LOWER ALLOWAYS TOWNSHIP
SALEM, NJ
LOWER ALLOWAYS TOWNSHIP DEPARTMENT OF PUBLIC WORKS GARAGE
ENERGY ASSESSMENT

for

NEW JERSEY
BOARD OF PUBLIC UTILITIES

LOWER ALLOWAYS TOWNSHIP
SALEM, NJ
LOWER ALLOWAYS TOWNSHIP DEPARTMENT OF PUBLIC WORKS GARAGE
ENERGY ASSESSMENT

for

NEW JERSEY
BOARD OF PUBLIC UTILITIES

CHA PROJECT NO. 22218

JANUARY 2011

Prepared by:

CLOUGH HARBOUR & ASSOCIATES LLP

2001 Route 46
Suite 107
Parsippany, NJ 07054

(973) 299-1100

TABLE OF CONTENTS

Page

1.0 INTRODUCTION & BACKGROUND....…….……...…...….....1

2.0 EXECUTIVE SUMMARY……....……..……..……...2

3.0 EXISTING CONDITIONS…….……....……..…3
- 3.1 Building General
- 3.2 Utility Usage
- 3.3 HVAC Systems
- 3.4 Lighting/Electrical Systems
- 3.5 Control Systems
- 3.6 Plumbing Systems

4.0 ENERGY CONSERVATION MEASURES…….……..7
- 4.1 ECM-1 Lighting Fixture Modifications
- 4.2 ECM-2 Lighting Control Modification
- 4.3 ECM-3 Install Exterior Wall Insulation
- 4.4 ECM-4 Install Additional Roof Insulation
- 4.5 ECM-5 Install Both Wall and Roof Insulation
- 4.6 ECM-6 Replace Single Pane Windows in Garage
- 4.7 ECM-7 Install Both Wall and Roof Insulation and Replace Single Pane Windows
- 4.8 ECM-8 Replace Propane-Fired Unit Heaters with Waste Oil-Fired Unit Heaters
- 4.9 ECM-9 Eliminate Leaks in Compressed Air Piping

5.0 PROJECT INCENTIVES……...……15
- 5.1 Incentives Overview
- 5.2 Building Incentives

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION……..……18
- 6.1 Geothermal
- 6.2 Solar
- 6.3 Wind
- 6.4 Combined Heat and Power Generation (CHP)
- 6.5 Biomass Power Generation
- 6.6 Demand Response Curtailment

7.0 EPA PORTFOLIO MANAGER……24

8.0 CONCLUSIONS & RECOMMENDATIONS.…….…..…..25

APPENDICES

A Utility Usage Analysis
B HVAC & Miscellaneous Equipment List
C ECM-1 Lighting Fixture Modifications
D ECM-2 Lighting Control Modification
E ECM-3 Install Exterior Wall Insulation
F ECM-4 Install Additional Roof Insulation
G ECM-5 Install Both Wall and Roof Insulation
H ECM-6 Replace Single Pane Windows in Garage
I ECM-7 Install Both Wall and Roof Insulation and Replace Single Pane Windows
J ECM-8 Replace Propane-Fired Unit Heaters with Waste Oil-Fired Unit Heaters
K ECM-9 Eliminate Leaks in Compressed Air Piping
L Carrier Hourly Analysis Program – Base Building
M Photovoltaic (PV) Rooftop Solar Power Generation
N Solar Thermal Domestic Hot Water Plant
O Wind
P EPA Portfolio Manager
Q Site Aerial Image

1.0 INTRODUCTION & BACKGROUND

This report summarizes the energy audit performed at the Lower Alloways Creek Township Department of Public Works Garage, located on Harmersville Road in Salem, NJ. Originally built in 1974 and expanded in 1976, the building is a 7,400 square foot, single story, high bay structure. The building houses the Department of Public Works garage and maintenance facility. The building contains offices, vehicle repair areas, shops, lunchroom, locker area, restroom, utility areas, and storage spaces

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.

This report covers the energy audit for the Lower Alloways Creek Township Department of Public Works Garage.

2.0 EXECUTIVE SUMMARY

This report details the results of the energy audit performed at the Lower Alloways Creek Township Department of Public Works Garage, located on Harmersville Road in Salem, NJ, a 7,400 square foot, single story, high bay structure. The following areas were evaluated for energy conservation measures:

- Lighting upgrades with occupancy sensors
- Building insulation at exterior walls and roof
- Window replacement
- Utilization of waste fuel burning HVAC equipment
- Eliminate leaks in compressed air piping

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 $7,450 for the recommended ECMs may be realized with a payback of 4.2 years.

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

ECM-1 & ECM-2 Lighting Control Modifications
(Proposed Fixtures – Combined Budgetary Cost and Savings)

Budgetary Cost	Annual Utility Savings				ROI (with Incentive)	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
11,250	0	6,100	0	1,100	0.5	1,990	10.3	8.4

* Incentive shown is per the New Jersey Smart Start Program, 2010 Lighting Controls Application. Incentive is based on the use of eight wall-mounted occupancy sensors and a $30 per fixture incentive for replacing T12 fixtures with T8 fixtures.

ECM-8 Replace Propane-Fired Unit Heaters with Waste Oil-Fired Unit Heaters

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity	Propane	Fuel Oil					
$	kWh	Gallons	Gallons	$		$	Years	Years
19,700	0	2,700	0	6,300	3.8	0	3.1	NA

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

ECM-9 Eliminate Leaks in Compressed Air Piping

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
270	0	340	0	50	1.8	0	5.4	NA

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

3.0 EXISTING CONDITIONS

3.1 Building General

The Salem, NJ, Lower Alloways Creek Township Department of Public Works Garage, constructed in 1974 and expanded in 1976, is a 7,400 square foot, single story, high bay structure. The facility contains offices, vehicle repair areas, shops, lunchroom, locker room, restroom, utility, and storage areas.

The Lower Alloways Creek Township Department of Public Works is a sector of Lower Alloways Creek Township's government that operates 40 hours per week throughout the year. Winter hours are 7 a.m. to 3:30 p.m. daily and summer hours are 6 a.m. to 2:30 p.m. daily. The garage facility is primarily used for vehicle storage and maintenance, as well as miscellaneous equipment storage.

The original building was constructed in 1974, with an expansion constructed in 1976. The building's exterior shell is in good condition. The exterior walls are 12" exposed concrete block with no insulation. The attic space above the office area has a plywood access floor that covers half of the attic space. Fiberglass batt insulation, with a resistance of R-16, is installed on top of the lay-in tiles that make up the office area ceiling. The flat roof is made up of a built up EPDM rubber roof on 1" rigid insulation, 5/8" plywood sheathing, a metal roof deck, and a steel truss system. The floor slab is on grade with a vapor barrier on top of 4" stone.

Windows in the offices, lunchroom, and plan review room areas are double pane, double hung. Windows in the garage areas are large, single pane, swing out windows. Exterior doors are insulated metal. The garage doors are insulated metal with vision glass, approximately 12' high by 15' wide. The main entry door and the door to the welding area do not have any weather-stripping. One of the garage doors in the double-bay garage area and two garage doors in the triple-bay garage area have broken weather-stripping that should be replaced. All other doors appear to have intact weather-stripping.

In addition to the main building, the site has additional storage and maintenance buildings that are not part of this energy audit's scope.

3.2 Utility Usage

Electricity is the only utility used at the site with a direct connection to the distribution network. In addition, propane and fuel oil deliveries occur to power the HVAC equipment. Electricity is purchased from Atlantic City Electric. Propane is purchased from 1st Propane. Fuel oil is purchased from Riggins. Potable water is provided by an on-site well.

During the period of September 2009 to August 2010, electric usage was approximately 59,200 kWh at a total cost of approximately $10,400. Review of electric bills during this period determined the building was charged a supply unit cost of $0.16 per kWh, demand unit cost of $4.05 per kW, and blended unit cost of $0.1755 per kWh. Electricity usage was highest is the winter months when the supplemental electric heat is energized in the office space. During a similar timeframe, the building heat produced by propane-fired equipment required approximately 2,700 gallons of propane. Based on the annual cost of $6,750, the blended price for propane was $2.53 per gallon. Propane consumption only occurs during the heating season to heat the garage bays. Building heat produced by fuel oil–fired equipment required approximately 440 gallons of fuel oil. Based on the annual cost of approximately $1,000, the blended price for fuel oil was $2.45 per gallon. Fuel oil consumption only occurs during the heating season to heat the office space areas. Utility data can be found in Appendix A.

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

3.3 HVAC Systems

Heating and air conditioning is provided to various areas of the facility as follows:

Heating is provided to the reception, office, and lunchroom areas by a fuel oil-fired furnace located in the ceiling space above the offices. The age of the furnace was undetermined, but based on the visual condition, it appears to be approximately 20 years old and has an efficiency of 80%. Heat is provided in one of the offices by an electric baseboard heater and in the restroom by an electric wall heater. The electric baseboard and wall heater in these areas appears to be original to the building, installed in 1974, approximately 36 years old. Propane-fired, propeller unit heaters provide heating in the garage areas. One unit heater is located in the welding bay, one is located in the two-bay garage, and the third is located in the three-bay garage. The units were originally natural gas-fired, but the burners were replaced to utilize propane. The efficiency of the units is approximately 80%. The units were installed within the past 10 years, between 2001 and 2002, approximately 8 years old. Central cooling is not provided within the garage or office spaces, however, various areas have window units or portable units to provide comfort during the summer months. Window units are located in the three office spaces and the lunchroom. Equipment data could not be located on the window units, but they appear to be between 9 and 18 MBH. The units are old and likely have an EER between 6 and 8. A portable air conditioner is located in the two-bay garage area office. This unit currently exhausts the reject heat into the garage space. The portable unit has a cooling capacity of 12 MBH and an EER of 9. The unit appears to have been purchased within the last two years.

The following is a summary of this equipment and areas served:

Equipment	Cooling Tons	Heating MBH Input/Output	Area Served
(2) Propane-Fired Unit Heaters	-	100 / 80	Welding Garage Bay and Three-Bay Garage
(1) Propane-Fired Unit Heater	-	125 / 100	Two-Bay Garage
(1) Fuel Oil-Fired Furnace	-	245 / 196	Reception, Offices, Lunchroom
(1) Electric Baseboard Heater	-	1.5 kW	(1) Office
(1) Electric Wall Heater	-	1.5 kW	Restroom
(4) Window Air Conditioners	Varies, 3/4 to 1-1/2	-	(3) Offices and Lunchroom
(1) Portable Air Conditioner	1	-	Two-Bay Garage Office

Exhaust in the restroom is through a ceiling mounted exhaust fan. The fan is energized by the light switch. The welding area has a roof mounted, ¾ horsepower exhaust fan. The two-bay garage has two

roof mounted, ¾ horsepower exhaust fans. All of the roof mounted exhaust fans are equipped with motor operated louvers. The fans and louvers are operated by individual three position switches. The three positions are "Low, Off, High."

In addition to the roof mounted exhaust fans, there are two other exhaust systems in the garage areas. One exhausts a hood in the welding area and the other is a truck exhaust system that has multiple outlets located in the welding area and two-bay garage. A propeller fan with flow directed towards a window provides additional ventilation.

All equipment appeared to be in good condition. A list of HVAC equipment can be found in appendix B.

3.4 Lighting/Electrical Systems

The majority of lighting fixtures throughout the facility utilize T-12 fluorescent lamps. All exit signs within the building utilize LED lamps and have halogen emergency lights.

Exterior building light fixtures, located at exterior doors and between garage doors, consists of 250 W mercury vapor or metal halide lamps. Exterior lights are on a timer, but also have a switch override.

There is no emergency generator supplying power to the building.

3.5 Control Systems

3.5.1 HVAC Controls

A wall-mounted, manual thermostat, located in the reception area, controls the office area fuel oil-fired furnace. Electric heaters in the office, the portable air conditioner, and the four window air conditioners are each controlled manually with integral unit controls. Each of the propane-fired heaters is controlled by a wall mounted, manual, dial-type thermostat located beneath each unit.

Following are the existing occupied and unoccupied heating and cooling setpoints noted at the time of the audit for each piece of HVAC equipment (Note that all settings are manually adjustable and can be reset by the occupants at any time.):

Equipment	Heating Occ/Unocc	Cooling Occ/Unocc	Yearly Occupied Hours
(2) Propane-Fired Unit Heaters	68°F / 68°F	N/A	2080 hrs/yr
(1) Propane-Fired Unit Heater	68°F / 68°F	N/A	2080 hrs/yr
(1) Fuel Oil-Fired Furnace	68°F / 60°F	N/A	2080 hrs/yr
(1) Electric Baseboard Heater	68°F / 68°F	N/A	2080 hrs/yr
(2) Electric Wall Heater	68°F / 68°F	N/A	2080 hrs/yr
(4) Window Air Conditioners	N/A	74°F / 74°F	2080 hrs/yr
(1) Portable Air Conditioner	N/A	74°F / 74°F	2080 hrs/yr

A manual switch controls the toilet room exhaust fan. Three manual switches control the garage exhaust fans. The garage exhaust fan switches have additional signage reminding building occupants to not energize the exhaust fans while the unit heaters are operating.

3.5.2 Lighting Controls

Manual wall switches control lighting within the public works garage. Exterior lighting is controlled by time clocks.

3.6 Plumbing Systems

Domestic hot water for the facility is produced by an electric 15 gallon, 1.25 kW, A.O. Smith water heater. The water heater is located in the utility room adjacent to the restroom in the office area. Another electric, 15-gallon, water heater to supply hot water to a hand wash sink in the two-bay garage was not operational during the survey. Building staff indicated that it was broken and was to be replaced. Cold water and hot water piping are not insulated. Plumbing fixtures include 1.6 gallon per flush tank type water closets; wall hung restroom sink; kitchen sinks; and hose bibbs. All faucets do not exceed the maximum allowable water flow requirements of the adopted plumbing codes.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Lighting Fixture Modifications

The facility utilizes inefficient lighting fixtures. 80 fixtures use T12 lamps and 3 fixtures use A-lamps and incandescent floodlights. Energy consumption can be greatly reduced by both replacing T12 fixtures with T8 fixtures and lamps and replacing A-lamps with compact fluorescent lamps. The fixtures and lamps that are suggested to be replaced are highlighted in Appendix C.

Energy savings for this measure were calculated by applying the existing and proposed fixture wattages to the estimated time of operation. The difference resulted in an annual savings of 4,900 kWh per year, or $900 per year. Supporting calculations, including all assumptions for lighting hours, and the annual energy usage for each fixture can be found in Appendix C.

Lighting has an expected life of approximately 15 years, according to the manufacturer, based on the hours of use within this facility. The total energy savings over the life of the project is estimated at 73,500 kWh and $13,500.

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

ECM-1 Lighting Fixture Modifications

Budgetary Cost	Annual Utility Savings				ROI (with incentive)	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity			Total				
$	kW	kWh	Therms	$		$	Years	Years
10,500	-	4,900	0	900	0.3	1,830	11.7	9.6

* There is a $30 per fixture incentive for replacing T12 fixtures with T8 fixtures available through the New Jersey Smart Start program's Prescriptive Lighting Application for this ECM.

This measure is recommended. See analysis in Section 4.2, "ECM-2 Lighting Control Modifications," for total energy reduction when combined with control modification.

4.2 ECM-2 Lighting Control Modification

Manual wall switches, panel switching, and timers currently control lighting throughout the facility. By equipping the office spaces, lunchroom, locker room, and restroom with motion sensors, unoccupied energy use can be greatly reduced. This ECM proposes the addition of eight wall-mounted occupancy sensors.

The weekly occupied times for each space was determined by taking into account typical traffic patterns for the building as provided through interviews with the end user. Applying the existing and proposed operating times to the combined wattage requirements for each room's lighting fixtures, the energy reduction in kWh per year and operational savings per year were determined. Because the occupancy sensor controls were being applied to lighting that was proposed to be revised in ECM-1, the savings were determined for both the existing and the replacement fixtures. For the existing fixtures, it was determined that approximately 1,800 kWh per year, or $300 per year, can be saved through implementation of this ECM. When this ECM is applied to fixtures modified by the proposal ECM-1, it was determined that about 1,200 kWh per year, or $200 per year, can be saved through implementation of this ECM.

Occupancy sensors have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project is estimated at:

Existing fixtures: 27,000 kWh and $4,500
Proposed fixtures: 18,000 kWh and $3,000

Supporting calculations, including the proposed rooms to install occupancy sensors; assumptions for lighting hours in each space; annual energy usage for each fixture; and the type of occupancy sensor recommended is included in Appendix D. The implementation cost and savings related to this ECM are summarized below:

ECM-2 Lighting Control Modifications (Existing Fixtures)

Budgetary Cost	Annual Utility Savings				ROI (with Incentive)	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
750	0	1,800	0	300	6.6	160	2.5	2.0

* Incentive shown is per the New Jersey Smart Start Program, 2010 Lighting Controls Application. Incentive is based on the use of eight wall-mounted occupancy sensors.

ECM-2 Lighting Control Modifications (Proposed Fixtures)

Budgetary Cost	Annual Utility Savings				ROI (with Incentive)	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
750	0	1,200	0	200	4.1	160	3.75	3.0

* Incentive shown is per the New Jersey Smart Start Program, 2010 Lighting Controls Application. Incentive is based on the use of eight wall-mounted occupancy sensors.

ECM-1 & ECM-2 Lighting Control Modifications
(Proposed Fixtures – Combined Budgetary Cost and Savings)

Budgetary Cost	Annual Utility Savings				ROI (with Incentive)	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
11,250	0	6,100	0	1,100	0.5	1,990	10.3	8.4

* Incentive shown is per the New Jersey Smart Start Program, 2010 Lighting Controls Application. Incentive is based on the use of eight wall-mounted occupancy sensors and a $30 per fixture incentive for replacing T12 fixtures with T8 fixtures.

This measure is recommended when applied to the proposed fixtures. The chart above, "ECM-2 Lighting Control Modifications (Proposed Fixtures – Combined Budgetary Cost and Savings)" shows that when the costs and savings of both fixture replacement and control modifications are combined, the payback period is less than 10 years. If the measures are installed by department of public works staff then the assumed labor costs will be less yielding a shorter payback period.

4.3 ECM-3 Install Exterior Wall Insulation

Insulation in the exterior walls is not currently installed. During the heating season insulation reduces the conduction of heat out of the building and during the cooling season it reduces the conduction of heat into the building. Insulation reduces the energy consumption of both the furnace and the air conditioning units because the overall load of the building is reduced. A properly insulated building also increases overall comfort by reducing drafts and providing a more uniform temperature throughout the building. The life expectancy of HVAC equipment can be increased because the demand on the unit is lessened. This ECM proposes the installation of a 2" Exterior Insulation Finishing System (EIFS). EIFS is a foam insulation system applied to the exterior walls of the building with a synthetic stucco finish applied for waterproofing.

This ECM was analyzed by modeling both the building and the hours of operation in the Carrier Hourly Analysis Program (HAP). Using this model, insulation was added to all exterior walls of the building and the energy consumption of the HVAC units was compared to the baseline building. HAP data for the building with insulation is located in Appendix E. Baseline building data is located in Appendix L. It was determined that approximately 1,200 kWh, 700 gallons of propane, and 100 gallons of fuel oil can be saved per year through implementation of this ECM. This is a monetary savings of approximately $2,200 per year.

Properly installed insulation has an indefinite life expectancy. For the purposes of calculating long-term savings and a return on investment, a period of 15 years was chosen. The total energy savings over the 15 years noted is estimated at 18,000 kWh, 10,500 gallons of propane, and 1,500 gallons of fuel oil, equaling $33,000.

Supporting calculations, annual energy usage for the HVAC units, and the cost of insulation is included in Appendix E. The implementation cost and savings related to this ECM are summarized below:

ECM-3 Install Exterior Wall Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity	Propane	Fuel Oil					
$	kWh	Gallons	Gallons	$		$	Years	Years
125,400	1,200	700	100	2,200	(0.7)	0	>25	NA

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

This measure is not recommended.

4.4 ECM-4 Install Additional Roof Insulation

Insulation currently installed at the roof is limited to 1" rigid insulation on 5/8" plywood sheathing. Other than the resistance of the actual roofing material, the only insulation is a 1" thick rigid board beneath the built up roofing. The estimated R-value of this insulation board is estimated to be R-7. Installation of additional insulation at the roof level will increase the roof system's overall resistance to heat transfer. The most cost effective way of installing this additional insulation is by applying a R-19 vinyl face insulation to the interior underside of the roof structure. Because of the existing trusses and equipment installed at the interior roof level, an additional cost for the burden of working around installed equipment has been applied to the budgetary costs. This ECM proposes the installation of additional insulation to increase the total resistance of the roof construction to heat transfer.

This ECM was analyzed by modeling both the building and the hours of operation in the Carrier Hourly Analysis Program (HAP). Using this model, insulation was added to the interior underside of the entire roof and the energy consumption of the HVAC units was compared to the baseline building. HAP data for the building with insulation is located in Appendix F. Baseline building data is located in Appendix L. It was determined that about 1,300 kWh, 700 gallons of propane, and 100 gallons of fuel oil can be saved per year can be saved through implementation of this ECM. This is a monetary savings of approximately $2,300 per year.

Properly installed insulation has an indefinite life expectancy. For the purposes of calculating long-term savings and a return on investment, a period of 15 years was chosen. The total energy savings over the 15 years noted is estimated at 19,500 kWh, 10,500 gallons of propane, and 1,500 gallons of fuel oil, equaling $34,500.

Supporting calculations, annual energy usage for the HVAC units, and the cost of insulation is included in Appendix F. The implementation cost and savings related to this ECM are summarized below:

ECM-4 Install Additional Roof Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity	Propane	Fuel Oil					
$	kWh	Gallons	Gallons	$		$	Years	Years
34,000	1,300	700	100	2,300	0.0	0	14.9	NA

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

This measure is not recommended.

4.5 ECM-5 Install Both Wall and Roof Insulation

While insulating either the exterior walls or roof will decrease heat transfer at that surface, insulation at both the exterior walls and roof will provide the highest reduction in total heat transfer because the paths of least resistance are minimized. This ECM proposes the installation of an EIFS system and the installation of R-19 vinyl face insulation at the interior roof. This ECM shows the total budgetary costs for installing both systems and the increased utility and energy savings of using both systems as opposed to one or the other.

This ECM was analyzed by modeling both the building and the hours of operation in the Carrier Hourly Analysis Program (HAP). Using this model, insulation was added to all exterior walls and at the roof level. The energy consumption of the HVAC units was then compared to the baseline building. HAP data for the building with insulation is located in Appendix G. Baseline building data is located in Appendix L. It was determined that about 2,500 kWh, 1,400 gallons of propane, and 200 gallons of fuel oil can be saved per year can be saved through implementation of this ECM. This is a monetary savings of approximately $4,500 per year.

Properly installed insulation has an indefinite life expectancy. For the purposes of calculating long-term savings and a return on investment, a period of 15 years was chosen. The total energy savings over the 15 years noted is estimated at 37,500 kWh, 21,000 gallons of propane, and 3,000 gallons of fuel oil, equaling $67,500.

Supporting calculations, annual energy usage for the HVAC units, and the cost of insulation is included in Appendix G. The implementation cost and savings related to this ECM are summarized on the following page:

ECM-5 Install Both Wall and Roof Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity	Propane	Fuel Oil					
$	kWh	Gallons	Gallons	$		$	Years	Years
159,000	2,500	1,400	200	4,500	(0.6)	0	>25	NA

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

This measure is not recommended.

4.6 ECM-6 Replace Single Pane Windows in Garage

The currently installed exterior windows in the garage bays are large, swing out, single pane. Double pane windows have better insulating properties that reduce the rate of heat loss or gain. Single pane windows have poorer insulating properties than double pane windows and allow a greater amount of air infiltration or exfiltration, depending on the pressure of the building. When single pane windows are used in conjunction with storm windows, the air gap between the single pane window and the storm window improves the insulating properties of the whole window system and reduces air movement through the windows. This ECM proposes the replacement of the single pane windows with double pane windows. Because the installation of storm windows provide an effect similar to double pane windows at a lesser cost, the budgetary costs and savings for both complete window replacement and installation of storm windows is shown in this ECM. The benefit of completely replacing the windows is the improved insulating properties of the windows as well as the added convenience to the building maintenance program. Storm windows would need to be removed when the windows are opened to provide outside air to the space.

The large, single pane, swing out windows located in both the garage bays and the garage area converted into an office space are proposed to be replaced in this ECM. The most cost effective replacement windows are fiberglass windows with the same dimensions as the existing windows. Aluminum windows were also considered, but the installation cost was more than two and a half times the cost of the fiberglass window installation. By replacing these windows with double pane windows, annual energy consumed for heating and cooling the spaces can be reduced, yielding an annual savings of about 50 kWh, 150 gallons of propane, and 25 gallons of fuel oil. This is a monetary savings of approximately $400 per year.

Implementation of this measure requires removal and disposal of the existing single pane windows and installation of the new double pane windows.

This ECM was analyzed by modeling both the baseline building and the building with replacement windows in the Carrier Hourly Analysis Program (HAP). Using this model, the energy use of heating and cooling equipment can be compared to the current energy consumption under equal conditions. HAP data for this ECM is located in Appendix H. Baseline building data is located in Appendix L.

The double pane windows have an expected life of 15 years and total energy savings over the life of the project is estimated at 750 kWh, 2,250 gallons of propane, and 375 gallons of fuel oil, equaling $6,000. The implementation cost and savings related to this ECM are presented in Appendix H and summarized on the following page:

ECM-6 Replace Single Pane Windows in Garage

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity	Propane	Fuel Oil					
$	kWh	Gallons	Gallons	$		$	Years	Years
9,200	50	150	25	400	(0.3)	0	23.0	NA

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

This measure is not recommended. If storm windows are installed at the garage windows, similar energy savings to replacing the windows can be achieved.

4.7 ECM-7 Install Both Wall and Roof Insulation and Replace Single Pane Windows

Just as described in ECM-5, increasing the resistance value of another component of the building's exterior increases the overall effectiveness of the entire system. This ECM proposes the installation of an EIFS system and the installation of R-19 vinyl face insulation at the interior roof. In addition, garage area windows are replaced with double pane window systems. This ECM shows the total budgetary costs for installing all systems and the increased utility and energy savings of using all systems as opposed to using any one of them individually.

This ECM was analyzed by modeling both the building and the hours of operation in the Carrier Hourly Analysis Program (HAP). Using this model, insulation was added to the exterior wall all around the building, as well as at the underside of the roof. Garage area windows were also replaced, as proposed in ECM-6, and the energy consumption of the HVAC units was compared to the baseline building. HAP data for the building with insulation is located in Appendix I. Baseline building data is located in Appendix L. It was determined that about 2,600 kWh, 1,500 gallons of propane, and 200 gallons of fuel oil can be saved per year through implementation of this ECM. This is a monetary savings of approximately $4,900 per year.

Properly installed insulation has an indefinite life expectancy. For the purposes of calculating long-term savings and a return on investment, a period of 15 years was chosen. Double pane windows have a life expectancy of 15 years. The total energy savings over the 15 years noted is estimated at 39,000 kWh, 22,500 gallons of propane, and 3,000 gallons of fuel oil, equaling $73,500.

Supporting calculations, annual energy usage for the HVAC units, and the cost of insulation is included in Appendix I. The implementation cost and savings related to this ECM are summarized below:

ECM-7 Install Both Wall and Roof Insulation and Replace Single Pane Windows

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity	Propane	Fuel Oil					
$	kWh	Gallons	Gallons	$		$	Years	Years
168,600	2,600	1,500	200	4,900	(0.6)	0	>25	NA

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

This measure is not recommended.

4.8 ECM-8 Replace Propane-Fired Unit Heaters with Waste Oil-Fired Unit Heaters

The Department of Public Works garage collects approximately 1,500 to 2,000 gallons of waste oil per year. Currently the department is selling the collected waste oil to a buyer for $0.25 per gallon. This generates approximately $500 per year for the department. By replacing the propane-fired fired unit heaters in the garage bays with waste oil-fired heaters, a low price source of fuel can be utilized by the department. Run times of the existing units were determined through building modeling in the Carrier Hourly Analysis Program (HAP). These run times were applied to the waste oil input rate of the new heaters to determine the amount of waste oil required.

Each of the three propane-fired heaters can be replaced with a waste oil-fired heater with 150,000 BTUH capacity and a fuel input rate of 1.07 gph. The propane utility bills show that the building consumed approximately 2,700 gallons of propane during the analyzed year. Propane has a heating value per unit fuel of 91.6 kBTU/gallon. This means that the heating required in the garage area was approximately 247,300 kBTU/year. Because fuel oil and waste oil have a higher heating value per unit, 139 kBTU/gallon, less waste fuel oil is required to generate the heat required in the garage areas. The garage areas need approximately 1,800 gallons of waste fuel oil to heat the spaces. The facility collects between 1,500 and 2,000 gallons of waste oil each year that can be used for heating the garage spaces. Currently it is being sold to a recycler for $0.25/gallon. By installing unit heaters capable of burning waste fuel, the facility's propane usage can be completely eliminated. This ECM proposes the installation of three waste oil-fired heaters with individual storage tanks, strainers, and a through wall chimney assembly.

