TOWNSHIP OF SOUTH BRUNSWICK
MONMOUTH JUNCTION
FIRE DISTRICT NO. 2, STATION 21
ENERGY ASSESSMENT

for

NEW JERSEY
BUREAU OF PUBLIC UTILITIES

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CHA PROJECT NO. 20998

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APPENDICES

1.0 INTRODUCTION & BACKGROUND

This report summarizes the energy audit performed at the Monmouth Junction, Fire District No. 2, Station 21, in the Township of South Brunswick located on Georges Road in Dayton, NJ. Built in 1980, with an addition in 1991, the building is a 5,220 square foot, single story structure. The building houses fire department equipment, EMS, member's room, 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 Station 21.

2.0 EXECUTIVE SUMMARY

This report details the results of the Monmouth Junction, Fire District No. 2, Station 21, in Dayton, NJ, within the Township of South Brunswick. The 5,220 square foot, single story structure houses fire department equipment, EMS, member's room, and auxiliary spaces. The following areas were evaluated for energy conservation measures:

- Lighting upgrades with occupancy sensors
- Providing high efficiency HVAC equipment
- Demand control ventilation
- HVAC occupancy load control
- Water use reduction
- Replacing storage water heaters with instantaneous water heaters

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Measures which are recommended for implementation have a payback of 10 years or less. This threshold is considered a viable return on investment. Potential annual savings of $585 for the recommended ECMs may be realized with a payback of 3.6 years.

Due to the limited hours of use of this facility, it is difficult to identify ECMs that have a payback of 10 years or less. However, it is recommended that the township consider implementing ECMs that would increase the energy efficiency of the facility and have the recommended payback period if the building was occupied and used in a more conventional manner. Such ECMs are identified in the body of this report.

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-4 Demand Ventilation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
2,000	-	300	160	240	0.8	NA	8.3	NA

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

ECM-5 Modify Meeting Room HVAC Unit Control

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
200	-	1,000	130	350	25.3	NA	0.6	NA

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

ECM-6 Modify Electric Wall Heater Control

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
300	-	320	-	60	2.0	NA	5.0	NA

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

ECM-7 Reduced Water Use

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Water	Electricity	Total				
$	Gallons	kWh	$		$	Years	Years
15	900	50	12	7	NA	1.3	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 Monmouth Junction, Fire District No. 2, Station 21, in the Township of South Brunswick, constructed in 1982 and expanded in 1992, is a 5,220 square foot, single story structure. The building houses fire department equipment, EMS, member's room, and auxiliary spaces.

South Brunswick has a volunteer fire company. As such, this building houses no full time employee. The building is also used for various functions at different times of use. The following represents average use: Member's Room, 8 hours per day, 2 times per month, plus additional meetings, totaling 246 hours per year. Truck Bays operate approximately 26 hours per month for calls and equipment maintenance.

The building was constructed in 1982 as a two bay fire station with an additional two bays added in 1992. The building's exterior shell and roof appear to be in good condition. The exterior wall materials vary. Part of the building walls consists of 12" split face block with molded core insulation. Other parts consist of 12" smooth face block with vermiculite insulation in the block. The entrance consists of 4" brick on plywood sheathing with 6" batt insulation and ½" painted gypsum board on the interior. The interior of the exterior walls are finished with ½" gypsum board in the public areas and painted block in the engine room and auxiliary spaces. The roof is constructed of wood trusses with insulation on the ceiling below and shingles. The exterior of the "A" frame for the roof above the walls is insulated siding. All public areas have acoustical tile ceilings. The locker and shower room areas and the engine room and auxiliary space have drywall ceilings. Exterior windows are extruded aluminum frame with fixed double pane glass. Exterior doors are insulated metal. The engine room overhead doors are insulated panels. All doors appeared to have good weather-stripping.

3.2 Utility Usage

Utilities include electricity, natural gas, and potable water. Electricity and natural gas are purchased from Public Service Electric & Gas Company (PSE&G); potable water from South Brunswick Water and Sewer Authority.

During the period of December 2008 to November 2009, electric usage was approximately 25,896 kWh at a total cost of about $4,840. Review of electricity bills during this period determined the building was charged a supply unit cost of $0.12 per kWh, demand unit cost of $12.46 per kW, and blended unit cost of $0.1869 per kWh. Because the cooling equipment is only used occasionally, electricity usage throughout the year was relatively constant. During the same 2009 timeframe, the building heat and domestic hot water (DHW) produced by natural gas-fired equipment required approximately 2,348 therms. Based on the annual cost of $2,910, the blended price for natural gas was $1.24 per therm. Natural gas consumption is highest in the winter months to produce building heat. Water bills during that same period equaled a consumption of 9,000 gallons at a total cost of $76. The base charge was $13.37 per quarter regardless of use. The average unit cost was $2.62/kgallons. Utility data can be found in Appendix A.

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

3.3 HVAC Systems

Ventilation and air conditioning is provided to the member's room by a split system utilizing a Central Environmental Systems gas-fired furnace with closed combustion and rated at 94% efficiency, a Lennox duct cooling coil, and a 10 SEER York condensing unit mounted on grade.

In total, the meeting room split system supplies 1,000 CFM air, including 400 CFM of outdoor air (OA).

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

Equipment	Cooling Tons	Heating MBH Input/Output	Area Served
Furnace and Duct Cooling Coil	3	50 / 47	Member's Room
Unit Heater (4 Total)	-	60 / 48	Engine Bays (2 in Old, 2 in New)
Radiant Heater	-	25 / 25	Compressor Room
Electric Wall Heater (2 Total)	-	1.5 kW	Restrooms

The new and existing engine bay's heat is generated by four Modine, gas-fired, unit heaters. In the compressor room, heat is generated by a Reznor, gas-fired, radiant panel. Each restoom has an electric wall heater.

There are 9 exhaust fans located throughout the building serving the restroom, engine decks, and member's room. Four of the nine exhaust fans are truck exhaust systems, two in each engine deck area.

The equipment is original to the building and was installed in 1982 and 1992 (18 to 28 years old). Service life is estimated at 15 years for split systems of this type and 13 years for gas fired unit heaters. A list of HVAC equipment can be found in Appendix B.

3.4 Lighting/Electrical Systems

The majority of lighting fixtures throughout the facility utilize two energy inefficient T-12 fluorescent lamps. There are a combined 30 inefficient T-12 fixtures throughout the facility. All exit signs (five) within the building use 2-15 watt incandescent lamps.

Exterior building lighting, located at exterior doors, includes metal halide lamps and A-lamps in decorative fixtures. Site lighting consists of pole mounted high pressure sodium lamps in the parking areas.

Emergency power is provided by a 30 kW, gas-fired, Onan generator. The unit powers the entire building except for the air conditioning compressors. The unit is located outdoors on the north side of the building.

3.5 Control Systems

3.5.1 HVAC Controls

The furnace and duct cooling coil combination serving the member's room is controlled by a wall-mounted, programmable thermostat with occupied and unoccupied cycle.

Unit heaters, radiant heater, and electric wall heaters are each controlled by their own wall mounted thermostat.

Following are the existing occupied and unoccupied heating and cooling setpoints for each piece of HVAC equipment:

Equipment	Heating Occ/Unocc	Cooling Occ/Unocc	Occupied Hours
Furnace and Cooling Coil	70°F / 60°F	75°F / 85°F	246
Engine Bay Unit Heaters	60°F / 60°F	-	312
Compressor Room Radiant Panel	60°F / 60°F	-	104
Restroom Electric Wall Heaters	70°F / 70°F	-	312

The toilet room exhaust fan runs continuously when lights are turned on. All exhaust fans, including engine exhaust systems, are controlled by manual switches.

3.5.2 Lighting Controls

Most lighting in the fire department building is controlled by manual wall switches. A single fixture in each engine bay is controlled by a photocell to provide a light source at all times in that area. Exterior lighting is controlled by a combination of photocells and switches.

3.6 Plumbing Systems

Domestic hot water for the facility is produced by two, electric, water heaters. A 20 gallon, electric, water heater is mounted on a steel wall bracket in Engine Bay No. 4 and provides hot water for the service sink located below. A 40 gallon, 40 MBH, water heater is located on a platform above the restrooms and provides hot water for the lavatories, shower, service sink, and kitchenette sink. The kitchenette sink is the most distant fixture, located approximately 50 feet from the water heater. There is no hot water circulation loop. Plumbing fixtures include 1.6 gallon per flush water closets; wall-hung restroom sinks; urinals ADA compliant showers; kitchen sink; service sinks; and exterior non-freeze wall hydrants. All fixtures do not exceed the allowable maximum water flow requirements of the adopted plumbing codes.

3.7 Miscellaneous Equipment

There are two air compressors located in the facility. One is used to fill the “Scott-Pak” and is rated at 10 HP. The second is for general use and truck maintenance and is rated at 5 HP. Both compressor units are in good condition with no noticeable leakage.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Lighting Fixture Modifications

The facility has 24 fixtures which utilize T-12 lamps; 12 are in the old engine bay, 9 are in the new engine bay, 6 are in the member's room, 2 are in the compressor room, and one is located in the men's restroom. Overall energy consumption can be reduced by replacing these fixtures to utilize more efficient T-8 lamps. The building also has 4 exit signs that currently have 16 watt fluorescent bulbs. Exit sign energy consumption can be greatly reduced by replacing these lamps with energy efficient LED lamps.

Energy savings for this measure were calculated by applying the existing and proposed fixture wattages to the estimated time of operation. The difference resulted in an annual savings of 1,500 kWh per year, or $300 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 23,000 kWh and $4,000.

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
4,300	-	1,500	0	300	0.1	900	14.3	11.3

* There is no incentive available through the New Jersey Smart Start program's Prescriptive Lighting Application for this ECM.

This measure does not meet the required payback period because the current operational hours of the lighting fixtures are extremely low. However, it is recommended that replacement of these fixtures for overall energy efficiency be considered.

4.2 ECM-2 Lighting Control Modifications

Lighting equipped with occupancy sensors are very effective in reducing unoccupied energy use. This ECM proposes the addition of four wall-mounted occupancy sensors in rooms that are not continuously occupied throughout the day.

The weekly occupied times for each space was determined by taking into account typical traffic patterns for the building as provided through interviews with the end user. Applying the existing and proposed operating times to the combined wattage requirements for each room's lighting fixtures, the energy reduction in kWh per year and operational savings per year were determined. Because the occupancy sensors were being applied to lighting that was proposed to be revised in ECM-1, the savings were determined for both the existing and the replacement fixtures. For the existing fixtures, it was determined that about 50 kWh per year, or $9 per year, can be saved through implementation of this ECM. When this ECM is applied to fixtures modified by the proposal ECM-1, it was determined that about 40 kWh per year, or $7per 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:

Existing fixtures: 700 kWh and $130
Proposed fixtures: 600 kWh and $110

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

ECM-2 Lighting Control Modifications (Existing Fixtures)

Budgetary Cost	Annual Utility Savings				ROI (with Incentive)	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
450	0	50	0	10	(0.7)	80	>25	>25

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

ECM-2 Lighting Control Modifications (Proposed Fixtures)

Budgetary Cost	Annual Utility Savings				ROI (with Incentive)	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
450	0	40	0	10	(0.7)	80	>25	>25

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

This measure does not meet the required payback period because the current operational hours of the lighting fixtures are already extremely low. Payback for this ECM is an unreasonable length of time. If it is determined that lights in the member's room or restrooms are mistakenly left on for extended periods of time, the payback period on the occupancy sensors will be greatly reduced. However, it is recommended installation of occupancy sensors for overall energy efficiency be considered.

4.3 ECM-3 Replace HVAC Split System with Higher SEER Units

Seasonal energy efficiency rating (SEER) is the value used to determine an air conditioner's energy efficiency. SEER is a ratio of the typical cooling output and the electrical input. The larger the SEER value, the more energy efficient the unit is. As of 2005, units manufactured in the United States must have a minimum SEER value of 13. The existing condensing unit serving the member's room is 15 years old, at the end of its life expectancy, and has a SEER rating of 10. By replacing the existing unit with one that has a SEER rating of 16, the energy consumption of the unit will be reduced by approximately 37%.

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 refrigeration line-set must be installed in place of the removed units. R-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.

If the occupancy of this room increases in the future, the savings from this ECM will be even greater.

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 the building model is located in Appendix O.

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

ECM-3 Replace HVAC Split System with Higher SEER Units

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
9,500	0	300	-	60	(0.9)	300	>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-ton, 16 SEER compressor.

This measure does not meet the required payback period because the current operational hours of the member's room are extremely low. However, it is recommended 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 R-22 is being phased out of use.

4.4 ECM-4 Demand Ventilation

The member's room is served by a gas-fired furnace, with a supply air rate of 1,000 CFM, including 400 CFM of outside air (OA). The unit draws fresh air in through an OA intake and blends it with return air prior to being treated and discharged into the room. The existing system constantly ventilates the space for maximum occupancy. If the space is occupied at less than the design level, the space is still ventilated at the maximum level. Because there is no control on the fresh air intake, the same amount of OA is treated regardless of the ventilation demand determined by space occupancy. Utilizing a demand control ventilation (DCV) system would regulate the amount of OA induced into the space based on the CO_2 levels detected within the room or return air duct. A DCV system is based on the principle that the number of people within the space is proportional to the concentration of CO_2. Controlling the outdoor air amount based on CO_2, the DCV system offers the possibility of reducing the energy consumption by reducing the over-ventilation periods during low occupancy. This ECM evaluates providing only the required fresh air to the space, decreasing the amount of OA to be treated, and reducing the annual heating and cooling loads.

The member's room is provided with 400 CFM of OA. Based on the occupancy schedule for the space and capabilities of the furnace, it was determined that the typical required amount of OA needed to serve the member's room is approximately 100 CFM. Utilizing a DCV system for the Member's Room, the required OA can be reduced to 100 CFM during occupied operating time in lieu of 400 CFM, yielding an annual savings of 158 therms and 305 kWh, or $239.

Implementation of this measure requires installation of OA controls on the furnace the member's room. This includes installing a CO_2 sensor within the return air duct, wiring and connections between the sensor and the unit, and reprogramming the unit's logic controller so that the unit can control the OA

damper positions based on the CO_2 readings. The existing dampers are considered to be in good condition and will be retrofitted with a modulating motor for more precise damper control.

The DCV equipment has an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 2,370 therms, 4,575 kWh, and $3,585.

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 the building model is located in Appendix O.

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

ECM-4 Demand Ventilation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
2,000	-	300	160	240	0.8	NA	8.3	NA

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

This measure is recommended.

4.5 ECM-5 Modify Meeting Room HVAC Unit Control

Heating and cooling in the member's room is currently controlled by a wall mounted, programmable thermostat. However, because the space is utilized on a non-consistant basis, it is difficult at best to preset the occupied and unoccupied time periods. Because of this, manual operation of the thermostat is the norm. A user will set the thermostat to heating or cooling for the duration of their time in the space. When the user is finished, and the space will be unoccupied, the occupant must remember to manually set the thermostat back to the unoccupied mode temperature. In a perfect world the thermostat would be set back every time, but it is unreasonable to assume that this is the case. Because the space is used so infrequently, the unoccupied space may be conditioned, consuming a large amount of energy, for quite some time before the thermostat will set back.

The installation of a timer override allows the space to be conditioned for a set length of time without the potential to heat or cool the space while it is unoccupied. The analysis of this ECM was conservative compared with the potential amount of time that the unit may run.

Utilizing a programmable thermostat with a timer override in the member's room, a potential annual savings of 85 therms and 902 kWh, or $273 can be realized.

A programmable thermostat has an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 1,275 therms and 13,530 kWh, or $4,095.

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 the building model is located in Appendix O.

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

ECM-5 Modify Meeting Room HVAC Unit Control

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
200	-	1,000	130	350	25.3	NA	0.6	NA

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

This measure is recommended.

4.6 ECM-6 Modify Electric Wall Heater Control

The restroom electric heaters are currently controlled by internal thermostats. The heaters only have one set-point and heat the restrooms to a constant 70 °F throughout the heating season. The restrooms are frequently unoccupied due to the typical building usage and do not need to be heated to 70 °F at all times. By installing a duel setting, line voltage, thermostat that changes over from the low setting of 50 °F to a high setting of 70 °F when the lights are energized, heating the space during unoccupied time periods will be eliminated.

Utilizing two dual setting, line voltage thermostats in the restrooms, a potential annual savings of 319 kWh, or $61 can be realized.

A dual setting thermostat has an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 4,785 kWh, or $909.

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

ECM-6 Modify Electric Wall Heater Control

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
300	-	320	-	60	2.0	NA	5.0	NA

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

This measure is recommended.

4.7 ECM-7 Reduce Water Use

The facility's restroom has a showerhead with a flow rate of 2.5 gallons per minute. Overall water consumption can be reduced by replacing these showerheads with fixtures that have a flow rate of 1.6 gallons per minute. The average annual operation of the showers was determined by taking into account typical traffic patterns of the facility. Because the shower is used so infrequently, the savings over the life of the shower head, including water consumption and electricity to generate hot water, is only $30.

Assuming a budgetary cost of $40 per shower head, replacing this fixture is not recommended because of the infrequent use.

The kitchenette sink has a faucet with a flow rate of 2.2 gallons per minute. Overall water consumption can be reduced by installing a 0.5 gallon per minute aerator on the faucet outlet. The average annual operation of the kitchenette sink was determined by taking into account typical traffic patterns of the facility. Annual savings by utilizing the aerator on the faucet are $3 per year in water savings and $9 per year in electricity savings. An aerator is a low cost solution that can be installed during normal building maintenance.

An aerator has an expected life of 10 years, and the total energy savings over the life of the project are estimated at 8,840 gallons and $99.

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

ECM-7 Reduced Water Use

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Water	Electricity	Total				
$	Gallons	kWh	$		$	Years	Years
15	900	50	12	7	NA	1.3	NA

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

This measure is recommended.

4.8 ECM-8 Replace Storage Water Heater with Instantaneous Water Heaters

The facility has two storage type water heaters that generate hot water for the plumbing fixtures. Storage type water heaters consume energy at two different instances. The first is when there is hot water draw at a fixture. The water is replenished in the tank with cold water and is brought back to the storage temperature. The other time that a storage type water heater consumes energy is to make up for standby losses. Standby losses occur because of the temperature differential between the storage temperature of the water and the ambient air temperature. Although this temperature loss is slowed by water heater insulation, the water heater must input more energy to make up for the water temperature drop.

To prevent standby losses, instantaneous, point-of-use, water heaters are recommended for the plumbing fixtures in the facility. Because there is no storage tank, standby losses are eliminated. Instantaneous water heaters do consume a larger energy draw to heat the same amount of water because of the rapid temperature rise required. While this is usually less than the standby losses, when large flow fixtures such as showers and service sinks are used as frequently as the low flow fixtures, the energy draw can become larger than the standby losses of the storage type water heater. A hybrid system that utilizes smaller storage tanks for the large flow fixtures and point-of-use heaters for the low flow fixtures is an option, but, because of the infrequent use of the fixtures in general, the payback period is too long.

The calculations, implementation and savings related to this ECM are presented in Appendix J and summarized on the following page:

ECM-8 Replace Storage Water Heater with Instantaneous Water Heaters

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
3,100	-	(85)	100	110	(0.5)	NA	28.1	NA

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

This ECM is not recommended because of the fixture flow rates and frequency of use.

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 only eligible for one incentive 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 $260. Implementation of the energy conservation measures discussed in this report is expected to reduce the building's energy usage by less than 15% which does not qualify it for incentives #2 or #3.

5.2.2 New Jersey Smart Start Program

The South Brunswick Fire District No. 2, Station 21 building is eligible for incentives from the New Jersey Smart Start Program.

The lighting control modifications ECM is eligible for about $80 in incentive money for the addition of four motion sensor lighting controls. Because of the operational hours of the building, it was determined that this ECM does not satisfy the payback period requirements set forth. If the operational hours of the building were to increase, this is an incentive that should be pursued.

5.2.3 Energy Efficient and Conservation Block Grant

The South Brunswick Station 21 building 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 facility, it was determined that the facility is paying the societal benefits charge. This facility 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 gas-fired furnaces with a duct cooling coil. 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 fire department 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 L. Additionally, further financial analysis was provided by www.solar-estimate.org. The result of this analysis is also located in Appendix L.

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 12.9 kW and a minimum of 7.0 kW over the previous 12 months. The monthly average over the observed 12 month period was 10.4 kW. Because the most frequent monthly demand is approximately 10.7 kW, a 10.7 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 K and summarized below:

Photovoltaic (PV) Rooftop Solar Power Generation – 10.7 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
85,600	0	13,300	0	2,500	2,500	10,700	6,500	>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 fire department building 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. DHW is presently produced by a natural gas fired water heater and, therefore, this measure would not 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 South Brunswick does not pay Federal taxes and, therefore, would not benefit from this program.

The implementation cost and savings related to this ECM are presented in Appendix L and summarized 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	500	0	90	90	NA	>25	NA

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

This measure is not recommended.

6.3 Wind

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

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

To avoid turbulence and capture greater wind energy, turbines are mounted on towers. Turbines should be mounted at least 30 feet above any structure or natural feature within 300 feet of the installation. Smaller turbines can utilize shorter towers. For example, a 250-watt turbine may be mounted on a 30-50 foot

tower, while a 10 kW turbine will usually need a tower of 80-120 feet. Tower designs include tubular or latticed, guyed or self-supporting. Wind turbine manufacturers also provide towers.

The New Jersey Clean Energy Program for small wind installations has designated numerous pre-approved wind turbines for installation in the State of New Jersey. Incentives for wind turbine installations are based on kilowatt hours saved in the first year. Systems sized under 16,000 kWh per year of production will receive a $3.20 per kWh incentive. Systems producing over 16,000 kWh will receive $51,200 for the first 16,000 kWh of production with an additional $0.50 per kWh up to a maximum cap of 750,000 kWh per year. Federal tax credits are also available for renewable energy projects up to 30% of installation cost for systems less than 100 kW. However, as noted previously, municipalities do not pay federal taxes and is, therefore, not eligible for the tax credit incentive.

The most important part of any small wind generation project is the mean annual wind speed at the height of which the turbine will be installed. In the Monmouth Junction area, the map indicates a mean annual wind speed of less than 4.5 meters per second, less than 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 M.

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 PSE&G, 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 fire department building had a monthly average kW demand of 10.43 kW and a maximum demand of 12.9 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.

The facility is considered a moderate energy consumer per the Portfolio Manager with a Site Energy Usage Index (EUI) of 62 kBTU/ft^2/year. In comparison, the national average site EUI is 78 kBTU/ft^2/year. The building's EUI is much lower than the national average because the building is rarely used when compared to a building that operates 40 hours per week. In addition, the national average includes a large variety of buildings that are classified as "Other." Before the additional measures discussed in this report are implemented, there is already a large lighting load reduction because of the rates of occupancy throughout the building.

If the recommended measures are implemented, ECM-4, ECM-5, ECM-6, and ECM-7, the facility's EUI will be reduced from 62 kBTU/ft^2/year to 55 kBTU/ft^2/year. If the facility were occupied more frequently, the energy conservation methods would have a greater effect.

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 a building rated 75 and the national average for all buildings designated "Other" as follows:

Energy Performance Comparison

	Evaluation Period	Comparisons	
Performance Metrics	Baseline (Ending date 11/31/2009)	Rating of 75	National Average
Energy Intensity			
Site (kBtu/ft^2)	62	0	78
Source (kBtu/ft^2)	104	0	157
Energy Cost			
$/year	$7,750.54	N/A	$9,766.43
$/$ft^2$/year	$1.48	N/A	$1.86
Greenhouse Gas Emissions			
$MtCO_2e$/year	26	0	33
$kgCO_2e/ft^2$/year	5	0	6

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

The user name and password for the facility's EPA Portfolio Manager Account has been provided to Douglas A. Wolfe, Fire Service Coordinator for Monmouth Junction.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Monmouth Junction, Fire District No. 2, Station 21, in the Township of South Brunswick, New Jersey identified potential ECMs for lighting fixture upgrades, lighting fixture control modifications, HVAC unit upgrades, demand ventilation control, HVAAC unit controls, water use reduction, and domestic hot water system revisions. Potential annual savings of $662 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-4 Demand Ventilation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
2,000	-	300	160	240	0.8	NA	8.3	NA

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

ECM-5 Modify Meeting Room HVAC Unit Control

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
200	-	1,000	130	350	25.3	NA	0.6	NA

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

ECM-6 Modify Electric Wall Heater Control

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
300	-	320	-	60	2.0	NA	5.0	NA

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

ECM-7 Reduced Water Use

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Water	Electricity	Total				
$	Gallons	kWh	$		$	Years	Years
15	900	50	12	7	NA	1.3	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

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

Electricity Cost Summary: Meter #226002587												
Period	Service Charge	Annual Demand kw	Summer Demand kw	Delivery kWh	Societal Benefits kWh	Securitization Transition kWh	Delivery Total	Generation kw	Transmission kw	Supply kWh	Supply Total	Total
December	$ 4.24	$ 32.71		$ 19.14	$ 17.27	$ 23.73	$ 97.09	$ 45.43	$ 15.22	$ 204.10	$ 264.75	$ 361.84
January	$ 4.24	$ 48.29		$ 20.91	$ 18.65	$ 25.58	$ 117.67	$ 45.31	$ 14.67	$ 220.11	$ 280.09	$ 397.76
February	$ 4.24	$ 27.26		$ 19.24	$ 17.16	$ 23.67	$ 91.57	$ 45.29	$ 14.58	$ 215.50	$ 275.37	$ 366.94
March	$ 4.24	$ 36.99		$ 17.32	$ 15.45	$ 21.31	$ 95.31	$ 45.29	$ 14.58	$ 191.43	$ 251.30	$ 346.61
April	$ 4.24	$ 44.78		$ 19.14	$ 17.07	$ 23.54	$ 108.77	$ 45.29	$ 14.58	$ 206.76	$ 266.63	$ 375.40
May	$ 4.27	$ 50.51		$ 17.18	$ 15.23	$ 21.00	$ 108.19	$ 45.29	$ 14.58	$ 181.88	$ 241.75	$ 349.94
June	$ 4.27	$ 47.05	$ 87.30	$ 26.20	$ 13.60	$ 18.76	$ 197.18	$ 49.93	$ 14.35	$ 193.72	$ 258.00	$ 455.18
July	$ 4.27	$ 47.83	$ 88.76	$ 33.22	$ 17.25	$ 23.79	$ 215.12	$ 50.46	$ 14.32	$ 259.07	$ 323.85	$ 538.97
August	$ 4.27	$ 32.15	$ 59.66	$ 29.47	$ 15.13	$ 20.44	$ 161.12	$ 50.46	$ 14.32	$ 219.62	$ 284.40	$ 445.52
September	$ 4.27	$ 45.08	$ 83.67	$ 31.17	$ 16.01	$ 21.56	$ 201.76	$ 50.46	$ 14.67	$ 226.95	$ 292.08	$ 493.84
October	$ 4.27	$ 36.46		$ 17.02	$ 14.49	$ 19.69	$ 91.93	$ 51.21	$ 14.71	$ 171.28	$ 237.20	$ 329.13
November	$ 4.27	$ 40.38		$ 20.84	$ 17.57	$ 24.04	$ 107.10	$ 51.23	$ 14.71	$ 206.11	$ 272.05	$ 379.15
Totals	$ 51.09	$ 489.49	$ 319.39	$ 270.85	$ 194.88	$ 267.11	$ 1,592.81	$ 575.65	$ 175.29	$ 2,496.53	$ 3,247.47	$ 4,840.28

PSE&G Rate Schedule "GLP"

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21

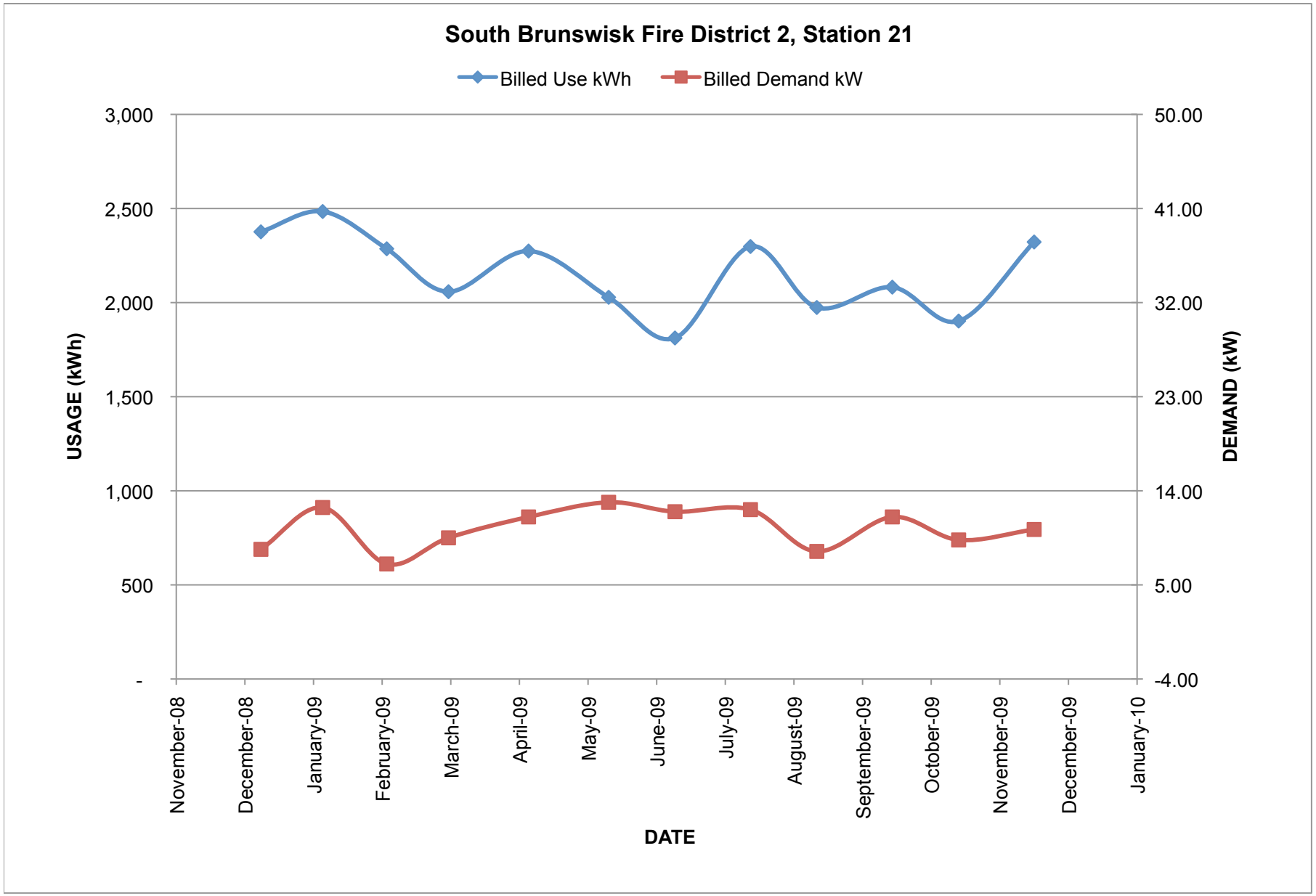
CHA Project # 20998

Electricity Cost Summary: Meter #226002587						
Period	Billed Use	Billed Demand	Total Cost	Demand Unit Cost	Suppy Unit Cost	Blended Cost
	kWh	kW	$	$/kW	$/kWh	$/kWh
December-08	2,376	8.40	$ 361.84	$ 11.11	$ 0.11	$ 0.1523
January-09	2,484	12.40	$ 397.76	$ 8.73	$ 0.11	$ 0.1601
February-09	2,286	7.00	$ 366.94	$ 12.45	$ 0.12	$ 0.1605
March-09	2,058	9.50	$ 346.61	$ 10.20	$ 0.12	$ 0.1684
April-09	2,274	11.50	$ 375.40	$ 9.10	$ 0.12	$ 0.1651
May-09	2,028	12.90	$ 349.94	$ 8.56	$ 0.12	$ 0.1726
June-09	1,812	12.00	$ 455.18	$ 16.55	$ 0.14	$ 0.2512
July-09	2,298	12.20	$ 538.97	$ 16.51	$ 0.15	$ 0.2345
August-09	1,974	8.20	$ 445.52	$ 19.10	$ 0.14	$ 0.2257
September-09	2,082	11.50	$ 493.84	$ 16.86	$ 0.14	$ 0.2372
October-09	1,902	9.30	$ 329.13	$ 11.01	$ 0.12	$ 0.1730
November-09	2,322	10.30	$ 379.15	$ 10.32	$ 0.12	$ 0.1633
Totals	25,896	125.20	$ 4,840.28			$ 0.1869
Monthly Ave.	2,158	10.43	$ 403.36	$ 12.46	$ 0.12	
Max. Demand		12.90				

Account Number: 62 919 026 13
Meter Number: 226002587
Rate Schedule: GLP
Utility Company: PSE&G

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.


