OCEAN COUNTY SOIL CONSERVATION DISTRICT
OFFICE BUILDING
ENERGY ASSESSMENT

for

NEW JERSEY
BUREAU OF PUBLIC UTILITIES

CHA PROJECT NO. 20435

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1.0 INTRODUCTION & BACKGROUND

The Ocean County Soil Conservation District (building) owns and operates a 4,528 square foot office building in Forked River, New Jersey. The building is a two-story office structure constructed in 1975.

Both floors incorporate walled offices, common meeting rooms, cubicle work spaces, and support areas including a kitchen/breakroom and utility rooms.

New Jersey's Clean Energy Program (NJCEP), funded by the New Jersey Board of Public Utilities (NJBPU), supports energy efficiency and sustainability for Municipal and Local Government Energy Audits. Through the support of a utility trust fund, New Jersey is able to assist state and local authorities in reducing energy consumption while increasing comfort.

This report covers the energy audit for the office building for the Ocean County Soil Conservation District.

2.0 EXECUTIVE SUMMARY

This report details the results of the Ocean County Soil Conservation District, which owns and operates a 4,528 square foot office building in Forked River, New Jersey. The two-story office structure was constructed in 1975. The following areas were evaluated for energy conservation measures:

- Exit sign replacement
- Occupancy sensors
- Pipe insulations
- Condensing unit replacement

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Measures which are recommended for implementation have a payback of 10 years or less. This threshold is considered a viable return on investment. Potential annual savings of $1,000 for the recommended ECMs may be realized with a payback of 3.1 years.

ECM – 5 Replace Exit Signs

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Oil	Total				
$	kW	kWh	gallons	$		$	Years	Years
500	0	1,700	0	300	5.93	100	1.7	1.3

*Incentive is based on the New Jersey Smart Start Prescriptive Lighting Measures.

ECM – 6 Install Occupancy Sensors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Oil	Total				
$	kW	kWh	gallons	$		$	Years	Years
2,600	0	3,600	0	700	14.00	400	3.7	0.8

*Incentive is based on the New Jersey Smart Start Prescriptive Lighting Measures.

The following ECMs are not recommended for implementation, but are included in the Executive Summary at the request of the Conservation District:

ECM – 1 Setback – Modify Work Week Hours

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Oil	Total				
$	kW	kWh	gallons	$		$	Years	Years
300	0	900	(50)	100	1.85	NA	3.0	NA

*No incentive is available for this measure.

ECM – 4 Replace Furnaces

Budgetary Cost	Annual Utility Savings						Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Gas	#2 Oil	Total	ROI			
$	kW	kWh	therms	gallons	$		$	Years	Years
7,000	0	0	(1,500)	1,300	1,100	5.97	NA	6.4	NA

*No Incentive is available through the New Jersey Smart Start Program.

ECM-4 is recommended when natural gas service becomes available.

3.0 EXISTING CONDITIONS

3.1 Building – General

The 4,528 square foot office building has two stories. The first floor is comprised of an open cubicle office layout with an adjoining kitchen/break area and reception lobby. The second floor consists of individual walled offices and a large conference meeting area. Both floors have utility closets and men's and women's restrooms. The majority of the building is utilized nine hours per day during week days.

The exterior is aluminum siding with an overall wood frame construction. The roof is pitched and has an unfinished attic space. No drawings were available however inspection of the attic space revealed 2x4 lumber construction and fiberglass insulation. There are 2 doors into the building. The main entry door has a vestibule constructed to help maintain heating/cooling setpoints within the reception area. The back door is infrequently used by employees. Both the entry door and back door have weather stripping to minimize air infiltration into the building.

The windows are double paned and appeared to be in fair condition. No air infiltration was observed due to cracks, trim deficiencies, or just being opened. In general, the building shell envelope is as tight as can be without major renovations to wall construction. Some heating/cooling discomfort issues were expressed by the owner. These are discussed in the HVAC systems section.

3.2 Utility Usage

The building uses electricity, No. 2 fuel oil, and potable water. Sewer is discharged to a municipal sewer collection system.