This ECM was analyzed by analyzing utility data and converting the quantity of propane used to heat the garage spaces to the BTU's needed per year. This yearly BTU usage was then converted to the amount of fuel oil required to heat the same spaces. Utility data used to analyze this ECM is located in Appendix A. It was determined that about 2,700 gallons of propane can be saved per year through implementation of this ECM. This is a monetary savings of approximately $6,800 per year. The facility had been selling the collected waste oil to a recycler for $0.25/gallon. For 2,000 collected gallons per year, this fuel oil was worth $500. The net monetary savings per year is $6,300.

Unit heaters have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project is estimated at 40,500 gallons of propane, equaling $94,500.

Data describing the installation costs is included in Appendix J. The implementation cost and savings related to this ECM are summarized below:

ECM-8 Replace Propane-Fired Unit Heaters with Waste Oil-Fired Unit Heaters

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity	Propane	Fuel Oil					
$	kWh	Gallons	Gallons	$		$	Years	Years
19,700	0	2,700	0	6,300	3.8	0	3.1	NA

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

This measure is recommended.

4.9 ECM-9 Eliminate Leaks in Compressed Air Piping

During the energy audit slow leaks were observed in the compressed air piping. Air flow could be heard and the compressor was energized even though no outlets were in use. By tightening and sealing the compressed air piping to eliminate leaks, the compressor run-time can be reduced, saving energy.

This ECM was analyzed by estimating excess run time based on observations during the survey. Because of the limited size of the system and the relatively small diameter of most of the compressed air piping, typical methods of determining the leak's volumetric flowrate were not applicable to this system. The compressor run time estimates are conservative.

The air compressor is a 5 hp unit which, converted to electrical units, is approximately 3.75 kW. If the compressor runs for an extra 15 minutes per day, approximately 340 kWh per year of electricity is consumed per year just because of a leaking system. If the fittings are tightened and air leaks eliminated, 340 kWh per year can be saved through implementation of this ECM. This is a monetary savings of approximately $50 per year.

Properly sealed piping should not have any leaks for at least 15 years and total energy savings over the life of the project is estimated at 5,100 kWh, equaling $750.

Data describing the installation costs is included in Appendix K. The implementation cost and savings related to this ECM are summarized below:

ECM-9 Eliminate Leaks in Compressed Air Piping

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
270	0	340	0	50	1.8	0	5.4	NA

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

This measure is recommended.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance Program

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

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

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

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

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

5.1.2 New Jersey Smart Start Program

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

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

5.1.3 Energy Efficient and Conservation Block Grant

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

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

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

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

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

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

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

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

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

of the incentive based on projected energy savings of the project. It is important to note that all applications for this incentive must be submitted before implementation of energy conservation measures.

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

5.2 Building Incentives

5.2.1 New Jersey Pay For Performance Program

The building is eligible for all three incentives available from the New Jersey P4P program. Incentive #1 is for the development of an energy reduction plan and will pay $.05/ square foot of the building footprint, which equates to about $370. Implementation of the energy conservation measures discussed in this report is expected to reduce the building's energy usage by over 15%, which qualifies it for both incentives #2 and #3. Combining incentives #2 and #3 will provide maximum savings of $0.18/ kWh and $1.80/ therm not to exceed 50% of the total project cost. The building is projected to save about 6,440 kWh, which amounts to about $1,200 in incentives. These incentives would reduce the overall payback of the project from 4.2 years to 4.0 years.

5.2.2 New Jersey Smart Start Program

The Lower Alloways Township Department of Public Works Garage is eligible for incentives from the New Jersey Smart Start Program.

The lighting replacement measure is eligible for $1,830 in savings if all fixtures are replaced. The lighting controls measure is eligible for $160 in savings if eight motion sensors are added for lighting control.

5.2.3 Energy Efficient and Conservation Block Grant

The Lower Alloways Township Department of Public Works Garage is owned by local government, which makes it eligible for this incentive. The incentive amount is determined by TRC Solutions and is not calculable at this time. Further information about this incentive, including the application, can be found at:
http://www.njcleanenergy.com/commercial-industrial/programs/energy-efficiency-and-conservation-block-grants

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

Based on the utility information that was provided by the township for the garage, it was determined that the building pays for the societal benefits charge. The garage is not eligible for additional funding through this program.

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.

Due to the use of this building, the best heating system available for the garage area is an infrared system. Such a system heats materials and the people, not the air surrounding these. A geothermal system requires the use of heat pumps, which are systems that heat air and not surfaces. Such systems are not compatible with the use of this building. Within the areas that an air system works well, the office, lunchroom, locker/toilet room, and mezzanine, there is little cooling required. This imbalance between the large swing in cooling and heating requirements is not conducive to a geothermal system. The benefits associated with a geothermal system are not realized in this type of facility.

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

The facility 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 Energy Program recommends the use of the PVWATTS program to determine solar grid tied system production. Version 2 of the program was used, allowing the zip code of the Department of Public Works garage to be analyzed. A fixed tilt array type was utilized to calculate energy production. The PVWATTS solar power generation model is provided in Appendix M. Additionally, further financial analysis was provided by www.solar-estimate.org. The result of this analysis is also located in Appendix M.

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 of New Jersey will allow the owner to participate in the New Jersey solar renewable energy certificates program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero

emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. The cost of the ACP penalty for 2009 is $689; this is the amount that must be paid per SERC by the high emission producers. The expected dollar amount that will be paid to the PV producer for 2009 is expected to be $600/SREC credit. Payments that will be received from the PV producer will change from year to year dependent upon supply and demand. Renewable Energy Consultants is a third party SREC broker that has been approved by the New Jersey Clean Energy Program. As stated above there is no definitive way to calculate an exact price that will be received by the PV producer per SREC over the next 15 years. Renewable Energy Consultants estimated an average of $487/ SERC per year and this number was utilized in the cash flow for this report.

The building had a maximum kW demand of 22.1 kW and a minimum of 12.1 kW over the 12-month reporting period used for the energy analysis. The monthly average over the observed 12-month period was 17.2 kW. Because the most frequent monthly demand is approximately 17 kW, a 17 kW system size was selected for the calculations. The system costs for PV installations were derived from average installation costs for this area. It should be noted that the cost of installation is currently $8 per watt or $8,000 per kW of installed system. This has increased in the past few years due to the rise in national demand for PV power generator systems. Other cost considerations will also need to be considered. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will need to be replaced multiple times during the useful life of the PV system.

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

Photovoltaic (PV) Rooftop Solar Power Generation – 17 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	$	$	$	$/yr	Years	Years
136,000	0	20,700	0	3,600	3,600	17,000	1,600	>25	~5

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

Based on the above, it is recommended that a third party power purchase agreement (PPA) be considered to take advantage of the ITC, reduce the cost of the system to the township, and provide a guaranteed reduced cost of power.

6.2.2 Solar Thermal Hot Water Plant

Active solar water-heating systems for buildings use solar collectors to absorb the sun's energy to heat a fluid, either a liquid or air. The collector would then circulate the heated liquid to the normal system. If the liquid is water it may be circulated to the domestic water heater to increase the temperature further prior to entering the hot water supply system. There are also collectors that heat air which is then passed through an air to liquid heat exchanger to increase the temperature of another fluid. Applications for active solar thermal energy include providing hot water, heating swimming pools, space heating, and preheating air in residential and commercial buildings.

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

Several options exist for using active solar thermal systems for space heating. The most common method involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system). The most practical system for the garage would utilize a solar circulation, domestic hot water system that pre-heats incoming water prior to entering the domestic water heater. Although this system is both the simplest and least expensive to implement, the small amount of hot water used at the facility on an annual basis results in a payback period that greatly exceeds the useful life of the system itself. DHW is presently produced by an electric water heater and, therefore, this measure would save site electricity.

Currently, an incentive is not available for installation of thermal solar systems. A Federal tax credit of 30% of installation cost for the thermal applications is available; however, Lower Alloways Township 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 N 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
9,300	0	575	0	100	100	NA	>25	NA

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

This measure is not recommended.

6.3 Wind

Wind turbines are part of a renewable energy system that converts the kinetic energy of wind into usable mechanical and electrical energy. Small wind turbines comprise the group of turbines utilized for residential and small business applications.

The most common design for small wind turbines utilize a horizontal axis propeller, which converts kinetic energy of the wind 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 Lower Alloways Township area, the map indicates a mean annual wind speed of less than 4.5 meters per second, approximately 14 miles per hour. Most small wind turbines are not financially viable at such wind speeds. Therefore, the model indicates that a wind turbine installation may not be applicable at this location. The model was designed to provide a good indication of wind speeds at applicable locations throughout the state. Before moving forward with a small wind production project at the facility's location, a wind test tower will need to be installed at the 30 meter tower height and monitored for a year. Consideration must also be given to the effects of the turbine location on the neighbors and local ordinances.

A wind speed map is included in Appendix O.

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

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 facility does not have sufficient need for electrical generation or the ability to use most of the thermal byproduct during the winter or summer months. 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 the lack of a reliable waste stream that can be utilized.

6.6 Demand Response Curtailment

Presently, electricity is delivered by JCP&L, which receives the electricity from regional power grid RFC. PJM 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, also known as Economic Load Response, is an agreement with the PJM regional transmission organization and an approved Curtailment Service Provider (CSP) to reduce electrical demand 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 PJM 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 PJM pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. The garage had a monthly average kW demand of 17.2 kW and a maximum demand of 22.1 kW over the previous 12 months.

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 United State Energy Protection Agency (EPA) is a federal agency in charge of regulating environment waste and policy in the United States. The EPA has released the EPA Portfolio Manager for public use. The program is designed to allow property owners and managers to share, compare and improve upon their facility's energy consumption. Inputting such parameters as electricity, heating fuel, building characteristics and location into the website based program generates a naturalized energy rating score out of 100. Once an account is registered, monthly utility data can be entered to track the savings progress and retrieve an updated energy rating score on a monthly basis. Because the EPA Portfolio Manager will only generate a report when all utility data overlaps for a period of 12 consecutive months, the year of utility data was adjusted as needed to overlap the electricity, propane, and fuel oil consumption. No usage months were modified, only the year.

The Department of Public Works garage is considered an average energy consumer per the Portfolio Manager with a Site Energy Usage Index (EUI) of 70 kBTU/ft^2/year. In comparison the national average site EUI is 77 kBTU/ft^2/year. The building's EUI is much lower than the national average because the national average includes a large variety of buildings that are classified as "Other," the majority of the floor area is not cooled, and the lighting load is much lower than other types of spaces that fall in the "Other" category.

If the recommended measures are implemented, ECM-1, ECM-2, ECM-8, and ECM-9, the facility's EUI will be reduced from 70 kBTU/ft^2/year to 55 kBTU/ft^2/year.

The EPA Portfolio Manager was not able to calculate an energy performance rating for this building because more than 50% of the floor area is defined as "Other" within the program. Although the Portfolio Manager does not calculate a rating for this building, we are still able to compare the building's performance with the national average for all buildings designated "Other" as follows:

Energy Performance Comparison

	Evaluation Period	Comparisons	
Performance Metrics	Baseline (Ending date 07/31/2010)	Rating of 75	National Average
Energy Intensity			
Site (kBtu/ft^2)	70	32	77
Source (kBtu/ft^2)	134	62	150
Energy Cost			
$/year	$18,632.69	$8,642.1	$20,601.91
$/$ft^2$/year	$2.52	$1.17	$2.79
Greenhouse Gas Emissions			
MtCO_2e/year	51	24	56
kgCO_2e/ft^2/year	7	3	8

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

The user name and password for the facility's EPA Portfolio Manager Account has been provided to Ronald L. Campbell Sr., Township Clerk for Lower Alloways Township.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Lower Alloways Township Department of Public Works Garage in Salem, New Jersey identified potential ECMs for lighting fixture upgrades, lighting control modifications, HVAC system upgrades, and compressed air piping modifications. Potential annual savings of $7,450 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-1 & ECM-2 Lighting Control Modifications
(Proposed Fixtures – Combined Budgetary Cost and Savings)

Budgetary Cost	Annual Utility Savings				ROI (with Incentive)	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
11,250	0	6,100	0	1,100	0.5	1,990	10.3	8.4

* Incentive shown is per the New Jersey Smart Start Program, 2010 Lighting Controls Application. Incentive is based on the use of eight wall-mounted occupancy sensors and a $30 per fixture incentive for replacing T12 fixtures with T8 fixtures.

ECM-8 Replace Propane-Fired Unit Heaters with Waste Oil-Fired Unit Heaters

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity	Propane	Fuel Oil					
$	kWh	Gallons	Gallons	$		$	Years	Years
19,700	0	2,700	0	6,300	3.8	0	3.1	NA

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

ECM-9 Eliminate Leaks in Compressed Air Piping

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
270	0	340	0	50	1.8	0	5.4	NA

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

APPENDIX A

Utility Usage Analysis

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage

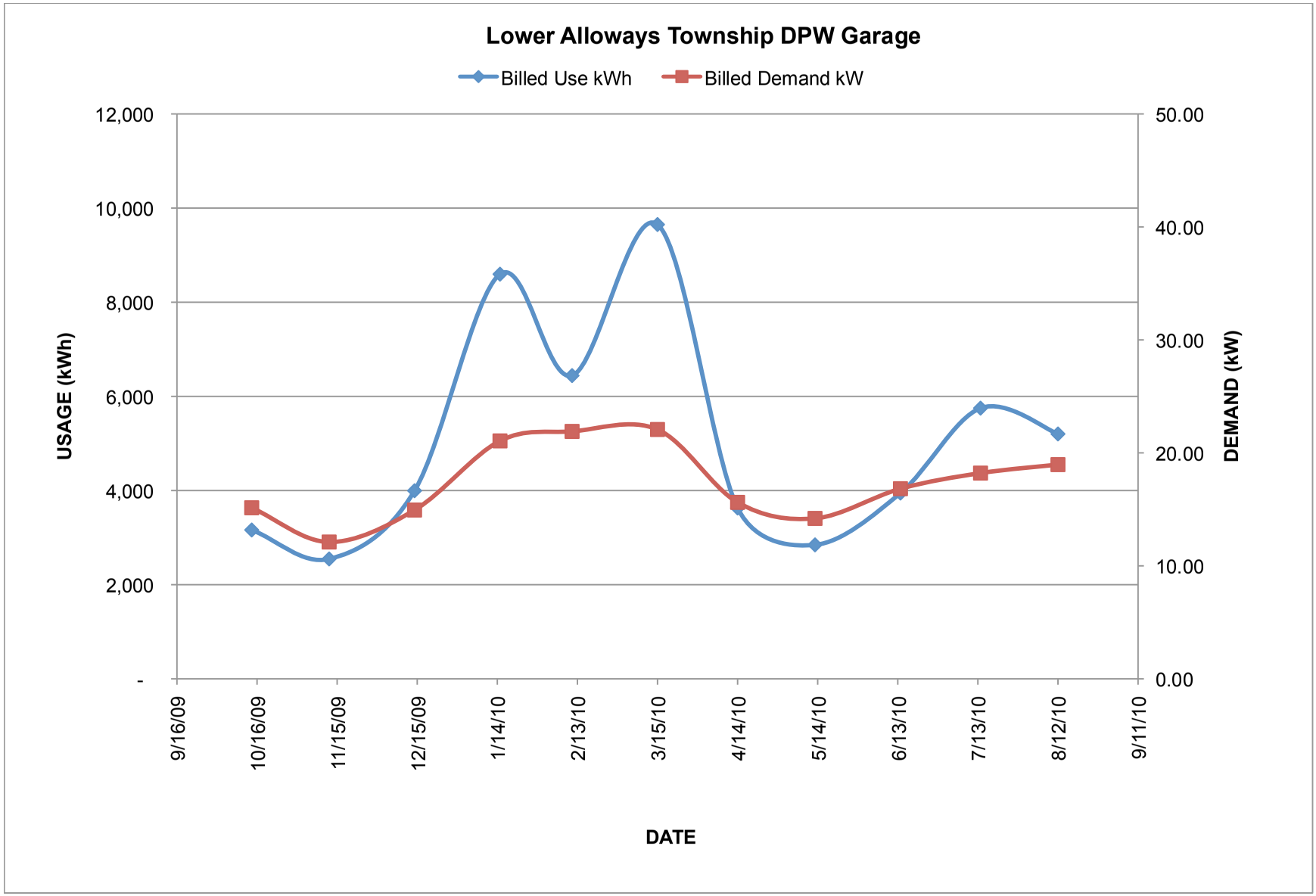
CHA Project number 22218

Electricity Cost Summary: Meter #23625506						
Period	Billed Use kWh	Billed Demand kW	Total Cost $	Demand Unit Cost $/kW	Suppy Unit Cost $/kWh	Blended Cost $/kWh
9/14/09	3,392	15.51	$ 669.07	$ -	$ 0.20	$ 0.1972
10/14/09	3,162	15.14	$ 583.98	$ -	$ 0.18	$ 0.1847
11/12/09	2,547	12.11	$ 436.24	$ 5.20	$ 0.14	$ 0.1713
12/14/09	3,996	14.94	$ 670.82	$ 6.08	$ 0.14	$ 0.1679
1/15/10	8,596	21.06	$ 1,371.20	$ 6.56	$ 0.14	$ 0.1595
2/11/10	6,442	21.90	$ 1,047.17	$ 5.56	$ 0.14	$ 0.1626
3/15/10	9,651	22.07	$ 1,527.55	$ 6.61	$ 0.14	$ 0.1583
4/14/10	3,629	15.62	$ 617.26	$ 5.78	$ 0.14	$ 0.1701
5/13/10	2,846	14.20	$ 493.13	$ 5.46	$ 0.14	$ 0.1733
6/14/10	3,946	16.83	$ 731.22	$ -	$ 0.18	$ 0.1853
7/14/10	5,750	18.21	$ 1,169.80	$ 7.31	$ 0.18	$ 0.2034
8/12/10	5,202	18.96	$ 1,066.71	$ -	$ 0.20	$ 0.2051
Totals	59,159	206.55	$ 10,384.15			$ 0.1755
Monthly Ave.	4,930	17.21	$ 865.35	$ 4.05	$ 0.16	
Max. Demand		22.07				

Account Number: 0185 5159 9998
Meter Number: 23625506
Rate Schedule: G2L2
Utility Company: Atlantic City Electric

Notes:

Total Billed Use kWh is the sum of each month's use in kWh.
Total Billed Billed Demand is the highest month's demand.
Total Cost is sum of each month's total billing including all charges.
(See Chart 2 "Total Column".)
Demand Unit Cost per month is kW charges from Chart 2 divided by kW used.
Does not incled Service Charge from Chart 2.
Supply Unit Cost per month is kWh charges from Chart 2 divided by kWh used.
Does not include Service Charge from Chart 2
Total Demand Unit Cost is total kW charges from chart 2 divided by total kW used.
Total Supply Unit Cost per year total kWh charges from chart 2 divided by total kWh.
Blended Rate per month is the Cost divided by the kWh used for that month.
Total Blended Rate is the Total Cost divided by the Total Use for the year.


Lower Alloways Township DPW Garage
Billed Use kWh
Billed Demand kW
12,000
10,000
8,000
6,000
4,000
2,000
-
50.00
40.00
30.00
20.00
10.00
0.00
USAGE (kWh)
DEMAND (kW)
9/16/09
10/16/09
11/15/09
12/15/09
1/14/10
2/13/10
3/15/10
4/14/10
5/14/10
6/13/10
7/13/10
8/12/10
9/11/10
DATE

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

Electricity Cost Summary: Meter #23625506																		
Period	Coustomer Charge	Demand kW	RGGI Recovery Charge kWh	Delivery kWh	Market Transition kWh	Non-Utility Generation kWh	Societal Benefits kWh	Infrastructure Investment Surcharge kWh	System Control Charge kWh	Transition Bond Charge kWh	Regulatory Assests Recovery Charge kWh	Delivery Total	Transmission kW	Basic Generation kWh	Supply Total	Total
9/14/09	$ 5.60	$ -	$ 0.24	$ 161.70	$ 8.75	$ (13.66)	$ 28.08	$ 0.19	$ 0.22	$ 19.67	$ 2.14	$ 212.93	$ -	$ 456.14	$ 456.14	$ 669.07
10/14/09	$ 6.00	$ -	$ 0.12	$ 150.73	$ 7.41	$ (12.73)	$ 26.13	$ 0.18	$ 0.21	$ 18.51	$ 2.00	$ 198.56	$ -	$ 385.42	$ 385.42	$ 583.98
11/12/09	$ 5.80	$ 33.43	$ -	$ 60.78	$ 5.29	$ (10.25)	$ 20.78	$ 0.15	$ 0.17	$ 15.07	$ 1.61	$ 132.83	$ 29.56	$ 273.85	$ 303.41	$ 436.24
12/14/09	$ 6.40	$ 48.23	$ -	$ 92.44	$ 8.29	$ (16.09)	$ 32.59	$ 0.23	$ 0.26	$ 23.65	$ 2.53	$ 198.53	$ 42.65	$ 429.64	$ 472.29	$ 670.82
1/15/10	$ 6.40	$ 73.37	$ -	$ 190.85	$ 17.84	$ (34.61)	$ 70.10	$ 1.28	$ 0.57	$ 50.87	$ 5.43	$ 382.10	$ 64.87	$ 924.23	$ 989.10	$ 1,371.20
2/11/10	$ 5.40	$ 64.64	$ -	$ 143.67	$ 13.37	$ (25.94)	$ 52.53	$ 1.63	$ 0.43	$ 38.12	$ 4.07	$ 297.92	$ 57.15	$ 692.10	$ 749.25	$ 1,047.17
3/15/10	$ 6.40	$ 77.42	$ -	$ 213.42	$ 20.03	$ (38.85)	$ 78.70	$ 2.44	$ 0.64	$ 57.11	$ 6.10	$ 423.41	$ 68.45	$ 1,035.69	$ 1,104.14	$ 1,527.55
4/14/10	$ 6.00	$ 47.88	$ -	$ 84.15	$ 7.53	$ (14.61)	$ 29.60	$ 0.92	$ 0.24	$ 21.48	$ 2.29	$ 185.48	$ 42.34	$ 389.44	$ 431.78	$ 617.26
5/13/10	$ 5.80	$ 41.14	$ -	$ 67.18	$ 5.91	$ (11.46)	$ 23.21	$ 0.72	$ 0.19	$ 16.84	$ 1.80	$ 151.33	$ 36.38	$ 305.42	$ 341.80	$ 493.13
6/14/10	$ 6.64	$ -	$ -	$ 194.73	$ 8.18	$ (15.89)	$ 32.17	$ 1.00	$ 0.26	$ 23.35	$ 1.89	$ 252.33	$ -	$ 478.89	$ 478.89	$ 731.22
7/14/10	$ 6.51	$ 76.30	$ 0.51	$ 154.76	$ 11.94	$ (23.15)	$ 46.89	$ 1.45	$ 0.38	$ 34.03	$ 1.62	$ 311.24	$ 56.85	$ 801.71	$ 858.56	$ 1,169.80
8/12/10	$ 6.29	$ -	$ 0.99	$ 267.94	$ 10.80	$ (20.94)	$ 42.42	$ 1.32	$ 0.34	$ 30.79	$ 1.46	$ 341.41	$ -	$ 725.30	$ 725.30	$ 1,066.71
Totals	$ 73.24	$ 462.41	$ 1.86	$ 1,782.35	$ 125.34	$ (238.18)	$ 483.20	$ 11.51	$ 3.91	$ 349.49	$ 32.94	$ 3,088.07	$ 398.25	$ 6,897.83	$ 7,296.08	$ 10,384.15

Atlantic City Electric Rate Schedule "G2L2"

Notes: **Chart 2** **Electricity Cost Summary**
This chart provides electrical cost breakdowns and sums totals. Sum totals are "Delivery Total", first 6 columns and Total Cost, four columns after "Delivery Total".
All numbers are in $.
Refer to Electricity Use Chart for kw and kWh figures.

ATLANTIC CITY ELECTRIC SERVICE TERRITORY
Last Updated: 07/22/10

***CUSTOMER CLASS** - R – RESIDENTIAL C – COMMERCIAL I – INDUSTRIAL
****GREEN POWER MARKETER**

Supplier	Telephone & Web Site	*Customer Class
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	**C** **ACTIVE**
Champion Energy Services, LLC 72 Avenue L Newark, NJ 07105	(877) 653-5090 www.championenergyservices.com	**C/I** **ACTIVE**
Commerce Energy, Inc. 4400 Route 9 South Suite100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com	**C** **ACTIVE**
Community Energy, Inc.*** 51 Sandbrook Headquarters Road Stockton, NJ 08559	(877) NJWIND-1 (877) 659-4631 www.CommunityEnergyInc.com	**R/C/I** **ACTIVE**
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	**C** **ACTIVE**
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com	**C/I** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com	**C/I** **ACTIVE**
FirstEnergy Solutions Corp. 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	**C/I** **ACTIVE**
Gateway Energy Services Corporation	(800) 805-8586	**R/C/I**

44 Whispering Pines Lane Lakewood, NJ 08701	www.gesc.com	**ACTIVE**
Gexa Energy New Jersey LLC 651 Jernee Mill Road Sayreville, New Jersey 08872	(866) 961-9399 www.gexaenergy.com	**C/I** **ACTIVE**
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street Sixth Floor Edison, New Jersey 08837	(866) 999-8374 www.gdfsuezenergyresources.com	**C/I** **ACTIVE**
Glacial Energy of New Jersey, Inc. 75 Route 15 Building E Lafayette, NJ 07848	(888) 452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Green Mountain Energy Company*** 3000 Atrium Way Mount Laurel, NJ 08054	(800) 810-7300 www.greenmountain.com	**R/C/I** **ACTIVE**
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	**C/I** **ACTIVE**
Liberty Power Delaware, LLC 3000 Atrium Way, Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Liberty Power Holdings, LLC 3000 Atrium Way, Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	**C/I** **ACTIVE**
Palmco Power NJ, LLC One Greentree Centre 10000 Lincoln Drive East Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	**C/I** **ACTIVE**
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com	**C/I** **ACTIVE**

PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095	(877) 273-6772 (800) 2- SEMPRA www.semprasolutions.com	**C/I** **ACTIVE**
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com	**C/I** **ACTIVE**
Sterling Planet, Inc.*** 58 Otto Avenue Beverly, NJ 08010	(877) 457-2306 www.sterlingplanet.com	**R/C/I** **ACTIVE**
Strategic Energy, LLC 55 Madison Avenue Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.com	**C/I** **ACTIVE**
UGI Energy Services, Inc. 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com	**C/I** **ACTIVE**
Viridian Energy 2001 Route 46, Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508 www.viridian.com	**R/C** **ACTIVE**

Back to main supplier information page

ATLANTIC CITY ELECTRIC SERVICE TERRITORY
Last Updated: 07/22/10

***CUSTOMER CLASS** - R – RESIDENTIAL C – COMMERCIAL I – INDUSTRIAL
****GREEN POWER MARKETER**

Supplier	Telephone & Web Site	*Customer Class
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	**C** **ACTIVE**
Champion Energy Services, LLC 72 Avenue L Newark, NJ 07105	(877) 653-5090 www.championenergyservices.com	**C/I** **ACTIVE**
Commerce Energy, Inc. 4400 Route 9 South Suite100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com	**C** **ACTIVE**
Community Energy, Inc.*** 51 Sandbrook Headquarters Road Stockton, NJ 08559	(877) NJWIND-1 (877) 659-4631 www.CommunityEnergyInc.com	**R/C/I** **ACTIVE**
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	**C** **ACTIVE**
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com	**C/I** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com	**C/I** **ACTIVE**
FirstEnergy Solutions Corp. 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	**C/I** **ACTIVE**
Gateway Energy Services Corporation	(800) 805-8586	**R/C/I**

44 Whispering Pines Lane Lakewood, NJ 08701	www.gesc.com	**ACTIVE**
Gexa Energy New Jersey LLC 651 Jernee Mill Road Sayreville, New Jersey 08872	(866) 961-9399 www.gexaenergy.com	**C/I** **ACTIVE**
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street Sixth Floor Edison, New Jersey 08837	(866) 999-8374 www.gdfsuezenergyresources.com	**C/I** **ACTIVE**
Glacial Energy of New Jersey, Inc. 75 Route 15 Building E Lafayette, NJ 07848	(888) 452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Green Mountain Energy Company*** 3000 Atrium Way Mount Laurel, NJ 08054	(800) 810-7300 www.greenmountain.com	**R/C/I** **ACTIVE**
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	**C/I** **ACTIVE**
Liberty Power Delaware, LLC 3000 Atrium Way, Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Liberty Power Holdings, LLC 3000 Atrium Way, Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	**C/I** **ACTIVE**
Palmco Power NJ, LLC One Greentree Centre 10000 Lincoln Drive East Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	**C/I** **ACTIVE**
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com	**C/I** **ACTIVE**

PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095	(877) 273-6772 (800) 2- SEMPRA www.semprasolutions.com	**C/I** **ACTIVE**
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com	**C/I** **ACTIVE**
Sterling Planet, Inc.*** 58 Otto Avenue Beverly, NJ 08010	(877) 457-2306 www.sterlingplanet.com	**R/C/I** **ACTIVE**
Strategic Energy, LLC 55 Madison Avenue Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.com	**C/I** **ACTIVE**
UGI Energy Services, Inc. 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com	**C/I** **ACTIVE**
Viridian Energy 2001 Route 46, Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508 www.viridian.com	**R/C** **ACTIVE**

Back to main supplier information page

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

Propane Cost Summary					
Period	Quantity Gal	Propane Total $	Reg Recovery Fee $	Total Cost	Blended Cost $/Gal
5/4/09	Filled to 80%	$ -	$ -	$ -	$ -
10/28/09	202.7	$ 441.87	$ 3.97	$ 445.84	$ 2.20
12/4/09	287.2	$ 688.99	$ 3.97	$ 692.96	$ 2.41
12/30/09	672.6	$ 1,546.91	$ 3.97	$ 1,550.88	$ 2.31
1/14/10	358.7	$ 968.45	$ -	$ 968.45	$ 2.70
2/24/10	539.7	$ 1,457.14	$ -	$ 1,457.14	$ 2.70
3/9/10	291.4	$ 786.75	$ 3.97	$ 790.72	$ 2.71
3/26/10	180.3	$ 486.79	$ -	$ 486.79	$ 2.70
5/18/10	138.1	$ 372.86	$ 3.97	$ 376.83	$ 2.73
5/18/10	Filled to 80%	$ -	$ -	$ -	$ -
Totals	2670.7	$ 6,749.76	$ 19.85	$ 6,769.61	$ 2.53

Account: LOW20A
Heating Only

Notes: **Propane Cost Summary**
Only limited bills per winter months.

