select One)

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

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

BUILDING CHARACTERISTICS

Roof Area	15,840 SF		
Occupied Area	33,408 SF	**Return Plenum?**	n

	Gross Wall Length	Average Wall Height	Ceiling Height	Window Area	Door Area	Net Wall Area
North Exposure	192 Ft	18.0 Ft	14.0 Ft	518 SF	0 SF	2,938 SF
East Exposure	178 Ft	16.4 Ft	12.0 Ft	172 SF	67 SF	2,674 SF
South Exposure	192 Ft	18.0 Ft	14.0 Ft	532 SF	21 SF	2,903 SF
West Exposure	178 Ft	16.4 Ft	12.0 Ft	172 SF	42 SF	2,698 SF

Forced Ventilation 3,750 cfm

HEAT GAIN/LOSS WORKSHEET

Project Name:	Kearny NJ	Project No.:	CHA #20711		
Location		Site Elevation:	460 Feet	Specific Volume	14.00 CF/#
Building Name	Public Library	Date:			
Engineer:	ND				

Building/Facility Designation: Entire building

COOLING HEAT GAINS TO THE ROOM - SENSIBLE

SOLAR GAINS

WINDOWS	AREA (SF)	SHGF	Shade Coef	Cooling Load Factor		Solar Heat Gain
North Exposure	518	38 btu/h/sf	0.8	0.75	Glass Type C	11,810 Btu/hr
East Exposure	172	216 btu/h/sf	0.8	0.31	Glass Type C	9,208 Btu/hr
South Exposure	532	109 btu/h/sf	0.8	0.58	Glass Type C	26,906 Btu/hr
West Exposure	172	216 btu/h/sf	0.8	0.29	Glass Type C	8,614 Btu/hr
						56,539 Btu/h

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain
North Exposure	2,170	0.17	20 *F	1.0	7,233 Btu/hr
East Exposure	1,898	0.17	39 *F	1.0	12,334 Btu/hr
South Exposure	2,135	0.17	27 *F	1.0	9,608 Btu/hr
West Exposure	1,922	0.17	22 *F	1.0	7,048 Btu/hr
Roof	15,840	0.07	73 *F	1.0	77,473 Btu/hr
Fenestration	1,394	0.50	17 *F		11,847 Btu/hr
Doors	130	0.14	27 *F		488 Btu/hr
Ceiling	33,408	0.14	0 *F		0 Btu/hr
Partition		0.05	0 *F		0 Btu/hr
Floor	33,408	0.04	0 *F		0 Btu/hr
					126,032 Btu/h

INTERNAL HEAT GAINS

							Room Heat Gain
Lights	1.00 w/sf x	33,408 Occ Area =	33.4 kW x 3.4x		1.0 RAF =		114,022 Btu/h
Plug Load	0.25 w/sf x	33,408 Occ Area =	8.4 kW x 3.4x		1.0 RAF =		28,505 Btu/h
People	30 people x	255 btu/person x	37% time in space =				2,831 Btu/h
Computer Work Stations		28 Units x	120 W/Unit x	3414 =			11,468 Btu/h
Equipment		kW x 3.413 =					0 Btu/h
Misc.							0 Btu/h
							156,825 Btu/h

VENTILATION AND INFILTRATION

		Infiltration Factor	Perimeter Ratio	Coef	Temp. Diff.	Room Heat Gain
Walls	8,125 SF	0.10 CFM/SF		1.04	17 *F	15,570 Btu/h
Doors	130 SF	0.40 CFM/LF	0.72 LF/SF	1.04	17 *F	713 Btu/h
Windows	1,394 SF	0.20 CFM/LF	0.83 LF/SF	1.04	17 *F	4,411 Btu/h
Ventilation	3,750 cfm			1.04	17 *F	71,866 Btu/h
						92,560 Btu/h

COOLING HEAT GAINS TO THE RA PLENUM - SENSIBLE

4,950

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain
North Exposure	768	0.17	20	1.0	2,560 Btu/hr
East Exposure	776	0.17	39	1.0	5,044 Btu/hr
South Exposure	768	0.17	27	1.0	3,456 Btu/hr
West Exposure	776	0.17	22	1.0	2,845 Btu/hr
Roof	15,840	0.07	73	0.0	0 Btu/hr
					13,905 Btu/h

INTERNAL HEAT GAINS

Lights	1.00 w/sf x	33,408 Occ Area =	33.4 kW x3413x		0.00 RAF =	0 Btu/h
Misc.						0 Btu/h
						0 Btu/h

SENSIBLE HEAT GAINS - TEMP. DEPENDENT	
Solar	56,539
Conduction to Room	126,032
Conduction to Plenum	13,905
Ventilaton and Infiltration	92,560
Sub Total	289,037

SENSIBLE HEAT GAINS - TEMP. INDEPENDENT	
Internal Gains to Room	156,825
Internal Gains to Plenum	0
Sub Total	156,825

HEAT GAIN/LOSS WORKSHEET

Project Name:	Kearny NJ	**Project No.:**	CHA #20711		
Location		**Site Elevation:**	460 Feet	**Specific Volume**	14.00 CF/#
Building Name	Public Library	**Date:**			
Engineer:	ND				

Building/Facility Designation Entire building

LATENT COOLING LOADS

Infiltration

		Infiltration Factor	Air Density	Humidity Ratio Dif.	Room Heat Gain
Walls	18,928 SF	0.10 CFM/SF	4,629	0.0042 ##/##	37,172 Btu/h
Doors	130 SF	0.40 CFM/LF	4,629	0.0042 ##/##	731 Btu/h
Windows	1,394 SF	0.20 CFM/LF	4,629	0.0042 ##/##	4,520 Btu/h
Ventilation	3,750 cfm		4,629	0.0042 ##/##	73,644 Btu/h
People	30 people	0.37 time in space		250 Btu/hr/person	2,775 Btu/h
					118,841 Btu/h

Cooling Load Summary

	Sensible	Latent	Total		
Temperature Dependent Gains	289,037	118,841	407,878		
Temperature Indep. Gains	156,825		156,825	SHR=	0.79
Total	445,862	118,841	564,703		

Building Cooling Load 47.1 Tons at 710 SF/Ton

Building Air Flow to Condition Space based on a 12°F Temp Rise is **34,486 CFM** / **1.03 CFM/sf**

HEATING CALCULATION

CONDUCTION

	NET AREA (SF)	U-VALUE	Heating Load Temp. Dif.	Room Heat Gain
North Exposure	2,938	0.17	56	27,421 Btu/h
East Exposure	2,674	0.17	56	24,954 Btu/h
South Exposure	2,903	0.17	56	27,095 Btu/h
West Exposure	2,698	0.17	56	25,182 Btu/h
Fenestration	1,394	0.50	56	39,026 Btu/h
Roof	15,840	0.07	56	59,432 Btu/h
Doors	130	0.14	56	1,013 Btu/h
Ceiling	33,408	0.14	0	0 Btu/h
Partition	0	0.05	0	0 Btu/h
Floor	15,840	0.04	50	31,680 Btu/h

Ventilation and Infiltration

		Infiltration Factor	Coef	Temp. Difference	Air Flow	Room Heat Gain
Walls	11,213 SF	0.10 CFM/SF	1.04	56	1,121 cfm	65,542 Btu/h
Doors	130 SF	0.40 CFM/LF	1.04	56	37 cfm	2,174 Btu/h
Windows	1,394 SF	0.20 CFM/LF	1.04	56	230 cfm	13,454 Btu/h
Ventilation Load	3,750 cfm		1.04	56	3,750 cfm	236,735 Btu/h
Total Ventilation & Infiltration Load					5,139 cfm	317,905 Btu/h

Building Heating Load	**553,708**	**btu/h**
		16.6 btu/sf

Kearny NJ
CHA #20711
Building: Public Library Geometry is done

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
East	6.0	7.0	1	42.0	26.0	
	3.5	7.0	1	24.5	21.0	
				0.0	0.0	
			Sub-total	66.5	47.0	
South	3.0	7.0	1	21.0	20.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	21.0	20.0	
West	6.0	7.0	1	42.0	26.0	
				0.0	0.0	
			Sub-total	42.0	26.0	
			Total	**129.5**	**93.0**	LF/SF 0.72