The building has three electric meters. One meter each provides service to the first and second floors; the third supplies the common building equipment systems. Electricity is delivered by Jersey Central Power and Light (JCP&L), Account Nos. 100018093334, 100018093235, and 100018093391; Rate: General Service Secondary 1 Phase, via an overhead service lateral. Electricity is supplied by a third party company, BGS. From July 2008 through July 2009, the combined three electric meters account had an annual electric consumption of 27,600 kWh, with a demand peak of approximately 9.0 kW, occurring in October 2008, and an annual electric cost of $5,400. This results in a blended electric unit cost of $0.195 per kWh. Combining all three services into one meter and one service was explored but the current basic account charges are too low to justify the electrical work that would be required to operate on one service.

As of April 2009, No. 2 fuel oil is delivered by Dover Oil Company, Account No. 6898M. All of the oil is used by two Ruud forced air furnaces. From May 2008 through April 2009, approximately 1,300 gallons of No. 2 fuel oil at a cost of $3,200 was purchased and consumed, resulting in a unit cost of approximately $2.41 per gallon.

Water is delivered by Lacey Municipal Utilities Authority, Account No. B 44643731, and is used mainly for restrooms and kitchen areas. From June 2008 through March 2009, the building utilized approximately 40,000 gallons of water at a cost of $800, equaling a unit cost of approximately $20.23 per thousand gallons. The sewer service fee is included in the blended rate.

As noted, electricity commodity supply and delivery is presently purchased from JCP&L. The delivery component will always be the responsibility of the utility that connects the facility to the power grid; however, the supply can be purchased from a third party. The electricity supply entity will require submission of one to three years of past energy bills. Contract terms can vary among suppliers. A list of

approved electrical energy commodity suppliers can be found in Appendix A. A summary of the monthly electricity, fuel oil, and water usage and charges for 2008-2009 is also provided in Appendix A.

3.3 HVAC Systems

Heating and cooling are provided by the two forced air furnaces, each located on the floor served. All spaces within the building are heated and cooled except utility closets.

3.3.1 Heating Systems

Heat is provided by two Ruud 163 MBTU forced air furnaces equipped with fuel oil burners, blowers, and ductwork routed to user occupied spaces. The first floor furnace is located in a utility room also used for storage. The second floor furnace is located in a dedicated utility closet. The furnaces are controlled by two programmable thermostats located in the first floor open cubicle area and the second floor large conference area. The thermostats are programmed to maintain a heated space setpoint of 68°F during the heating season with a night setback of 64°F . The furnace systems operate independently. The forced air is delivered to user spaces by a network of supply ductwork and ceiling mounted supply grilles; furnace blowers are constant speed. Return grilles located in the first floor cubicle area and second floor conference area enable air to return back to each furnace.

Hot water is provided by two six gallon, 1,500 watt hot water tanks. The first floor is served by the tank in the utility room; second floor by the tank located in the ceiling plenum above the men's restroom. Copper piping provides hot water to the restrooms and kitchen area.

3.3.2 Air Handling Systems

The building utilizes the two forced air upflow furnaces. There are no exhaust or make up air fans in the building. Each furnace is located in a utility room or closet that has a small 4" square air intake damper for fresh air.

The men's and women's restrooms have small fractional horsepower exhaust fans; exhaust is routed to the unoccupied attic space. This is considered a poor HVAC design practice because humid air is emptied into a space that is not ventilated. OCSCD may want to consider exhausting this air to an outside vent; however, energy savings would not be realized.

Ceiling mounted fans, with fractional horsepower motors and local manual switching control, are located in the large open office areas.

3.3.3 Cooling Systems

The two forced air furnaces each have cooling coils to accommodate DX cooling. Two compressors, 4 ton, Goodman model CKL 49-1A, located outside the building provide refrigerant to each furnace coil. The furnaces and compressors are controlled with the same programmable furnace heating thermostats used for heating control. The cooling setpoint is 74°F in the cooling months with a night setback of 78°F.