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

Fuel Oil Cost Summary			
Period	Quantity Gal	Fuel Oil Total $	Blended Cost $/Gal
10/20/09	435.8	$ 1,068.58	$ 2.45
Totals	435.8	$ 1,068.58	$ 2.45

Account: 43520276
Heating Only

Notes: **Fuel Oil Cost Summary**
Only limited bills per winter months.

APPENDIX B

HVAC & Miscellaneous Equipment List

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

HVAC Equipment List											
Item	**Quanity**	**Manufacturer**	**Model Number**	**Serial number**	**Cooling Capacity MBH**	**Condition**	**Fuel**	**Heating Input MBH**	**Heating Output MBH**	**Refrigerant**	**Comments**
Propane-Fired Unit Heater	2	Sterling HVAC	QVF-100	B02S002712	-	Very Good	Propane	100	80	-	Original units natural gas-fired, replacement propane burner installed
Propane-Fired Unit Heater	1	Sterling HVAC	QVF-125	A01S003191	-	Very Good	Propane	125	100	-	Original units natural gas-fired, replacement propane burner installed
Portable Air Conditioner	1	LG	LP1200DXRY8	-	12	Excellent	-	-	-	R-22	Located in double-bay office, exhausts into garage space
Window Air Conditioner	1	Carrier	-	-	Approximately 18	Good	-	-	-		Located in lunchroom
Window Air Conditioner	1	-	BT30751-00	-	Approximately 12	Good	-	-	-		Located in office adjacent to three-bay garage space
Window Air Conditioner	1	White-Westinghouse	-	-	Approximately 12	Good	-	-	-		Located in office off reception area
Window Air Conditioner	1	Whirlpool	-	-	Approximately 12	Good	-	-	-		Located in corner office off corridor
Electric Baseboard Heater	1	-	-	-	-	Good	Electric	-	-	-	Located in corner office off corridor
Electric Wall Heater	1	-	-	-	-	Good	Electric	-	-	-	Located in restroom
Electric Wall Heater	1	Singer	-	-	-	Good	Electric	-	-	-	Located in plan review room
Fuel Oil-Fired Furnace	1	Patco Inc.	D196H0K12	001493	-	Good	Fuel Oil	245		-	Located in attic above office area.
Exhaust Fan	3	-	-	-	-	-	-	-	-	-	3/4 Horsepower motor, switch control
Bathroom Exhaust Fan	1	-	-	-	-	-	-	-	-	-	Bathroom exhaust fan, energizes via light switch
Truck Exhaust	1	-	-	-	-	-	-	-	-	-	Truck exhaust blower located in welding bay. Truck exhaust has four capped drops
Hood Exhaust	1	-	-	-	-	-	-	-	-	-	Hood exhaust blower located in two-bay garage, hood located in welding area

Miscllaneous Equipment List								
Item	**Quanity**	**Manufacturer**	**Model Number**	**Serial number**	**Motor Size**	**Electrical Characteristics**	**Condition**	**Comments**
1-Ton Lift	1	CM	L-1-635	204701	1 HP	240V/3Ph/60Hz	Good	-
Welder	1	Lincoln	R3S-400	AC475460	-	230V/68A	Good	-
Drill Press	1	Rockwell	-	1804350	Fractional	Plug-In	Good	-
Rotary Blade Grinder	1	-	RBG-3410-C	-	Fractional	Plug-In	Good	-
Bench Saw	1	Milwaukee	-	-	Fractional	Plug-In	Good	-
Welder	1	Snap On	YA212A	8121-014538	-	230V/30A	Good	-
Welding and Cutting	1	C-Teck	PCM-52I	AH7A-75271	-	230V/3Ph/30A	Good	-
Arc Welder	1	Lincoln	IdealArc 250-250	648783	-	230V/50A	Good	-
Bench Grinder and Buffer	1	Baldor	712	-	1/2 HP	115V, Plug-In	Good	-
1.5-Ton Lift	1	Mohawk	M-4507-0102	984777629	3 HP	230V/17.1A	Good	-
18-Ton Lift	1	Roper	IAM27	F10975	7.5 HP	240V/3Ph	Good	-
Air Compressor	1	Saylor Beall	MUDR705	5A-130-G91	-	-	Good	-
Air Compressor Motor	1	Baldor	M3218T	-	5 HP	230V/14A	Good	-
Air Compressor Tank	1	-	-	-	-	-	Good	11.7 Cubic Feet

APPENDIX C

ECM-1 Lighting Fixture Modifications

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-1 Lighting Fixture Modifications

Item	Budgetary Costs*	Annual Utility Savings			Potential Incentive	Payback (Without Incentive)	Payback (With Incentive)
		Electricity	Natural Gas	Total			
	$	KWH	Therms	$	$	Years	Years
A-Lamp to CFLs	$ 24	700	$ -	$ 123	$ -	0.2	0.2
T12 Fixtures to T8 Fixtures	$ 10,500	4200	$ -	$ 737	$ 1,830	14.2	11.8
Combined	$ 10,524	4900		$ 860	$ 1,830	12.2	10.1

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-1 Lighting Fixture Modifications

EXISTING LIGHTING FIXTURES AND CONTROLS										
Location	Fixture Description	No. of Fixture	Lamp Type & No.	Ballast Type & No.	Fixture Watts	Total Watts	Hours of Operation	Control	kwh/Year	Operational Cost/Year
Welding Bay	8' Utility Fixture	6	(2) F96T12/ES	(1) Magnetic	131	786	2080	Switch	1635	$286.92
Double Bay Office	8' Utility Fixture	6	(1) F96T12/ES	(1) Magnetic	74	444	2080	Switch	924	$162.08
Double Bay Office	3' Utility Fixture	1	(1) F40CWT12/ES	(1) Magnetic	41	41	2080	Switch	85	$14.97
Double Bay	8' Utility Fixture	6	(2) F96T12/ES	(1) Magnetic	131	786	2080	Switch	1635	$286.92
Double Bay	8' Utility Fixture	4	(2) F96T12/ES	(1) Magnetic	131	524	2080	Switch	1090	$191.28
Double Bay	8' Utility Fixture	5	(2) F96T12/ES	(1) Magnetic	131	655	2080	Switch	1362	$239.10
Double Bay	8' Utility Fixture	8	(2) F96T12/ES	(1) Magnetic	131	1048	2080	Switch	2180	$382.56
Double Bay	8' Utility Fixture	4	(1) F96T12/ES	(1) Magnetic	74	296	2080	Switch	616	$108.05
Double Bay	4' Utility Fixture	1	(2) F40CWT12/ES	(1) Magnetic	82	82	2080	Switch	171	$29.93
Triple Bay	2' Utility Fixture	2	(2) F40CWT12/ES	(1) Magnetic	72	144	2080	Switch	300	$52.57
Triple Bay	4' Utility Fixture	4	(2) F40CWT12/ES	(1) Magnetic	82	328	2080	Switch	682	$119.73
Triple Bay	4' Utility Fixture	3	(2) F40CWT12/ES	(1) Magnetic	82	246	2080	Switch	512	$89.80
Triple Bay	8' Utility Fixture	1	(1) F96T12/ES	(1) Magnetic	74	74	2080	Switch	154	$27.01
Triple Bay	4' Utility Fixture	2	(2) F40CWT12/ES	(1) Magnetic	82	164	2080	Switch	341	$59.87
Triple Bay	8' Utility Fixture	1	(2) F96T12/ES	(1) Magnetic	131	131	2080	Switch	272	$47.82
Reception/Lunchroom	2'x4' Recessed Fixture	6	(4) F40CWT12/ES	(2) Magnetic	164	984	2080	Switch	2047	$359.20
Office Adjacent to Triple Bay	4' Surface Mounted Fixture	2	(2) F40CWT12/ES	(1) Magnetic	82	164	2080	Switch	341	$59.87
Office Adjacent to Triple Bay	8' Surface Mounted Fixture	1	(1) F96T12/ES	(1) Magnetic	74	74	2080	Switch	154	$27.01
Office Adjacent to Triple Bay	4' Surface Mounted Fixture	1	(2) F40CWT12/ES	(1) Magnetic	82	82	520	Switch	43	$7.48
Office Adjacent to Triple Bay	8' Surface Mounted Fixture	1	(1) F96T12/ES	(1) Magnetic	74	74	520	Switch	38	$6.75
Office Off of Reception	2'x4' Recessed Fixture	4	(4) F40CWT12/ES	(2) Magnetic	164	656	2080	Switch	1364	$239.47
Plan Review Room	2'x4' Recessed Fixture	4	(4) F40CWT12/ES	(2) Magnetic	164	656	2080	Switch	1364	$239.47
Corridor	4' Surface Mounted Fixture	1	(2) F40CWT12/ES	(1) Magnetic	82	82	2080	Switch	171	$29.93
Corner Office	4' Surface Mounted Fixture	4	(2) F40CWT12/ES	(1) Magnetic	82	328	2080	Switch	682	$119.73
Utility Room	4' Surface Mounted Fixture	1	(2) F40CWT12/ES	(1) Magnetic	82	82	416	Switch	34	$5.99
Restroom	2' Fluorescent Vanity Light	1	(1) F40CWT12/ES	(1) Magnetic	41	41	2080	Switch	85	$14.97
Throughout Facility	Exit/Emergency Light Combination	6	LED Exit Light with Halogen Emergency Lights	-	1.2	-	8760	Breaker	-	-
Exterior	Decorative Fixture Above Door	2	(1) 100W Incandescent A-lamp	-	100	200	2080	Timer	416	$73.01
Exterior	Mercury Vapor Fixture	7	(1) 250W MV	(1) Magnetic	285	1995	2080	Timer	4150	$728.25
Exterior	Metal Halide Fixture	2	(1) 250W MH	(1) Magnetic	295	590	2080	Timer	1227	$215.37
Exterior	Flood Light	1	(2) 120W Flood Lights	-	240	240	2080	Timer	499	$87.61
TOTAL									**24574**	**4313**

Energy Cost: $0.1755

Notes: **Existing Lighting Fixture Schedule**

Total Watts = No. of Fixture x Fixture Watts

kwh/Year = Total Watts/1000 x Hours of Operation

Operational Cost/Year = kwh/Year x Energy Cost

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage

CHA Project Number 22218

Lighting Fixture Replacement Savings																
Existing Fixtures					Proposed Replacement Fixture								Savings			
Location	Fixture Description with System Watts	Controls	kwh/Year	Operational Cost/Year	Fixture Description	No. of Fixtures	Fixture Watts	Total Watts	Hours of Operation	kwh/Year	Operational Costs	Installed Cost Per Fixture	Total Installed Cost	kwh/Year	Yearly $ Savings	Payback in Years
Welding Bay	8' Utility Fixture, (2) T12, 131W	Switch	1635	$286.94	8' Utility Fixture, (2) T8	6	120	720	2080	1498	$262.83	$100.00	$600.00	137	$24.11	24.9
Double Bay Office	8' Utility Fixture, (1) T12, 74W	Switch	924	$162.16	8' Utility Fixture, (1) T8	6	58	348	2080	724	$127.03	$100.00	$600.00	200	$35.13	17.1
Double Bay Office	3' Utility Fixture, (1) T12, 41W	Switch	85	$14.92	3' Utility Fixture, (1) T8	1	32	29	2080	60	$10.59	$86.00	$86.00	25	$4.33	19.9
Double Bay	8' Utility Fixture, (2) T12, 131W	Switch	1635	$286.94	8' Utility Fixture, (2) T8	6	120	720	2080	1498	$262.83	$100.00	$600.00	137	$24.11	24.9
Double Bay	8' Utility Fixture, (2) T12, 131W	Switch	1090	$191.30	8' Utility Fixture, (2) T8	4	120	480	2080	998	$175.22	$100.00	$400.00	92	$16.08	24.9
Double Bay	8' Utility Fixture, (2) T12, 131W	Switch	1362	$239.03	8' Utility Fixture, (2) T8	5	120	600	2080	1248	$219.02	$100.00	$500.00	114	$20.01	25.0
Double Bay	8' Utility Fixture, (2) T12, 131W	Switch	2180	$382.59	8' Utility Fixture, (2) T8	8	120	960	2080	1997	$350.44	$100.00	$800.00	183	$32.15	24.9
Double Bay	8' Utility Fixture, (1) T12, 74W	Switch	616	$108.11	8' Utility Fixture, (1) T8	4	58	232	2080	483	$84.69	$100.00	$400.00	133	$23.42	17.1
Double Bay	4' Utility Fixture, (2) T12, 82W	Switch	171	$30.01	4' Utility Fixture, (2) T8	1	54	54	2080	112	$19.71	$98.00	$98.00	59	$10.30	9.5
Triple Bay	2' Utility Fixture, (2) T12, 72W	Switch	300	$52.65	2' Utility Fixture, (2) T8	2	62	124	2080	258	$45.26	$87.00	$174.00	42	$7.39	23.6
Triple Bay	4' Utility Fixture, (2) T12, 82W	Switch	682	$119.69	4' Utility Fixture, (2) T8	4	54	216	2080	449	$78.85	$98.00	$392.00	233	$40.84	9.6
Triple Bay	4' Utility Fixture, (2) T12, 82W	Switch	512	$89.86	4' Utility Fixture, (2) T8	3	54	162	2080	337	$59.14	$98.00	$294.00	175	$30.72	9.6
Triple Bay	8' Utility Fixture, (1) T12, 74W	Switch	154	$27.03	8' Utility Fixture, (1) T8	1	58	58	2080	121	$21.17	$100.00	$100.00	33	$5.85	17.1
Triple Bay	4' Utility Fixture, (2) T12, 82W	Switch	341	$59.85	4' Utility Fixture, (2) T8	2	54	108	2080	225	$39.42	$98.00	$196.00	116	$20.42	9.6
Triple Bay	8' Utility Fixture, (2) T12, 131W	Switch	272	$47.74	8' Utility Fixture, (2) T8	1	120	120	2080	250	$43.80	$100.00	$100.00	22	$3.93	25.4
Reception/Lunchroom	2'x4' Recessed Fixture, (4) T12, 164W	Switch	2047	$359.25	2'x4' Recessed Fixture, (4) T8	6	104	624	2080	1298	$227.78	$98.00	$588.00	749	$131.46	4.5
Office Adjacent to Triple Bay	4' Surface Mounted Fixture, (2) T12, 82W	Switch	341	$59.85	4' Surface Mounted Fixture, (2) T8	2	54	108	2080	225	$39.42	$98.00	$196.00	116	$20.42	9.6
Office Adjacent to Triple Bay	8' Surface Mounted Fixture, (1) T12, 74W	Switch	154	$27.03	8' Surface Mounted Fixture, (1) T8	1	58	58	2080	121	$21.17	$100.00	$100.00	33	$5.85	17.1
Office Adjacent to Triple Bay	4' Surface Mounted Fixture, (2) T12, 82W	Switch	171	$30.01	4' Surface Mounted Fixture, (2) T8	1	54	54	520	28	$4.93	$98.00	$98.00	143	$25.08	3.9
Office Adjacent to Triple Bay	8' Surface Mounted Fixture, (1) T12, 74W	Switch	154	$27.03	8' Surface Mounted Fixture, (1) T8	1	58	58	520	30	$5.29	$100.00	$100.00	124	$21.73	4.6
Office Off of Reception	2'x4' Recessed Fixture, (4) T12, 164W	Switch	1364	$239.38	2'x4' Recessed Fixture, (4) T8	4	104	416	2080	865	$151.86	$98.00	$392.00	499	$87.53	4.5
Plan Review Room	2'x4' Recessed Fixture, (4) T12, 164W	Switch	1364	$239.38	2'x4' Recessed Fixture, (4) T8	4	104	416	2080	865	$151.86	$98.00	$392.00	499	$87.53	4.5
Corridor	4' Surface Mounted Fixture, (2) T12, 82W	Switch	171	$30.01	4' Surface Mounted Fixture, (2) T8	1	54	54	2080	112	$19.71	$98.00	$98.00	59	$10.30	9.5
Corner Office	4' Surface Mounted Fixture, (2) T12, 82W	Switch	682	$119.69	4' Surface Mounted Fixture, (2) T8	4	54	216	2080	449	$78.85	$98.00	$392.00	233	$40.84	9.6
Utility Room	4' Surface Mounted Fixture, (2) T12, 82W	Switch	34	$5.97	4' Surface Mounted Fixture, (2) T8	1	54	54	416	22	$3.94	$98.00	$98.00	12	$2.02	48.4
Restroom	2' Fluorescent Vanity Light, (1) T12, 41W	Switch	85	$14.92	2' Fluorescent Vanity Light, (1) T8	1	32	32	2080	67	$11.68	$87.00	$87.00	18	$3.24	26.9
Throughout Facility	Exit/Emergency Light Combination, LED, 1.2W	Breaker	63	$11.06		6			8760							
Exterior	Decorative Fixture Above Door, (1) A-lamp, 100W	Timer	416	$73.01	Decorative Fixture Above Door, (1) CFL	2	25	50	2080	104	$18.25	$6.00	$12.00	312	$54.76	0.2
Exterior	Mercury Vapor Fixture, (1) MV, 285W	Timer	4150	$728.33		7			2080							
Exterior	Metal Halide Fixture, (1) MH, 29W	Timer	1227	$215.34		2			2080							
Exterior	Flood Light, (2) Flood Lamps, 240W	Timer	499	$87.57	Flood Light, (2) CFL Flood Lights	1	60	60	2081	125	$21.91	$12.00	$12.00	374	$65.66	0.2
												Total	**$7,905**	**4873**	**855**	**9.2**

Energy Cost: $0.1755

* Installed cost per fixture includes $30 per fixture incentive when converting from T-12 to T-8

Notes: **Lighting Fixture Replacement Savings**

Total Watts = No. of Fixture x Fixture Watts

kwh/Year = Total Watts/1000 x Hours of Operation

Operational Cost/Year = kwh/Year x Energy Cost

Total Installed Cost = Number of Fixtures x Installed Cost Per Fixture

Yearly $ Savings = Savings kwh/Year x Energy Cost

Payback in Years = Total Installed Cost/Yearly $ Savings

Installed cost of compact fluorescent fixtures is only cost of lamp (bulb). Life of compact fluorescent lamp is twice as long as incandescent "A" lamp, offsetting installation cost.

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-1 Lighting Fixture Modifications
T-12 to T-8 Fixtures

Multipliers	
Material	1
Labor	1.21
Equipment	1.07

Installation Costs											
	Qty	Unit	Unit Costs			Subtotal Costs			Total Cost w/o Incentive	Incentive Available	Remarks
			Material	Labor	Equipment	Material	Labor	Equipment			
8', 2 Lamp, T-12 to T-8 Fixture	30	ea	$ 81.00	$ 49.00	$ -	$2,430	$1,779	$0	$4,209	$900	
8', 1 Lamp, T-12 to T-8 Fixture	13	ea	$ 81.00	$ 49.00	$ -	$1,053	$771	$0	$1,824	$390	
4', 2 Lamp, T-12 to T-8 Fixture	19	ea	$ 79.00	$ 49.00	$ -	$1,501	$1,127	$0	$2,628	$570	
3', 1 Lamp, T-12 to T-8 Fixture	1	ea	$ 67.00	$ 49.00	$ -	$67	$59	$0	$126	$30	
2', 2 Lamp, T-12 to T-8 Fixture	2	ea	$ 68.00	$ 49.00	$ -	$136	$119	$0	$255	$60	
2' Vanity Light, 1 Lam, T-12 to T-8 Fixture	1	ea	$ 67.00	$ 49.00	$ -	$67	$59	$0	$126	$30	
2'x4', 4 Lamp, T-12 to T-8 Fixture	14	ea	$ 79.00	$ 49.00	$ -	$1,106	$830	$0	$1,936	$420	

Subtotal	$11,103
10% Contingency	$1,110
10% OH	$1,110
10% Profit	$1,110
Total	$14,434
Incentive	$2,400
Total Cost with Incentive	$12,034

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-1 Lighting Fixture Modifications
A-Lamp to CFL

Multipliers	
Material	1
Labor	1.21
Equipment	1.07

Installation Costs											
	Qty	Unit	Unit Costs			Subtotal Costs			Total Cost w/o Incentive	Incentive Available	Remarks
			Material	Labor	Equipment	Material	Labor	Equipment			
Compact Fluorescent Lamp	4	ea	$6	$0	$0	$24	$0	$0	$24	$0	

Subtotal	$24
Total	$24
Incentive	$0
Total Cost with Incentive	$24

APPENDIX D

ECM-2 Lighting Control Modification

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-2 Lighting Control Modifications

Existing Fixtures

Item	Budgetary Costs	Annual Utility Savings			ROI	Potential Incentive	Payback (Without Incentive)	Payback (With Incentive)
		Electricity	Natural Gas	Total				
	$	KWH	Therms	$		$	Years	Years
Motion Sensor Control								
Areas Indicated	$ 900	$ 1,800	$ -	$ 300	4.0	$ 160	3.0	2.5

Fixtures Proposed in ECM-1

Item	Budgetary Costs	Annual Utility Savings			ROI	Potential Incentive	Payback (Without Incentive)	Payback (With Incentive)
		Electricity	Natural Gas	Total				
	$	KWH	Therms	$		$	Years	Years
Motion Sensor Control								
Areas Indicated	$ 900	$ 1,200	$ -	$ 200	2.3	$ 160	4.5	3.7

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-2 Lighting Control Modifications

EXISTING LIGHTING FIXTURES AND CONTROLS										
Location	Fixture Description	No. of Fixture	Lamp Type & No.	Ballast Type & No.	Fixture Watts	Total Watts	Hours of Operation	Control	kwh/Year	Operational Cost/Year
Welding Bay	8' Utility Fixture	6	(2) F96T12/ES	(1) Magnetic	131	786	2080	Switch	1635	$286.92
Double Bay Office	8' Utility Fixture	6	(1) F96T12/ES	(1) Magnetic	74	444	2080	Switch	924	$162.08
Double Bay Office	3' Utility Fixture	1	(1) F40CWT12/ES	(1) Magnetic	41	41	2080	Switch	85	$14.97
Double Bay	8' Utility Fixture	6	(2) F96T12/ES	(1) Magnetic	131	786	2080	Switch	1635	$286.92
Double Bay	8' Utility Fixture	4	(2) F96T12/ES	(1) Magnetic	131	524	2080	Switch	1090	$191.28
Double Bay	8' Utility Fixture	5	(2) F96T12/ES	(1) Magnetic	131	655	2080	Switch	1362	$239.10
Double Bay	8' Utility Fixture	8	(2) F96T12/ES	(1) Magnetic	131	1048	2080	Switch	2180	$382.56
Double Bay	8' Utility Fixture	4	(1) F96T12/ES	(1) Magnetic	74	296	2080	Switch	616	$108.05
Double Bay	4' Utility Fixture	1	(2) F40CWT12/ES	(1) Magnetic	82	82	2080	Switch	171	$29.93
Triple Bay	2' Utility Fixture	2	(2) F40CWT12/ES	(1) Magnetic	72	144	2080	Switch	300	$52.57
Triple Bay	4' Utility Fixture	4	(2) F40CWT12/ES	(1) Magnetic	82	328	2080	Switch	682	$119.73
Triple Bay	4' Utility Fixture	3	(2) F40CWT12/ES	(1) Magnetic	82	246	2080	Switch	512	$89.80
Triple Bay	8' Utility Fixture	1	(1) F96T12/ES	(1) Magnetic	74	74	2080	Switch	154	$27.01
Triple Bay	4' Utility Fixture	2	(2) F40CWT12/ES	(1) Magnetic	82	164	2080	Switch	341	$59.87
Triple Bay	8' Utility Fixture	1	(2) F96T12/ES	(1) Magnetic	131	131	2080	Switch	272	$47.82
Reception/Lunchroom	2'x4' Recessed Fixture	6	(4) F40CWT12/ES	(2) Magnetic	164	984	2080	Switch	2047	$359.20
Office Adjacent to Triple Bay	4' Surface Mounted Fixture	2	(2) F40CWT12/ES	(1) Magnetic	82	164	2080	Switch	341	$59.87
Office Adjacent to Triple Bay	8' Surface Mounted Fixture	1	(1) F96T12/ES	(1) Magnetic	74	74	2080	Switch	154	$27.01
Office Adjacent to Triple Bay	4' Surface Mounted Fixture	1	(2) F40CWT12/ES	(1) Magnetic	82	82	520	Switch	43	$7.48
Office Adjacent to Triple Bay	8' Surface Mounted Fixture	1	(1) F96T12/ES	(1) Magnetic	74	74	520	Switch	38	$6.75
Office Off of Reception	2'x4' Recessed Fixture	4	(4) F40CWT12/ES	(2) Magnetic	164	656	2080	Switch	1364	$239.47
Plan Review Room	2'x4' Recessed Fixture	4	(4) F40CWT12/ES	(2) Magnetic	164	656	2080	Switch	1364	$239.47
Corridor	4' Surface Mounted Fixture	1	(2) F40CWT12/ES	(1) Magnetic	82	82	2080	Switch	171	$29.93
Corner Office	4' Surface Mounted Fixture	4	(2) F40CWT12/ES	(1) Magnetic	82	328	2080	Switch	682	$119.73
Utility Room	4' Surface Mounted Fixture	1	(2) F40CWT12/ES	(1) Magnetic	82	82	416	Switch	34	$5.99
Restroom	2' Fluorescent Vanity Light	1	(1) F40CWT12/ES	(1) Magnetic	41	41	2080	Switch	85	$14.97
Throughout Facility	Exit/Emergency Light Combination	6	LED Exit Light with Halogen Emergency Lights	-	1.2	7.2	8760	Breaker	-	-
Exterior	Decorative Fixture Above Door	2	(1) 100W Incandescent A-lamp	-	100	200	2080	Timer	416	$73.01
Exterior	Mercury Vapor Fixture	7	(1) 250W MV	(1) Magnetic	285	1995	2080	Timer	4150	$728.25
Exterior	Metal Halide Fixture	2	(1) 250W MH	(1) Magnetic	295	590	2080	Timer	1227	$215.37
Exterior	Flood Light	1	(2) 120W Flood Lights	-	240	240	2080	Timer	499	$87.61
TOTAL									**24573.95**	**4312.73**

Energy Cost: $0.1755

Notes: **Existing Lighting Fixture Schedule**

Total Watts = No. of Fixture x Fixture Watts

kwh/Year = Total Watts/1000 x Hours of Operation

Operational Cost/Year = kwh/Year x Energy Cost

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage

CHA Project Number 22218

ECM-2 Lighting Control Modifications

Multipliers	
Material	0.98
Labor	1.21
Equipment	1.07

Installation Costs

	Qty	Unit	Unit Costs			Subtotal Costs			Total Cost w/o Incentive	Incentive Available	Remarks
			Material	Labor	Equipment	Material	Labor	Equipment			
Motion Sensor (Wall Mounted)	1	ea	$ 25	$ 50		$ 25	$ 61	$ -	$ 85	$ 20	