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet		
North	72.0	16.0	1	1152.0	176.0		All wall quantities must remain equal to 1
	48.0	24.0	1	1152.0	144.0		
	72.0	16.0	1	1152.0	176.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	192.0			3456.0	496.0	18.0	Average height wall automatically linked to
East	68.0	16.0	1	1088.0	168.0		
	30.0	24.0	1	720.0	108.0		
	68.0	12.0	1	816.0	160.0		
	12.0	24.0	1	288.0	72.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	178.0			2912.0	508.0	16.4	Average height wall automatically linked to
South	72.0	16.0	1	1152.0	176.0		
	48.0	24.0	1	1152.0	144.0		
	72.0	16.0	1	1152.0	176.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	192.0			3456.0	496.0	18.0	Average height wall automatically linked to
West	68.0	16.0	1	1088.0	168.0		
	30.0	24.0	1	720.0	108.0		
	68.0	12.0	1	816.0	160.0		
	12.0	24.0	1	288.0	72.0		
				0.0	0.0	Ave. height	
	178.0			2912.0	508.0	16.4	Average height auto linked to block load sheet

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North	5.0	7.0	2	70.0	48.0	
	4.0	7.0	3	84.0	66.0	
	5.0	7.0	6	210.0	144.0	
	5.0	7.0	2	70.0	48.0	
	4.0	7.0	3	84.0	66.0	
				0.0	0.0	
			Sub-total	518.0	372.0	
East	5.0	7.0	2	70.0	48.0	
	5.0	4.0	1	20.0	18.0	
	3.7	7.0	1	25.9	21.4	
	4.0	7.0	2	56.0	44.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	171.9	131.4	
South	5.0	7.0	2	70.0	48.0	
	4.0	7.0	3	84.0	66.0	
	2.0	7.0	16	224.0	288.0	
	5.0	7.0	2	70.0	48.0	
	4.0	7.0	3	84.0	66.0	
				0.0	0.0	
			Sub-total	532.0	516.0	
West	5.0	7.0	2	70.0	48.0	
	5.0	4.0	1	20.0	18.0	
	3.7	7.0	1	25.9	21.4	
	4.0	7.0	2	56.0	44.0	
				0.0	0.0	
			Sub-total	171.9	131.4	
			Total	**1393.8**	**1150.8**	LF/SF 0.83

Kearny NJ
CHA #20711
Building: Public Library

ECM-2 Night Setback

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.		
						$ -	$ -	$ -	$ -	
Programmable thermostat	4	ea	$ 100	$ 150	$ -	$ 392	$ 726	$ -	$ 1,118	
Boiler controller (steam ops)	1	ea	$ 1,800	$ 980	$ -	$ 1,764	$ 1,186	$ -	$ 2,950	per temperature program
Install Thermostatic valves	36	ea	$85	$135		$ 2,999	$ 5,881	$ -	$ 8,879	
Split system controller and acessories	1	ls	$2,500	$1,500		$ 2,450	$ 1,815	$ -	$ 4,265	
Misc	1	ls	$250	$500		$ 245	$ 605	$ -	$ 850	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$18,062	Subtotal
$3,612	20% Contingency
$3,251	Contractor 15% O&P
$0	0% Engineering
$24,926	**Total**

APPENDIX D

ECM-3 Replace Window AC Units

Kearny NJ
CHA #20711
Building: Public Library

ECM-3 Replace Window AC units w/ Ductless Splits
(utilize remote outdoor condensers)

ASSUMPTIONS			Comments
Electric Cost	$0.180	/ kWh	
Average run hours per Week	55	Hours	Unit is manually turned on (even if after hours)
Space Balance Point	55	F	
Space Temperature Setpoint	70	deg F	setpoint
Avg. BTU / Hr Rating of existing AC unit	12,000	Btu / Hr	(typical size for cooling office spaces in this type of building)
Average EER	7.0		Units appear to average 10 years old, EER was 8 when new

Item	Value	Units	Comments
Total Number of Units	6		
Existing Annual Electric Usage	3,189	kWh	
Proposed EER	14.4		New ductless mini-splits (per manufacturer)
Proposed Annual Electric Usage	1,550	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below
Proposed kW	5	kWh	

ANNUAL SAVINGS		
Annual Savings	3,184	kWh
Annual Cost Savings	$573	

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

Total	8,760	639	49%	310

Kearny NJ
CHA #20711
Building: Public Library

ECM-3 Replace Window AC units w/ Ductless Splits

Two pairs of two window AC can be use common condensing units
Other two will have individual condensing units

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Window AC Unit Removal	6	LS		$25		$ -	$ 182	$ -	$ 182	
Indoor wall unit	6	ea	$745	$210		$ 4,381	$ 1,525	$ -	$ 5,905	
Condensing unit	4	ea	$1,380	$290		$ 5,410	$ 1,404	$ -	$ 6,813	
Electrical	4	ea	$80	$120		$ 314	$ 581	$ -	$ 894	
Misc	4	LS	$20	$30		$ 78	$ 145	$ -	$ 224	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 14,018	Subtotal
$ 2,804	20% Contingency
$ 2,103	15% Contractor O&P
$ -	0% Engineering
$ 18,924	**Total**

APPENDIX E

ECM-4 Install Door Seals

Kearny NJ
CHA #20711
Building: Public Library

ECM-4 Install Door Seals

Existing: Doors or Door Seals result in excessive heat loss and infiltration
Proposed: Install new doors and/or weatherstripping to eliminate door infiltration

Building Footprint	33,408	SF	Ex Occupied Clng Temp.	74	*F	Ex Occupied Htg Temp.	70	*F
Heating System Efficiency	68%		Ex Unoccupied Clng Temp.	74	*F	Ex Unoccupied Htg Temp.	70	*F
Cooling System Efficiency	1.20	kW/ton	Prop Occupied Clng Temp.	74	*F	Prop Occupied Htg Temp.	70	*F
Internal Gains	156,825	btu/h	Prop Unoccupied Clng Temp.	74	*F	Prop Unoccupied Htg Temp.	70	*F
Unoc Internal Gain factor	0.03		Occupied Cooling UA	-11,557	btu/hr/°F	Occupied Heating UA	4,211	btu/hr/°F
Ave Occ Internal Gain Factor	0.7		Unoccupied Cooling UA	-8,232	btu/hr/°F	Unoccupied Heating UA	4,211	btu/hr/°F
			Cooling Occ Enthalpy Setpoint	27.5	Btu/lb			
			Cooling Unocc Enthalpy Setpoint	27.5	Btu/lb			