3.3.4 HVAC Discomfort

Three discomfort issues were expressed by the building owner during the audit. The first was heating/cooling deficiences in the reception area. The back offices, in relation to the main entrance, were

also mentioned as having some heating/cooling deficiencies. The third issue was vestibule door weather stripping.

The first floor consists of a single HVAC zone. The large cubicle work area, reception and the break room are all heated/cooled based on the setpoint programmed into the thermostat located in the large cubicle area. There is a wall separating reception from the large cubicle work area. The reception area is warmer than the cubicle work area in the cooling months and colder than the cubicle work area in the heating months. The reception area has windows with constant sun exposure throughout the day. In the summer time, radiant heat thru the windows increases temperature within the space but the thermostat located in the large cubicle work area does not see this temperature increase due to wall separation. The end result is the large cubicle area tracks its cooling setpoint well in the summertime and the reception area tends to be hotter than the programmed setpoint. A similar problem exists in the winter time with the heating. Also, heating/cooling losses due to the opening and closing of the vestibule door has a larger impact to the reception area due the zone wall separation and location of the thermostat.

The back offices are typically cooler or warmer than the thermostat setpoints. This is due to two reasons. First, some offices on the second floor are enclosed in walls that separate them from the space where the thermostat is located. Second, the forced air heating/cooling system is constant speed. These back offices and spaces are the furthest point away from the location where the furnace fans push air into the spaces.

The vestibule has a single door entering the vestibule and double door entering the reception area. The double door has weather stripping installed in the seam between the doors. The owner has expressed concern that this weather stripping frequently falls off and the air gap allows drafts into reception.

HVAC Discomfort Recommendations:

Over heating of the reception area during the summer months and insufficient heating in the winter months can be addressed by further considering the following:

1. Installing a clear window film that rejects solar energy but allows visible light to pass through. 3M manufacturers a Prestige PR 70 spectrally selective film that can be applied to the reception area windows. This film would be applied to the 4 windows in the reception area and hallway. The film is typically applied to the inside window pane and has no tint. Solar heating in the summer time would be reduced and the cooling being provided to this space would track more closely to thermostat located in the 1st floor main work area. The window film modification would not result in an energy savings because the zone thermostat is located remotely from the reception area. A local contractor was contacted for budgetary pricing for this work. This effort would improve comfort within reception during the summer time.

2. Installing supplementary electric fin tube heating below each window in the reception area and a new thermostat to control this heating. The 1st floor furnace would continue to provide hot air to the reception area but the new thermostat located in reception will react to adverse conditions in this space such as frequent opening of the vestibule door or radiant cooling coming off the windows. The electric heating modification would result in an increase in electric consumption for the building. Detailed design is recommended for this modification. This effort would improve comfort within reception during the winter time.

3. Rebalancing, re-ducting and damper rework for the reception area is a more extensive HVAC modification requiring detailed design. A damper can be provided in the reception area supply air

ductwork to supply more heated/cooled air to the space. This will result in more heat in the winter time and more cooling in summer time. It should be noted that the 1st floor furnace is constant speed and has the most basic controls. The duct rework and damper air let through would accommodate this existing condition while being careful to avoid starving other areas of the 1st floor. There would be no energy savings associated with this rework and this should be considered only in lieu of options 1 and 2.

4. The weather stripping between the double doors in the vestibule should be evaluated by a qualified door installer and modified to allow more secure fastening. Another possible correction would be to modify the framing of the double door to accept a single door. This would eliminate the need for the large weather stripping in the seam between doors.

3.4 Lighting/Electrical

Lighting was recently upgraded, and consists mainly of efficient T-8 fluorescent fixtures with electronic ballasts, and a small number of inefficient incandescent decorative or utility space fixtures, mainly in underutilized areas such as mechanical areas or hallways. Lighting is controlled by manual switches.

There are some recessed compact fluorescent 6" cans for downlighting in the reception area. Incandescent exit signs are used with the exception of one newer exterior door that has a high efficiency LED exit sign.