Subtotal	$ 85
10% Contingency	$ 9
10% OH	$ 9
10% Profit	$ 10
Total	$ 113
Incentive	$ 20
Total Cost with Incentive	$ 93

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-2 Lighting Control Modifications

ECM-2 Lighting Control Modifications (Existing Fixtures)

Existing Lighting Fixture Controls									**Prooposed Lighting Fixture Controls**					**Savings After Retrofit**	
Location	Fixture Description	No. of Fixtures	Lamp Type & No.	Total Watts	Hours of Operation	Control	kwh/Year	Operational Cost/Year	Modified Control	New Hours of Operation	kwh/Year	Operational Cost/Year	Installation Cost*	Cost Savings/Year	Payback in Years
Welding Bay	8' Utility Fixture	6	(2) F96T12/ES	786	2080	Switch	1635	$286.92							
Double Bay Office	8' Utility Fixture	6	(1) F96T12/ES	444	2080	Switch	924	$162.08	Motion Sensor	1560	693	$121.56	$46.57	$40.52	1.1
Double Bay Office	3' Utility Fixture	1	(1) F40CWT12/ES	41	2080	Switch	85	$14.97	Motion Sensor	1560	64	$11.22	$46.57	$3.74	12.4
Double Bay	8' Utility Fixture	6	(2) F96T12/ES	786	2080	Switch	1635	$286.92							
Double Bay	8' Utility Fixture	4	(2) F96T12/ES	524	2080	Switch	1090	$191.28							
Double Bay	8' Utility Fixture	5	(2) F96T12/ES	655	2080	Switch	1362	$239.10							
Double Bay	8' Utility Fixture	8	(2) F96T12/ES	1048	2080	Switch	2180	$382.56							
Double Bay	8' Utility Fixture	4	(1) F96T12/ES	296	2080	Switch	616	$108.05							
Double Bay	4' Utility Fixture	1	(2) F40CWT12/ES	82	2080	Switch	171	$29.93							
Triple Bay	2' Utility Fixture	2	(2) F40CWT12/ES	144	2080	Switch	300	$52.57							
Triple Bay	4' Utility Fixture	4	(2) F40CWT12/ES	328	2080	Switch	682	$119.73							
Triple Bay	4' Utility Fixture	3	(2) F40CWT12/ES	246	2080	Switch	512	$89.80							
Triple Bay	8' Utility Fixture	1	(1) F96T12/ES	74	2080	Switch	154	$27.01							
Triple Bay	4' Utility Fixture	2	(2) F40CWT12/ES	164	2080	Switch	341	$59.87							
Triple Bay	8' Utility Fixture	1	(2) F96T12/ES	131	2080	Switch	272	$47.82							
Reception/Lunchroom	2'x4' Recessed Fixture	6	(4) F40CWT12/ES	984	2080	Switch	2047	$359.20	Motion Sensor	1560	1535	$269.40	$93.14	$89.80	1.0
Office Adjacent to Triple Bay	4' Surface Mounted Fixture	2	(2) F40CWT12/ES	164	2080	Switch	341	$59.87	Motion Sensor	1560	256	$44.90	$46.57	$14.97	3.1
Office Adjacent to Triple Bay	8' Surface Mounted Fixture	1	(1) F96T12/ES	74	2080	Switch	154	$27.01	Motion Sensor	1560	115	$20.26	$46.57	$6.75	6.9
Office Adjacent to Triple Bay	4' Surface Mounted Fixture	1	(2) F40CWT12/ES	82	520	Switch	43	$7.48							
Office Adjacent to Triple Bay	8' Surface Mounted Fixture	1	(1) F96T12/ES	74	520	Switch	38	$6.75							
Office Off of Reception	2'x4' Recessed Fixture	4	(4) F40CWT12/ES	656	2080	Switch	1364	$239.47	Motion Sensor	1560	1023	$179.60	$93.14	$59.87	1.6
Plan Review Room	2'x4' Recessed Fixture	4	(4) F40CWT12/ES	656	2080	Switch	1364	$239.47	Motion Sensor	1560	1023	$179.60	$93.14	$59.87	1.6
Corridor	4' Surface Mounted Fixture	1	(2) F40CWT12/ES	82	2080	Switch	171	$29.93	Motion Sensor	1560	128	$22.45	$93.14	$7.48	12.4
Corner Office	4' Surface Mounted Fixture	4	(2) F40CWT12/ES	328	2080	Switch	682	$119.73	Motion Sensor	1560	512	$89.80	$93.14	$29.93	3.1
Utility Room	4' Surface Mounted Fixture	1	(2) F40CWT12/ES	82	416	Switch	34	$5.99							
Restroom	2' Fluorescent Vanity Light	1	(1) F40CWT12/ES	41	2080	Switch	85	$14.97	Motion Sensor	1560	64	$11.22	$93.14	$3.74	24.9
Throughout Facility	Exit/Emergency Light Combination	6	LED Exit Light with Halogen Emergency Lights	7.2	8760	Breaker	63	$11.07							
Exterior	Decorative Fixture Above Door	2	(1) 100W Incandescent A-lamp	200	2080	Timer	416	$73.01							
Exterior	Mercury Vapor Fixture	7	(1) 250W MV	1995	2080	Timer	4150	$728.25							
Exterior	Metal Halide Fixture	2	(1) 250W MH	590	2080	Timer	1227	$215.37							
Exterior	Flood Light	1	(2) 120W Flood Lights	240	2080	Timer	499	$87.61							

Energy Cost: $0.1755

*Installation costs do not include potential incentive.

Motions Sensors with 10 Years or Less Payback

kwh Savings/Year	Installation Cost	Cost Savings/Year	Payback in Years
1804	$745.12	$316.67	2.4

Notes: **Lighting Control Modifications**

Total Watts = No. of Fixture x Fixture Watts
kwh/Year = Total Watts/1000 x Hours of Operation
Operational Cost/Year = kwh/Year x Energy Cost

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-2 Lighting Control Modifications

ECM-2 Lighting Control Modifications (Fixtures Proposed in ECM-1)																
Existing Lighting Fixture Controls									**Prooposed Lighting Fixture Controls**					**Savings After Retrofit**		
Location	Fixture Description	No. of Fixtures	Lamp Type & No.	Total Watts	Hours of Operation	Control	kwh/Year	Operational Cost/Year	Modified Control	New Hours of Operation	kwh/Year	Operational Cost/Year	Installation Cost*	Cost Savings/Year	Payback in Years
Welding Bay	8' Utility Fixture	6	(2) F96T8	720	2080	Switch	1498	$262.83							
Double Bay Office	8' Utility Fixture	6	(1) F96T8	348	2080	Switch	724	$127.03	Motion Sensor	1560	543	$95.28	$46.57	$31.76	1.5
Double Bay Office	3' Utility Fixture	1	(1) F32T8	32	2080	Switch	67	$11.68	Motion Sensor	1560	50	$8.76	$46.57	$2.92	15.9
Double Bay	8' Utility Fixture	6	(2) F96T8	720	2080	Switch	1498	$262.83							
Double Bay	8' Utility Fixture	4	(2) F96T8	480	2080	Switch	998	$175.22							
Double Bay	8' Utility Fixture	5	(2) F96T8	600	2080	Switch	1248	$219.02							
Double Bay	8' Utility Fixture	8	(2) F96T8	960	2080	Switch	1997	$350.44							
Double Bay	8' Utility Fixture	4	(1) F96T8	232	2080	Switch	483	$84.69							
Double Bay	4' Utility Fixture	1	(2) F32T8	54	2080	Switch	112	$19.71							
Triple Bay	2' Utility Fixture	2	(2) F32T8	124	2080	Switch	258	$45.26							
Triple Bay	4' Utility Fixture	4	(2) F32T8	216	2080	Switch	449	$78.85							
Triple Bay	4' Utility Fixture	3	(2) F32T8	162	2080	Switch	337	$59.14							
Triple Bay	8' Utility Fixture	1	(1) F96T8	58	2080	Switch	121	$21.17							
Triple Bay	4' Utility Fixture	2	(2) F32T8	108	2080	Switch	225	$39.42							
Triple Bay	8' Utility Fixture	1	(2) F96T8	120	2080	Switch	250	$43.80							
Reception/Lunchroom	2'x4' Recessed Fixture	6	(4) F32T8/30ES	624	2080	Switch	1298	$227.78	Motion Sensor	1560	973	$170.84	$93.14	$56.95	1.6
Office Adjacent to Triple Bay	4' Surface Mounted Fixture	2	(2) F32T8	108	2080	Switch	225	$39.42	Motion Sensor	1560	168	$29.57	$46.57	$9.86	4.7
Office Adjacent to Triple Bay	8' Surface Mounted Fixture	1	(1) F96T8	58	2080	Switch	121	$21.17	Motion Sensor	1560	90	$15.88	$46.57	$5.29	8.8
Office Adjacent to Triple Bay	4' Surface Mounted Fixture	1	(2) F32T8	54	520	Switch	28	$4.93							
Office Adjacent to Triple Bay	8' Surface Mounted Fixture	1	(1) F96T8	58	520	Switch	30	$5.29							
Office Off of Reception	2'x4' Recessed Fixture	4	(4) F32T8/30ES	416	2080	Switch	865	$151.86	Motion Sensor	1560	649	$113.89	$93.14	$37.96	2.5
Plan Review Room	2'x4' Recessed Fixture	4	(4) F32T8/30ES	416	2080	Switch	865	$151.86	Motion Sensor	1560	649	$113.89	$93.14	$37.96	2.5
Corridor	4' Surface Mounted Fixture	1	(2) F32T8	54	2080	Switch	112	$19.71	Motion Sensor	1560	84	$14.78	$93.14	$4.93	18.9
Corner Office	4' Surface Mounted Fixture	4	(2) F32T8	216	2080	Switch	449	$78.85	Motion Sensor	1560	337	$59.14	$93.14	$19.71	4.7
Utility Room	4' Surface Mounted Fixture	1	(2) F32T8	54	416	Switch	22	$3.94							
Restroom	2' Fluorescent Vanity Light	1	(1) F32T8	32	2080	Switch	67	$11.68	Motion Sensor	1560	50	$8.76	$93.14	$2.92	31.9
Throughout Facility	Exit/Emergency Light Combination	6		-	8760	Breaker	-	-							
Exterior	Decorative Fixture Above Door	2	(1) 25W CFL	50	2080	Timer	104	$18.25							
Exterior	Mercury Vapor Fixture	7			2080	Timer	0	$0.00							
Exterior	Metal Halide Fixture	2			2080	Timer	0	$0.00							
Exterior	Flood Light	1	(2) 30W CFL	60	2080	Timer	125	$21.90							

Energy Cost: $0.1755

*Installation costs do not include potential incentive.

Notes: **Lighting Control Modifications**
Total Watts = No. of Fixture x Fixture Watts
kwh/Year = Total Watts/1000 x Hours of Operation
Operational Cost/Year = kwh/Year x Energy Cost

Motions Sensors with 10 Years or Less Payback

kwh Savings/Year	Installation Cost	Cost Savings/Year	Payback in Years
1198	$745.12	$210.26	3.5

APPENDIX E

ECM-3 Install Exterior Wall Insulation

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-3 Install Exterior Wall Insulation

Installation Costs						
	Qty	Unit	Unit Costs	Subtotal Costs	Total Cost	Remarks
			Material/Labor	Material/Labor		
Clean/Prep Wall	7850	SF	$1.50	$11,775	$11,775	
2" EIFS System	7850	SF	$9	$70,650	$70,650	
Panzer Mesh at base	1962.5	SF	$4	$7,850	$7,850	
Reset Light Fixtures	10	EA	$75	$750	$750	
Reset Downspouts	4	EA	$100	$400	$400	
Total Overhead/Profit	37.2%	LS	$91,425	$34,010	$34,010	

Total	$125,435

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-3 Install Exterior Wall Insulation

Annual Energy Use Comparison				
	Electricity kWh	Propane Gallons	Fuel Oil Gallons	Cost $
Base Building	63,760	2,335	461	$ 18,228
Building with Exterior Wall Insulation	62,533	1,662	358	$ 16,057
Difference	1,227	673	103	$ 2,171

ECM-3 2" EIFS Input Data

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/21/2010
01:35PM

1. General Details:

Building Name ..... **ECM-3 2" EIFS**

2. Plants Included in this Building:

None

3. Air Systems Included in this Building:

System Name	Mult.
ECM-3 Electric Baseboard	1
ECM-3 Electric Wall Heater	1
ECM-3 Fuel Oil Fired AHU	1
ECM-3 Propane Unit Heater	1
ECM-3 Window AC #1	1
ECM-3 Window AC #2	1
ECM-3 Window AC #3	1
ECM-3 Window AC #4	1

4: Miscellaneous Energy

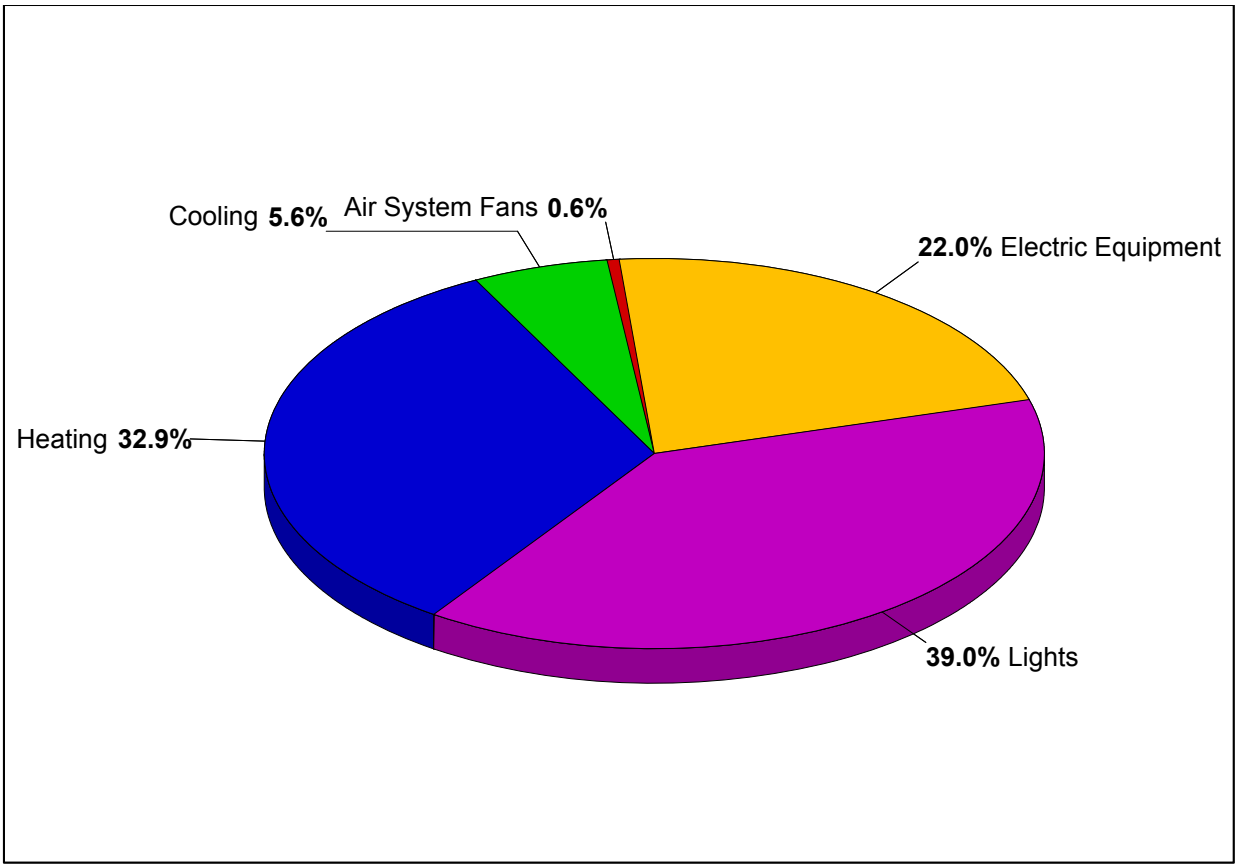
(no items defined)

5: Meters

Electric ..... **Electric Rate**
Fuel Oil ..... **Fuel Gas Rate**
Propane ..... **Propane Rate**

6: Miscellaneous Data

Average Building Power Factor ..... **100.00 %**
Source Electric Generating Efficiency ..... **28.00 %**
Additional Floor Area ..... **0.0 ft²**



1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	88	0.010	0.6
Cooling	903	0.099	5.6
Heating	5,277	0.575	32.9
Pumps	0	0.000	0.0
Cooling Tower Fans	0	0.000	0.0
HVAC Sub-Total	**6,268**	**0.683**	**39.0**
Lights	6,258	0.682	39.0
Electric Equipment	3,529	0.385	22.0
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**61.0**
Grand Total	**16,055**	**1.750**	**100.0**

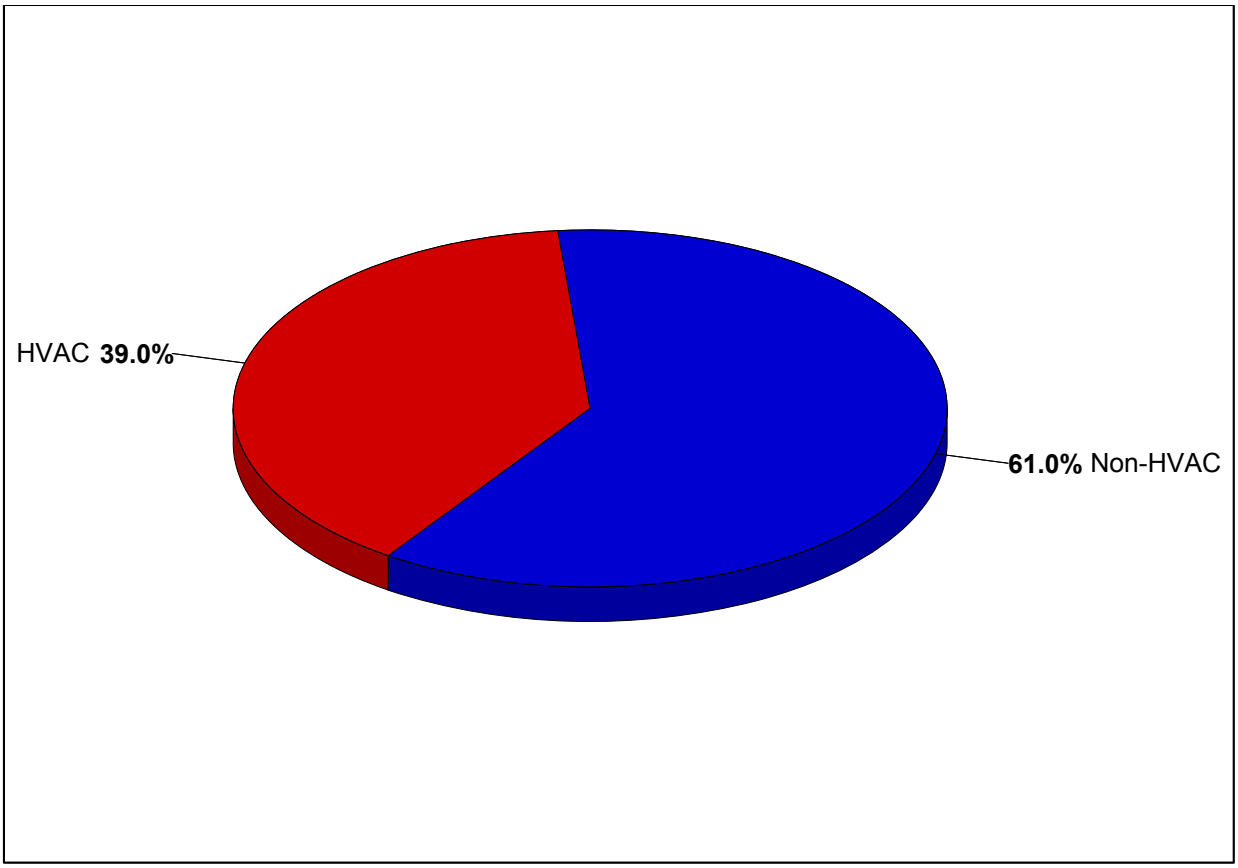
Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Annual HVAC & Non-HVAC Cost Totals - ECM-3 2" EIFS

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:30AM

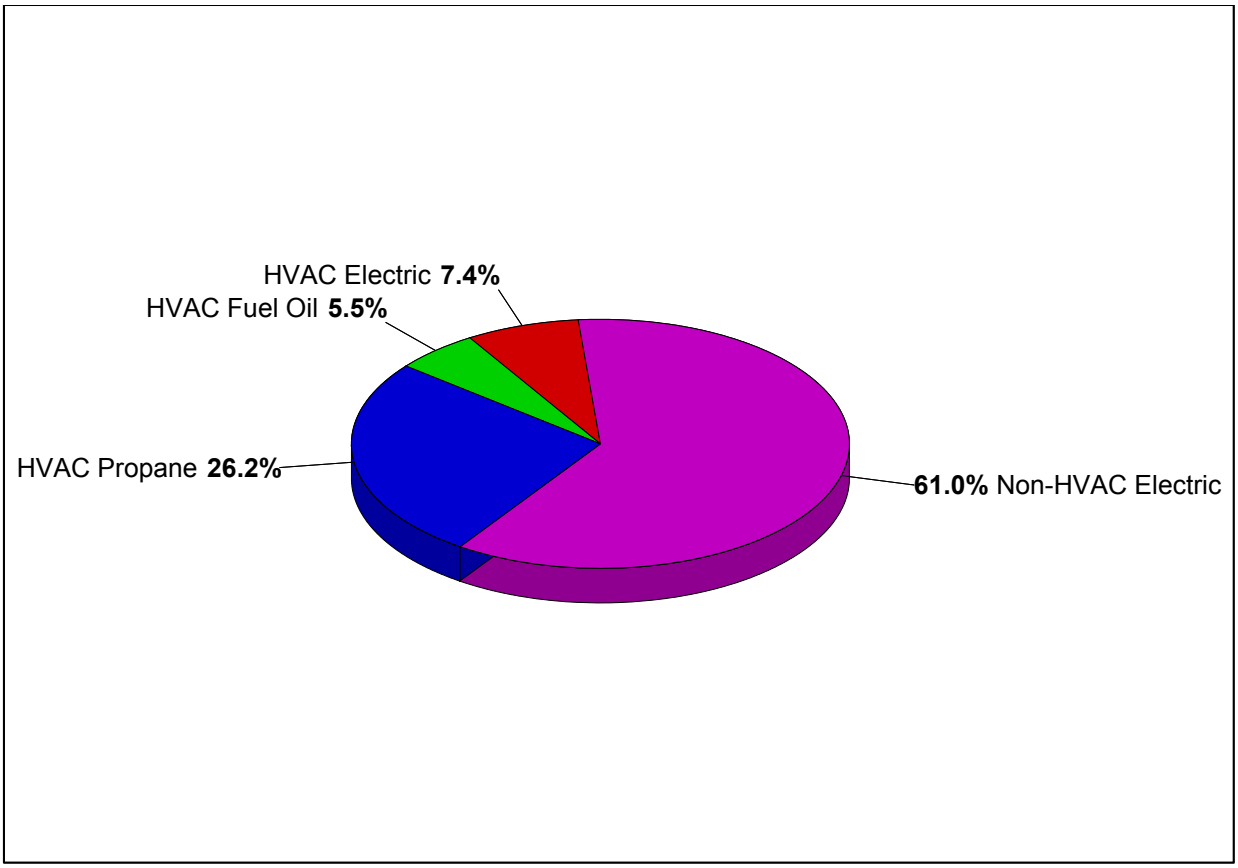


1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	6,268	0.683	39.0
Non-HVAC	9,787	1.067	61.0
Grand Total	**16,055**	**1.750**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	1,188	0.130	7.4
Natural Gas	0	0.000	0.0
Fuel Oil	877	0.096	5.5
Propane	4,204	0.458	26.2
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**6,269**	**0.683**	**39.0**
Non-HVAC Components			
Electric	9,787	1.067	61.0
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**61.0**
Grand Total	**16,055**	**1.750**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by Energy Source - ECM-3 2" EIFS

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:30AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	55,126	6.010
Heating Coil Loads	165,334	18.024
Grand Total	**220,460**	**24.034**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	23,098	2.518	82,494	8.993
Natural Gas	0	0.000	0	0.000
Fuel Oil	49,701	5.418	49,701	5.418
Propane	152,197	16.592	152,197	16.592
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**224,995**	**24.528**	**284,391**	**31.003**
Non-HVAC Components				
Electric	190,266	20.742	679,520	74.078
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,266**	**20.742**	**679,520**	**74.078**
Grand Total	**415,261**	**45.270**	**963,911**	**105.081**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by System Component - ECM-3 2" EIFS

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:30AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	55,126	6.010
Heating Coil Loads	165,334	18.024
Grand Total	**220,460**	**24.034**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	1,719	0.187	6,140	0.669
Cooling	17,563	1.915	62,724	6.838
Heating	205,714	22.426	215,527	23.496
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
HVAC Sub-Total	**224,995**	**24.528**	**284,391**	**31.003**
Lights	121,668	13.264	434,530	47.371
Electric Equipment	68,600	7.479	245,001	26.709
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,269**	**20.742**	**679,530**	**74.079**
Grand Total	**415,264**	**45.270**	**963,921**	**105.082**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Annual Cost Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:30AM

Table 1. Annual Costs

Component	ECM-3 2" EIFS ($)
Air System Fans	88
Cooling	903
Heating	5,277
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**6,268**
Lights	6,258
Electric Equipment	3,529
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**16,055**

Table 2. Annual Cost per Unit Floor Area

Component	ECM-3 2" EIFS ($/ft²)
Air System Fans	0.010
Cooling	0.099
Heating	0.575
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.683**
Lights	0.682
Electric Equipment	0.385
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.750**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	ECM-3 2" EIFS (%)
Air System Fans	0.6
Cooling	5.6
Heating	32.9
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**39.0**
Lights	39.0
Electric Equipment	22.0
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**61.0**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:30AM

Table 1. Annual Costs

Component	ECM-3 2" EIFS ($)
HVAC Components	
Electric	1,188
Natural Gas	0
Fuel Oil	877
Propane	4,204
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**6,269**
Non-HVAC Components	
Electric	9,787
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**16,055**

Table 2. Annual Energy Consumption

Component	ECM-3 2" EIFS
HVAC Components	
Electric (kWh)	6,770
Natural Gas (na)	0
Fuel Oil (gal)	358
Propane (gal)	1,662
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	55,764
Natural Gas (na)	0
Fuel Oil (gal)	0
Propane (gal)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	62,533
Natural Gas (na)	0
Fuel Oil (gal)	358
Propane (gal)	1,662
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	ECM-3 2" EIFS
CO2 Equivalent (lb)	125,455

Table 4. Annual Cost per Unit Floor Area

Component	ECM-3 2" EIFS ($/ft²)
HVAC Components	
Electric	0.130
Natural Gas	0.000
Fuel Oil	0.096
Propane	0.458
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.683**
Non-HVAC Components	
Electric	1.067
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.750**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 5. Component Cost as a Percentage of Total Cost

Component	ECM-3 2" EIFS (%)
HVAC Components	
Electric	7.4
Natural Gas	0.0
Fuel Oil	5.5
Propane	26.2
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**39.0**
Non-HVAC Components	
Electric	61.0
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**61.0**
Grand Total	**100.0**

APPENDIX F

ECM-4 Install Additional Roof Insulation

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-4 Install Additional Roof Insulation

Installation Costs						
	Qty	Unit	Unit Costs	Subtotal Costs	Total Cost	Remarks
			Material/Labor	Material/Labor		
R-19 Vinyl Face Insulation	7410	SF	$3.00	$22,230	$22,230	
Burden of Working Around Existing Equipment	7410	SF	$0.34	$2,519	$2,519	
Total Overhead/Profit	37.2%	LS	$24,749	$9,207	$9,207	

Total	$33,956

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-4 Install Additional Roof Insulation

Annual Energy Use Comparison				
	Electricity kWh	Propane Gallons	Fuel Oil Gallons	Cost $
Base Building	63,760	2,335	461	$ 18,228
Building with Additional Roof Insulation	62,414	1,602	367	$ 15,907
Difference	1,346	733	94	$ 2,321

ECM-4 Roof Insulation Input Data

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/21/2010
01:36PM

1. General Details:

Building Name ..... **ECM-4 Roof Insulation**

2. Plants Included in this Building:

None

3. Air Systems Included in this Building:

System Name	Mult.
ECM-4 Electric Baseboard	1
ECM-4 Electric Wall Heater	1
ECM-4 Fuel Oil Fired AHU	1
ECM-4 Propane Unit Heater	1
ECM-4 Window AC #1	1
ECM-4 Window AC #2	1
ECM-4 Window AC #3	1
ECM-4 Window AC #4	1