South Brunswisk Fire District 2, Station 21
Billed Use kWh
Billed Demand kW
3,000
2,500
2,000
1,500
1,000
500
-
50.00
41.00
32.00
23.00
14.00
5.00
-4.00
USAGE (kWh)
DEMAND (kW)
November-08
December-08
January-09
February-09
March-09
April-09
May-09
June-09
July-09
August-09
September-09
October-09
November-09
December-09
January-10
DATE

PSE&G SERVICE TERRITORY
Last Updated: 04/21/10

***CUSTOMER CLASS - R – RESIDENTIAL C – COMMERCIAL I -INDUSTRIAL**

Supplier	Telephone & Web Site	*Customer Class
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	877-977-2636 www.americanpowernet.com	**C** **ACTIVE**
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com	**C** **ACTIVE**
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	**C** **ACTIVE**
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com	**C/I** **ACTIVE**
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	212-538-3124 www.creditsuisse.com	**C** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com	**C/I** **ACTIVE**
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 www.fes.com	**C/I** **ACTIVE**
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, N.J. 08701	(800) 805-8586 www.gesc.com	**R/C/I** **ACTIVE**
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	1-877-569-2841 www.glacialenergy.com	**C/I** **ACTIVE**

Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	**C/I** **ACTIVE**
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	1-877-763-9977 www.integrysenergy.com	**C/I** **ACTIVE**
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866)769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com	**C/I** **ACTIVE**
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	**C/I** **ACTIVE**
Palmco Power NJ, LLC One Greentree Centre 10000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	**C/I** **ACTIVE**
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com	**C/I** **ACTIVE**
Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com	**C/I** **ACTIVE**
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.south jerseyenergy.com	**C/I** **ACTIVE**

Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com	**C/I** **ACTIVE**
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.com	**C/I** **ACTIVE**
Suez Energy Resources NA, Inc. 333 Thornall Street, 6th Floor Edison, NJ 08837	(888) 644-1014 www.suezenergyresources.com	**C/I** **ACTIVE**
UGI Energy Services, Inc. 704 East Main Street Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com	**C/I** **ACTIVE**

Back to the main supplier page

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire Districk No. 2, Station 21

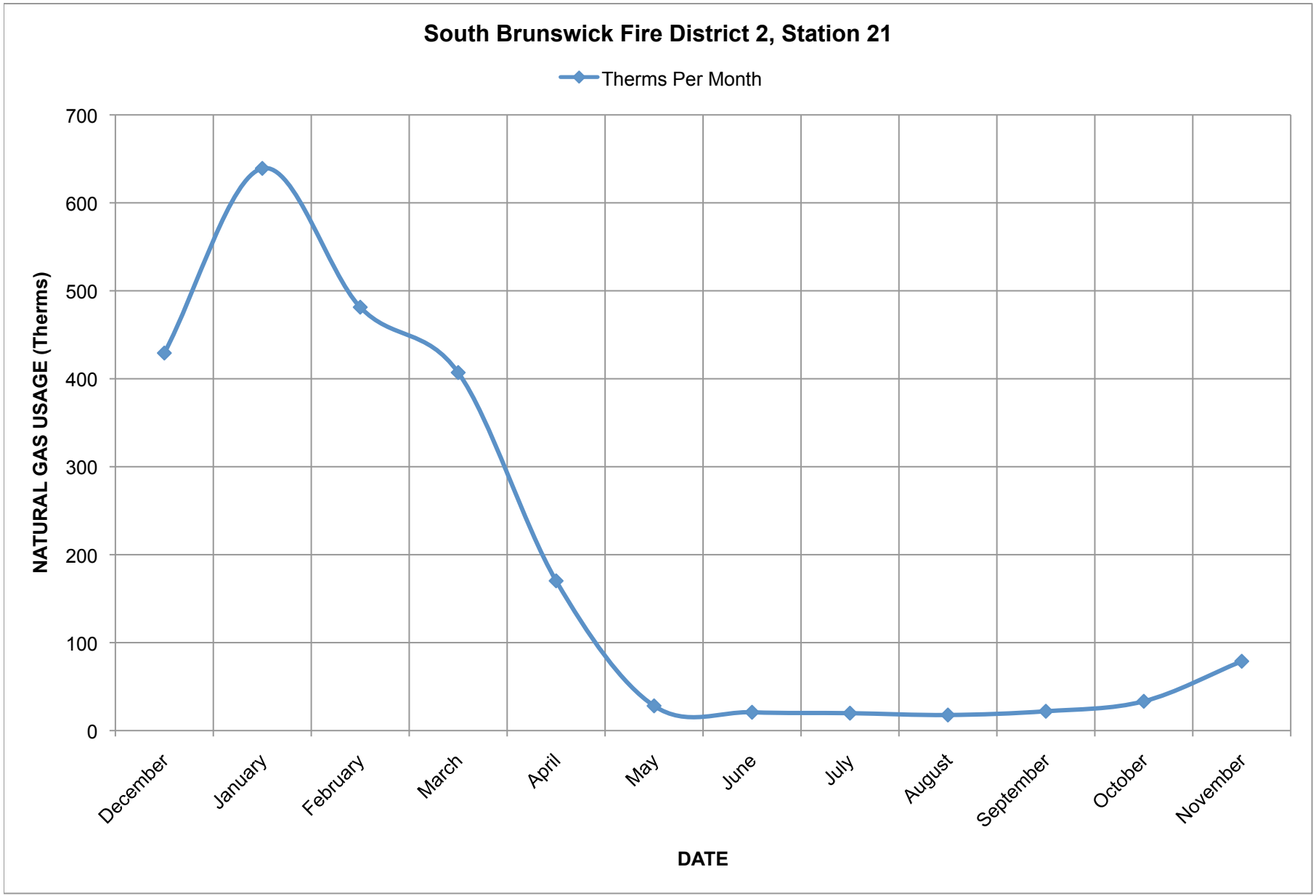
CHA Project # 20998

Gas Cost Summary: Meter #2667488										
Period	Service Charge	Therms	Distribution	Demand	Balancing Charge	Societal Benefits	Total Demand	Total Supply	Total Cost	Blended Cost $/Therm
December	$ 9.93	429.242	$ 112.13		$ 39.62	$ 20.45	$ 182.13	$ 415.02	$ 597.15	$ 1.39
January	$ 9.93	639.163	$ 166.97		$ 59.71	$ 31.55	$ 268.16	$ 575.66	$ 843.82	$ 1.32
February	$ 9.93	481.348	$ 125.74		$ 44.50	$ 23.79	$ 203.96	$ 367.02	$ 570.98	$ 1.19
March	$ 9.93	407.053	$ 106.33		$ 37.44	$ 20.11	$ 173.81	$ 276.23	$ 450.04	$ 1.11
April	$ 9.93	170.235	$ 44.47			$ 8.41	$ 62.81	$ 105.41	$ 168.22	$ 0.99
May	$ 10.09	28.116	$ 7.45			$ 1.38	$ 18.92	$ 15.94	$ 34.86	$ 1.24
June	$ 10.12	20.847	$ 5.54			$ 1.02	$ 16.68	$ 11.95	$ 28.63	$ 1.37
July	$ 10.12	19.805	$ 5.27			$ 0.97	$ 16.36	$ 12.21	$ 28.57	$ 1.44
August	$ 10.12	17.72	$ 4.71			$ 0.95	$ 15.78	$ 9.95	$ 25.73	$ 1.45
September	$ 10.12	21.975	$ 5.84			$ 1.20	$ 17.16	$ 11.05	$ 28.21	$ 1.28
October	$ 10.12	33.323	$ 8.86			$ 1.65	$ 20.63	$ 20.16	$ 40.79	$ 1.22
November	$ 10.12	78.835	$ 20.97		$ 5.51	$ 3.63	$ 40.23	$ 53.03	$ 93.26	$ 1.18
Totals	$ 120.46	2347.662	$ 614.28	$ -	$ 186.78	$ 115.11	$ 1,036.63	$ 1,873.63	$ 2,910.26	$ 1.24

PSE&G Rate Schedule "GSGH"

Notes: **Chart 4** **Gas Cost Summary**

This chart provides gas cost breakdowns and sums totals. Sum totals are "Total Demand", 1st, 3rd, 4th, 5th, 6th columns and Total Cost = Total Demand + Total Supply".
Blended Cost = Total divided by Therms.
All numbers are in $ except Therms.


South Brunswick Fire District 2, Station 21
Therms Per Month
NATURAL GAS USAGE (Therms)
700
600
500
400
300
200
100
0
December
January
February
March
April
May
June
July
August
September
October
November
DATE

PSE&G SERVICE TERRITORY
Last Updated: 04/21/10

***CUSTOMER CLASS** - R – RESIDENTIAL C – COMMERCIAL I - INDUSTRIAL

Supplier	Telephone & Web Site	*Customer Class
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109	800-6BUYGAS (6-289427) www.cooperativenet.com	**C/I** **ACTIVE**
Direct Energy Services, LLP 120 Wood Avenue, Suite 611 Iselin, NJ 08830	866-547-2722 www.directenergy.com	**R/C/I** **INACTIVE**
Dominion Retail, Inc. 395 Highway 170 - Suite 125 Lakewood, NJ 08701	866-275-4240 http://retail.dom.com	**R/C** **ACTIVE**
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	800-805-8586 www.gesc.com	**R/C/I** **ACTIVE**
UGI Energy Services, Inc. **d/b/a GASMARK** 704 East Main Street, Suite 1 Moorestown, NJ 08057	856-273-9995 www.ugienergyservices.com	**C/I** **ACTIVE**
Great Eastern Energy 116 Village Riva, Suite 200 Princeton, NJ 08540	888-651-4121 www.greateastern.com	**C/I** **ACTIVE**

Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095	800-437-7872 www.hess.com	**C/I** **ACTIVE**
Hudson Energy Services, LLC 545 Route 17 South Ridgewood, NJ 07450	877- Hudson 9 www.hudsonenergyservices.com	**C** **ACTIVE**
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	800-724-1880 www.intelligentenergy.org	**R/C/I** **ACTIVE**
Keil & Sons 1 Bergen Blvd. Fairview, NJ 07002	1-877-Systrum www.systrumenergy@aol.com	**R/C/I** **ACTIVE**
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	877-750-7046 www.metromediaenergy.com	**C** **ACTIVE**
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	888-53-Metro www.metroenergy.com	**R/C** **ACTIVE**
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 088327	800-375-1277 www.mxenergy.com	**R/C** **ACTIVE**
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	800-840-4GAS www.natgasco.com	**C** **ACTIVE**
Palmco Energy NJ, LLC One Greentree Centre 10000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	877-726-5862 www.PalmcoEnergy.com	**C/I** **ACTIVE**

Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	800-363-7499 www.pepco-services.com	**C/I** **ACTIVE**
PPL EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002	800-281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095	877-273-6772 800-2 SEMPRA www.semprasolutions.com	**C/I** **ACTIVE**
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	800-756-3749 www.sjindustries.com/sje.htm	**C/I** **ACTIVE**
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	800-225-1560 www.spragueenergy.com	**C/I** **ACTIVE**
Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	800-646-6457 www.stuyfuel.com	**C** **ACTIVE**
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	800-557-1121 www.woodruffenergy.com	**R/C/I** **ACTIVE**

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BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

Water Cost Summary: Account Number #3034300					
Period	Consumption Gallons	Base Charge	Water Charge	Total Cost	Water cost per 1000 gallons
2/24/09	2000	$ 12.10	$ 4.86	$ 16.96	$ 2.43
5/22/09	2000	$ 13.37	$ 5.36	$ 18.73	$ 2.68
8/24/09	2000	$ 13.37	$ 5.36	$ 18.73	$ 2.68
11/23/09	3000	$ 13.37	$ 8.04	$ 21.41	$ 2.68
Totals		$ 52.21	$ 23.62	$ 75.83	$ 2.62

South Brunswick Township Water & sewer

Notes: **Chart 5** **Water Cost Summary**

This chart provides water cost breakdowns and sums totals.

All numbers are in $ except gallons.

APPENDIX B

HVAC Equipment List

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

HVAC Equipment List											
Item	**Quanity**	**Manufacturer**	**Model Number**	**Serial number**	**Cooling Capacity MBH**	**Condition**	**Fuel**	**Heating Input MBH**	**Heating Output MBH**	**Refrigerant**	**Comments**
Furnace	1	Central Environmental Systems	P-HDB12N04701A	9114729143	-	Satisfactory	Natural Gas	50	47	-	Above Meeting Room
Duct Coil	1	Lennox	CH16-31FF	-	34.9	Exceeds Useful Life	-	-	-	R-22	Above Meeting Room
Furnace Condensing Unit	1	York	H1DA030506A	EM4MI69822	34.9	Exceeds Useful Life	-	-	-	R-22	Above Meeting Room
Unit Heater	4	Modine	CEEXL-60	-	-	Satisfactory	Natural Gas	60	48	-	Engine Bay (Old & New)
Radiant Heater	1	Reznor	RIRH-25	-	-	Satisfactory	Natural Gas	25	25	-	Compressor Room
Electric Wall Heater	2	Emerson	CWH-202	-	-	Satisfactory	Electric	1500 Watt	-	-	Restrooms

APPENDIX C

ECM-1 Lighting Fixture Modifications

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-1 Lighting Fixture Modifications

Item	Budgetary Costs	Annual Utility Savings			ROI	Potential Incentive	Payback (Without Incentive)	Payback (With Incentive)
		Electricity	Natural Gas	Total				
	$	KWH	Therms	$		$	Years	Years
Exit Sign Upgrades	$356	$97	$0	$97	3.1	0	3.7	3.7
Linear T-12 to T-8	$4,272	$188	$0	$188	(0.3)	720	22.7	18.9
U-Lamp T-12 to T-8	$660	$3	$0	$3	(0.9)	180	239.1	173.9
Combined	$5,288	$288		$288		900	18.4	15.3

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

Existing Lighting Fixture Schedule										
Location	Fixture Description	No. of Fixtures	Lamp Type & No.	Ballast Type & No.	Fixture Watts	Total Watts	Hours of Operation	Control	kwh/Year	Operational Cost/Year
Old Engine Bay	8' Fluorescent Strip	1	(2) T12	(1) Magnetic	227	227	4380	Photocell	994.26	$185.83
Old Engine Bay	8' Fluorescent Strip	11	(2) T12	(1) Magnetic	227	2497	312	Switch	779.06	$145.61
Old Engine Bay Men's Room	1'x4' Recessed Fluorescent	1	(2) T12	(1) Magnetic	227	227	104	Switch	23.61	$4.41
Old Engine Bay Women's Room	Combination Light/Fan	1	A-Lamp	-	100	100	104	Switch	10.40	$1.94
Member's Room	2'x2' Recessed Fluorescent	6	(2) U-Lamps	(1) Magnetic	72	432	246	Switch	106.27	$19.86
Compressor Room	8' Fluorescent Strip	2	(2) T12	(1) Magnetic	227	454	104	Switch	47.22	$8.82
New Engine Bay	8' Fluorescent Strip	1	(2) T12	(1) Magnetic	227	227	4380	Photocell	994.26	$185.83
New Engine Bay	8' Fluorescent Strip	8	(2) T12	(1) Magnetic	227	1816	312	Switch	566.59	$105.90
Exit Signs	Fluorescent Lamps	5	(2) 15 W A-Lamp	-	30	150	8760	Breaker	1314.00	$245.59
Exterior Building Mounted	Metal Halide	2	(2) Metal Halide	(1) Magnetic	461	922	312	Switch	287.66	$53.76
Exterior Building Mounted	Metal Halide	2	(2) Metal Halide	(1) Magnetic	461	922	4380	Photocell	4038.36	$754.77
Exterior Building Mounted	10" Globe Lamps	4	A-Lamp	-	54	216	312	Switch	67.39	$12.60
Exterior Building Mounted	Prescolite	3	A-Lamp	-	54	162	312	Switch	50.54	$9.45
Exterior	High Pressure Sodium	1	HPS	(1) Magnetic	61	61	4380	Photocell	267.18	$49.94
Exterior Pole Mounted	High Pressure Sodium	2	HPS	(1) Magnetic	116	232	4380	Photocell	1016.16	$189.92
Exterior Flag Pole	-	1	-	-		0	4380	Photocell	0.00	$0.00

Energy Cost: $0.1869

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

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

ECM-1 Lighting Fixture Modifications																
Existing Fixtures					Proposed Replacement Fixture									Savings		
Location	Fixture Description	Control	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
Old Engine Bay	(1) 8' Strips, (2) T12 Lamps, 227 W	Photocell	994	$185.83	8' Fluorescent, (2) T8 Lamps, 160W	1	160	160	4380	701	$130.98	$100.00	$100.00	293	$54.85	1.82
Old Engine Bay	(11) 8' Strips, (2) T12 Lamps, 227 W	Switch	779	$145.61	8' Fluorescent, (2) T8 Lamps, 160W	11	160	1760	312	549	$102.63	$100.00	$1,100.00	230	$42.98	25.60
Old Engine Bay Men's Room	(1) 1'x4', (2) T12 Lamps, 227 W	Switch	24	$4.41	8' Fluorescent, (2) T8 Lamps, 160W	1	160	160	104	17	$3.11	$100.00	$100.00	7	$1.30	76.79
Old Engine Bay Women's Room	Combination Light/Fan, 100 W Lamp	Switch	10	$1.94	-	1		0	104	0	$0.00		$0.00	0	$0.00	0.00
Member's Room	(6) 2'x2', (2) U-Lamps, 72 W	Switch	106	$19.86	2'x2', (2) U-Lamps, 62W	6	62	372	246	92	$17.10	$91.00	$546.00	15	$2.76	197.92
Compressor Room	(2) 8' Strips, (2) T12 Lamps, 227 W	Switch	47	$8.82	8' Fluorescent, (2) T8 Lamps, 160W	2	160	320	104	33	$6.22	$100.00	$200.00	14	$2.60	76.79
New Engine Bay	(1) 8' Strips, (2) T12 Lamps, 227 W	Photocell	994	$185.83	8' Fluorescent, (2) T8 Lamps, 160W	1	160	160	4380	701	$130.98	$100.00	$100.00	293	$54.85	1.82
New Engine Bay	(8) 8' Strips, (2) T12 Lamps, 227 W	Switch	567	$105.90	8' Fluorescent, (2) T8 Lamps, 160W	8	160	1280	312	399	$74.64	$100.00	$800.00	167	$31.26	25.60
Exit Signs	(4) 7W PL, (2) Compact Fluorescent Lamps, 16 W	Breaker	561	$104.78	LED, (2) T6.5	4	1.2	5	8760	42	$7.86	$89.00	$356.00	519	$96.92	3.67
Exterior Building Mounted	(2) Metal Halide, 461 W	Switch	288	$53.76	-			0	312	0	$0.00		$0.00	0	$0.00	0.00
Exterior Building Mounted	(2) Metal halide, 461 W	Photocell	4038	$754.77				0	4380	0	$0.00		$0.00	0	$0.00	0.00
Exterior Building Mounted	(4) 10" Globe Lamps, 54 W	Switch	67	$12.60	-			0	312	0	$0.00		$0.00	0	$0.00	0.00
Exterior Building Mounted	(3) Prescolite, 54 W	Switch	51	$9.45	-			0	312	0	$0.00		$0.00	0	$0.00	0.00
Exterior	High Pressure Sodium with Photocell, 61 W	Photocell	267	$49.94	-			0	4380	0	$0.00		$0.00	0	$0.00	0.00
Exterior Pole Mounted	(2) High Pressure Sodium, 116 W	Photocell	1016	$189.92	-			0	4380	0	$0.00		$0.00	0	$0.00	0.00
Exterior Flag Pole	(1)	Photocell	0	$0.00	-				4380				$0.00	0	$0.00	0.00
Total													$3,302.00	1538	$287.52	11.48

Energy Cost: $0.1869

*Installed cost per fixture includes $30 per fixture incentive

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
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-1 Lighting Fixture Modifications
EXIT SIGNS

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			
Exit Sign Lamps Replacement and rewiring.	5	ea	$15	$50		$74	$303	$0	$376	$ -	

Subtotal	$376
10% Contingency	$38
10% OH	$41
10% Profit	$45
Total	$500
Incentive	$0
Total Cost with Incentive	$500

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

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			
Linear T-12 to T-8 Lamps	24	ea	$81	$49	$0	$1,944	$1,423	$0	$3,367	$720	
U-Lamp T-12 to T-8 Lamps	6	ea	$72	$49	$0	$432	$356	$0	$788	$180	

Subtotal	$4,155
10% Contingency	$0
10% OH	$0
10% Profit	$0
Total	$4,155
Incentive	$0
Total Cost with Incentive	$4,155

APPENDIX D

ECM-2 Lighting Control Modifications

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-2 Lighting Control Modifications

Item	Budgetary Costs	Annual Utility Savings (Existing Fixtures)			Potential Incentive	Payback (Without Incentive)	Payback (With Incentive)
		Electricity	Natural Gas	Total			
	$	KWH	Therms	$	$	Years	Years
Motion Sensor Control							
Restrooms	$ 226.28	$ 4.77	$ -	$ 4.77	40	47.4	39.1
Member's Room	$ 113.14	$ 14.90	$ -	$ 14.90	20	7.6	6.3
Compressor Room	$ 113.14	$ 6.62	$ -	$ 6.62	20	17.1	14.1
Combined	$ 452.56	$ 26.29		$ 26.29	80	17.2	14.2

Item	Budgetary Costs	Annual Utility Savings (Proposed Fixtures)			Potential Incentive	Payback (Without Incentive)	Payback (With Incentive)
		Electricity	Natural Gas	Total			
	$	KWH	Therms	$	$	Years	Years
Motion Sensor Control							
Restrooms	$ 226.28	$ 3.79	$ -	$ 3.79	40	59.7	49.2
Member's Room	$ 113.14	$ 12.83	$ -	$ 12.83	20	8.8	7.3
Compressor Room	$ 113.14	$ 4.67	$ -	$ 4.67	20	24.2	19.9
Combined	$ 452.56	$ 21.29		$ 21.29	80	21.3	17.5

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

Existing Lighting Fixture Schedule										
Location	Fixture Description	No. of Fixtures	Lamp Type & No.	Ballast Type & No.	Fixture Watts	Total Watts	Hours of Operation	Control	kwh/Year	Operational Cost/Year
Old Engine Bay	8' Fluorescent Strip	1	(2) T12	(1) Magnetic	227	227	4380	Photocell	994.26	$185.83
Old Engine Bay	8' Fluorescent Strip	11	(2) T12	(1) Magnetic	227	2497	312	Switch	779.06	$145.61
Old Engine Bay Men's Room	1'x4' Recessed Fluorescent	1	(2) T12	(1) Magnetic	227	227	104	Switch	23.61	$4.41
Old Engine Bay Women's Room	Combination Light/Fan	1	A-Lamp	-	100	100	104	Switch	10.40	$1.94
Member's Room	2'x2' Recessed Fluorescent	6	(2) U-Lamps	(1) Magnetic	72	432	246	Switch	106.27	$19.86
Compressor Room	8' Fluorescent Strip	2	(2) T12	(1) Magnetic	227	454	104	Switch	47.22	$8.82
New Engine Bay	8' Fluorescent Strip	1	(2) T12	(1) Magnetic	227	227	4380	Photocell	994.26	$185.83
New Engine Bay	8' Fluorescent Strip	8	(2) T12	(1) Magnetic	227	1816	312	Switch	566.59	$105.90
Exit Signs	Incandescent Lamps	5	(2) 15 W, A-Lamp	-	30	150	8760	Breaker	1314.00	$245.59
Exterior Building Mounted	Metal Halide	2	(2) Metal Halide	(1) Magnetic	461	922	312	Switch	287.66	$53.76
Exterior Building Mounted	Metal Halide	2	(2) Metal Halide	(1) Magnetic	461	922	4380	Photocell	4038.36	$754.77
Exterior Building Mounted	10" Globe Lamps	4	A-Lamp	-	54	216	312	Switch	67.39	$12.60
Exterior Building Mounted	Prescolite	3	A-Lamp	-	54	162	312	Switch	50.54	$9.45
Exterior	High Pressure Sodium	1	HPS	(1) Magnetic	61	61	4380	Photocell	267.18	$49.94
Exterior Pole Mounted	High Pressure Sodium	2	HPS	(1) Magnetic	116	232	4380	Photocell	1016.16	$189.92
Exterior Flag Pole	-	1	-	-		0	4380	Photocell	0.00	$0.00

Energy Cost: $0.1869

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
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

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)	4	ea	$ 25.00	$ 50.00		$ 98.00	$ 242.00	$ -	$ 340.00	$ 20.00	

Subtotal	$ 340.00
10% Contingency	$ 34.00
10% OH	$ 37.40
10% Profit	$ 41.14
Total	$ 452.54
Incentive	$ 20.00
Total Cost with Incentive	$ 432.54

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

ECM-2 Lighting Control Modifications (With Existing Fixtures)													
Existing Fixtures						Proposed Lighting Fixture Controls						Savings After Retrofit	
Location	Fixture Description	Control	Hours of Operation	kwh/Year	Operational Cost/Year	Modified Control	New Hours of Operation	kwh/year	Operational Cost/year	Installation Cost*		Cost Savings/year	Payback in Years
Old Engine Bay	(1) 8' Strips, (2) T12 Lamps, 227 W	Photocell	4380	994	$185.83								
Old Engine Bay	(11) 8' Strips, (2) T12 Lamps, 227 W	Switch	312	779	$145.61								
Old Engine Bay Men's Room	(1) 1'x4', (2) T12 Lamps, 227 W	Switch	104	24	$4.41	Wall Motion Sensor	78	18	$3.31	$93.14		$1.10	84.4
Old Engine Bay Women's Room	Combination Light/Fan, 100 W Lamp	Switch	104	10	$1.94	Wall Motion Sensor	78	8	$1.46	$93.14		$0.49	191.7
Member's Room	(6) 2'x2', (2) U-Lamps, 72 W	Switch	246	106	$19.86	Wall Motion Sensor	185	80	$14.90	$93.14		$4.97	18.8
Compressor Room	(2) 8' Strips, (2) T12 Lamps, 227 W	Switch	104	47	$8.82	Wall Motion Sensor	78	35	$6.62	$93.14		$2.21	42.2
New Engine Bay	(1) 8' Strips, (2) T12 Lamps, 227 W	Photocell	4380	994	$185.83								
New Engine Bay	(8) 8' Strips, (2) T12 Lamps, 227 W	Switch	312	567	$105.90								
Exit Signs	(5) Exit Signs, (2) Incandescent Lamps, 16 W	Breaker	8760	1314	$245.59								
Exterior Building Mounted	(2) Metal Halide, 461 W	Switch	312	288	$53.76								
Exterior Building Mounted	(2) Metal halide, 461 W	Photocell	4380	4038	$754.77								
Exterior Building Mounted	(4) 10" Globe Lamps, 54 W	Switch	312	67	$12.60								
Exterior Building Mounted	(3) Prescolite, 54 W	Switch	312	51	$9.45								
Exterior	High Pressure Sodium with Photocell, 61 W	Photocell	4380	267	$49.94								
Exterior Pole Mounted	(2) High Pressure Sodium, 116 W	Photocell	4380	1016	$189.92								
Exterior Flag Pole	(1)	Photocell	4380	0	$0.00								
Total									$26.28	$372.56		$8.76	43

Energy Cost: $0.1869

Notes: **Lighting Fixture Replacement Savings**

*Installation Cost includes incentive

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

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

ECM-2 Lighting Control Modifications (With Proposed Fixtures)												
Existing Fixtures						Proposed Lighting Fixture Controls					Savings After Retrofit	
Location	Fixture Description	Control	Hours of Operation	kwh/Year	Operational Cost/Year	Modified Control	New Hours of Operation	kwh/year	Operational Cost/year	Installation Cost*	Cost Savings/year	Payback in Years
Old Engine Bay	(1) 8' Strips, (2) T8 Lamps, 160 W	Photocell	4380	701	$130.98							
Old Engine Bay	(11) 8' Strips, (2) T8 Lamps, 160 W	Switch	312	549	$102.63							
Old Engine Bay Men's Room	(1) 1'x4', (2) T8 Lamps, 160 W	Switch	104	17	$3.11	Wall Motion Sensor	78	12	$2.33	$93.14	$0.78	119.8
Old Engine Bay Women's Room	Combination Light/Fan, 100 W Lamp	Switch	104	10	$1.94	Wall Motion Sensor	78	8	$1.46	$93.14	$0.49	191.7
Member's Room	(6) 2'x2', (2) U-Lamps, 62 W	Switch	246	92	$17.10	Wall Motion Sensor	185	69	$12.83	$93.14	$4.28	21.8
Compressor Room	(2) 8' Strips, (2) T8 Lamps, 160 W	Switch	104	33	$6.22	Wall Motion Sensor	78	25	$4.67	$93.14	$1.56	59.9
New Engine Bay	(1) 8' Strips, (2) T8 Lamps, 160 W	Photocell	4380	701	$130.98							
New Engine Bay	(8) 8' Strips, (2) T8 Lamps, 160 W	Switch	312	399	$74.64							
Exit Signs	(5) LED, 1.2 W	Breaker	8760	53	$9.91							
Exterior Building Mounted	(2) Metal Halide, 461 W	Switch	312	288	$53.76							
Exterior Building Mounted	(2) Metal halide, 461 W	Photocell	4380	4038	$754.77							
Exterior Building Mounted	(4) 10" Globe Lamps, 54 W	Switch	312	67	$12.60							
Exterior Building Mounted	(3) Prescolite, 54 W	Switch	312	51	$9.45							
Exterior	High Pressure Sodium with Photocell, 61 W	Photocell	4380	267	$49.94							
Exterior Pole Mounted	(2) High Pressure Sodium, 116 W	Photocell	4380	1016	$189.92							
Exterior Flag Pole	(1)	Photocell	4380	0	$0.00							
Total									$21.28	$372.56	$7.09	53

