TOWNSHIP OF ANDOVER
NEWTON, NJ
ANDOVER TOWNSHIP HILLSIDE HOUSE
ENERGY ASSESSMENT

for

NEW JERSEY
BUREAU OF PUBLIC UTILITIES

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CHA PROJECT NO. 20997

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APPENDICES

1.0 INTRODUCTION & BACKGROUND

This report summarizes the energy audit performed at the Andover Township Hillside House, in the Township of Andover located on Lake Iliff Road in Andover, NJ. The recently renovated building is a 2,740 square foot, two-story structure with a basement and attic. The building houses a general gathering area, kitchenette, unisex restroom, storage areas, public restrooms, and auxiliary 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 Andover Township Hillside House.

2.0 EXECUTIVE SUMMARY

This report details the results of the energy audit performed at the Andover Township Hillside House, in the Township of Andover located on Lake Iliff Road in Andover, NJ. The 2,740 square foot structure houses a general gathering area, kitchenette, unisex restroom, storage areas, and public restrooms. The first floor has a partial second floor with three unfinished rooms and a partial third floor with one unfinished room. The partial basement houses mechanical and electrical equipment.

The following areas were evaluated for energy conservation measures:

- Lighting fixture modifications
- Lighting control modifications with occupancy sensors
- Install attic insulation
- Replacing HVAC equipment with energy efficient units

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Measures that 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 $1,610 for the recommended ECMs may be realized with a payback of 2.7 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 Lighting Fixture Modifications

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,110	-	3,500	0	660	10	210	1.7	1.4

* 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.

ECM-2 Lighting Control Modifications (With Lighting Changes Proposed in ECM-1)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
280	0	2,600	0	500	25.8	60	0.6	0.4

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

ECM-3 Insulate the Attic Space

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
2,900	0	200	190	450	1.3	0	6.4	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 Newton, NJ, Andover Township Hillside House, in the Township of Andover, is a 2,740 square foot structure with partial second and third floors and a partial basement. It appears to have been constructed in the 1930s when the Hillside Barn was constructed. In 1981 the police department occupied the building until 2003 when the new police facility was opened across Newton-Sparta Avenue. After which the building was renovated as a recreational-rental facility. The building houses a general gathering area, kitchenette, unisex restroom, storage areas, public restrooms, and auxiliary spaces.

Andover Township's Hillside House is a facility where scheduled township events and classes occur, as well as a rental space for township residents and non-residents. As such, the building is host to scheduled classes, including: twenty four sessions of YMCA programs which are three hours each, fifty six evening yoga classes which are two hours each, and scrapbooking twice a month which is 3 hours per session. In 2009 the building was rented a total of seven times at 6 hours per rental. Attached to the Hillside House is a storage room and public restrooms. The restrooms are open throughout the year for public use.

With the recent renovations the building shell was modified with new exterior siding on sheathing attached to the existing building's wood framing system with insulation and painted gypsum wall board on the interior. The windows were replaced with insulated glass, double hung or fixed vinyl clad wood. The entry doors were replaced with insulated vinyl clad wood doors with vision glass. The roof was reshingled. Insulation within the attic and knee wall space has deteriorated and should be replaced. The building shell is in good condition; the windows and doors all have good weather stripping.

3.2 Utility Usage

Utilities include electricity, propane, and potable water. Electricity is purchased from Jersey Central Power & Light Company (JCP&L), Finch Fuel Oil Co. Inc. delivers fuel oil, and potable water is provided by an on-site well.

During the period of December 2008 to November 2009, electric usage was approximately 13,500 kWh at a total cost of about $2,600. Review of electricity bills during this period determined the building was charged a supply unit cost of $0.19 per kWh. There is no charge for demand to this facility. Electricity usage was highest is the winter months.

Over the course of 2009, the building heat produced by fuel oil-fired equipment required approximately 380 gallons of fuel oil. A fuel oil delivery occurred in January 2009 to fill the storage tank. The next delivery occurred in February 2010 and replenished the fuel oil consumed over 2009. Based on the February 2010 invoice, the cost of the fuel oil was $810 or $2.13 per gallon. Fuel oil consumption is highest in the winter months to produce building heat. Fuel oil delivery occurs once each heating season. Utility data can be found in Appendix A.

Electricity supply and delivery is presently purchased from JCP&L. 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 energy commodity suppliers can be found in Appendix A.

3.3 HVAC Systems

Heating is provided to the building by a Lennox, fuel oil-fired furnace with an AFUE of 81%. Cooling is provided by a Lennox, 3 ½ ton condensing unit, located outside the building. Additional heat is provided in the unisex bathroom by a 3 ft. electric baseboard heater and in the public restrooms by two Broan electric wall heaters. Operable windows and infiltration provide ventilation.

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

Equipment	Cooling Tons	Heating MBH Input/Output	Area Served
Furnace with Cooling Coil	3.5	105 / 85	Entire Building, Less Restrooms
3' Electric Baseboard	-	5 / 5 (1.5 kW)	Unisex Restroom
(2) Electric Wall Heaters	-	5 / 5 (1.5 kW)	Public Restrooms

There are 2 combination exhaust fans/lights located in the public restrooms.

The furnace appears to have been replaced in 2004, the condensing unit in 1996, and the electric heat at the time of the recent renovation. The service life of this equipment is estimated at 15 years. A list of HVAC equipment can be found in Appendix B.

3.4 Lighting/Electrical Systems

The majority of lighting fixtures throughout the facility utilizes incandescent A-lamps and flood lights. Fluorescent fixtures all utilize T-12 lamps. All exit signs within the building use LED.

Exterior building lighting, located on each side of the building, includes mercury vapor fixtures and a metal halide fixture. Accent lighting at the main entry is an A-lamp in a decorative fixture.

The kitchenette area contains a microwave oven.

There is no emergency power supply to this building.

3.5 Control Systems

3.5.1 HVAC Controls

A wall-mounted, analog, dial-type thermostat controls the furnace and cooling coil system. A wall-mounted, analog, dial-type thermostat also controls the electric baseboard heat in the unisex bathroom. Internal thermostats control each of the electric wall heaters in the public restrooms.

Following are the existing occupied and unoccupied heating and cooling setpoints for each heating and/or cooling system:

Equipment	Heating Occ/Unocc	Cooling Occ/Unocc
Furnace with Cooling Coil	70°F / 65°F	75°F / 80°F
3' Electric Baseboard	70°F / 70°F	NA
(2) Electric Wall Heaters	70°F / 70°F	NA

There is currently no programmed schedule for the thermostat to automatically enter occupied or unoccupied mode. Building occupants manually change the system from unoccupied mode when entering and back to unoccupied mode when leaving.

The public restroom exhaust fans are operated via the light switch.

3.5.2 Lighting Controls

Manual wall switches control lighting in the facility. Most exterior lighting is controlled by photocells and with the balance controlled by switches.

3.6 Plumbing Systems

An electric water heater produces domestic hot water for the facility. The water heater is 50 gallons, 4.5 kW, and provides hot water to the lavatories and kitchen sink. The water heater is located in the basement. Plumbing fixtures include 1.6 gallon per flush, tank type water closets; restroom sinks and kitchen sink. All faucets meet the maximum water flow requirements of the adopted plumbing codes.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Lighting Fixture Modifications

The facility has 36 fixtures that utilize A-lamp or flood light incandescent lamps and 12 fixtures that utilize 150-watt halogen lamps; these fixtures are located throughout the entire building. Overall energy consumption can be reduced by utilizing more efficient compact fluorescent lamps. Utilizing compact fluorescent lamps, the wattage per fixture can be reduced by 75%. In addition, there are 7 fluorescent fixtures that utilize T12 lamps. Replacing these fixtures and lamps with ones that utilize T8 lamps will reduce overall energy consumption.

Energy savings for this measure were calculated by applying the existing and proposed fixture wattages to the estimated time of operation. Although some of the T8 replacement fixtures have a payback of more than 10 years, it is recommended that these fixtures be replaced to simplify spare lamp inventory. The difference resulted in an annual savings of 3,500 kWh per year, or $660 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 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 52,500 kWh and $9,900.

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	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,110	-	3,500	0	660	10	210	1.7	1.4

* 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.

4.2 ECM-2 Lighting Control Modifications

Manual wall switches currently control lighting throughout the facility. By equipping certain areas with motion sensors, unoccupied energy use can be greatly reduced. Lights in the main ground floor room will remain on switches so that groups of light can be turned on and off as required. If applied to the existing lighting, this ECM proposes the addition of six wall-mounted occupancy sensors. If applied to the lighting changes proposed in ECM-1 as recommended, this ECM proposes the addition of three wall-mounted occupancy sensors. Recommended areas for occupancy sensors are highlighted in Appendix D.

The weekly occupied times for each space was determined by taking into account typical traffic patterns for the building. Motion sensors are proposed for the following areas: public men's restroom, public women's restroom, and the storage area adjacent to these restrooms. Motion sensors were considered in the unisex restroom and the second floor rooms, but the payback period exceeds 10 years if the proposed lighting in ECM-1 is installed. Applying the existing and proposed operating times to the combined wattage requirements for each room's lighting fixtures, applied to lighting proposed in ECM-1, it was

determined that about 2,600 kWh per year, or $500 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 are estimated at 39,000 kWh and $7,500.

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 (With Existing Lighting)

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
560	0	5,000	0	900	23.1	120	0.6	0.5

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

ECM-2 Lighting Control Modifications (With Lighting Changes Proposed in ECM-1)

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
280	0	2,600	0	500	25.8	60	0.6	0.4

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

This measure is recommended.

4.3 ECM-3 Insulate the Attic Space

Insulation in the attic is badly damaged or missing. 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 condensing unit 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 12” of R-38 batt insulation throughout the attic.

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 applied to the attic space and the energy consumption of the HVAC units was compared to the base building. HAP data for the building with insulation is located in Appendix E. Base building data is located in Appendix L. It was determined that about 200 kWh per year and 190 gallons of fuel oil, or $450 per year, can be saved through implementation of this ECM.

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 3,000 kWh, 2,850 gallons of fuel oil, equaling $6,750.

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 Insulate the Attic Space

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
2,900	0	200	190	450	1.3	0	6.4	NA

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

This measure is recommended.

4.4 ECM-4 Replace Existing Condensing Unit and Cooling Coil with Higher Efficiency Units

The existing condensing unit serving the building is 14 years old, nearing the end of its life expectancy, and has a SEER rating of 10. By replacing the existing unit with a unit that has a SEER rating of 16, the energy consumption of the unit will be reduced by approximately 38%. The analysis of this ECM assumes that the attic insulation proposed in ECM-3 has been installed. This assumption was made because the insulation can be installed immediately and has a quick payback. It is more than likely that implementation of this ECM would occur after the insulation is installed.

Implementation of this ECM requires the removal of the existing condensing unit, cooling coil, capture of the existing refrigerant charge, and removal of the existing line-set. In addition, a new condensing unit, cooling coil, and refrigerant line-set must be installed in place of the removed units. HCFC-22 is in the process of being phased out of use and it is recommended that the facility take the opportunity of the equipment ending its useful life to upgrade to a newer refrigerant.

This ECM was analyzed by modeling both the building and the hours of operation in the Carrier Hourly Analysis Program (HAP). Using this model, the energy use of replacement equipment can be compared to the existing equipment under equal conditions. HAP data for this ECM is located in Appendix F. Building data with insulation installed is located in Appendix L.

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

ECM-4 Replace Existing Condensing Unit and Cooling Coil with Higher Efficiency Units

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
9,700	0	200	0	40	(0.9)	350	>25	>25

* Incentive shown is per the New Jersey Smart Start Program, 2010 Electric Unitary HVAC Application. Incentive is based on the use of 3.5-ton, 16 SEER compressor.

This measure does not meet the required payback. However, it is recommended that installation of a new compressor and cooling coil be considered for overall energy efficiency, because the compressor is nearing the end of its useful life, and the refrigerant HCFC-22 is being phased out of use.

4.5 ECM-5 Replace Existing Furnace, Condensing Unit, and Cooling Coil with Higher Efficiency Units

The existing condensing unit serving the building is 14 years old, nearing the end of its life expectancy, and has a SEER rating of 10. By replacing the existing unit with a unit that has a SEER rating of 16, the energy consumption of the unit will be reduced by approximately 38%. The fuel oil-fired furnace is only 6 years old and has an efficiency of 81%. By replacing the fuel oil-fired furnace with a 95% efficient propane-fired furnace, energy consumption will be reduced. The analysis of this ECM assumes that the attic insulation proposed in ECM-3 has been installed. This assumption was made because the insulation can be installed immediately and has a quick payback. It is more than likely that implementation of this ECM would occur after the insulation is installed.

Implementation of this ECM requires the removal of the existing furnace, condensing unit, cooling coil, filling of fuel oil tank with sand, capture of the existing refrigerant charge, and removal of the existing line-set. In addition, a new furnace, aboveground propane tank, condensing unit, cooling coil, and refrigeration line-set must be installed in place of the removed units. HCFC-22 is in the process of being phased out of use and it is recommended that the facility take the opportunity of the equipment ending its useful life to upgrade to a newer refrigerant.

This ECM was analyzed by modeling both the building and the hours of operation in the Carrier Hourly Analysis Program (HAP). Using this model, the energy use of replacement equipment can be compared to the existing equipment under equal conditions. HAP data for this ECM is located in Appendix G. Building data with insulation installed is located in Appendix L.

The cost of propane used for these calculations is $1.66/gallon. This is the blended cost of propane currently supplied to the Hillside Barn facility that is adjacent to this building.

The implementation cost and savings related to this ECM are located in Appendix G and summarized below:

ECM-5 Replace Existing Furnace, Condensing Unit, and Cooling Coil with Higher Efficiency Units

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Gallons of		Electricity	Total				
$	Fuel Oil	Propane	kWh	$		$	Years	Years
12,300	190	(240)	200	40	(1.0)	350	>25	>25

* Incentive shown is per the New Jersey Smart Start Program, 2010 Electric Unitary HVAC Application. Incentive is based on the use of 3.5-ton, 16 SEER compressor.

The utility savings for fuel oil shown in the table above are in addition to the 190 gallon reduction in ECM-3 for a total of 380 gallons.

This measure does not meet the required payback.

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 $140. 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 not to exceed 50% of the total project cost. The building is projected to save about 6,300 kWh, which amounts to about $1,100 in incentives. This incentive from the P4P program would reduce the overall payback of the project from 2.7 years to 2.0 years.

5.2.2 New Jersey Smart Start Program

The Andover Township Hillside House is eligible for incentives from the New Jersey Smart Start Program.

The lighting fixture modifications measure is eligible for $210 in savings for the replacement of 7 T12 fixtures with T8 fixtures. The lighting control modifications measure is also eligible for $60 in savings for the installation of three wall mounted occupancy sensors. Combined, these incentives total $270.

5.2.3 Energy Efficient and Conservation Block Grant

The Andover Township Police Department 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 Hillside House, it was determined that the building pays for the societal benefits charge. The Hillside House building 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.

The building primarily uses packaged rooftop units. This existing equipment is not compatible with a geothermal energy source. Therefore, to take advantage of a GHP system, the existing mechanical equipment would have to be completely removed and a low temperature closed loop water source heat pump system would have to be installed to realize the benefit of the consistent temperature of the ground. Significant site work is also required for the installation of the geothermal pipe loop.

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

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 Hillside House building to be analyzed. A fixed tilt array type was utilized to calculate energy production. The PVWATTS solar power generation model is provided in Appendix H. Additionally, further financial analysis was provided by www.solar-estimate.org. The result of this analysis is also located in Appendix H.

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 8.9 kW and a minimum of 4.8 kW over the previous 12 months. The monthly average over the observed 12-month period was 6.8 kW. Because the most frequent monthly demand is approximately 7 kW, a 7 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. 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 H and summarized below:

Photovoltaic (PV) Rooftop Solar Power Generation – 7 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
56,000	0	8,752	0	1,700	1,700	7,000	4,500	>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 Hillside House 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 the 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. An electric water heater presently produces DHW and, therefore, this measure could 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, the Township of Andover 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 I 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	570	0	110	110	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 that converts kinetic energy of the wind into rotary motion to drive a generator that 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 Andover 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. Optimum energy production from turbines is dependant on many variables, most importantly rotor size and consistent wind speed. Small wind turbines generally require winds in the 20 miles per hour range to be most efficient, depending on the rotor size and application. 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 J.

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 facility had a monthly average kW demand of 6.8 kW and a maximum demand of 8.9 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.

Hillside House is considered a low energy consumer per the Portfolio Manager with a Site Energy Usage Index (EUI) of 33 kBTU/ft^2/year. In comparison the national average site EUI is 65 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" and the building is not occupied the majority of the time.

If the recommended measures are implemented, ECM-1, ECM-2, and ECM-3, the facility's EUI will be reduced from 33 kBTU/ft^2/year to 15 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 11/30/2009)	Rating of 75	National Average
Energy Intensity			
Site (kBtu/ft^2)	33	NA	65
Source (kBtu/ft^2)	73	NA	136
Energy Cost			
$/year	$3,206.95	NA	$6,229.88
$/$ft^2$/year	$1.17	NA	$2.27
Greenhouse Gas Emissions			
$MtCO_2e$/year	10	NA	19
$kgCO_2e/ft^2$/year	4	NA	8

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

The user name and password for the facility's EPA Portfolio Manager Account has been provided to Timothy B. Day, CFO/Treasurer for Andover Township.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Newton, NJ, Andover Township Hillside House, in the Township of Andover, New Jersey identified potential ECMs for lighting fixture upgrades, lighting control modifications, and installation of attic insulation. Potential annual savings of $1,610 may be realized for the recommended ECM, with a summary of the costs, savings, and paybacks as follows:

ECM-1 Lighting Fixture Modifications

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,110	-	3,500	0	660	10	210	1.7	1.4

* 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.