					EXISTING LOADS						PROPOSED LOADS									
					Occupied			Unoccupied			Occupied			Unoccupied						
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy lbs	Proposed Heating Energy lbs
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	-329,388	-499,475	-109,778	-234,601	-134,975	-4,705	-329,388	-496,582	-109,778	-234,601	-132,082	-4,705	0	0	0	0
97.5	42.5	3	1	2	-271,600	-346,858	-109,778	-193,443	-93,733	-4,705	-271,600	-344,849	-109,778	-193,443	-91,724	-4,705	136	135	0	0
92.5	39.5	34	13	21	-213,813	-277,486	-109,778	-152,285	-74,986	-4,705	-213,813	-275,879	-109,778	-152,285	-73,379	-4,705	1,252	1,246	0	0
87.5	36.6	131	48	83	-156,026	-210,427	-109,778	-111,127	-56,864	-4,705	-156,026	-209,208	-109,778	-111,127	-55,646	-4,705	3,730	3,714	0	0
82.5	34.0	500	185	315	-98,238	-150,305	-109,778	-69,969	-40,617	-4,705	-98,238	-149,434	-109,778	-69,969	-39,747	-4,705	10,249	10,206	0	0
77.5	31.6	620	229	391	-40,451	-94,808	-109,778	-28,811	-25,620	-4,705	-40,451	-94,259	-109,778	-28,811	-25,071	-4,705	7,920	7,886	0	0
72.5	29.2	664	245	419	0	0	-109,778	0	0	-4,705	0	0	-109,778	0	0	-4,705	2,887	2,887	0	0
67.5	27.0	854	315	539	10,527	13,874	-109,778	10,527	3,749	-4,705	10,527	13,794	-109,778	10,527	3,669	-4,705	2,691	2,693	0	0
62.5	24.5	927	342	585	31,581	41,623	-109,778	31,581	11,248	-4,705	31,581	41,382	-109,778	31,581	11,007	-4,705	1,251	1,259	0	0
57.5	21.4	600	221	379	52,635	69,372	-109,778	52,635	18,747	-4,705	52,635	68,970	-109,778	52,635	18,345	-4,705	0	0	411	407
52.5	18.7	610	225	385	73,688	97,120	-109,778	73,688	26,245	-4,705	73,688	96,558	-109,778	73,688	25,683	-4,705	0	0	741	736
47.5	16.2	611	225	386	94,742	124,869	-109,778	94,742	33,744	-4,705	94,742	124,146	-109,778	94,742	33,021	-4,705	0	0	1,066	1,059
42.5	14.4	656	242	414	115,796	152,617	-109,778	115,796	41,242	-4,705	115,796	151,733	-109,778	115,796	40,358	-4,705	0	0	1,492	1,483
37.5	12.6	1,023	378	645	136,850	180,366	-109,778	136,850	48,741	-4,705	136,850	179,321	-109,778	136,850	47,696	-4,705	0	0	2,869	2,853
32.5	10.7	734	271	463	157,904	208,115	-109,778	157,904	56,240	-4,705	157,904	206,909	-109,778	157,904	55,034	-4,705	0	0	2,447	2,434
27.5	8.6	334	123	211	178,957	235,863	-109,778	178,957	63,738	-4,705	178,957	234,497	-109,778	178,957	62,372	-4,705	0	0	1,290	1,284
22.5	6.8	252	93	159	200,011	263,612	-109,778	200,011	71,237	-4,705	200,011	262,085	-109,778	200,011	69,710	-4,705	0	0	1,107	1,102
17.5	5.5	125	46	79	221,065	291,360	-109,778	221,065	78,735	-4,705	221,065	289,673	-109,778	221,065	77,048	-4,705	0	0	615	612
12.5	4.1	47	17	30	242,119	319,109	-109,778	242,119	86,234	-4,705	242,119	317,261	-109,778	242,119	84,386	-4,705	0	0	256	255
7.5	2.6	22	8	14	263,173	346,858	-109,778	263,173	93,733	-4,705	263,173	344,849	-109,778	263,173	91,724	-4,705	0	0	132	131
2.5	1.0	13	5	8	284,227	374,606	-109,778	284,227	101,231	-4,705	284,227	372,437	-109,778	284,227	99,062	-4,705	0	0	85	84
-2.5	0.0	0	0	0	305,280	402,355	-109,778	305,280	108,730	-4,705	305,280	400,025	-109,778	305,280	106,400	-4,705	0	0	0	0
-7.5	-1.5	0	0	0	326,334	430,103	-109,778	326,334	116,228	-4,705	326,334	427,612	-109,778	326,334	113,737	-4,705	0	0	0	0
TOTALS		**8,760**	**3,233**	**5,527**													**30,116**	**30,027**	**12,512**	**12,441**

Existing Building Ventilation & Infiltration	5,139	**cfm**
Existing Unocc. Building Ventilation & Infiltration	1,389	**cfm**
Door infiltration	37	**cfm**
Proposed reduction (80%)	30	**cfm**
Proposed Building Ventilation & Infiltration	5,109	**cfm**
Proposed Unocc. Building Ventilation & Infiltration	1,359	**cfm**

Savings	**70**	**therms**
	89	**kWh**

Kearny NJ
CHA #20711
Building: Public Library

ECM-4 Install Door Seals

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.		
									$ -	
Fix door seals	1	ea	$ 40	$ 180	$ -	$ 39	$ 218	$ -	$ 257	
Door Seals (double door - 6' x 7')	1	ea	$ 65	$ 100	$ -	$ 64	$ 121	$ -	$ 185	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 442	Subtotal
$ 88	20% Contingency
$ 80	15% Contractor O&P
$ -	0% Engineering
$ 610	**Total**

APPENDIX F

ECM-5 Lighting Replacements

Energy Audit of Kearny, NJ
CHA Project No. 20711 - Public Library
ECM-5 Lighting Replacements