Energy Cost: $0.1869

Notes: **Lighting Fixture Replacement Savings**

*Installation Cost includes incentive

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

APPENDIX E

ECM-3 Replace HVAC Split System with Higher SEER Units

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

ECM-3 Replace HVAC Split System with Higher SEER 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 Ton Condensing Unit and Cooling Coil	1	ea	$ 3,524.00	$ 686.00		$ 3,453.52	$ 830.06	$ -	$ 4,283.58	
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

Subtotal	$ 7,628.67
10% OH, 10% Profit	$ 762.87
10% Contingency	$ 762.87
Total	$ 9,154.40

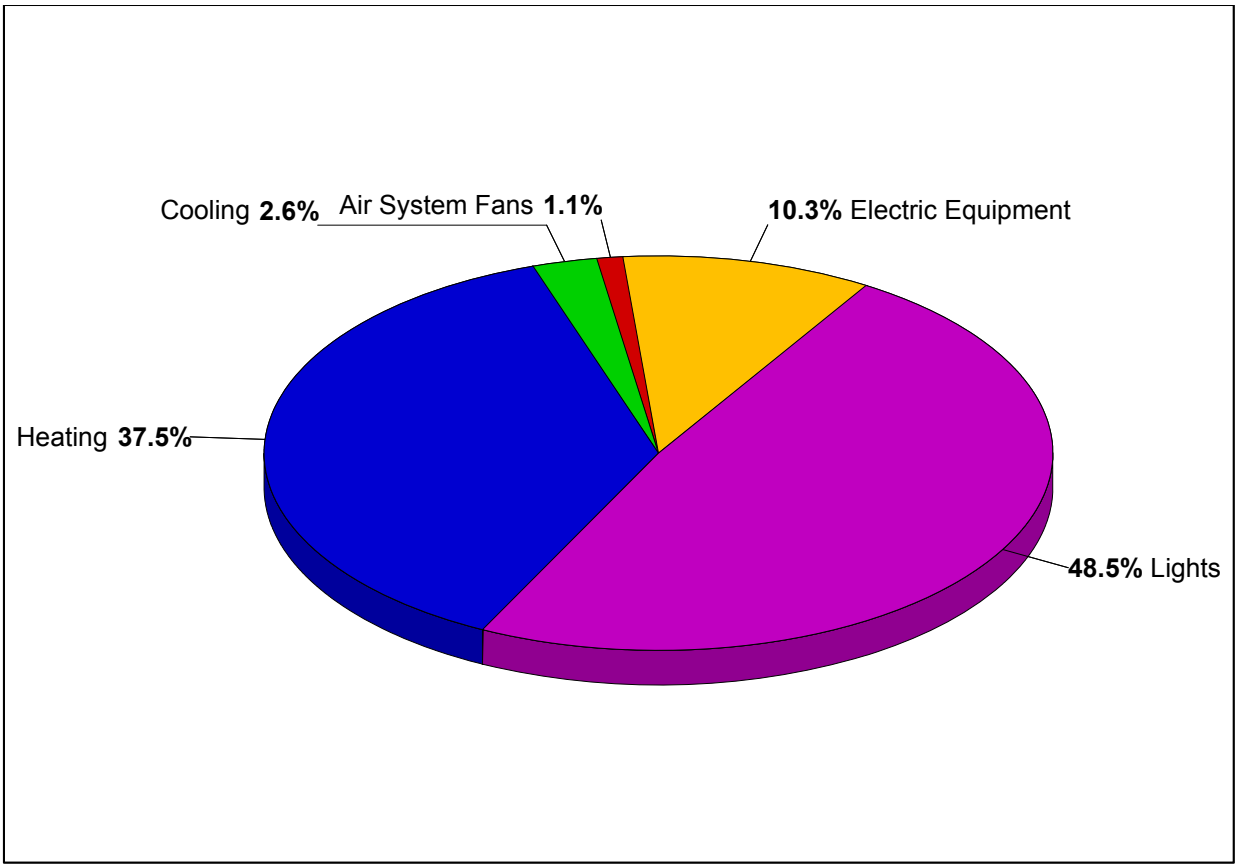
BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-3 Replace HVAC Split System with Higher SEER Units

Annual Energy Use Comparison			
	Electricity kWh	Natural Gas therms	Cost $
Existing 10 SEER Compressor and Coil	2,063	2,640	$ 3,659.00
Proposed 16 SEER Compressor and Coil	1,757	2,640	$ 3,602.00
Difference	306	0	$ 57.00

Annual Component Costs - 16 SEER



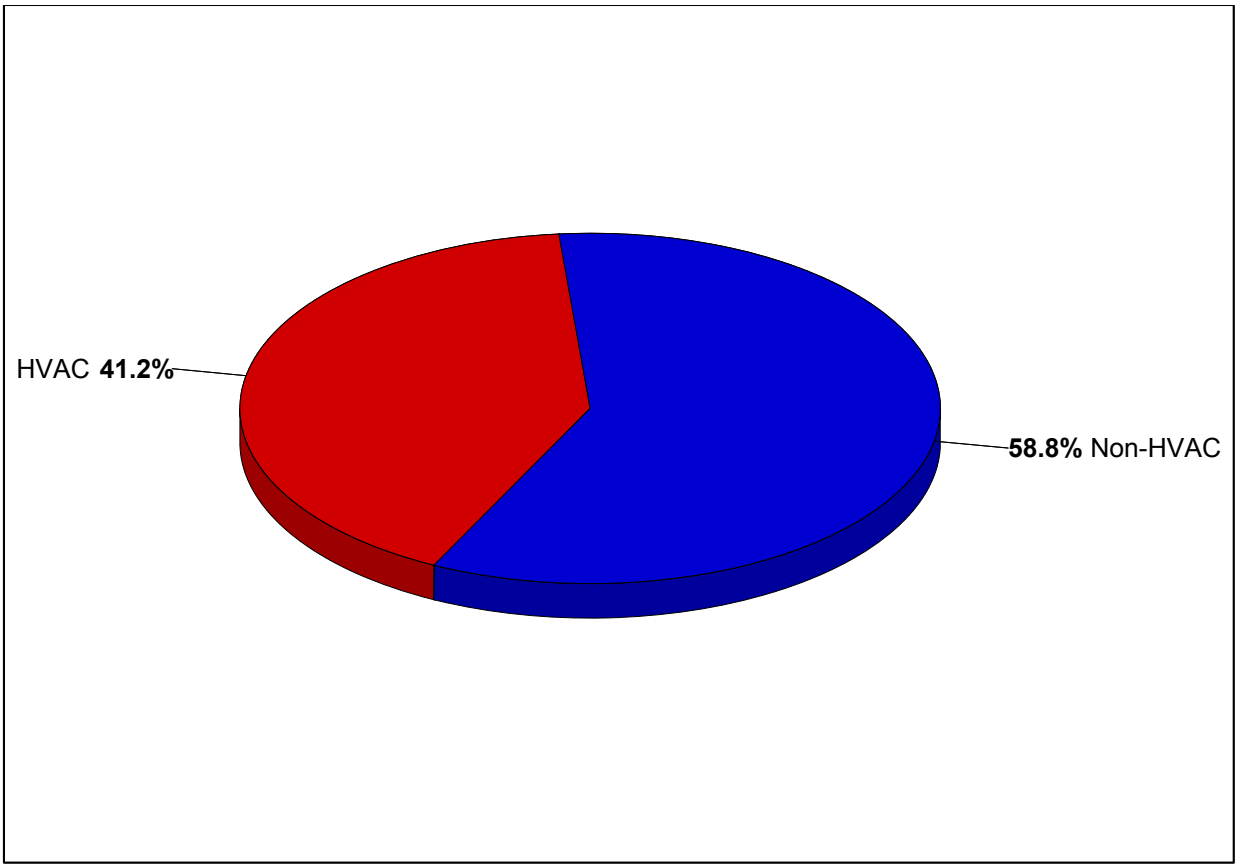
1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	97	0.019	1.1
Cooling	231	0.045	2.6
Heating	3,274	0.639	37.5
Pumps	0	0.000	0.0
Cooling Tower Fans	0	0.000	0.0
HVAC Sub-Total	**3,602**	**0.704**	**41.2**
Lights	4,234	0.827	48.5
Electric Equipment	896	0.175	10.3
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**5,130**	**1.002**	**58.8**
Grand Total	**8,732**	**1.706**	**100.0**

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

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Annual HVAC & Non-HVAC Cost Totals - 16 SEER



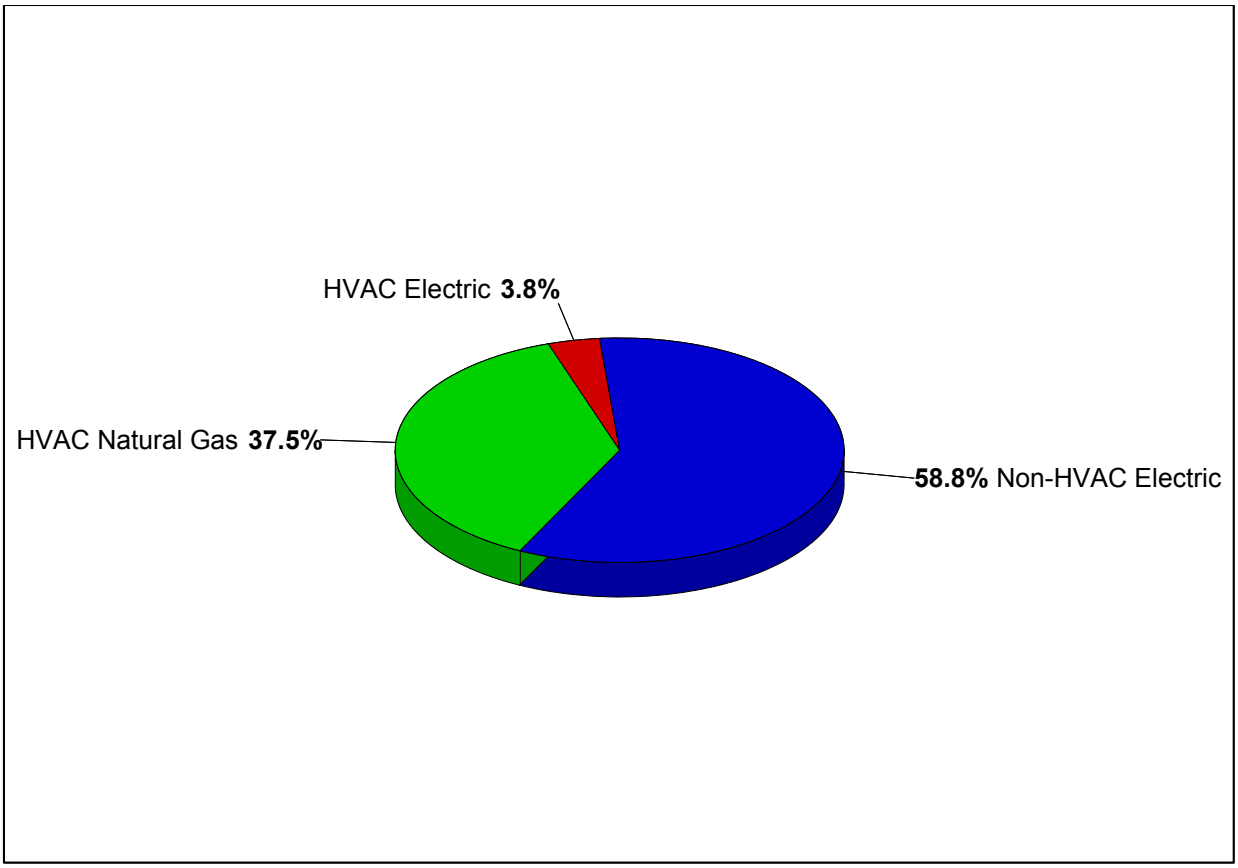
1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	3,602	0.703	41.2
Non-HVAC	5,130	1.002	58.8
Grand Total	**8,732**	**1.705**	**100.0**

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

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Annual Energy Costs - 16 SEER



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	328	0.064	3.8
Natural Gas	3,274	0.639	37.5
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**3,602**	**0.704**	**41.2**
Non-HVAC Components			
Electric	5,130	1.002	58.8
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**5,130**	**1.002**	**58.8**
Grand Total	**8,732**	**1.705**	**100.0**

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

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Energy Budget by Energy Source - 16 SEER

Station 21
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1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	20,153	3.936
Heating Coil Loads	213,851	41.768
Grand Total	**234,004**	**45.704**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	5,994	1.171	21,407	4.181
Natural Gas	263,994	51.561	263,994	51.561
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**269,988**	**52.732**	**285,401**	**55.742**
Non-HVAC Components				
Electric	93,652	18.291	334,470	65.326
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**93,652**	**18.291**	**334,470**	**65.326**
Grand Total	**363,639**	**71.023**	**619,871**	**121.068**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **5120.0** ft²
   Conditioned Floor Area ..... **5120.0** ft²

Energy Budget by System Component - 16 SEER

Station 21
Kitchen and Associates

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1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	20,153	3.936
Heating Coil Loads	213,851	41.768
Grand Total	**234,004**	**45.704**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	1,773	0.346	6,331	1.236
Cooling	4,221	0.825	15,077	2.945
Heating	263,994	51.561	263,994	51.561
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
HVAC Sub-Total	**269,988**	**52.732**	**285,401**	**55.742**
Lights	77,300	15.098	276,072	53.920
Electric Equipment	16,351	3.194	58,398	11.406
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**93,652**	**18.291**	**334,470**	**65.326**
Grand Total	**363,639**	**71.023**	**619,871**	**121.068**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **5120.0** ft²
   Conditioned Floor Area ..... **5120.0** ft²

Monthly Component Costs - 16 SEER

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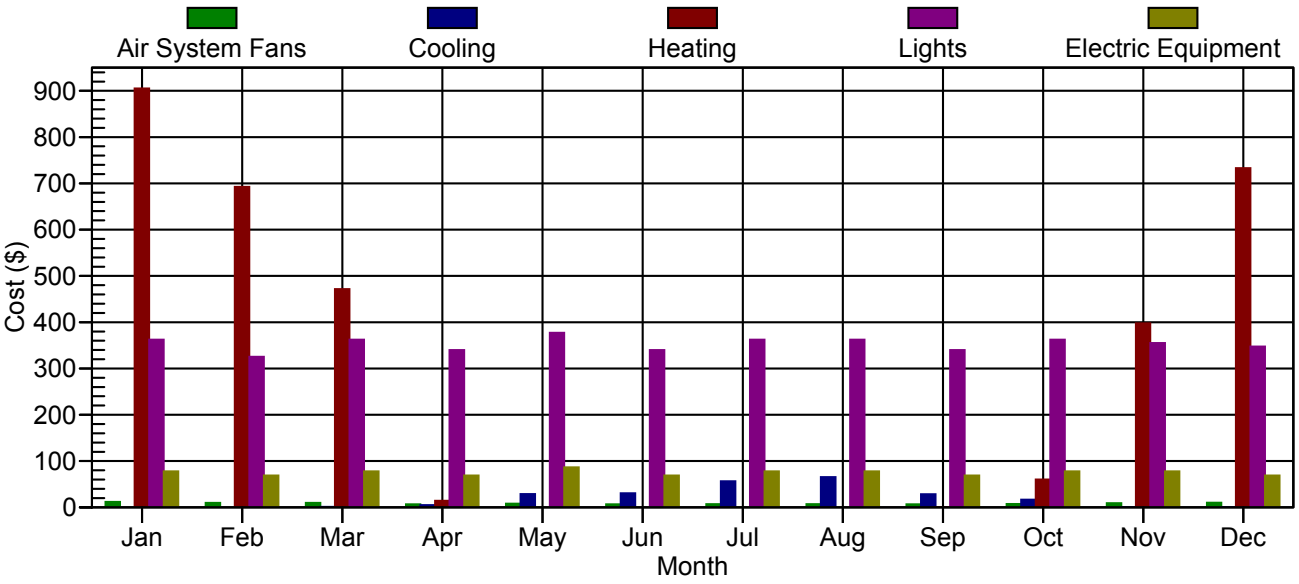

1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Cooling Towers ($)	HVAC Total ($)
January	12	0	905	0	0	917
February	9	0	692	0	0	701
March	9	1	471	0	0	481
April	6	5	14	0	0	25
May	8	29	0	0	0	37
June	6	30	0	0	0	36
July	7	56	0	0	0	63
August	7	65	0	0	0	72
September	6	28	0	0	0	34
October	7	17	60	0	0	84
November	9	0	397	0	0	406
December	10	0	733	0	0	743
Total	**97**	**231**	**3,274**	**0**	**0**	**3,602**

2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	362	78	0	0	440	1,357
February	325	69	0	0	394	1,095
March	362	78	0	0	440	921
April	340	69	0	0	409	434
May	377	86	0	0	463	500
June	340	69	0	0	409	445
July	362	78	0	0	440	503
August	362	78	0	0	440	512
September	340	69	0	0	409	443
October	362	78	0	0	440	524
November	355	78	0	0	432	838
December	347	69	0	0	416	1,159
Total	**4,234**	**896**	**0**	**0**	**5,130**	**8,732**

Monthly Energy Costs - 16 SEER

Station 21
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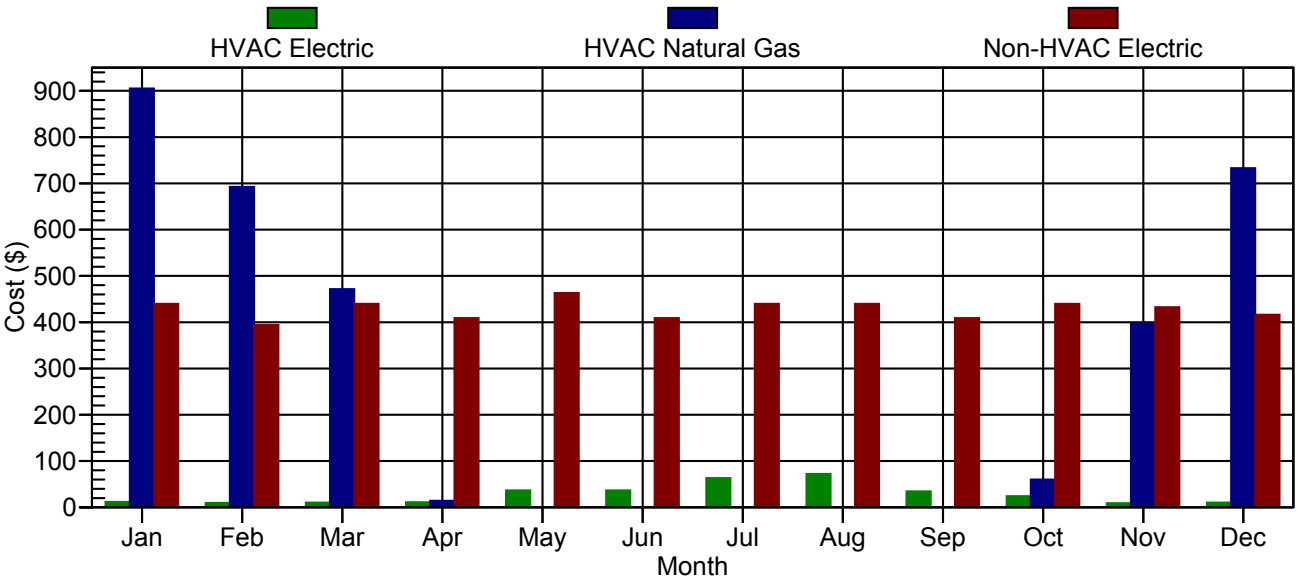

1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	12	905	0	0	0	0	0
February	9	692	0	0	0	0	0
March	10	471	0	0	0	0	0
April	11	14	0	0	0	0	0
May	37	0	0	0	0	0	0
June	37	0	0	0	0	0	0
July	63	0	0	0	0	0	0
August	72	0	0	0	0	0	0
September	34	0	0	0	0	0	0
October	24	60	0	0	0	0	0
November	9	397	0	0	0	0	0
December	10	733	0	0	0	0	0
Total	**328**	**3,274**	**0**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	440	0	0	0	0	0
February	394	0	0	0	0	0
March	440	0	0	0	0	0
April	409	0	0	0	0	0
May	463	0	0	0	0	0
June	409	0	0	0	0	0
July	440	0	0	0	0	0
August	440	0	0	0	0	0
September	409	0	0	0	0	0
October	440	0	0	0	0	0
November	432	0	0	0	0	0
December	416	0	0	0	0	0
Total	**5,130**	**0**	**0**	**0**	**0**	**0**

Monthly Energy Use by Energy Type - 16 SEER

Station 21
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1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	62	730	0	0	0	0	0
Feb	51	558	0	0	0	0	0
Mar	55	380	0	0	0	0	0
Apr	59	11	0	0	0	0	0
May	195	0	0	0	0	0	0
Jun	196	0	0	0	0	0	0
Jul	338	0	0	0	0	0	0
Aug	387	0	0	0	0	0	0
Sep	184	0	0	0	0	0	0
Oct	128	48	0	0	0	0	0
Nov	48	320	0	0	0	0	0
Dec	55	591	0	0	0	0	0
Totals	1,757	2,640	0	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	2,352	0	0	0	0	0
Feb	2,108	0	0	0	0	0
Mar	2,352	0	0	0	0	0
Apr	2,187	0	0	0	0	0
May	2,478	0	0	0	0	0
Jun	2,187	0	0	0	0	0
Jul	2,352	0	0	0	0	0
Aug	2,352	0	0	0	0	0
Sep	2,187	0	0	0	0	0
Oct	2,352	0	0	0	0	0
Nov	2,313	0	0	0	0	0
Dec	2,226	0	0	0	0	0
Totals	27,448	0	0	0	0	0

Monthly Energy Use by Component - 16 SEER

Station 21
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)	62	51	50	33	42	33	37	37	33	39	47	54
Cooling												
Electric (kWh)	0	0	5	25	154	163	300	349	151	89	1	1
Natural Gas (Therm)	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 (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 (Therm)	730	558	380	11	0	0	0	0	0	48	320	591
Fuel Oil (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
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)	1938	1740	1938	1818	2017	1818	1938	1938	1818	1938	1898	1858
Electric Eqpt. (kWh)	415	369	415	369	461	369	415	415	369	415	415	369
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (Therm)	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

Station 21
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Table 1. Annual Costs

Component	16 SEER ($)
Air System Fans	97
Cooling	231
Heating	3,274
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**3,602**
Lights	4,234
Electric Equipment	896
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**5,130**
Grand Total	**8,732**

Table 2. Annual Cost per Unit Floor Area

Component	16 SEER ($/ft²)
Air System Fans	0.019
Cooling	0.045
Heating	0.639
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.704**
Lights	0.827
Electric Equipment	0.175
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**1.002**
Grand Total	**1.706**
Gross Floor Area (ft²)	5120.0
Conditioned Floor Area (ft²)	5120.0

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

Table 3. Component Cost as a Percentage of Total Cost

Component	16 SEER (%)
Air System Fans	1.1
Cooling	2.6
Heating	37.5
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**41.2**
Lights	48.5
Electric Equipment	10.3
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**58.8**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Station 21 05/21/2010
Kitchen and Associates 09:36AM

Table 1. Annual Costs

Component	16 SEER ($)
HVAC Components	
Electric	328
Natural Gas	3,274
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**3,602**
Non-HVAC Components	
Electric	5,130
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**5,130**
Grand Total	**8,732**

Table 2. Annual Energy Consumption

Component	16 SEER
HVAC Components	
Electric (kWh)	1,757
Natural Gas (Therm)	2,640
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	27,448
Natural Gas (Therm)	0
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	29,204
Natural Gas (Therm)	2,640
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	16 SEER
CO2 Equivalent (lb)	0

Table 4. Annual Cost per Unit Floor Area

Component	16 SEER ($/ft²)
HVAC Components	
Electric	0.064
Natural Gas	0.639
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.704**
Non-HVAC Components	
Electric	1.002
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**1.002**
Grand Total	**1.705**
Gross Floor Area (ft²)	5120.0
Conditioned Floor Area (ft²)	5120.0

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

Table 5. Component Cost as a Percentage of Total Cost

Component	16 SEER (%)
HVAC Components	
Electric	3.8
Natural Gas	37.5
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**41.2**
Non-HVAC Components	
Electric	58.8
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**58.8**
Grand Total	**100.0**

APPENDIX F

ECM-4 Demand Ventilation

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-4 Demand Ventilation

Item	Budgetary Costs	Annual Utility Savings			ROI	Potential Incentive	Payback (Without Incentive)	Payback (With Incentive)
		Electricity	Natural Gas	Total				
	$	KWH	Therms	$		$	Years	Years
AHU	$1,599	305	158	$239	1.2	0	6.7	-

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-4 Demand Ventilation

	Total CFM	OA CFM	OA%
Org. Scheduled CFM	1000	400	40%
Derated CFM	1000	100	10%
SA Enthalpy	26		
SA Set Point (WINTER)	70		
SA Setpoint (SUMMER)	75		
Balance Point	65		
Heating Equipment Efficiency	94%		
Cooling Equip Efficiency (kW/Ton)	0.972		
Electrical Cost ($/kW)	$0.18		
Natural Gas Cost ($/Therm)	$1.16		

Simple Payback Analysis	
Cost	$1,599.20
Incentive	$0.00
Adjusted Cost	$1,599.20
Savings/yr	$239.17
Payback in years	6.69

			EXISTING					PROPOSED DEMAND CONTROL VENTILATION					SAVINGS		
Avg. DB Bin Temp °F	**OA Enthalpy Btu/lb**	**Occupied Bin Hours**	**OA CFM**	**Cooling Load MBH**	**Heating Load MBH**	**Cooling kWH**	**Heating Therm**	**Derated O.A. CFM**	**Cooling Load MBH**	**Heating Load MBH**	**Cooling kWH**	**Heating Therms**	**Cooling kWH**	**Heating Therms**	**$**
100	49.1	0	400	42		0		100	10		0		0		$0.00
95	42.5	1	400	30		2		100	7		1		2		$0.33
90	39.5	10	400	24		20		100	6		5		15		$2.69
85	36.6	39	400	19		60		100	5		15		45		$8.25
80	34	149	400	14		174		100	4		43		130		$23.77
75	31.6	185	400	10		151		100	3		38		113		$20.66
70	29.2	198	400		0		0	100		0		0		0	$0.00
65	27	254	400		2		5	100		1		1		4	$4.49
60	24.5	276	400		4		11	100		1		3		8	$9.75
55	21.4	179	400		6		11	100		2		3		8	$9.49
50	18.7	182	400		9		15	100		2		4		11	$12.86
45	16.2	182	400		11		18	100		3		5		14	$16.07
40	14.4	195	400		13		24	100		3		6		18	$20.67
35	12.6	304	400		15		43	100		4		11		32	$37.59
30	10.7	218	400		17		35	100		4		9		27	$30.81
25	8.6	99	400		19		18	100		5		5		14	$15.74
20	6.8	75	400		22		15	100		5		4		11	$13.25
15	5.5	37	400		24		8	100		6		2		6	$7.19
10	4.1	14	400		26		3	100		6		1		3	$2.97
5	2.6	7	400		28		2	100		7		0		1	$1.61
0	1	4	400		30		1	100		8		0		1	$0.99
-5	0	0	400		32		0	100		8		0		0	$0.00
-10	-1.5	0	400		35		0	100		9		0		0	$0.00
Total		**2608**		**139**	**294**	**407**	**211**		**35**	**73**	**102**	**52.719**	**305**	**158.16**	**$239.17**

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-4 Demand Ventilation

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		
Carbon Dioxide Sensors	1	ea	$250	$100		$245	$121	$0	$366	
Wiring and Connections	1	ea	$50	$150		$49	$182	$0	$231	
Programing	1	ea	$0	$500		$0	$605	$0	$605	
Modulating Motor Damp	1	ea	$135	$150		$135	$150	$0	$285	

Subtotal	$1,487
10% Contingency	$149
10% OH	$164
10% Profit	$180
Total	$1,979

Annual Component Costs - Demand Control Ventilation

Station 21
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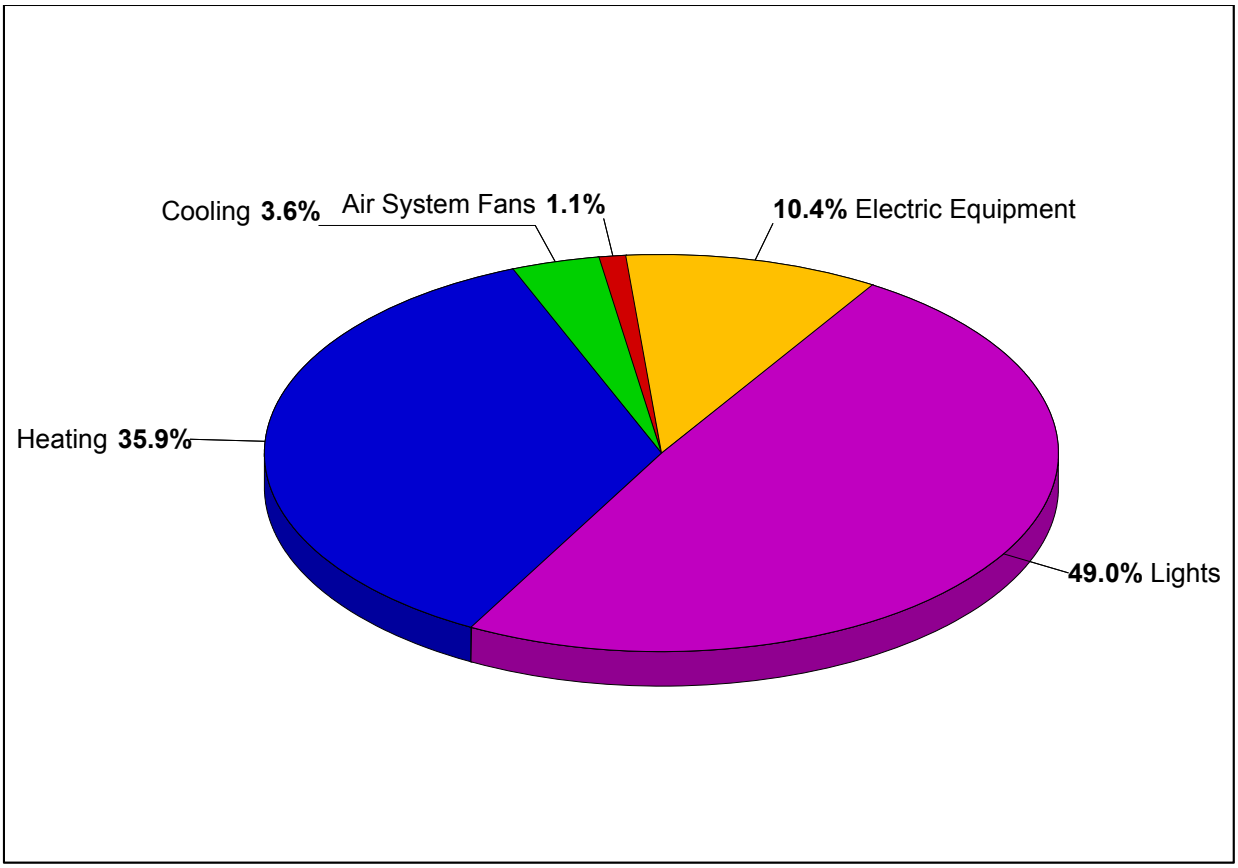
09:38AM