ECM-2 Lighting Control Modifications (With Lighting Changes Proposed in ECM-1)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
280	0	2,600	0	500	25.8	60	0.6	0.4

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

ECM-3 Insulate the Attic Space

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Fuel Oil	Total				
$	kW	kWh	Gallons	$		$	Years	Years
2,900	0	200	190	450	1.3	0	6.4	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

Andover Hillside House

CHA Project #20997

Electricity Cost Summary: Meter #G92625775													
Period	Customer Charge	Demand kw	RGGI Recovery Charge	Delivery kWh	Societal Benefits kWh	System Control Charge kWh	Delivery Total	Basic Generation kWh	Non-Utility Generation kWh		Supply Total	Total
December	$ 3.25	$ -		$ 62.43	$ 8.19	$ 0.10	$ 73.97	$ 141.43	$ 21.56		$ 162.99	$ 236.96
January	$ 3.25	$ -		$ 67.19	$ 12.08	$ 0.15	$ 82.67	$ 212.90	$ 31.78		$ 244.68	$ 327.35
February	$ 3.25	$ -		$ 64.84	$ 10.16	$ 0.12	$ 78.37	$ 179.44	$ 26.73		$ 206.17	$ 284.54
March	$ 3.25	$ -		$ 63.80	$ 9.30	$ 0.11	$ 76.46	$ 159.46	$ 24.47		$ 183.93	$ 260.39
April	$ 3.25	$ -		$ 61.73	$ 7.61	$ 0.09	$ 72.68	$ 129.90	$ 20.03		$ 149.93	$ 222.61
May	$ 3.25	$ -	$ 0.04	$ 40.10	$ 4.29	$ 0.05	$ 47.73	$ 73.14	$ 11.28		$ 84.42	$ 132.15
June	$ 3.25	$ -	$ 0.04	$ 43.24	$ 4.29	$ 0.05	$ 50.87	$ 83.87	$ 11.30		$ 95.17	$ 146.04
July	$ 3.25	$ -	$ 0.05	$ 49.67	$ 4.93	$ 0.06	$ 57.96	$ 96.12	$ 12.97		$ 109.09	$ 167.05
August	$ 3.25	$ -	$ 0.05	$ 46.55	$ 4.62	$ 0.06	$ 54.53	$ 90.10	$ 12.16		$ 102.26	$ 156.79
September	$ 3.25	$ -	$ 0.05	$ 49.02	$ 4.87	$ 0.06	$ 57.25	$ 91.35	$ 12.80		$ 104.15	$ 161.40
October	$ 3.25	$ -		$ 55.47	$ 5.86	$ 0.07	$ 64.65	$ 100.27	$ 15.60		$ 115.87	$ 180.52
November	$ 3.25	$ -		$ 65.60	$ 10.57	$ 0.13	$ 79.55	$ 182.53	$ 28.36		$ 210.89	$ 290.44
											$ -	$ -
Totals	$ 39.00	$ -	$ 0.23	$ 669.64	$ 86.77	$ 1.05	$ 796.69	$ 1,540.51	$ 229.04	$ -	$ 1,769.55	$ 2,566.24

JCP&L Rate Schedule "GS Secondary"

BPU ENERGY AUDIT PROGRAM

Andover Hillside House

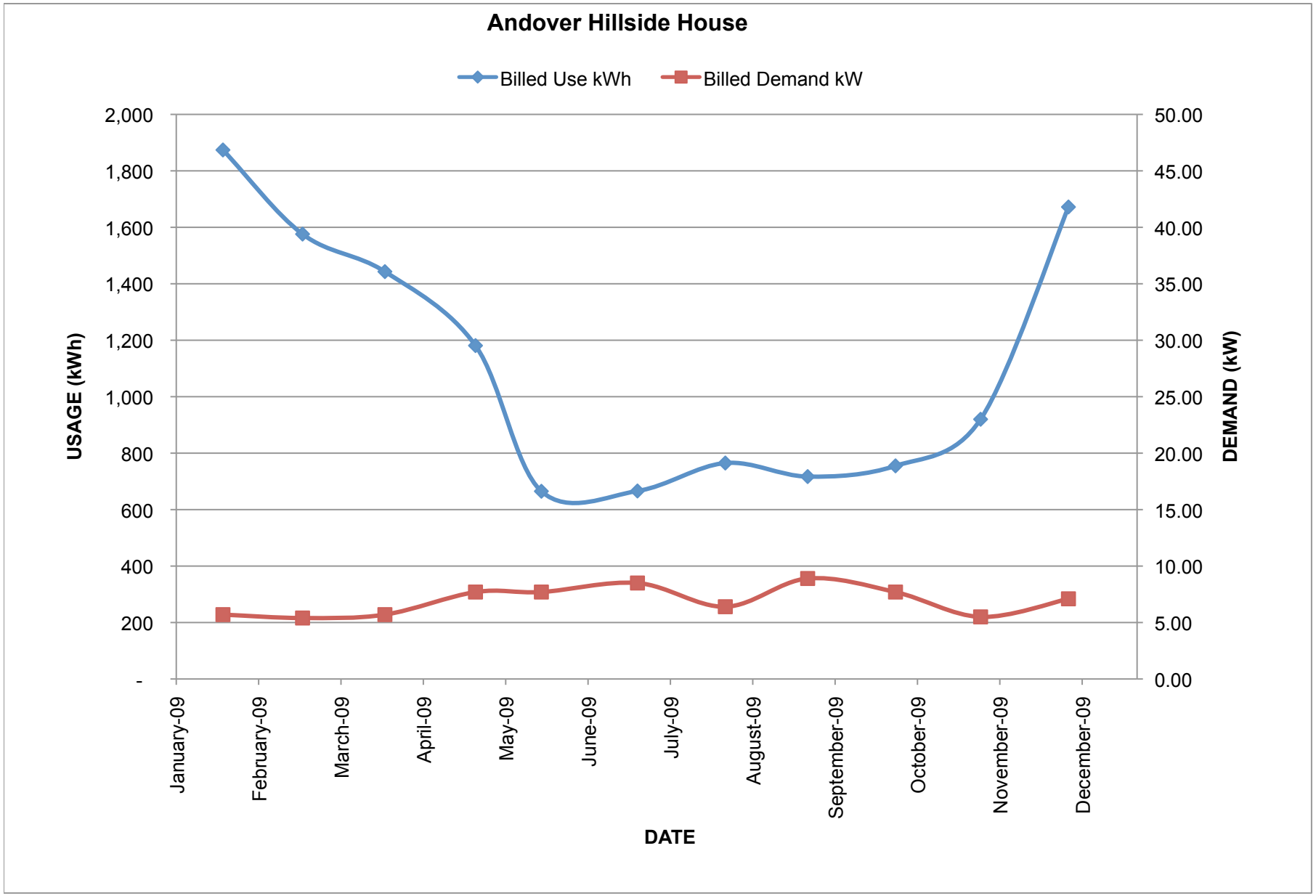
CHA Project #20997

Electricity Cost Summary: Meter #G92625775						
Period	Billed Use kWh	Billed Demand kW	Total Cost $	Demand Unit Cost $/kW	Suppy Unit Cost $/kWh	Blended Cost $/kWh
December-08	1,271	4.80	$ 236.96	$ -	$ 0.18	$ 0.1864
January-09	1,874	5.70	$ 327.35	$ -	$ 0.17	$ 0.1747
February-09	1,576	5.40	$ 284.54	$ -	$ 0.18	$ 0.1805
March-09	1,443	5.70	$ 260.39	$ -	$ 0.18	$ 0.1805
April-09	1,181	7.70	$ 222.61	$ -	$ 0.19	$ 0.1885
May-09	665	7.70	$ 132.15	$ -	$ 0.19	$ 0.1987
June-09	666	8.50	$ 146.04	$ -	$ 0.21	$ 0.2193
July-09	765	6.40	$ 167.05	$ -	$ 0.21	$ 0.2184
August-09	717	8.90	$ 156.79	$ -	$ 0.21	$ 0.2187
September-09	755	7.70	$ 161.40	$ -	$ 0.21	$ 0.2138
October-09	920	5.50	$ 180.52	$ -	$ 0.19	$ 0.1962
November-09	1,672	7.10	$ 290.44	$ -	$ 0.17	$ 0.1737
Totals	13,505	81.10	$ 2,566.24			$ 0.1900
Monthly Ave.	1,125	6.76	$ 213.85	$ -	$ 0.19	
Max. Demand		8.90				

Account Number: 10 00 02 4792 59
Meter Number: G92625775
Rate Schedule: GS Secondary
Utility Company: JCP&L

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.


Andover Hillside House
Billed Use kWh
Billed Demand kW
USAGE (kWh)
DEMAND (kW)
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
-
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
January-09
February-09
March-09
April-09
May-09
June-09
July-09
August-09
September-09
October-09
November-09
December-09
DATE

Licensed Electric Generation Suppliers

(May 2010)

To sell electric generation service in New Jersey, electric power suppliers must be licensed by the New Jersey Board of Public Utilities (NJ BPU). They must also be registered with the local public utility to sell electric generation service in that utility's service area. Below is a list of suppliers who are licensed with the NJ BPU and are registered to sell electric generation service in the Jersey Central Power & Light Company service territory.

Supplier Name	Phone No.
BOC Energy Services	800-247-2644
Champion Energy Services, Inc.	281-653-5090
Commerce Energy, Inc.	800-556-8457
Con Edison Solutions, Inc.	888-686-1383
Constellation NewEnergy, Inc.	888-635-0827
Direct Energy, LLC	800-260-0300
Dominion Retail, Inc.	800-264-4754
FirstEnergy Solutions Corp.	800-977-0500
Gateway Energy Services Corp.	800-313-8333
Glacial Energy	877-569-2841
Hess Corp	800-437-7872
Integrys Energy Services, Inc.	877-763-9977
Liberty Power Holdings, LLC	866-POWER-99
Palmco Power NJ, LLC	877-726-5862
Pepco Energy Services, Inc.	800-ENERGY-9
PP&L EnergyPlus, LLC	800-281-2000
Sempra Energy Solutions	877-2SEMPRA
South Jersey Energy	800-756-3749
GDF Suez Energy Resources NA	888-644-1014
UGI Energy Services	800-427-8545

Contact the supplier directly to verify whether or not new customers are being accepted.

EL OIL CO., INC.
Schuyler Avenue
Kearny, NJ 07032
PHONE: 201-991-2370
FAX: 201-991-7061
finchfuel@yahoo.com.

FUEL INVOICE

Page 1
Date 01/26/09

BILL TO:

ANDOVER TOWNSHIP
134 NEWTON-SPARTA RD.
NEWTON NJ 07860

DELIVER TO:

ANDOVER TWSP. REC. HOUSE
144 LAKE ILIFF ROAD
NEWTON NJ 07860

Customer Number 1802 **Payment Terms**

Date	Reference		Description	Gallons	Price	Amount	Extension
23/09	84079	2	#2 FUEL OIL	506.0	1.5733	796.09	796.09
			FED LUST TAX			0.51	0.51

gone to a computerized system which is time activated.
nts that are PAST DUE are automatically turned over to
ORLD SYSTEMS, INC. An Account Receivable Management Firm.

Invoice Total 796.60

Returned Checks will be charged a $35.00 Fee.

Please return bottom portion of invoice with payment to ensure we apply your payment correctly.
Thank You

0	58.50 - 59.55	54.70 - 55.70	----- - -----
5c	c58.60 - 59.70c	c54.80 - 55.85c	----- - -----
0c	c56.30 - 61.40c	c54.15 - 56.40c	c53.40 - -----
	----- - -----	----- - -----	cn49.65 - -----
	bc58.00 - -----	c55.00 - -----	----- - -----
	c81.05 - 81.66c	----- - -----	----- - -----
	----- - -----	----- - -----	rc52.70 - -----
5c	c55.00 - 56.45c	----- - -----	c55.00 - -----
	----- - -----	----- - -----	fc55.00 - -----
	----- - -----	c56.40 - -----	----- - -----
	c56.30 - 61.40c	----- - -----	----- - -----

e -1.5%. a -1.7%. r -2.1%. n - 2.2%. f-2.8%.
ston ULSD Prem- 1.5755. d - Eff. Jan. 17.
r Conn. s - Eff. Jan. 22 at 6 PM. p - Eff. 7 PM.
Phila. Propane, Selkirk NY-.8750 eff. Jan. 21.

DELIVERY RECEIVED BY	DATE	DRIVER	GALLONS	POSTED PRICE	AMOUNT	
	1/23/09		506			STEVE 973-505-6828
	EOL	TRUCK	10THIS			

TOTAL $
RECD PAYMENT

++Net Price Prem -.50 Bunker C and Fuel -257.50 at

Due to market conditions, prices are as accurate as possible. Unless otherwise noted prices eff 12 AM of day of publication.

FUEL OIL CO., INC.

648 Schuyler Avenue
Kearny, NJ 07032
PHONE: 201-991-2370
FAX: 201-991-7061
AIL: finchfuel@yahoo.com.

FUEL INVOICE

Page 1
Date 02/03/10

BILL TO:

ANDOVER TOWNSHIP
134 NEWTON-SPARTA RD.
NEWTON NJ 07860

DELIVER TO:

ANDOVER TWSP. REC. HOUSE
144 LAKE ILIFF ROAD
NEWTON NJ 07860

Customer Number 1802 **Payment Terms**

Date	Reference		Description	Gallons	Price	Amount	Extension
02/10	90380	2	#2 FUEL OIL	380.0	2.1288	808.94	808.94
			FED LUST TAX			0.38	0.38
						Invoice Total	**809.32**

gone to a computerized system which is time activated.
nts that are PAST DUE are automatically turned over to
ORLD SYSTEMS, INC. An Account Receivable Management Firm.

Returned Checks will be charged a $35.00 Fee.

648 Schuyler ... 201-991-2370

Haven	----- - -----	c111.05 - 111.45c	c112.00 - -----	c105.05 - 109.81c	----- - -----	----- - -----
folk	----- - -----	----- - -----	----- - -----	----- - -----	----- - -----	rc88.80 - -----
adelphia	c86.50 - 96.75c	c85.00 - 95.90c	c80.00 - 88.55c	c76.50 - 88.10c	----- - -----	c76.50 - -----
adelphia	cy90.00 - 98.55yc	----- - -----	----- - -----	----- - -----	----- - -----	fc76.50 - -----
idence	----- - -----	c93.55 - 99.60c	----- - -----	c87.45 - 93.20c	----- - -----	----- - -----

c - Consumer Price. Sulfur Max. y -0.3%, b -1.1%, e -1.5%, a -1.7%, r -2.1%, n - 2.2% f-2.8%
+State Gross Receipt tax not included in New Jersey or Conn.
++Net Price, Bunker C ship Fuel 453.50 at Phila; Propane, Selkirk NY-1.5160 eff. Feb. 2, 2010.
Due to market conditions, prices are as accurate as possible. Unless otherwise noted, prices effective 12:00 AM of day of publication.
s- Eff. Feb. 1 at 6-PM. p - Eff. 7 PM. d - Eff. Jan. 30.

APPENDIX B

HVAC Equipment List

BPU ENERGY AUDIT PROGRAM

Andover Township Hillside House

CHA Project #20997

HVAC Equipment List											
Item	**Quanity**	**Manufacturer**	**Model Number**	**Serial number**	**Cooling Capacity (MBH)**	**Condition**	**Fuel**	**Heating Input MBH**	**Heating Output MBH**	**Refrigerant**	**Comments**
Oil Furnace	1	Lennox	023Q3-105/120-24	960417-25322	-	Good	Oil	105	85	-	AFUE 81%
Condensing Unit	1	Lennox	HS25-461-P	5896D17437	42	Good	-	-	-	HCFC-22	
Electric Heat	2	Broan	-	-	-	Satisfactory	Electricity	1.5 kW	1.5 kW	-	Wall Heater
Electric Heat	1	Mears	-	-	-	Good	Electricity	1.5 kW	1.5 kW	-	3' Electric Heat Strip

APPENDIX C

ECM-1
Lighting Fixture Modifications

BPU ENERGY AUDIT PROGRAM
Andover Township Hillside House
CHA Project #20997

ECM-1 Lighting Fixture Modifications

Item	Budgetary Costs*	Annual Utility Savings			Potential Incentive	Payback (Without Incentive)	Payback (With Incentive)
		Electricity	Natural Gas	Total			
	$	$	$	$	$	Years	Years
A-Lamp to CFLs	$300	$452	$0	$452	$0	0.7	0.7
T12 Fixtures to T8 Fixtures	$600	$212	$0	$212	$180	2.8	2.0
Combined	$900	$664		$664	$180	1.4	1.1

*Budgetary costs include $30 per fixture incentive for replacing T12 fixtures and lamps with T8 fixtures and lamps

BPU ENERGY AUDIT PROGRAM
Andover Township Hillside House
CHA Project #20997

Existing Lighting Fixture Schedule										
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
Men's Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	(2) Magnetic	164	164	8760	Switch	1437	$272.96
Men's Room	Fan/Light Combination	1	(1) A-Lamp, 100W	-	100	100	8760	Switch	876	$166.44
Women's Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	(2) Magnetic	164	164	8760	Switch	1437	$272.96
Women's Room	Fan/Light Combination	1	(1) A-Lamp, 100W	-	100	100	8760	Switch	876	$166.44
Storage	2'x4' Recessed Fluorescent Fixture	2	(4) T12, 34W	(2) Magnetic	164	328	2080	Switch	682	$129.63
Common Area	High Hats	6	(1) Flood, 85W	-	85	510	334	Switch	170	$32.36
Common Area	High Hats	16	(1) Flood, 85W	-	85	1360	334	Switch	454	$86.31
Common Area	High Hats	3	(1) Halogen, 30W	-	30	90	334	Switch	30	$5.71
Common Area	High Hats	6	(1) Halogen, 30W	-	30	180	334	Switch	60	$11.42
Entry	High Hats	2	(1) Flood, 85W	-	85	170	334	Switch	57	
Kitchenette	High Hats	4	(1) Halogen,65W	-	65	260	334	Switch	87	$16.50
Kitchenette	Ceiling Mounted	1	(1) A-Lamp, 60W	-	60	60	334	Switch	20	$3.81
Storage	Flood Light	1	(1) A-Lamp. 120W	-	120	120	200	Switch	24	$4.56
Unisex Restroom	Ceiling Mounted	2	(1) A-Lamp, 60W	-	60	120	2080	Switch	250	$47.42
Entryway	Ceiling Mounted	1	(1) Halogen, 30W	-	30	30	334	Switch	10	$1.90
Trhoughout Building	Exit Signs	3	(1) LED, 1.2W	-	1.2	3.6	8760	Breaker	32	$5.99
Stairs Down	Ceiling Mounted	1	(1) A-Lamp, 60W	-	60	60	2080	Switch	125	$23.71
Basement	Ceiling Mounted	1	(1) A-Lamp, 60W	-	60	60	2080	Switch	125	$23.71
2nd Floor Landing	4' Fluorescent Strip	1	(1) T12, 34W	(1) Magnetic	42	42	334	Switch	14	$2.67
2nd Floor Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	(2) Magnetic	164	164	334	Switch	55	$10.41
2nd Floor Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	(2) Magnetic	164	164	334	Switch	55	$10.41
2nd Floor Room	Ceiling Mounted	1	(1) A-Lamp, 100W	-	100	100	334	Switch	33	$6.35
Attic	Ceiling Mounted	1	(1) A-Lamp, 100W	-	100	100	100	Switch	10	$1.90
Attic	Ceiling Mounted	1	(1) A-Lamp, 75W	-	75	75	100	Switch	8	$1.43
Exterior	Mercury Vapor	4	(1) MV, 100W	(1) Magnetic	119	476	4380	Photocell	2085	$396.13
Exterior	Mercury Vapor	1	(1) MV, 100W	(1) Magnetic	119	119	4380	Switch	521	$99.03
Exterior	Metal Halide	1	(1) MH, 100W	(1) Magnetic	122	122	8760	Switch	1069	$203.06
Exterior	Decorative Globe	1	(1) A-Lamp, 60W	-	60	60	2080	Switch	125	$23.71
TOTAL									**10724.80**	**$2,026.92**