4: Miscellaneous Energy

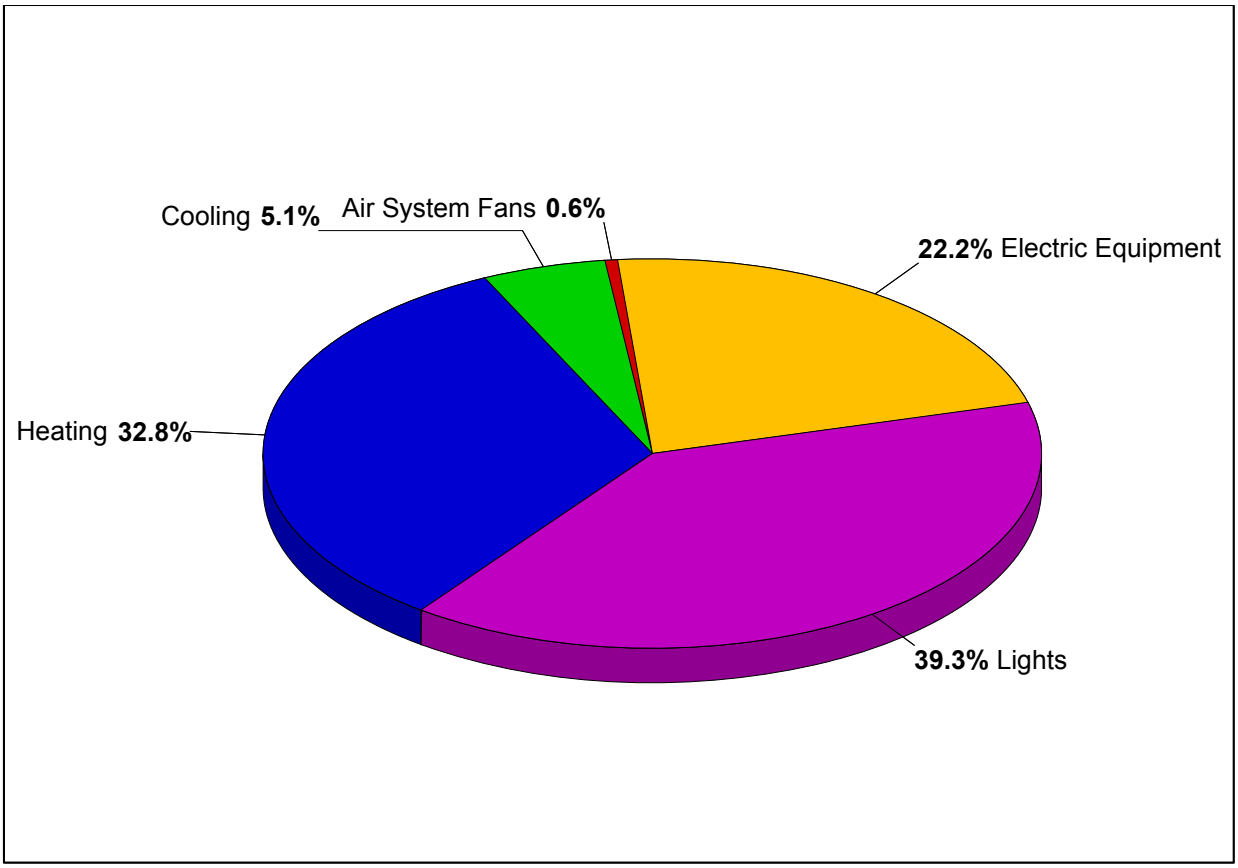
(no items defined)

5: Meters

Electric ..... **Electric Rate**
Fuel Oil ..... **Fuel Gas Rate**
Propane ..... **Propane Rate**

6: Miscellaneous Data

Average Building Power Factor ..... **100.00 %**
Source Electric Generating Efficiency ..... **28.00 %**
Additional Floor Area ..... **0.0 ft²**



1. Annual Costs

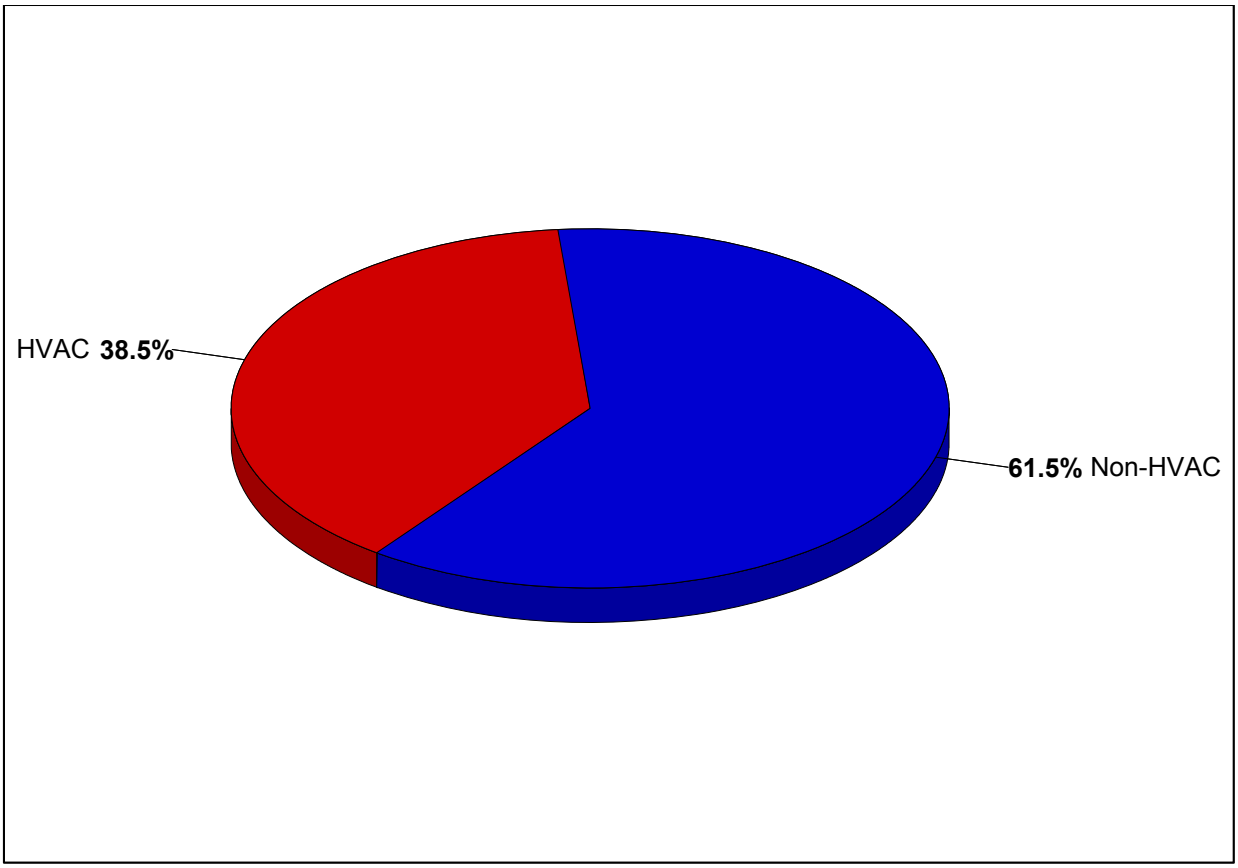
Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	88	0.010	0.6
Cooling	817	0.089	5.1
Heating	5,216	0.569	32.8
Pumps	0	0.000	0.0
Cooling Tower Fans	0	0.000	0.0
HVAC Sub-Total	**6,122**	**0.667**	**38.5**
Lights	6,258	0.682	39.3
Electric Equipment	3,529	0.385	22.2
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**61.5**
Grand Total	**15,908**	**1.734**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Annual HVAC & Non-HVAC Cost Totals - ECM-4 Roof Insulation

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:30AM



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	6,122	0.667	38.5
Non-HVAC	9,787	1.067	61.5
Grand Total	**15,908**	**1.734**	**100.0**

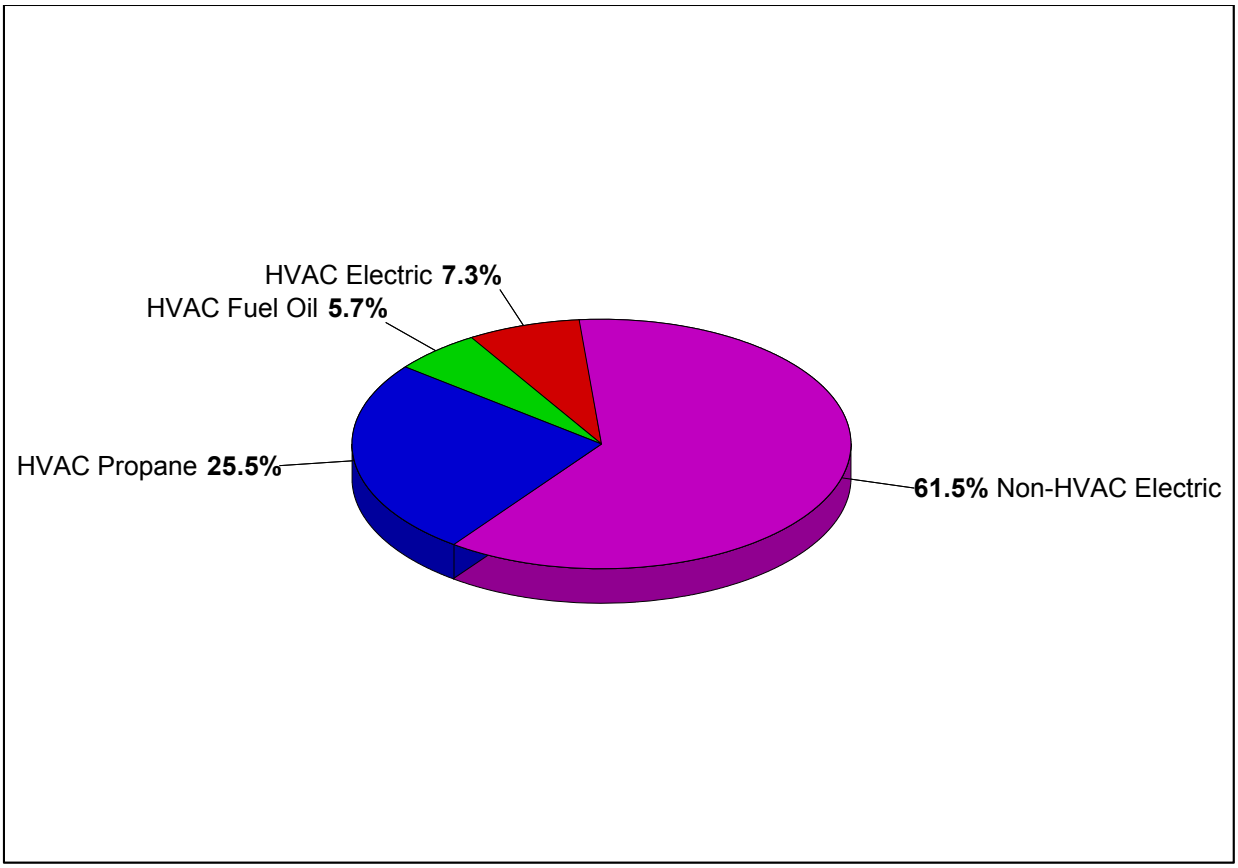
Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Annual Energy Costs - ECM-4 Roof Insulation

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:30AM



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	1,167	0.127	7.3
Natural Gas	0	0.000	0.0
Fuel Oil	901	0.098	5.7
Propane	4,054	0.442	25.5
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**6,122**	**0.667**	**38.5**
Non-HVAC Components			
Electric	9,787	1.067	61.5
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**61.5**
Grand Total	**15,908**	**1.734**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by Energy Source - ECM-4 Roof Insulation

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:30AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	49,282	5.372
Heating Coil Loads	163,355	17.808
Grand Total	**212,636**	**23.181**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	22,692	2.474	81,042	8.835
Natural Gas	0	0.000	0	0.000
Fuel Oil	51,060	5.566	51,060	5.566
Propane	146,770	16.000	146,770	16.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**220,521**	**24.040**	**278,871**	**30.401**
Non-HVAC Components				
Electric	190,266	20.742	679,520	74.078
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,266**	**20.742**	**679,520**	**74.078**
Grand Total	**410,787**	**44.782**	**958,391**	**104.480**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by System Component - ECM-4 Roof Insulation

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:30AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	49,282	5.372
Heating Coil Loads	163,355	17.808
Grand Total	**212,636**	**23.181**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	1,715	0.187	6,126	0.668
Cooling	15,885	1.732	56,734	6.185
Heating	202,920	22.122	216,011	23.549
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
HVAC Sub-Total	**220,521**	**24.040**	**278,871**	**30.401**
Lights	121,668	13.264	434,530	47.371
Electric Equipment	68,600	7.479	245,001	26.709
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,269**	**20.742**	**679,530**	**74.079**
Grand Total	**410,790**	**44.783**	**958,402**	**104.481**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Annual Cost Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:30AM

Table 1. Annual Costs

Component	ECM-4 Roof Insulation ($)
Air System Fans	88
Cooling	817
Heating	5,216
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**6,122**
Lights	6,258
Electric Equipment	3,529
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**15,908**

Table 2. Annual Cost per Unit Floor Area

Component	ECM-4 Roof Insulation ($/ft²)
Air System Fans	0.010
Cooling	0.089
Heating	0.569
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.667**
Lights	0.682
Electric Equipment	0.385
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.734**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	ECM-4 Roof Insulation (%)
Air System Fans	0.6
Cooling	5.1
Heating	32.8
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**38.5**
Lights	39.3
Electric Equipment	22.2
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**61.5**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:30AM

Table 1. Annual Costs

Component	ECM-4 Roof Insulation ($)
HVAC Components	
Electric	1,167
Natural Gas	0
Fuel Oil	901
Propane	4,054
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**6,122**
Non-HVAC Components	
Electric	9,787
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**15,908**

Table 2. Annual Energy Consumption

Component	ECM-4 Roof Insulation
HVAC Components	
Electric (kWh)	6,651
Natural Gas (na)	0
Fuel Oil (gal)	367
Propane (gal)	1,602
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	55,764
Natural Gas (na)	0
Fuel Oil (gal)	0
Propane (gal)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	62,414
Natural Gas (na)	0
Fuel Oil (gal)	367
Propane (gal)	1,602
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	ECM-4 Roof Insulation
CO2 Equivalent (lb)	124,614

Table 4. Annual Cost per Unit Floor Area

Component	ECM-4 Roof Insulation ($/ft²)
HVAC Components	
Electric	0.127
Natural Gas	0.000
Fuel Oil	0.098
Propane	0.442
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.667**
Non-HVAC Components	
Electric	1.067
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.734**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 5. Component Cost as a Percentage of Total Cost

Component	ECM-4 Roof Insulation (%)
HVAC Components	
Electric	7.3
Natural Gas	0.0
Fuel Oil	5.7
Propane	25.5
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**38.5**
Non-HVAC Components	
Electric	61.5
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**61.5**
Grand Total	**100.0**

APPENDIX G

ECM-5 Install Both Wall and Roof Insulation

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-5 Install Both Wall and Roof Insulation

Installation Costs						
	Qty	Unit	Unit Costs	Subtotal Costs	Total Cost	Remarks
			Material/Labor	Material/Labor		
Exterior Wall Insulation Cost (ECM-3)	1	LS	$125,435.00	$125,435	$125,435	
Additional Roof Insulation Cost (ECM-4)	1	LS	$33,956	$33,956	$33,956	

Total	$159,391

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-5 Install Both Wall and Roof Insulation

Annual Energy Use Comparison				
	Electricity kWh	Propane Gallons	Fuel Oil Gallons	Cost $
Base Building	63,760	2,335	461	$ 18,228
Building with Both Wall and Roof Insulation	61,216	941	264	$ 13,771
Difference	2,544	1,394	197	$ 4,456

ECM-5 Wall and Roof Insulation Input Data

1. General Details:

Building Name ..... **ECM-5 Wall and Roof Insulation**

2. Plants Included in this Building:

None

3. Air Systems Included in this Building:

System Name	Mult.
ECM-5 Electric Baseboard	1
ECM-5 Electric Wall Heater	1
ECM-5 Fuel Oil Fired AHU	1
ECM-5 Propane Unit Heater	1
ECM-5 Window AC #1	1
ECM-5 Window AC #2	1
ECM-5 Window AC #3	1
ECM-5 Window AC #4	1

4: Miscellaneous Energy

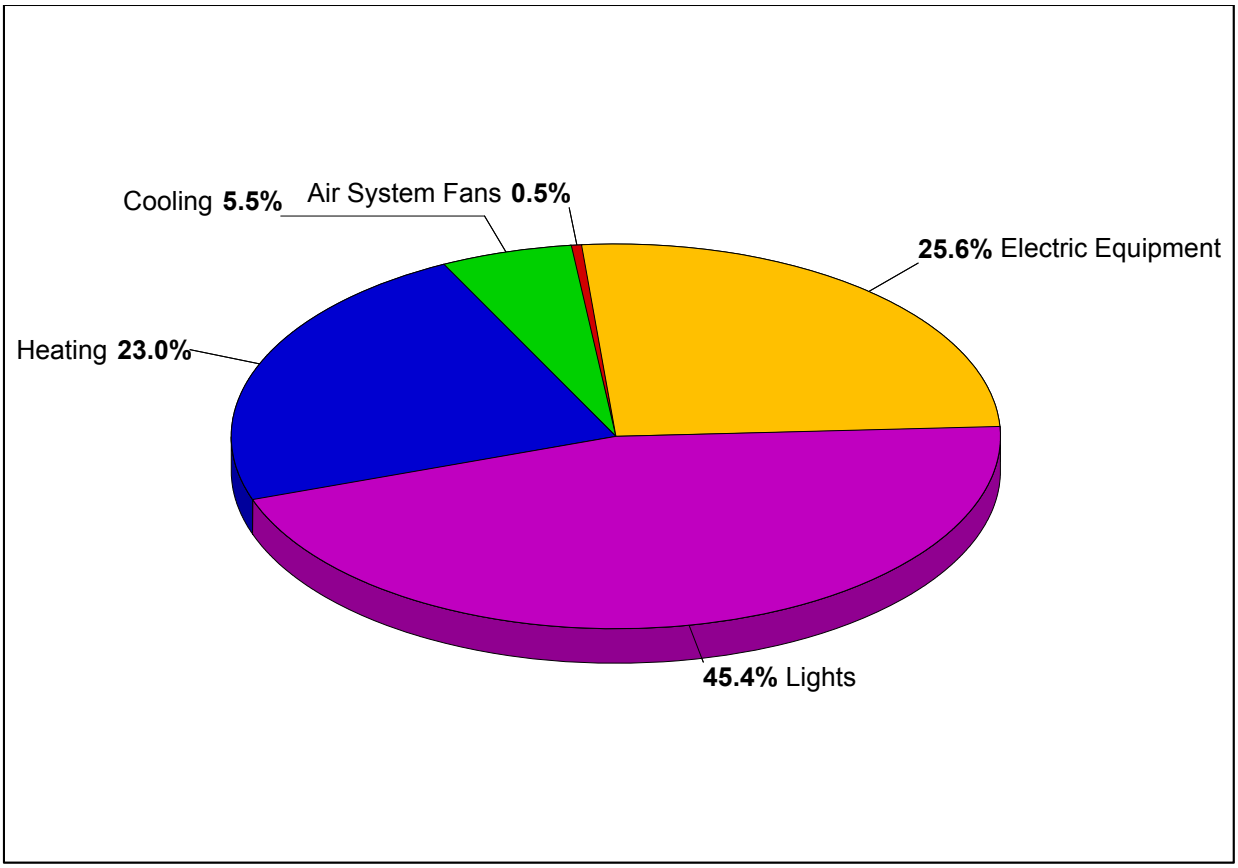
(no items defined)

5: Meters

Electric ..... **Electric Rate**
Fuel Oil ..... **Fuel Gas Rate**
Propane ..... **Propane Rate**

6: Miscellaneous Data

Average Building Power Factor ..... **100.00 %**
Source Electric Generating Efficiency ..... **28.00 %**
Additional Floor Area ..... **0.0 ft²**



1. Annual Costs

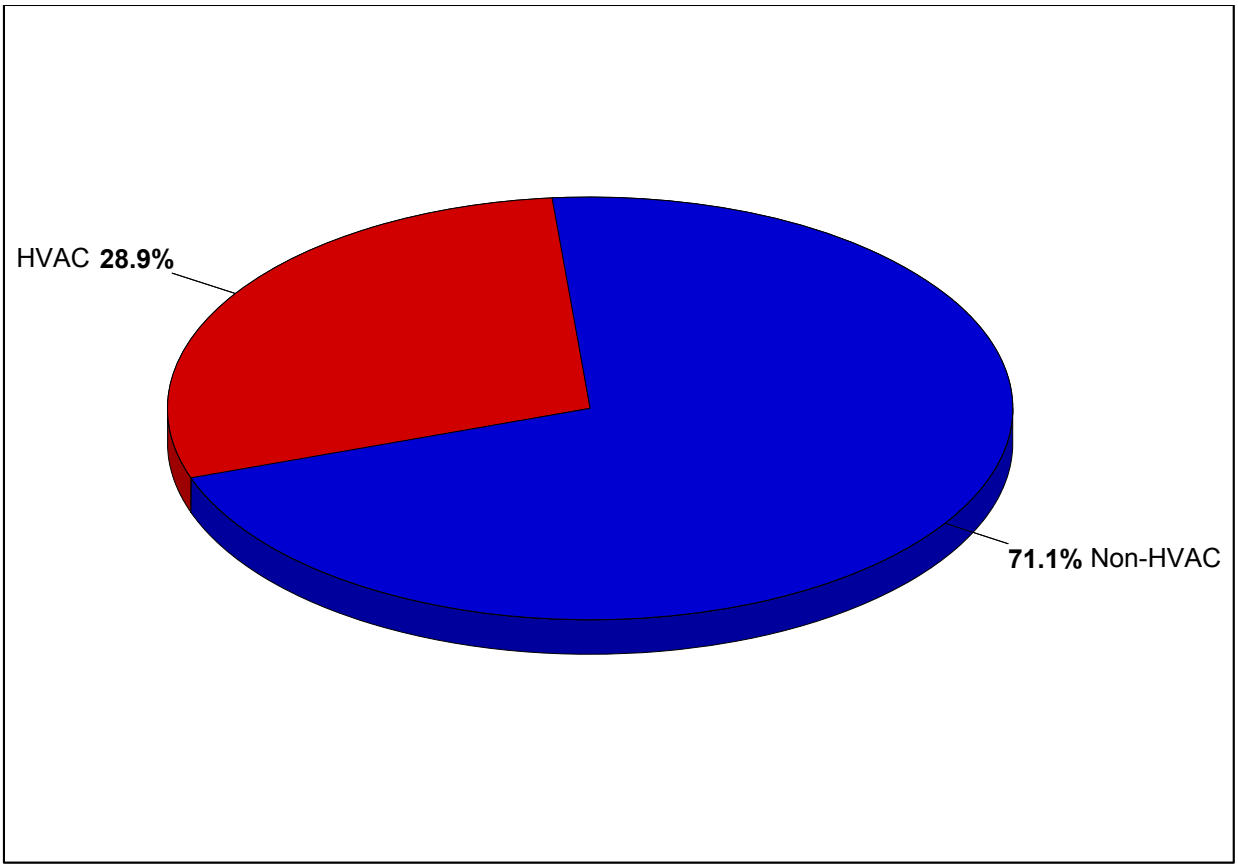
Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	63	0.007	0.5
Cooling	760	0.083	5.5
Heating	3,162	0.345	23.0
Pumps	0	0.000	0.0
Cooling Tower Fans	0	0.000	0.0
HVAC Sub-Total	**3,986**	**0.435**	**28.9**
Lights	6,258	0.682	45.4
Electric Equipment	3,529	0.385	25.6
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**71.1**
Grand Total	**13,772**	**1.501**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Annual HVAC & Non-HVAC Cost Totals - ECM-5 Wall and Roof Insulation

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:31AM

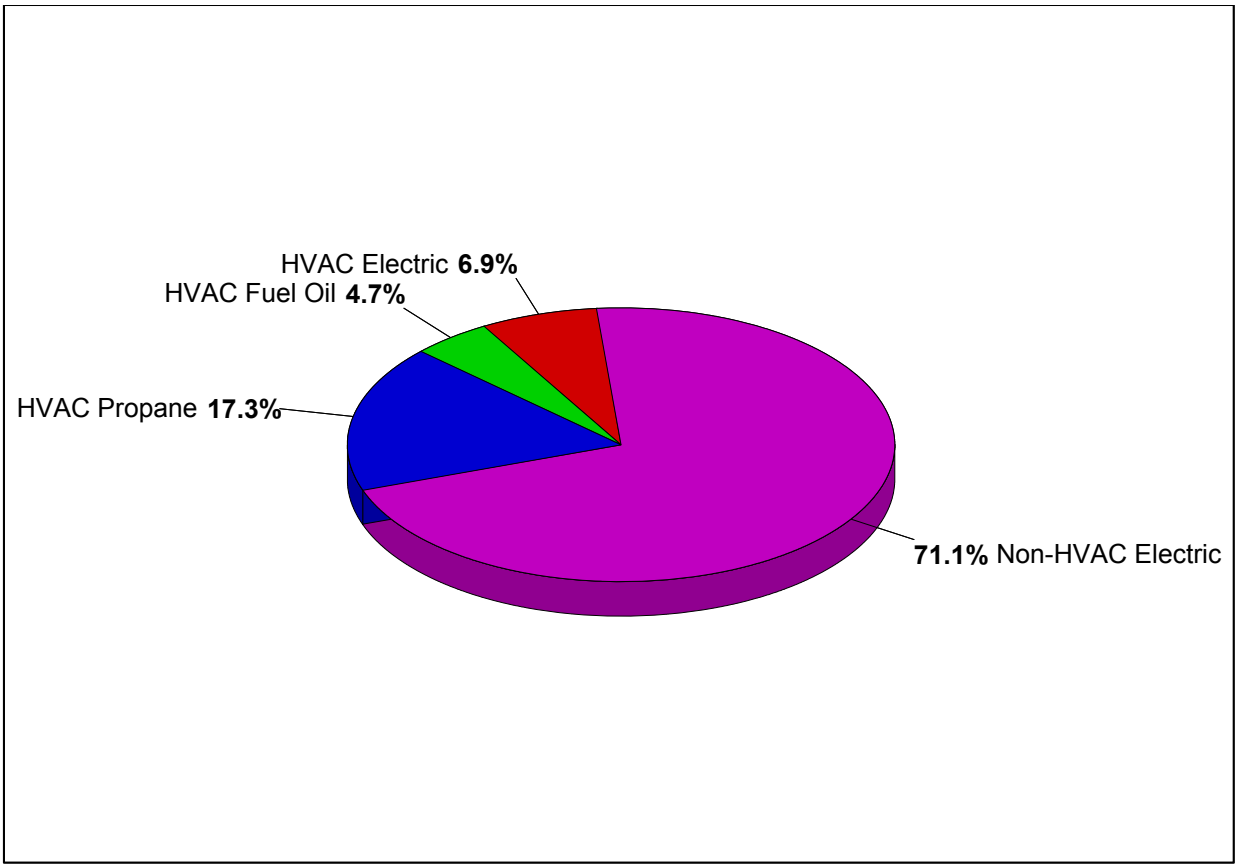


1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	3,986	0.434	28.9
Non-HVAC	9,787	1.067	71.1
Grand Total	**13,772**	**1.501**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	957	0.104	6.9
Natural Gas	0	0.000	0.0
Fuel Oil	648	0.071	4.7
Propane	2,381	0.260	17.3
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**3,986**	**0.434**	**28.9**
Non-HVAC Components			
Electric	9,787	1.067	71.1
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**71.1**
Grand Total	**13,772**	**1.501**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by Energy Source - ECM-5 Wall and Roof Insulation

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:31AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	45,728	4.985
Heating Coil Loads	100,934	11.003
Grand Total	**146,662**	**15.989**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	18,604	2.028	66,441	7.243
Natural Gas	0	0.000	0	0.000
Fuel Oil	36,736	4.005	36,736	4.005
Propane	86,193	9.396	86,193	9.396
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**141,533**	**15.429**	**189,370**	**20.644**
Non-HVAC Components				
Electric	190,266	20.742	679,520	74.078
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,266**	**20.742**	**679,520**	**74.078**
Grand Total	**331,798**	**36.171**	**868,890**	**94.723**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by System Component - ECM-5 Wall and Roof Insulation

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:31AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	45,728	4.985
Heating Coil Loads	100,934	11.003
Grand Total	**146,662**	**15.989**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	1,232	0.134	4,401	0.480
Cooling	14,780	1.611	52,787	5.755
Heating	125,520	13.684	132,182	14.410
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
HVAC Sub-Total	**141,533**	**15.429**	**189,370**	**20.644**
Lights	121,668	13.264	434,530	47.371
Electric Equipment	68,600	7.479	245,001	26.709
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,269**	**20.742**	**679,530**	**74.079**
Grand Total	**331,801**	**36.171**	**868,901**	**94.724**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Annual Cost Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:31AM