Outdoor lighting consists of 100 watt metal halide fixtures utilizing timers, allowing the fixtures to de-energize at a specific time during daylight hours. All observed outdoor lighting fixtures were shut off during the site visit.

3.5 Control Systems

The heating and cooling of the building is controlled with two programmable thermostats, one for each floor. Night setback is used during unoccupied hours. The building does not have a direct digital control (DDC) system. Thermostats, furnace, and condenser controls are hardwired together.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Setback – Modify Work Week Hours

At the request of the Conservation District, an energy evaluation for reducing the five day work week to four days, for a total of 32 hours, was performed. The building is currently occupied Monday-Friday nine hours daily, eight hours of working occupancy. By removing one day from this schedule, annual occupied hours are reduced by approximately 470 hours and energy savings are realized.

For the energy savings calculations, a setback of 4°F was used for heating and cooling. It was determined that the building currently was fully occupied 45 hours per week and unoccupied 123 hours per week. The proposed schedule would result in 36 hours per week fully occupied and 132 hours per week unoccupied. If the building is set back during the unoccupied periods, a small energy savings will result. This savings is approximately $100 per year. The detailed analysis showed that although summer cooling electricity was decreased, the winter time heating load was increased by working harder to maintain a setback temperature. This is caused by the unoccupied space not having people, computers, and lighting present that in turn generates heat and reduces the demand for building heat. There is a tradeoff between saving electricity on the cooling and adding more cost to the heating fuel oil bills.

The existing programmable thermostats can be reprogrammed for one additional day included in the setback schedules. The programming effort is minimal. This analysis only examines the energy implications.

The heating and cooling system has an expected lifetime of 15 years, according to ASHRAE, and the estimated annual energy savings was 930 kWh of electricity and the additional requirement of 50 gallons of fuel oil. This provides a total energy savings of 13,940 kWh and a required additional 780 gallons of fuel oil to achieve the $800 lifetime projection.

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

ECM – 1 Setback – Modify Work Week Hours

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Oil	Total				
$	kW	kWh	gallons	$		$	Years	Years
300	0	900	(50)	100	1.85	NA	3.0	NA

*No incentive is available for this measure.

This measure is not recommended due to limited savings.

4.2 ECM-2 Install Piping Insulation

Several lengths of hot water piping in the domestic hot water system are uninsulated, which wastes heat, when hot water is required by the restroom or kitchen sinks, to the room. Exposed lengths of copper piping were observed in the first floor utility room and second floor ceiling plenum. All piping was tied directly into the 6 gallon hot water tanks. Installing insulation on exposed piping was evaluated.

The decrease in heat loss from insulating the exposed pipes is taken as energy savings. Implementation includes new fiberglass 1” insulation and overall service jackets to meet energy code.

Piping insulation has an expected lifetime of 15 years, according to ASHRAE, and the estimated annual energy savings was 7 gallons of fuel oil for a total energy savings of 105 gallons over the life of the project or $253.

This measure has less than a $100 savings and over 10 year payback and is, therefore, not recommended.

4.3 ECM-3 Replace Air-Cooled Condensing Units

The two compressors located outdoors are used to provide cooling to the forced air furnaces and are inefficient by today's standards. Energy savings can be realized by replacing the units with more energy efficient models.

The compressors are estimated to have an energy efficiency ratio EER of 7.0; the proposed compressors have an EER of 16. The difference in EER between existing and proposed are the energy savings.

The implementation includes the cost to replace the cooling coils in each furnace along with new refrigerant piping. The existing programmable thermostats can continue to control both new compressors.

The energy calculations determined that replacing the existing units with two new compressors would result in the annual savings of 1,600 kWh of electricity.

Compressors have an expected lifetime of 15 years, according to ASHRAE, and the estimated life time energy savings would be 24,100 kWh or a savings of $4,700

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

ECM – 3 Replace Air-Cooled Condensing Units

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Oil	Total				
$	kW	kWh	gallons	$		$	Years	Years
8,300	0	1,600	0	300	(0.43)	NA	>25	NA

*No Incentive is available through the New Jersey Smart Start Program.