0 $0.126 $/kWh
$12.14 $/kW

Field Code	Area Description	EXISTING CONDITIONS: No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	RETROFIT CONDITIONS: Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	COST & SAVINGS ANALYSIS: Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
230	Front Desk Lights (24 hours)	2	HB400MH1	MH400/1	458	0.9	Breaker	8760	8,024	2	HB250IND1	IND250	265	0.5	Breaker	8,760	4,643	3,381	0.4	$ 482.28	$ 1,487.50	$140	3.1	2.8
230	Primary Library Lighting	41	HB400MH1	MH400/1	458	18.8	Breaker	2834	53,217	41	HB250IND1	IND250	265	10.9	Breaker	2,834	30,791	22,425	7.9	$ 3,978.37	$ 30,493.75	$2,870	7.7	6.9
X1	Front Vestibule	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2834	13	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2,834	13	-	-	$ -	$ -	$0		
80	Front Vestibule Stairs	3	42 CF 1	CF42/1-L	48	0.1	SW	2834	408	3	42 CF 1	CF42/1-L	48	0.1	SW	2,834	408	-	-	$ -	$ -	$0		
14	Under Front Stair Landing	1	CIRC 22/32 C F 2 (MAG)	FC22/32/1	58	0.1	SW	2834	164	1	CIRC 22/32 C F 2 (MAG)	FC22/32/1	58	0.1	SW	2,834	164	-	-	$ -	$ -	$0		
71	Under Front Stair Closet	1	I 60	I60/1	60	0.1	SW	1000	60	1	CF 26	CFQ26/1-L	27	0.0	SW	1,000	27	33	0.0	$ 8.97	$ 6.25	$0	0.7	0.7
5	Front Women's Bathroom	3	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.2	SW	2834	510	3	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.2	SW	2,834	510	-	-	$ -	$ -	$0		
71	Front Women's Bathroom Closet	1	I 60	I60/1	60	0.1	Pull String	1000	60	1	CF 26	CFQ26/1-L	27	0.0	Pull String	1,000	27	33	0.0	$ 8.97	$ 6.25	$0	0.7	0.7
55	Front Men's Bathroom	2	2T 17 R F 3 (ELE)	F23ILL	47	0.1	SW	2834	266	2	2T 17 R F 3 (ELE)	F23ILL	47	0.1	SW	2,834	266	-	-	$ -	$ -	$0		
101	Front Men's Bathroom Closet	1	I 40	I40/1	40	0.0	Pull String	1000	40	1	CF 13	CFQ13/1-L	15	0.0	Pull String	1,000	15	25	0.0	$ 6.79	$ 6.75	$0	1.0	1.0
43	Front Computer/Reference Section	1	DC 42 P CF 8	CF42/8-L	376	0.4	SW	2834	1,066	1	DC 42 P CF 8	CF42/8-L	376	0.4	SW	2,834	1,066	-	-	$ -	$ -	$0		
204	Middle Library Hallway	3	S 96 C F 1 (MAG) 8'	F81EHS	125	0.4	SW	2834	1,063	3	S 96 C F 1 (MAG) 8'	F81EHS	125	0.4	SW	2,834	1,063	-	-	$ -	$ -	$0		
71	Rear Closet	1	I 60	I60/1	60	0.1	SW	2834	170	1	CF 26	CFQ26/1-L	27	0.0	SW	2,834	77	94	0.0	$ 16.59	$ 6.25	$0	0.4	0.4
X1	Children's Department	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2834	9	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2,834	9	-	-	$ -	$ -	$0		
234	Children's Department	2	SP 100 W I 1	i100/1	100	0.2	SW	2834	567	2	SP 42 1	CF42/1-L	48	0.1	SW	2,834	272	295	0.1	$ 52.29	$ 40.50	$0	0.8	0.8
179	Rear Vestibule	1	W 32 C F 2 (ELE)	F42LL	60	0.1	SW	2834	170	1	W 32 C F 2 (ELE)	F42LL	60	0.1	SW	2,834	170	-	-	$ -	$ -	$0		
X1	Rear Vestibule	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2834	13	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2,834	13	-	-	$ -	$ -	$0		
71	Under Rear Stair Landing	3	I 60	I60/1	60	0.2	Pull String	2834	510	3	CF 26	CFQ26/1-L	27	0.1	Pull String	2,834	230	281	0.1	$ 49.77	$ 18.75	$0	0.4	0.4
14	Under Rear Stair Landing	1	CIRC 22/32 C F 2 (MAG)	FC22/32/1	58	0.1	SW	2834	164	1	CIRC 22/32 C F 2 (MAG)	FC22/32/1	58	0.1	SW	2,834	164	-	-	$ -	$ -	$0		
80	Under Rear Stair Landing	1	42 CF 1	CF42/1-L	48	0.0	SW	2834	136	1	42 CF 1	CF42/1-L	48	0.0	SW	2,834	136	-	-	$ -	$ -	$0		
179	Rear Vestibule	1	W 32 C F 2 (ELE)	F42LL	60	0.1	SW	2834	170	1	W 32 C F 2 (ELE)	F42LL	60	0.1	SW	2,834	170	-	-	$ -	$ -	$0		
80	Under Rear Stair Closet	1	42 CF 1	CF42/1-L	48	0.0	SW	2834	136	1	42 CF 1	CF42/1-L	48	0.0	SW	2,834	136	-	-	$ -	$ -	$0		
6	Basement Conference/Auditorium	4	T 34 R F 4 (MAG)	F44EE	144	0.6	SW	2834	1,632	4	T 28 R F 4	F44SSILL	96	0.4	SW	2,834	1,088	544	0.2	$ 96.53	$ 525.00	$80	5.4	4.6
6	Basement Conference/Auditorium	3	T 34 R F 4 (MAG)	F44EE	144	0.4	SW	2834	1,224	3	T 28 R F 4	F44SSILL	96	0.3	SW	2,834	816	408	0.1	$ 72.40	$ 393.75	$60	5.4	4.6
X1	Basement Conference/Auditorium	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2834	9	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2,834	9	-	-	$ -	$ -	$0		
71	Basement Front Storage	2	I 60	I60/1	60	0.1	Pull String	1000	120	2	CF 26	CFQ26/1-L	27	0.1	Pull String	1,000	54	66	0.1	$ 17.93	$ 12.50	$0	0.7	0.7
80	Boiler Room	2	42 CF 1	CF42/1-L	48	0.1	SW	1000	96	2	42 CF 1	CF42/1-L	48	0.1	SW	1,000	96	-	-	$ -	$ -	$0		
179	Basement Art Room	2	W 32 C F 2 (ELE)	F42LL	60	0.1	SW	1000	120	2	W 32 C F 2 (ELE)	F42LL	60	0.1	SW	1,000	120	-	-	$ -	$ -	$0		
70	Basement Electrical/Communication	2	W 32 C F 1	F41LL	32	0.1	SW	2834	181	2	W 32 C F 1	F41LL	32	0.1	SW	2,834	181	-	-	$ -	$ -	$0		
87	Basement Corridor	3	W 32 P F 2 (MAG)	F42LE	71	0.2	SW	2834	604	3	W 32 P F 2 (MAG)	F42LE	71	0.2	SW	2,834	604	-	-	$ -	$ -	$0		
87	Basement Corridor	3	W 32 P F 2 (MAG)	F42LE	71	0.2	SW	2834	604	3	W 32 P F 2 (MAG)	F42LE	71	0.2	SW	2,834	604	-	-	$ -	$ -	$0		
X1	Basement Corridor	1	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2834	4	1	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2,834	4	-	-	$ -	$ -	$0		
38	Movie/Projector Room	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2834	680	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2,834	680	-	-	$ -	$ -	$0		
38	Movie/Projector Room	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2834	680	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2,834	680	-	-	$ -	$ -	$0		
87	Basement Elevator Room	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	2834	402	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	2,834	402	-	-	$ -	$ -	$0		
70	Basement Studio	2	W 32 C F 1	F41LL	32	0.1	SW	2834	181	2	W 32 C F 1	F41LL	32	0.1	SW	2,834	181	-	-	$ -	$ -	$0		
87	Basement Staff Lounge/Kitchen	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	3102.5	441	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	3,103	441	-	-	$ -	$ -	$0		
87	Basement Staff Lounge/Kitchen	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	3102.5	441	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	3,103	441	-	-	$ -	$ -	$0		
80	Basement Lounge/Kitchen Hall	1	42 CF 1	CF42/1-L	48	0.0	SW	2834	136	1	42 CF 1	CF42/1-L	48	0.0	SW	2,834	136	-	-	$ -	$ -	$0		
51	Basement Lounge/Kitchen Storage	1	W 34 CF 4 (MAG)	F44EE	144	0.1	SW	1000	144	1	W 28 F 4	F44SSILL	96	0.1	SW	1,000	96	48	0.0	$ 13.04	$ 141.75	$0	10.9	10.9
87	Bsmt Lounge/Kitchen Womens BR	1	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	1000	71	1	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	1,000	71	-	-	$ -	$ -	$0		
87	Basement Story Hour Room	4	W 32 P F 2 (MAG)	F42LE	71	0.3	SW	2834	805	4	W 32 P F 2 (MAG)	F42LE	71	0.3	SW	2,834	805	-	-	$ -	$ -	$0		
80	Basement Story Hour Hall	1	42 CF 1	CF42/1-L	48	0.0	SW	2834	136	1	42 CF 1	CF42/1-L	48	0.0	SW	2,834	136	-	-	$ -	$ -	$0		
87	Basement Story Hour Mens BR	1	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	1000	71	1	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	1,000	71	-	-	$ -	$ -	$0		
80	Basement Story Hour Storage Room	1	42 CF 1	CF42/1-L	48	0.0	SW	2834	136	1	42 CF 1	CF42/1-L	48	0.0	SW	2,834	136	-	-	$ -	$ -	$0		
70	Basement Left Side Storage Room	4	W 32 C F 1	F41LL	32	0.1	SW	1000	128	4	W 32 C F 1	F41LL	32	0.1	SW	1,000	128	-	-	$ -	$ -	$0		
70	Basement Left Side Storage Room	4	W 32 C F 1	F41LL	32	0.1	SW	1000	128	4	W 32 C F 1	F41LL	32	0.1	SW	1,000	128	-	-	$ -	$ -	$0		
70	Basement Left Side Storage Room	4	W 32 C F 1	F41LL	32	0.1	SW	1000	128	4	W 32 C F 1	F41LL	32	0.1	SW	1,000	128	-	-	$ -	$ -	$0		
70	Basement Left Side Storage Room	4	W 32 C F 1	F41LL	32	0.1	SW	1000	128	4	W 32 C F 1	F41LL	32	0.1	SW	1,000	128	-	-	$ -	$ -	$0		
87	Basement Board Room	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	2834	402	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	2,834	402	-	-	$ -	$ -	$0		
173	Main Library Book Case Lights	38	W 34 BC F 1 (MAG)	F41EE	43	1.6	Pull String	500	817	38	W 34 BC F 1 (MAG)	F41EE	43	1.6	Pull String	500	817	-	-	$ -	$ -	$0		
146	Front Entrance Exterior	1	WPMH400	MH400/1	458	0.5	Timer	4368	2,001	1	WP100IND2	IND200	210	0.2	Timer	4,368	917	1,083	0.2	$ 172.62	$ 300.00	$70	1.7	1.3
226	Front Entrance Exterior Spot Lights	2	SP 70 W MH	MH70/1	95	0.2	Timer	4368	830	2	SP 70 W MH	MH70/1	95	0.2	Timer	4,368	830	-	-	$ -	$ -	$0		
226	Front Right Spot Lights	2	SP 70 W MH	MH70/1	95	0.2	Timer	4368	830	2	SP 70 W MH	MH70/1	95	0.2	Timer	4,368	830	-	-	$ -	$ -	$0		
229	Fire Exit Stair Light	1	WP200 I 1	i200/1	200	0.2	Timer	4368	874	1	WP 42 2	CF42/1-L	48	0.0	Timer	4,368	210	664	0.2	$ 105.80	$ 40.50	$0	0.4	0.4
146	Faculty Entrance Exterior	2	WPMH400	MH400/1	458	0.9	Timer	4368	4,001	2	WP100IND2	IND200	210	0.4	Timer	4,368	1,835	2,167	0.5	$ 345.24	$ 600.00	$140	1.7	1.3
140	Faculty Entrance Exterior	2	WPMH 175	MH175/1	215	0.4	Timer	4368	1,878	2	WP100IND1	IND100	105	0.2	Timer	4,368	917	961	0.2	$ 153.13	$ 1,206.75	$140	7.9	7.0
229	Faculty Entrance Exterior	1	WP200 I 1	i200/1	200	0.2	Timer	4368	874	1	WP 42 2	CF42/1-L	48	0.0	Timer	4,368	210	664	0.2	$ 105.80	$ 40.50	$0	0.4	0.4
	Total	**195**				**30.2**			**88,872**	**195**			**4,069**	**20**			**55,701**	**33,171**	**10.3**	**$5,687**	**$35,327**	**$3,500**		
																	Demand Savings			**10.3**	**$1,507**			
																	kWh Savings			**33,171**	**$4,180**			
																	Total savings				**$5,687**		**6.2**	**5.6**