Table 1. Annual Costs

Component	ECM-5 Wall and Roof Insulation ($)
Air System Fans	63
Cooling	760
Heating	3,162
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**3,986**
Lights	6,258
Electric Equipment	3,529
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**13,772**

Table 2. Annual Cost per Unit Floor Area

Component	ECM-5 Wall and Roof Insulation ($/ft²)
Air System Fans	0.007
Cooling	0.083
Heating	0.345
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.435**
Lights	0.682
Electric Equipment	0.385
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.501**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	ECM-5 Wall and Roof Insulation (%)
Air System Fans	0.5
Cooling	5.5
Heating	23.0
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**28.9**
Lights	45.4
Electric Equipment	25.6
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**71.1**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:31AM

Table 1. Annual Costs

Component	ECM-5 Wall and Roof Insulation ($)
HVAC Components	
Electric	957
Natural Gas	0
Fuel Oil	648
Propane	2,381
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**3,986**
Non-HVAC Components	
Electric	9,787
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**13,772**

Table 2. Annual Energy Consumption

Component	ECM-5 Wall and Roof Insulation
HVAC Components	
Electric (kWh)	5,452
Natural Gas (na)	0
Fuel Oil (gal)	264
Propane (gal)	941
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	55,764
Natural Gas (na)	0
Fuel Oil (gal)	0
Propane (gal)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	61,216
Natural Gas (na)	0
Fuel Oil (gal)	264
Propane (gal)	941
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	ECM-5 Wall and Roof Insulation
CO2 Equivalent (lb)	112,631

Table 4. Annual Cost per Unit Floor Area

Component	ECM-5 Wall and Roof Insulation ($/ft²)
HVAC Components	
Electric	0.104
Natural Gas	0.000
Fuel Oil	0.071
Propane	0.260
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.434**
Non-HVAC Components	
Electric	1.067
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.501**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 5. Component Cost as a Percentage of Total Cost

Component	ECM-5 Wall and Roof Insulation (%)
HVAC Components	
Electric	6.9
Natural Gas	0.0
Fuel Oil	4.7
Propane	17.3
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**28.9**
Non-HVAC Components	
Electric	71.1
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**71.1**
Grand Total	**100.0**

APPENDIX H

ECM-6 Replace Single Pane Windows in Garage

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-6 Replace Single Pane Window in Garage

Installation Costs						
	Qty	Unit	Unit Costs	Subtotal Costs	Total Cost	Remarks
			Material/Labor	Material/Labor		
Remove Existing Windows	8	EA	$50.00	$400	$400	
Disposal and Handling	8	EA	$25	$200	$200	
New Fiberglass Window with Double Glazing	8	EA	$720	$5,760	$5,760	
Calking	171	LF	$2	$342	$342	
Total Overhead/Profit	37.2%	LS	$6,702	$2,493	$2,493	

Total	$9,195

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-6 Replace Single Pane Window in Garage

Annual Energy Use Comparison				
	Electricity kWh	Propane Gallons	Fuel Oil Gallons	Cost $
Base Building	63,760	2,335	461	$ 18,228
Building with Replacement Garage Windows	63,708	2,190	437	$ 17,793
Difference	52	145	24	$ 435

ECM-6 Replace Single Pane Windows Input Data

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/21/2010
01:37PM

1. General Details:

Building Name ..... **ECM-6 Replace Single Pane Windows**

2. Plants Included in this Building:

None

3. Air Systems Included in this Building:

System Name	Mult.
ECM-6 Electric Baseboard	1
ECM-6 Electric Wall Heater	1
ECM-6 Fuel Oil Fired AHU	1
ECM-6 Propane Unit Heater	1
ECM-6 Window AC #1	1
ECM-6 Window AC #2	1
ECM-6 Window AC #3	1
ECM-6 Window AC #4	1

4: Miscellaneous Energy

(no items defined)

5: Meters

Electric ..... **Electric Rate**
Fuel Oil ..... **Fuel Gas Rate**
Propane ..... **Propane Rate**

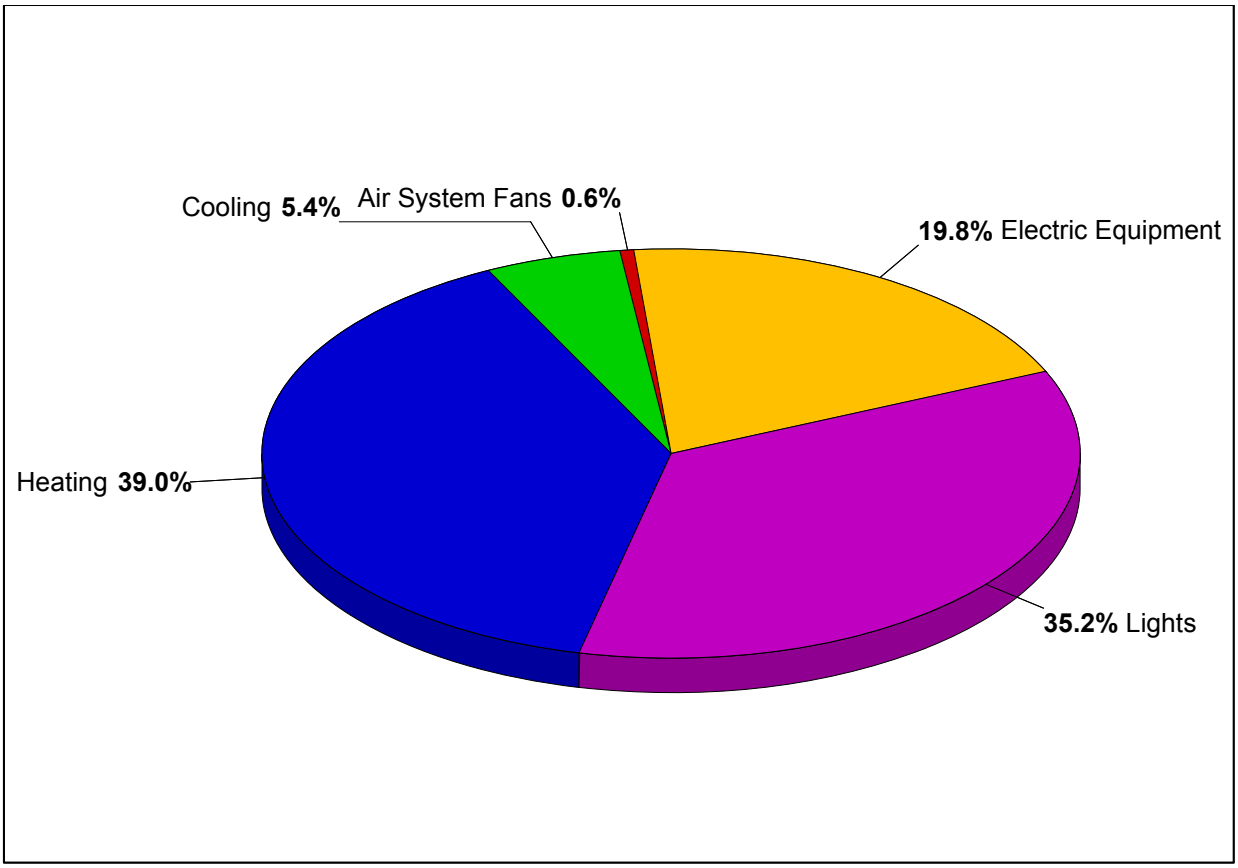
6: Miscellaneous Data

Average Building Power Factor ..... **100.00 %**
Source Electric Generating Efficiency ..... **28.00 %**
Additional Floor Area ..... **0.0 ft²**

Annual Component Costs - ECM-6 Replace Single Pane Windows

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:32AM



1. Annual Costs

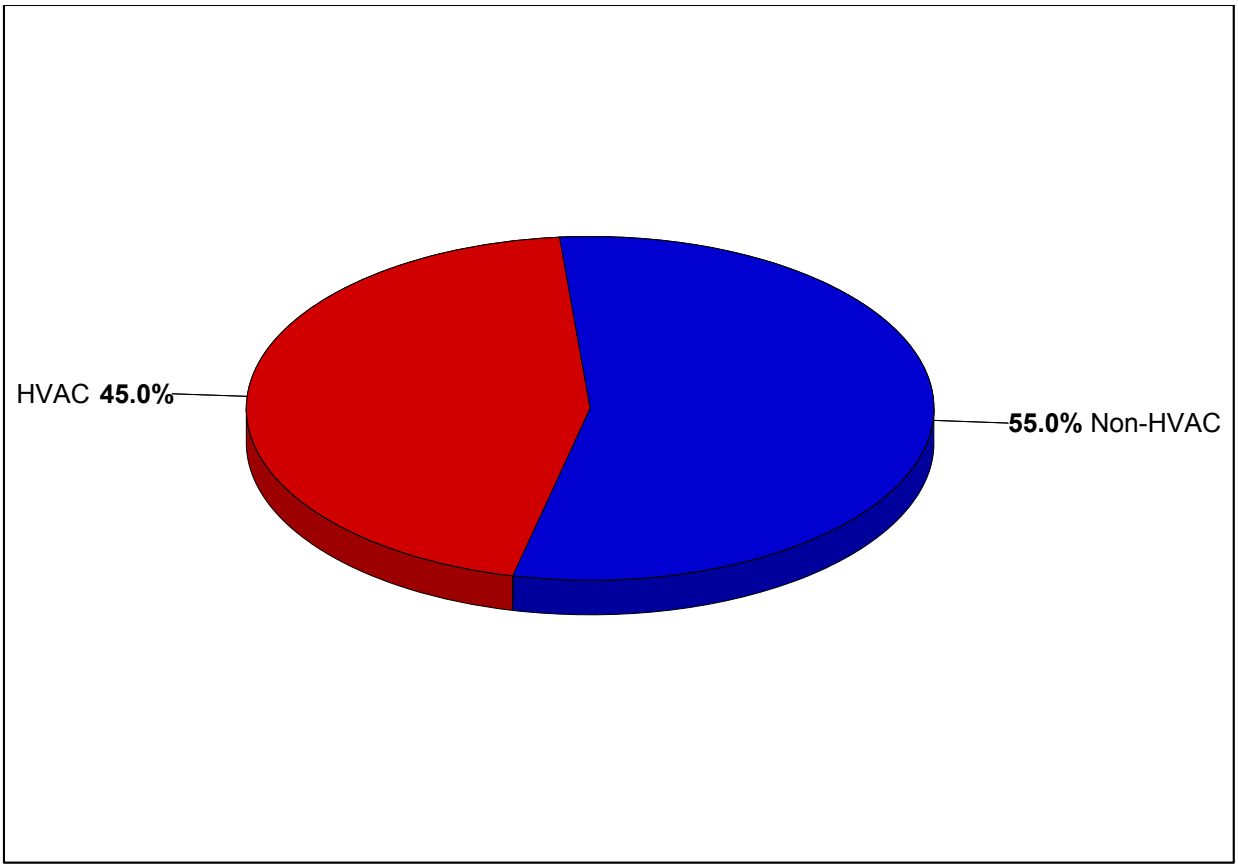
Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	108	0.012	0.6
Cooling	955	0.104	5.4
Heating	6,943	0.757	39.0
Pumps	0	0.000	0.0
Cooling Tower Fans	0	0.000	0.0
HVAC Sub-Total	**8,006**	**0.873**	**45.0**
Lights	6,258	0.682	35.2
Electric Equipment	3,529	0.385	19.8
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**55.0**
Grand Total	**17,793**	**1.940**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Annual HVAC & Non-HVAC Cost Totals - ECM-6 Replace Single Pane Windows

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:32AM

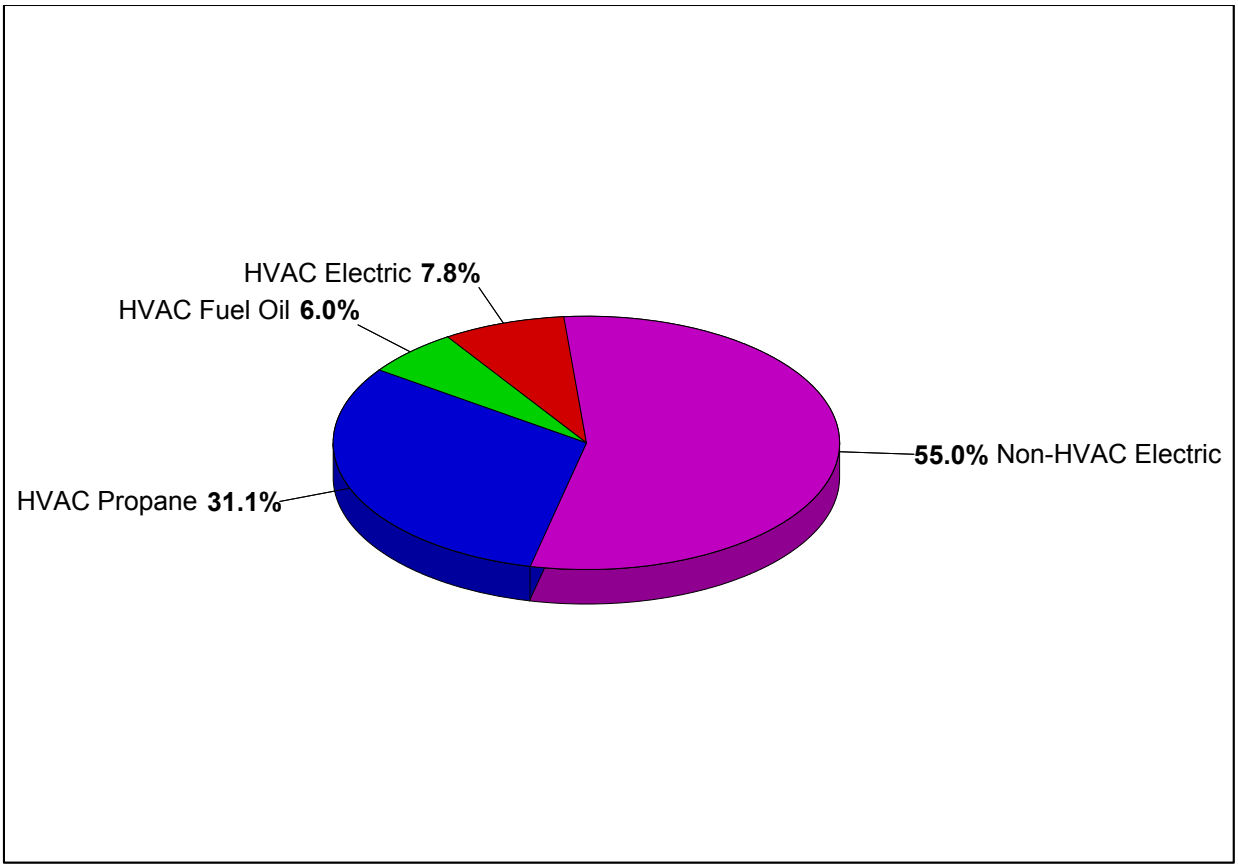


1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	8,006	0.873	45.0
Non-HVAC	9,787	1.067	55.0
Grand Total	**17,793**	**1.940**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	1,394	0.152	7.8
Natural Gas	0	0.000	0.0
Fuel Oil	1,073	0.117	6.0
Propane	5,540	0.604	31.1
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**8,006**	**0.873**	**45.0**
Non-HVAC Components			
Electric	9,787	1.067	55.0
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**55.0**
Grand Total	**17,793**	**1.940**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by Energy Source - ECM-6 Replace Single Pane Windows

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:32AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	58,523	6.380
Heating Coil Loads	215,531	23.496
Grand Total	**274,053**	**29.876**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	27,105	2.955	96,804	10.553
Natural Gas	0	0.000	0	0.000
Fuel Oil	60,806	6.629	60,806	6.629
Propane	200,561	21.864	200,561	21.864
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**288,473**	**31.448**	**358,172**	**39.046**
Non-HVAC Components				
Electric	190,266	20.742	679,520	74.078
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,266**	**20.742**	**679,520**	**74.078**
Grand Total	**478,738**	**52.190**	**1,037,692**	**113.125**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by System Component - ECM-6 Replace Single Pane Windows

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:32AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	58,523	6.380
Heating Coil Loads	215,531	23.496
Grand Total	**274,053**	**29.876**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	2,107	0.230	7,526	0.821
Cooling	18,562	2.024	66,292	7.227
Heating	267,804	29.195	284,354	30.999
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
HVAC Sub-Total	**288,473**	**31.448**	**358,172**	**39.046**
Lights	121,668	13.264	434,530	47.371
Electric Equipment	68,600	7.479	245,001	26.709
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,269**	**20.742**	**679,530**	**74.079**
Grand Total	**478,741**	**52.190**	**1,037,702**	**113.126**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Annual Cost Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:32AM

Table 1. Annual Costs

Component	ECM-6 Replace Single Pane Windows ($)
Air System Fans	108
Cooling	955
Heating	6,943
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**8,006**
Lights	6,258
Electric Equipment	3,529
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**17,793**

Table 2. Annual Cost per Unit Floor Area

Component	ECM-6 Replace Single Pane Windows ($/ft²)
Air System Fans	0.012
Cooling	0.104
Heating	0.757
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.873**
Lights	0.682
Electric Equipment	0.385
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.940**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	ECM-6 Replace Single Pane Windows (%)
Air System Fans	0.6
Cooling	5.4
Heating	39.0
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**45.0**
Lights	35.2
Electric Equipment	19.8
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**55.0**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:32AM

Table 1. Annual Costs

Component	ECM-6 Replace Single Pane Windows ($)
HVAC Components	
Electric	1,394
Natural Gas	0
Fuel Oil	1,073
Propane	5,540
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**8,006**
Non-HVAC Components	
Electric	9,787
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**17,793**

Table 2. Annual Energy Consumption

Component	ECM-6 Replace Single Pane Windows
HVAC Components	
Electric (kWh)	7,944
Natural Gas (na)	0
Fuel Oil (gal)	437
Propane (gal)	2,190
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	55,764
Natural Gas (na)	0
Fuel Oil (gal)	0
Propane (gal)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	63,708
Natural Gas (na)	0
Fuel Oil (gal)	437
Propane (gal)	2,190
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	ECM-6 Replace Single Pane Windows
CO2 Equivalent (lb)	135,335

Table 4. Annual Cost per Unit Floor Area

Component	ECM-6 Replace Single Pane Windows ($/ft²)
HVAC Components	
Electric	0.152
Natural Gas	0.000
Fuel Oil	0.117
Propane	0.604
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.873**
Non-HVAC Components	
Electric	1.067
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.940**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 5. Component Cost as a Percentage of Total Cost

Component	ECM-6 Replace Single Pane Windows (%)
HVAC Components	
Electric	7.8
Natural Gas	0.0
Fuel Oil	6.0
Propane	31.1
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**45.0**
Non-HVAC Components	
Electric	55.0
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**55.0**
Grand Total	**100.0**

APPENDIX I

ECM-7 Install Both Wall and Roof Insulation and Replace Single Pane Windows

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-7 Install Both Wall and Roof Insulation and Replace Single Pane Wind

Installation Costs						
	Qty	Unit	Unit Costs	Subtotal Costs	Total Cost	Remarks
			Material/Labor	Material/Labor		
Exterior Wall Insulation Cost (ECM-3)	1	LS	$125,435	$125,435	$125,435	
Additional Roof Insulation Cost (ECM-4)	1	LS	$33,956	$33,956	$33,956	
Replace Single Pane Garage Windows (ECM-6)	1	LS	$9,195	$9,195	$9,195	

Total	$168,586

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-7 Install Both Wall and Roof Insulation and Replace Single Pane Windows

Annual Energy Use Comparison				
	Electricity kWh	Propane Gallons	Fuel Oil Gallons	Cost $
Base Building	63,760	2,335	461	$ 18,227.80
Building with Wall and Roof Insulation and Replacement Garage Windows	61,160	808	242	$ 13,371.20
Difference	2,600	1,527	219	$ 4,856.60

ECM-7 Wall and Roof Insulation and New Window Input Data

Lower Alloways DPW - TrueUp 10/21/2010
Kitchen and Associates 01:38PM

1. General Details:

Building Name ..... **ECM-7 Wall and Roof Insulation and New Window**

2. Plants Included in this Building:

None

3. Air Systems Included in this Building:

System Name	Mult.
ECM-7 Electric Baseboard	1
ECM-7 Electric Wall Heater	1
ECM-7 Fuel Oil Fired AHU	1
ECM-7 Propane Unit Heater	1
ECM-7 Window AC #1	1
ECM-7 Window AC #2	1
ECM-7 Window AC #3	1
ECM-7 Window AC #4	1

4: Miscellaneous Energy

(no items defined)

5: Meters

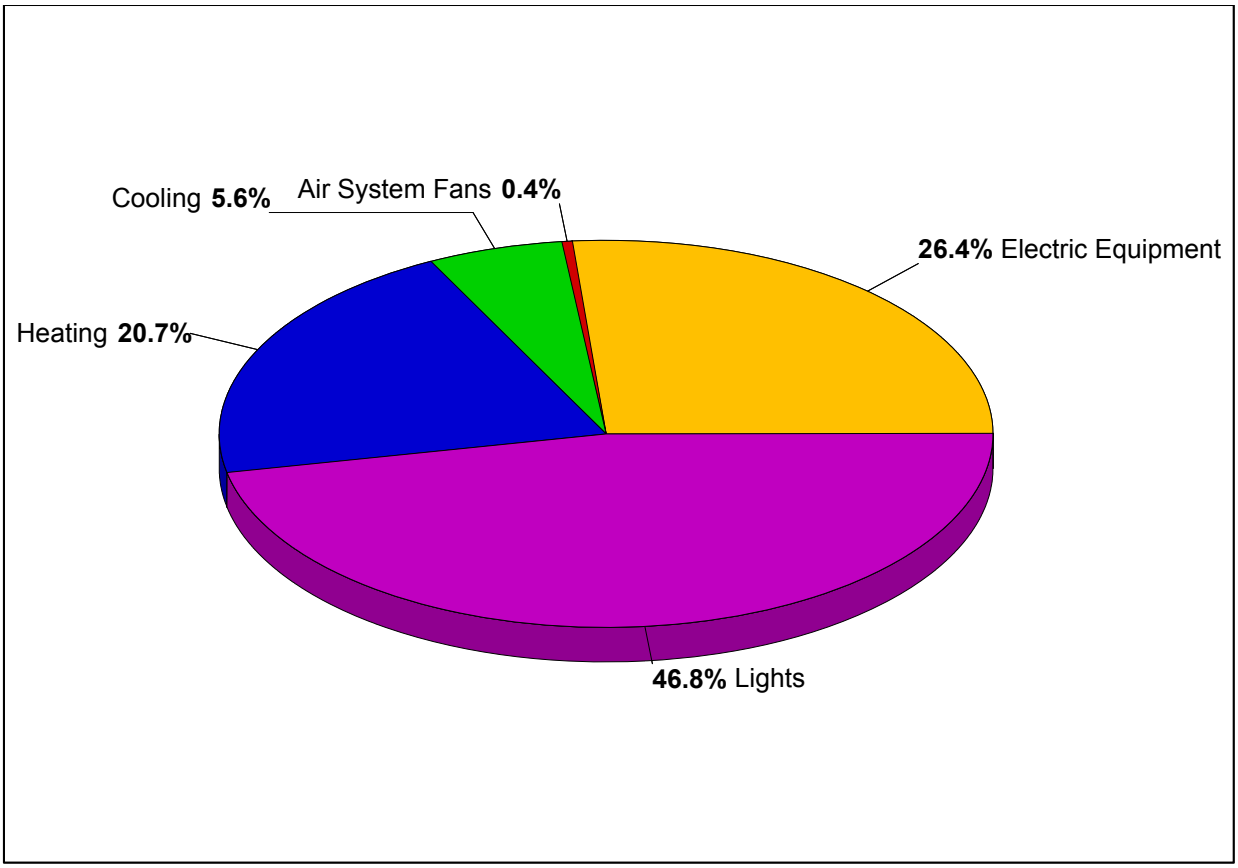
Electric ..... **Electric Rate**
Fuel Oil ..... **Fuel Gas Rate**
Propane ..... **Propane Rate**

6: Miscellaneous Data

Average Building Power Factor ..... **100.00 %**
Source Electric Generating Efficiency ..... **28.00 %**
Additional Floor Area ..... **0.0 ft²**

Annual Component Costs - ECM-7 Wall and Roof Insulation and New Window

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:32AM



1. Annual Costs

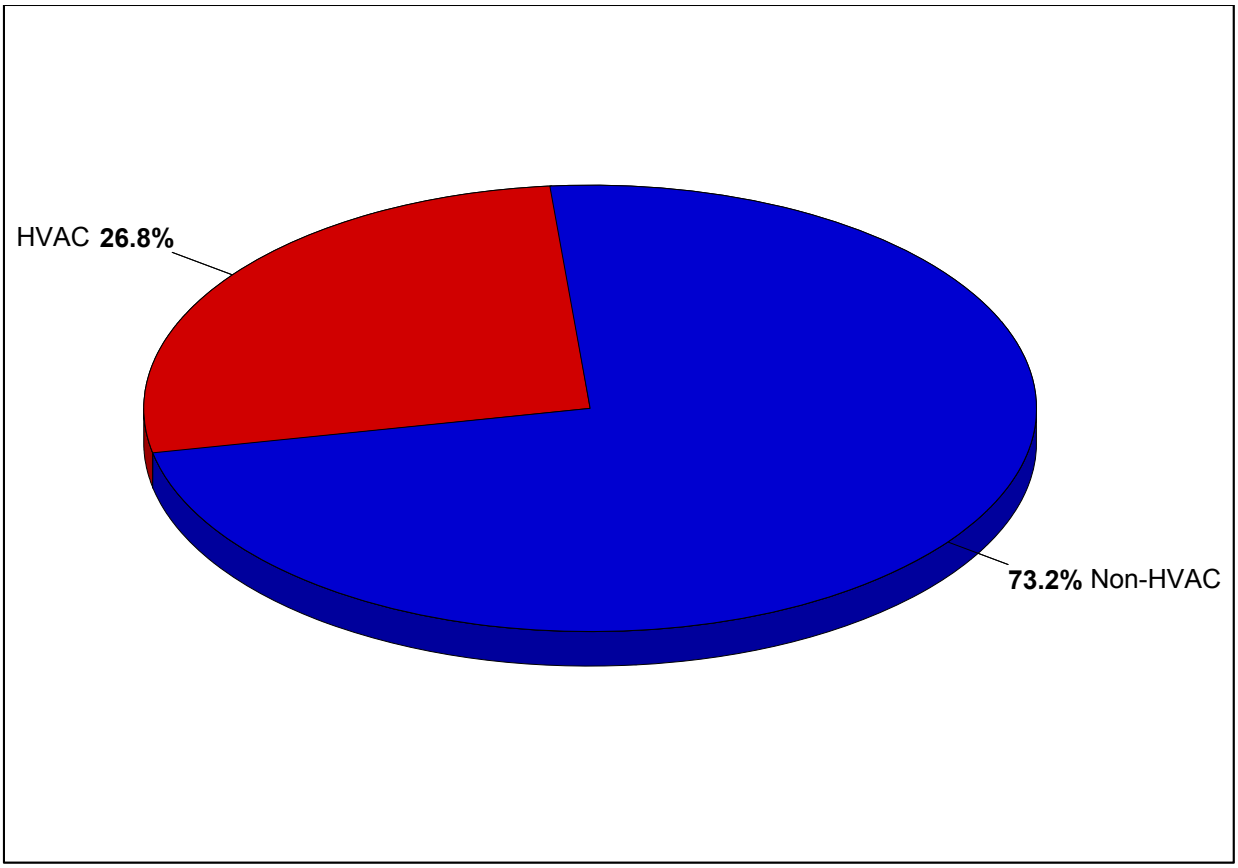
Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	58	0.006	0.4
Cooling	755	0.082	5.6
Heating	2,770	0.302	20.7
Pumps	0	0.000	0.0
Cooling Tower Fans	0	0.000	0.0
HVAC Sub-Total	**3,584**	**0.391**	**26.8**
Lights	6,258	0.682	46.8
Electric Equipment	3,529	0.385	26.4
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**73.2**
Grand Total	**13,371**	**1.458**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Annual HVAC & Non-HVAC Cost Totals - ECM-7 Wall and Roof Insulation and New Window