1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	97	0.019	1.1
Cooling	310	0.061	3.6
Heating	3,106	0.607	35.9
Pumps	0	0.000	0.0
Cooling Tower Fans	0	0.000	0.0
HVAC Sub-Total	**3,513**	**0.686**	**40.6**
Lights	4,234	0.827	49.0
Electric Equipment	896	0.175	10.4
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**5,130**	**1.002**	**59.4**
Grand Total	**8,643**	**1.688**	**100.0**

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

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Annual HVAC & Non-HVAC Cost Totals - Demand Control Ventilation

Station 21 05/21/2010
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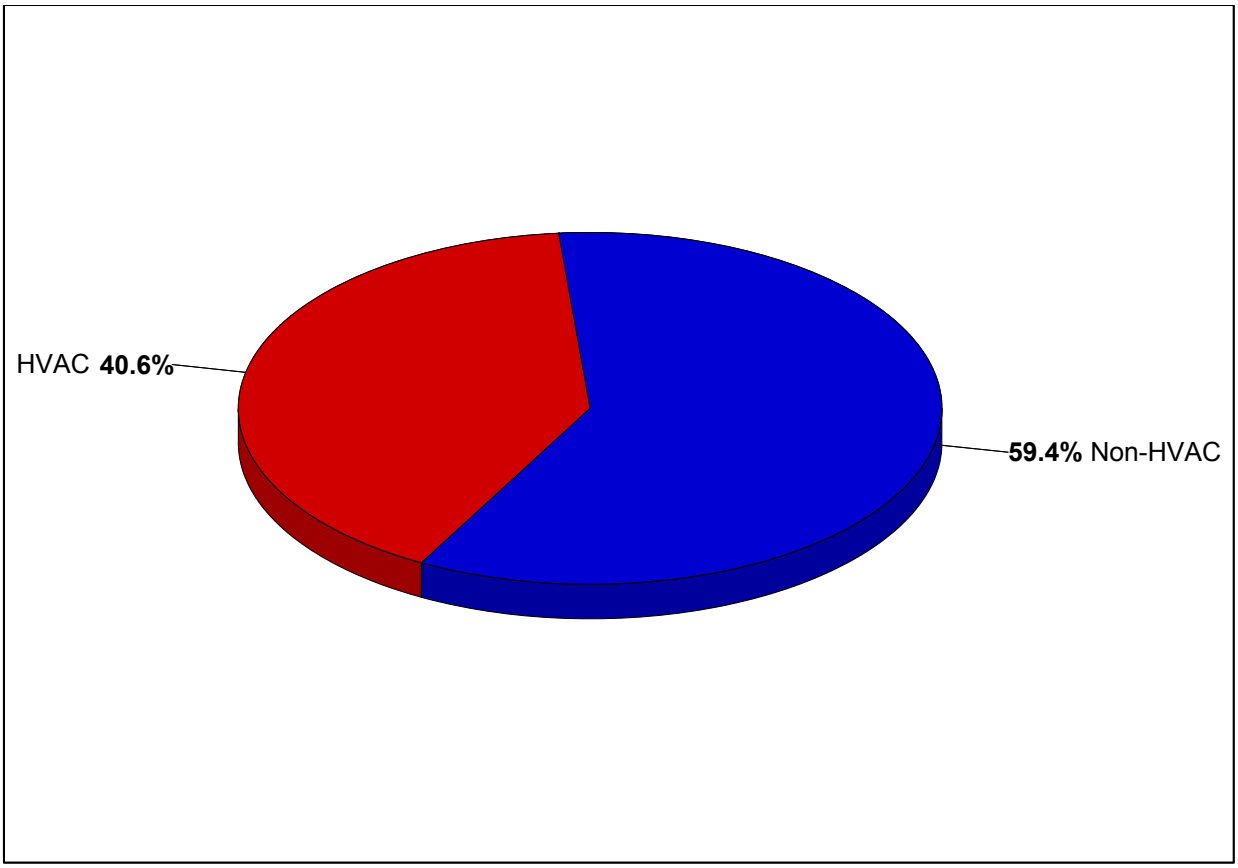

1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	3,513	0.686	40.6
Non-HVAC	5,130	1.002	59.4
Grand Total	**8,643**	**1.688**	**100.0**

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

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Annual Energy Costs - Demand Control Ventilation

Station 21
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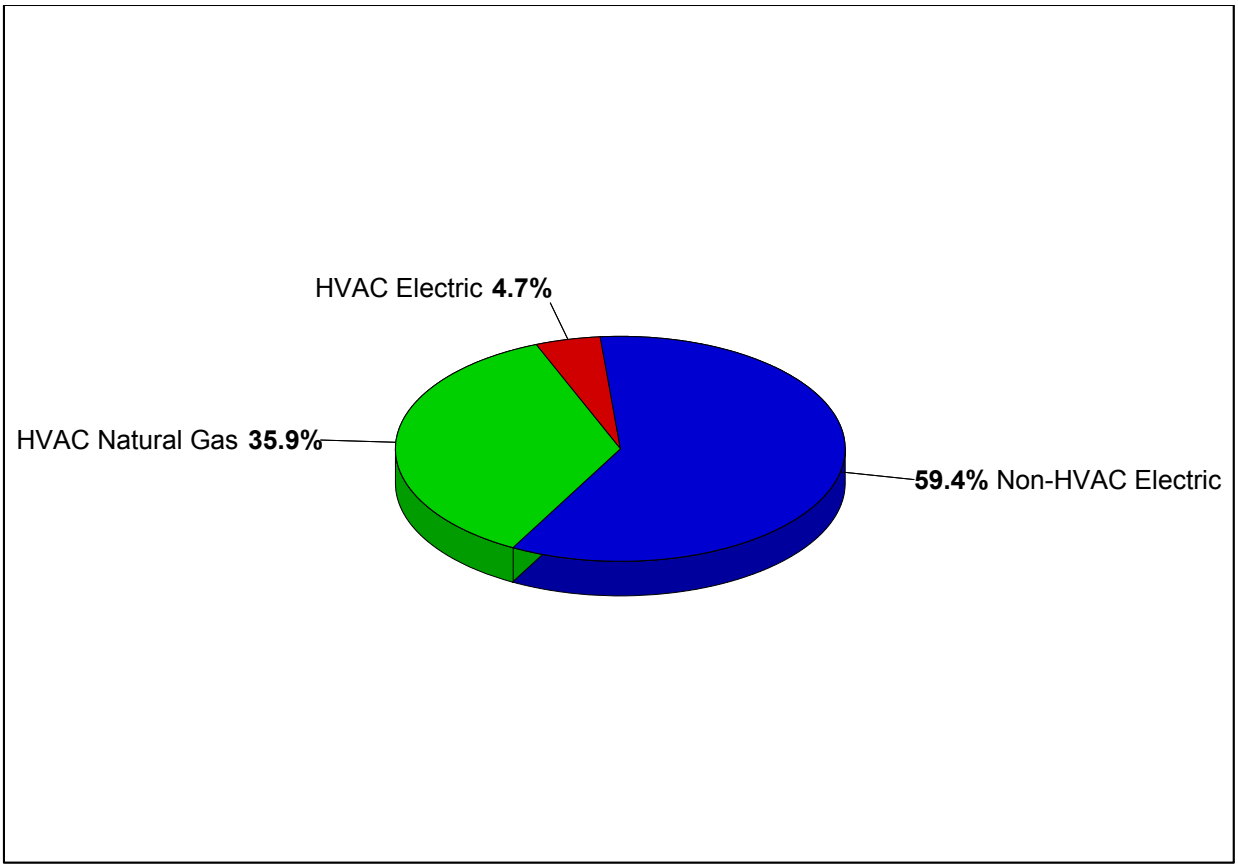

1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	407	0.080	4.7
Natural Gas	3,106	0.607	35.9
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**3,513**	**0.686**	**40.6**
Non-HVAC Components			
Electric	5,130	1.002	59.4
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**5,130**	**1.002**	**59.4**
Grand Total	**8,643**	**1.688**	**100.0**

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

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Energy Budget by Energy Source - Demand Control Ventilation

Station 21 05/21/2010
Kitchen and Associates 09:38AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	21,702	4.239
Heating Coil Loads	201,114	39.280
Grand Total	**222,816**	**43.519**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	7,432	1.452	26,544	5.185
Natural Gas	250,444	48.915	250,444	48.915
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**257,876**	**50.367**	**276,988**	**54.099**
Non-HVAC Components				
Electric	93,652	18.291	334,470	65.326
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**93,652**	**18.291**	**334,470**	**65.326**
Grand Total	**351,528**	**68.658**	**611,458**	**119.426**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **5120.0** ft²
   Conditioned Floor Area ..... **5120.0** ft²

Energy Budget by System Component - Demand Control Ventilation

Station 21 05/21/2010
Kitchen and Associates 09:38AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	21,702	4.239
Heating Coil Loads	201,114	39.280
Grand Total	**222,816**	**43.519**

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	1,773	0.346	6,331	1.236
Cooling	5,660	1.105	20,214	3.948
Heating	250,444	48.915	250,444	48.915
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
HVAC Sub-Total	**257,876**	**50.367**	**276,988**	**54.099**
Lights	77,300	15.098	276,072	53.920
Electric Equipment	16,351	3.194	58,398	11.406
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**93,652**	**18.291**	**334,470**	**65.326**
Grand Total	**351,528**	**68.658**	**611,458**	**119.425**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **5120.0** ft²
   Conditioned Floor Area ..... **5120.0** ft²

Monthly Component Costs - Demand Control Ventilation

Station 21
Kitchen and Associates

05/21/2010
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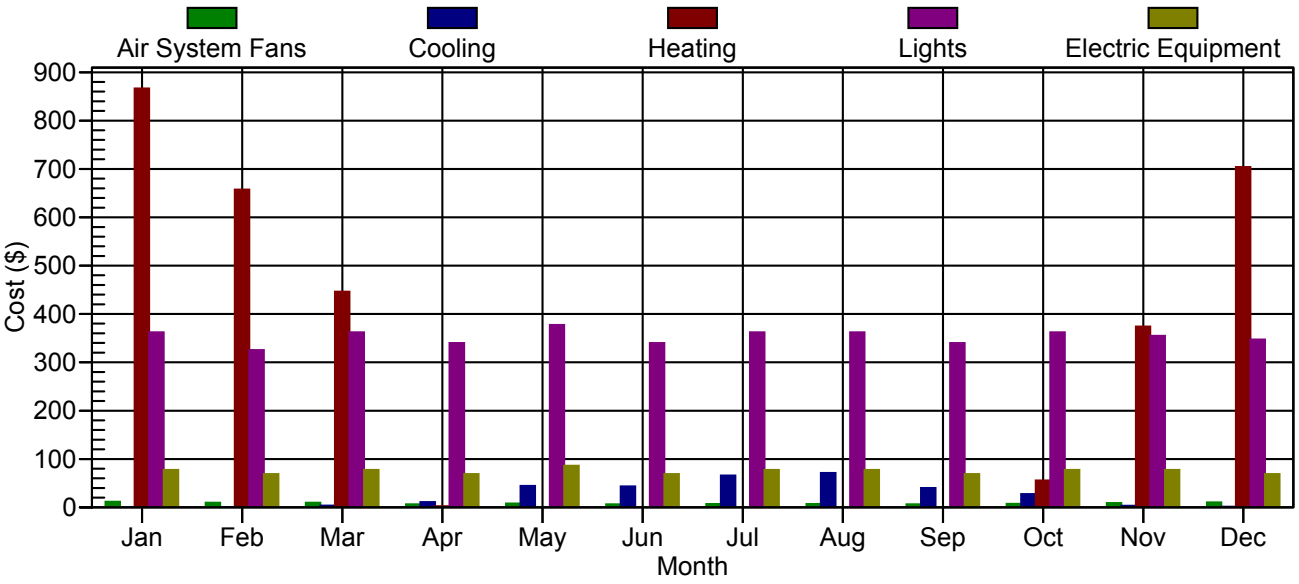


1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Cooling Towers ($)	HVAC Total ($)
January	12	0	867	0	0	879
February	9	0	657	0	0	666
March	9	4	446	0	0	459
April	6	11	2	0	0	19
May	8	44	0	0	0	52
June	6	43	0	0	0	49
July	7	66	0	0	0	73
August	7	71	0	0	0	78
September	6	40	0	0	0	46
October	7	27	56	0	0	90
November	9	3	374	0	0	386
December	10	1	704	0	0	715
Total	**97**	**310**	**3,106**	**0**	**0**	**3,513**

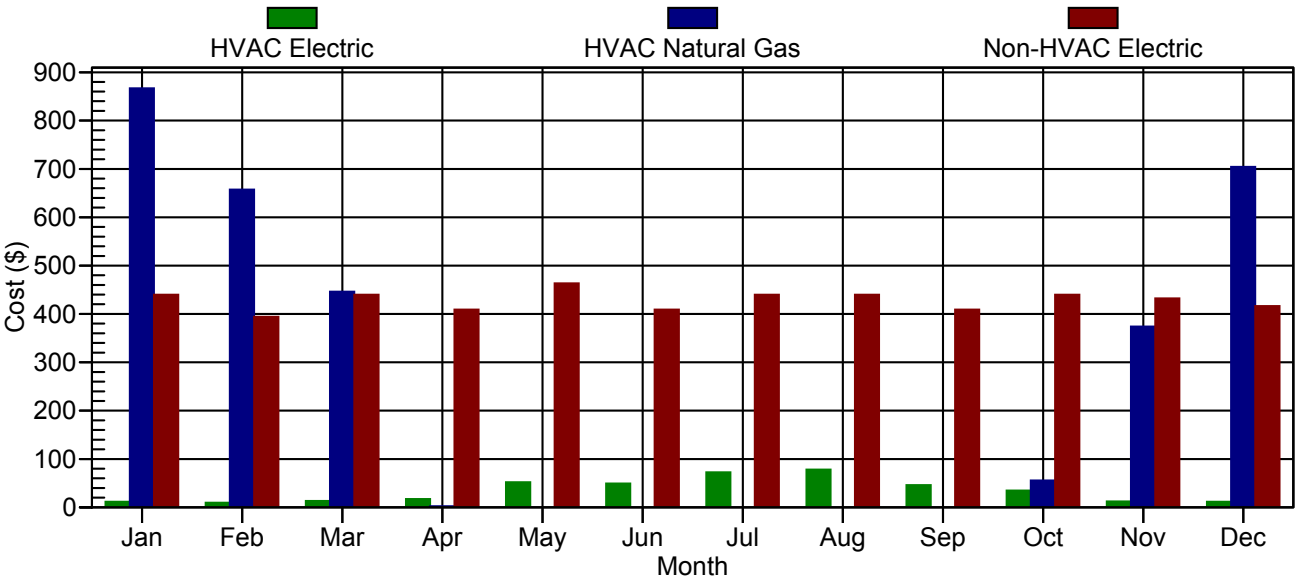
2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	362	78	0	0	440	1,319
February	325	69	0	0	394	1,060
March	362	78	0	0	440	899
April	340	69	0	0	409	428
May	377	86	0	0	463	515
June	340	69	0	0	409	458
July	362	78	0	0	440	513
August	362	78	0	0	440	518
September	340	69	0	0	409	455
October	362	78	0	0	440	530
November	355	78	0	0	432	818
December	347	69	0	0	416	1,131
Total	**4,234**	**896**	**0**	**0**	**5,130**	**8,643**

Monthly Energy Costs - Demand Control Ventilation

Station 21
Kitchen and Associates

05/21/2010
09:38AM



1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	12	867	0	0	0	0	0
February	10	657	0	0	0	0	0
March	13	446	0	0	0	0	0
April	17	2	0	0	0	0	0
May	52	0	0	0	0	0	0
June	49	0	0	0	0	0	0
July	73	0	0	0	0	0	0
August	78	0	0	0	0	0	0
September	46	0	0	0	0	0	0
October	35	56	0	0	0	0	0
November	12	374	0	0	0	0	0
December	11	704	0	0	0	0	0
Total	**407**	**3,106**	**0**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	440	0	0	0	0	0
February	394	0	0	0	0	0
March	440	0	0	0	0	0
April	409	0	0	0	0	0
May	463	0	0	0	0	0
June	409	0	0	0	0	0
July	440	0	0	0	0	0
August	440	0	0	0	0	0
September	409	0	0	0	0	0
October	440	0	0	0	0	0
November	432	0	0	0	0	0
December	416	0	0	0	0	0
Total	**5,130**	**0**	**0**	**0**	**0**	**0**

Monthly Energy Use by Energy Type - Demand Control Ventilation

Station 21 05/21/2010
Kitchen and Associates 09:38AM

1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	62	699	0	0	0	0	0
Feb	52	530	0	0	0	0	0
Mar	70	360	0	0	0	0	0
Apr	91	2	0	0	0	0	0
May	278	0	0	0	0	0	0
Jun	263	0	0	0	0	0	0
Jul	388	0	0	0	0	0	0
Aug	417	0	0	0	0	0	0
Sep	246	0	0	0	0	0	0
Oct	186	45	0	0	0	0	0
Nov	64	302	0	0	0	0	0
Dec	60	568	0	0	0	0	0
Totals	2,178	2,504	0	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	2,352	0	0	0	0	0
Feb	2,108	0	0	0	0	0
Mar	2,352	0	0	0	0	0
Apr	2,187	0	0	0	0	0
May	2,478	0	0	0	0	0
Jun	2,187	0	0	0	0	0
Jul	2,352	0	0	0	0	0
Aug	2,352	0	0	0	0	0
Sep	2,187	0	0	0	0	0
Oct	2,352	0	0	0	0	0
Nov	2,313	0	0	0	0	0
Dec	2,226	0	0	0	0	0
Totals	27,448	0	0	0	0	0

Monthly Energy Use by Component - Demand Control Ventilation

Station 21
Kitchen and Associates

05/21/2010
09:38AM

1. Monthly Energy Use by System Component

Component	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Air System Fans (kWh)	62	51	50	33	42	33	37	37	33	39	47	54
Cooling												
Electric (kWh)	0	1	20	58	237	230	351	380	213	147	16	7
Natural Gas (Therm)	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 (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 (Therm)	699	530	360	2	0	0	0	0	0	45	302	568
Fuel Oil (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
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)	1938	1740	1938	1818	2017	1818	1938	1938	1818	1938	1898	1858
Electric Eqpt. (kWh)	415	369	415	369	461	369	415	415	369	415	415	369
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (Therm)	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

Station 21
Kitchen and Associates

05/21/2010
09:38AM

Table 1. Annual Costs

Component	Demand Control Ventilation ($)
Air System Fans	97
Cooling	310
Heating	3,106
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**3,513**
Lights	4,234
Electric Equipment	896
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**5,130**
Grand Total	**8,643**

Table 2. Annual Cost per Unit Floor Area

Component	Demand Control Ventilation ($/ft²)
Air System Fans	0.019
Cooling	0.061
Heating	0.607
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.686**
Lights	0.827
Electric Equipment	0.175
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**1.002**
Grand Total	**1.688**
Gross Floor Area (ft²)	5120.0
Conditioned Floor Area (ft²)	5120.0

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

Table 3. Component Cost as a Percentage of Total Cost

Component	Demand Control Ventilation (%)
Air System Fans	1.1
Cooling	3.6
Heating	35.9
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**40.6**
Lights	49.0
Electric Equipment	10.4
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**59.4**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Station 21
Kitchen and Associates

05/21/2010
09:38AM

Table 1. Annual Costs

Component	Demand Control Ventilation ($)
HVAC Components	
Electric	407
Natural Gas	3,106
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**3,513**
Non-HVAC Components	
Electric	5,130
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**5,130**
Grand Total	**8,643**

Table 2. Annual Energy Consumption

Component	Demand Control Ventilation
HVAC Components	
Electric (kWh)	2,178
Natural Gas (Therm)	2,504
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	27,448
Natural Gas (Therm)	0
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	29,626
Natural Gas (Therm)	2,504
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	Demand Control Ventilation
CO2 Equivalent (lb)	0

Table 4. Annual Cost per Unit Floor Area

Component	Demand Control Ventilation ($/ft²)
HVAC Components	
Electric	0.080
Natural Gas	0.607
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.686**
Non-HVAC Components	
Electric	1.002
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**1.002**
Grand Total	**1.688**
Gross Floor Area (ft²)	5120.0
Conditioned Floor Area (ft²)	5120.0

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

Table 5. Component Cost as a Percentage of Total Cost

Component	Demand Control Ventilation (%)
HVAC Components	
Electric	4.7
Natural Gas	35.9
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**40.6**
Non-HVAC Components	
Electric	59.4
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**59.4**
Grand Total	**100.0**

APPENDIX G

ECM-5 Modify Meeting Room HVAC Unit Control

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

ECM-5 Modify Member's Room HVAC Unit Control

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		
Programmable Thermostat	1	ea	$150	$50		$147	$61	$0	$208	

Subtotal	$208
10% OH, 10% Profit	$21
10% Contingency	$21
Total	$249

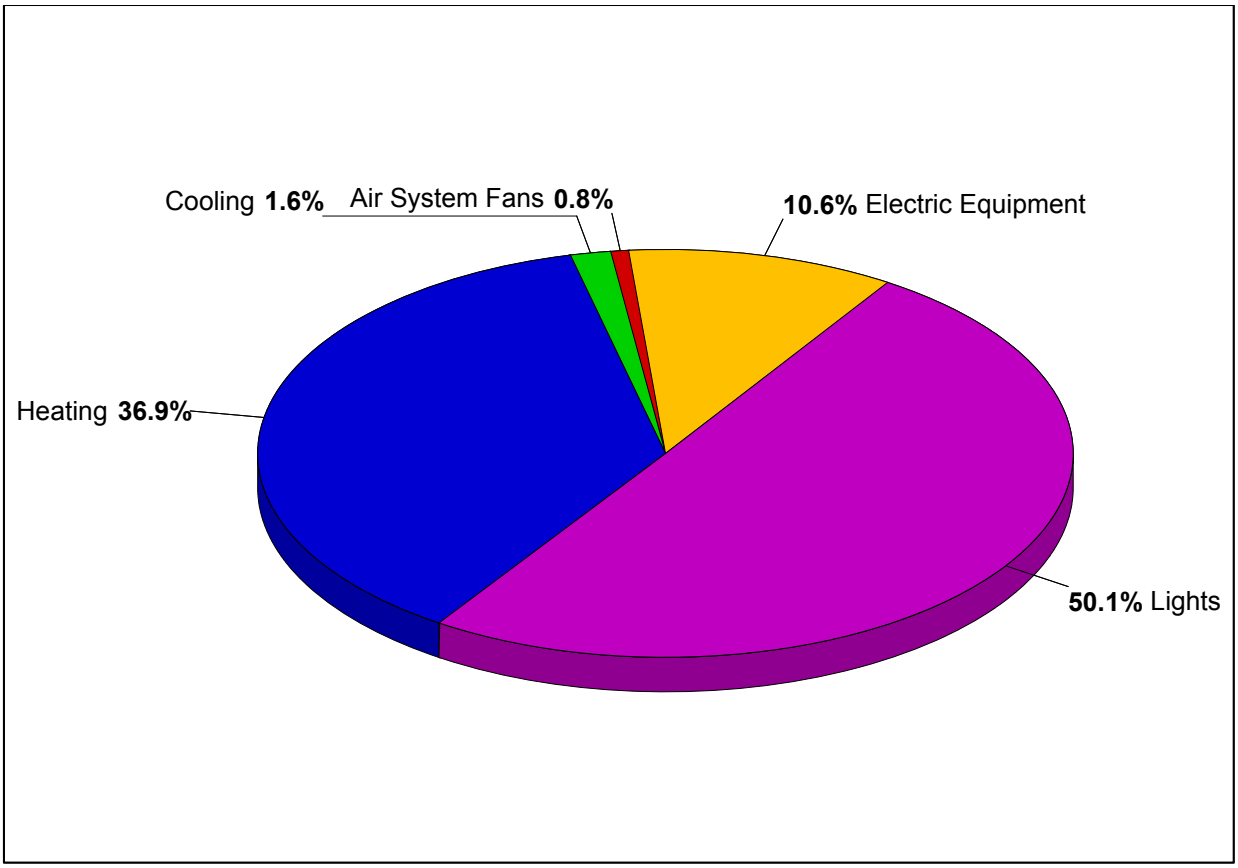
BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-5 Modify Member's Room HVAC Unit Control

Annual Energy Use Comparison			
	Electricity kWh	Natural Gas therms	Cost $
Existing Manual Thermostat Control	2,063	2,640	$ 3,659.00
Proposed Programmable Thermostat with Timer Override	1,062	2,512	$ 3,313.00
Difference	1,001	128	$ 346.00

Annual Component Costs - Night Setback



1. Annual Costs

Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	64	0.013	0.8
Cooling	135	0.026	1.6
Heating	3,115	0.608	36.9
Pumps	0	0.000	0.0
Cooling Tower Fans	0	0.000	0.0
HVAC Sub-Total	**3,313**	**0.647**	**39.2**
Lights	4,234	0.827	50.1
Electric Equipment	896	0.175	10.6
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**5,130**	**1.002**	**60.8**
Grand Total	**8,443**	**1.649**	**100.0**

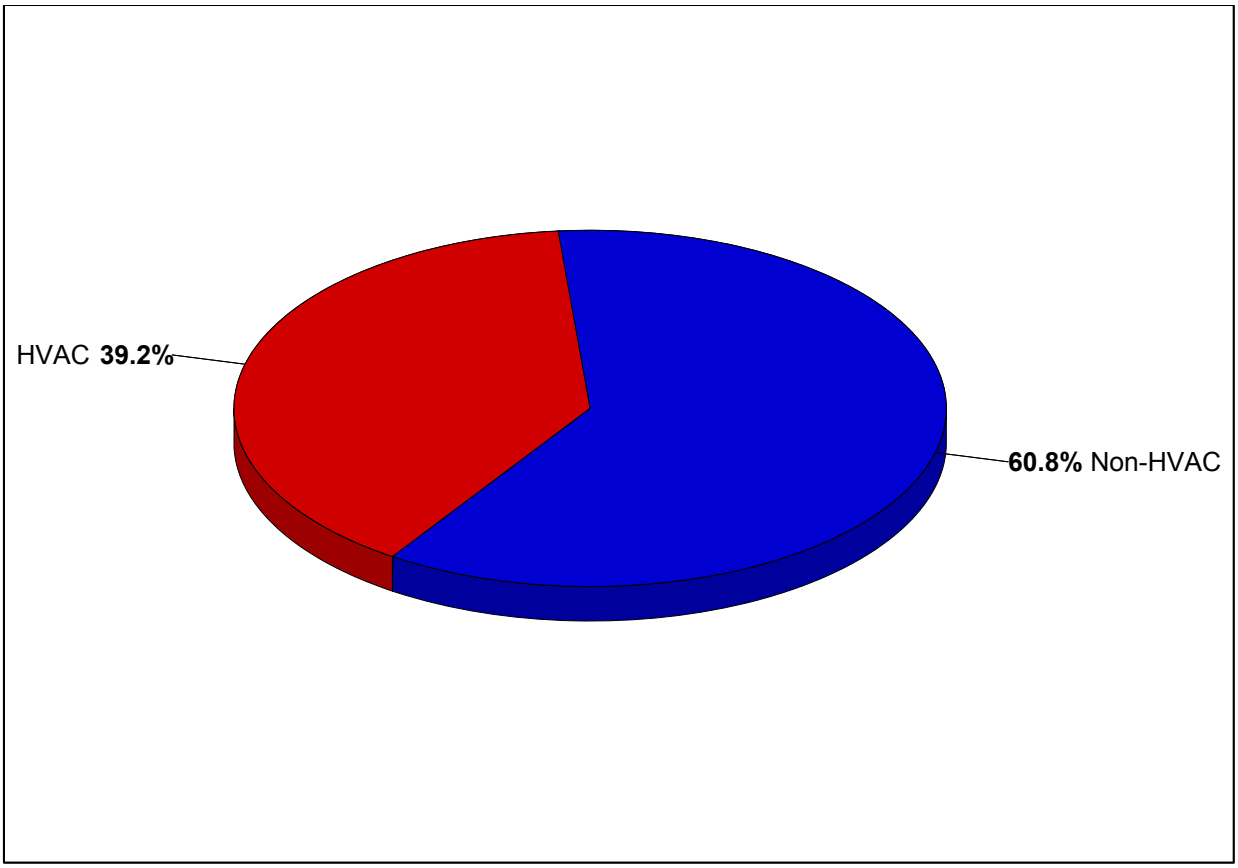
Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Annual HVAC & Non-HVAC Cost Totals - Night Setback

Station 21
Kitchen and Associates

05/21/2010
09:39AM



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	3,313	0.647	39.2
Non-HVAC	5,130	1.002	60.8
Grand Total	**8,443**	**1.649**	**100.0**

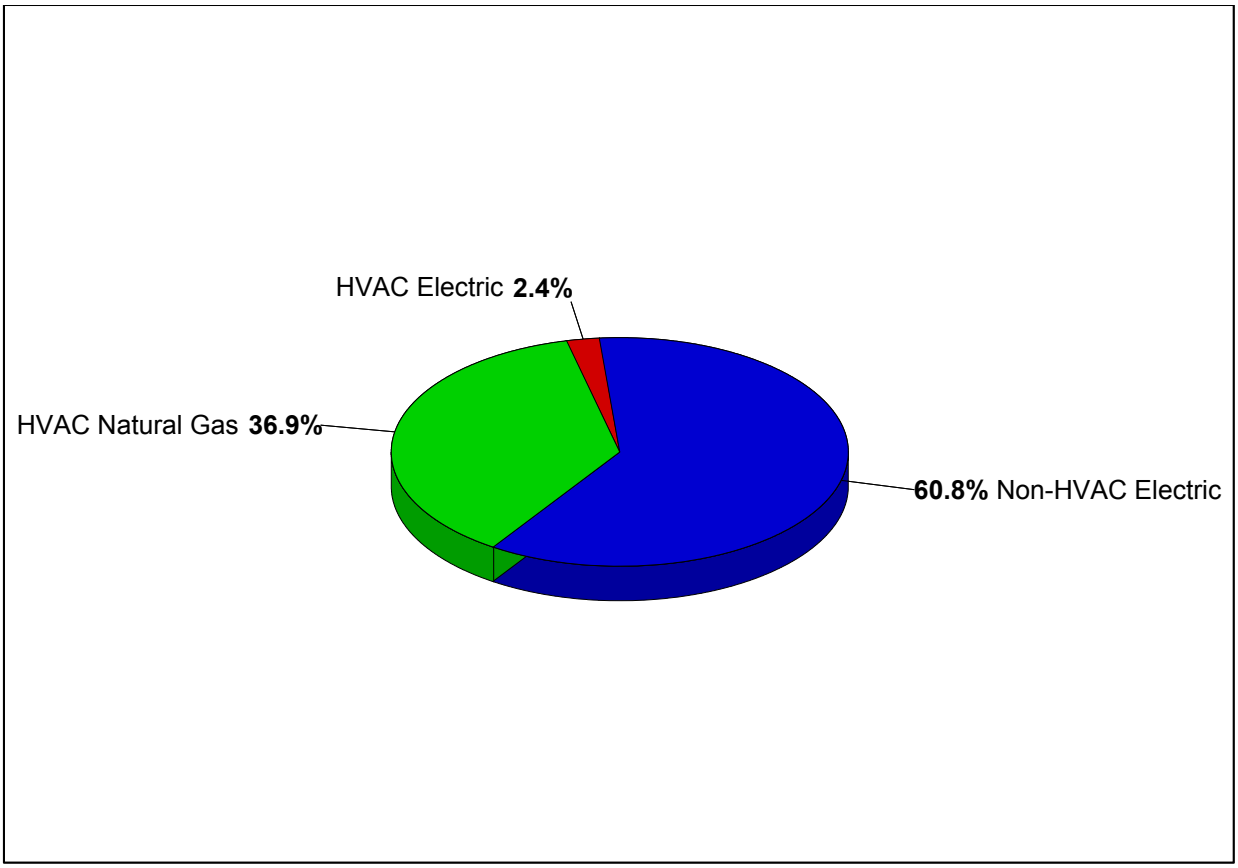
Note: Cost per unit floor area is based on the gross building floor area.