APPENDIX G

ECM-6 Install Occupancy Sensors

Energy Audit of Kearny, NJ
CHA Project No. 20711 - Public Library
ECM-6 Install Occupancy Sensors

0 — $0.126 $/kWh
$12.14 $/kW

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	NYSERDA Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
230	Front Hallway Night Lights	2	HB400MH1	MH400/1	458	0.9	Breaker	8760	8,024.2	2	HB400MH1	MH400/1	458	0.9	None	8760	8,024.2	0.0	0.0	$0.00	$0.00	$0.00		
230	Ceiling Lights Throughout Library	41	HB400MH1	MH400/1	458	18.8	Breaker	2834	53,216.9	41	HB400MH1	MH400/1	458	18.8	None	2834	53,216.9	0.0	0.0	$0.00	$0.00	$0.00		
X1	Front Vestibule	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2834	12.8	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	None	2834	12.8	0.0	0.0	$0.00	$0.00	$0.00		
80	Front Vestibule Stairs	3	42 CF 1	CF42/1-L	48	0.1	SW	2834	408.1	3	42 CF 1	CF42/1-L	48	0.1	None	2834	408.1	0.0	0.0	$0.00	$0.00	$0.00		
14	Under Front Stair Landing	1	CIRC 22/32 C F 2 (MAG)	FC22/32/1	58	0.1	SW	2834	164.4	1	CIRC 22/32 C F 2 (MAG)	FC22/32/1	58	0.1	None	2834	164.4	0.0	0.0	$0.00	$0.00	$0.00		
71	Under Front Stair Closet	1	I 60	I60/1	60	0.1	SW	1000	60.0	1	I 60	I60/1	60	0.1	None	1000	60.0	0.0	0.0	$0.00	$0.00	$0.00		
5	Front Women's Bathroom	3	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.2	SW	2834	510.1	3	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.2	None	2834	510.1	0.0	0.0	$0.00	$0.00	$0.00		
71	Front Women's Bathroom Closet	1	I 60	I60/1	60	0.1	Pull String	1000	60.0	1	I 60	I60/1	60	0.1	None	1000	60.0	0.0	0.0	$0.00	$0.00	$0.00		
55	Front Men's Bathroom	2	2T 17 R F 3 (ELE)	F23ILL	47	0.1	SW	2834	266.4	2	2T 17 R F 3 (ELE)	F23ILL	47	0.1	None	2834	266.4	0.0	0.0	$0.00	$0.00	$0.00		
101	Front Men's Bathroom Closet	1	I 40	I40/1	40	0.0	Pull String	1000	40.0	1	I 40	I40/1	40	0.0	None	1000	40.0	0.0	0.0	$0.00	$0.00	$0.00		
43	Front Computer/Reference Section	1	DC 42 P CF 8	CF42/8-L	376	0.4	SW	2834	1,065.6	1	DC 42 P CF 8	CF42/8-L	376	0.4	None	2834	1,065.6	0.0	0.0	$0.00	$0.00	$0.00		
204	Middle Library Hallway	3	S 96 C F 1 (MAG) 8'	F81EHS	125	0.4	SW	2834	1,062.8	3	S 96 C F 1 (MAG) 8'	F81EHS	125	0.4	None	2834	1,062.8	0.0	0.0	$0.00	$0.00	$0.00		
71	Rear Closet	1	I 60	I60/1	60	0.1	SW	2834	170.0	1	I 60	I60/1	60	0.1	None	2834	170.0	0.0	0.0	$0.00	$0.00	$0.00		
X1	Children's Department	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2834	8.5	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	None	2834	8.5	0.0	0.0	$0.00	$0.00	$0.00		
234	Children's Department	2	SP 100 W I 1	i100/1	100	0.2	SW	2834	566.8	2	SP 100 W I 1	i100/1	100	0.2	None	2834	566.8	0.0	0.0	$0.00	$0.00	$0.00		
179	Rear Vestibule	1	W 32 C F 2 (ELE)	F42LL	60	0.1	SW	2834	170.0	1	W 32 C F 2 (ELE)	F42LL	60	0.1	None	2834	170.0	0.0	0.0	$0.00	$0.00	$0.00		
X1	Rear Vestibule	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2834	12.8	3	X 1.5 W LED	ELED1.5/1	1.5	0.0	None	2834	12.8	0.0	0.0	$0.00	$0.00	$0.00		
71	Under Rear Stair Landing	3	I 60	I60/1	60	0.2	Pull String	2834	510.1	3	I 60	I60/1	60	0.2	None	2834	510.1	0.0	0.0	$0.00	$0.00	$0.00		
14	Under Rear Stair Landing	1	CIRC 22/32 C F 2 (MAG)	FC22/32/1	58	0.1	SW	2834	164.4	1	CIRC 22/32 C F 2 (MAG)	FC22/32/1	58	0.1	None	2834	164.4	0.0	0.0	$0.00	$0.00	$0.00		
80	Under Rear Stair Landing	1	42 CF 1	CF42/1-L	48	0.0	SW	2834	136.0	1	42 CF 1	CF42/1-L	48	0.0	None	2834	136.0	0.0	0.0	$0.00	$0.00	$0.00		
179	Rear Vestibule	1	W 32 C F 2 (ELE)	F42LL	60	0.1	SW	2834	170.0	1	W 32 C F 2 (ELE)	F42LL	60	0.1	None	2834	170.0	0.0	0.0	$0.00	$0.00	$0.00		
80	Under Rear Stair Closet	1	42 CF 1	CF42/1-L	48	0.0	SW	2834	136.0	1	42 CF 1	CF42/1-L	48	0.0	None	2834	136.0	0.0	0.0	$0.00	$0.00	$0.00		
6	Basement Conference/Auditorium	4	T 34 R F 4 (MAG)	F44EE	144	0.6	SW	2834	1,632.4	4	T 34 R F 4 (MAG)	F44EE	144	0.6	None	2834	1,632.4	0.0	0.0	$0.00	$0.00	$0.00		
6	Basement Conference/Auditorium	3	T 34 R F 4 (MAG)	F44EE	144	0.4	SW	2834	1,224.3	3	T 34 R F 4 (MAG)	F44EE	144	0.4	None	2834	1,224.3	0.0	0.0	$0.00	$0.00	$0.00		
X1	Basement Conference/Auditorium	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2834	8.5	2	X 1.5 W LED	ELED1.5/1	1.5	0.0	None	2834	8.5	0.0	0.0	$0.00	$0.00	$0.00		
71	Basement Front Storage	2	I 60	I60/1	60	0.1	Pull String	1000	120.0	2	I 60	I60/1	60	0.1	None	1000	120.0	0.0	0.0	$0.00	$0.00	$0.00		
80	Boiler Room	2	42 CF 1	CF42/1-L	48	0.1	SW	1000	96.0	2	42 CF 1	CF42/1-L	48	0.1	None	1000	96.0	0.0	0.0	$0.00	$0.00	$0.00		
179	Basement Art Room	2	W 32 C F 2 (ELE)	F42LL	60	0.1	SW	1000	120.0	2	W 32 C F 2 (ELE)	F42LL	60	0.1	None	1000	120.0	0.0	0.0	$0.00	$0.00	$0.00		
70	Basement Electrical/Communication	2	W 32 C F 1	F41LL	32	0.1	SW	2834	181.4	2	W 32 C F 1	F41LL	32	0.1	None	2834	181.4	0.0	0.0	$0.00	$0.00	$0.00		