This measure is not recommended.

4.4 ECM-4 Replace Furnaces

The two existing furnaces are reaching the end of their useful life. Both use #2 fuel oil to supply heat to the building. Conservation District personnel noted that natural gas may soon become available and requested an evaluation be conducted of more energy efficient furnaces. Newer natural gas condensing furnaces are more efficient and reliable. If implemented, fuel oil deliveries would no longer be required.

The existing fuel oil system furnaces are not the most efficient fuel oil furnaces available. Switching fuel sources would allow for a greater overall system efficiency than replacing fuel oil burning furnaces with newer fuel oil burning ones.
Based on the age of the furnaces, it is estimated that the existing furnaces had a thermal efficiency of 75%. New natural gas condensing furnaces at this size have an efficiency of about 92%. Sample cutsheets

of a new furnace are included in Appendix E. Using the amount of fuel oil burned by the furnaces over a 12 month period, annual energy savings by installing new gas-fired furnaces were calculated.

The calculations show that installing two new furnaces would result in the annual savings of 1,300 gallons of fuel oil and requiring a new natural gas demand of 1,500 therms. This measure is recommended for implementation when natural gas service becomes available. A rate of $1.39 per therm was used in the savings calculations based on information available from the NJ Bureau of Labor Statistics for natural gas costs in this area of New Jersey.

The furnaces have an expected lifetime of 15 years, according to ASHRAE, and the estimated annual energy savings was 1,300 gallons of oil for a total energy savings of 20,100 gallons of oil and the added requirement of 22,700 therms of natural gas. The lifetime benefit of the project is $48,500.

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

ECM – 4 Replace Furnaces

Budgetary Cost	Annual Utility Savings					ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Gas	#2 Oil	Total				
$	kW	kWh	therms	gallons	$		$	Years	Years
7,000	0	0	(1,500)	1,300	1,100	5.97	NA	6.4	NA

*No Incentive is available through the New Jersey Smart Start Program.

This measure is not recommended at this time, but is recommended when natural gas service becomes available.

4.5 ECM-5 Replace Exit Signs

It is proposed that existing incandescent exit signs be replaced with more energy efficient LED signs. Replacement of the signs in the lobby, stairway, and conference area with LED signs will result in electricity savings. The electric branch wiring circuits can be reused and implementation is a one-for-one swap out.

LED exit signs have an expected lifetime of 15 years, according to ASHRAE, and the estimated annual energy savings was 1,700 kWh for a total energy savings of 25,400 kWh over the life of the project or $3,800.

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

ECM – 5 Replace EXIT Signs

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Oil	Total				
$	kW	kWh	gallons	$		$	Years	Years
500	0	1,700	0	300	5.93	100	1.7	1.3

*Incentive is based on the New Jersey Smart Start Prescriptive Lighting Measures.

This measure is recommended.

4.6 ECM-6 Install Occupancy Sensors

It is proposed that a total of 17 occupancy sensors be installed in select rooms to turn lights off when the area is unoccupied. A lighting survey was conducted of all fixtures to determine the average time lights are presently on in each space. Occupancy sensors were not considered in mechanical areas and stairways due to safety concerns. Other areas were not considered due to the proposed location of the occupancy sensor. If a sensor does not have a clear view of the occupant's room or hallway, it may darken even with people in the space, creating an unsafe condition.

Occupancy sensors have an expected lifetime of 15 years, according to ASHRAE, and the estimated annual energy savings was 14,600 kWh for a total energy savings of 219,000 kWh over the life of the project or $38,800.

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

ECM – 6 Install Occupancy Sensors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Oil	Total				
$	kW	kWh	gallons	$		$	Years	Years
2,600	0	3,600	0	700	14.00	400	3.7	0.8

*Incentive is based on the New Jersey Smart Start Prescriptive Lighting Measures.

This measure is recommended.