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Annual Energy Costs - Night Setback

Station 21
Kitchen and Associates

05/21/2010
09:39AM



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	199	0.039	2.4
Natural Gas	3,115	0.608	36.9
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**3,313**	**0.647**	**39.2**
Non-HVAC Components			
Electric	5,130	1.002	60.8
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**5,130**	**1.002**	**60.8**
Grand Total	**8,443**	**1.649**	**100.0**

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

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Energy Budget by Energy Source - Night Setback

Station 21 — 05/21/2010
Kitchen and Associates — 09:39AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	12,339	2.410
Heating Coil Loads	201,815	39.417
Grand Total	**214,154**	**41.827**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	3,625	0.708	12,946	2.529
Natural Gas	251,190	49.061	251,190	49.061
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**254,814**	**49.769**	**264,136**	**51.589**
Non-HVAC Components				
Electric	93,652	18.291	334,470	65.326
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**93,652**	**18.291**	**334,470**	**65.326**
Grand Total	**348,466**	**68.060**	**598,605**	**116.915**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **5120.0** ft²
   Conditioned Floor Area ..... **5120.0** ft²

Energy Budget by System Component - Night Setback

Station 21 05/21/2010
Kitchen and Associates 09:39AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	12,339	2.410
Heating Coil Loads	201,815	39.417
Grand Total	**214,154**	**41.827**

2. Energy Consumption by System Component

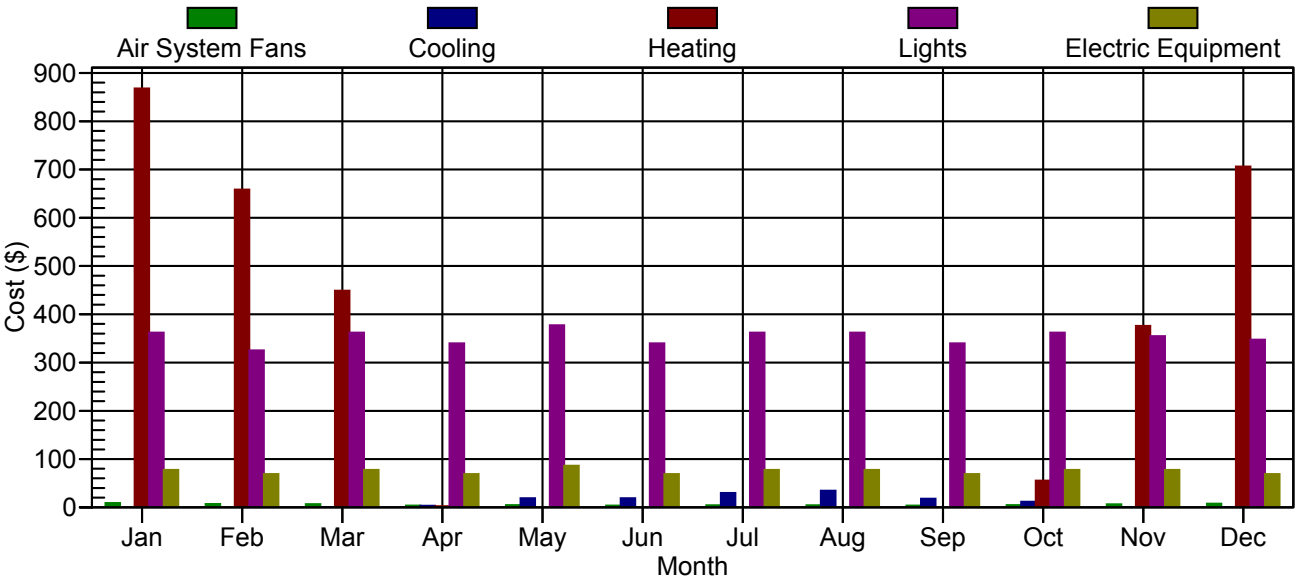
Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	1,167	0.228	4,167	0.814
Cooling	2,458	0.480	8,779	1.715
Heating	251,190	49.061	251,190	49.061
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
HVAC Sub-Total	**254,814**	**49.769**	**264,136**	**51.589**
Lights	77,300	15.098	276,072	53.920
Electric Equipment	16,351	3.194	58,398	11.406
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**93,652**	**18.291**	**334,470**	**65.326**
Grand Total	**348,466**	**68.060**	**598,605**	**116.915**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **5120.0** ft²
   Conditioned Floor Area ..... **5120.0** ft²

Monthly Component Costs - Night Setback

Station 21
Kitchen and Associates

05/21/2010
09:39AM



1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Cooling Towers ($)	HVAC Total ($)
January	9	0	868	0	0	877
February	7	0	658	0	0	665
March	7	1	449	0	0	457
April	4	3	2	0	0	9
May	5	19	0	0	0	24
June	4	19	0	0	0	23
July	4	30	0	0	0	34
August	4	34	0	0	0	38
September	4	18	0	0	0	22
October	4	11	55	0	0	70
November	6	0	376	0	0	382
December	7	0	706	0	0	713
Total	**64**	**135**	**3,115**	**0**	**0**	**3,313**

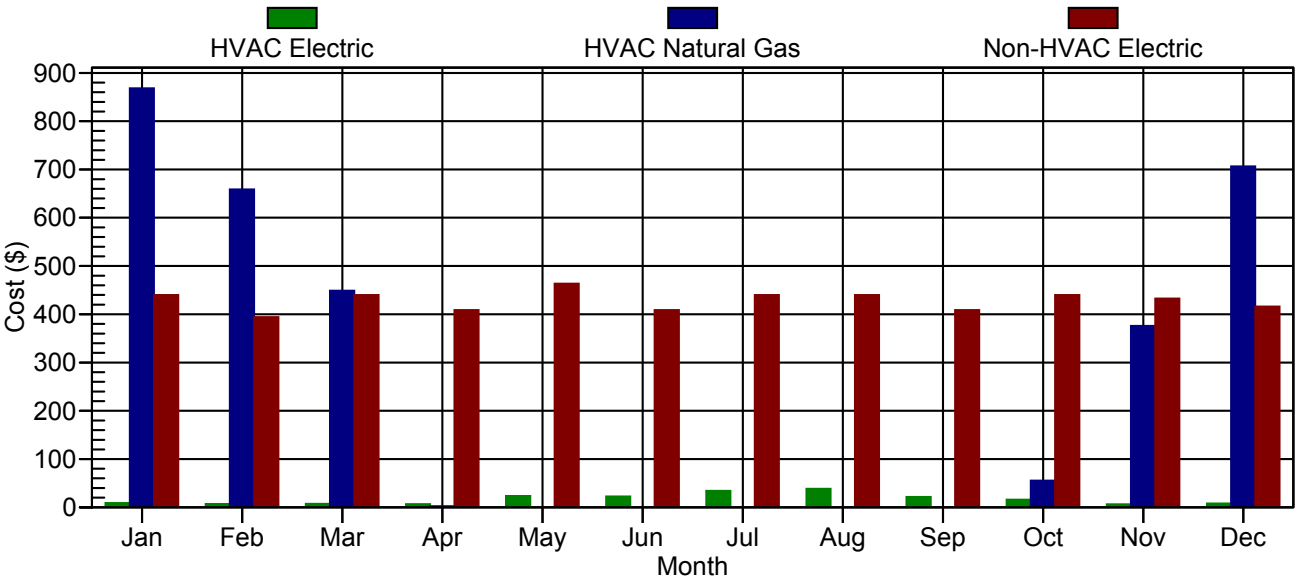
2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	362	78	0	0	440	1,317
February	325	69	0	0	394	1,059
March	362	78	0	0	440	897
April	340	69	0	0	409	418
May	377	86	0	0	463	487
June	340	69	0	0	409	432
July	362	78	0	0	440	474
August	362	78	0	0	440	478
September	340	69	0	0	409	431
October	362	78	0	0	440	510
November	355	78	0	0	432	814
December	347	69	0	0	416	1,129
Total	**4,234**	**896**	**0**	**0**	**5,130**	**8,443**

Monthly Energy Costs - Night Setback

Station 21
Kitchen and Associates

05/21/2010
09:39AM



1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	9	868	0	0	0	0	0
February	7	658	0	0	0	0	0
March	7	449	0	0	0	0	0
April	7	2	0	0	0	0	0
May	23	0	0	0	0	0	0
June	22	0	0	0	0	0	0
July	34	0	0	0	0	0	0
August	38	0	0	0	0	0	0
September	21	0	0	0	0	0	0
October	16	55	0	0	0	0	0
November	6	376	0	0	0	0	0
December	8	706	0	0	0	0	0
Total	**199**	**3,115**	**0**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	440	0	0	0	0	0
February	394	0	0	0	0	0
March	440	0	0	0	0	0
April	409	0	0	0	0	0
May	463	0	0	0	0	0
June	409	0	0	0	0	0
July	440	0	0	0	0	0
August	440	0	0	0	0	0
September	409	0	0	0	0	0
October	440	0	0	0	0	0
November	432	0	0	0	0	0
December	416	0	0	0	0	0
Total	**5,130**	**0**	**0**	**0**	**0**	**0**

Monthly Energy Use by Energy Type - Night Setback

Station 21
Kitchen and Associates

05/21/2010
09:39AM

1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	47	700	0	0	0	0	0
Feb	37	531	0	0	0	0	0
Mar	39	362	0	0	0	0	0
Apr	36	2	0	0	0	0	0
May	125	0	0	0	0	0	0
Jun	119	0	0	0	0	0	0
Jul	181	0	0	0	0	0	0
Aug	205	0	0	0	0	0	0
Sep	115	0	0	0	0	0	0
Oct	84	45	0	0	0	0	0
Nov	33	303	0	0	0	0	0
Dec	41	570	0	0	0	0	0
Totals	1,062	2,512	0	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	2,352	0	0	0	0	0
Feb	2,108	0	0	0	0	0
Mar	2,352	0	0	0	0	0
Apr	2,187	0	0	0	0	0
May	2,478	0	0	0	0	0
Jun	2,187	0	0	0	0	0
Jul	2,352	0	0	0	0	0
Aug	2,352	0	0	0	0	0
Sep	2,187	0	0	0	0	0
Oct	2,352	0	0	0	0	0
Nov	2,313	0	0	0	0	0
Dec	2,226	0	0	0	0	0
Totals	27,448	0	0	0	0	0

Monthly Energy Use by Component - Night Setback

Station 21
Kitchen and Associates

05/21/2010
09:39AM

1. Monthly Energy Use by System Component

Component	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Air System Fans (kWh)	47	37	35	20	24	20	22	22	20	24	32	40
Cooling												
Electric (kWh)	0	0	4	16	100	100	159	183	95	61	1	1
Natural Gas (Therm)	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 (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 (Therm)	700	531	362	2	0	0	0	0	0	45	303	570
Fuel Oil (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
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)	1938	1740	1938	1818	2017	1818	1938	1938	1818	1938	1898	1858
Electric Eqpt. (kWh)	415	369	415	369	461	369	415	415	369	415	415	369
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (Therm)	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

Station 21
Kitchen and Associates

05/21/2010
09:39AM

Table 1. Annual Costs

Component	Night Setback ($)
Air System Fans	64
Cooling	135
Heating	3,115
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**3,313**
Lights	4,234
Electric Equipment	896
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**5,130**
Grand Total	**8,443**

Table 2. Annual Cost per Unit Floor Area

Component	Night Setback ($/ft²)
Air System Fans	0.013
Cooling	0.026
Heating	0.608
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.647**
Lights	0.827
Electric Equipment	0.175
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**1.002**
Grand Total	**1.649**
Gross Floor Area (ft²)	5120.0
Conditioned Floor Area (ft²)	5120.0

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

Table 3. Component Cost as a Percentage of Total Cost

Component	Night Setback (%)
Air System Fans	0.8
Cooling	1.6
Heating	36.9
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**39.2**
Lights	50.1
Electric Equipment	10.6
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**60.8**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Station 21 05/21/2010
Kitchen and Associates 09:39AM

Table 1. Annual Costs

Component	Night Setback ($)
HVAC Components	
Electric	199
Natural Gas	3,115
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**3,313**
Non-HVAC Components	
Electric	5,130
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**5,130**
Grand Total	**8,443**

Table 2. Annual Energy Consumption

Component	Night Setback
HVAC Components	
Electric (kWh)	1,062
Natural Gas (Therm)	2,512
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	27,448
Natural Gas (Therm)	0
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	28,510
Natural Gas (Therm)	2,512
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	Night Setback
CO2 Equivalent (lb)	0

Table 4. Annual Cost per Unit Floor Area

Component	Night Setback ($/ft²)
HVAC Components	
Electric	0.039
Natural Gas	0.608
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.647**
Non-HVAC Components	
Electric	1.002
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**1.002**
Grand Total	**1.649**
Gross Floor Area (ft²)	5120.0
Conditioned Floor Area (ft²)	5120.0

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

Table 5. Component Cost as a Percentage of Total Cost

Component	Night Setback (%)
HVAC Components	
Electric	2.4
Natural Gas	36.9
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**39.2**
Non-HVAC Components	
Electric	60.8
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**60.8**
Grand Total	**100.0**

APPENDIX H

ECM-6 Modify Electric Wall Heater Control

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

ECM-6 Modify Electric Wall Heater Control

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		
Dual setting, Line Voltage Thermostat	2	ea	$100	$50		$196	$121	$0	$317	
with Tie-in to Light Switch										

Subtotal	$317
10% OH, 10% Profit	$32
10% Contingency	$32
Total	$380

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-6 Modify Electric Wall Heater Control

Annual Energy Use Comparison			
	Electricity kWh	Natural Gas therms	Cost $
Existing Wall Heater Control	1,115	0	$ 212
Proposed Wall Heater Control	796	0	$ 151
Difference	319	0	$ 61

Energy consumption is based on the modified degree day procedure, per ASHRAE:

$E = [(H_L*D*24)/(DeltT*n*V)](C_D)(C_F)$

E = fuel or energy consumption for the estimate period

H_L = design heat loss, including infiltration, Btu per hour

D = number of 65 F degree days for the estimate period

DeltT = design temperature difference, Fahrenheit

n = rated full load efficiency, decimal

V = heating value of fuel, consistent with HL and E

C_D = interim correction factor for heating effect vs degree days

C_F = interim part-load correction factor for fueled systems only; equals 1.0 for electric resistance heating

APPENDIX I

ECM-7 Reduce Water Use

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-7 Reduced Water Use

Budgetary Costs	Annual Utility Savings			ROI	Potential Incentive	Payback (Without Incentive)	Payback (With Incentive)
	Water	Electricity	Total				
$	$	$	$		$	Years	Years
$ 15.00	$ 2.00	$ 9.00	$ 11.00	6.6	0	1.4	1.4

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21

CHA Project # 20998

Water Cost Summary: Account Number #3034300					
Period	Consumption Gallons	Base Charge	Water Charge	Total Cost	Water cost per 1000 gallons
2/24/09	2000	$ 12.10	$ 4.86	$ 16.96	$ 2.43
5/22/09	2000	$ 13.37	$ 5.36	$ 18.73	$ 2.68
8/24/09	2000	$ 13.37	$ 5.36	$ 18.73	$ 2.68
11/23/09	3000	$ 13.37	$ 8.04	$ 21.41	$ 2.68
Totals		$ 52.21	$ 23.62	$ 75.83	$ 2.62

South Brunswick Township Water & sewer

Notes: **Chart 5** **Water Cost Summary**

This chart provides water cost breakdowns and sums totals.

All numbers are in $ except gallons.

Back to Web Site

South Brunswick Township
New Jersey

Billing Residential Rates

Meter Size

Size of Meter	Quarterly Base Charge
5/8"-3/4"	$13.37
1"	$24.06

Domestic Water & Sewer Charges

Water Charge:	Sewer Charge:
Each Customer Will be Charged a, Quarterly Base Charge, Plus Consumption Tier Rate Per 1,000 Gallons 0-18,000 $2.68 18,001-50,000 $3.10 50,001-100,000 $3.49 Over 100,000 $3.87	Number of Units x $118.20

Charges to connect to water and/or sewer
Service Charges

- Water: $65.00
- Sewer: $65.00

If tying into both Water and Sewer at the time of application, the Service Charge is:

- Water: $37.50
- Sewer: $37.50

Connection Charge

- **Water**
  $575.00 (up to a 2 inch line) For connection larger than 2 inches: All connections larger than 2" shall be installed by the applicant at the applicant's expense. Inspection of the installation will be made by an authorized representative of the township. All wet taps and connections made to the water system by owners of major subdivisions, townhouses, student dorms, apartments, mobile home parks, commercial and industrial properties shall be made by the owners at their expense.
- **Sewer (not applicable)**
  All sewer connections are done by the applicant at the applicants expense.

Facility Charges

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

Simple Payback Analysis	
Cost	$15.00
Incentive	$0.00
Adjusted Cost	$15.00
Savings/yr	$11.65
Payback in years	1.29

ECM-7 Reduced Water Use

Existing Fixture								Replacement Fixture					Savings		
Fixture	**Flow Rate (gpm)**	**Annual Operation (min)**	**Quantity**	**Annual Water Use (gallons)**	**Annual Water Cost ($)**	**Annual Electric Use (kWh)**	**Annual Electric Cost ($)**	**Flow Rate**	**Annual Water Use (gallons)**	**Annual Water Cost ($)**	**Annual Electric Use (kWh)**	**Annual Gas Cost ($)**	**Water**	**Gas**	**Total**
Kitchen Sink	2.2	520	1	1144	$3	65	$12.15	0.5	260	0.6968	15	2.8035	$2	$9.35	$11.65

Energy-Efficient Products
- Federal Requirements
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Energy Cost Calculator for Faucets and Showerheads

Vary utility cost, hours of operation, and /or efficiency level.

INPUT SECTION

Input the following data (if any parameter is missing, calculator will set to the default value).			*Defaults*	
Water Saving Product	Showerhead		*Faucet*	*Showerhead*
Flow Rate	1.6	gpm	*2.2 gpm*	*2.5 gpm*
Water Cost (including waste water charges)	2.62	$/1000 gal	*$4/1000 gal*	*$4/1000 gal*
Gas Cost	1.24	$/therm	*0.60 $/therm*	*0.60 $/therm*
Electricity Cost	.1869	$/kWh	*0.06 $/kWh*	*0.06 $/kWh*
Minutes per Day of Operation	7	minutes	*30 minutes*	*20 minutes*
Days per Year of Operation	26	days	*260 days*	*365 days*
Quantity to be Purchased	1	unit(s)	*1 unit*	*1 unit*

Calculate | Reset

OUTPUT SECTION

Performance per Showerhead	**Your Choice**	**Base Model**	**FEMP Recommended Level**	**Best Available**	**Self Closing Faucet (gallon per cycle)**
WATER USE ONLY					
Gallon per Minute	1.6 gpm	2.5	2.2	1.5	n/a
Annual Water Use	291 gal	455	400	273	n/a
Annual Water Cost	$ 1	$ 1	$ 1	$ 1	$ n/a
Lifetime Water Cost	$ 8	$ 8	$ 8	$ 8	$ n/a
WITH ELECTRIC WATER HEATING					
Annual Energy Use	38 kWh	59	52	35	n/a
Annual Energy Cost	$ 7	$ 11	$ 10	$ 7	$ n/a
Lifetime Energy Cost	$ 56	$ 86	$ 76	$ 51	$ n/a
Lifetime Energy and Water Cost Savings	$ 30	$ 0	$ 10	$ 35	$ n/a

Lifetime Energy and Water Cost Savings for 1 Showerhead(s)	$ 30	$ 0	$ 10	$ 35	$ n/a
WITH GAS WATER HEATING					
Annual Energy Use	2 therms	3	3	2	n/a
Annual Energy Cost	$ 2	$ 4	$ 4	$ 2	$ n/a
Lifetime Energy Cost	$ 17	$ 33	$ 33	$ 17	$ n/a
Lifetime Energy and Water Cost Savings	$ 16	$ 0	$ 0	$ 16	$ n/a
Lifetime Energy and Water Cost Savings for 1 Showerhead(s)	$ 16	$ 0	$ 0	$ 16	$ n/a

For electric water heating applications, your selection of an energy saving showerhead with a flow rate of 1.6 gallon(s) per minute will have a combined energy and water cost savings (per showerhead) of $ 30 over an estimated 10 year life expectancy compared to the base model.

For gas water heating applications, your selection of an energy saving showerhead with a flow rate of 1.6 gallon(s) per minute will have a combined energy and water cost savings (per showerhead) of $ 16 over an estimated 10 year life expectancy compared to the base model.

Assumptions

- "Base model" has an efficiency that just meets the national minimum standard for faucets or showerheads.
- Lifetime energy cost and lifetime water cost is the sum of the discounted value of the annual energy and water costs based on an assumed faucet or showerhead life of 10 years.
- Future gas and electricity price trends and a discount rate of 3.2% are based on Federal guidelines.
- $0.06 per kWh is the Federal average electricity price in the U.S.
- $0.60 per therm is the Federal average gas price in the U.S.
- The assumed combined water and waste-water price is $4.00/1000 gallons.

Disclaimer

This cost calculator is a screening tool that estimates a product's lifetime energy cost savings at various efficiency levels. Maintenance and installation costs do not vary significantly among the same product having different efficiencies; so, these costs are not included in this calculator tool. For a detailed life-cycle cost analysis, FEMP has developed a tool called Building Life-Cycle Cost (BLCC). This downloadable tool allows the user to vary interest rates, installation costs, maintenance costs, salvage values, and life expectancy for a product or an entire energy project.

Water Saving Product Flow Rate in gallons per minute. Default for a faucet is 2.2 gallons per minute. Default for a showerhead is 2.5 gallons per minute. Waster cost including waste water charges in dollars per 1000 gallons. Default for a faucet is 4 dollars per 1000 gallons. Default for a showerhead is 4 dollars per 1000 gallons. Gas cost in dollars per therm. Default for a faucet is 0.60 dollars per therm. Default for a showerhead is 0.60 per therm. Electricity cost in dollars per kilowatt hour. Default for a faucet is 0.06 dollars per kilowatt hour. Default for a showerhead is 0.06 dollars per kilowatt hour. Minutes per day of operation, measured in minutes. Default for a faucet is 30 minutes. Default for a showerhead is 20 minutes. Days per year of operation, measured in days. Default for a faucet is 260 days. Default for a showerhead is 365 days. Quantity to be purchased, measured in units. Default for a faucet is 1 unit. Default for a showerhead is 1 unit. Performance for faucet or showerhead, depending on selection above. Your Choice with Water Use Only Form Labels Gallons per minute based on your choice, for water use only. Annual water use based on your choice, for water use only. Annual water cost based on your choice, for water use only. Lifetime water cost based on your choice, for water use only. Base Model with Water Use Only Form Labels Gallons per minute based on the base model, for water use only. Annual water use based on the base model, for water use only. Annual water cost based on the base model, for water use only. Lifetime water cost based on the base model, for water use only. FEMP Recommended Levels with Water Use Only Form Labels Gallons per minute based on FEMP recommended levels,

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For electric water heating applications, your selection of an energy saving with a flow rate of gallon(s) per minute will have a combined energy and cost savings (per) of For gas water heating applications, your selection of an energy saving with a flow rate of gallon(s) per minute will have a combined energy and water cost savings (per) of

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Energy Cost Calculator for Faucets and Showerheads

Vary utility cost, hours of operation, and /or efficiency level.				
INPUT SECTION				
Input the following data (if any parameter is missing, calculator will set to the default value).			*Defaults*	
Water Saving Product	Faucet		*Faucet*	*Showerhead*
Flow Rate	0.5	gpm	*2.2 gpm*	*2.5 gpm*
Water Cost (including waste water charges)	2.62	$/1000 gal	*$4/1000 gal*	*$4/1000 gal*
Gas Cost	1.24	$/therm	*0.60 $/therm*	*0.60 $/therm*
Electricity Cost	.1869	$/kWh	*0.06 $/kWh*	*0.06 $/kWh*
Minutes per Day of Operation	2	minutes	*30 minutes*	*20 minutes*
Days per Year of Operation	260	days	*260 days*	*365 days*
Quantity to be Purchased	1	unit(s)	*1 unit*	*1 unit*
Calculate / Reset				

OUTPUT SECTION					
Performance per Faucet	**Your Choice**	**Base Model**	**FEMP Recommended Level**	**Best Available**	**Self Closing Faucet (gallon per cycle)**
WATER USE ONLY					
Gallon per Minute	0.5 gpm	2.2	2	1.5	0.25
Annual Water Use	260 gal	1144	1040	780	260
Annual Water Cost	$ 1	$ 3	$ 3	$ 2	$ 1
Lifetime Water Cost	$ 8	$ 25	$ 25	$ 17	$ 8
WITH ELECTRIC WATER HEATING					
Annual Energy Use	15 kWh	65	59	44	15
Annual Energy Cost	$ 3	$ 12	$ 11	$ 8	$ 3
Lifetime Energy Cost	$ 22	$ 95	$ 86	$ 64	$ 22
Lifetime Energy and Water Cost Savings	$ 90	$ 0	$ 9	$ 39	$ 90

Lifetime Energy and Water Cost Savings for 1 Faucet(s)	$ 90	$ 0	$ 9	$ 39	$ 90
WITH GAS WATER HEATING					
Annual Energy Use	1 therms	4	3	2	1
Annual Energy Cost	$ 1	$ 5	$ 4	$ 2	$ 1
Lifetime Energy Cost	$ 8	$ 42	$ 33	$ 17	$ 8
Lifetime Energy and Water Cost Savings	$ 51	$ 0	$ 9	$ 33	$ 51
Lifetime Energy and Water Cost Savings for 1 Faucet(s)	$ 51	$ 0	$ 9	$ 33	$ 51

For electric water heating applications, your selection of an energy saving faucet with a flow rate of 0.5 gallon(s) per minute will have a combined energy and water cost savings (per faucet) of $ 90 over an estimated 10 year life expectancy compared to the base model.

For gas water heating applications, your selection of an energy saving faucet with a flow rate of 0.5 gallon(s) per minute will have a combined energy and water cost savings (per faucet) of $ 51 over an estimated 10 year life expectancy compared to the base model.

Assumptions

- "Base model" has an efficiency that just meets the national minimum standard for faucets or showerheads.
- Lifetime energy cost and lifetime water cost is the sum of the discounted value of the annual energy and water costs based on an assumed faucet or showerhead life of 10 years.
- Future gas and electricity price trends and a discount rate of 3.2% are based on Federal guidelines.
- $0.06 per kWh is the Federal average electricity price in the U.S.
- $0.60 per therm is the Federal average gas price in the U.S.
- The assumed combined water and waste-water price is $4.00/1000 gallons.

Disclaimer

This cost calculator is a screening tool that estimates a product's lifetime energy cost savings at various efficiency levels. Maintenance and installation costs do not vary significantly among the same product having different efficiencies; so, these costs are not included in this calculator tool. For a detailed life-cycle cost analysis, FEMP has developed a tool called Building Life-Cycle Cost (BLCC). This downloadable tool allows the user to vary interest rates, installation costs, maintenance costs, salvage values, and life expectancy for a product or an entire energy project.