87	Basement Corridor	3	W 32 P F 2 (MAG)	F42LE	71	0.2	SW	2834	603.6	3	W 32 P F 2 (MAG)	F42LE	71	0.2	None	2834	603.6	0.0	0.0	$0.00	$0.00	$0.00		
87	Basement Corridor	3	W 32 P F 2 (MAG)	F42LE	71	0.2	SW	2834	603.6	3	W 32 P F 2 (MAG)	F42LE	71	0.2	None	2834	603.6	0.0	0.0	$0.00	$0.00	$0.00		
X1	Basement Corridor	1	X 1.5 W LED	ELED1.5/1	1.5	0.0	Breaker	2834	4.3	1	X 1.5 W LED	ELED1.5/1	1.5	0.0	None	2834	4.3	0.0	0.0	$0.00	$0.00	$0.00		
38	Movie/Projector Room	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2834	680.2	4	T 32 R F 2 (ELE)	F42LL	60	0.2	C-OCC	1200	288.0	392.2	0.0	$49.41	$187.50	$35.00	3.8	3.1
38	Movie/Projector Room	4	T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2834	680.2	4	T 32 R F 2 (ELE)	F42LL	60	0.2	None	2834	680.2	0.0	0.0	$0.00	$0.00	$0.00		
87	Basement Elevator Room	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	2834	402.4	2	W 32 P F 2 (MAG)	F42LE	71	0.1	None	2834	402.4	0.0	0.0	$0.00	$0.00	$0.00		
70	Basement Studio	2	W 32 C F 1	F41LL	32	0.1	SW	2834	181.4	2	W 32 C F 1	F41LL	32	0.1	None	2834	181.4	0.0	0.0	$0.00	$0.00	$0.00		
87	Basement Staff Lounge/Kitchen	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	3102.5	440.6	2	W 32 P F 2 (MAG)	F42LE	71	0.1	C-OCC	1500	213.0	227.6	0.0	$28.67	$187.50	$35.00	6.5	5.3
87	Basement Staff Lounge/Kitchen	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	3102.5	440.6	2	W 32 P F 2 (MAG)	F42LE	71	0.1	None	3102.5	440.6	0.0	0.0	$0.00	$0.00	$0.00		
80	Basement Lounge/Kitchen Hall	1	42 CF 1	CF42/1-L	48	0.0	SW	2834	136.0	1	42 CF 1	CF42/1-L	48	0.0	None	2834	136.0	0.0	0.0	$0.00	$0.00	$0.00		
51	Basement Lounge/Kitchen Storage	1	W 34 CF 4 (MAG)	F44EE	144	0.1	SW	1000	144.0	1	W 34 CF 4 (MAG)	F44EE	144	0.1	None	1000	144.0	0.0	0.0	$0.00	$0.00	$0.00		
87	Bsmt Lounge/Kitchen Womens BR	1	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	1000	71.0	1	W 32 P F 2 (MAG)	F42LE	71	0.1	None	1000	71.0	0.0	0.0	$0.00	$0.00	$0.00		
87	Basement Story Hour Room	4	W 32 P F 2 (MAG)	F42LE	71	0.3	SW	2834	804.9	4	W 32 P F 2 (MAG)	F42LE	71	0.3	C-OCC	1200	340.8	464.1	0.0	$58.47	$187.50	$35.00	3.2	2.6
80	Basement Story Hour Hall	1	42 CF 1	CF42/1-L	48	0.0	SW	2834	136.0	1	42 CF 1	CF42/1-L	48	0.0	None	2834	136.0	0.0	0.0	$0.00	$0.00	$0.00		
87	Basement Story Hour Mens BR	1	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	1000	71.0	1	W 32 P F 2 (MAG)	F42LE	71	0.1	None	1000	71.0	0.0	0.0	$0.00	$0.00	$0.00		
80	Basement Story Hour Storage Room	1	42 CF 1	CF42/1-L	48	0.0	SW	2834	136.0	1	42 CF 1	CF42/1-L	48	0.0	None	2834	136.0	0.0	0.0	$0.00	$0.00	$0.00		
70	Basement Left Side Storage Room	4	W 32 C F 1	F41LL	32	0.1	SW	1000	128.0	4	W 32 C F 1	F41LL	32	0.1	None	1000	128.0	0.0	0.0	$0.00	$0.00	$0.00		
70	Basement Left Side Storage Room	4	W 32 C F 1	F41LL	32	0.1	SW	1000	128.0	4	W 32 C F 1	F41LL	32	0.1	None	1000	128.0	0.0	0.0	$0.00	$0.00	$0.00		
70	Basement Left Side Storage Room	4	W 32 C F 1	F41LL	32	0.1	SW	1000	128.0	4	W 32 C F 1	F41LL	32	0.1	None	1000	128.0	0.0	0.0	$0.00	$0.00	$0.00		
70	Basement Left Side Storage Room	4	W 32 C F 1	F41LL	32	0.1	SW	1000	128.0	4	W 32 C F 1	F41LL	32	0.1	None	1000	128.0	0.0	0.0	$0.00	$0.00	$0.00		
87	Basement Board Room	2	W 32 P F 2 (MAG)	F42LE	71	0.1	SW	2834	402.4	2	W 32 P F 2 (MAG)	F42LE	71	0.1	OCC	1200	170.4	232.0	0.0	$29.24	$118.75	$20.00	4.1	3.4
173	Main Library Book Case Lights	38	W 34 BC F 1 (MAG)	F41EE	43	1.6	Pull String	500	817.0	38	W 34 BC F 1 (MAG)	F41EE	43	1.6	None	500	817.0	0.0	0.0	$0.00	$0.00	$0.00		
146	Front Entrance Exterior	1	WPMH400	MH400/1	458	0.5	Timer	4368	2,000.5	1	WPMH400	MH400/1	458	0.5	None	4368	2,000.5	0.0	0.0	$0.00	$0.00	$0.00		
226	Front Entrance Exterior Spot Lights	2	SP 70 W MH	MH70/1	95	0.2	Timer	4368	829.9	2	SP 70 W MH	MH70/1	95	0.2	None	4368	829.9	0.0	0.0	$0.00	$0.00	$0.00		
226	Front Right Spot Lights	2	SP 70 W MH	MH70/1	95	0.2	Timer	4368	829.9	2	SP 70 W MH	MH70/1	95	0.2	None	4368	829.9	0.0	0.0	$0.00	$0.00	$0.00		
229	Fire Exit Stair Light	1	WP200 I 1	i200/1	200	0.2	Timer	4368	873.6	1	WP200 I 1	i200/1	200	0.2	None	4368	873.6	0.0	0.0	$0.00	$0.00	$0.00		
146	Faculty Entrance Exterior	2	WPMH400	MH400/1	458	0.9	Timer	4368	4,001.1	2	WPMH400	MH400/1	458	0.9	None	4368	4,001.1	0.0	0.0	$0.00	$0.00	$0.00		
140	Faculty Entrance Exterior	2	WPMH 175	MH175/1	215	0.4	Timer	4368	1,878.2	2	WPMH 175	MH175/1	215	0.4	None	4368	1,878.2	0.0	0.0	$0.00	$0.00	$0.00		
229	Faculty Entrance Exterior	1	WP200 I 1	i200/1	200	0.2	Timer	4368	873.6	1	WP200 I 1	i200/1	200	0.2	None	4368	873.6	0.0	0.0	$0.00	$0.00	$0.00		
	Total	195				30.2			88,872	195				30			87,557	1,316	0	166	$681	125		
																	Demand Savings			0.0	$0			
																	kWh Savings			1,316	$166			
																	Total Savings				$166		4.1	3.4