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:32AM



1. Annual Costs

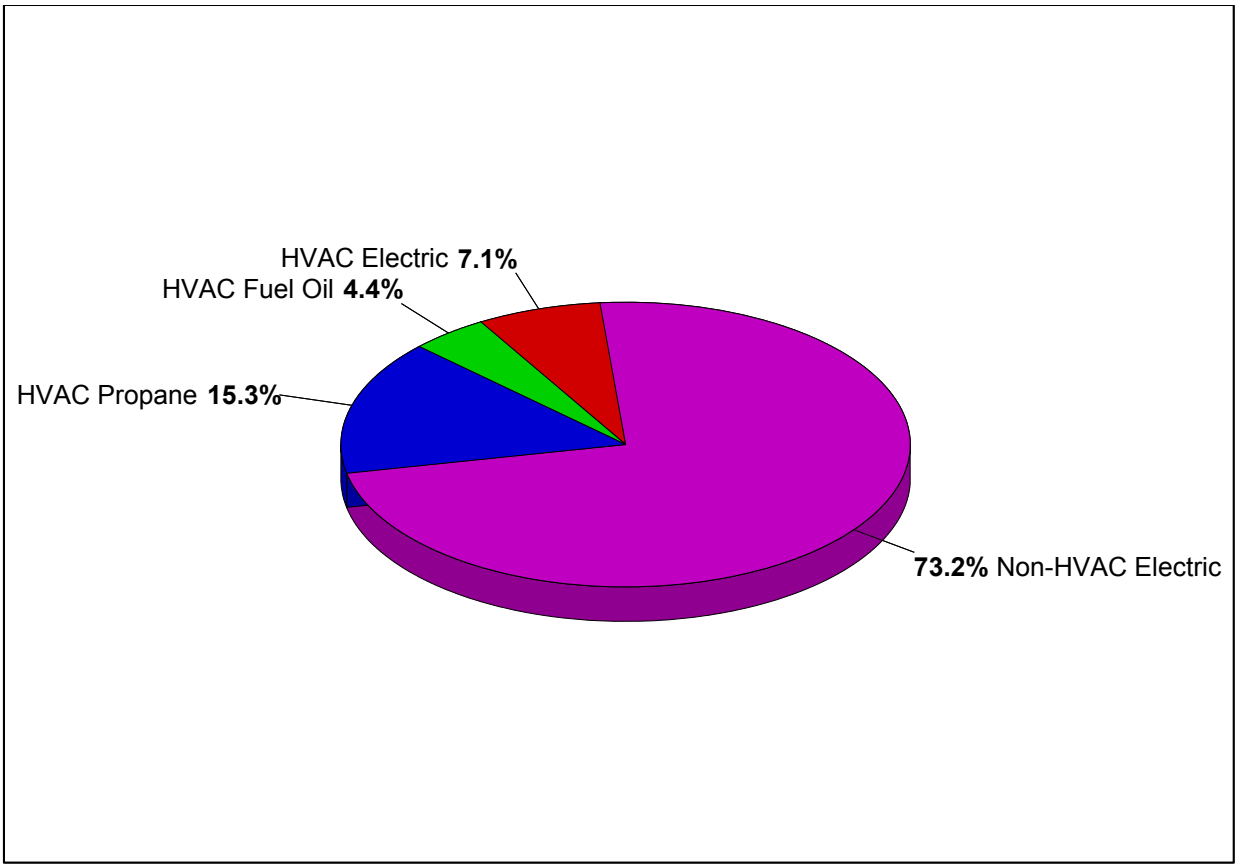
Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	3,584	0.391	26.8
Non-HVAC	9,787	1.067	73.2
Grand Total	**13,371**	**1.458**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Annual Energy Costs - ECM-7 Wall and Roof Insulation and New Window

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:32AM



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	947	0.103	7.1
Natural Gas	0	0.000	0.0
Fuel Oil	593	0.065	4.4
Propane	2,044	0.223	15.3
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**3,584**	**0.391**	**26.8**
Non-HVAC Components			
Electric	9,787	1.067	73.2
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**73.2**
Grand Total	**13,371**	**1.458**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by Energy Source - ECM-7 Wall and Roof Insulation and New Window

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:32AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	45,422	4.952
Heating Coil Loads	88,680	9.667
Grand Total	**134,101**	**14.619**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	18,414	2.007	65,763	7.169
Natural Gas	0	0.000	0	0.000
Fuel Oil	33,598	3.663	33,598	3.663
Propane	74,013	8.069	74,013	8.069
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**126,025**	**13.739**	**173,374**	**18.901**
Non-HVAC Components				
Electric	190,266	20.742	679,520	74.078
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,266**	**20.742**	**679,520**	**74.078**
Grand Total	**316,290**	**34.481**	**852,894**	**92.979**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by System Component - ECM-7 Wall and Roof Insulation and New Window

Lower Alloways DPW - TrueUp 10/25/2010
Kitchen and Associates 11:32AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	45,422	4.952
Heating Coil Loads	88,680	9.667
Grand Total	**134,101**	**14.619**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	1,136	0.124	4,058	0.442
Cooling	14,687	1.601	52,453	5.718
Heating	110,202	12.014	116,863	12.740
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
HVAC Sub-Total	**126,025**	**13.739**	**173,374**	**18.900**
Lights	121,668	13.264	434,530	47.371
Electric Equipment	68,600	7.479	245,001	26.709
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,269**	**20.742**	**679,530**	**74.079**
Grand Total	**316,293**	**34.481**	**852,905**	**92.980**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Annual Cost Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:32AM

Table 1. Annual Costs

Component	ECM-7 Wall and Roof Insulation and New Window ($)
Air System Fans	58
Cooling	755
Heating	2,770
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**3,584**
Lights	6,258
Electric Equipment	3,529
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**13,371**

Table 2. Annual Cost per Unit Floor Area

Component	ECM-7 Wall and Roof Insulation and New Window ($/ft²)
Air System Fans	0.006
Cooling	0.082
Heating	0.302
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.391**
Lights	0.682
Electric Equipment	0.385
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.458**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	ECM-7 Wall and Roof Insulation and New Window (%)
Air System Fans	0.4
Cooling	5.6
Heating	20.7
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**26.8**
Lights	46.8
Electric Equipment	26.4
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**73.2**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:32AM

Table 1. Annual Costs

Component	ECM-7 Wall and Roof Insulation and New Window ($)
HVAC Components	
Electric	947
Natural Gas	0
Fuel Oil	593
Propane	2,044
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**3,584**
Non-HVAC Components	
Electric	9,787
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**13,371**

Table 2. Annual Energy Consumption

Component	ECM-7 Wall and Roof Insulation and New Window
HVAC Components	
Electric (kWh)	5,397
Natural Gas (na)	0
Fuel Oil (gal)	242
Propane (gal)	808
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	55,764
Natural Gas (na)	0
Fuel Oil (gal)	0
Propane (gal)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	61,160
Natural Gas (na)	0
Fuel Oil (gal)	242
Propane (gal)	808
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	ECM-7 Wall and Roof Insulation and New Window
CO2 Equivalent (lb)	110,490

Table 4. Annual Cost per Unit Floor Area

Component	ECM-7 Wall and Roof Insulation and New Window ($/ft²)
HVAC Components	
Electric	0.103
Natural Gas	0.000
Fuel Oil	0.065
Propane	0.223
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.391**
Non-HVAC Components	
Electric	1.067
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.458**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 5. Component Cost as a Percentage of Total Cost

Component	ECM-7 Wall and Roof Insulation and New Window (%)
HVAC Components	
Electric	7.1
Natural Gas	0.0
Fuel Oil	4.4
Propane	15.3
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**26.8**
Non-HVAC Components	
Electric	73.2
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**73.2**
Grand Total	**100.0**

APPENDIX J

ECM-8 Replace Propane-Fired Unit Heaters with Waste Oil-Fired Unit Heaters

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-8 Replace Propane-Fired Unit Heaters with Waste Oil-Fired Unit Heaters

Multipliers	
Material	0.98
Labor	1.21
Equipment	1.07

Installation Costs

	Qty	Unit	Unit Costs			Subtotal Costs			Total Cost	Remarks
			Material	Labor	Equipment	Material	Labor	Equipment		
150 kBTU Waste Fuel Oil Heater with Chimney Package and Storage Tank	3	ea	$4,799	$375	$ -	$14,109	$1,361	$0	$15,470	
Demolition and Removal of Existing Heaters and Piping	3	ea	$0	$250	$0	$0	$908	$0	$908	

Subtotal	$16,378
10% OH, 10% Profit	$1,638
10% Contingency	$1,638
Total	$19,653

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-8 Replace Propane-Fired Unit Heaters with Waste Oil-Fired Unit Heaters

Annual Energy Use Comparison					
	Electricity kWh	Propane Gallons	Fuel Oil Gallons	Waste Fuel Oil Gallons	Cost $
Base Building	59,159	2,671	436	0	$ 18,514.62
Building with Waste Oil Heaters	59,159	0	436	1,800	$ 12,207.75
Difference	0	2,671	0	(1,800)	$ 6,306.87

APPENDIX K

ECM-9 Eliminate Leaks in Compressed Air Piping

BPU ENERGY AUDIT PROGRAM

Lower Alloways Township DPW Garage
CHA Project Number 22218

ECM-9 Eliminate Leaks in Compressed Air Piping

Multipliers	
Material	0.98
Labor	1.21
Equipment	1.07

Installation Costs										
	Qty	Unit	Unit Costs			Subtotal Costs			Total Cost	Remarks
			Material	Labor	Equipment	Material	Labor	Equipment		
Miscellaneous Fittings and a Half Day at the Site	1	LS	$75	$125	$ -	$74	$151	$0	$225	

Subtotal	$225
10% OH, 10% Profit	$22
10% Contingency	$22
Total	$270

APPENDIX L

Carrier Hourly Analysis Program – Base Building

Base Building Input Data

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/21/2010
12:28PM

1. General Details:

Building Name ..... **Base Building**

2. Plants Included in this Building:

None

3. Air Systems Included in this Building:

System Name	Mult.
Electric Baseboard	1
Electric Wall Heater	1
Fuel Oil Fired AHU	1
Propane Unit Heater	1
Window AC #1	1
Window AC #2	1
Window AC #3	1
Window AC #4	1

4: Miscellaneous Energy

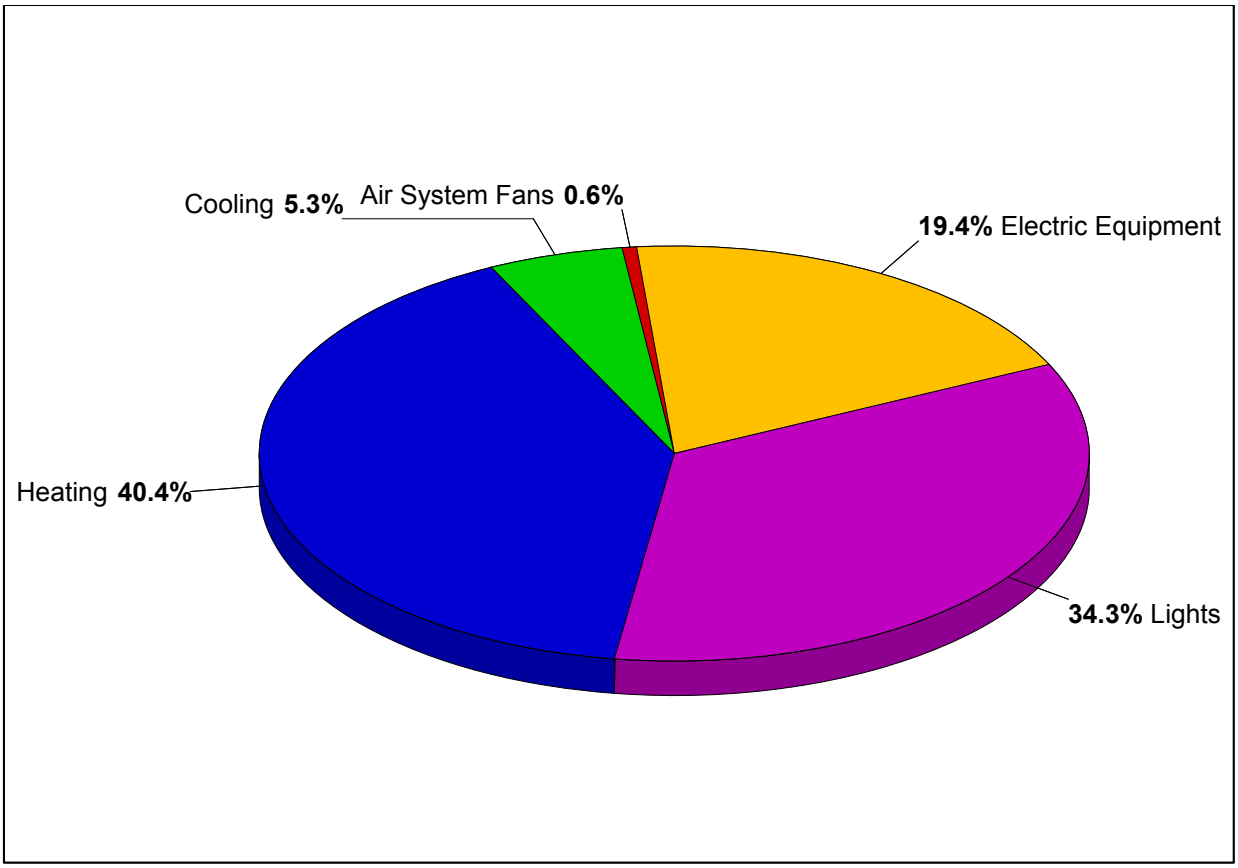
(no items defined)

5: Meters

Electric ..... **Electric Rate**
Fuel Oil ..... **Fuel Gas Rate**
Propane ..... **Propane Rate**

6: Miscellaneous Data

Average Building Power Factor ..... **100.00 %**
Source Electric Generating Efficiency ..... **28.00 %**
Additional Floor Area ..... **0.0 ft²**



1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	113	0.012	0.6
Cooling	959	0.105	5.3
Heating	7,368	0.803	40.4
Pumps	0	0.000	0.0
Cooling Tower Fans	0	0.000	0.0
HVAC Sub-Total	**8,440**	**0.920**	**46.3**
Lights	6,258	0.682	34.3
Electric Equipment	3,529	0.385	19.4
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**53.7**
Grand Total	**18,226**	**1.987**	**100.0**

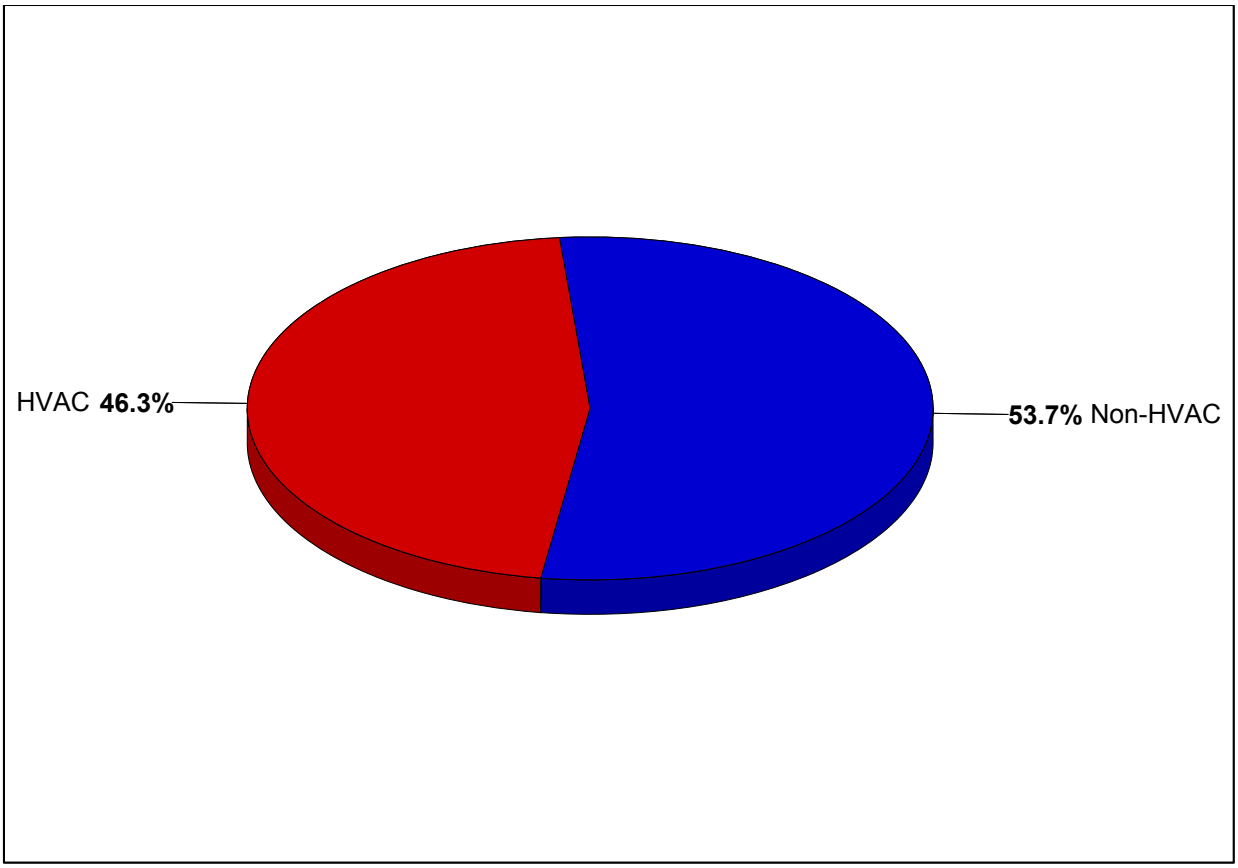
Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Annual HVAC & Non-HVAC Cost Totals - Base Building

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:29AM



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	8,440	0.920	46.3
Non-HVAC	9,787	1.067	53.7
Grand Total	**18,226**	**1.987**	**100.0**

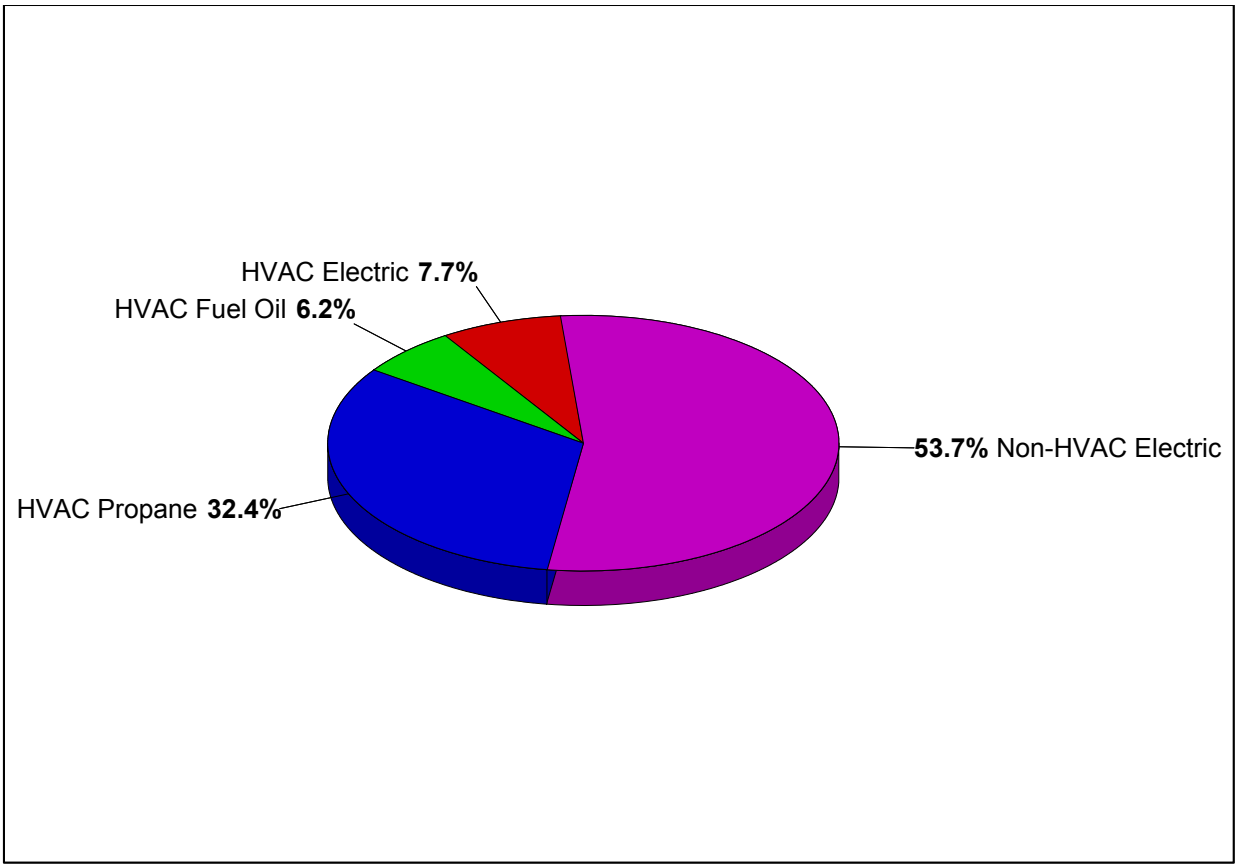
Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Annual Energy Costs - Base Building

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:29AM



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	1,403	0.153	7.7
Natural Gas	0	0.000	0.0
Fuel Oil	1,129	0.123	6.2
Propane	5,907	0.644	32.4
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**8,440**	**0.920**	**46.3**
Non-HVAC Components			
Electric	9,787	1.067	53.7
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**9,787**	**1.067**	**53.7**
Grand Total	**18,226**	**1.987**	**100.0**

Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **9173.0** ft²
Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by Energy Source - Base Building

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:29AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	58,820	6.412
Heating Coil Loads	228,751	24.937
Grand Total	**287,570**	**31.350**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	27,282	2.974	97,436	10.622
Natural Gas	0	0.000	0	0.000
Fuel Oil	64,019	6.979	64,019	6.979
Propane	213,874	23.316	213,874	23.316
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**305,175**	**33.269**	**375,329**	**40.917**
Non-HVAC Components				
Electric	190,266	20.742	679,520	74.078
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,266**	**20.742**	**679,520**	**74.078**
Grand Total	**495,440**	**54.011**	**1,054,848**	**114.995**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Energy Budget by System Component - Base Building

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:29AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	58,820	6.412
Heating Coil Loads	228,751	24.937
Grand Total	**287,570**	**31.350**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	2,205	0.240	7,874	0.858
Cooling	18,641	2.032	66,576	7.258
Heating	284,329	30.996	300,879	32.801
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
HVAC Sub-Total	**305,175**	**33.269**	**375,329**	**40.917**
Lights	121,668	13.264	434,530	47.371
Electric Equipment	68,600	7.479	245,001	26.709
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**190,269**	**20.742**	**679,530**	**74.079**
Grand Total	**495,443**	**54.011**	**1,054,859**	**114.996**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **9173.0** ft²
   Conditioned Floor Area ..... **9173.0** ft²

Annual Cost Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:29AM

Table 1. Annual Costs

Component	Base Building ($)
Air System Fans	113
Cooling	959
Heating	7,368
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**8,440**
Lights	6,258
Electric Equipment	3,529
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**18,226**

Table 2. Annual Cost per Unit Floor Area

Component	Base Building ($/ft²)
Air System Fans	0.012
Cooling	0.105
Heating	0.803
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.920**
Lights	0.682
Electric Equipment	0.385
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.987**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	Base Building (%)
Air System Fans	0.6
Cooling	5.3
Heating	40.4
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**46.3**
Lights	34.3
Electric Equipment	19.4
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**53.7**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Lower Alloways DPW - TrueUp
Kitchen and Associates

10/25/2010
11:29AM

Table 1. Annual Costs

Component	Base Building ($)
HVAC Components	
Electric	1,403
Natural Gas	0
Fuel Oil	1,129
Propane	5,907
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**8,440**
Non-HVAC Components	
Electric	9,787
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**9,787**
Grand Total	**18,226**

Table 2. Annual Energy Consumption

Component	Base Building
HVAC Components	
Electric (kWh)	7,996
Natural Gas (na)	0
Fuel Oil (gal)	461
Propane (gal)	2,335
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	55,764
Natural Gas (na)	0
Fuel Oil (gal)	0
Propane (gal)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	63,760
Natural Gas (na)	0
Fuel Oil (gal)	461
Propane (gal)	2,335
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	Base Building
CO2 Equivalent (lb)	137,640

Table 4. Annual Cost per Unit Floor Area

Component	Base Building ($/ft²)
HVAC Components	
Electric	0.153
Natural Gas	0.000
Fuel Oil	0.123
Propane	0.644
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.920**
Non-HVAC Components	
Electric	1.067
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**1.067**
Grand Total	**1.987**
Gross Floor Area (ft²)	9173.0
Conditioned Floor Area (ft²)	9173.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 5. Component Cost as a Percentage of Total Cost

Component	Base Building (%)
HVAC Components	
Electric	7.7
Natural Gas	0.0
Fuel Oil	6.2
Propane	32.4
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**46.3**
Non-HVAC Components	
Electric	53.7
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**53.7**
Grand Total	**100.0**

APPENDIX M

Photovoltaic (PV) Rooftop Solar Power Generation

PVWatts * * * AC Energy & Cost Savings

Cautions for Interpreting the Results

Lower Alloways Township, 17 kW System

Station Identification	
City:	Wilmington
State:	Delaware
Latitude:	39.67° N
Longitude:	75.60° W
Elevation:	24 m
PV System Specifications	
DC Rating:	17.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	13.1 kW
Array Type:	Fixed Tilt
Array Tilt:	39.7°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	17.5 ¢/kWh

Results			
Month	Solar Radiation (kWh/m^2/day)	AC Energy (kWh)	Energy Value ($)
1	3.48	1461	256.41
2	4.46	1675	293.96
3	4.78	1915	336.08
4	5.13	1928	338.36
5	5.34	1954	342.93
6	5.73	2011	352.93
7	5.57	1988	348.89
8	5.70	2062	361.88
9	5.02	1787	313.62
10	4.71	1808	317.30
11	3.50	1347	236.40
12	2.88	1146	201.12
Year	4.69	21080	3699.54

Output Hourly Performance Data * Output Results as Text

About the Hourly Performance Data | Saving Text from a Browser

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

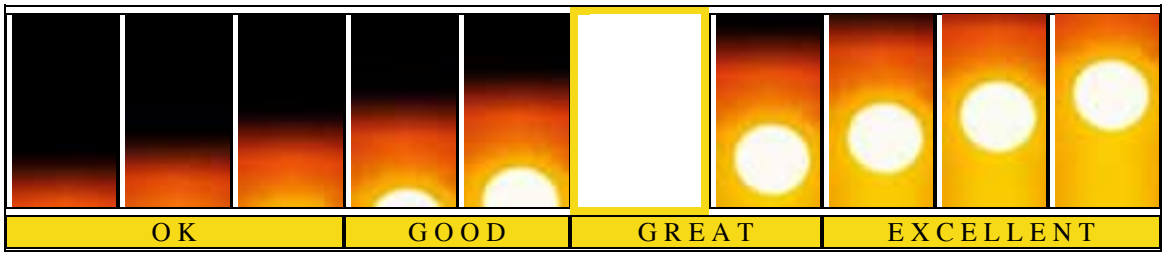
Please send questions and comments regarding PVWATTS to Webmaster

Disclaimer and copyright notice

Return to RReDC home page (http://rredc.nrel.gov)

Your Solar Electric Estimate

YOUR SOLAR RATING



The solar rating of your area is **Great** for adopting a solar system. (4.63 kWh/m^2 per day).
You may want to change some of the information to better match your situation.

Customize Your Assumptions

Price Installed $ 8 per watt DC.

Provide 36 % of my electricity, on average, over the course of a year.

Electric Rate: $	0.1755/kWh More
Monthly Electric Usage:	4,930 kWh/Month More
Utility Annual Inflation Rate:	3.78%
Utility Savings Method:	Net Metering (common)
Federal ITC Based Upon:	Gross Cost
Federal Income Tax Rate:	28%
State Income Tax Rate:	7.8% (Low: 1.40% - High: 8.97%) help

Loan Modeling: Borrow 0 % of $84,147 estimated cost
at 6.5 % interest (apr) re-paid over 30 years

---

f you agree **this is a smart investment**, we encourage ou to work with a Professional to help you install your very own system.

http://www.solar-estimate.org/index.php?page=solar-installer&subpage=show&wantsolar=1&zipcode=08038

Click on the buttons to learn about our assumptions and other important information used to generate your estimate. Also, please review the notes below.

Help us improve. We rely on feedback from our users to help keep our service accurate and useful:
› Send us your Feedback

Your Solar Electric Estimate by the Numbers

Building Type:	Commercial/Business
State & County:	NJ - Salem
Utility:	Atlantic City Electric Co

Utility Type:	Investor-Owned Utility
Your Average Monthly Electricity Bill: (Assumed rate x average monthly useage)	$ 865 / Month
Tiered Rates Apply:	No
Time-of-Use Metering Offered:	No
Net-Metering Available:	Yes - See Notes, below!

FIND...

More

ESTIMATED SYSTEM SIZE

The system size best for your situation will vary based upon product, building, geographic and other variables. We encourage you to work with a Solar Pro who can better estimate the system size best for your situation. We estimate your building will need a system sized between 13.88 kW and 20.82 kW of peak power. This estimate assumes the mid-point of this range.