Water Saving Product Flow Rate in gallons per minute. Default for a faucet is 2.2 gallons per minute. Default for a showerhead is 2.5 gallons per minute. Waster cost including waste water charges in dollars per 1000 gallons. Default for a faucet is 4 dollars per 1000 gallons. Default for a showerhead is 4 dollars per 1000 gallons. Gas cost in dollars per therm. Default for a faucet is 0.60 dollars per therm. Default for a showerhead is 0.60 per therm. Electricity cost in dollars per kilowatt hour. Default for a faucet is 0.06 dollars per kilowatt hour. Default for a showerhead is 0.06 dollars per kilowatt hour. Minutes per day of operation, measured in minutes. Default for a faucet is 30 minutes. Default for a showerhead is 20 minutes. Days per year of operation, measured in days. Default for a faucet is 260 days. Default for a showerhead is 365 days. Quantity to be purchased, measured in units. Default for a faucet is 1 unit. Default for a showerhead is 1 unit. Performance for faucet or showerhead, depending on selection above. Your Choice with Water Use Only Form Labels Gallons per minute based on your choice, for water use only. Annual water use based on your choice, for water use only. Annual water cost based on your choice, for water use only. Lifetime water cost based on your choice, for water use only. Base Model with Water Use Only Form Labels Gallons per minute based on the base model, for water use only. Annual water use based on the base model, for water use only. Annual water cost based on the base model, for water use only. Lifetime water cost based on the base model, for water use only. FEMP Recommended Levels with Water Use Only Form Labels Gallons per minute based on FEMP recommended levels,

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Lifetime energy and water cost savings for the number of units and item you selected, based on best available levels and measured in dollars, for water use with electric water heating. Self Closing Faucet with Electric Water Heating Form Labels Annual energy use, based on self closing faucet and measured in dollars, for water use with electric water heating. Annual energy cost, based on self closing faucet and measured in dollars, measured in gallon per cycle, for water use with electric water heating. Lifetime energy cost, based on self closing faucet and measured in dollars, for water use with electric water heating. Lifetime energy and water cost savings, based on self closing faucet and measured in dollars, for water use with electric water heating. Units to be purchased. Either Faucet or Showerhead, based on selection above. Lifetime energy and water cost savings for the number of units and item you selected, based on self closing faucet and measured in dollars, for water use with electric water heating. Your Choice with Gas Water Heating Form Labels Annual energy use, based on your choice and measured in kilowatt hour, for water use with gas water heating. Annual energy cost, based on your choice and measured in dollars, for water use with gas water heating. Lifetime energy cost, based on your choice and measured in dollars, for water use with gas water heating. Lifetime energy and water cost savings, based on your choice and measured in dollars, for water use with gas water heating. Lifetime energy and water cost savings for the number of units and item you selected, based on your choice and measured in dollars, for water use with gas water heating. Base Model with Gas Water Heating Form Labels Annual energy use, based on the base model and measured in dollars, for water use with gas water heating. Annual energy cost, based on the base model and measured in dollars, for water use with gas water heating. Lifetime energy cost, based on the base model and measured in dollars, for water use with gas water heating. Lifetime energy and water cost savings, based on the base model and measured in dollars,, for water use with gas water heating. Lifetime energy and water cost savings for the number of units and item you selected, based on the base model and measured in dollars, for water use with gas water heating. FEMP Recommended Levels with Gas Water Heating Form Labels Annual energy use, based on FEMP recommended levels and measured in dollars,, for water use with gas water heating. Annual energy cost, based on FEMP recommended levels and measured in dollars, for water use with gas water heating. Lifetime energy cost, based on FEMP recommended levels and measured in dollars, for water use with gas water heating. Lifetime energy and water cost savings, based on FEMP recommended levels and measured in dollars, for water use with gas water heating. Lifetime energy and water cost savings for the number of units and item you selected, based on FEMP recommended levels and measured in dollars, for water use with gas water heating. Best Available with Gas Water Heating Form Labels Annual energy use, based on best available levels and measured in dollars,, for water use with gas water heating. Annual energy cost, based on best available levels and measured in dollars, for water use with gas water heating. Lifetime energy cost, based on best available levels and measured in dollars, for water use with gas water heating. Lifetime energy and water cost savings, based on best available levels and measured in dollars,, for water use with gas water heating. Lifetime energy and water cost savings for the number of units and item you selected, based on best available levels and measured in dollars, for water use with gas water heating. Self Closing Faucet with Gas Water Heating Form Labels Annual energy use, based on self closing faucet and measured in dollars, for water use with gas water heating. Annual energy cost, based on self closing faucet and measured in dollars, measured in gallon per cycle, for water use with gas water heating. Lifetime energy cost, based on self closing faucet and measured in dollars, for water use with gas water heating. Lifetime energy and water cost savings, based on self closing faucet and measured in dollars, for water use with gas water heating. Units to be purchased. Either Faucet or Showerhead, based on selection above. Lifetime energy and water cost savings for the number of units and item you selected, based on self closing faucet and measured in dollars, for water use with gas water heating. For electric water heating applications, your selection of an energy saving with a flow rate of gallon(s) per minute will have a combined energy and cost savings (per) of For gas water heating applications, your selection of an energy saving with a flow rate of gallon(s) per minute will have a combined energy and water cost savings (per) of

Printable Version

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-7 Reduced Water Use

Multipliers	
Material	1
Labor	1.21
Equipment	1.07

Installation Costs

Item	Qty	Unit	Unit Costs			Subtotal Costs			Total Cost	Remarks
			Material	Labor	Equipment	Material	Labor	Equipment		
0.5 GPM Faucet Aerator	1	ea	$ 15.00	$ -		$ 15.00	$ -	$ -	$ 15.00	

** Intallation by Owner

Subtotal		$ 15.00
Total		$ 15.00

APPENDIX J

ECM-8 Replace Storage Water Heaters with Instantaneous Water Heaters

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-8 Replace Storage Water Heaters with Instantaneous Water Heaters

Budgetary Costs	Annual Utility Savings			ROI	Potential Incentive	Payback (Without Incentive)	Payback (With Incentive)
	Natural Gas	Electricity	Total				
$	$	$	$		$	Years	Years
$ 3,100.00	$ 124.01	$ (15.60)	$ 108.41	(0.5)	0	28.6	28.6

BPU ENERGY AUDIT PROGRAM
South Brunswick Fire District No. 2, Station 21
CHA Project # 20998
ECM-8 Replace Storage Water Heaters with Instantaneous Water Heaters

Simple Payback Analysis		
Cost		$3,100.00
Incentive		$0.00
Adjusted Cost		$3,100.00
Savings/yr		$205.26
Payback in years		15.10

Calculation of Energy Consumption Due to Fixture Demand

Fixture	Flow Rate (gpm)	Duration Per Use (min)	Uses Per Week	Gallons Per Year	Therms Per Year (55 deg F Temp. Change)
Lavatory	0.5	1	20	520	2.401
Shower	2.2	7	0.5	400.4	1.849
Kitchen Sink	2.2	1.5	5	858	3.962
Kitchen Sink (Proposed ECM-7)	0.5	1.5	5	195	0.900
Total					**9.112**

Instantaneous Heater	kw	Hours of Operation	kwh	therm
Lav Point of Use 0.5 gpm	3.5	17.33	61	2.07
Kitchenette sink point of use 0.5 gpm	3.5	6.5	22.75	0.78

Calculation of Annual Savings Due to Fixture Demand

Water Heater	Annual Demand Therms	Gas Cost ($1.24/Therm)	Electricity Cost ($5.48/Therm)	Annual Standby Losses	Total Cost
Storage	8.212	$10.18	$0.00	$232.24	242.423
Hybrid Point of Use	7.881	$2.29	$33.06	$116.12	149.177
Hybrid Point of Use (Proposed ECM-7)	4.699	$2.29	$15.60	$116.12	134.014

Annual Savings	**$108.41**

Annual Standby Losses Equation per US Department of Energy
Standby Losses = (Operational Days)[(0.4105)/Efficiency](Cost per Therm)

BPU ENERGY AUDIT PROGRAM

South Brunswick Fire District No. 2, Station 21
CHA Project # 20998

ECM-8 Replace Storage Water Heaters with Instantaneous Water Heaters

Multipliers	
Material	0.98
Labor	1.21
Equipment	1.07

Installation Costs

	Qty	Unit	Unit Costs			Subtotal Costs			Total Cost	Remarks
			Material	Labor	Equipment	Material	Labor	Equipment		
						$ -	$ -	$ -	$ -	
Energy Saver, 2.5 gal. single element	3	ea	$ 225.00	$ 149.00		$ 661.50	$ 540.87	$ -	$ 1,202.37	
15 Gallon Storage for Service Sink/Shower	1	ea	$ 1,175.00	$ 200.00		$ 1,151.50	$ 242.00	$ -	$ 1,393.50	
						$ -	$ -	$ -	$ -	

Subtotal	$ 2,595.87
10% OH, 10% Profit	$ 259.59
10% Contingency	$ 259.59
Total	$ 3,115.04

APPENDIX K

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:	0267371
State:	New Jersey
Latitude:	40.5 ° N
Longitude:	74.8 ° W
PV System Specifications	
DC Rating:	10.7 kW
DC to AC Derate Factor:	0.770
AC Rating:	8.24 kW
Array Type:	Fixed Tilt
Array Tilt:	40.5 °
Array Azimuth:	180.0 °
Energy Specifications	
Cost of Electricity:	18.7 ¢/kWh

Results

Month	Solar Radiation (kWh/m^2/day)	AC Energy (kWh)	Energy Value ($)
1	3.30	869	162.42
2	4.03	948	177.18
3	5.14	1308	244.47
4	5.33	1258	235.12
5	5.68	1331	248.76
6	5.66	1244	232.50
7	5.64	1264	236.24
8	5.41	1215	227.08
9	5.23	1178	220.17
10	4.60	1112	207.83
11	3.42	826	154.38
12	3.07	785	146.72
Year	4.71	13340	2493.25

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 **Good** for adopting a solar system. (4.48 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 50 % of my electricity, on average, over the course of a year.

Electric Rate: $	0.1869 /kWh More
Monthly Electric Usage:	2,158 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 $51,696 estimated cost
at 6.5 % interest (apr) re-paid over 30 years

---

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

http://www.solar-estimate.org/index.php?page=solar-installer&subpage=show&wantsolar=1&zipcode=08810

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

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

Your Solar Electric Estimate by the Numbers

Building Type:	Commercial/Business
State & County:	NJ - Middlesex
Utility:	PUBLIC SERVICE ELEC AND GAS

Utility:	CO
Utility Type:	Investor-Owned Utility
Your Average Monthly Electricity Bill: (Assumed rate x average monthly useage)	$ 403 / Month
Tiered Rates Apply:	Yes - See Notes, below!
Time-of-Use Metering Offered:	Yes - See Notes, below!
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 8.62 kW and 12.92 kW of peak power. This estimate assumes the mid-point of this range.

Solar Rating:	**Good** 4.48 kWh/sq-m/day
Solar System Capacity Required:	10.77 kW of peak power (DC watts)
Roof Area Needed:	1,077 sq-ft
Equivalent Annual Production:	12,951 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 11 kW peak DC power system will cost between $68,928 and $103,392. 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!	**$86,160** 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	$ 99,751
NJ Solar Electric (PV) Incentive (Non-residential $ 0.80 per watt to 50 kW) » link	$ 8,616

Federal Tax Credit (30% of Gross Cost at Installation) » link	$ 25,848
Modified Accelerated Cost Recovery System (MACRS) Depreciation (5 yr) » link	**YES**
ESTIMATED NET COST:	**$ -48,055**
ESTIMATED NET COST AT INSTALLATION:	**$ 51,696**
Cash & Loan Amounts:	$ 51,696 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:	**$2,420 to $6,292**
Average Monthly Utility Savings: *over 25-year expected life of system*	**$338 to $880**
Average Annual Utility Savings: *over 25-year expected life of system*	**$4,062 to $10,561**
25-year Utility Savings:	**$101,547 to $264,022**
Internal Rate of Return (IRR):	**23.2% - 33.3%**
Net Present Value (NPV):	**$68,293 - $122,890**
Profitability Index:	**2.3 - 3.4**
Greenhouse Gas (CO_2) Saved: *over 25-year system life*	**265 tons** **530,000 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	($86,160)					
NJ: Solar Renewable Energy Certificates (SREC)	$0	$8,165	$7,919	$7,681	$7,450	$7,225
NJ Solar Electric (PV) Incentive (Non-residential $ 0.80 per watt to 50 kW)	$8,616	$0	$0	$0	$0	$0
Federal Tax Credit (30% of Gross Cost at Installation)	$25,848	$0	$0	$0	$0	$0
Tax savings from MACRS Depreciation	$0	$4,627	$7,403	$4,442	$2,665	$2,665
Utility Savings	$0	$1,612	$1,673	$1,737	$1,802	$1,870
ANNUAL CASH FLOW	$-51,696	$14,404	$16,995	$13,859	$11,917	$11,760
Cumulative Cash Flow	$-51,696	$-37,292	$-20,297	$-6,438	**$5,479 Breakeven**	$17,239

Year of Operation:	**6**	**7**	**8**	**9**	**10**	**11**
Gross Cost						
NJ: Solar Renewable Energy Certificates (SREC)	$7,008	$6,797	$6,592	$6,394	$6,202	$6,015
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	$1,333	$0	$0	$0	$0	$0
Utility Savings	$1,941	$2,014	$2,091	$2,170	$2,252	$2,337
ANNUAL CASH FLOW	$10,282	$8,811	$8,683	$8,564	$8,454	$8,352

Cumulative Cash Flow	$27,521	$36,332	$45,015	$53,579	$62,033	$70,385

Year of Operation:	**12**	**13**	**14**	**15**	**16**	**17**
Gross Cost				($9,693) Inverter Replaced		
NJ: Solar Renewable Energy Certificates (SREC)	$5,834	$5,658	$5,488	$5,323	$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	$2,425	$2,517	$2,612	$2,711	$2,813	$2,919
ANNUAL CASH FLOW	$8,259	$8,175	$8,100	$-1,659	$2,813	$2,919
Cumulative Cash Flow	$78,644	$86,819	$94,919	$93,260	$96,073	$98,992

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	$0	$0	$0	$0	$0	$0	$0	$0

Installation)								
Tax savings from MACRS Depreciation	$0	$0	$0	$0	$0	$0	$0	$0
Utility Savings	$3,030	$3,144	$3,263	$3,386	$3,514	$3,647	$3,785	$3,928
ANNUAL CASH FLOW	$3,030	$3,144	$3,263	$3,386	$3,514	$3,647	$3,785	$3,928
Cumulative Cash Flow	$102,022	$105,166	$108,429	$111,815	$115,329	$118,976	$122,761	$126,689

FAQ's: Frequently Asked Questions for NJ:

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

Notes & Assumptions: Solar Electric (PV) Systems

* HOW TO REDUCE THE SYSTEM SIZE NEEDED & INCREASE SAVINGS

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

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

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

Factor	Assumption
Solar resources	Assumed solar availability: As per Solar Radiance chart
Soiling or contamination of the PV panels	Clean, washed frequently: 100% design sunlight transmission
Temperature	25C, calm wind
System configuration (battery or non-battery)	Non-battery
Orientation to the sun	tilted at your latitude, full sun

Shading	None
PV Energy delivered as % of manufacturer's rating	95%
Soiling, wiring & power point tracking losses	9% (91% delivered)
Inverter Efficiency	90%
Total Energy Delivered	95% x 91% x 90% = 78%

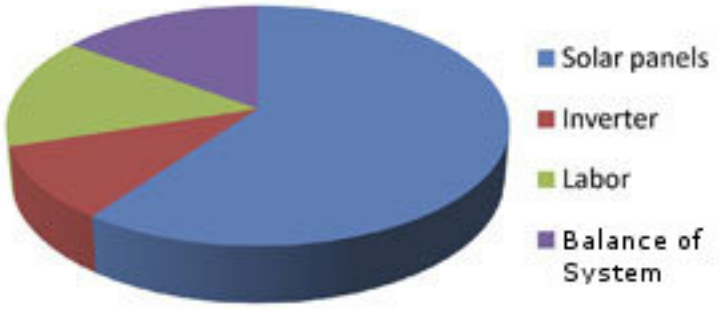
Energy Efficiency: Improving your building's energy efficiency will reduce the system size you need to attain a "net-zero" energy bill.
Tiered Rates: Often people are paying a "Tiered" rate for their electricity. This is a higher rate (higher than the "Base" rate) for electricity charged when a home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

THE COST TO GO SOLAR

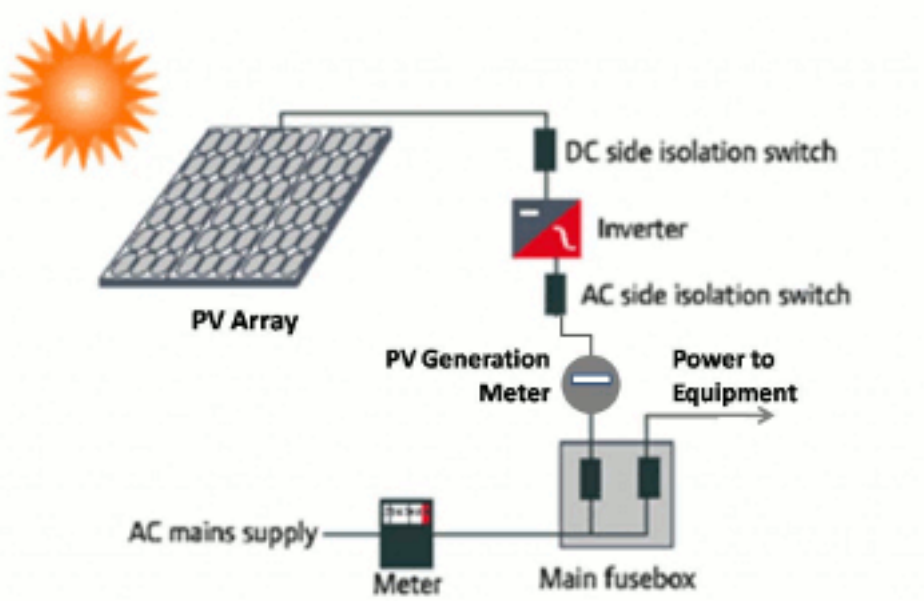
This is only an estimate based upon many assumptions and limited data entered by you: Installation costs can vary considerably. The cost to purchase and install a complete grid-tied solar photovoltaic (PV) system on a residential home is typically as further defined in the table, below. This includes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

Assumed Cost, per Watt DC

Item	System Size < 2kW	System Size ≥ 2kW
Assumed Total	$10 per watt DC (+/- 20%)	$9 per watt DC (+/- 20%)



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



OTHER ASSUMPTIONS

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

HELPFUL PDF's & Links

Report on Solar-Estimate.org Estimator: Comparisons, Methods & 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**

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

APPENDIX L

Solar Thermal Domestic Hot Water Plant

SOLAR WATER HEATING CALCULATOR

RENEWABLE ENERGY
THE INFINITE POWER OF TEXAS

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)	2.3125	? Water Inlet Temperature (Degrees F)	50
? Capacity (gallons)	40	? Ambient Temperature (Degrees F)	60
? Surface Area (calculated - sq ft)	17.65	? Hot Water Temperature (Degrees F)	140
? Effective R-value	16	? Hot Water Usage (Gallons per Day)	6
Energy Use			
184.7		? Heat Delivered in Hot Water (BTU/hr)	
88.25		? Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		**Electric**
0	? Overall Efficiency	0.6631
0	? Conversion Efficiency	0.98
NaN BTU/hr	? Power Into Water Heater	278.5 BTU/hr
Cost		
$ 0.40 /Therm	? Utility Rates	$ 0.1869 /kWh

$ NaN	? Yearly Water Heating Cost	$ 133.542
How Does Solar Compare?		
? Solar Water Heater Cost: $ 9305		? Percentage Solar: 70
NaN years for gas	? Payback Time for Solar System	99.5399 years for electric

More information on solar water heating:

- Fact sheet - Solar Water Heaters (requires Adobe Acrobat reader)
- Fact sheet - Solar Water Heaters for Swimming Pools (requires Adobe Acrobat reader)
- Kids fact sheet - Heat from the Sun (requires Adobe Acrobat reader)

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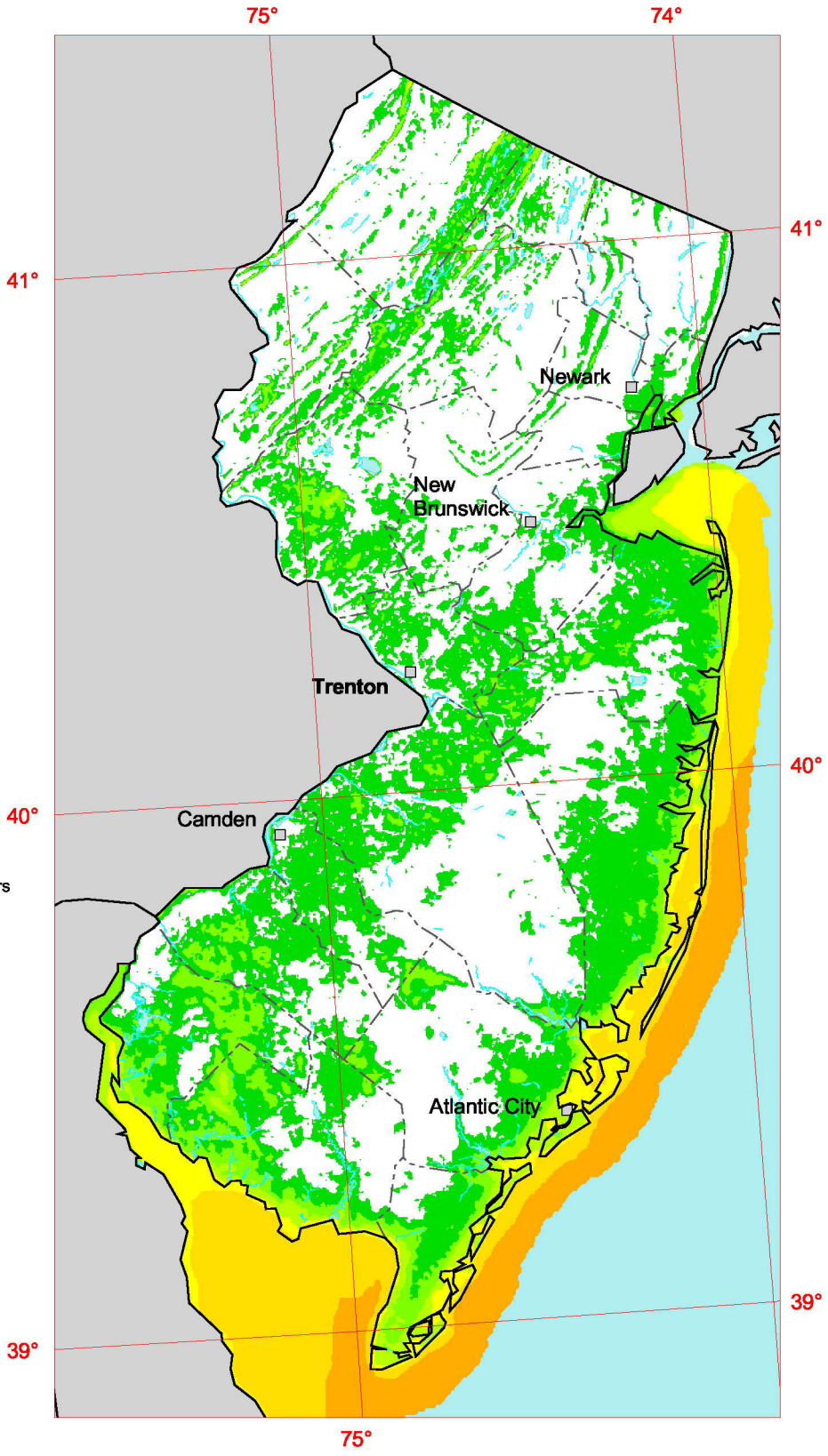
APPENDIX M

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 N

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
South Brunswick Fire District No. 2, Station 21

Building ID: 2271891
For 12-month Period Ending: November 30, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: May 07, 2010

Facility
South Brunswick Fire District No. 2, Station 21
Georges Road
South Brunswick, NJ 08810

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1982
Gross Floor Area (ft²): 5,220

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	88,357
Natural Gas (kBtu)[4]	234,768
Total Energy (kBtu)	323,125

Energy Intensity[5]

Site (kBtu/ft²/yr)	62
Source (kBtu/ft²/yr)	104

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	26

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison

National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	-34%
Building Type	Fire Station/Police Station

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	South Brunswick Fire District No. 2, Station 21	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Fire Station/Police Station	Is this an accurate description of the space in question?		☐
Location	Georges Road, South Brunswick, NJ 08810	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		☐
Addition (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	
Gross Floor Area	1,800 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	N/A(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	N/A(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.		☐
Existing Section (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	
Gross Floor Area	3,420 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	N/A(Optional)	Is this the number of personal computers in the space?		☐

Weekly operating hours	N/A(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: Public Service Elec & Gas 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	2,322.00
10/01/2009	10/31/2009	1,902.00
09/01/2009	09/30/2009	2,082.00
08/01/2009	08/31/2009	1,974.00
07/01/2009	07/31/2009	2,298.00
06/01/2009	06/30/2009	1,812.00
05/01/2009	05/31/2009	2,028.00
04/01/2009	04/30/2009	2,274.00
03/01/2009	03/31/2009	2,058.00
02/01/2009	02/28/2009	2,286.00
01/01/2009	01/31/2009	2,484.00
12/01/2008	12/31/2008	2,376.00
Electric Meter Consumption (kWh (thousand Watt-hours))		**25,896.00**
Electric Meter Consumption (kBtu (thousand Btu))		**88,357.15**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**88,357.15**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

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

Start Date	End Date	Energy Use (therms)
11/01/2009	11/30/2009	78.84
10/01/2009	10/31/2009	33.32
09/01/2009	09/30/2009	21.98
08/01/2009	08/31/2009	17.72
07/01/2009	07/31/2009	19.81
06/01/2009	06/30/2009	20.85
05/01/2009	05/31/2009	28.12
04/01/2009	04/30/2009	170.24
03/01/2009	03/31/2009	407.05
02/01/2009	02/28/2009	481.35

01/01/2009	01/31/2009	639.16
12/01/2008	12/31/2008	429.24
Natural Gas Meter Consumption (therms)		**2,347.68**
Natural Gas Meter Consumption (kBtu (thousand Btu))		**234,768.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**234,768.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

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

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
South Brunswick Fire District No. 2, Station 21
Georges Road
South Brunswick, NJ 08810

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

South Brunswick Fire District No. 2, Station 21	
Gross Floor Area Excluding Parking: (ft^2)	5,220
Year Built	1982
For 12-month Evaluation Period Ending Date:	November 30, 2009

Facility Space Use Summary

Addition		Existing Section	
Space Type	Other - Fire Station/Police Station	Space Type	Other - Fire Station/Police Station
Gross Floor Area(ft^2)	1,800	Gross Floor Area(ft^2)	3,420
Number of PCs[o]	N/A	Number of PCs[o]	N/A
Weekly operating hours[o]	N/A	Weekly operating hours[o]	N/A
Workers on Main Shift[o]	N/A	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)	62	62	0	N/A	78
Source (kBtu/ft^2)	104	104	0	N/A	157
Energy Cost					
$/year	$ 7,750.54	$ 7,750.54	N/A	N/A	$ 9,766.43
$/$ft^2$/year	$ 1.48	$ 1.48	N/A	N/A	$ 1.86
Greenhouse Gas Emissions					
$MtCO_2e$/year	26	26	0	N/A	33
$kgCO_2e/ft^2$/year	5	5	0	N/A	6

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

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

APPENDIX O

Hourly Analysis Program Input Data

Station 21-BaseBuilding Input Data

1. General Details:

Building Name ..... **Station 21-BaseBuilding**

2. Plants Included in this Building:

None

3. Air Systems Included in this Building:

System Name	Mult.
Split-System Meeting Room	1
Unit Heaters	1

4: Miscellaneous Energy

(no items defined)

5: Meters

Electric ..... **Station 21 Electric Rate**
Natural Gas ..... **Station 21 Nat. Gas**

6: Miscellaneous Data

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

Bays

1. General Details:

Floor Area ..... **4680.0** ft²
Avg. Ceiling Height ..... **9.0** ft
Building Weight ..... **30.0** lb/ft²

1.1. OA Ventilation Requirements:

Space Usage ..... **MISCELLANEOUS: Warehouse**
OA Requirement 1 ..... **0.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

2. Internals:

2.1. Overhead Lighting:

Fixture Type ..... **Free Hanging**
Wattage ..... **1.30** W/ft²
Ballast Multiplier **1.00**
Schedule ..... **Station 20 Schedule**

2.2. Task Lighting:

Wattage ..... **0.35** W/ft²
Schedule **24-Hrs**

2.3. Electrical Equipment:

Wattage ..... **0.75** W/ft²
Schedule ..... **Station 20 Schedule**

2.4. People:

Occupancy ..... **0.0** Person
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **None**

2.5. Miscellaneous Loads:

Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
SE	526.0	2	0	0
SW	1206.0	6	0	0
NW	726.0	4	0	0
NE	1206.0	6	0	0

3.1. Construction Types for Exposure SE

Wall Type ..... **Medium Weight Wall**
1st Window Type ..... **Standard Glass**

3.2. Construction Types for Exposure SW

Wall Type ..... **Medium Weight Wall**
1st Window Type ..... **Standard Glass**

3.3. Construction Types for Exposure NW

Wall Type ..... **Medium Weight Wall**
1st Window Type ..... **Standard Glass**

3.4. Construction Types for Exposure NE

Wall Type ..... **Medium Weight Wall**
1st Window Type ..... **Standard Glass**

4. Roofs, Skylights:

Exp.	Roof Gross Area (ft²)	Roof Slope (deg.)	Skylight Qty.
H	5120.3	0	0

4.1. Construction Types for Exposure H

Roof Type ..... **Medium Weight Roof**

5. Infiltration:

Design Cooling ..... **0.05** CFM/ft²
Design Heating ..... **0.05** CFM/ft²
Energy Analysis ..... **0.05** CFM/ft²
Infiltration occurs at all hours.

6. Floors:

Type	**Slab Floor On Grade**	
Floor Area	**4680.0**	ft²
Total Floor U-Value	**0.100**	BTU/(hr-ft²-°F)
Exposed Perimeter	**322.0**	ft
Edge Insulation R-Value	**0.00**	(hr-ft²-°F)/BTU

7. Partitions:

(No partition data).

Meeting Room

1. General Details:

Floor Area	**440.0**	ft²
Avg. Ceiling Height	**9.0**	ft
Building Weight	**30.0**	lb/ft²

1.1. OA Ventilation Requirements:

Space Usage	**GENERAL: Conference/meeting**	
OA Requirement 1	**5.0**	CFM/person
OA Requirement 2	**0.06**	CFM/ft²
Space Usage Defaults	**ASHRAE Std 62.1-2007**	

2. Internals:

2.1. Overhead Lighting:

Fixture Type	**Free Hanging**	
Wattage	**1.30**	W/ft²
Ballast Multiplier	**1.00**	
Schedule	**Station 20 Schedule**	

2.2. Task Lighting:

Wattage	**0.00**	W/ft²
Schedule	**None**	

2.3. Electrical Equipment:

Wattage	**0.75**	W/ft²
Schedule	**Station 20 Schedule**	

2.4. People:

Occupancy	**20.0**	People
Activity Level	**Office Work**	
Sensible	**245.0**	BTU/hr/person
Latent	**205.0**	BTU/hr/person
Schedule	**Station 20 Schedule**	

2.5. Miscellaneous Loads:

Sensible	**0**	BTU/hr
Schedule	**None**	
Latent	**0**	BTU/hr
Schedule	**None**	

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
SE	200.0	2	0	0

3.1. Construction Types for Exposure SE

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

4. Roofs, Skylights:

(No Roof or Skylight data).

5. Infiltration:

Design Cooling	**0.05**	CFM/ft²
Design Heating	**0.05**	CFM/ft²
Energy Analysis	**0.05**	CFM/ft²

Infiltration occurs at all hours.