Energy Cost: $0.1900

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

Andover Township Hillside House

CHA Project #20997

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
Men's Room	2'x4' Recessed Fluorescent Fixture, (4) T12, 34W	Switch	1437	$272.96	2'x4' Recessed Fluorescent Fixture, (4) T8, 32W	1	114	114	8760	999	$189.74	$98.00	$98.00	438	$83.22	1.2
Men's Room	Fan/Light Combination, (1) A-Lamp, 100W	Switch	876	$166.44	Compact Fluorescent Lamp, 25W	1	25	25	8760	219	$41.61	$5.95	$5.95	657	$124.83	0.0
Women's Room	2'x4' Recessed Fluorescent Fixture, (4) T12, 34W	Switch	1437	$272.96	2'x4' Recessed Fluorescent Fixture, (4) T8, 32W	1	114	114	8760	999	$189.74	$98.00	$98.00	438	$83.22	1.2
Women's Room	Fan/Light Combination, (1) A-Lamp, 100W	Switch	876	$166.44	Compact Fluorescent Lamp, 25W	1	25	25	8760	219	$41.61	$5.95	$5.95	657	$124.83	0.0
Storage	2'x4' Recessed Fluorescent Fixture, (4) T12, 34W	Switch	682	$129.63	2'x4' Recessed Fluorescent Fixture, (4) T8, 32W	2	114	228	2080	474	$90.11	$98.00	$196.00	208	$39.52	5.0
Common Area	High Hats,(1) Flood, 85W	Switch	170	$32.30	Compact Fluorescent Lamp, 20W	6	20	120	334	40	$7.62	$5.95	$35.70	130	$24.68	1.4
Common Area	High Hats,(1) Flood, 85W	Switch	454	$86.26	Compact Fluorescent Lamp, 20W	16	20	320	334	107	$20.31	$5.95	$95.20	347	$65.95	1.4
Common Area	High Hats, (1) Halogen, 30W	Switch	30	$5.70		3			334							
Common Area	High Hats, (1) Halogen, 30W	Switch	60	$11.40		6			334							
Entry	High Hats, (1) Flood, 85W	Switch	57	$10.83	Compact Fluorescent Lamp, 20W	2	20	40	334	13	$2.54	$5.95	$11.90	44	$8.29	1.4
Kitchenette	High Hats, (1) Halogen, 65W	Switch	87	$16.53		4			334							
Kitchenette	Ceiling Mounted, (1) A-Lamp, 60W	Switch	20	$3.80	Compact Fluorescent Lamp, 15W	1	15	15	334	5	$0.95	$5.95	$5.95	15	$2.85	2.1
Storage	Flood Light, (1) Flood, 120W	Switch	24	$4.56	Compact Fluorescent Lamp, 30W	1	30	30	200	6	$1.14	$5.95	$5.95	18	$3.42	1.7
Unisex Restroom	Ceiling Mounted, (1) A-Lamp, 60W	Switch	250	$47.42	Compact Fluorescent Lamp, 15W	2	15	30	2080	62	$11.86	$5.95	$11.90	187	$35.57	0.3
Entryway	Ceiling Mounted, (1) Halogen, 30W	Switch	10	$1.90		1			334							
Throughout Building	Exit Signs, LED, 1.2W	Breaker	32	$5.99		3			8760							
Stairs Down	Ceiling Mounted, (1) A-Lamp, 60W	Switch	125	$23.71	Compact Fluorescent Lamp, 15W	1	15	15	2080	31	$5.93	$5.95	$5.95	94	$17.78	0.3
Basement	Ceiling Mounted, (1) A-Lamp, 60W	Switch	125	$23.71	Compact Fluorescent Lamp, 15W	1	15	15	2080	31	$5.93	$5.95	$5.95	94	$17.78	0.3
2nd Floor Landing	4' Fluorescent Strip, (1) T12, 34W	Switch	14	$2.66	4' Fluorescent Strip, (1) T8, 32W	1	32	32	334	11	$2.03	$90.00	$90.00	3	$0.63	143.0
2nd Floor Room	2'x4' Recessed Fluorescent Fixture, (4) T12, 34W	Switch	55	$10.45	2'x4' Recessed Fluorescent Fixture, (4) T8, 32W	1	114	114	334	38	$7.23	$98.00	$98.00	17	$3.22	30.5
2nd Floor Room	2'x4' Recessed Fluorescent Fixture, (4) T12, 34W	Switch	55	$10.45	2'x4' Recessed Fluorescent Fixture, (4) T8, 32W	1	114	114	334	38	$7.23	$98.00	$98.00	17	$3.22	30.5
2nd Floor Room	Ceiling Mounted, (1) A-Lamp, 100W	Switch	33	$6.27	Compact Fluorescent Lamp, 25W	1	25	25	334	8	$1.59	$5.95	$5.95	25	$4.68	1.3
Attic	Ceiling Mounted, (1) A-Lamp, 100W	Switch	10	$1.90	Compact Fluorescent Lamp, 25W	1	25	25	100	3	$0.48	$5.95	$5.95	8	$1.43	4.2
Attic	Ceiling Mounted, (1) A-Lamp75W	Switch	8	$1.52	Compact Fluorescent Lamp, 20W	1	20	20	100	2	$0.38	$5.95	$5.95	6	$1.14	5.2
Exterior	Mercury Vapor, 119W	Photocell	2085	$396.13		4			4380							
Exterior	Mercury Vapor, 119W	Switch	521	$99.03		1			4380							
Exterior	Metal Halide, 122W	Switch	1069	$203.06		1			8760							
Exterior	Decorative Globe, (1) A-Lamp, 60W	Switch	125	$23.71	Compact Fluorescent Lamp, 15W	1	15	15	2080	31	$5.93	$5.95	$5.95	94	$17.78	0.3
												Total	**$892.20**	**3495**	**$664.05**	**1.3**

Energy Cost: $0.1900

* 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

BPU ENERGY AUDIT PROGRAM
Andover Township Hillside House
CHA Project #20997

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			
4', 4 Lamp, T-12 to T-8 Fixture	6	ea	$79	$49	$0	$474	$356	$0	$830	$180	

Subtotal	$830
10% Contingency	$83
10% OH	$83
10% Profit	$83
Total	$1,079
Incentive	$180
Total Cost with Incentive	$899

APPENDIX D

ECM-2
Lighting Control Modifications

BPU ENERGY AUDIT PROGRAM
Andover Township Hillside House
CHA Project #20997

ECM-2 Lighting Control Modifications (Proposed Fixtures 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	279	2,619	0	498	25.8	60	0.6	0.4

BPU ENERGY AUDIT PROGRAM
Andover Township Hillside House
CHA Project #20997

Existing Lighting Fixture Schedule										
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
Men's Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	(2) Magnetic	164	164	8760	Switch	1437	$272.96
Men's Room	Fan/Light Combination	1	(1) A-Lamp, 100W	-	100	100	8760	Switch	876	$166.44
Women's Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	(2) Magnetic	164	164	8760	Switch	1437	$272.96
Women's Room	Fan/Light Combination	1	(1) A-Lamp, 100W	-	100	100	8760	Switch	876	$166.44
Storage	2'x4' Recessed Fluorescent Fixture	2	(4) T12, 34W	(2) Magnetic	164	328	2080	Switch	682	$129.63
Common Area	High Hats	6	(1) Flood, 85W	-	85	510	334	Switch	170	$32.36
Common Area	High Hats	16	(1) Flood, 85W	-	85	1360	334	Switch	454	$86.31
Common Area	High Hats	3	(1) Halogen, 30W	-	30	90	334	Switch	30	$5.71
Common Area	High Hats	6	(1) Halogen, 30W	-	30	180	334	Switch	60	$11.42
Entry	High Hats	2	(1) Flood, 85W	-	85	170	334	Switch	57	
Kitchenette	High Hats	4	(1) Halogen,65W	-	65	260	334	Switch	87	$16.50
Kitchenette	Ceiling Mounted	1	(1) A-Lamp, 60W	-	60	60	334	Switch	20	$3.81
Storage	Flood Light	1	(1) A-Lamp. 120W	-	120	120	200	Switch	24	$4.56
Unisex Restroom	Ceiling Mounted	2	(1) A-Lamp, 60W	-	60	120	2080	Switch	250	$47.42
Entryway	Ceiling Mounted	1	(1) Halogen, 30W	-	30	30	334	Switch	10	$1.90
Trhoughout Building	Exit Signs	3	(1) LED, 1.2W	-	1.2	3.6	8760	Breaker	32	$5.99
Stairs Down	Ceiling Mounted	1	(1) A-Lamp, 60W	-	60	60	2080	Switch	125	$23.71
Basement	Ceiling Mounted	1	(1) A-Lamp, 60W	-	60	60	2080	Switch	125	$23.71
2nd Floor Landing	4' Fluorescent Strip	1	(1) T12, 34W	(1) Magnetic	42	42	334	Switch	14	$2.67
2nd Floor Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	(2) Magnetic	164	164	334	Switch	55	$10.41
2nd Floor Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	(2) Magnetic	164	164	334	Switch	55	$10.41
2nd Floor Room	Ceiling Mounted	1	(1) A-Lamp, 100W	-	100	100	334	Switch	33	$6.35
Attic	Ceiling Mounted	1	(1) A-Lamp, 100W	-	100	100	100	Switch	10	$1.90
Attic	Ceiling Mounted	1	(1) A-Lamp, 75W	-	75	75	100	Switch	8	$1.43
Exterior	Mercury Vapor	4	(1) MV, 100W	(1) Magnetic	119	476	4380	Photocell	2085	$396.13
Exterior	Mercury Vapor	1	(1) MV, 100W	(1) Magnetic	119	119	4380	Switch	521	$99.03
Exterior	Metal Halide	1	(1) MH, 100W	(1) Magnetic	122	122	8760	Switch	1069	$203.06
Exterior	Decorative Globe	1	(1) A-Lamp, 60W	-	60	60	2080	Switch	125	$23.71
TOTAL									**10724.80**	**$2,026.92**

Energy Cost: $0.1900

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
Andover Township Hillside House
CHA Project #20997

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)	3	ea	$ 25.00	$ 50.00		$ 73.50	$ 181.50	$ -	$ 255.00	$ 20.00	

Subtotal	$255
10% Contingency	$26
10% OH	$28
10% Profit	$31
Total	$339
Incentive	$20
Total Cost with Incentive	$319

BPU ENERGY AUDIT PROGRAM

Andover Township Hillside House
CHA Project #20997

Existing Lighting Fixture Controls (Existing Fixtures)									**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
Men's Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	164	8760	Switch	1437	$272.96	Motion Sensor	876	144	$27.30	$46.57	$245.67	0.2
Men's Room	Fan/Light Combination	1	(1) A-Lamp, 100W	100	8760	Switch	876	$166.44	Motion Sensor	876	88	$16.64	$46.57	$149.80	0.3
Women's Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	164	8760	Switch	1437	$272.96	Motion Sensor	876	144	$27.30	$46.57	$245.67	0.2
Women's Room	Fan/Light Combination	1	(1) A-Lamp, 100W	100	8760	Switch	876	$166.44	Motion Sensor	876	88	$16.64	$46.57	$149.80	0.3
Storage	2'x4' Recessed Fluorescent Fixture	2	(4) T12, 34W	328	2080	Switch	682	$129.63	Motion Sensor	208	68	$12.96	$93.14	$116.66	0.8
Common Area	High Hats	6	(1) Flood, 85W	510	334	Switch	170	$32.36							
Common Area	High Hats	16	(1) Flood, 85W	1360	334	Switch	454	$86.31							
Common Area	High Hats	3	(1) Halogen, 30W	90	334	Switch	30	$5.71							
Common Area	High Hats	6	(1) Halogen, 30W	180	334	Switch	60	$11.42							
Entry	High Hats	2	(1) Flood, 85W	170	334	Switch	57	$10.79							
Kitchenette	High Hats	4	(1) Halogen,65W	260	334	Switch	87	$16.50	Motion Sensor	250.5	65	$12.37	$46.57	$4.12	11.3
Kitchenette	Ceiling Mounted	1	(1) A-Lamp, 60W	60	334	Switch	20	$3.81	Motion Sensor	250.5	15	$2.86	$46.57	$0.95	48.9
Storage	Flood Light	1	(1) A-Lamp, 120W	120	200	Switch	24	$4.56	Motion Sensor	150	18	$3.42	$93.14	$1.14	81.7
Unisex Restroom	Ceiling Mounted	2	(1) A-Lamp, 60W	120	2080	Switch	250	$47.42	Motion Sensor	1560	187	$35.57	$93.14	$11.86	7.9
Entryway	Ceiling Mounted	1	(1) Halogen, 30W	30	334	Switch	10	$1.90							
Trhoughout Building	Exit Signs	3	(1) LED, 1.2W	3.6	8760	Breaker	32	$5.99							
Stairs Down	Ceiling Mounted	1	(1) A-Lamp, 60W	60	2080	Switch	125	$23.71							
Basement	Ceiling Mounted	1	(1) A-Lamp, 60W	60	2080	Switch	125	$23.71							
2nd Floor Landing	4' Fluorescent Strip	1	(1) T12, 34W	42	334	Switch	14	$2.67	Motion Sensor	33.4	1	$0.27	$93.14	$2.40	38.8
2nd Floor Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	164	334	Switch	55	$10.41	Motion Sensor	33.4	5	$1.04	$93.14	$9.37	9.9
2nd Floor Room	2'x4' Recessed Fluorescent Fixture	1	(4) T12, 34W	164	334	Switch	55	$10.41	Motion Sensor	33.4	5	$1.04	$93.14	$9.37	9.9
2nd Floor Room	Ceiling Mounted	1	(1) A-Lamp, 100W	100	334	Switch	33	$6.35	Motion Sensor	33.4	3	$0.63	$93.14	$5.71	16.3
Attic	Ceiling Mounted	1	(1) A-Lamp, 100W	100	100	Switch	10	$1.90	Motion Sensor	10	1	$0.19	$46.57	$1.71	27.2
Attic	Ceiling Mounted	1	(1) A-Lamp, 75W	75	100	Switch	8	$1.43	Motion Sensor	10	1	$0.14	$46.57	$1.28	36.3
Exterior	Mercury Vapor	4	(1) MV, 100W	476	4380	Photocell	2085	$396.13							
Exterior	Mercury Vapor	1	(1) MV, 100W	119	4380	Switch	521	$99.03							
Exterior	Metal Halide	1	(1) MH, 100W	122	8760	Switch	1069	$203.06							
Exterior	Decorative Globe	1	(1) A-Lamp, 60W	60	2080	Switch	125	$23.71							

Energy Cost: $0.1900

*Installation costs do not include potential incentive.

Notes:
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

Lighting Control Modifications

Motions Sensors with 10 Years or Less Payback

kwh Savings/Year	Installation Cost	Cost Savings/Year	Payback in Years
4938	$558.84	$938.18	0.6

BPU ENERGY AUDIT PROGRAM

Andover Township Hillside House
CHA Project #20997

Existing Lighting Fixture Controls (Proposed Fixtures from ECM-1)									**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
Men's Room	2'x4' Recessed Fluorescent Fixture, (4) T8, 32W	1	(4) T8, 32W	114	8760	Switch	999	$189.74	Motion Sensor	876	100	$18.97	$46.57	$170.77	0.3
Men's Room	Compact Fluorescent Lamp, 25W	1	(1) CFL, 25W	25	8760	Switch	219	$41.61	Motion Sensor	876	22	$4.16	$46.57	$37.45	1.2
Women's Room	2'x4' Recessed Fluorescent Fixture, (4) T8, 32W	1	(4) T8, 32W	114	8760	Switch	999	$189.74	Motion Sensor	876	100	$18.97	$46.57	$170.77	0.3
Women's Room	Compact Fluorescent Lamp, 25W	1	(1) CFL, 25W	25	8760	Switch	219	$41.61	Motion Sensor	876	22	$4.16	$46.57	$37.45	1.2
Storage	2'x4' Recessed Fluorescent Fixture, (4) T8, 32W	2	(4) T8, 32W	228	2080	Switch	474	$90.11	Motion Sensor	208	47	$9.01	$93.14	$81.10	1.1
Common Area	Compact Fluorescent Lamp, 20W	6	(1) CFL, 20W	120	334	Switch	40	$7.62							
Common Area	Compact Fluorescent Lamp, 20W	16	(1) CFL, 20W	320	334	Switch	107	$20.31							
Common Area	High Hats	3	(1) Halogen, 30W	90	334	Switch	30	$5.71							
Common Area	High Hats	6	(1) Halogen, 30W	180	334	Switch	60	$11.42							
Entry	Compact Fluorescent Lamp, 20W	2	(1) CFL, 20W	40	334	Switch	13	$2.54							
Kitchenette	High Hats	4	(1) Halogen,65W	260	334	Switch	87	$16.50	Motion Sensor	250.5	65	$12.37	$46.57	$4.12	11.3
Kitchenette	Compact Fluorescent Lamp, 15W	1	(1) CFL, 15W	15	334	Switch	5	$0.95	Motion Sensor	250.5	4	$0.71	$46.57	$0.24	195.7
Storage	Compact Fluorescent Lamp, 30W	1	(1) CFL, 30W	30	200	Switch	6	$1.14	Motion Sensor	150	5	$0.86	$93.14	$0.29	326.8
Unisex Restroom	Compact Fluorescent Lamp, 15W	2	(1) CFL, 15W	30	2080	Switch	62	$11.86	Motion Sensor	1560	47	$8.89	$93.14	$2.96	31.4
Entryway	Ceiling Mounted	1	(1) Halogen, 30W	30	334	Switch	10	$1.90							
Trhoughout Building	Exit Signs	3	(1) LED, 1.2W	3.6	8760	Breaker	32	$5.99							
Stairs Down	Compact Fluorescent Lamp, 15W	1	(1) CFL, 15W	15	2080	Switch	31	$5.93							
Basement	Compact Fluorescent Lamp, 15W	1	(1) CFL, 15W	15	2080	Switch	31	$5.93							
2nd Floor Landing	4' Fluorescent Strip, (1) T8, 32W	1	(1) T8, 32W	32	334	Switch	11	$2.03	Motion Sensor	33.4	1	$0.20	$93.14	$1.83	51.0
2nd Floor Room	2'x4' Recessed Fluorescent Fixture, (4) T8, 32W	1	(4) T8, 32W	114	334	Switch	38	$7.23	Motion Sensor	33.4	4	$0.72	$93.14	$6.51	14.3
2nd Floor Room	2'x4' Recessed Fluorescent Fixture, (4) T8, 32W	1	(4) T8, 32W	114	334	Switch	38	$7.23	Motion Sensor	33.4	4	$0.72	$93.14	$6.51	14.3
2nd Floor Room	Compact Fluorescent Lamp, 25W	1	(1) CFL, 25W	25	334	Switch	8	$1.59	Motion Sensor	33.4	1	$0.16	$93.14	$1.43	65.2
Attic	Compact Fluorescent Lamp, 25W	1	(1) CFL, 25W	25	100	Switch	3	$0.48	Motion Sensor	10	0	$0.05	$46.57	$0.43	108.9
Attic	Compact Fluorescent Lamp, 20W	1	(1) CFL, 20W	20	100	Switch	2	$0.38	Motion Sensor	10	0	$0.04	$46.57	$0.34	136.2
Exterior	Mercury Vapor	4	(1) MV, 100W	476	4380	Photocell	2085	$396.13							
Exterior	Mercury Vapor	1	(1) MV, 100W	119	4380	Switch	521	$99.03							
Exterior	Metal Halide	1	(1) MH, 100W	122	8760	Switch	1069	$203.06							
Exterior	Compact Fluorescent Lamp, 15W	1	(1) CFL, 15W	15	2080	Switch	31	$5.93							

Energy Cost: $0.1900

*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
2619	$279.42	$497.53	0.6

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

APPENDIX E

ECM-3
Insulate the Attic Space

BPU ENERGY AUDIT PROGRAM
Andover Township Hillside House
CHA Project #20997

ECM-3 Insulate the Attic Space

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		
12" R-39 Batt Insulation	1700	sf	$ 1.03	$ 0.34	$ -	$ 1,715.98	$ 699.38	$ -	$ 2,415.36	

Subtotal	$ 2,415.36
10% OH, 10% Profit	$ 241.54
10% Contingency	$ 241.54
Total	$ 2,898.43

BPU ENERGY AUDIT PROGRAM
Andover Township Town Hall
CHA Project #20997

ECM-3 Insulate the Attic Space

Annual Energy Use Comparison			
	Electricity kWh	Fuel Oil Gallons	Cost $
Existing Building with No Attic Insulation	1,401	380	$ 1,075
Proposed Building with 12" R-29 Batt Insulation in Attic	1,174	188	$ 623
Difference	227	192	$ 452

Add Attic Insulation Input Data

Project Name: Hillside House-Revised
Prepared by: Kitchen and Associates

06/01/2010
05:11PM

1. General Details:

Air System Name	**Add Attic Insulation**	
Equipment Type	**Split AHU**	
Air System Type	**Single Zone CAV**	
Number of zones	**1**	

2. System Components:

Ventilation Air Data:

Airflow Control	**Constant Ventilation Airflow**	
Ventilation Sizing Method	**Sum of Space OA Airflows**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**0**	%
Outdoor Air CO2 Level	**400**	ppm

Central Cooling Data:

Supply Air Temperature	**58.0**	°F
Coil Bypass Factor	**0.100**	
Cooling Source	**Air-Cooled DX**	
Schedule	**JFMAMJJASOND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Central Heating Data:

Supply Temperature	**100.0**	°F
Heating Source	**Combustion - Fuel Oil**	
Schedule	**JFMAMJJASOND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Supply Fan Data:

Fan Type	**Forward Curved**	
Configuration	**Blow-thru**	
Fan Performance	**0.50**	in wg
Overall Efficiency	**54**	%

Duct System Data:

Supply Duct Data:

Duct Heat Gain	**0**	%
Duct Leakage	**0**	%

Return Duct or Plenum Data:

Return Air Via	**Ducted Return**	

3. Zone Components:

Space Assignments:

Zone 1: BLD1-F001-Z01	
Add_Attic_Insulation_FL1	x1
Add_Attic_Insulation_FL2	x1
Add_Attic_Insulation_FL3	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**80.0**	°F
Heating T-stat: Occ.	**70.0**	°F
Heating T-stat: Unocc.	**65.0**	°F
T-stat Throttling Range	**1.50**	°F
Diversity Factor	**100**	%
Direct Exhaust Airflow	**0.0**	CFM
Direct Exhaust Fan kW	**0.0**	kW
Thermostat Schedule	**90.1 Assembly HVAC**	
Unoccupied Cooling is	**Available**	

Supply Terminals Data:

Zone	**All**	
Terminal Type	**Diffuser**	
Minimum Airflow	**0.00**	CFM/person

Zone Heating Units:

Zone	**All**	
Zone Heating Unit Type	**None**	

Zone Unit Heat Source ..... **Electric Resistance**
Zone Heating Unit Schedule ..... **JFMAMJJASOND**

4. Sizing Data (User-Modified):

System Sizing Data:

Cooling Supply Temperature ..... **58.0** °F
Supply Fan Airflow ..... **1200.0** CFM
Ventilation Airflow ..... **0.0** CFM
Heating Supply Temperature ..... **100.0** °F

Hydronic Sizing Specifications:

Chilled Water Delta-T ..... **10.0** °F
Hot Water Delta-T ..... **20.0** °F

Safety Factors:

Cooling Sensible ..... **0** %
Cooling Latent ..... **0** %
Heating ..... **0** %

Zone Sizing Data:

Zone Airflow Sizing Method ..... **Peak zone sensible load**
Space Airflow Sizing Method ..... **Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	1200.0	-	-	

5. Equipment Data

Central Cooling Unit - Air-Cooled DX

Design OAT ..... **95.0** °F
Equipment Sizing ..... **User-Defined**
Gross Cooling Capacity ..... **42.0** MBH
ARI Performance Rating ..... **10.00** SEER
Conventional Cutoff OAT ..... **55.0** °F
Low Temperature Operation ..... **Used**
Low Temperature Cutoff OAT ..... **15.0** °F

Central Heating Unit - Combustion

Equipment Sizing ..... **User-Defined**
Gross Heating Capacity ..... **105.0** MBH
Average Efficiency ..... **81.0** %
Misc. Electric ..... **0.000** kW

Billing Details - Electric - Add Attic Insulation

Hillside House-Revised
Kitchen and Associates

06/01/2010
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1. Component Charges

Billing Period	Energy Charges ($)	Demand Charges ($)	Customer Charges ($)	Taxes ($)	Total Charge ($)
Jan	64	0	0	0	64
Feb	57	0	0	0	57
Mar	63	0	0	0	63
Apr	62	0	0	0	62
May	76	0	0	0	76
Jun	85	0	0	0	85
Jul	123	0	0	0	123
Aug	116	0	0	0	116
Sep	78	0	0	0	78
Oct	69	0	0	0	69
Nov	61	0	0	0	61
Dec	63	0	0	0	63
Totals	918	0	0	0	918

2. Totals

Billing Period	Total Charges ($)	Total Consumption (kWh)	Avg Price ($/kWh)
Jan	64	338	0.1900
Feb	57	299	0.1900
Mar	63	329	0.1900
Apr	62	327	0.1900
May	76	400	0.1900
Jun	85	446	0.1900
Jul	123	646	0.1900
Aug	116	612	0.1900
Sep	78	411	0.1900
Oct	69	364	0.1900
Nov	61	323	0.1900
Dec	63	334	0.1900
Totals	918	4,830	0.1900

3. Consumption Totals

Billing Period	Peak (kWh)	Mid-Peak (kWh)	Normal Peak (kWh)	Off-Peak (kWh)	Overall (kWh)
Jan	0	0	0	0	338
Feb	0	0	0	0	299
Mar	0	0	0	0	329
Apr	0	0	0	0	327
May	0	0	0	0	400
Jun	0	0	0	0	446
Jul	0	0	0	0	646
Aug	0	0	0	0	612
Sep	0	0	0	0	411
Oct	0	0	0	0	364
Nov	0	0	0	0	323
Dec	0	0	0	0	334
Totals	0	0	0	0	4,830

4. Billing Demands

Billing Period	Peak (kW)	Mid-Peak (kW)	Normal Peak (kW)	Off-Peak (kW)	Overall (kW)
Jan	0.0	0.0	0.0	0.0	2.6
Feb	0.0	0.0	0.0	0.0	2.6
Mar	0.0	0.0	0.0	0.0	2.8
Apr	0.0	0.0	0.0	0.0	3.4
May	0.0	0.0	0.0	0.0	5.9
Jun	0.0	0.0	0.0	0.0	5.8
Jul	0.0	0.0	0.0	0.0	5.9
Aug	0.0	0.0	0.0	0.0	5.7
Sep	0.0	0.0	0.0	0.0	5.1
Oct	0.0	0.0	0.0	0.0	4.7
Nov	0.0	0.0	0.0	0.0	2.7
Dec	0.0	0.0	0.0	0.0	2.6

5. Maximum Demands

Billing Period	Peak (kW)	Mid-Peak (kW)	Normal Peak (kW)	Off-Peak (kW)	Overall (kW)
Jan	0.0	0.0	0.0	0.0	2.6
Feb	0.0	0.0	0.0	0.0	2.6
Mar	0.0	0.0	0.0	0.0	2.8
Apr	0.0	0.0	0.0	0.0	3.4
May	0.0	0.0	0.0	0.0	5.9
Jun	0.0	0.0	0.0	0.0	5.8
Jul	0.0	0.0	0.0	0.0	5.9
Aug	0.0	0.0	0.0	0.0	5.7
Sep	0.0	0.0	0.0	0.0	5.1
Oct	0.0	0.0	0.0	0.0	4.7
Nov	0.0	0.0	0.0	0.0	2.7
Dec	0.0	0.0	0.0	0.0	2.6

6. Time Of Maximum Demands

Billing Period	Peak (m/d/h)	Mid-Peak (m/d/h)	Normal Peak (m/d/h)	Off-Peak (m/d/h)	Overall (m/d/h)
Jan	n/a	n/a	n/a	n/a	1/1/0900
Feb	n/a	n/a	n/a	n/a	2/1/0900
Mar	n/a	n/a	n/a	n/a	3/29/1400
Apr	n/a	n/a	n/a	n/a	4/19/1700
May	n/a	n/a	n/a	n/a	5/17/1500
Jun	n/a	n/a	n/a	n/a	6/11/1600
Jul	n/a	n/a	n/a	n/a	7/19/1600
Aug	n/a	n/a	n/a	n/a	8/30/1400
Sep	n/a	n/a	n/a	n/a	9/3/1400
Oct	n/a	n/a	n/a	n/a	10/1/1500
Nov	n/a	n/a	n/a	n/a	11/1/1200
Dec	n/a	n/a	n/a	n/a	12/3/0900

Monthly Component Costs - Add Attic Insulation

Hillside House-Revised
Kitchen and Associates

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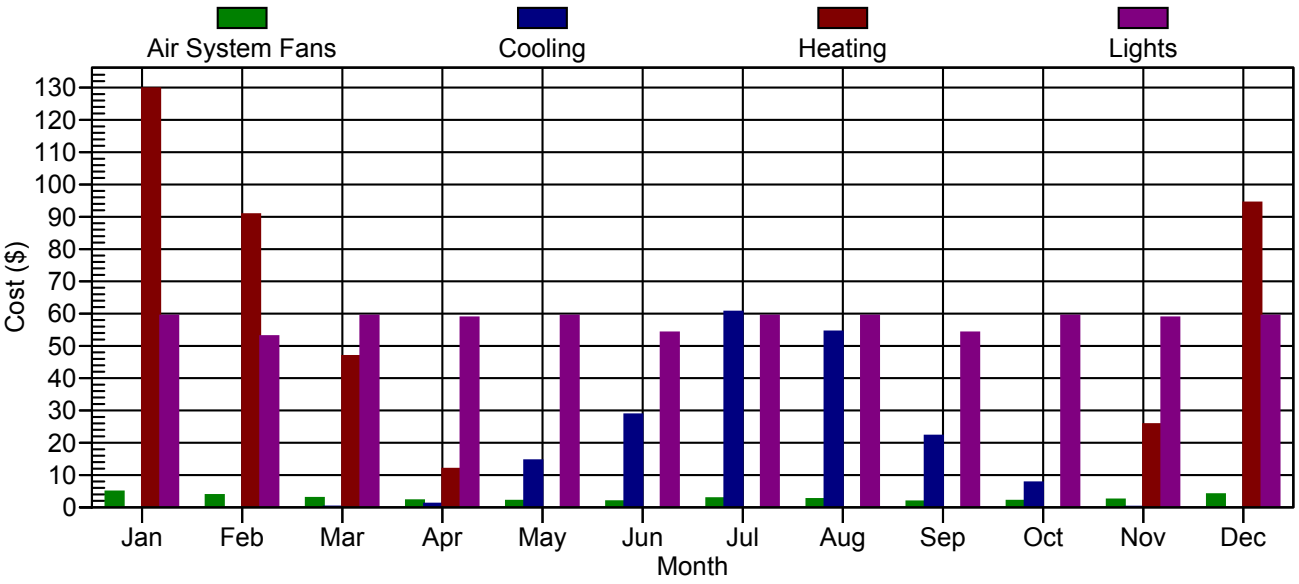

1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Cooling Towers ($)	HVAC Total ($)
January	5	0	130	0	0	135
February	4	0	91	0	0	95
March	3	0	47	0	0	50
April	2	1	12	0	0	15
May	2	15	0	0	0	17
June	2	29	0	0	0	31
July	3	61	0	0	0	64
August	3	54	0	0	0	57
September	2	22	0	0	0	24
October	2	8	0	0	0	10
November	2	0	26	0	0	28
December	4	0	94	0	0	98
Total	**33**	**190**	**400**	**0**	**0**	**623**

2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	59	0	0	0	59	194
February	53	0	0	0	53	148
March	59	0	0	0	59	109
April	59	0	0	0	59	74
May	59	0	0	0	59	76
June	54	0	0	0	54	85
July	59	0	0	0	59	123
August	59	0	0	0	59	116
September	54	0	0	0	54	78
October	59	0	0	0	59	69
November	59	0	0	0	59	87
December	59	0	0	0	59	157
Total	**695**	**0**	**0**	**0**	**695**	**1,317**

Monthly Energy Costs - Add Attic Insulation

Hillside House-Revised
Kitchen and Associates

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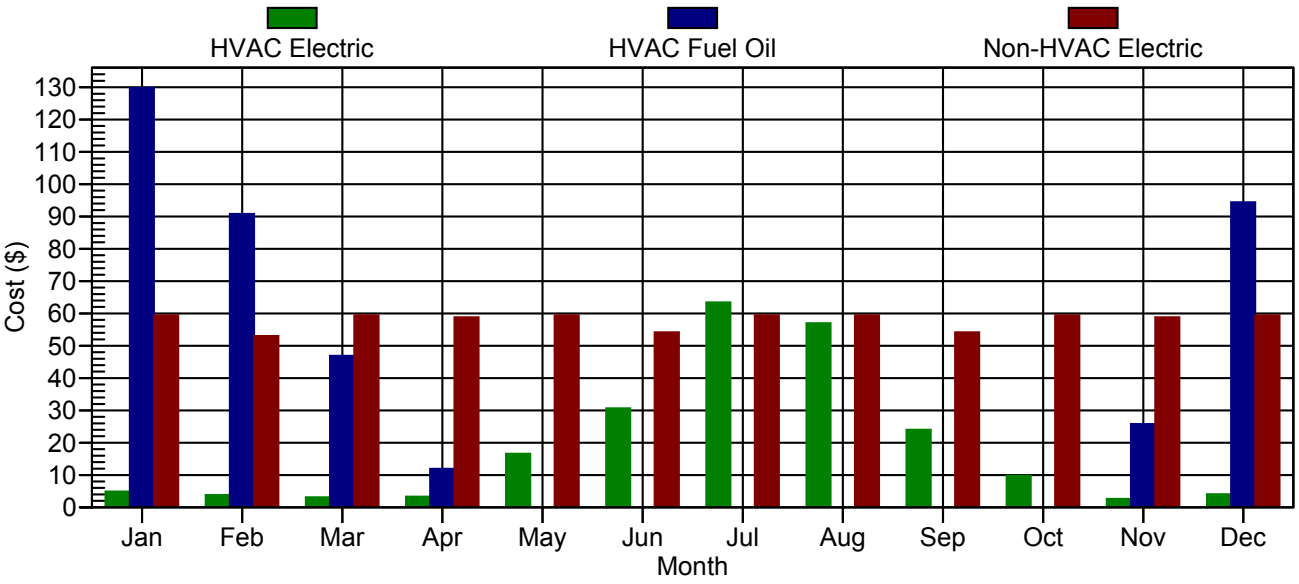

1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	5	0	130	0	0	0	0
February	4	0	91	0	0	0	0
March	3	0	47	0	0	0	0
April	3	0	12	0	0	0	0
May	17	0	0	0	0	0	0
June	31	0	0	0	0	0	0
July	63	0	0	0	0	0	0
August	57	0	0	0	0	0	0
September	24	0	0	0	0	0	0
October	10	0	0	0	0	0	0
November	3	0	26	0	0	0	0
December	4	0	94	0	0	0	0
Total	**223**	**0**	**400**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	59	0	0	0	0	0
February	53	0	0	0	0	0
March	59	0	0	0	0	0
April	59	0	0	0	0	0
May	59	0	0	0	0	0
June	54	0	0	0	0	0
July	59	0	0	0	0	0
August	59	0	0	0	0	0
September	54	0	0	0	0	0
October	59	0	0	0	0	0
November	59	0	0	0	0	0
December	59	0	0	0	0	0
Total	**695**	**0**	**0**	**0**	**0**	**0**

Monthly Energy Use by Energy Type - Add Attic Insulation

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:11PM

1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (na)	Fuel Oil (Gallons)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	26	0	61	0	0	0	0
Feb	20	0	43	0	0	0	0
Mar	16	0	22	0	0	0	0
Apr	17	0	6	0	0	0	0
May	87	0	0	0	0	0	0
Jun	161	0	0	0	0	0	0
Jul	334	0	0	0	0	0	0
Aug	300	0	0	0	0	0	0
Sep	126	0	0	0	0	0	0
Oct	51	0	0	0	0	0	0
Nov	14	0	12	0	0	0	0
Dec	21	0	44	0	0	0	0
Totals	1,174	0	188	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (na)	Fuel Oil (Gallons)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	312	0	0	0	0	0
Feb	279	0	0	0	0	0
Mar	312	0	0	0	0	0
Apr	310	0	0	0	0	0
May	312	0	0	0	0	0
Jun	285	0	0	0	0	0
Jul	312	0	0	0	0	0
Aug	312	0	0	0	0	0
Sep	285	0	0	0	0	0
Oct	312	0	0	0	0	0
Nov	310	0	0	0	0	0
Dec	312	0	0	0	0	0
Totals	3,656	0	0	0	0	0

Monthly Energy Use by Component - Add Attic Insulation

Hillside House-Revised
Kitchen and Associates

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1. Monthly Energy Use by System Component

Component	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Air System Fans (kWh)	26	20	15	11	11	10	15	13	10	11	13	21
Cooling												
Electric (kWh)	0	0	1	6	77	152	319	287	117	41	1	0
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (Gallons)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote CW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Heating												
Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (Gallons)	61	43	22	6	0	0	0	0	0	0	12	44
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Pumps (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Clg. Tower Fans (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Lighting (kWh)	312	279	312	310	312	285	312	312	285	312	310	312
Electric Eqpt. (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0

Annual Cost Summary

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:11PM

Table 1. Annual Costs

Component	Add Attic Insulation ($)
Air System Fans	33
Cooling	190
Heating	400
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**623**
Lights	695
Electric Equipment	0
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**695**
Grand Total	**1,317**

Table 2. Annual Cost per Unit Floor Area

Component	Add Attic Insulation ($/ft²)
Air System Fans	0.013
Cooling	0.076
Heating	0.160
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.250**
Lights	0.279
Electric Equipment	0.000
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**0.279**
Grand Total	**0.529**
Gross Floor Area (ft²)	2492.0
Conditioned Floor Area (ft²)	2492.0

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

Table 3. Component Cost as a Percentage of Total Cost

Component	Add Attic Insulation (%)
Air System Fans	2.5
Cooling	14.4
Heating	30.3
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**47.3**
Lights	52.7
Electric Equipment	0.0
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**52.7**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:11PM

Table 1. Annual Costs

Component	Add Attic Insulation ($)
HVAC Components	
Electric	223
Natural Gas	0
Fuel Oil	400
Propane	0
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**623**
Non-HVAC Components	
Electric	695
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**695**
Grand Total	**1,317**

Table 2. Annual Energy Consumption

Component	Add Attic Insulation
HVAC Components	
Electric (kWh)	1,174
Natural Gas (na)	0
Fuel Oil (Gallons)	188
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	3,656
Natural Gas (na)	0
Fuel Oil (Gallons)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	4,830
Natural Gas (na)	0
Fuel Oil (Gallons)	188
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	Add Attic Insulation
CO2 Equivalent (lb)	0

Table 4. Annual Cost per Unit Floor Area

Component	Add Attic Insulation ($/ft²)
HVAC Components	
Electric	0.090
Natural Gas	0.000
Fuel Oil	0.160
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.250**
Non-HVAC Components	
Electric	0.279
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**0.279**
Grand Total	**0.529**
Gross Floor Area (ft²)	2492.0
Conditioned Floor Area (ft²)	2492.0

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

Table 5. Component Cost as a Percentage of Total Cost

Component	Add Attic Insulation (%)
HVAC Components	
Electric	16.9
Natural Gas	0.0
Fuel Oil	30.3
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**47.3**
Non-HVAC Components	
Electric	52.7
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**52.7**
Grand Total	**100.0**

APPENDIX F

ECM-4
Replace Existing Condensing Unit and Cooling Coil with Higher Efficiency Units

BPU ENERGY AUDIT PROGRAM
Andover Township Town Hall
CHA Project #20997

ECM-4 Replace Existing Condensing Unit and Cooling Coil with Higher Efficiency Units

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		
						$ -	$ -	$ -	$ -	
Condensing Unit Demo	1	ea		$ 740.00		$ -	$ 895.40	$ -	$ 895.40	
Cooling Coil and Line-Set Demo	1	ea		$ 950.00		$ -	$ 1,149.50	$ -	$ 1,149.50	
New 3.5 Ton Condensing Unit and Cooling Coil*	1	ea	$ 4,000.00	$ 686.00		$ 3,920.00	$ 830.06	$ -	$ 4,750.06	
New Refrigeration Line-Set**	1	ea	$ 276.00	$ 851.00		$ 270.48	$ 1,029.71	$ -	$ 1,300.19	

*Material cost of condensing unit and cooling coil includes a $92/ton incentive

*Electrical wiring and ductwork modification costs are included in condensing unit and cooling coil costs.