4.7 Potential Incentives

Incentives are available for prescriptive measures for various types of equipment. Prescriptive measures are paid after installation and no energy savings verification will be required. There are incentives available for the occupancy sensors and the LED exit sign replacements discussed in this study.

Lighting energy reduction incentives were calculated utilizing the New Jersey SmartStart Building prescriptive lighting measures and incentive program. This program provides incentives dependent upon the existing fixture type and proposed lighting retrofit measure. Prescriptive lighting incentives were utilized for this report to show savings and incentives that would be received if only lighting implementation was selected.

There are no incentives available through the Pay-for-Performance program. See Appendix H for calculations.

5.0 ALTERNATIVE ENERGY EVALUATION

5.1 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. 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 the collection and transfer of this heat to and from the building possible.

The building has two forced air furnaces. To take advantage of a GHP system, a low temperature closed loop water source heat pump system would have to be installed to realize the benefit of the consistent temperature of the ground. This will also include removal of the existing heating and cooling systems. The new heat pump system would require new furnaces, heat exchangers, and a vertical closed loop ground heat exchanger.

This measure is not recommended due to high cost to replace existing systems to take advantage of geothermal heat transfer.

5.2 Solar

5.2.1 Photovoltaic (PV) Rooftop Solar Power Generation

The building was evaluated for potential to install rooftop photovoltaic (PV) solar panels for the purpose of power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electric current. This DC current is converted to alternating current (AC) with the use of an electrical device called an inverter. The roof of the building is pitched and does not have sufficient room to install a solar cell array.

This measure is not recommended due to the lack of building roof space to support the infrastructure required for a solar array.

5.2.2 Solar Thermal Domestic Hot Water Plant

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

A standard solar hot water system is typically composed of solar collectors, a 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, so as to maximize the amount of radiation collected on a yearly basis.

Although there are several options 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 building would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for domestic hot water production.

This measure is not recommended due to the lack of building roof space to support the infrastructure required for solar panels.

5.3 Wind

Wind energy is a form of solar energy created by the uneven heating of the earth's surface by the sun. Most small wind turbines use a horizontal axis propeller, or rotor, to capture the kinetic energy of the wind and convert it into rotary motion to drive a generator, which usually is designed specifically for the wind turbine. The rotor consists of two or three blades, usually made from wood or fiberglass. These materials give the turbine the needed strength and flexibility, and have the added advantage of not interfering with television signals. The structural backbone of the wind turbine is called the mainframe, and it includes the "slip-rings" that connect the wind turbine - which rotates as it points itself 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. As a rule of thumb, turbines should be mounted at least 30 feet above any structures or natural features within 300 feet of the installation. Smaller turbines can go on 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. Towers come in a variety of designs, including tubular or latticed, guyed or self-supporting. Wind turbine manufacturers also offer towers, and can ensure that the tower meets required building and safety specifications as well as being compatible with the turbine.

The NJCEP for small wind installations has assigned numerous pre-approved wind turbines for installation in the state New Jersey. Incentives for wind turbine installations are based on kilowatt hours saved in the first year. Systems size 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. These incentives can make a project like this very cost effective. Federal tax credits are also available for renewable energy projects up to 30% of insulation costs for systems less than 100 kW. The Conservation District does not pay Federal taxes, and therefore would not be able to utilize the Federal tax credit incentive.

The most important part of any small wind generation project is of course the mean annual wind speed at the height of which the turbine will be installed. There is no clear portion of the property to install a wind turbine. A wind resource map downloaded from the AWS Truewind Corporation indicates that that mean annual wind speed at 30 m in the Ocean County area is less than 10.1 miles per hour. Most small wind turbines become financially viable over 10 miles per hour of mean annual wind speed, therefore the ASW Truewind model indicates that installation of a wind turbine may not be applicable for this location.

This model was designed to give a good indication of wind speeds at applicable locations throughout the state.

An aerial satellite depiction of the Office Building and a wind resource map may be found in Appendix I.

This measure is not recommended due to not having a clear portion of property for the installation of a wind turbine. In addition, the low mean annual wind speed of the proposed location is unfavorable.