6. Floors:

Type	**Slab Floor On Grade**	
Floor Area	**440.0**	ft²
Total Floor U-Value	**0.100**	BTU/(hr-ft²-°F)
Exposed Perimeter	**322.0**	ft
Edge Insulation R-Value	**0.00**	(hr-ft²-°F)/BTU

7. Partitions:

7.1. 1st Partition Details:

Partition Type	**Wall Partition**	
Area	**560.0**	ft²
U-Value	**0.500**	BTU/(hr-ft²-°F)
Uncondit. Space Max Temp	**95.0**	°F
Ambient at Space Max Temp	**95.0**	°F
Uncondit. Space Min Temp	**55.0**	°F
Ambient at Space Min Temp	**10.0**	°F

7.2. 2nd Partition Details:

Partition Type	**Ceiling Partition**	
Area	**440.0**	ft²
U-Value	**0.500**	BTU/(hr-ft²-°F)
Uncondit. Space Max Temp	**120.0**	°F
Ambient at Space Max Temp	**95.0**	°F
Uncondit. Space Min Temp	**55.0**	°F
Ambient at Space Min Temp	**10.0**	°F

Split-System Meeting Room Input Data

Project Name: Station 21 — 05/21/2010
Prepared by: Kitchen and Associates — 09:33AM

1. General Details:

Air System Name	**Split-System Meeting Room**
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	**ASHRAE Std 62.1-2007**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**5**	%
Outdoor Air CO2 Level	**400**	ppm

Central Cooling Data:

Supply Air Temperature	**55.0**	°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	**95.0**	°F
Heating Source	**Combustion - Natural Gas**	
Schedule	**JFMA* * * * SOND**	
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	**10**	%
Duct Leakage	**5**	%

Return Duct or Plenum Data:

Return Air Via	**Ducted Return**

3. Zone Components:

Space Assignments:

Zone 1: Zone 1	
Meeting Room	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**85.0**	°F
Heating T-stat: Occ.	**70.0**	°F
Heating T-stat: Unocc.	**60.0**	°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	**Station 20 T-stat**	
Unoccupied Cooling is	**Not Available**	

Supply Terminals Data:

Zone	**All**	
Terminal Type	**Diffuser**	
Minimum Airflow	**1000.0**	CFM

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	**55.0**	°F
Supply Fan Airflow	**1052.6**	CFM
Ventilation Airflow	**400.0**	CFM
Heating Supply Temperature	**95.0**	°F

Hydronic Sizing Specifications:

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

Safety Factors:

Cooling Sensible	**10**	%
Cooling Latent	**10**	%
Heating	**0**	%

Zone Sizing Data:

Zone Airflow Sizing Method	**Sum of space airflow rates**
Space Airflow Sizing Method	**Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	1000.0	-	-	

5. Equipment Data

Central Cooling Unit - Air-Cooled DX

Estimated Maximum Load	**48.9**	MBH
Design OAT	**95.0**	°F
Equipment Sizing	**User-Defined**	
Gross Cooling Capacity	**34.9**	MBH
ARI Performance Rating	**10.00**	SEER
Conventional Cutoff OAT	**55.0**	°F
Low Temperature Operation	**Used**	
Low Temperature Cutoff OAT	**0.0**	°F

Central Heating Unit - Combustion

Estimated Maximum Load	**40.4**	MBH
Equipment Sizing	**User-Defined**	
Gross Heating Capacity	**50.0**	MBH
Average Efficiency	**94.0**	%
Misc. Electric	**0.000**	kW

Unit Heaters Input Data

Project Name: Station 21 — 05/21/2010
Prepared by: Kitchen and Associates — 09:33AM

1. General Details:

Air System Name	**Unit Heaters**
Equipment Type	**Packaged Vertical Units**
Air System Type	**Single Zone CAV**
Number of zones	**1**

2. System Components:

Ventilation Air Data:

Airflow Control	**Constant Ventilation Airflow**	
Ventilation Sizing Method	**ASHRAE Std 62.1-2007**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**0**	%
Outdoor Air CO2 Level	**400**	ppm

Central Heating Data:

Supply Temperature	**95.0**	°F
Heating Source	**Combustion - Natural Gas**	
Schedule	**JFM* * * * * OND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Supply Fan Data:

Fan Type	**Forward Curved**	
Configuration	**Blow-thru**	
Fan Performance	**0.10**	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: Zone 1	
Bays	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**85.0**	°F
Heating T-stat: Occ.	**60.0**	°F
Heating T-stat: Unocc.	**60.0**	°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	**Station 20 T-stat**	
Unoccupied Cooling is	**Not 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:

Supply Fan Airflow	**2720.0**	CFM
Ventilation Airflow	**0.0**	CFM
Heating Supply Temperature	**95.0**	°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 ..... **Sum of space airflow rates**
Space Airflow Sizing Method ..... **Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	2720.0	-	-	

5. Equipment Data

Central Heating Unit - Combustion

Estimated Maximum Load ..... **88.3** MBH
Equipment Sizing ..... **User-Defined**
Gross Heating Capacity ..... **265.0** MBH
Average Efficiency ..... **80.0** %
Misc. Electric ..... **0.000** kW

1. General Details:

Building Name ..... **16 SEER**

2. Plants Included in this Building:

None

3. Air Systems Included in this Building:

System Name	Mult.
16 SEERSplit-System Meeting Room	1
16 SEER Unit Heaters	1

4: Miscellaneous Energy

(no items defined)

5: Meters

Electric ..... **Station 20 Electric Rate**
Natural Gas ..... **Station 20 Nat. Gas**

6: Miscellaneous Data

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

16 SEER Meeting Room

1. General Details:

Floor Area	**440.0**	ft²
Avg. Ceiling Height	**9.0**	ft
Building Weight	**30.0**	lb/ft²

1.1. OA Ventilation Requirements:

Space Usage	**GENERAL: Conference/meeting**	
OA Requirement 1	**5.0**	CFM/person
OA Requirement 2	**0.06**	CFM/ft²
Space Usage Defaults	**ASHRAE Std 62.1-2007**	

2. Internals:

2.1. Overhead Lighting:

Fixture Type	**Free Hanging**	
Wattage	**1.30**	W/ft²
Ballast Multiplier	**1.00**	
Schedule	**Station 20 Schedule**	

2.2. Task Lighting:

Wattage	**0.00**	W/ft²
Schedule	**None**	

2.3. Electrical Equipment:

Wattage	**0.75**	W/ft²
Schedule	**Station 20 Schedule**	

2.4. People:

Occupancy	**20.0**	People
Activity Level	**Office Work**	
Sensible	**245.0**	BTU/hr/person
Latent	**205.0**	BTU/hr/person
Schedule	**Station 20 Schedule**	

2.5. Miscellaneous Loads:

Sensible	**0**	BTU/hr
Schedule	**None**	
Latent	**0**	BTU/hr
Schedule	**None**	

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
SE	200.0	2	0	0

3.1. Construction Types for Exposure SE

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

4. Roofs, Skylights:

(No Roof or Skylight data).

5. Infiltration:

Design Cooling	**0.05**	CFM/ft²
Design Heating	**0.05**	CFM/ft²
Energy Analysis	**0.05**	CFM/ft²

Infiltration occurs at all hours.

6. Floors:

Type	**Slab Floor On Grade**	
Floor Area	**440.0**	ft²
Total Floor U-Value	**0.100**	BTU/(hr-ft²-°F)
Exposed Perimeter	**322.0**	ft
Edge Insulation R-Value	**0.00**	(hr-ft²-°F)/BTU

7. Partitions:

7.1. 1st Partition Details:

Partition Type	**Wall Partition**	
Area	**560.0**	ft²
U-Value	**0.500**	BTU/(hr-ft²-°F)
Uncondit. Space Max Temp	**95.0**	°F
Ambient at Space Max Temp	**95.0**	°F
Uncondit. Space Min Temp	**55.0**	°F
Ambient at Space Min Temp	**10.0**	°F

7.2. 2nd Partition Details:

Partition Type	**Ceiling Partition**	
Area	**440.0**	ft²
U-Value	**0.500**	BTU/(hr-ft²-°F)
Uncondit. Space Max Temp	**120.0**	°F
Ambient at Space Max Temp	**95.0**	°F
Uncondit. Space Min Temp	**55.0**	°F
Ambient at Space Min Temp	**10.0**	°F

16 SEER Unit Heaters Input Data

Project Name: Station 21 — 05/21/2010
Prepared by: Kitchen and Associates — 09:30AM

1. General Details:

Air System Name	**16 SEER Unit Heaters**	
Equipment Type	**Packaged Vertical Units**	
Air System Type	**Single Zone CAV**	
Number of zones	**1**	

2. System Components:

Ventilation Air Data:

Airflow Control	**Constant Ventilation Airflow**	
Ventilation Sizing Method	**ASHRAE Std 62.1-2007**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**0**	%
Outdoor Air CO2 Level	**400**	ppm

Central Heating Data:

Supply Temperature	**95.0**	°F
Heating Source	**Combustion - Natural Gas**	
Schedule	**JFM* * * * * OND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Supply Fan Data:

Fan Type	**Forward Curved**	
Configuration	**Blow-thru**	
Fan Performance	**0.10**	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: Zone 1	
16 SEER Bays	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**85.0**	°F
Heating T-stat: Occ.	**60.0**	°F
Heating T-stat: Unocc.	**60.0**	°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	**Station 20 T-stat**	
Unoccupied Cooling is	**Not 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:

Supply Fan Airflow	**2720.0**	CFM
Ventilation Airflow	**0.0**	CFM
Heating Supply Temperature	**95.0**	°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	**Sum of space airflow rates**
Space Airflow Sizing Method	**Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	2720.0	-	-	

5. Equipment Data

Central Heating Unit - Combustion

Estimated Maximum Load	**88.3**	MBH
Equipment Sizing	**User-Defined**	
Gross Heating Capacity	**265.0**	MBH
Average Efficiency	**80.0**	%
Misc. Electric	**0.000**	kW

16 SEERSplit-System Meeting Room Input Data

Project Name: Station 21 — 05/21/2010
Prepared by: Kitchen and Associates — 09:31AM

1. General Details:

Air System Name	**16 SEERSplit-System Meeting Room**	
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	**ASHRAE Std 62.1-2007**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**5**	%
Outdoor Air CO2 Level	**400**	ppm

Central Cooling Data:

Supply Air Temperature	**55.0**	°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	**95.0**	°F
Heating Source	**Combustion - Natural Gas**	
Schedule	**JFMA* * * * SOND**	
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	**10**	%
Duct Leakage	**5**	%

Return Duct or Plenum Data:

Return Air Via	**Ducted Return**	

3. Zone Components:

Space Assignments:

Zone 1: Zone 1	
16 SEER Meeting Room	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**85.0**	°F
Heating T-stat: Occ.	**70.0**	°F
Heating T-stat: Unocc.	**60.0**	°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	**Station 20 T-stat**	
Unoccupied Cooling is	**Not Available**	

Supply Terminals Data:

Zone	**All**	
Terminal Type	**Diffuser**	
Minimum Airflow	**1000.0**	CFM

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	**55.0**	°F
Supply Fan Airflow	**1052.6**	CFM
Ventilation Airflow	**400.0**	CFM
Heating Supply Temperature	**95.0**	°F

Hydronic Sizing Specifications:

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

Safety Factors:

Cooling Sensible	**10**	%
Cooling Latent	**10**	%
Heating	**0**	%

Zone Sizing Data:

Zone Airflow Sizing Method	**Sum of space airflow rates**
Space Airflow Sizing Method	**Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	1000.0	-	-	

5. Equipment Data

Central Cooling Unit - Air-Cooled DX

Estimated Maximum Load	**48.9**	MBH
Design OAT	**95.0**	°F
Equipment Sizing	**User-Defined**	
Gross Cooling Capacity	**34.9**	MBH
ARI Performance Rating	**16.00**	SEER
Conventional Cutoff OAT	**55.0**	°F
Low Temperature Operation	**Used**	
Low Temperature Cutoff OAT	**0.0**	°F

Central Heating Unit - Combustion

Estimated Maximum Load	**40.4**	MBH
Equipment Sizing	**User-Defined**	
Gross Heating Capacity	**50.0**	MBH
Average Efficiency	**94.0**	%
Misc. Electric	**0.000**	kW

16 SEER Bays

1. General Details:

Floor Area	**4680.0**	ft²
Avg. Ceiling Height	**9.0**	ft
Building Weight	**30.0**	lb/ft²

1.1. OA Ventilation Requirements:

Space Usage	**MISCELLANEOUS: Warehouse**	
OA Requirement 1	**0.0**	CFM/person
OA Requirement 2	**0.06**	CFM/ft²
Space Usage Defaults	**ASHRAE Std 62.1-2007**	

2. Internals:

2.1. Overhead Lighting:

Fixture Type	**Free Hanging**	
Wattage	**1.30**	W/ft²
Ballast Multiplier	**1.00**	
Schedule	**Station 20 Schedule**	

2.2. Task Lighting:

Wattage	**0.35**	W/ft²
Schedule	**24-Hrs**	

2.3. Electrical Equipment:

Wattage	**0.75**	W/ft²
Schedule	**Station 20 Schedule**	

2.4. People:

Occupancy	**0.0**	Person
Activity Level	**Office Work**	
Sensible	**245.0**	BTU/hr/person
Latent	**205.0**	BTU/hr/person
Schedule	**None**	

2.5. Miscellaneous Loads:

Sensible	**0**	BTU/hr
Schedule	**None**	
Latent	**0**	BTU/hr
Schedule	**None**	

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
SE	526.0	2	0	0
SW	1206.0	6	0	0
NW	726.0	4	0	0
NE	1206.0	6	0	0

3.1. Construction Types for Exposure SE

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

3.2. Construction Types for Exposure SW

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

3.3. Construction Types for Exposure NW

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

3.4. Construction Types for Exposure NE

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

4. Roofs, Skylights:

Exp.	Roof Gross Area (ft²)	Roof Slope (deg.)	Skylight Qty.
H	5120.3	0	0

4.1. Construction Types for Exposure H

Roof Type	**Medium Weight Roof**

5. Infiltration:

Design Cooling	**0.05**	CFM/ft²
Design Heating	**0.05**	CFM/ft²
Energy Analysis	**0.05**	CFM/ft²

Infiltration occurs at all hours.

6. Floors:

Type	**Slab Floor On Grade**	
Floor Area	**4680.0**	ft²
Total Floor U-Value	**0.100**	BTU/(hr-ft²-°F)
Exposed Perimeter	**322.0**	ft
Edge Insulation R-Value	**0.00**	(hr-ft²-°F)/BTU

7. Partitions:

(No partition data).

DVC Meeting Room

1. General Details:

Floor Area	**440.0**	ft²
Avg. Ceiling Height	**9.0**	ft
Building Weight	**30.0**	lb/ft²

1.1. OA Ventilation Requirements:

Space Usage	**GENERAL: Conference/meeting**	
OA Requirement 1	**5.0**	CFM/person
OA Requirement 2	**0.06**	CFM/ft²
Space Usage Defaults	**ASHRAE Std 62.1-2007**	

2. Internals:

2.1. Overhead Lighting:

Fixture Type	**Free Hanging**	
Wattage	**1.30**	W/ft²
Ballast Multiplier	**1.00**	
Schedule	**Station 20 Schedule**	

2.2. Task Lighting:

Wattage	**0.00**	W/ft²
Schedule	**None**	

2.3. Electrical Equipment:

Wattage	**0.75**	W/ft²
Schedule	**Station 20 Schedule**	

2.4. People:

Occupancy	**20.0**	People
Activity Level	**Office Work**	
Sensible	**245.0**	BTU/hr/person
Latent	**205.0**	BTU/hr/person
Schedule	**Station 20 Schedule**	

2.5. Miscellaneous Loads:

Sensible	**0**	BTU/hr
Schedule	**None**	
Latent	**0**	BTU/hr
Schedule	**None**	

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
SE	200.0	2	0	0

3.1. Construction Types for Exposure SE

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

4. Roofs, Skylights:

(No Roof or Skylight data).

5. Infiltration:

Design Cooling	**0.05**	CFM/ft²
Design Heating	**0.05**	CFM/ft²
Energy Analysis	**0.05**	CFM/ft²

Infiltration occurs at all hours.

6. Floors:

Type	**Slab Floor On Grade**	
Floor Area	**440.0**	ft²
Total Floor U-Value	**0.100**	BTU/(hr-ft²-°F)
Exposed Perimeter	**322.0**	ft
Edge Insulation R-Value	**0.00**	(hr-ft²-°F)/BTU

7. Partitions:

7.1. 1st Partition Details:

Partition Type	**Wall Partition**	
Area	**560.0**	ft²
U-Value	**0.500**	BTU/(hr-ft²-°F)
Uncondit. Space Max Temp	**95.0**	°F
Ambient at Space Max Temp	**95.0**	°F
Uncondit. Space Min Temp	**55.0**	°F
Ambient at Space Min Temp	**10.0**	°F

7.2. 2nd Partition Details:

Partition Type	**Ceiling Partition**	
Area	**440.0**	ft²
U-Value	**0.500**	BTU/(hr-ft²-°F)
Uncondit. Space Max Temp	**120.0**	°F
Ambient at Space Max Temp	**95.0**	°F
Uncondit. Space Min Temp	**55.0**	°F
Ambient at Space Min Temp	**10.0**	°F

DCV Bays

1. General Details:
Floor Area ..... **4680.0** ft²
Avg. Ceiling Height ..... **9.0** ft
Building Weight ..... **30.0** lb/ft²

1.1. OA Ventilation Requirements:
Space Usage ..... **MISCELLANEOUS: Warehouse**
OA Requirement 1 ..... **0.0** CFM/person
OA Requirement 2 ..... **0.06** CFM/ft²
Space Usage Defaults ..... **ASHRAE Std 62.1-2007**

2. Internals:
2.1. Overhead Lighting:
Fixture Type ..... **Free Hanging**
Wattage ..... **1.30** W/ft²
Ballast Multiplier **1.00**
Schedule ..... **Station 20 Schedule**

2.2. Task Lighting:
Wattage ..... **0.35** W/ft²
Schedule **24-Hrs**

2.3. Electrical Equipment:
Wattage ..... **0.75** W/ft²
Schedule ..... **Station 20 Schedule**

2.4. People:
Occupancy ..... **0.0** Person
Activity Level ..... **Office Work**
Sensible ..... **245.0** BTU/hr/person
Latent ..... **205.0** BTU/hr/person
Schedule ..... **None**

2.5. Miscellaneous Loads:
Sensible ..... **0** BTU/hr
Schedule ..... **None**
Latent ..... **0** BTU/hr
Schedule ..... **None**

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
SE	526.0	2	0	0
SW	1206.0	6	0	0
NW	726.0	4	0	0
NE	1206.0	6	0	0

3.1. Construction Types for Exposure SE
Wall Type ..... **Medium Weight Wall**
1st Window Type ..... **Standard Glass**

3.2. Construction Types for Exposure SW
Wall Type ..... **Medium Weight Wall**
1st Window Type ..... **Standard Glass**

3.3. Construction Types for Exposure NW
Wall Type ..... **Medium Weight Wall**
1st Window Type ..... **Standard Glass**

3.4. Construction Types for Exposure NE
Wall Type ..... **Medium Weight Wall**
1st Window Type ..... **Standard Glass**

4. Roofs, Skylights:

Exp.	Roof Gross Area (ft²)	Roof Slope (deg.)	Skylight Qty.
H	5120.3	0	0

4.1. Construction Types for Exposure H
Roof Type ..... **Medium Weight Roof**

5. Infiltration:
Design Cooling ..... **0.05** CFM/ft²
Design Heating ..... **0.05** CFM/ft²
Energy Analysis ..... **0.05** CFM/ft²
Infiltration occurs at all hours.

6. Floors:

Type	**Slab Floor On Grade**	
Floor Area	**4680.0**	ft²
Total Floor U-Value	**0.100**	BTU/(hr-ft²-°F)
Exposed Perimeter	**322.0**	ft
Edge Insulation R-Value	**0.00**	(hr-ft²-°F)/BTU

7. Partitions:

(No partition data).

Demand Control Ventilation Input Data

1. General Details:

Building Name ..... **Demand Control Ventilation**

2. Plants Included in this Building:

None

3. Air Systems Included in this Building:

System Name	Mult.
DCV Split-System Meeting Room	1
DCV Unit Heaters	1

4: Miscellaneous Energy

(no items defined)

5: Meters

Electric ..... **Station 20 Electric Rate**
Natural Gas ..... **Station 20 Nat. Gas**

6: Miscellaneous Data

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

DCV Split-System Meeting Room Input Data

Project Name: Station 21 — 05/21/2010
Prepared by: Kitchen and Associates — 09:31AM

1. General Details:

Air System Name	**DCV Split-System Meeting Room**
Equipment Type	**Split AHU**
Air System Type	**Single Zone CAV**
Number of zones	**1**

2. System Components:

Ventilation Air Data:

Airflow Control	**Demand Controlled Ventilation**	
Ventilation Sizing Method	**Sum of Space OA Airflows**	
Minimum Airflow	**40**	%
Damper Leak Rate	**5**	%
Minimum CO2 Differential	**100**	ppm
Maximum CO2 Differential	**700**	ppm
Outdoor Air CO2 Level	**400**	ppm

Central Cooling Data:

Supply Air Temperature	**55.0**	°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	**95.0**	°F
Heating Source	**Combustion - Natural Gas**	
Schedule	**JFMA* * * * SOND**	
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	**10**	%
Duct Leakage	**5**	%

Return Duct or Plenum Data:

Return Air Via	**Ducted Return**

3. Zone Components:

Space Assignments:

Zone 1: Zone 1	
DVC Meeting Room	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**85.0**	°F
Heating T-stat: Occ.	**70.0**	°F
Heating T-stat: Unocc.	**60.0**	°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	**Station 20 T-stat**	
Unoccupied Cooling is	**Not Available**	

Supply Terminals Data:

Zone	**All**	
Terminal Type	**Diffuser**	
Minimum Airflow	**1000.0**	CFM

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 ..... **55.0** °F
Supply Fan Airflow ..... **1052.6** CFM
Ventilation Airflow ..... **100.0** CFM
Heating Supply Temperature ..... **95.0** °F

Hydronic Sizing Specifications:

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

Safety Factors:

Cooling Sensible ..... **10** %
Cooling Latent ..... **10** %
Heating ..... **0** %

Zone Sizing Data:

Zone Airflow Sizing Method ..... **Sum of space airflow rates**
Space Airflow Sizing Method ..... **Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	1000.0	-	-	

5. Equipment Data

Central Cooling Unit - Air-Cooled DX

Estimated Maximum Load ..... **36.5** MBH
Design OAT ..... **95.0** °F
Equipment Sizing ..... **User-Defined**
Gross Cooling Capacity ..... **34.9** MBH
ARI Performance Rating ..... **10.00** SEER
Conventional Cutoff OAT ..... **55.0** °F
Low Temperature Operation ..... **Used**
Low Temperature Cutoff OAT ..... **0.0** °F

Central Heating Unit - Combustion

Estimated Maximum Load ..... **20.9** MBH
Equipment Sizing ..... **User-Defined**
Gross Heating Capacity ..... **50.0** MBH
Average Efficiency ..... **94.0** %
Misc. Electric ..... **0.000** kW

DCV Unit Heaters Input Data

Project Name: Station 21 — 05/21/2010
Prepared by: Kitchen and Associates — 09:32AM

1. General Details:

Air System Name	**DCV Unit Heaters**	
Equipment Type	**Packaged Vertical Units**	
Air System Type	**Single Zone CAV**	
Number of zones	**1**	

2. System Components:

Ventilation Air Data:

Airflow Control	**Constant Ventilation Airflow**	
Ventilation Sizing Method	**ASHRAE Std 62.1-2007**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**0**	%
Outdoor Air CO2 Level	**400**	ppm

Central Heating Data:

Supply Temperature	**95.0**	°F
Heating Source	**Combustion - Natural Gas**	
Schedule	**JFM* * * * * OND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Supply Fan Data:

Fan Type	**Forward Curved**	
Configuration	**Blow-thru**	
Fan Performance	**0.10**	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: Zone 1	
DCV Bays	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**85.0**	°F
Heating T-stat: Occ.	**60.0**	°F
Heating T-stat: Unocc.	**60.0**	°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	**Station 20 T-stat**	
Unoccupied Cooling is	**Not 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:

Supply Fan Airflow	**2720.0**	CFM
Ventilation Airflow	**0.0**	CFM
Heating Supply Temperature	**95.0**	°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 ..... **Sum of space airflow rates**
Space Airflow Sizing Method ..... **Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	2720.0	-	-	

5. Equipment Data

Central Heating Unit - Combustion

Estimated Maximum Load ..... **88.3** MBH
Equipment Sizing ..... **User-Defined**
Gross Heating Capacity ..... **265.0** MBH
Average Efficiency ..... **80.0** %
Misc. Electric ..... **0.000** kW

NightSB Bays

1. General Details:

Floor Area	**4680.0**	ft²
Avg. Ceiling Height	**9.0**	ft
Building Weight	**30.0**	lb/ft²

1.1. OA Ventilation Requirements:

Space Usage	**MISCELLANEOUS: Warehouse**	
OA Requirement 1	**0.0**	CFM/person
OA Requirement 2	**0.06**	CFM/ft²
Space Usage Defaults	**ASHRAE Std 62.1-2007**	

2. Internals:

2.1. Overhead Lighting:

Fixture Type	**Free Hanging**	
Wattage	**1.30**	W/ft²
Ballast Multiplier	**1.00**	
Schedule	**Station 20 Schedule**	

2.2. Task Lighting:

Wattage	**0.35**	W/ft²
Schedule	**24-Hrs**	

2.3. Electrical Equipment:

Wattage	**0.75**	W/ft²
Schedule	**Station 20 Schedule**	

2.4. People:

Occupancy	**0.0**	Person
Activity Level	**Office Work**	
Sensible	**245.0**	BTU/hr/person
Latent	**205.0**	BTU/hr/person
Schedule	**None**	

2.5. Miscellaneous Loads:

Sensible	**0**	BTU/hr
Schedule	**None**	
Latent	**0**	BTU/hr
Schedule	**None**	

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
SE	526.0	2	0	0
SW	1206.0	6	0	0
NW	726.0	4	0	0
NE	1206.0	6	0	0

3.1. Construction Types for Exposure SE

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

3.2. Construction Types for Exposure SW

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

3.3. Construction Types for Exposure NW

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

3.4. Construction Types for Exposure NE

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

4. Roofs, Skylights:

Exp.	Roof Gross Area (ft²)	Roof Slope (deg.)	Skylight Qty.
H	5120.3	0	0

4.1. Construction Types for Exposure H

Roof Type	**Medium Weight Roof**

5. Infiltration:

Design Cooling	**0.05**	CFM/ft²
Design Heating	**0.05**	CFM/ft²
Energy Analysis	**0.05**	CFM/ft²

Infiltration occurs at all hours.

6. Floors:

Type	**Slab Floor On Grade**	
Floor Area	**4680.0**	ft²
Total Floor U-Value	**0.100**	BTU/(hr-ft²-°F)
Exposed Perimeter	**322.0**	ft
Edge Insulation R-Value	**0.00**	(hr-ft²-°F)/BTU

7. Partitions:

(No partition data).

Night Setback Input Data

1. General Details:

Building Name ..... **Night Setback**

2. Plants Included in this Building:

None

3. Air Systems Included in this Building:

System Name	Mult.
Night SB Split-System Meeting Rm	1
Night SB Unit Heaters	1

4: Miscellaneous Energy

(no items defined)

5: Meters

Electric ..... **Station 20 Electric Rate**
Natural Gas ..... **Station 20 Nat. Gas**

6: Miscellaneous Data

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

Night SB Split-System Meeting Rm Input Data

Project Name: Station 21 — 05/21/2010
Prepared by: Kitchen and Associates — 09:32AM

1. General Details:

Air System Name	**Night SB Split-System Meeting Rm**
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	**ASHRAE Std 62.1-2007**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**5**	%
Outdoor Air CO2 Level	**400**	ppm

Central Cooling Data:

Supply Air Temperature	**55.0**	°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	**95.0**	°F
Heating Source	**Combustion - Natural Gas**	
Schedule	**JFMA* * * * SOND**	
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	**10**	%
Duct Leakage	**5**	%

Return Duct or Plenum Data:

Return Air Via	**Ducted Return**

3. Zone Components:

Space Assignments:

Zone 1: Zone 1	
NightSB Meeting Room	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**85.0**	°F
Heating T-stat: Occ.	**70.0**	°F
Heating T-stat: Unocc.	**60.0**	°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	**Night Setback**	
Unoccupied Cooling is	**Not Available**	

Supply Terminals Data:

Zone	**All**	
Terminal Type	**Diffuser**	
Minimum Airflow	**1000.0**	CFM

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	**55.0**	°F
Supply Fan Airflow	**1052.6**	CFM
Ventilation Airflow	**400.0**	CFM
Heating Supply Temperature	**95.0**	°F

Hydronic Sizing Specifications:

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

Safety Factors:

Cooling Sensible	**10**	%
Cooling Latent	**10**	%
Heating	**0**	%

Zone Sizing Data:

Zone Airflow Sizing Method	**Sum of space airflow rates**
Space Airflow Sizing Method	**Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	1000.0	-	-	

5. Equipment Data

Central Cooling Unit - Air-Cooled DX

Estimated Maximum Load	**50.7**	MBH
Design OAT	**95.0**	°F
Equipment Sizing	**User-Defined**	
Gross Cooling Capacity	**34.9**	MBH
ARI Performance Rating	**16.00**	SEER
Conventional Cutoff OAT	**55.0**	°F
Low Temperature Operation	**Used**	
Low Temperature Cutoff OAT	**0.0**	°F

Central Heating Unit - Combustion

Estimated Maximum Load	**40.4**	MBH
Equipment Sizing	**User-Defined**	
Gross Heating Capacity	**50.0**	MBH
Average Efficiency	**94.0**	%
Misc. Electric	**0.000**	kW

Night SB Unit Heaters Input Data

Project Name: Station 21 — 05/21/2010
Prepared by: Kitchen and Associates — 09:33AM

1. General Details:

Air System Name	**Night SB Unit Heaters**	
Equipment Type	**Packaged Vertical Units**	
Air System Type	**Single Zone CAV**	
Number of zones	**1**	

2. System Components:

Ventilation Air Data:

Airflow Control	**Constant Ventilation Airflow**	
Ventilation Sizing Method	**ASHRAE Std 62.1-2007**	
Unocc. Damper Position	**Closed**	
Damper Leak Rate	**0**	%
Outdoor Air CO2 Level	**400**	ppm

Central Heating Data:

Supply Temperature	**95.0**	°F
Heating Source	**Combustion - Natural Gas**	
Schedule	**JFM* * * * * OND**	
Capacity Control	**Cycled or Staged Capacity - Fan On**	

Supply Fan Data:

Fan Type	**Forward Curved**	
Configuration	**Blow-thru**	
Fan Performance	**0.10**	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: Zone 1	
NightSB Bays	x1

Thermostats and Zone Data:

Zone	**All**	
Cooling T-stat: Occ.	**75.0**	°F
Cooling T-stat: Unocc.	**85.0**	°F
Heating T-stat: Occ.	**60.0**	°F
Heating T-stat: Unocc.	**60.0**	°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	**Station 20 T-stat**	
Unoccupied Cooling is	**Not 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:

Supply Fan Airflow	**2720.0**	CFM
Ventilation Airflow	**0.0**	CFM
Heating Supply Temperature	**95.0**	°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	**Sum of space airflow rates**
Space Airflow Sizing Method	**Individual peak space loads**

Zone	Supply Airflow (CFM)	Zone Htg Unit (MBH)	Reheat Coil (MBH)	- (CFM)
1	2720.0	-	-	

5. Equipment Data

Central Heating Unit - Combustion

Estimated Maximum Load	**88.3**	MBH
Equipment Sizing	**User-Defined**	
Gross Heating Capacity	**265.0**	MBH
Average Efficiency	**80.0**	%
Misc. Electric	**0.000**	kW

NightSB Meeting Room

1. General Details:

Floor Area	**440.0**	ft²
Avg. Ceiling Height	**9.0**	ft
Building Weight	**30.0**	lb/ft²

1.1. OA Ventilation Requirements:

Space Usage	**GENERAL: Conference/meeting**	
OA Requirement 1	**5.0**	CFM/person
OA Requirement 2	**0.06**	CFM/ft²
Space Usage Defaults	**ASHRAE Std 62.1-2007**	

2. Internals:

2.1. Overhead Lighting:

Fixture Type	**Free Hanging**	
Wattage	**1.30**	W/ft²
Ballast Multiplier	**1.00**	
Schedule	**Station 20 Schedule**	

2.2. Task Lighting:

Wattage	**0.00**	W/ft²
Schedule	**None**	

2.3. Electrical Equipment:

Wattage	**0.75**	W/ft²
Schedule	**Station 20 Schedule**	

2.4. People:

Occupancy	**20.0**	People
Activity Level	**Office Work**	
Sensible	**245.0**	BTU/hr/person
Latent	**205.0**	BTU/hr/person
Schedule	**Station 20 Schedule**	

2.5. Miscellaneous Loads:

Sensible	**0**	BTU/hr
Schedule	**None**	
Latent	**0**	BTU/hr
Schedule	**None**	

3. Walls, Windows, Doors:

Exp.	Wall Gross Area (ft²)	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
SE	200.0	2	0	0

3.1. Construction Types for Exposure SE

Wall Type	**Medium Weight Wall**
1st Window Type	**Standard Glass**

4. Roofs, Skylights:

(No Roof or Skylight data).