**Refrigerant piping insulation is included in refrigeration line-set costs.

Subtotal	$ 8,095.15
10% OH, 10% Profit	$ 809.52
10% Contingency	$ 809.52
Total	$ 9,714.18

BPU ENERGY AUDIT PROGRAM
Andover Township Town Hall
CHA Project #20997

ECM-4 Replace Existing Condensing Unit and Cooling Coil with Higher

Annual Energy Use Comparison			
	Electricity kWh	Fuel Oil Gallons	Cost $
Existing 10 SEER Compressor and Coil	1,174	188	$ 623
Proposed 16 SEER Compressor and Coil	976	188	$ 585
Difference	198	-	$ 38

Replace Cond_CCOIL Input Data

Project Name: Hillside House-Revised
Prepared by: Kitchen and Associates

06/01/2010
05:12PM

1. General Details:

Air System Name	**Replace Cond_CCOIL**	
Equipment Type	**Split AHU**	
Air System Type	**Single Zone CAV**	
Number of zones	**1**	

2. System Components:

Ventilation Air Data:

Airflow Control	**Constant Ventilation Airflow**	
Ventilation Sizing Method	**Sum of Space OA Airflows**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**0**	%
Outdoor Air CO2 Level	**400**	ppm

Central Cooling Data:

Supply Air Temperature	**58.0**	°F
Coil Bypass Factor	**0.100**	
Cooling Source	**Air-Cooled DX**	
Schedule	**JFMAMJJASOND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Central Heating Data:

Supply Temperature	**100.0**	°F
Heating Source	**Combustion - Fuel Oil**	
Schedule	**JFMAMJJASOND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Supply Fan Data:

Fan Type	**Forward Curved**	
Configuration	**Blow-thru**	
Fan Performance	**0.50**	in wg
Overall Efficiency	**54**	%

Duct System Data:

Supply Duct Data:

Duct Heat Gain	**0**	%
Duct Leakage	**0**	%

Return Duct or Plenum Data:

Return Air Via	**Ducted Return**	

3. Zone Components:

Space Assignments:

Zone 1: BLD1-F001-Z01	
Replace COND_COIL_FL1	x1
Replace COND_COIL_FL2	x1
Replace COND_COIL_FL3	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**80.0**	°F
Heating T-stat: Occ.	**70.0**	°F
Heating T-stat: Unocc.	**65.0**	°F
T-stat Throttling Range	**1.50**	°F
Diversity Factor	**100**	%
Direct Exhaust Airflow	**0.0**	CFM
Direct Exhaust Fan kW	**0.0**	kW
Thermostat Schedule	**90.1 Assembly HVAC**	
Unoccupied Cooling is	**Available**	

Supply Terminals Data:

Zone	**All**	
Terminal Type	**Diffuser**	
Minimum Airflow	**0.00**	CFM/person

Zone Heating Units:

Zone	**All**	
Zone Heating Unit Type	**None**	

Zone Unit Heat Source ..... **Electric Resistance**
Zone Heating Unit Schedule ..... **JFMAMJJASOND**

4. Sizing Data (User-Modified):

System Sizing Data:

Cooling Supply Temperature ..... **58.0** °F
Supply Fan Airflow ..... **1200.0** CFM
Ventilation Airflow ..... **0.0** CFM
Heating Supply Temperature ..... **100.0** °F

Hydronic Sizing Specifications:

Chilled Water Delta-T ..... **10.0** °F
Hot Water Delta-T ..... **20.0** °F

Safety Factors:

Cooling Sensible ..... **0** %
Cooling Latent ..... **0** %
Heating ..... **0** %

Zone Sizing Data:

Zone Airflow Sizing Method ..... **Peak zone sensible load**
Space Airflow Sizing Method ..... **Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	1200.0	-	-	

5. Equipment Data

Central Cooling Unit - Air-Cooled DX

Design OAT ..... **95.0** °F
Equipment Sizing ..... **User-Defined**
Gross Cooling Capacity ..... **42.0** MBH
ARI Performance Rating ..... **16.00** SEER
Conventional Cutoff OAT ..... **55.0** °F
Low Temperature Operation ..... **Used**
Low Temperature Cutoff OAT ..... **15.0** °F

Central Heating Unit - Combustion

Equipment Sizing ..... **User-Defined**
Gross Heating Capacity ..... **105.0** MBH
Average Efficiency ..... **81.0** %
Misc. Electric ..... **0.000** kW

Billing Details - Electric - Replace_Cond_CCoil

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:12PM

1. Component Charges

Billing Period	Energy Charges ($)	Demand Charges ($)	Customer Charges ($)	Taxes ($)	Total Charge ($)
Jan	64	0	0	0	64
Feb	57	0	0	0	57
Mar	62	0	0	0	62
Apr	62	0	0	0	62
May	73	0	0	0	73
Jun	79	0	0	0	79
Jul	111	0	0	0	111
Aug	106	0	0	0	106
Sep	74	0	0	0	74
Oct	68	0	0	0	68
Nov	61	0	0	0	61
Dec	63	0	0	0	63
Totals	880	0	0	0	880

2. Totals

Billing Period	Total Charges ($)	Total Consumption (kWh)	Avg Price ($/kWh)
Jan	64	338	0.1900
Feb	57	299	0.1900
Mar	62	329	0.1900
Apr	62	326	0.1900
May	73	384	0.1900
Jun	79	416	0.1900
Jul	111	583	0.1900
Aug	106	556	0.1900
Sep	74	388	0.1900
Oct	68	356	0.1900
Nov	61	323	0.1900
Dec	63	334	0.1900
Totals	880	4,632	0.1900

3. Consumption Totals

Billing Period	Peak (kWh)	Mid-Peak (kWh)	Normal Peak (kWh)	Off-Peak (kWh)	Overall (kWh)
Jan	0	0	0	0	338
Feb	0	0	0	0	299
Mar	0	0	0	0	329
Apr	0	0	0	0	326
May	0	0	0	0	384
Jun	0	0	0	0	416
Jul	0	0	0	0	583
Aug	0	0	0	0	556
Sep	0	0	0	0	388
Oct	0	0	0	0	356
Nov	0	0	0	0	323
Dec	0	0	0	0	334
Totals	0	0	0	0	4,632

4. Billing Demands

Billing Period	Peak (kW)	Mid-Peak (kW)	Normal Peak (kW)	Off-Peak (kW)	Overall (kW)
Jan	0.0	0.0	0.0	0.0	2.6
Feb	0.0	0.0	0.0	0.0	2.6
Mar	0.0	0.0	0.0	0.0	2.8
Apr	0.0	0.0	0.0	0.0	3.2
May	0.0	0.0	0.0	0.0	5.2
Jun	0.0	0.0	0.0	0.0	5.1
Jul	0.0	0.0	0.0	0.0	5.3
Aug	0.0	0.0	0.0	0.0	5.1
Sep	0.0	0.0	0.0	0.0	4.6
Oct	0.0	0.0	0.0	0.0	4.3
Nov	0.0	0.0	0.0	0.0	2.7
Dec	0.0	0.0	0.0	0.0	2.6

5. Maximum Demands

Billing Period	Peak (kW)	Mid-Peak (kW)	Normal Peak (kW)	Off-Peak (kW)	Overall (kW)
Jan	0.0	0.0	0.0	0.0	2.6
Feb	0.0	0.0	0.0	0.0	2.6
Mar	0.0	0.0	0.0	0.0	2.8
Apr	0.0	0.0	0.0	0.0	3.2
May	0.0	0.0	0.0	0.0	5.2
Jun	0.0	0.0	0.0	0.0	5.1
Jul	0.0	0.0	0.0	0.0	5.3
Aug	0.0	0.0	0.0	0.0	5.1
Sep	0.0	0.0	0.0	0.0	4.6
Oct	0.0	0.0	0.0	0.0	4.3
Nov	0.0	0.0	0.0	0.0	2.7
Dec	0.0	0.0	0.0	0.0	2.6

6. Time Of Maximum Demands

Billing Period	Peak (m/d/h)	Mid-Peak (m/d/h)	Normal Peak (m/d/h)	Off-Peak (m/d/h)	Overall (m/d/h)
Jan	n/a	n/a	n/a	n/a	1/1/0900
Feb	n/a	n/a	n/a	n/a	2/1/0900
Mar	n/a	n/a	n/a	n/a	3/29/1400
Apr	n/a	n/a	n/a	n/a	4/19/1700
May	n/a	n/a	n/a	n/a	5/17/1500
Jun	n/a	n/a	n/a	n/a	6/11/1600
Jul	n/a	n/a	n/a	n/a	7/19/1600
Aug	n/a	n/a	n/a	n/a	8/30/1400
Sep	n/a	n/a	n/a	n/a	9/3/1400
Oct	n/a	n/a	n/a	n/a	10/1/1500
Nov	n/a	n/a	n/a	n/a	11/1/1200
Dec	n/a	n/a	n/a	n/a	12/3/0900

Monthly Component Costs - Replace_Cond_CCoil

Hillside House-Revised
Kitchen and Associates

06/01/2010
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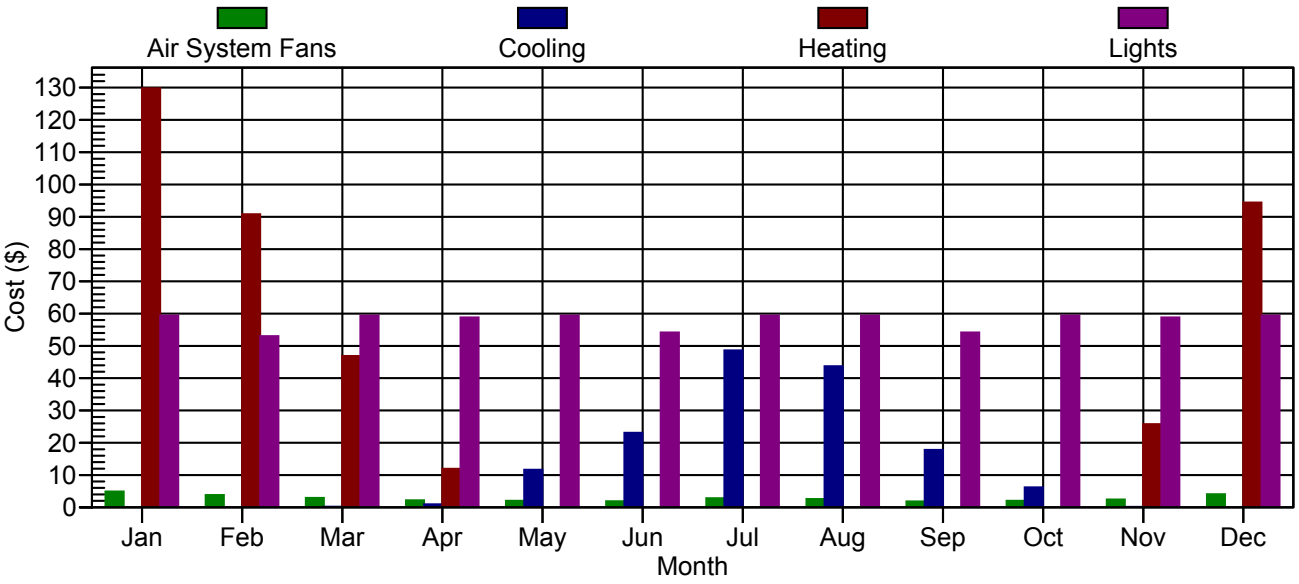

1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Cooling Towers ($)	HVAC Total ($)
January	5	0	130	0	0	135
February	4	0	91	0	0	95
March	3	0	47	0	0	50
April	2	1	12	0	0	15
May	2	12	0	0	0	14
June	2	23	0	0	0	25
July	3	49	0	0	0	52
August	3	44	0	0	0	47
September	2	18	0	0	0	20
October	2	6	0	0	0	8
November	2	0	26	0	0	28
December	4	0	94	0	0	98
Total	**33**	**152**	**400**	**0**	**0**	**585**

2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	59	0	0	0	59	194
February	53	0	0	0	53	148
March	59	0	0	0	59	109
April	59	0	0	0	59	74
May	59	0	0	0	59	73
June	54	0	0	0	54	79
July	59	0	0	0	59	111
August	59	0	0	0	59	106
September	54	0	0	0	54	74
October	59	0	0	0	59	67
November	59	0	0	0	59	87
December	59	0	0	0	59	157
Total	**695**	**0**	**0**	**0**	**695**	**1,280**

Monthly Energy Costs - Replace_Cond_CCoil

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Kitchen and Associates

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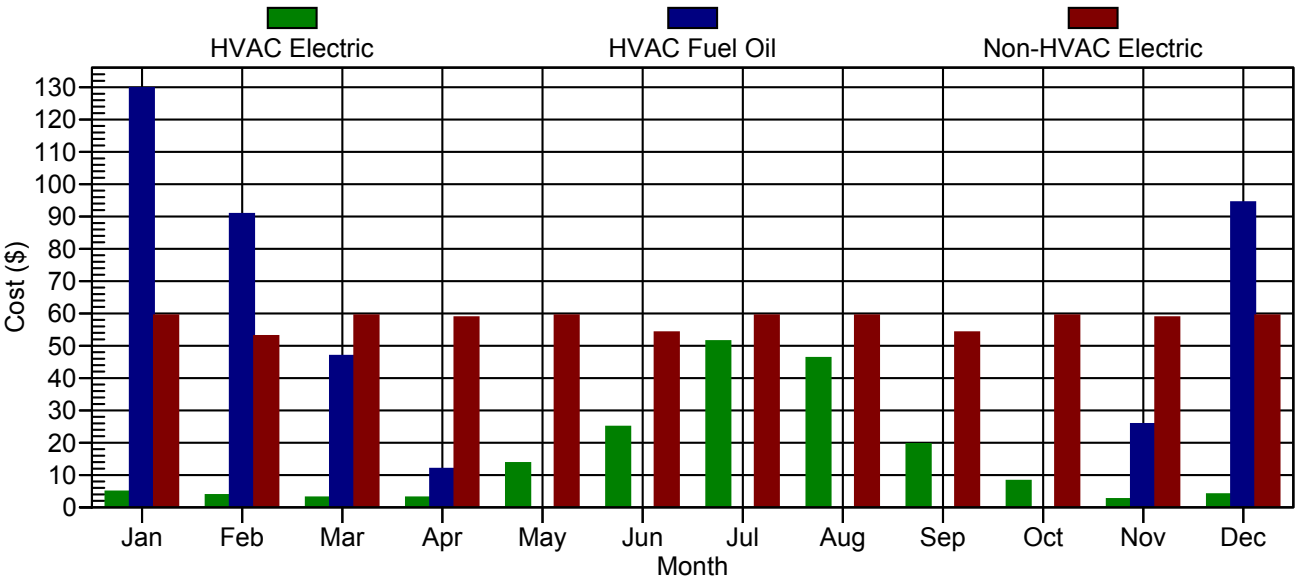


1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	5	0	130	0	0	0	0
February	4	0	91	0	0	0	0
March	3	0	47	0	0	0	0
April	3	0	12	0	0	0	0
May	14	0	0	0	0	0	0
June	25	0	0	0	0	0	0
July	51	0	0	0	0	0	0
August	46	0	0	0	0	0	0
September	20	0	0	0	0	0	0
October	8	0	0	0	0	0	0
November	3	0	26	0	0	0	0
December	4	0	94	0	0	0	0
Total	**186**	**0**	**400**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	59	0	0	0	0	0
February	53	0	0	0	0	0
March	59	0	0	0	0	0
April	59	0	0	0	0	0
May	59	0	0	0	0	0
June	54	0	0	0	0	0
July	59	0	0	0	0	0
August	59	0	0	0	0	0
September	54	0	0	0	0	0
October	59	0	0	0	0	0
November	59	0	0	0	0	0
December	59	0	0	0	0	0
Total	**695**	**0**	**0**	**0**	**0**	**0**

Monthly Energy Use by Energy Type - Replace_Cond_CCoil

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:12PM

1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (na)	Fuel Oil (Gallons)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	26	0	61	0	0	0	0
Feb	20	0	43	0	0	0	0
Mar	16	0	22	0	0	0	0
Apr	16	0	6	0	0	0	0
May	72	0	0	0	0	0	0
Jun	131	0	0	0	0	0	0
Jul	271	0	0	0	0	0	0
Aug	243	0	0	0	0	0	0
Sep	103	0	0	0	0	0	0
Oct	43	0	0	0	0	0	0
Nov	13	0	12	0	0	0	0
Dec	21	0	44	0	0	0	0
Totals	976	0	188	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (na)	Fuel Oil (Gallons)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	312	0	0	0	0	0
Feb	279	0	0	0	0	0
Mar	312	0	0	0	0	0
Apr	310	0	0	0	0	0
May	312	0	0	0	0	0
Jun	285	0	0	0	0	0
Jul	312	0	0	0	0	0
Aug	312	0	0	0	0	0
Sep	285	0	0	0	0	0
Oct	312	0	0	0	0	0
Nov	310	0	0	0	0	0
Dec	312	0	0	0	0	0
Totals	3,656	0	0	0	0	0

Monthly Energy Use by Component - Replace_Cond_CCoil

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:12PM

1. Monthly Energy Use by System Component

Component	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Air System Fans (kWh)	26	20	15	11	11	10	15	13	10	11	13	21
Cooling												
Electric (kWh)	0	0	1	5	61	122	256	230	94	33	1	0
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (Gallons)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote CW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Heating												
Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (Gallons)	61	43	22	6	0	0	0	0	0	0	12	44
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Pumps (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Clg. Tower Fans (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Lighting (kWh)	312	279	312	310	312	285	312	312	285	312	310	312
Electric Eqpt. (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0

Annual Cost Summary

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:12PM

Table 1. Annual Costs

Component	Replace_Cond_C Coil ($)
Air System Fans	33
Cooling	152
Heating	400
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**585**
Lights	695
Electric Equipment	0
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**695**
Grand Total	**1,280**

Table 2. Annual Cost per Unit Floor Area

Component	Replace_Cond_C Coil ($/ft²)
Air System Fans	0.013
Cooling	0.061
Heating	0.160
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.235**
Lights	0.279
Electric Equipment	0.000
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**0.279**
Grand Total	**0.513**
Gross Floor Area (ft²)	2492.0
Conditioned Floor Area (ft²)	2492.0

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

Table 3. Component Cost as a Percentage of Total Cost

Component	Replace_Cond_C Coil (%)
Air System Fans	2.6
Cooling	11.9
Heating	31.2
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**45.7**
Lights	54.3
Electric Equipment	0.0
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**54.3**
Grand Total	**100.0**

Table 1. Annual Costs

Component	Replace_Cond_C Coil ($)
HVAC Components	
Electric	186
Natural Gas	0
Fuel Oil	400
Propane	0
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**585**
Non-HVAC Components	
Electric	695
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**695**
Grand Total	**1,280**

Table 2. Annual Energy Consumption

Component	Replace_Cond_C Coil
HVAC Components	
Electric (kWh)	976
Natural Gas (na)	0
Fuel Oil (Gallons)	188
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	3,656
Natural Gas (na)	0
Fuel Oil (Gallons)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	4,632
Natural Gas (na)	0
Fuel Oil (Gallons)	188
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	Replace_Cond_C Coil
CO2 Equivalent (lb)	0

Table 4. Annual Cost per Unit Floor Area

Component	Replace_Cond_C Coil ($/ft²)
HVAC Components	
Electric	0.075
Natural Gas	0.000
Fuel Oil	0.160
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.235**
Non-HVAC Components	
Electric	0.279
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**0.279**
Grand Total	**0.514**
Gross Floor Area (ft²)	2492.0
Conditioned Floor Area (ft²)	2492.0

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

Table 5. Component Cost as a Percentage of Total Cost

Component	Replace_Cond_C Coil (%)
HVAC Components	
Electric	14.5
Natural Gas	0.0
Fuel Oil	31.2
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**45.7**
Non-HVAC Components	
Electric	54.3
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**54.3**
Grand Total	**100.0**

APPENDIX G

ECM-5
Replace Existing Furnace, Condensing Unit, and Cooling Coil with Higher Efficiency Units

BPU ENERGY AUDIT PROGRAM
Andover Township Hillside House
CHA Project #20997

ECM-5 Replace Existing Furnace, Condensing Unit, and Cooling Coil with Higher Efficiency Units

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		
						$ -	$ -	$ -	$ -	
Condensing Unit Demo	1	ea		$ 740.00		$ -	$ 895.40	$ -	$ 895.40	
Cooling Coil and Line-Set Demo	1	ea		$ 750.00		$ -	$ 907.50	$ -	$ 907.50	
Furnace Demo	1	ea		$ 177.00		$ -	$ 214.17	$ -	$ 214.17	
Sand Fill for Fuel Oil Tank	3	Cubic Yards	$ 23.00	$ 200.00		$ 67.62	$ 726.00	$ -	$ 793.62	
New Propane Fired Furnace	1	ea	$ 695.00	$ 221.00		$ 681.10	$ 267.41	$ -	$ 948.51	
New Aboveground Propane Storage Tank (Leased)	1	ea	$ -	$ -		$ -	$ -	$ -	$ -	
New 3.5 Ton Condensing Unit and Cooling Coil*	1	ea	$ 4,000.00	$ 686.00		$ 3,920.00	$ 830.06	$ -	$ 4,750.06	
New Refrigeration Line-Set**	1	ea	$ 276.00	$ 851.00		$ 270.48	$ 1,029.71	$ -	$ 1,300.19	
New Propane Piping	50	LF	$ 4.00	$ 4.00		$ 196.00	$ 242.00	$ -	$ 438.00	

*Material cost of condensing unit and cooling coil includes a $92/ton incentive

*Electrical wiring and ductwork modification costs are included in condensing unit and cooling coil costs.