Solar Rating:	**Good** 4.63 kWh/sq-m/day
Solar System Capacity Required:	17.35 kW of peak power (DC watts)
Roof Area Needed:	1,735 sq-ft
Equivalent Annual Production:	21,301 kWh electricity

More

More

More

ESTIMATED SYSTEM COST

FIND...

This is only an estimate based upon many assumptions. Installation costs can vary considerably. We encourage you to work with a Solar Pro who can provide you with a more detailed cost estimate. We estimate that a 17 kW peak DC power system will cost between $111,040 and $166,560. This estimate assumes the mid-point of this cost range.

Assumed Installation Gross Cost: "Gross Cost" is the cost before any rebates, incentives, tax credits, etc. are applied. See the Cost Notes, below!	**$138,800** assuming $8 per watt DC

More

FINANCIAL INCENTIVES

Financial incentives shown are totals across all years. So, if an incentive spans multiple years then the value shown is the total of all years. For details, please refer to the table below "Cash Flow by Year and Cumulative Across Years"

NJ: Solar Renewable Energy Certificates (SREC) » link	$ 164,063
NJ Solar Electric (PV) Incentive (Non-residential $ 0.75 per watt. 50 kW max size) » link	$ 13,013

Federal Tax Credit (30% of Gross Cost at Installation) » link	$ 41,640	
Modified Accelerated Cost Recovery System (MACRS) Depreciation (5 yr) » link	**YES**	More
ESTIMATED NET COST:	**$ -79,916**	More
ESTIMATED NET COST AT INSTALLATION:	**$ 84,147**	More
Cash & Loan Amounts:	$ 84,147 Cash $ 0 Borrowed	
Loan Monthly Payment (6.5% apr, 30 years):	$ 0	

CASH FLOW

Cash Flow Breakeven is where the chart crosses the $0 point - this is when your investment has paid itself back in cash.

The chart above is a summary of the net cash flow you can expect over time. Net Cash Flow is the total cash after all costs (out-flows of cash) are reduced by financial incentives, annual utility savings and tax effects (in-flows of cash).

Average values are used together with your assumed income tax rate (36%). Any property appreciation has not been included, as this is generally not a cash flow (it's an investment). The loan modeled, if any, is included. Because this is a business, we have assumed utility savings result in loss of some expense write offs against income, but Modified Accelerated Cost Recovery System (MACRS) Depreciation applies (an income tax benefit). Because individual tax situations vary, we have not included Federal income tax liabilities that may result from having received non-federal incentives, if any (e.g. state rebate programs) as they are usually not taxed as earned income.

SAVINGS & BENEFITS

First-year Utility Savings:	**$3,738**	More
Average Monthly Utility Savings: *over 25-year expected life of system*	**$523**	More
Average Annual Utility Savings: *over 25-year expected life of system*	**$6,274**	More
25-year Utility Savings:	**$156,847**	More
Return on Investment (ROI):	**241%**	More
Internal Rate of Return (IRR):	**24.8%**	More
Net Present Value (NPV):	**$111,054**	More
Profitability Index:	**2.3**	More
Greenhouse Gas (CO2) Saved: *over 25-year system life*	**437 tons** **874,000 auto miles**	More

Cash Flow by Year and Cumulative Across Years

This cash flow table includes tax effects applied to utility savings and loan interest payments (if any). For commercial (business) situations we assume utility savings result in loss of some expense write offs against income: Utility Savings = ($'s saved on utility bill) x (1 - Income Tax Rate). "Tax Savings from MACRS depreciation" (below) is the net cash saved on income taxes after the depreciation expense is written off. So the amount that was depreciated would be the cash value shown divided by the Income Tax Rate (more

info.). Because individual tax situations vary, we have not included Federal income tax liabilities that may result from having received non-federal incentives, if any (e.g. state rebate programs) as they are usually not taxed as earned income. Any income from your system (e.g. performance-based incentives and "SREC's") may be taxed as income (also not shown).

Year of Operation:	**at Install**	**1**	**2**	**3**	**4**	**5**
Gross Cost	($138,800)					
NJ: Solar Renewable Energy Certificates (SREC)	$0	$13,429	$13,025	$12,633	$12,253	$11,884
NJ Solar Electric (PV) Incentive (Non-residential $ 0.75 per watt. 50 kW max size)	$13,013	$0	$0	$0	$0	$0
Federal Tax Credit (30% of Gross Cost at Installation)	$41,640	$0	$0	$0	$0	$0
Tax savings from MACRS Depreciation	$0	$22,547	$6,013	$3,608	$2,165	$2,165
Utility Savings	$0	$2,490	$2,585	$2,682	$2,784	$2,889
ANNUAL CASH FLOW	$-84,147	$38,466	$21,622	$18,923	$17,201	$16,937
Cumulative Cash Flow	$-84,147	$-45,681	$-24,059	$-5,136	$**12,065** **Breakeven**	$29,002

Year of Operation:	**6**	**7**	**8**	**9**	**10**	**11**
Gross Cost						
NJ: Solar Renewable Energy Certificates (SREC)	$11,526	$11,179	$10,843	$10,516	$10,200	$9,893
NJ Solar Electric (PV) Incentive (Non-residential $ 0.75 per watt. 50 kW max size)	$0	$0	$0	$0	$0	$0
Federal Tax Credit (30% of Gross Cost at Installation)	$0	$0	$0	$0	$0	$0
Tax savings from MACRS Depreciation	$2,165	$0	$0	$0	$0	$0
Utility Savings	$2,998	$3,111	$3,229	$3,351	$3,478	$3,609
ANNUAL CASH FLOW	$15,606	$14,290	$14,072	$13,867	$13,678	$13,502
Cumulative Cash Flow	$44,608	$58,898	$72,970	$86,837	$100,515	$114,017

Year of Operation:	**12**	**13**	**14**	**15**	**16**	**17**
Gross Cost				($15,615) Inverter Replaced		
NJ: Solar Renewable Energy Certificates (SREC)	$9,595	$9,306	$9,026	$8,755	$0	$0
NJ Solar Electric (PV) Incentive (Non-residential $ 0.75 per watt. 50 kW max size)	$0	$0	$0	$0	$0	$0
Federal Tax Credit (30% of Gross Cost at Installation)	$0	$0	$0	$0	$0	$0
Tax savings from MACRS	$0	$0	$0	$0	$0	$0

Depreciation						
Utility Savings	$3,746	$3,887	$4,034	$4,187	$4,345	$4,509
ANNUAL CASH FLOW	$13,341	$13,193	$13,060	$-2,673	$4,345	$4,509
Cumulative Cash Flow	$127,358	$140,551	$153,611	$150,938	$155,283	$159,792

Year of Operation:	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Gross Cost								
NJ: Solar Renewable Energy Certificates (SREC)	$0	$0	$0	$0	$0	$0	$0	$0
NJ Solar Electric (PV) Incentive (Non-residential $ 0.75 per watt. 50 kW max size)	$0	$0	$0	$0	$0	$0	$0	$0
Federal Tax Credit (30% of Gross Cost at Installation)	$0	$0	$0	$0	$0	$0	$0	$0
Tax savings from MACRS Depreciation	$0	$0	$0	$0	$0	$0	$0	$0
Utility Savings	$4,680	$4,856	$5,040	$5,231	$5,428	$5,633	$5,846	$6,067
ANNUAL CASH FLOW	$4,680	$4,856	$5,040	$5,231	$5,428	$5,633	$5,846	$6,067
Cumulative Cash Flow	$164,472	$169,328	$174,368	$179,599	$185,027	$190,660	$196,506	$202,573

FAQ's: Frequently Asked Questions for NJ:

- Are renewable energy systems exempt from sales tax in New Jersey?
- Can I sell Solar Renewable Energy Certificates (SREC) in New Jersey?
- Where can I find more information about New Jersey Renewable energy programs and incentives?

Notes & Assumptions: Solar Electric (PV) Systems

* HOW TO REDUCE THE SYSTEM SIZE NEEDED & INCREASE SAVINGS

The estimate provided above assumes "base" electric rates apply. Other taxes and surcharges may be applied to your utility bill. We suggest you review a recent utility bill and change the "Assumed Electric Rate", above, as needed to better match your situation.

You may have other metered-rate options with your utility. Options such as Tiered billing rates, Time-Of-Use (TOU) metering, and Net-Metering, if available, can help reduce the system size you need to provide a "net-zero" energy bill. Sometimes people also reduce the size of their solar system to accommodate planned improvements in their building's energy efficiency, or to match a budget and/or the available space for installing a solar system.

Energy production from a solar electric (PV) system is a function of several factors, including the following. Our assumptions are:

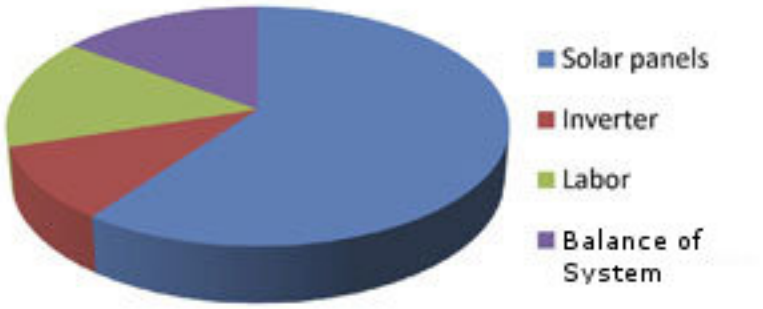
Factor	Assumption
Solar resources	Assumed solar availability: As per Solar Radiance chart
Soiling or contamination of the PV panels	Clean, washed frequently: 100% design sunlight transmission
Temperature	25C, calm wind
System configuration (battery or non-battery)	Non-battery
Orientation to the sun	tilted at your latitude, full sun
Shading	None
PV Energy delivered as % of manufacturer's rating	95%
Soiling, wiring & power point tracking losses	9% (91% delivered)
Inverter Efficiency	90%
Total Energy Delivered	95% x 91% x 90% = 78%

Energy Efficiency: Improving your building's energy efficiency will reduce the system size you need to attain a "net-zero" energy bill.
Tiered Rates: Often people are paying a "Tiered" rate for their electricity. This is a higher rate (higher than the "Base" rate) for electricity charged when a home or building uses more that a "Base" amount allocated for the building. Installing a solar system will reduce your electrical demand from the utility. This can result in a lower utility rate because you stay within the "Base" rate level. In this case, the more expensive "Tiered" rate electricity is eliminated, reducing your average electricity rate.
TOU Metering: Many utilities offer Time-of-Use (TOU) meters. This allows the price of electricity to vary by time of day (called "Peak" or "Off-Peak" periods) and by season (usually "Winter" versus "Summer" rates). If TOU metering is offered by your utility, a solar system may result in additional savings. This is because peak (more expensive electricity) rates often occur during the daytime. This is usually when a solar system is producing the most output, thus reducing your demand for peak-rate electricity from the utility.
Most utilities do charge for the purchase and installation of a time-of-use meter (normally a few hundred dollars). We have assumed the cost for this is part of the "Estimated Installation cost" shown above.
Net-Metering: With Net-Metering, surplus electricity generated by your renewable energy system will be credited back to your utility account. So if your solar system makes more electricity than you are using, the "meter spins backwards". You are not actually "selling" electricity, since in most states the utility will not reimburse you for excess electricity. But, if your utility offers "Net-Metering" you may be able to get credit for electricity provided back to the grid during peak periods. Combined with TOU metering, Net-Metering can result in multiplied savings since your electricity account may be gaining electricity credits during the time of peak utility rates -- Think of a hot, sunny summer day ... your solar system is producing power, spinning your electric meter backwards, and supplying the grid with electricity to run other people's air conditioners -- you're "spinning back" cost at peak rates! That's the savings power of Net-metering, combined with TOU rates.
Solar Power "Fixes" Energy Costs: The cost of sunshine is free. While the sun rises every morning, the cost of sunshine does not. Utility rates, on the other hand, tend to rise steadily in cost. So, the value of your savings from a solar system are likely to increase as time goes on. If you are on a fixed income (e.g. nearing or in retirement) this may be of particular interest to you.

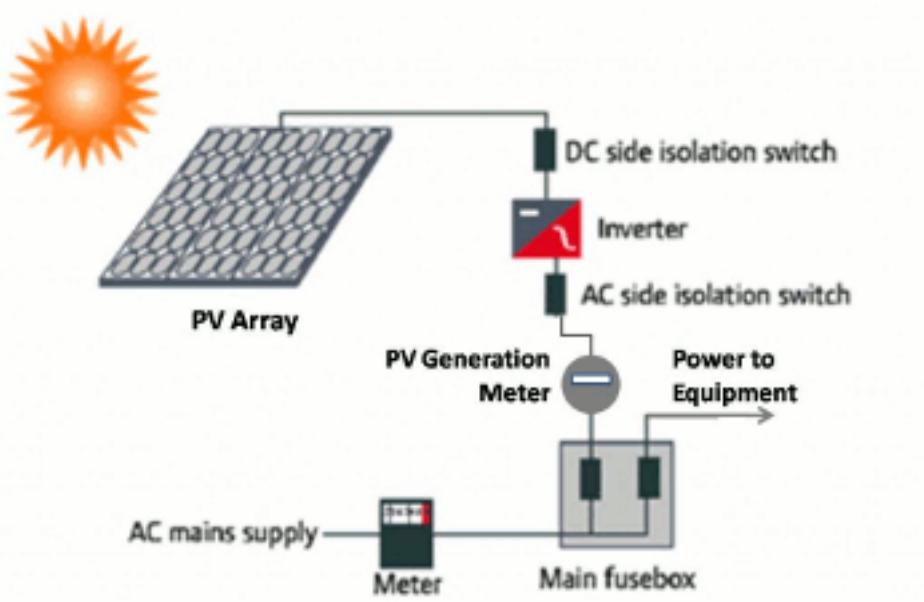
THE COST TO GO SOLAR

This is only an estimate based upon many assumptions and limited data entered by you: Installation costs can vary considerably. The cost to purchase and install a complete grid-tied solar photovoltaic (PV) system on a residential home is typically as further defined in the table, below. This includes the PV array, inverter and associated balance of system costs. It does not include the cost of options you may select, such as battery backup power storage, or the costs of building preparation work, like new shingles. Costs can also be higher if you add other features or have special installation needs (such as application over tile roofing) or you choose to use special mounting systems (such as sun tracking systems). Other factors may also affect price, including, but not limited to, your location, the building condition, type and location, its wiring, and warrantees offered.

	Assumed Cost, per Watt DC	
Item	**System Size < 2kW**	**System Size ≥ 2kW**
Assumed Total	$9 per watt DC (+/- 20%)	$8 per watt DC (+/- 20%)



About 60% of the cost to install a solar-electric (PV) system goes to the solar photovoltaic (PV) panels, 10% to an inverter, 15% to direct labor, and 15% to the "balance of system" (BOS) costs.



OTHER ASSUMPTIONS

This summary is based upon many assumptions and the limited data you entered. An actual site assessment by a qualified solar system retailer or contractor will be needed to determine the actual costs and benefits of installing a solar electric system.

HELPFUL PDF's & Links	
	Report on Solar-Estimate.org Estimator: Comparisons, Methods & Assumptions
	Payback & Other Financial Test for Solar on Your Home

The Dept. of Energy's: **PVWatts Online PV Calculator**

Natural Resources Canada's: **RETScreen Renewable Energy Calculators**

A Free Public Service of the Solar & Wind Communities since 2000

contractorcheck.com℠

Contractor verification assisted by **» ContractorCheck.com**

Pre-Screened SOLAR PRO

Pre-screened, Customer-recommended Solar Pros
See: **» How it Works**

Your privacy is important. We will not release or disclose your personal information to others without your permission. Privacy Policy

SOLAR-ESTIMATE.ORG is a free, public service. We believe the efficient use of energy and renewable energy systems makes for comfortable living and a more secure future. So we want to help you reduce your energy demands, increase your energy efficiency and help you utilize more energy from renewable energy systems and sources -- like solar electric (PV - photovoltaics), solar space (air), water & pool heating, wind turbines, biomass furnaces and ground-source heat pumps. Our mission is to serve as a convenient, user-friendly means for home and small commercial building owners to make preliminary evaluations of renewable and solar energy options for their location, run financial analysis and help find and verify the experience, quality and business status of certified solar contractors, and other professionals who can design, install and service renewable and solar energy and energy efficient power systems. (See How It Works). As a business verification service, we maintain the largest directory of current local solar installer and solar contractor profiles including extensive customer reviews and ratings of these professionals. Profiles are not limited to solar energy professionals, but include many other renewable energy, design, engineering and support professional services. We also serve as a consolidator of national and region-specific solar and energy efficiency programs, and utility information about renewable energy, solar energy and energy efficient measures. Our software tools and content include: Online solar estimator (solar calculator, analysis) to help you determine the costs and benefits of a renewable or solar energy system for your particular location and building needs, including financial analysis tools. We also provide a trusted means by which you, as a consumer, can review and access solar panel installers, solar contractors, solar pros and other solar, renewable energy and energy efficiency professional services. And we offer answers to frequently asked questions about renewable and solar power, links and resources to current information about solar power, solar energy, renewable energy, energy bill savings, energy efficiency data, solar incentives, tax credits, rebates and other programs and helpful information so you can learn about solar energy, help us promote renewable and solar power adoption and, hopefully, install a solar system for your home, building, company or community and/or improve your energy efficiency and use. **Site Map**

© 2000 - 2010 Energy Matters LLC. This is copyrighted content and includes company trademarks. Use of content or trademarks without prior written consent is strictly prohibited. U.S. and International patents pending. **Terms & Conditions of Use**

A solar-powered site and service of Energy Matters LLC.

APPENDIX N

Solar Thermal Domestic Hot Water Plant

RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

Interactive Energy Calculators

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

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

Solar Water Heating Calculator

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

Water Heater Characteristics			
Physical		**Thermal**	
? Diameter (feet)	1.5	? Water Inlet Temperature (Degrees F)	50
? Capacity (gallons)	15	? Ambient Temperature (Degrees F)	70
? Surface Area (calculated - sq ft)	8.882	? Hot Water Temperature (Degrees F)	120
? Effective R-value	6	? Hot Water Usage (Gallons per Day)	10
Energy Use			
239.5		? Heat Delivered in Hot Water (BTU/hr)	
74.02		? Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		**Electric**
0	? Overall Efficiency	0.7486
0	? Conversion Efficiency	0.98
NaN BTU/hr	? Power Into Water Heater	319.9 BTU/hr
Cost		
$ 0.40 /Therm	? Utility Rates	$ 0.1755 /kWh
$ NaN	? Yearly Water Heating Cost	$ 144.038
How Does Solar Compare?		
? Solar Water Heater Cost: $ 9300		? Percentage Solar: 70
NaN years for gas	? Payback Time for Solar System	92.2374 years for electric

More information on solar water heating:

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

Return to Top of Page

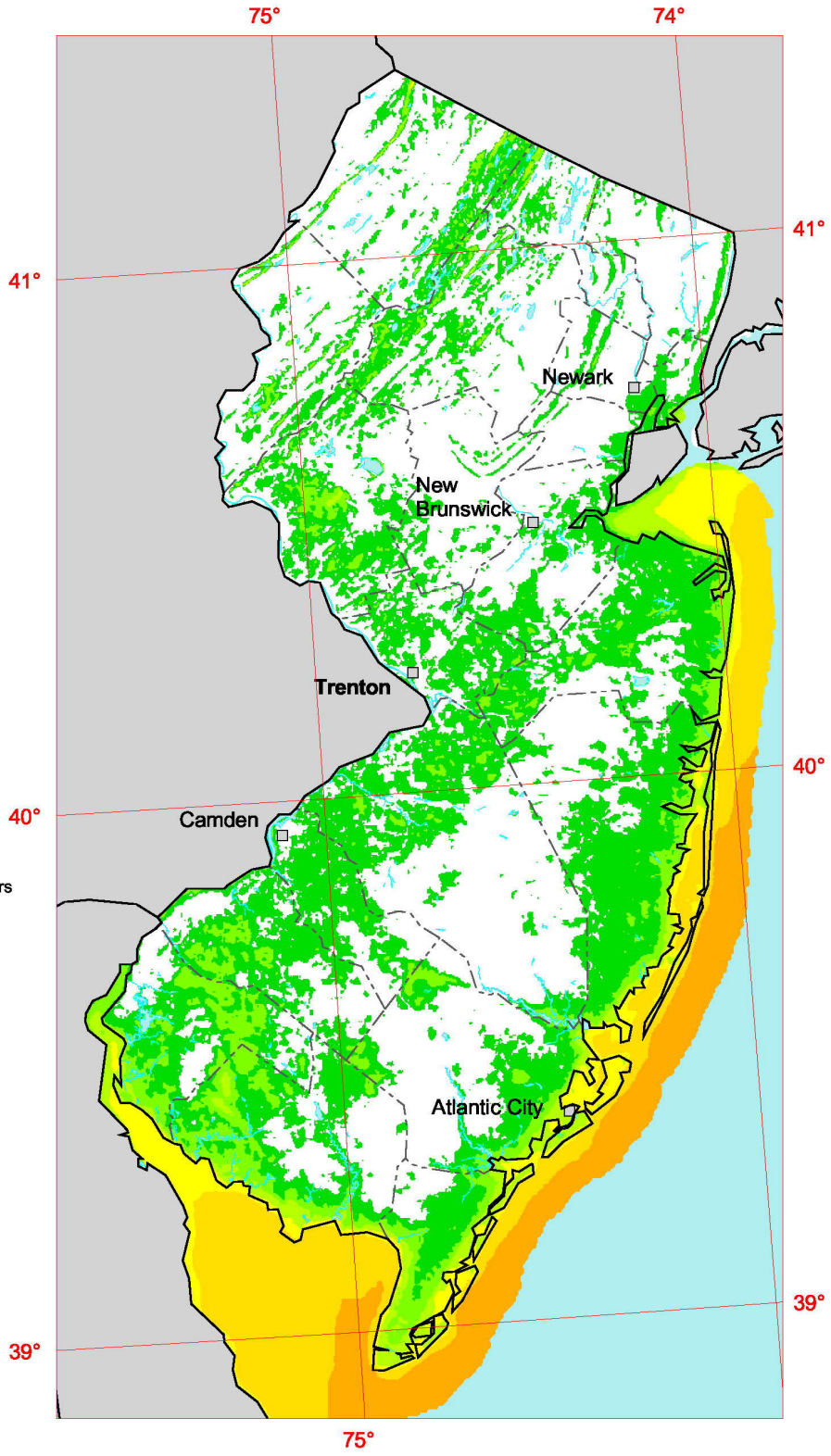
APPENDIX O

Wind

New Jersey

30 m Wind Speed Map

The annual wind speed estimates for this map were produced by TrueWind Solutions using their Mesomap system and historical weather data. It has been validated with available surface data by NREL and wind energy meteorological consultants.



15 0 15 30 45 Kilometers

10 0 10 20 30 Miles

Wind Speed at 30 Meters
m/s

- < 4.5
- 4.5 - 5.0
- 5.0 - 5.5
- 5.5 - 6.0
- 6.0 - 6.5
- 6.5 - 7.0
- 7.0 - 7.5
- 7.5 - 8.0
- 8.0 - 8.5
- > 8.5

U.S. Department of Energy
National Renewable Energy Laboratory

NREL

10-JAN-2003 1.1.8

APPENDIX P

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Lower Alloways Township DPW Garage

Building ID: 2482882
For 12-month Period Ending: July 31, 2010[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: October 25, 2010

Facility
Lower Alloways Township DPW Garage
Harmersville Rd
Salem, NJ 08079

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1974
Gross Floor Area (ft²): 7,408

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	201,182
Fuel Oil (No. 2) (kBtu)	62,319
Liquid Propane (kBtu)	252,369
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	515,870

Energy Intensity[5]

Site (kBtu/ft²/yr)	70
Source (kBtu/ft²/yr)	134

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	51

Electric Distribution Utility
Pepco - Atlantic City Electric Co

National Average Comparison

National Average Site EUI	77
National Average Source EUI	150
% Difference from National Average Source EUI	-11%
Building Type	Service (Vehicle Repair/Service, Postal Service)

Stamp of Certifying Professional

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

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.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, Licensed Professional facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) or a Registered Architect (RA) 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 or RA 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	Lower Alloways Township DPW Garage	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Service (Vehicle Repair/Service, Postal Service)	Is this an accurate description of the space in question?		☐
Location	Harmersville Rd, Salem, NJ 08079	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		☐
Offices (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	1,784 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	40 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	4	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 5.3 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	2	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐
Garage (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑

Gross Floor Area	5,624 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	1(Optional)	Is this the number of personal computers in the space?		
Weekly operating hours	40Hours(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	4(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: Pepco - Atlantic City Electric Co

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
06/15/2010	07/14/2010	5,750.00
05/14/2010	06/14/2010	3,964.00
04/15/2010	05/13/2010	2,846.00
03/16/2010	04/14/2010	3,629.00
02/12/2010	03/15/2010	9,651.00
01/16/2010	02/11/2010	6,442.00
12/15/2009	01/15/2010	8,596.00
11/13/2009	12/14/2009	3,996.00
10/15/2009	11/12/2009	2,547.00
09/15/2009	10/14/2009	3,162.00
08/13/2009	09/14/2009	3,392.00

Electric Consumption (kWh (thousand Watt-hours))	**53,975.00**
Electric Consumption (kBtu (thousand Btu))	**184,162.70**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))	**184,162.70**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?	☐

Fuel Type: Fuel Oil (No. 2)

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

Start Date	End Date	Energy Use (Gallons)
06/12/2010	07/11/2010	0.00
05/12/2010	06/11/2010	0.00
04/12/2010	05/11/2010	0.00
03/12/2010	04/11/2010	0.00
02/12/2010	03/11/2010	0.00
01/12/2010	02/11/2010	0.00
12/12/2009	01/11/2010	0.00
11/12/2009	12/11/2009	0.00
10/12/2009	11/11/2009	0.00
09/12/2009	10/11/2009	435.80
08/12/2009	09/11/2009	0.00

Fuel Oil Consumption (Gallons)	**435.80**
Fuel Oil Consumption (kBtu (thousand Btu))	**60,441.32**
Total Fuel Oil (No. 2) Consumption (kBtu (thousand Btu))	**60,441.32**
Is this the total Fuel Oil (No. 2) consumption at this building including all Fuel Oil (No. 2) meters?	☐

Fuel Type: Liquid Propane

Meter: Propane (Gallons)
Space(s): Entire Facility

Start Date	End Date	Energy Use (Gallons)
06/04/2010	07/03/2010	0.00
05/19/2010	06/03/2010	0.00
03/27/2010	05/18/2010	138.10
03/10/2010	03/26/2010	180.30
02/25/2010	03/09/2010	291.40
01/15/2010	02/24/2010	539.70
12/31/2009	01/14/2010	358.70
12/05/2009	12/30/2009	672.60
10/29/2009	12/04/2009	287.20
09/04/2009	10/28/2009	202.70
08/12/2009	09/03/2009	0.00

Propane Consumption (Gallons)	**2,670.70**
Propane Consumption (kBtu (thousand Btu))	**244,763.25**
Total Liquid Propane Consumption (kBtu (thousand Btu))	**244,763.25**
Is this the total Liquid Propane consumption at this building including all Liquid Propane meters?	☐

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

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Lower Alloways Township DPW Garage
Harmersville Rd
Salem, NJ 08079

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Lower Alloways Township DPW Garage	
Gross Floor Area Excluding Parking: (ft^2)	7,408
Year Built	1974
For 12-month Evaluation Period Ending Date:	July 31, 2010

Facility Space Use Summary

Offices	
Space Type	Office
Gross Floor Area(ft^2)	1,784
Weekly operating hours	40
Workers on Main Shift	4
Number of PCs	2
Percent Cooled	50% or more
Percent Heated	50% or more

Garage	
Space Type	Other - Service (Vehicle Repair/Service, Postal Service)
Gross Floor Area(ft^2)	5,624
Number of PCs°	1
Weekly operating hours°	40
Workers on Main Shift°	4

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 07/31/2010)	**Baseline** (Ending Date 07/31/2010)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	70	70	32	N/A	77
Source (kBtu/ft^2)	134	134	62	N/A	150
Energy Cost					
$/year	$ 18,632.69	$ 18,632.69	$ 8,642.10	N/A	$ 20,601.91
$/$ft^2$/year	$ 2.52	$ 2.52	$ 1.17	N/A	$ 2.79
Greenhouse Gas Emissions					
$MtCO_2e$/year	51	51	24	N/A	56
$kgCO_2e/ft^2$/year	7	7	3	N/A	8

More than 50% of your building is defined as Service (Vehicle Repair/Service, Postal Service). This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for Service (Vehicle Repair/Service, Postal Service). This building uses X% less energy per square foot than the CBECS national average for Service (Vehicle Repair/Service, Postal Service).

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

APPENDIX Q

Site Aerial Image

Arms Rd
© GlobeXplorer © 2010 Navteq © 2010 Microsoft
bing