5. Infiltration:

Design Cooling	**0.05**	CFM/ft²
Design Heating	**0.05**	CFM/ft²
Energy Analysis	**0.05**	CFM/ft²

Infiltration occurs at all hours.

6. Floors:

Type	**Slab Floor On Grade**	
Floor Area	**440.0**	ft²
Total Floor U-Value	**0.100**	BTU/(hr-ft²-°F)
Exposed Perimeter	**322.0**	ft
Edge Insulation R-Value	**0.00**	(hr-ft²-°F)/BTU

7. Partitions:

7.1. 1st Partition Details:

Partition Type	**Wall Partition**	
Area	**560.0**	ft²
U-Value	**0.500**	BTU/(hr-ft²-°F)
Uncondit. Space Max Temp	**95.0**	°F
Ambient at Space Max Temp	**95.0**	°F
Uncondit. Space Min Temp	**55.0**	°F
Ambient at Space Min Temp	**10.0**	°F

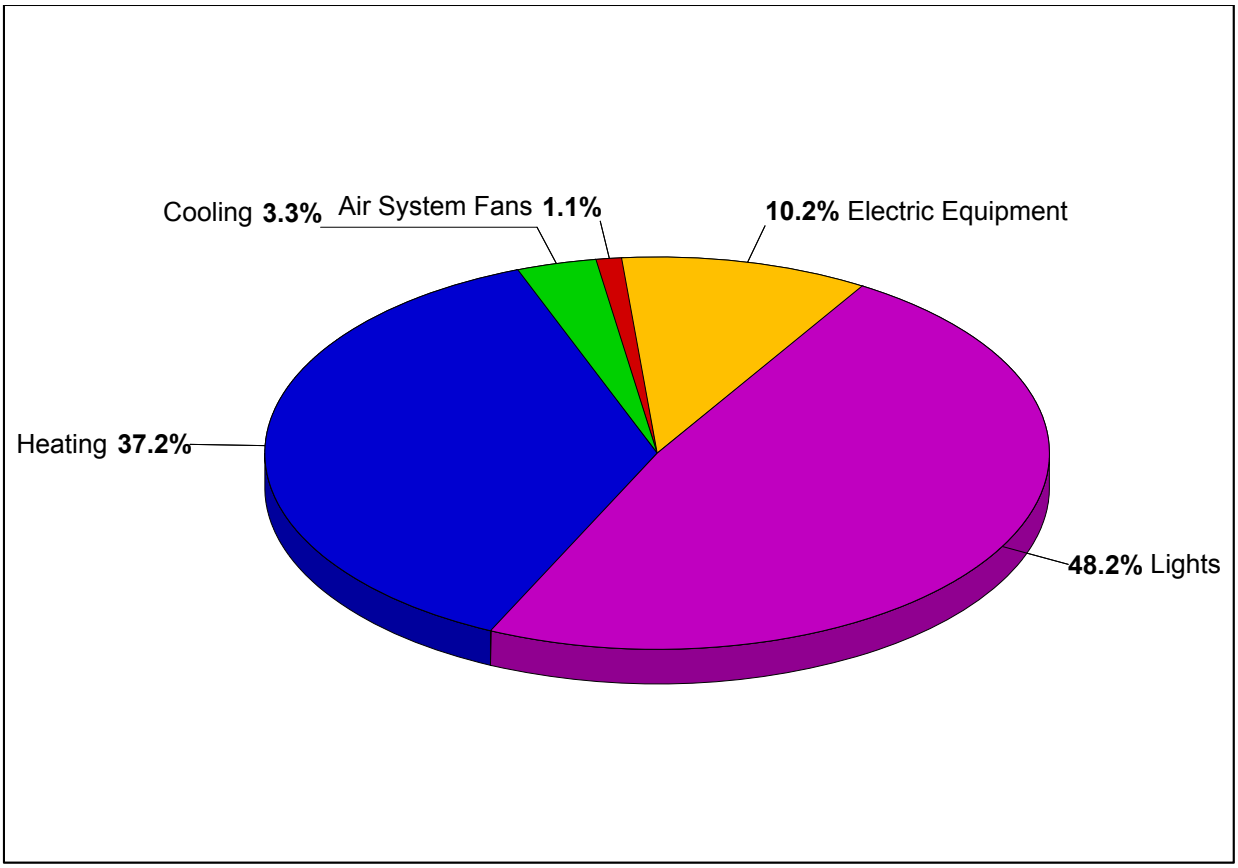
7.2. 2nd Partition Details:

Partition Type	**Ceiling Partition**	
Area	**440.0**	ft²
U-Value	**0.500**	BTU/(hr-ft²-°F)
Uncondit. Space Max Temp	**120.0**	°F
Ambient at Space Max Temp	**95.0**	°F
Uncondit. Space Min Temp	**55.0**	°F
Ambient at Space Min Temp	**10.0**	°F

APPENDIX P

Hourly Analysis Program Base Building Outputs

Annual Component Costs - Station 21-BaseBuilding



1. Annual Costs

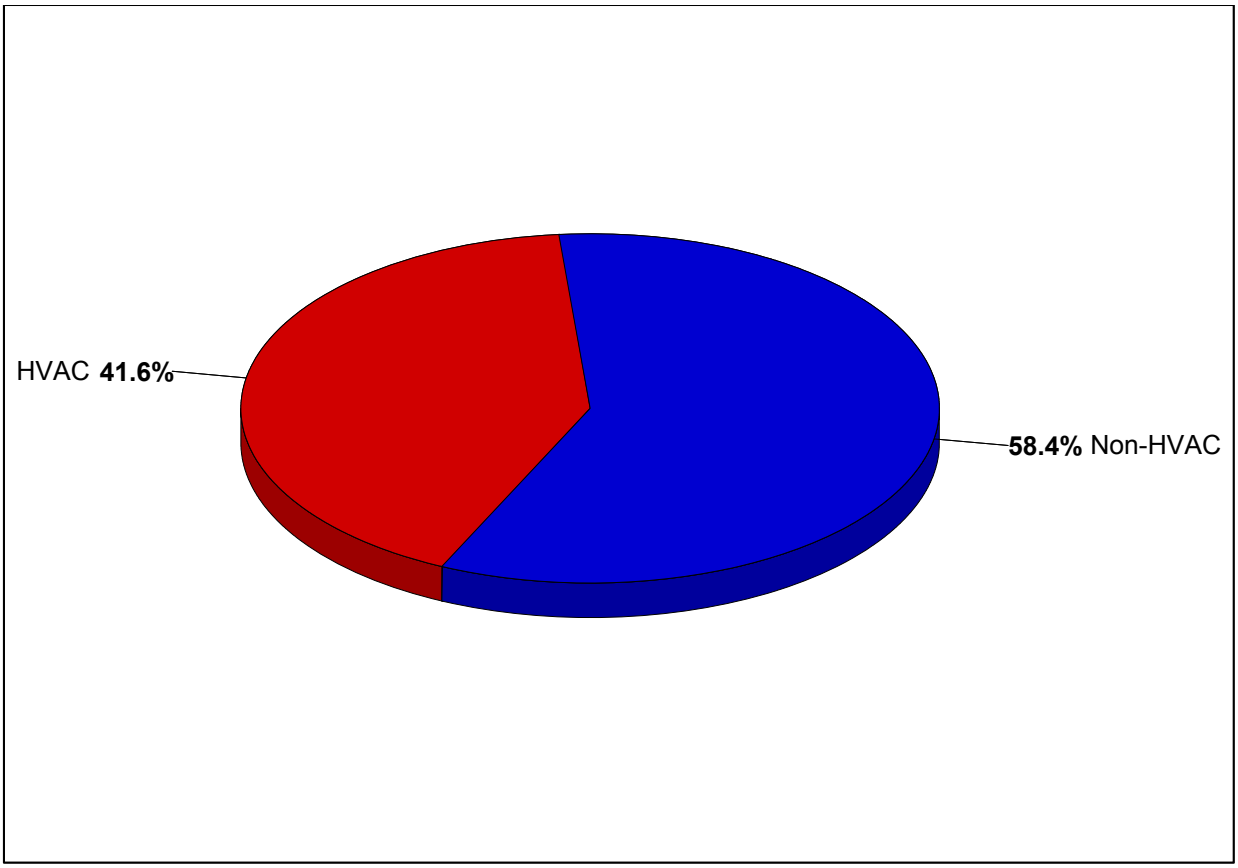
Component	Annual Cost ($)	($/ft²)	Percent of Total (%)
Air System Fans	97	0.019	1.1
Cooling	288	0.056	3.3
Heating	3,274	0.639	37.2
Pumps	0	0.000	0.0
Cooling Tower Fans	0	0.000	0.0
HVAC Sub-Total	**3,659**	**0.715**	**41.6**
Lights	4,234	0.827	48.2
Electric Equipment	896	0.175	10.2
Misc. Electric	0	0.000	0.0
Misc. Fuel Use	0	0.000	0.0
Non-HVAC Sub-Total	**5,130**	**1.002**	**58.4**
Grand Total	**8,789**	**1.717**	**100.0**

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

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Annual HVAC & Non-HVAC Cost Totals - Station 21-BaseBuilding

Station 21 05/21/2010
Kitchen and Associates 09:41AM

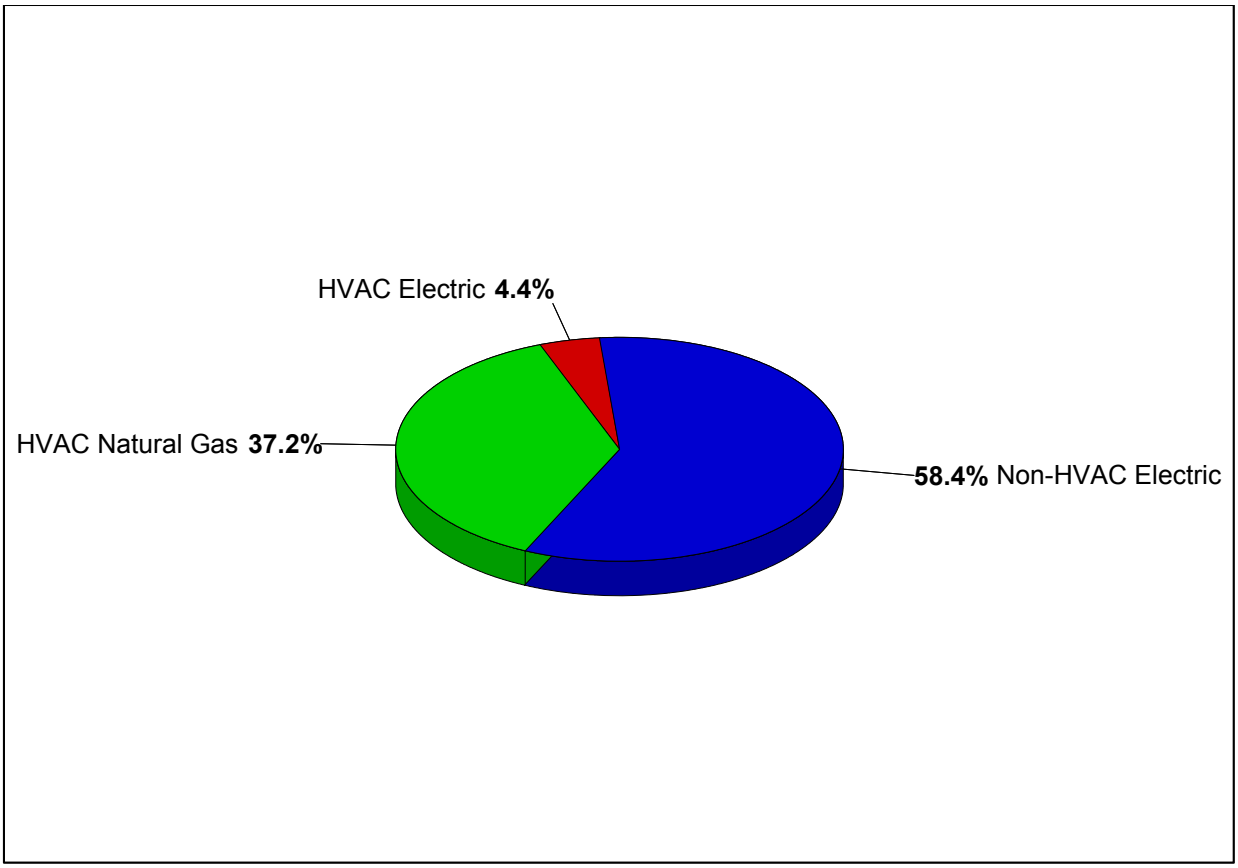


1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC	3,659	0.715	41.6
Non-HVAC	5,130	1.002	58.4
Grand Total	**8,789**	**1.717**	**100.0**

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

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²



1. Annual Costs

Component	Annual Cost ($/yr)	($/ft²)	Percent of Total (%)
HVAC Components			
Electric	385	0.075	4.4
Natural Gas	3,274	0.639	37.2
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Remote Chilled Water	0	0.000	0.0
HVAC Sub-Total	**3,659**	**0.715**	**41.6**
Non-HVAC Components			
Electric	5,130	1.002	58.4
Natural Gas	0	0.000	0.0
Fuel Oil	0	0.000	0.0
Propane	0	0.000	0.0
Remote Hot Water	0	0.000	0.0
Remote Steam	0	0.000	0.0
Non-HVAC Sub-Total	**5,130**	**1.002**	**58.4**
Grand Total	**8,789**	**1.717**	**100.0**

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

Gross Floor Area ..... **5120.0** ft²
Conditioned Floor Area ..... **5120.0** ft²

Energy Budget by Energy Source - Station 21-BaseBuilding

Station 21 — 05/21/2010
Kitchen and Associates — 09:41AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	20,153	3.936
Heating Coil Loads	213,851	41.768
Grand Total	**234,004**	**45.704**

2. Energy Consumption by Energy Source

Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
HVAC Components				
Electric	7,038	1.375	25,134	4.909
Natural Gas	263,994	51.561	263,994	51.561
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Remote Chilled Water	0	0.000	0	0.000
HVAC Sub-Total	**271,031**	**52.936**	**289,128**	**56.470**
Non-HVAC Components				
Electric	93,652	18.291	334,470	65.326
Natural Gas	0	0.000	0	0.000
Fuel Oil	0	0.000	0	0.000
Propane	0	0.000	0	0.000
Remote Hot Water	0	0.000	0	0.000
Remote Steam	0	0.000	0	0.000
Non-HVAC Sub-Total	**93,652**	**18.291**	**334,470**	**65.326**
Grand Total	**364,683**	**71.227**	**623,598**	**121.796**

Notes:

1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **5120.0** ft²
   Conditioned Floor Area ..... **5120.0** ft²

Energy Budget by System Component - Station 21-BaseBuilding

Station 21 05/21/2010
Kitchen and Associates 09:41AM

1. Annual Coil Loads

Component	Load (kBTU)	(kBTU/ft²)
Cooling Coil Loads	20,153	3.936
Heating Coil Loads	213,851	41.768
Grand Total	**234,004**	**45.704**

2. Energy Consumption by System Component

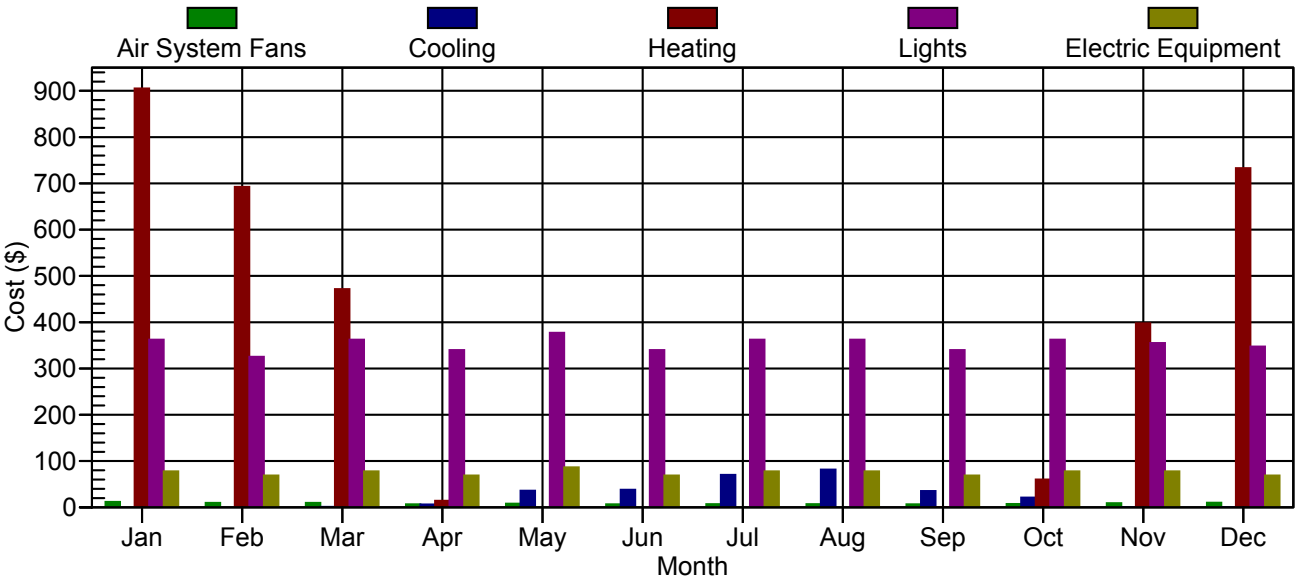
Component	Site Energy (kBTU)	Site Energy (kBTU/ft²)	Source Energy (kBTU)	Source Energy (kBTU/ft²)
Air System Fans	1,773	0.346	6,331	1.236
Cooling	5,265	1.028	18,804	3.673
Heating	263,994	51.561	263,994	51.561
Pumps	0	0.000	0	0.000
Cooling Towers	0	0.000	0	0.000
HVAC Sub-Total	**271,031**	**52.936**	**289,128**	**56.470**
Lights	77,300	15.098	276,072	53.920
Electric Equipment	16,351	3.194	58,398	11.406
Misc. Electric	0	0.000	0	0.000
Misc. Fuel Use	0	0.000	0	0.000
Non-HVAC Sub-Total	**93,652**	**18.291**	**334,470**	**65.326**
Grand Total	**364,683**	**71.227**	**623,597**	**121.796**

Notes:
1. 'Cooling Coil Loads' is the sum of all air system cooling coil loads.
2. 'Heating Coil Loads' is the sum of all air system heating coil loads.
3. Site Energy is the actual energy consumed.
4. Source Energy is the site energy divided by the electric generating efficiency (28.0%).
5. Source Energy for fuels equals the site energy value.
6. Energy per unit floor area is based on the gross building floor area.
   Gross Floor Area ..... **5120.0** ft²
   Conditioned Floor Area ..... **5120.0** ft²

Monthly Component Costs - Station 21-BaseBuilding

Station 21
Kitchen and Associates

05/21/2010
09:41AM



1. HVAC Component Costs

Month	Air System Fans ($)	Cooling ($)	Heating ($)	Pumps ($)	Cooling Towers ($)	HVAC Total ($)
January	12	0	905	0	0	917
February	9	0	692	0	0	701
March	9	1	471	0	0	481
April	6	6	14	0	0	26
May	8	36	0	0	0	44
June	6	38	0	0	0	44
July	7	70	0	0	0	77
August	7	81	0	0	0	88
September	6	35	0	0	0	41
October	7	21	60	0	0	88
November	9	0	397	0	0	406
December	10	0	733	0	0	743
Total	**97**	**288**	**3,274**	**0**	**0**	**3,659**

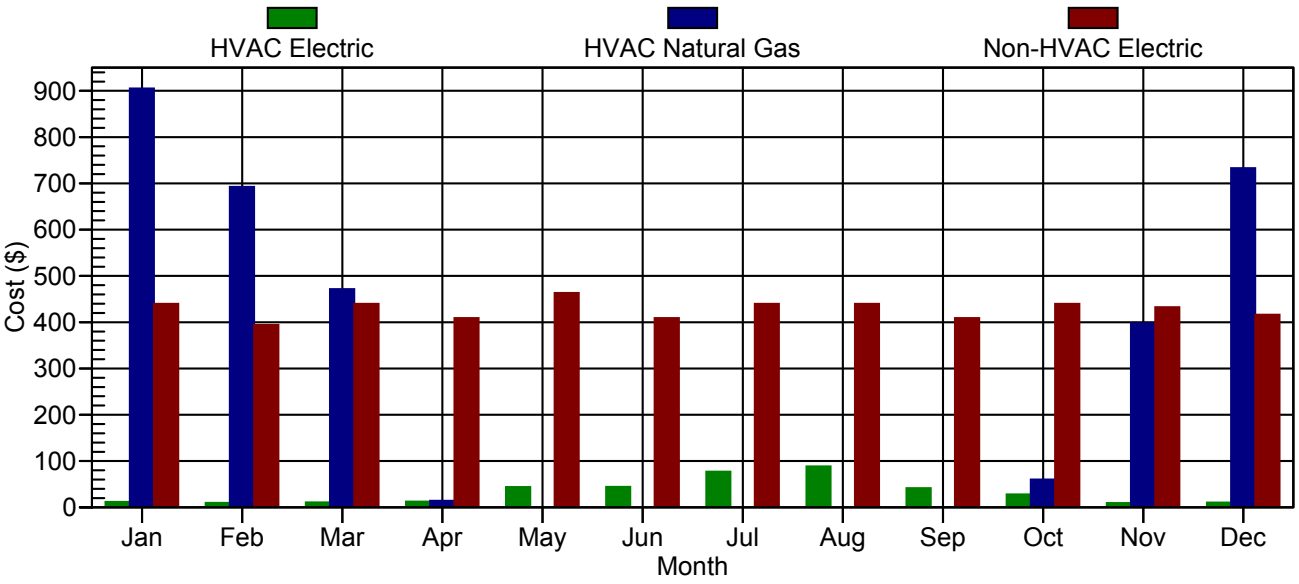
2. Non-HVAC Component Costs

Month	Lights ($)	Electric Equipment ($)	Misc. Electric ($)	Misc. Fuel Use ($)	Non-HVAC Total ($)	Grand Total ($)
January	362	78	0	0	440	1,357
February	325	69	0	0	394	1,095
March	362	78	0	0	440	921
April	340	69	0	0	409	435
May	377	86	0	0	463	507
June	340	69	0	0	409	453
July	362	78	0	0	440	517
August	362	78	0	0	440	528
September	340	69	0	0	409	450
October	362	78	0	0	440	528
November	355	78	0	0	432	838
December	347	69	0	0	416	1,159
Total	**4,234**	**896**	**0**	**0**	**5,130**	**8,789**

Monthly Energy Costs - Station 21-BaseBuilding

Station 21
Kitchen and Associates

05/21/2010
09:41AM



1. HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)	Remote Chilled Water ($)
January	12	905	0	0	0	0	0
February	9	692	0	0	0	0	0
March	11	471	0	0	0	0	0
April	12	14	0	0	0	0	0
May	44	0	0	0	0	0	0
June	44	0	0	0	0	0	0
July	77	0	0	0	0	0	0
August	88	0	0	0	0	0	0
September	41	0	0	0	0	0	0
October	28	60	0	0	0	0	0
November	9	397	0	0	0	0	0
December	10	733	0	0	0	0	0
Total	**385**	**3,274**	**0**	**0**	**0**	**0**	**0**

2. Non-HVAC Costs

Month	Electric ($)	Natural Gas ($)	Fuel Oil ($)	Propane ($)	Remote Hot Water ($)	Remote Steam ($)
January	440	0	0	0	0	0
February	394	0	0	0	0	0
March	440	0	0	0	0	0
April	409	0	0	0	0	0
May	463	0	0	0	0	0
June	409	0	0	0	0	0
July	440	0	0	0	0	0
August	440	0	0	0	0	0
September	409	0	0	0	0	0
October	440	0	0	0	0	0
November	432	0	0	0	0	0
December	416	0	0	0	0	0
Total	**5,130**	**0**	**0**	**0**	**0**	**0**

Monthly Energy Use by Energy Type - Station 21-BaseBuilding

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1. HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)	Remote CW (na)
Jan	62	730	0	0	0	0	0
Feb	51	558	0	0	0	0	0
Mar	56	380	0	0	0	0	0
Apr	65	11	0	0	0	0	0
May	233	0	0	0	0	0	0
Jun	237	0	0	0	0	0	0
Jul	412	0	0	0	0	0	0
Aug	473	0	0	0	0	0	0
Sep	221	0	0	0	0	0	0
Oct	150	48	0	0	0	0	0
Nov	48	320	0	0	0	0	0
Dec	55	591	0	0	0	0	0
Totals	2,063	2,640	0	0	0	0	0

2. Non-HVAC Energy Use

Month	Electric (kWh)	Natural Gas (Therm)	Fuel Oil (na)	Propane (na)	Remote HW (na)	Remote Steam (na)
Jan	2,352	0	0	0	0	0
Feb	2,108	0	0	0	0	0
Mar	2,352	0	0	0	0	0
Apr	2,187	0	0	0	0	0
May	2,478	0	0	0	0	0
Jun	2,187	0	0	0	0	0
Jul	2,352	0	0	0	0	0
Aug	2,352	0	0	0	0	0
Sep	2,187	0	0	0	0	0
Oct	2,352	0	0	0	0	0
Nov	2,313	0	0	0	0	0
Dec	2,226	0	0	0	0	0
Totals	27,448	0	0	0	0	0

Monthly Energy Use by Component - Station 21-BaseBuilding

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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)	62	51	50	33	42	33	37	37	33	39	47	54
Cooling												
Electric (kWh)	0	0	6	32	192	203	374	435	188	111	1	1
Natural Gas (Therm)	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 (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 (Therm)	730	558	380	11	0	0	0	0	0	48	320	591
Fuel Oil (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
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)	1938	1740	1938	1818	2017	1818	1938	1938	1818	1938	1898	1858
Electric Eqpt. (kWh)	415	369	415	369	461	369	415	415	369	415	415	369
Misc. Electric (kWh)	0	0	0	0	0	0	0	0	0	0	0	0
Misc. Fuel												
Natural Gas (Therm)	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

Station 21
Kitchen and Associates

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Table 1. Annual Costs

Component	Station 21-BaseBuilding ($)
Air System Fans	97
Cooling	288
Heating	3,274
Pumps	0
Cooling Tower Fans	0
HVAC Sub-Total	**3,659**
Lights	4,234
Electric Equipment	896
Misc. Electric	0
Misc. Fuel Use	0
Non-HVAC Sub-Total	**5,130**
Grand Total	**8,789**

Table 2. Annual Cost per Unit Floor Area

Component	Station 21-BaseBuilding ($/ft²)
Air System Fans	0.019
Cooling	0.056
Heating	0.639
Pumps	0.000
Cooling Tower Fans	0.000
HVAC Sub-Total	**0.715**
Lights	0.827
Electric Equipment	0.175
Misc. Electric	0.000
Misc. Fuel Use	0.000
Non-HVAC Sub-Total	**1.002**
Grand Total	**1.717**
Gross Floor Area (ft²)	5120.0
Conditioned Floor Area (ft²)	5120.0

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

Table 3. Component Cost as a Percentage of Total Cost

Component	Station 21-BaseBuilding (%)
Air System Fans	1.1
Cooling	3.3
Heating	37.2
Pumps	0.0
Cooling Tower Fans	0.0
HVAC Sub-Total	**41.6**
Lights	48.2
Electric Equipment	10.2
Misc. Electric	0.0
Misc. Fuel Use	0.0
Non-HVAC Sub-Total	**58.4**
Grand Total	**100.0**

Annual Energy and Emissions Summary

Station 21
Kitchen and Associates

05/21/2010
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Table 1. Annual Costs

Component	Station 21-BaseBuilding ($)
HVAC Components	
Electric	385
Natural Gas	3,274
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Remote CW	0
HVAC Sub-Total	**3,659**
Non-HVAC Components	
Electric	5,130
Natural Gas	0
Fuel Oil	0
Propane	0
Remote HW	0
Remote Steam	0
Non-HVAC Sub-Total	**5,130**
Grand Total	**8,789**

Table 2. Annual Energy Consumption

Component	Station 21-BaseBuilding
HVAC Components	
Electric (kWh)	2,063
Natural Gas (Therm)	2,640
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0
Non-HVAC Components	
Electric (kWh)	27,448
Natural Gas (Therm)	0
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Totals	
Electric (kWh)	29,510
Natural Gas (Therm)	2,640
Fuel Oil (na)	0
Propane (na)	0
Remote HW (na)	0
Remote Steam (na)	0
Remote CW (na)	0

Table 3. Annual Emissions

Component	Station 21-BaseBuilding
CO2 Equivalent (lb)	0

Table 4. Annual Cost per Unit Floor Area

Component	Station 21-BaseBuilding ($/ft²)
HVAC Components	
Electric	0.075
Natural Gas	0.639
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Remote CW	0.000
HVAC Sub-Total	**0.715**
Non-HVAC Components	
Electric	1.002
Natural Gas	0.000
Fuel Oil	0.000
Propane	0.000
Remote HW	0.000
Remote Steam	0.000
Non-HVAC Sub-Total	**1.002**
Grand Total	**1.717**
Gross Floor Area (ft²)	5120.0
Conditioned Floor Area (ft²)	5120.0

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

Table 5. Component Cost as a Percentage of Total Cost

Component	Station 21-BaseBuilding (%)
HVAC Components	
Electric	4.4
Natural Gas	37.2
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Remote CW	0.0
HVAC Sub-Total	**41.6**
Non-HVAC Components	
Electric	58.4
Natural Gas	0.0
Fuel Oil	0.0
Propane	0.0
Remote HW	0.0
Remote Steam	0.0
Non-HVAC Sub-Total	**58.4**
Grand Total	**100.0**

APPENDIX Q

Site Aerial Image


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