APPENDIX H

New Jersey Pay For Performance Incentive Program

Kearny NJ
CHA #20711
Building: Public Library

New Jersey Pay For Performance Incentive Program

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

	Annual Utilities	
	kWh	Therms
Existing Usage (from utility)	127,385	205
Proposed Savings	41,440	0
Existing Total MMBtus	455	
Proposed Savings MMBtus	141	
% Reduction	31.1%	
Proposed Annual Savings	$17,600	

	≥ %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	$9,117	$0	$9,117
Incentive #3	$5,802	$0	$5,802
Totals	**$14,918**	**$0**	**$14,918**

Total Project Cost	$113,500
% Incentives of Project Cost*	13.1%
Project Cost w/ Incentives*	$98,582

Project Payback (years)	
w/o Incentives	w/ Incentives
6.4	5.6

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

APPENDIX I

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:	45.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	34.6 kW
Array Type:	Fixed Tilt
Array Tilt:	40.7°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	18.0 ¢/kWh

Results			
Month	Solar Radiation (kWh/m^2/day)	AC Energy (kWh)	Energy Value ($)
1	3.36	3725	670.50
2	4.05	4022	723.96
3	4.58	4880	878.40
4	4.84	4769	858.42
5	5.30	5254	945.72
6	5.33	4956	892.08
7	5.27	5005	900.90
8	5.25	4952	891.36
9	5.06	4804	864.72
10	4.46	4525	814.50
11	3.15	3229	581.22
12	2.87	3114	560.52
Year	4.46	53235	9582.30

Output Hourly Performance Data

About the Hourly Performance Data

*

Output Results as Text

Saving Text from a Browser

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

Please send questions and comments regarding PVWATTS to Webmaster

Disclaimer and copyright notice

Cautions for Interpreting the Results

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

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

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

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

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

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

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

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

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

Township of Kearny
Public Library

Cost of Electricity $0.180 $/kWh

Photovoltaic (PV) Rooftop Solar Power Generation-45kW 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
$450,000	**0.0**	**53,240**	**0**	**$9,600**	**0**	**$9,600**	**$45,000**	**$25,900**	**46.9**	**11.4**

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

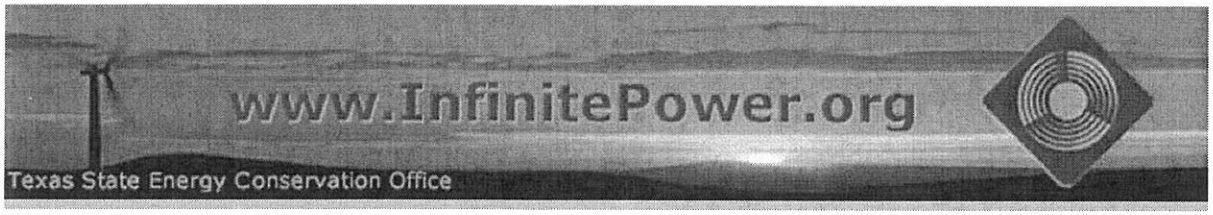
** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= $487/1000kwh

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 J

Solar Thermal Domestic Hot Water Plant



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About SECO

RARE

Interactive Energy Calculators

RENEWABLE ENERGY
THE INFINITE POWER OF TEXAS

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

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

Solar Water Heating Calculator

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

Water Heater Characteristics			
Physical		**Thermal**	
? Diameter (feet)	1.5	? Water Inlet Temperature (Degrees F)	55
? Capacity (gallons)	40	? Ambient Temperature (Degrees F)	70
? Surface Area (calculated - sq ft)	17.79	? Hot Water Temperature (Degrees F)	120
? Effective R-value	NaN	? Hot Water Usage (Gallons per Day)	50
Energy Use			
1112		? 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
1390 BTU/hr	? Power Into Water Heater	1135 BTU/hr
Cost		
$ 2.063 /Therm	? Utility Rates	$ 0.18 /kWh
$ 251.199	? Yearly Water Heating Cost	$ 524.149
How Does Solar Compare?		
? Solar Water Heater Cost: $ 27100		? Percentage Solar: 70
154.117 years for gas	? Payback Time for Solar System	73.8612 years for electric

NJBPU Energy Audits
CHA # 20711
Township of Kearny
Public Library

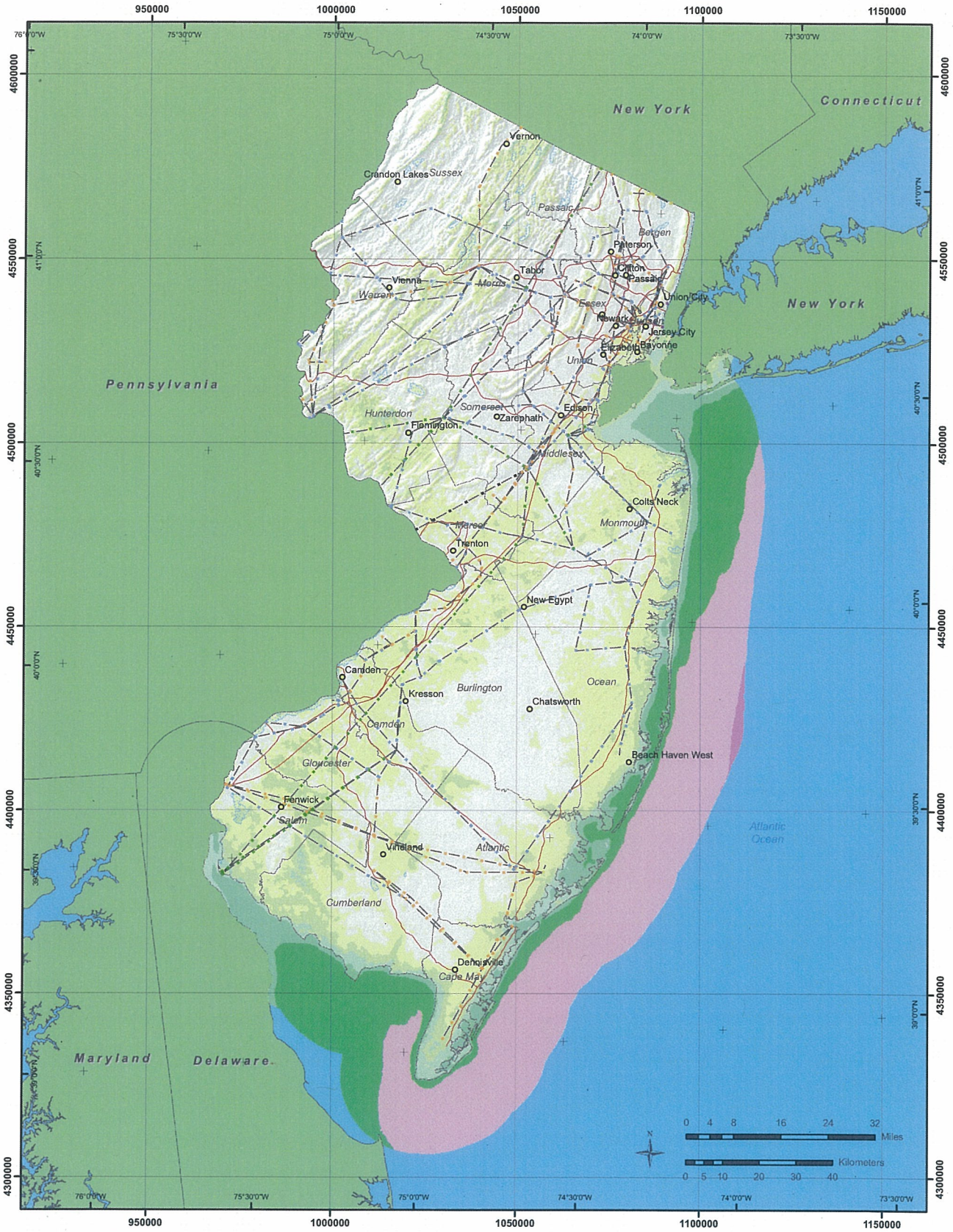
Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