**Refrigerant piping insulation is included in refrigeration line-set costs.

Subtotal	$ 10,247.45
10% OH, 10% Profit	$ 1,024.75
10% Contingency	$ 1,024.75
Total	$ 12,296.94

BPU ENERGY AUDIT PROGRAM
Andover Township Town Hall
CHA Project #20997

ECM-5 Replace Existing Furnace, Condensing Unit, and Cooling Coil with Higher Efficiency Units

Annual Energy Use Comparison				
	Electricity kWh	Fuel Oil Gallons	Propane Gallons*	Cost $
Existing 10 SEER Compressor and Coil with 81% Efficient Fuel Oil Furnace	1,174	188	0	$ 623
Proposed 16 SEER Compressor and Coil with 95% Efficient Propane Furnace	976	0	242	$ 588
Difference	198	188	(242)	$ 35

*The cost of propane used for these galculations is $1.66/gallon. This is the blended cost of propane currently supplied to the Hillside Barn facility that is adjacent to this building.

Replace HVAC Unit Input Data

Project Name: Hillside House-Revised
Prepared by: Kitchen and Associates

06/01/2010
05:13PM

1. General Details:

Air System Name	**Replace HVAC Unit**	
Equipment Type	**Split AHU**	
Air System Type	**Single Zone CAV**	
Number of zones	**1**	

2. System Components:

Ventilation Air Data:

Airflow Control	**Constant Ventilation Airflow**	
Ventilation Sizing Method	**Sum of Space OA Airflows**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**0**	%
Outdoor Air CO2 Level	**400**	ppm

Central Cooling Data:

Supply Air Temperature	**58.0**	°F
Coil Bypass Factor	**0.100**	
Cooling Source	**Air-Cooled DX**	
Schedule	**JFMAMJJASOND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Central Heating Data:

Supply Temperature	**100.0**	°F
Heating Source	**Combustion - Propane**	
Schedule	**JFMAMJJASOND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Supply Fan Data:

Fan Type	**Forward Curved**	
Configuration	**Blow-thru**	
Fan Performance	**0.50**	in wg
Overall Efficiency	**54**	%

Duct System Data:

Supply Duct Data:

Duct Heat Gain	**0**	%
Duct Leakage	**0**	%

Return Duct or Plenum Data:

Return Air Via	**Ducted Return**	

3. Zone Components:

Space Assignments:

Zone 1: BLD1-F001-Z01	
Replace Unit_FL1	x1
Replace Unit_FL2	x1
Replace Unit_FL3	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**80.0**	°F
Heating T-stat: Occ.	**70.0**	°F
Heating T-stat: Unocc.	**65.0**	°F
T-stat Throttling Range	**1.50**	°F
Diversity Factor	**100**	%
Direct Exhaust Airflow	**0.0**	CFM
Direct Exhaust Fan kW	**0.0**	kW
Thermostat Schedule	**90.1 Assembly HVAC**	
Unoccupied Cooling is	**Available**	

Supply Terminals Data:

Zone	**All**	
Terminal Type	**Diffuser**	
Minimum Airflow	**0.00**	CFM/person

Zone Heating Units:

Zone	**All**	
Zone Heating Unit Type	**None**	

Zone Unit Heat Source ..... **Electric Resistance**
Zone Heating Unit Schedule ..... **JFMAMJJASOND**

4. Sizing Data (User-Modified):

System Sizing Data:

Cooling Supply Temperature ..... **58.0** °F
Supply Fan Airflow ..... **1200.0** CFM
Ventilation Airflow ..... **0.0** CFM
Heating Supply Temperature ..... **100.0** °F

Hydronic Sizing Specifications:

Chilled Water Delta-T ..... **10.0** °F
Hot Water Delta-T ..... **20.0** °F

Safety Factors:

Cooling Sensible ..... **0** %
Cooling Latent ..... **0** %
Heating ..... **0** %

Zone Sizing Data:

Zone Airflow Sizing Method ..... **Peak zone sensible load**
Space Airflow Sizing Method ..... **Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	1200.0	-	-	

5. Equipment Data

Central Cooling Unit - Air-Cooled DX

Design OAT ..... **95.0** °F
Equipment Sizing ..... **User-Defined**
Gross Cooling Capacity ..... **42.0** MBH
ARI Performance Rating ..... **16.00** SEER
Conventional Cutoff OAT ..... **55.0** °F
Low Temperature Operation ..... **Used**
Low Temperature Cutoff OAT ..... **15.0** °F

Central Heating Unit - Combustion

Equipment Sizing ..... **User-Defined**
Gross Heating Capacity ..... **105.0** MBH
Average Efficiency ..... **95.0** %
Misc. Electric ..... **0.000** kW

Billing Details - Electric - Replace HVAC Unit

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:14PM

1. Component Charges

Billing Period	Energy Charges ($)	Demand Charges ($)	Customer Charges ($)	Taxes ($)	Total Charge ($)
Jan	64	0	0	0	64
Feb	57	0	0	0	57
Mar	62	0	0	0	62
Apr	62	0	0	0	62
May	73	0	0	0	73
Jun	79	0	0	0	79
Jul	111	0	0	0	111
Aug	106	0	0	0	106
Sep	74	0	0	0	74
Oct	68	0	0	0	68
Nov	61	0	0	0	61
Dec	63	0	0	0	63
Totals	880	0	0	0	880

2. Totals

Billing Period	Total Charges ($)	Total Consumption (kWh)	Avg Price ($/kWh)
Jan	64	338	0.1900
Feb	57	299	0.1900
Mar	62	329	0.1900
Apr	62	326	0.1900
May	73	384	0.1900
Jun	79	416	0.1900
Jul	111	583	0.1900
Aug	106	556	0.1900
Sep	74	388	0.1900
Oct	68	356	0.1900
Nov	61	323	0.1900
Dec	63	334	0.1900
Totals	880	4,632	0.1900

3. Consumption Totals

Billing Period	Peak (kWh)	Mid-Peak (kWh)	Normal Peak (kWh)	Off-Peak (kWh)	Overall (kWh)
Jan	0	0	0	0	338
Feb	0	0	0	0	299
Mar	0	0	0	0	329
Apr	0	0	0	0	326
May	0	0	0	0	384
Jun	0	0	0	0	416
Jul	0	0	0	0	583
Aug	0	0	0	0	556
Sep	0	0	0	0	388
Oct	0	0	0	0	356
Nov	0	0	0	0	323
Dec	0	0	0	0	334
Totals	0	0	0	0	4,632

4. Billing Demands

Billing Period	Peak (kW)	Mid-Peak (kW)	Normal Peak (kW)	Off-Peak (kW)	Overall (kW)
Jan	0.0	0.0	0.0	0.0	2.6
Feb	0.0	0.0	0.0	0.0	2.6
Mar	0.0	0.0	0.0	0.0	2.8
Apr	0.0	0.0	0.0	0.0	3.2
May	0.0	0.0	0.0	0.0	5.2
Jun	0.0	0.0	0.0	0.0	5.1
Jul	0.0	0.0	0.0	0.0	5.3
Aug	0.0	0.0	0.0	0.0	5.1
Sep	0.0	0.0	0.0	0.0	4.6
Oct	0.0	0.0	0.0	0.0	4.3
Nov	0.0	0.0	0.0	0.0	2.7
Dec	0.0	0.0	0.0	0.0	2.6

5. Maximum Demands

Billing Period	Peak (kW)	Mid-Peak (kW)	Normal Peak (kW)	Off-Peak (kW)	Overall (kW)
Jan	0.0	0.0	0.0	0.0	2.6
Feb	0.0	0.0	0.0	0.0	2.6
Mar	0.0	0.0	0.0	0.0	2.8
Apr	0.0	0.0	0.0	0.0	3.2
May	0.0	0.0	0.0	0.0	5.2
Jun	0.0	0.0	0.0	0.0	5.1
Jul	0.0	0.0	0.0	0.0	5.3
Aug	0.0	0.0	0.0	0.0	5.1
Sep	0.0	0.0	0.0	0.0	4.6
Oct	0.0	0.0	0.0	0.0	4.3
Nov	0.0	0.0	0.0	0.0	2.7
Dec	0.0	0.0	0.0	0.0	2.6

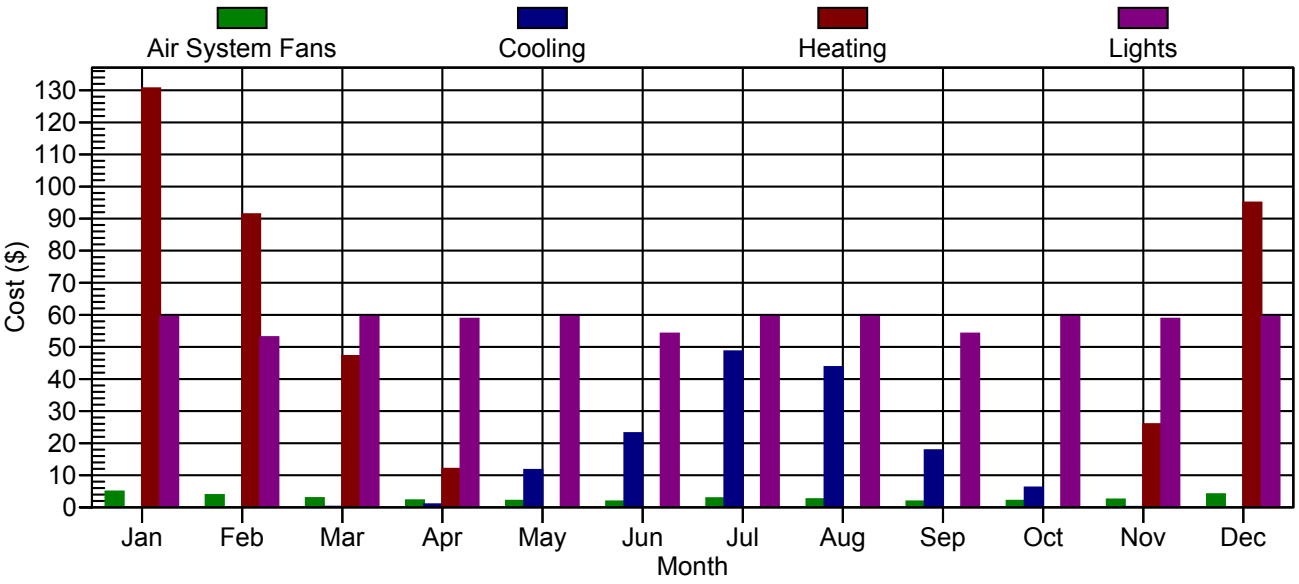
6. Time Of Maximum Demands

Billing Period	Peak (m/d/h)	Mid-Peak (m/d/h)	Normal Peak (m/d/h)	Off-Peak (m/d/h)	Overall (m/d/h)
Jan	n/a	n/a	n/a	n/a	1/1/0900
Feb	n/a	n/a	n/a	n/a	2/1/0900
Mar	n/a	n/a	n/a	n/a	3/29/1400
Apr	n/a	n/a	n/a	n/a	4/19/1700
May	n/a	n/a	n/a	n/a	5/17/1500
Jun	n/a	n/a	n/a	n/a	6/11/1600
Jul	n/a	n/a	n/a	n/a	7/19/1600
Aug	n/a	n/a	n/a	n/a	8/30/1400
Sep	n/a	n/a	n/a	n/a	9/3/1400
Oct	n/a	n/a	n/a	n/a	10/1/1500
Nov	n/a	n/a	n/a	n/a	11/1/1200
Dec	n/a	n/a	n/a	n/a	12/3/0900

Monthly Component Costs - Replace HVAC Unit

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:14PM



1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Cooling Towers ($)	HVAC Total ($)
January	5	0	131	0	0	136
February	4	0	91	0	0	95
March	3	0	47	0	0	50
April	2	1	12	0	0	15
May	2	12	0	0	0	14
June	2	23	0	0	0	25
July	3	49	0	0	0	52
August	3	44	0	0	0	47
September	2	18	0	0	0	20
October	2	6	0	0	0	8
November	2	0	26	0	0	28
December	4	0	95	0	0	99
Total	**33**	**152**	**402**	**0**	**0**	**588**

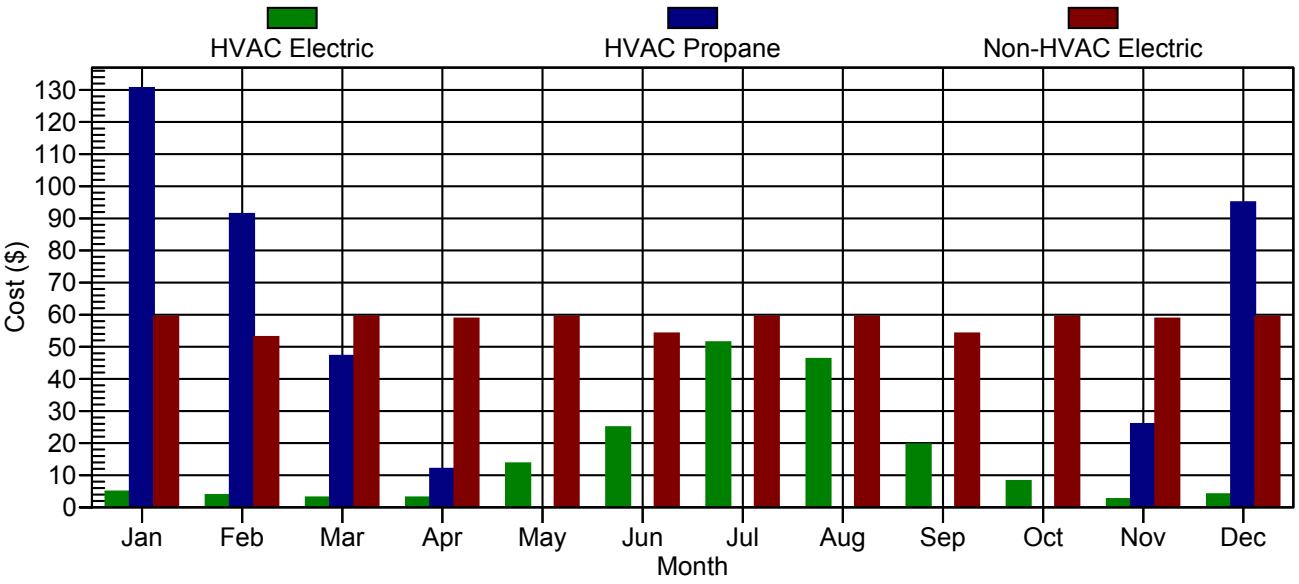
2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	59	0	0	0	59	195
February	53	0	0	0	53	148
March	59	0	0	0	59	109
April	59	0	0	0	59	74
May	59	0	0	0	59	73
June	54	0	0	0	54	79
July	59	0	0	0	59	111
August	59	0	0	0	59	106
September	54	0	0	0	54	74
October	59	0	0	0	59	67
November	59	0	0	0	59	87
December	59	0	0	0	59	158
Total	**695**	**0**	**0**	**0**	**695**	**1,282**

Monthly Energy Costs - Replace HVAC Unit

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:14PM



1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	5	0	0	131	0	0	0
February	4	0	0	91	0	0	0
March	3	0	0	47	0	0	0
April	3	0	0	12	0	0	0
May	14	0	0	0	0	0	0
June	25	0	0	0	0	0	0
July	51	0	0	0	0	0	0
August	46	0	0	0	0	0	0
September	20	0	0	0	0	0	0
October	8	0	0	0	0	0	0
November	3	0	0	26	0	0	0
December	4	0	0	95	0	0	0
Total	**186**	**0**	**0**	**402**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	59	0	0	0	0	0
February	53	0	0	0	0	0
March	59	0	0	0	0	0
April	59	0	0	0	0	0
May	59	0	0	0	0	0
June	54	0	0	0	0	0
July	59	0	0	0	0	0
August	59	0	0	0	0	0
September	54	0	0	0	0	0
October	59	0	0	0	0	0
November	59	0	0	0	0	0
December	59	0	0	0	0	0
Total	**695**	**0**	**0**	**0**	**0**	**0**

Monthly Energy Use by Energy Type - Replace HVAC Unit

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:14PM

1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (na)	Fuel Oil (na)	Propane (Gallons)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	26	0	0	79	0	0	0
Feb	20	0	0	55	0	0	0
Mar	16	0	0	28	0	0	0
Apr	16	0	0	7	0	0	0
May	72	0	0	0	0	0	0
Jun	131	0	0	0	0	0	0
Jul	271	0	0	0	0	0	0
Aug	243	0	0	0	0	0	0
Sep	103	0	0	0	0	0	0
Oct	43	0	0	0	0	0	0
Nov	13	0	0	16	0	0	0
Dec	21	0	0	57	0	0	0
Totals	976	0	0	242	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (na)	Fuel Oil (na)	Propane (Gallons)	Remote HW (na)	Remote Steam (na)
Jan	312	0	0	0	0	0
Feb	279	0	0	0	0	0
Mar	312	0	0	0	0	0
Apr	310	0	0	0	0	0
May	312	0	0	0	0	0
Jun	285	0	0	0	0	0
Jul	312	0	0	0	0	0
Aug	312	0	0	0	0	0
Sep	285	0	0	0	0	0
Oct	312	0	0	0	0	0
Nov	310	0	0	0	0	0
Dec	312	0	0	0	0	0
Totals	3,656	0	0	0	0	0

Monthly Energy Use by Component - Replace HVAC Unit

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:14PM

1. Monthly Energy Use by System Component

Component	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Air System Fans (kWh)	26	20	15	11	11	10	15	13	10	11	13	21
Cooling												
Electric (kWh)	0	0	1	5	61	122	256	230	94	33	1	0
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (Gallons)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote CW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Heating												
Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (Gallons)	79	55	28	7	0	0	0	0	0	0	16	57
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Pumps (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Clg. Tower Fans (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Lighting (kWh)	312	279	312	310	312	285	312	312	285	312	310	312
Electric Eqpt. (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (Gallons)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0

Annual Cost Summary

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:14PM

Table 1. Annual Costs

Component	Replace HVAC Unit ($)
Air System Fans	33
Cooling	152
Heating	402
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**588**
Lights	695
Electric Equipment	0
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**695**
Grand Total	**1,282**

Table 2. Annual Cost per Unit Floor Area

Component	Replace HVAC Unit ($/ft²)
Air System Fans	0.013
Cooling	0.061
Heating	0.161
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.236**
Lights	0.279
Electric Equipment	0.000
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**0.279**
Grand Total	**0.514**
Gross Floor Area (ft²)	2492.0
Conditioned Floor Area (ft²)	2492.0

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

Table 3. Component Cost as a Percentage of Total Cost

Component	Replace HVAC Unit (%)
Air System Fans	2.6
Cooling	11.9
Heating	31.4
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**45.8**
Lights	54.2
Electric Equipment	0.0
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**54.2**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:14PM

Table 1. Annual Costs

Component	Replace HVAC Unit ($)
HVAC Components	
Electric	186
Natural Gas	0
Fuel Oil	0
Propane	402
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**588**
Non-HVAC Components	
Electric	695
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**695**
Grand Total	**1,282**

Table 2. Annual Energy Consumption

Component	Replace HVAC Unit
HVAC Components	
Electric (kWh)	976
Natural Gas (na)	0
Fuel Oil (na)	0
Propane (Gallons)	242
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	3,656
Natural Gas (na)	0
Fuel Oil (na)	0
Propane (Gallons)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	4,632
Natural Gas (na)	0
Fuel Oil (na)	0
Propane (Gallons)	242
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	Replace HVAC Unit
CO2 Equivalent (lb)	0

Table 4. Annual Cost per Unit Floor Area

Component	Replace HVAC Unit ($/ft²)
HVAC Components	
Electric	0.075
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.161
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.236**
Non-HVAC Components	
Electric	0.279
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**0.279**
Grand Total	**0.515**
Gross Floor Area (ft²)	2492.0
Conditioned Floor Area (ft²)	2492.0

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

Table 5. Component Cost as a Percentage of Total Cost

Component	Replace HVAC Unit (%)
HVAC Components	
Electric	14.5
Natural Gas	0.0
Fuel Oil	0.0
Propane	31.4
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**45.8**
Non-HVAC Components	
Electric	54.2
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**54.2**
Grand Total	**100.0**

APPENDIX H

Photovoltaic (PV) Rooftop Solar Power Generation

PVWatts ***** AC Energy & Cost Savings ***** Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 90 characters.)