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

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

APPENDIX K

Wind



Wind Resource of New Jersey

Mean Annual Wind Speed at 30 Meters

Features

- City
- Interstate Highway
- County Boundary
- Water Body

Generalized Transmission Line

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

Mean Speed at 30 m

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

AWS Truewind

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

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

Bing Maps

318 Kearny Ave, Kearny, NJ 07032-2505

My Notes

APPENDIX L

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Public Library

Building ID: 2236254
For 12-month Period Ending: December 31, 2008[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: March 15, 2010

Facility
Public Library
318 Kearny Avenue
Kearny, NJ 07032

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

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

Year Built: 1907
Gross Floor Area (ft²): 14,000

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	434,638
Fuel Oil (No. 2) (kBtu)	1,193,654
Natural Gas (kBtu)[4]	20,900
Total Energy (kBtu)	1,649,192

Energy Intensity[5]

Site (kBtu/ft²/yr)	118
Source (kBtu/ft²/yr)	191

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	155

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	246
% Difference from National Average Source EUI	-22%
Building Type	Library

Stamp of Certifying Professional

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

Certifying Professional
N/A

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Public Library	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Library	Is this an accurate description of the space in question?		☐
Location	318 Kearny Avenue, Kearny, NJ 07032	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Library (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	14,000 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	20(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	62Hours(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	30(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

Meter: PSE&G Electricity (Library) (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	8,160.00
11/01/2008	11/30/2008	7,680.00
10/01/2008	10/31/2008	10,880.00
09/01/2008	09/30/2008	13,840.00
08/01/2008	08/31/2008	14,560.00
07/01/2008	07/31/2008	12,880.00
06/01/2008	06/30/2008	14,560.00
05/01/2008	05/31/2008	10,720.00
04/01/2008	04/30/2008	7,840.00
03/01/2008	03/31/2008	8,640.00
02/01/2008	02/29/2008	8,080.00
01/01/2008	01/31/2008	8,080.00
PSE&G Electricity (Library) Consumption (kWh (thousand Watt-hours))		**125,920.00**
PSE&G Electricity (Library) Consumption (kBtu (thousand Btu))		**429,639.04**

Meter: PSE&G Electricity (Museum) (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2008	12/31/2008	0.00
11/01/2008	11/30/2008	0.00
10/01/2008	10/31/2008	0.00
09/01/2008	09/30/2008	0.00
08/01/2008	08/31/2008	274.00
07/01/2008	07/31/2008	370.00
06/01/2008	06/30/2008	283.00
05/01/2008	05/31/2008	158.00
04/01/2008	04/30/2008	180.00
03/01/2008	03/31/2008	200.00
02/01/2008	02/29/2008	0.00
01/01/2008	01/31/2008	0.00
PSE&G Electricity (Museum) Consumption (kWh (thousand Watt-hours))		**1,465.00**

PSE&G Electricity (Museum) Consumption (kBtu (thousand Btu))	**4,998.58**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))	**434,637.62**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?	☐

Fuel Type: Natural Gas

Meter: PSE&G Natural Gas (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
12/01/2008	12/31/2008	16.00
11/01/2008	11/30/2008	15.00
10/01/2008	10/31/2008	14.00
09/01/2008	09/30/2008	47.00
08/01/2008	08/31/2008	13.00
07/01/2008	07/31/2008	13.00
06/01/2008	06/30/2008	15.00
05/01/2008	05/31/2008	15.00
04/01/2008	04/30/2008	15.00
03/01/2008	03/31/2008	16.00
02/01/2008	02/29/2008	14.00
01/01/2008	01/31/2008	16.00

PSE&G Natural Gas Consumption (therms)	**209.00**
PSE&G Natural Gas Consumption (kBtu (thousand Btu))	**20,900.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**20,900.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

Fuel Type: Fuel Oil (No. 2)

Meter: National Term Fuel Oil (Gallons)
Space(s): Entire Facility

Start Date	End Date	Energy Use (Gallons)
11/03/2008	12/18/2008	1,099.00
10/10/2008	11/02/2008	308.00
09/15/2008	10/09/2008	0.00
08/15/2008	09/14/2008	0.00
07/15/2008	08/14/2008	0.00
06/15/2008	07/14/2008	0.00
05/15/2008	06/14/2008	0.00
04/10/2008	05/15/2008	750.00
03/19/2008	04/09/2008	800.00
02/11/2008	03/18/2008	2,520.00
01/15/2008	02/10/2008	2,358.00

National Term Fuel Oil Consumption (Gallons)	**7,835.00**
National Term Fuel Oil Consumption (kBtu (thousand Btu))	**1,086,640.07**
Total Fuel Oil (No. 2) Consumption (kBtu (thousand Btu))	**1,086,640.07**

APPENDIX M

Equipment Inventory

New Jersey BPU Energy Audit Program
CHA #20711
Kearny
Public Library

Description	Manufacturer Name	Model No.	Equipment Type	Capacity/Size	Location	Areas Served	Date Installed	Useable Life Expectancy (years)
Boiler	IBR	A-712-SO, Series 2B-J2	#2fuel oil, steam	Output 2148MBH, 6949 SF, 19.65 gal/hr	Basement	Entire building	1971	-8
DHMW	Rheem	Model 21V40-38, Serial RHNG 0403H16438	Gas fired hot water heater	40 gallon, input 38,000btu/hr	Basement	Entire building	2003	14
Split System	Sanyo	No tag	Electric condensing unit	Estimated 1 ton	Outside	1st fl library	1997	3
Split System	Mitsubishi	PUY-A36NHA, Serial 64U00084C	Electric condensing unit	3 tons, 208/230V, 1ph, 60Hz	Outside	1st fl library	1997	3
Split System	Mitsubishi	N/A	Electric condensing unit	Estimated 1ton	Outside	1st fl library	1997	3
Split System	Mitsubishi	N/A	Electric condensing unit	Estimated 1ton	Outside	1st fl library	1997	3
Split System	Mitsubishi	N/A	Electric condensing unit	Estimated 1ton	Outside	1st fl library	1997	3
Split System	Mitsubishi	N/A	Electric condensing unit	Estimated 1ton	Outside	1st fl library	1997	3
Split System	Unknonwn	PUY-A36NHA, Serial N/A	Electric condensing unit	Estimated 1ton	Outside	1st fl library	1997	3
Split System	Mitsubishi	MUY-A36NHA, Serial 8000340T	Electric condensing unit	3 tons, 208/230V, 1ph, 60Hz	Outside	1st fl library	1997	3
Split System	Mitsubishi	MUY-A17NA, Serial 6004093T	Electric condensing unit	1 tons, 208/230V, 1ph, 60Hz	Outside	1st fl library	1997	3
Split System	Mitsubishi	MUY-A24NA, Serial 7008547 T	Electric condensing unit	23 tons, 208/230V, 1ph, 60Hz	Outside	1st fl library	1997	3
Split System	Mitsubishi	MUZ-D36NA, Serial 800627 T	Electric condensing unit	3 tons, 208/230V, 1ph, 60Hz	Outside	1st fl library	1997	3
Split System	Turbo Air	TAS 24	Electric condensing unit	22,000 btu/hr	Outside	1st fl library	1997	3
Split System	Mitsubishi	PUY-A36NHA, Serial 52000770B	Electric condensing unit	3 tons, 208/230V, 1ph, 60Hz	Outside	1st fl library	1997	3
Window AC	Carrier	Unknown	Window AC cooling unit	Estimated 14,000 btu/hr	Window	Bedroom	Unknown	Unknown
Window AC	Carrier	Unknown	Window AC cooling unit	Estimated 14,000 btu/hr	Window	Bedroom	Unknown	Unknown
Window AC	Carrier	Unknown	Window AC cooling unit	Estimated 14,000 btu/hr	Window	Bedroom	Unknown	Unknown
Window AC	Carrier	Unknown	Window AC cooling unit	Estimated 14,000 btu/hr	Window	Bedroom	Unknown	Unknown
Window AC	Carrier	Unknown	Window AC cooling unit	Estimated 14,000 btu/hr	Window	Bedroom	Unknown	Unknown
Window AC	Carrier	Unknown	Window AC cooling unit	Estimated 14,000 btu/hr	Window	Bedroom	Unknown	Unknown