Station Identification	
Cell ID:	0267370
State:	New Jersey
Latitude:	40.9 ° N
Longitude:	74.7 ° W
PV System Specifications	
DC Rating:	7.00 kW
DC to AC Derate Factor:	0.770
AC Rating:	5.39 kW
Array Type:	Fixed Tilt
Array Tilt:	40.9 °
Array Azimuth:	180.0 °
Energy Specifications	
Cost of Electricity:	19.0 ¢/kWh

Results

Month	Solar Radiation (kWh/m^2/day)	AC Energy (kWh)	Energy Value ($)
1	3.13	544	103.36
2	3.93	613	116.47
3	5.04	833	158.27
4	5.30	816	155.04
5	5.57	867	164.73
6	5.80	851	161.69
7	5.48	814	154.66
8	5.46	819	155.61
9	5.29	787	149.53
10	4.74	757	143.83
11	3.43	544	103.36
12	2.98	507	96.33
Year	4.68	8752	1662.88

Output Results as Text

Saving Text from a Browser

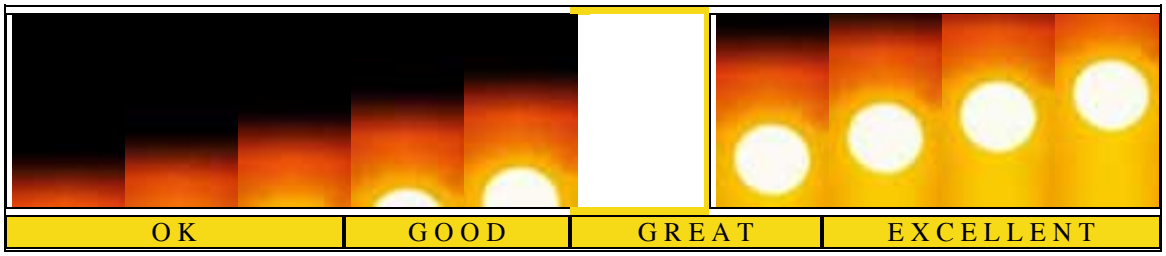
Run PVWATTS v.2 for another location

Run PVWATTS v.1

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. (4.68 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.
This is a user-entered cost. Enter 0 to return to default.

Provide 65 % of my electricity, on average, over the course of a year.

Electric Rate: $	0.19/kWh More
Monthly Electric Usage:	1,125 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 $33,360 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
ery own system.

http://www.solar-estimate.org/index.php?page=solar-installer&subpage=show&wantsolar=1&zipcode=07860

lick on the buttons to learn about our assumptions and other important information used to generate your estimate. Also, please review the
otes 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 - Sussex
Utility:	Jersey Central Power & Lt

Utility:	Co
Utility Type:	Investor-Owned Utility
Your Average Monthly Electricity Bill: (Assumed rate x average monthly useage)	$ 214 / Month
Tiered Rates Apply:	No
Time-of-Use Metering Offered:	No
Net-Metering Available:	Yes - See Notes, below!

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 5.56 kW and 8.34 kW of peak power. This estimate assumes the mid-point of this range.

Solar Rating:	**Good** 4.68 kWh/sq-m/day
Solar System Capacity Required:	6.95 kW of peak power (DC watts)
Roof Area Needed:	695 sq-ft
Equivalent Annual Production:	8,771 kWh electricity

ESTIMATED SYSTEM COST

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 7 kW peak DC power system will cost between $44,480 and $66,720. 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!	**$55,600** assuming $8 per watt DC

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	$ 67,556
NJ Solar Electric (PV) Incentive (Non-residential $ 0.80 per watt to 50 kW) » link	$ 5,560

Federal Tax Credit (30% of Gross Cost at Installation) » link	$ 16,680
Modified Accelerated Cost Recovery System (MACRS) Depreciation (5 yr) » link	**YES**
ESTIMATED NET COST:	**$ -34,196**
ESTIMATED NET COST AT INSTALLATION:	**$ 33,360**
Cash & Loan Amounts:	$ 33,360 Cash $ 0 Borrowed
Loan Monthly Payment (6.5% apr, 30 years):	$ 0

CASH FLOW

Cash Flow Breakeven is where the chart crosses the $ zero 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: Your utility offers Tiered rates and/or TOU metering. Therefore, the electricity savings you realize may exceed the annual electricity needs of your building. See the notes, below, about why you may want to choose a smaller system.	**$1,667**
Average Monthly Utility Savings: *over 25-year expected life of system*	**$233**
Average Annual Utility Savings: *over 25-year expected life of system*	**$2,798**
25-year Utility Savings:	**$69,960**
Internal Rate of Return (IRR):	**24.4%**
Net Present Value (NPV):	**$47,796**
Profitability Index:	**2.4**
Greenhouse Gas (CO2) Saved: *over 25-year system life*	**180 tons** **360,000 auto miles**

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	($55,600)					
NJ: Solar Renewable Energy Certificates (SREC)	$0	$5,530	$5,363	$5,202	$5,045	$4,893
NJ Solar Electric (PV) Incentive (Non-residential $ 0.80 per watt to 50 kW)	$5,560	$0	$0	$0	$0	$0
Federal Tax Credit (30% of Gross Cost at Installation)	$16,680	$0	$0	$0	$0	$0
Tax savings from MACRS Depreciation	$0	$2,986	$4,777	$2,866	$1,720	$1,720
Utility Savings	$0	$1,111	$1,153	$1,196	$1,242	$1,289
ANNUAL CASH FLOW	$-33,360	$9,627	$11,293	$9,265	$8,006	$7,901
Cumulative Cash Flow	$-33,360	$-23,733	$-12,440	$-3,175	$**4,831** **Breakeven**	$12,732

Year of Operation:	**6**	**7**	**8**	**9**	**10**	**11**
Gross Cost						
NJ: Solar Renewable Energy Certificates (SREC)	$4,746	$4,603	$4,465	$4,330	$4,200	$4,074
NJ Solar Electric (PV) Incentive (Non-residential $ 0.80 per watt to 50 kW)	$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	$860	$0	$0	$0	$0	$0
Utility Savings	$1,337	$1,388	$1,440	$1,495	$1,551	$1,610
ANNUAL CASH FLOW	$6,943	$5,991	$5,905	$5,825	$5,751	$5,684
Cumulative Cash Flow	$19,675	$25,666	$31,571	$37,396	$43,147	$48,831

Year of Operation:	12	13	14	15	16	17
Gross Cost				($6,255) Inverter Replaced		
NJ: Solar Renewable Energy Certificates (SREC)	$3,951	$3,832	$3,717	$3,605	$0	$0
NJ Solar Electric (PV) Incentive (Non-residential $ 0.80 per watt to 50 kW)	$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	$0	$0	$0	$0	$0	$0
Utility Savings	$1,671	$1,734	$1,799	$1,867	$1,938	$2,011
ANNUAL CASH FLOW	$5,622	$5,566	$5,516	$-783	$1,938	$2,011
Cumulative Cash Flow	$54,453	$60,019	$65,535	$64,752	$66,690	$68,701

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 $ 0.80 per watt to 50 kW)	$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	$0	$0	$0	$0	$0	$0	$0	$0

from MACRS Depreciation								
Utility Savings	$2,087	$2,166	$2,248	$2,333	$2,421	$2,513	$2,608	$2,706
ANNUAL CASH FLOW	$2,087	$2,166	$2,248	$2,333	$2,421	$2,513	$2,608	$2,706
Cumulative Cash Flow	$70,788	$72,954	$75,202	$77,535	$79,956	$82,469	$85,077	$87,783

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	95%

as % of manufacturer's rating	
Soiling, wiring & power point tracking losses	9% (91% delivered)
Inverter Efficiency	90%
Total Energy Delivered	95% x 91% x 90% = 78%

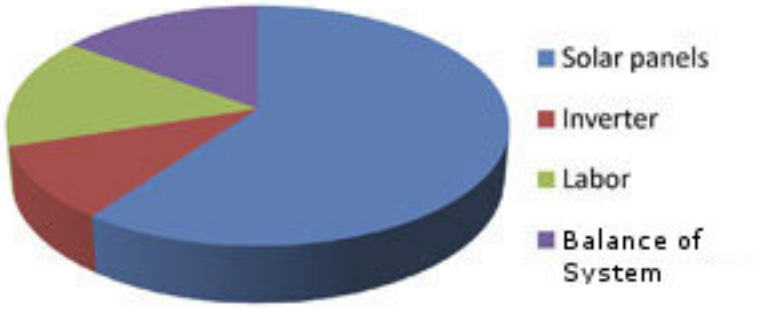
Energy Efficiency: Improving your building's energy efficiency will reduce the system size you need to attain a "net-zero" energy bill.
Tiered Rates: Often people are paying a "Tiered" rate for their electricity. This is a higher rate (higher than the "Base" rate) for electricity charged when a home 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

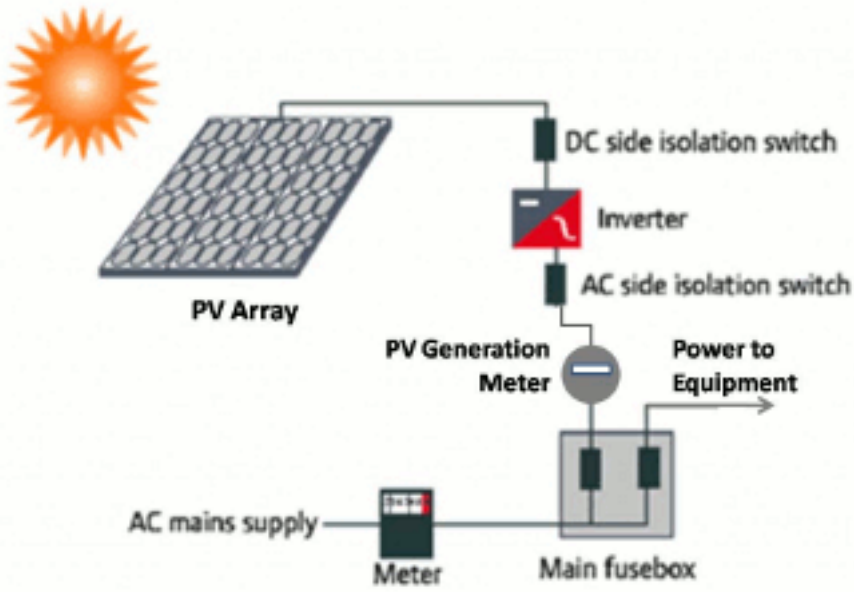
This is only an estimate based upon many assumptions and limited data entered by you: Installation costs can vary considerably. The cost to purchase and install a complete grid-tied solar photovoltaic (PV) system on a residential home is typically as further defined in the table, below. This includes 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	$10 per watt DC	$9 per watt DC

(+/- 20%) (+/- 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 & Assumptio

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

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**

APPENDIX I

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.

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)	1.8	? Water Inlet Temperature (Degrees F)	50
? Capacity (gallons)	50	? Ambient Temperature (Degrees F)	65
? Surface Area (calculated - sq ft)	19.94	? Hot Water Temperature (Degrees F)	140
? Effective R-value	16	? Hot Water Usage (Gallons per Day)	7
Energy Use			
215.5		? Heat Delivered in Hot Water (BTU/hr)	
93.47		? Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		**Electric**
0	? Overall Efficiency	0.6835
0	? Conversion Efficiency	0.98

NaN BTU/hr	? Power Into Water Heater	315.3 BTU/hr
Cost		
$ 0.40 /Therm	? Utility Rates	$ 0.19 /kWh
$ NaN	? Yearly Water Heating Cost	$ 153.696[illegible]
How Does Solar Compare?		
? Solar Water Heater Cost: $ 9300		? Percentage Solar: 70
NaN years for gas	? Payback Time for Solar System	86.4412[illegible] 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

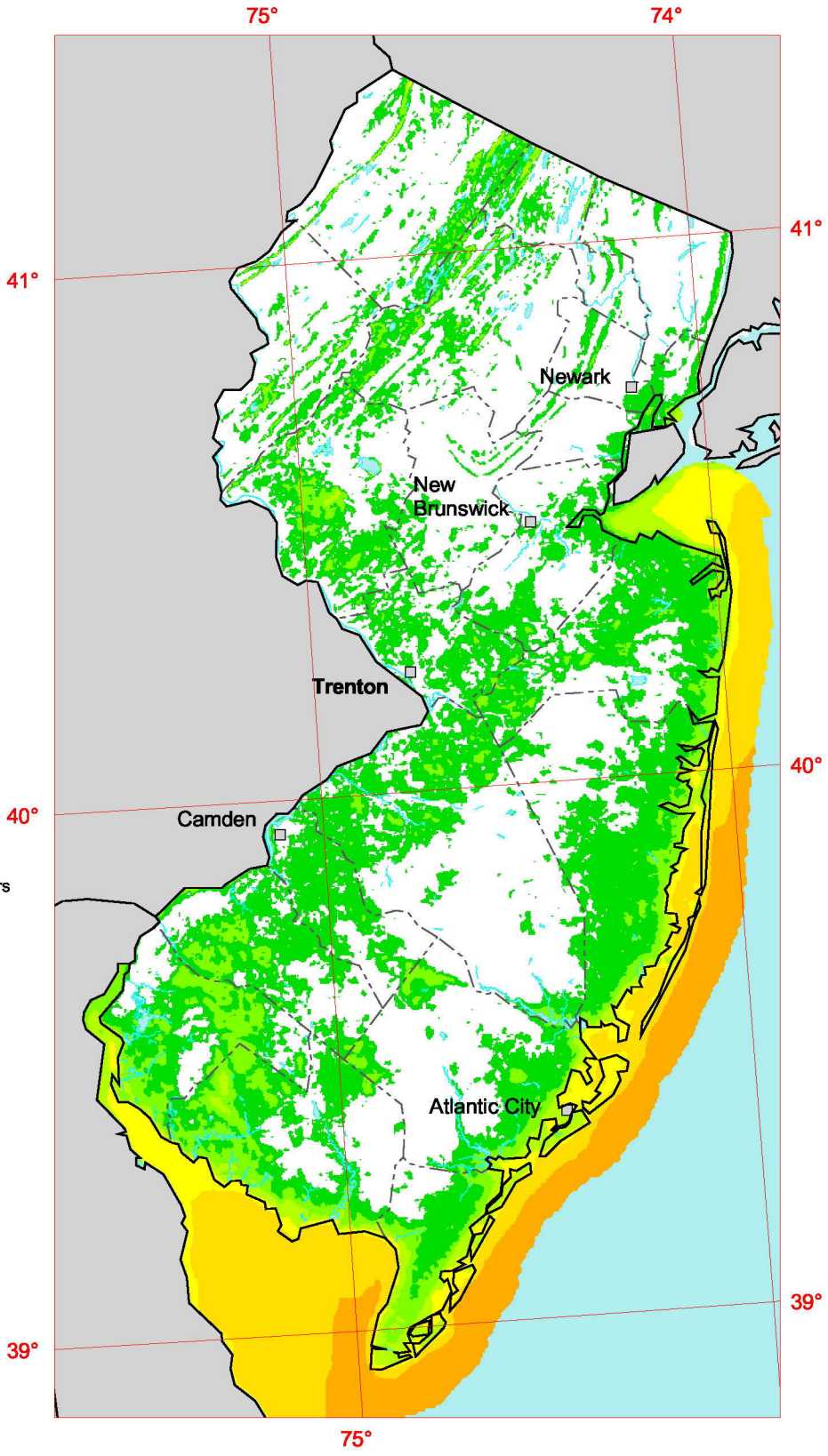
APPENDIX J

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 K

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Andover Township Hillside House

Building ID: 2315076
For 12-month Period Ending: November 30, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: May 20, 2010

Facility
Andover Township Hillside House
144 Lake Iliff Rd
Newton, NJ 07860

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1950
Gross Floor Area (ft²): 2,740

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	46,079
Fuel Oil (No. 2) (kBtu)	45,590
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	91,669

Energy Intensity[5]

Site (kBtu/ft²/yr)	33
Source (kBtu/ft²/yr)	73

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	10

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	65
National Average Source EUI	136
% Difference from National Average Source EUI	-46%
Building Type	Recreation

Stamp of Certifying Professional

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

Certifying Professional
N/A

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

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

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
Building Name	Andover Township Hillside House	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Recreation	Is this an accurate description of the space in question?		☐
Location	144 Lake Iliff Rd, Newton, NJ 07860	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		☐
Main Building (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	
Gross Floor Area	2,740 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	0(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	10Hours(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	N/A(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: FirstEnergy - Jersey Central Power & Lt Co

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
11/01/2009	11/30/2009	1,672.00
10/01/2009	10/31/2009	920.00
09/01/2009	09/30/2009	755.00
08/01/2009	08/31/2009	717.00
07/01/2009	07/31/2009	765.00
06/01/2009	06/30/2009	666.00
05/01/2009	05/31/2009	665.00
04/01/2009	04/30/2009	1,181.00
03/01/2009	03/31/2009	1,443.00
02/01/2009	02/28/2009	1,576.00
01/01/2009	01/31/2009	1,874.00
12/01/2008	12/31/2008	1,271.00
Electric Meter Consumption (kWh (thousand Watt-hours))		**13,505.00**
Electric Meter Consumption (kBtu (thousand Btu))		**46,079.06**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**46,079.06**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Fuel Oil (No. 2)

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

Start Date	End Date	Energy Use (Gallons)
11/01/2009	11/30/2009	47.50
10/01/2009	10/31/2009	23.80
09/01/2009	09/30/2009	7.90
08/01/2009	08/31/2009	0.00
07/01/2009	07/31/2009	0.00
06/01/2009	06/30/2009	0.00
05/01/2009	05/31/2009	0.00
04/01/2009	04/30/2009	15.80
03/01/2009	03/31/2009	31.60
02/01/2009	02/28/2009	79.20

01/01/2009	01/31/2009	95.00
Fuel Oil Delivery Consumption (Gallons)		**300.80**
Fuel Oil Delivery Consumption (kBtu (thousand Btu))		**41,718.10**
Total Fuel Oil (No. 2) Consumption (kBtu (thousand Btu))		**41,718.10**
Is this the total Fuel Oil (No. 2) consumption at this building including all Fuel Oil (No. 2) meters?		☐

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

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Andover Township Hillside House
144 Lake Iliff Rd
Newton, NJ 07860

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Andover Township Hillside House	
Gross Floor Area Excluding Parking: (ft^2)	2,740
Year Built	1950
For 12-month Evaluation Period Ending Date:	November 30, 2009

Facility Space Use Summary

Main Building	
Space Type	Other - Recreation
Gross Floor Area(ft^2)	2,740
Number of PCs[o]	0
Weekly operating hours[o]	10
Workers on Main Shift[o]	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 11/30/2009)	**Baseline** (Ending Date 11/30/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	33	33	0	N/A	65
Source (kBtu/ft^2)	73	73	0	N/A	136
Energy Cost					
$/year	$ 3,206.95	$ 3,206.95	N/A	N/A	$ 6,229.88
$/$ft^2$/year	$ 1.17	$ 1.17	N/A	N/A	$ 2.27
Greenhouse Gas Emissions					
$MtCO_2e$/year	10	10	0	N/A	19
$kgCO_2e/ft^2$/year	4	4	0	N/A	8

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

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

APPENDIX L

Carrier Hourly Analysis Program Base Building Data

ALT1 - Floor 1 BLD1-F001-Z01 Input Data

Project Name: Hillside House-Revised
Prepared by: Kitchen and Associates

06/01/2010
05:10PM

1. General Details:

Air System Name	**ALT1 - Floor 1 BLD1-F001-Z01**	
Equipment Type	**Split AHU**	
Air System Type	**Single Zone CAV**	
Number of zones	**1**	

2. System Components:

Ventilation Air Data:

Airflow Control	**Constant Ventilation Airflow**	
Ventilation Sizing Method	**Sum of Space OA Airflows**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**0**	%
Outdoor Air CO2 Level	**400**	ppm

Central Cooling Data:

Supply Air Temperature	**58.0**	°F
Coil Bypass Factor	**0.100**	
Cooling Source	**Air-Cooled DX**	
Schedule	**JFMAMJJASOND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Central Heating Data:

Supply Temperature	**100.0**	°F
Heating Source	**Combustion - Fuel Oil**	
Schedule	**JFMAMJJASOND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Supply Fan Data:

Fan Type	**Forward Curved**	
Configuration	**Blow-thru**	
Fan Performance	**0.50**	in wg
Overall Efficiency	**54**	%

Duct System Data:

Supply Duct Data:

Duct Heat Gain	**0**	%
Duct Leakage	**0**	%

Return Duct or Plenum Data:

Return Air Via	**Ducted Return**	

3. Zone Components:

Space Assignments:

Zone 1: BLD1-F001-Z01	
BLD1-F001-Z01	x1
BLD1-F002-Z01	x1
BLD1-F003-Z01	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**80.0**	°F
Heating T-stat: Occ.	**70.0**	°F
Heating T-stat: Unocc.	**65.0**	°F
T-stat Throttling Range	**1.50**	°F
Diversity Factor	**100**	%
Direct Exhaust Airflow	**0.0**	CFM
Direct Exhaust Fan kW	**0.0**	kW
Thermostat Schedule	**90.1 Assembly HVAC**	
Unoccupied Cooling is	**Available**	

Supply Terminals Data:

Zone	**All**	
Terminal Type	**Diffuser**	
Minimum Airflow	**0.00**	CFM/person

Zone Heating Units:

Zone	**All**	
Zone Heating Unit Type	**None**	

Zone Unit Heat Source ..... **Electric Resistance**
Zone Heating Unit Schedule ..... **JFMAMJJASOND**

4. Sizing Data (User-Modified):

System Sizing Data:

Cooling Supply Temperature ..... **58.0** °F
Supply Fan Airflow ..... **1200.0** CFM
Ventilation Airflow ..... **0.0** CFM
Heating Supply Temperature ..... **100.0** °F

Hydronic Sizing Specifications:

Chilled Water Delta-T ..... **10.0** °F
Hot Water Delta-T ..... **20.0** °F

Safety Factors:

Cooling Sensible ..... **0** %
Cooling Latent ..... **0** %
Heating ..... **0** %

Zone Sizing Data:

Zone Airflow Sizing Method ..... **Peak zone sensible load**
Space Airflow Sizing Method ..... **Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	1200.0	-	-	

5. Equipment Data

Central Cooling Unit - Air-Cooled DX

Design OAT ..... **95.0** °F
Equipment Sizing ..... **User-Defined**
Gross Cooling Capacity ..... **42.0** MBH
ARI Performance Rating ..... **10.00** SEER
Conventional Cutoff OAT ..... **55.0** °F
Low Temperature Operation ..... **Used**
Low Temperature Cutoff OAT ..... **15.0** °F

Central Heating Unit - Combustion

Equipment Sizing ..... **User-Defined**
Gross Heating Capacity ..... **105.0** MBH
Average Efficiency ..... **81.0** %
Misc. Electric ..... **0.000** kW

Billing Details - Electric - Split System - Existing

Hillside House-Revised
Kitchen and Associates

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1. Component Charges

Billing Period	Energy Charges ($)	Demand Charges ($)	Customer Charges ($)	Taxes ($)	Total Charge ($)
Jan	67	0	0	0	67
Feb	59	0	0	0	59
Mar	64	0	0	0	64
Apr	62	0	0	0	62
May	77	0	0	0	77
Jun	91	0	0	0	91
Jul	139	0	0	0	139
Aug	128	0	0	0	128
Sep	77	0	0	0	77
Oct	68	0	0	0	68
Nov	62	0	0	0	62
Dec	66	0	0	0	66
Totals	961	0	0	0	961

2. Totals

Billing Period	Total Charges ($)	Total Consumption (kWh)	Avg Price ($/kWh)
Jan	67	352	0.1900
Feb	59	310	0.1900
Mar	64	336	0.1900
Apr	62	329	0.1900
May	77	405	0.1900
Jun	91	480	0.1900
Jul	139	732	0.1900
Aug	128	676	0.1900
Sep	77	407	0.1900
Oct	68	356	0.1900
Nov	62	328	0.1900
Dec	66	346	0.1900
Totals	961	5,057	0.1900

3. Consumption Totals

Billing Period	Peak (kWh)	Mid-Peak (kWh)	Normal Peak (kWh)	Off-Peak (kWh)	Overall (kWh)
Jan	0	0	0	0	352
Feb	0	0	0	0	310
Mar	0	0	0	0	336
Apr	0	0	0	0	329
May	0	0	0	0	405
Jun	0	0	0	0	480
Jul	0	0	0	0	732
Aug	0	0	0	0	676
Sep	0	0	0	0	407
Oct	0	0	0	0	356
Nov	0	0	0	0	328
Dec	0	0	0	0	346
Totals	0	0	0	0	5,057

4. Billing Demands

Billing Period	Peak (kW)	Mid-Peak (kW)	Normal Peak (kW)	Off-Peak (kW)	Overall (kW)
Jan	0.0	0.0	0.0	0.0	2.6
Feb	0.0	0.0	0.0	0.0	2.6
Mar	0.0	0.0	0.0	0.0	2.8
Apr	0.0	0.0	0.0	0.0	3.6
May	0.0	0.0	0.0	0.0	6.0
Jun	0.0	0.0	0.0	0.0	5.9
Jul	0.0	0.0	0.0	0.0	6.1
Aug	0.0	0.0	0.0	0.0	5.8
Sep	0.0	0.0	0.0	0.0	5.3
Oct	0.0	0.0	0.0	0.0	4.8
Nov	0.0	0.0	0.0	0.0	2.6
Dec	0.0	0.0	0.0	0.0	2.6

5. Maximum Demands

Billing Period	Peak (kW)	Mid-Peak (kW)	Normal Peak (kW)	Off-Peak (kW)	Overall (kW)
Jan	0.0	0.0	0.0	0.0	2.6
Feb	0.0	0.0	0.0	0.0	2.6
Mar	0.0	0.0	0.0	0.0	2.8
Apr	0.0	0.0	0.0	0.0	3.6
May	0.0	0.0	0.0	0.0	6.0
Jun	0.0	0.0	0.0	0.0	5.9
Jul	0.0	0.0	0.0	0.0	6.1
Aug	0.0	0.0	0.0	0.0	5.8
Sep	0.0	0.0	0.0	0.0	5.3
Oct	0.0	0.0	0.0	0.0	4.8
Nov	0.0	0.0	0.0	0.0	2.6
Dec	0.0	0.0	0.0	0.0	2.6

6. Time Of Maximum Demands

Billing Period	Peak (m/d/h)	Mid-Peak (m/d/h)	Normal Peak (m/d/h)	Off-Peak (m/d/h)	Overall (m/d/h)
Jan	n/a	n/a	n/a	n/a	1/1/0900
Feb	n/a	n/a	n/a	n/a	2/1/0900
Mar	n/a	n/a	n/a	n/a	3/29/1400
Apr	n/a	n/a	n/a	n/a	4/19/1700
May	n/a	n/a	n/a	n/a	5/17/1600
Jun	n/a	n/a	n/a	n/a	6/11/1600
Jul	n/a	n/a	n/a	n/a	7/19/1700
Aug	n/a	n/a	n/a	n/a	8/30/1400
Sep	n/a	n/a	n/a	n/a	9/10/1500
Oct	n/a	n/a	n/a	n/a	10/1/1600
Nov	n/a	n/a	n/a	n/a	11/1/0900
Dec	n/a	n/a	n/a	n/a	12/3/0900

Monthly Component Costs - Split System - Existing

Hillside House-Revised
Kitchen and Associates

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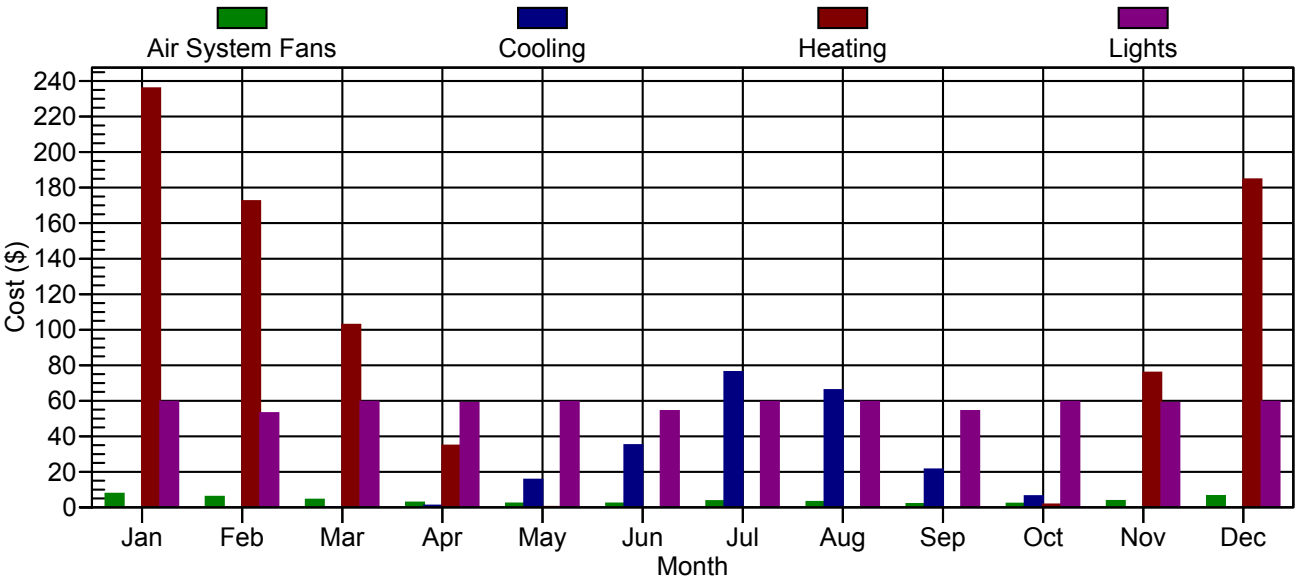


1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Cooling Towers ($)	HVAC Total ($)
January	8	0	236	0	0	244
February	6	0	172	0	0	178
March	4	0	103	0	0	107
April	3	1	35	0	0	39
May	2	16	0	0	0	18
June	2	35	0	0	0	37
July	3	76	0	0	0	79
August	3	66	0	0	0	69
September	2	21	0	0	0	23
October	2	6	2	0	0	10
November	4	0	76	0	0	80
December	6	0	185	0	0	191
Total	**45**	**221**	**808**	**0**	**0**	**1,074**

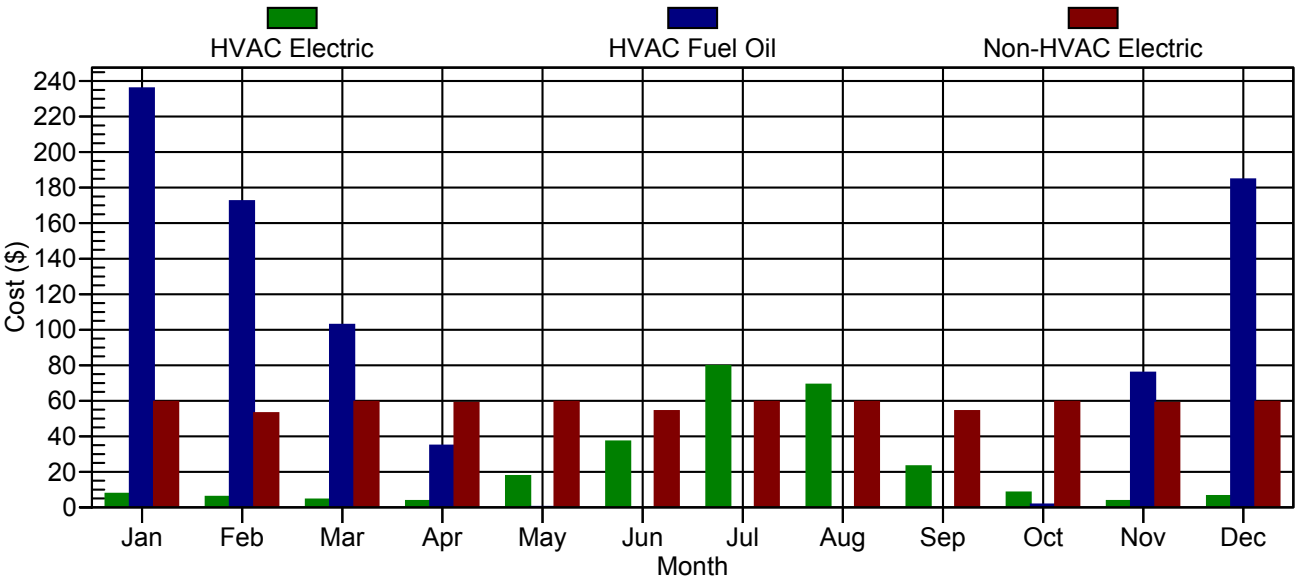
2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	59	0	0	0	59	303
February	53	0	0	0	53	231
March	59	0	0	0	59	166
April	59	0	0	0	59	98
May	59	0	0	0	59	77
June	54	0	0	0	54	91
July	59	0	0	0	59	138
August	59	0	0	0	59	128
September	54	0	0	0	54	77
October	59	0	0	0	59	69
November	59	0	0	0	59	139
December	59	0	0	0	59	250
Total	**695**	**0**	**0**	**0**	**695**	**1,769**

Monthly Energy Costs - Split System - Existing

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:10PM



1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	8	0	236	0	0	0	0
February	6	0	172	0	0	0	0
March	4	0	103	0	0	0	0
April	4	0	35	0	0	0	0
May	18	0	0	0	0	0	0
June	37	0	0	0	0	0	0
July	80	0	0	0	0	0	0
August	69	0	0	0	0	0	0
September	23	0	0	0	0	0	0
October	8	0	2	0	0	0	0
November	4	0	76	0	0	0	0
December	6	0	185	0	0	0	0
Total	**266**	**0**	**808**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	59	0	0	0	0	0
February	53	0	0	0	0	0
March	59	0	0	0	0	0
April	59	0	0	0	0	0
May	59	0	0	0	0	0
June	54	0	0	0	0	0
July	59	0	0	0	0	0
August	59	0	0	0	0	0
September	54	0	0	0	0	0
October	59	0	0	0	0	0
November	59	0	0	0	0	0
December	59	0	0	0	0	0
Total	**695**	**0**	**0**	**0**	**0**	**0**

Monthly Energy Use by Energy Type - Split System - Existing

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:10PM

1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (na)	Fuel Oil (Gallons)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	40	0	111	0	0	0	0
Feb	31	0	81	0	0	0	0
Mar	23	0	48	0	0	0	0
Apr	19	0	16	0	0	0	0
May	93	0	0	0	0	0	0
Jun	195	0	0	0	0	0	0
Jul	419	0	0	0	0	0	0
Aug	363	0	0	0	0	0	0
Sep	122	0	0	0	0	0	0
Oct	44	0	1	0	0	0	0
Nov	19	0	36	0	0	0	0
Dec	33	0	87	0	0	0	0
Totals	1,401	0	380	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (na)	Fuel Oil (Gallons)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	312	0	0	0	0	0
Feb	279	0	0	0	0	0
Mar	312	0	0	0	0	0
Apr	310	0	0	0	0	0
May	312	0	0	0	0	0
Jun	285	0	0	0	0	0
Jul	312	0	0	0	0	0
Aug	312	0	0	0	0	0
Sep	285	0	0	0	0	0
Oct	312	0	0	0	0	0
Nov	310	0	0	0	0	0
Dec	312	0	0	0	0	0
Totals	3,656	0	0	0	0	0

Monthly Energy Use by Component - Split System - Existing

Hillside House-Revised
Kitchen and Associates

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05:10PM

1. Monthly Energy Use by System Component

Component	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Air System Fans (kWh)	40	31	23	14	11	11	18	16	10	11	19	33
Cooling												
Electric (kWh)	0	0	1	5	82	184	401	347	112	33	0	0
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (Gallons)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote CW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Heating												
Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Oil (Gallons)	111	81	48	16	0	0	0	0	0	1	36	87
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0
Pumps (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Clg. Tower Fans (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Lighting (kWh)	312	279	312	310	312	285	312	312	285	312	310	312
Electric Eqpt. (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (na)	0	0	0	0	0	0	0	0	0	0	0	0
Propane (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote HW (na)	0	0	0	0	0	0	0	0	0	0	0	0
Remote Steam (na)	0	0	0	0	0	0	0	0	0	0	0	0

Annual Cost Summary

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:10PM

Table 1. Annual Costs

Component	Split System - Existing ($)
Air System Fans	45
Cooling	221
Heating	808
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**1,074**
Lights	695
Electric Equipment	0
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**695**
Grand Total	**1,769**

Table 2. Annual Cost per Unit Floor Area

Component	Split System - Existing ($/ft²)
Air System Fans	0.018
Cooling	0.089
Heating	0.324
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.431**
Lights	0.279
Electric Equipment	0.000
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**0.279**
Grand Total	**0.710**
Gross Floor Area (ft²)	2492.0
Conditioned Floor Area (ft²)	2492.0

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

Table 3. Component Cost as a Percentage of Total Cost

Component	Split System - Existing (%)
Air System Fans	2.5
Cooling	12.5
Heating	45.7
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**60.7**
Lights	39.3
Electric Equipment	0.0
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**39.3**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Hillside House-Revised
Kitchen and Associates

06/01/2010
05:10PM

Table 1. Annual Costs

Component	Split System - Existing ($)
HVAC Components	
Electric	266
Natural Gas	0
Fuel Oil	808
Propane	0
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**1,074**
Non-HVAC Components	
Electric	695
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**695**
Grand Total	**1,769**

Table 2. Annual Energy Consumption

Component	Split System - Existing
HVAC Components	
Electric (kWh)	1,401
Natural Gas (na)	0
Fuel Oil (Gallons)	380
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	3,656
Natural Gas (na)	0
Fuel Oil (Gallons)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	5,057
Natural Gas (na)	0
Fuel Oil (Gallons)	380
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	Split System - Existing
CO2 Equivalent (lb)	0

Table 4. Annual Cost per Unit Floor Area

Component	Split System - Existing ($/ft²)
HVAC Components	
Electric	0.107
Natural Gas	0.000
Fuel Oil	0.324
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.431**
Non-HVAC Components	
Electric	0.279
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**0.279**
Grand Total	**0.710**
Gross Floor Area (ft²)	2492.0
Conditioned Floor Area (ft²)	2492.0

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

Table 5. Component Cost as a Percentage of Total Cost

Component	Split System - Existing (%)
HVAC Components	
Electric	15.1
Natural Gas	0.0
Fuel Oil	45.7
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**60.7**
Non-HVAC Components	
Electric	39.3
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**39.3**
Grand Total	**100.0**

APPENDIX M

Site Aerial Image


Lake Iliff Rd
Lake Iliff Rd
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