5.4 Combined Heat and Power Generation (CHP)

Combined heat and power (CHP) also known as "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 present time are sized approximately 50 kW and above, with numerous options in blocks grouped around 300 kW, 800 kW, 1,200 kW, and larger. Typically, CHP systems are used to produce a portion of the electricity needed by a facility some or all of the time, with the balance of electric needs satisfied by purchase from the grid.

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. The building has sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter, however thermal usage during the summer months is low. Thermal energy produced by the CHP plant in the warmer months will be wasted.

The most viable selection for a CHP plant at this location would be a reciprocating engine natural gas-fired unit. Presently, there is no natural gas available at the facility, and emission standards do not allow diesel fired CHP units to run continuously.

This measure is not recommended due not having natural gas at the present location and the limited use of summertime thermal production.

5.5 Biomass Power Generation

Biomass power generation is a process in which waste organic materials are used to produce electricity or thermal energy that otherwise would be sent to the landfill or expelled to the atmosphere. To participate in NJCEP's Customer On-Site Renewable Energy (CORE) 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- uses a 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
- NJDEP evaluates biomass resources not identified in the RPS

*From NJOCE website

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

This measure is not recommended due the Office Building not having a waste stream that can be utilized for the production electricity or thermal energy.

5.6 Demand Response Curtailment

Presently, electricity is delivered and supplied by JCP&L, which is the regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia including the State of New Jersey.

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

Presently the maximum summer electric demand is 9.0 kW. The facility will not be able to satisfy the Curtailment Service Provider required 100kW minimum; therefore this ECM is not recommended.

6.0 EPA PORTFOLIO MANAGER

The United State Energy Protection Agency (EPA) is a federal agency which leads the nation's environmental research and assessment efforts. The mission of the Environmental Protection Agency is to protect human health and the environment. The EPA has released an interactive energy management tool known as the EPA Portfolio Manager that allows building owners to track and assess energy and water consumption across their facility. This program is designed to allow property owners and managers to share, compare and improve upon their facility's energy consumption. Inputting such parameters at 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 utility information of electricity, fuel oil, and water consumption was entered into this tool; however, it does not assign an energy score unless the building's gross square footage is greater than 5,000 sq. ft. The building has a Source Energy Index of 119 kBTU/ft^2/year. Reducing energy loss associated with infiltration, equipment, and occupancy run hours will reduce this index.

A full EPA Energy Star Portfolio Manager Report is located in Appendix U. The user name and password for the building's Portfolio Manager account was provided to David Friedman, District Director, Ocean County Soil Conservation District.

7.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Ocean County Soil Conservation District office building in Forked River, New Jersey identified potential ECMs for exit sign replacement and occupancy sensors. Potential annual savings of $1,000 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM – 5 Replace Exit Signs

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Oil	Total	ROI			
$	kW	kWh	gallons	$		$	Years	Years
500	0	1,700	0	300	5.93	100	1.7	1.3

*Incentive is based on the New Jersey Smart Start Prescriptive Lighting Measures.

ECM – 6 Install Occupancy Sensors

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Oil	Total	ROI			
$	kW	kWh	gallons	$		$	Years	Years
2,600	0	3,600	0	700	14.00	400	3.7	0.8

*Incentive is based on the New Jersey Smart Start Prescriptive Lighting Measures.

The following ECMs are not recommended for implementation, but are included in the Conclusions & Recommendations at the request of the Conservation District:

ECM – 1 Setback – Modify Work Week Hours

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		#2 Oil	Total	ROI			
$	kW	kWh	gallons	$		$	Years	Years
300	0	900	(50)	100	1.85	NA	3.0	NA

*No incentive is available for this measure.

ECM – 4 Replace Furnaces

Budgetary Cost	Annual Utility Savings						Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Gas	#2 Oil	Total	ROI			
$	kW	kWh	therms	gallons	$		$	Years	Years
7,000	0	0	(1,500)	1,300	1,100	5.97	NA	6.4	NA

*No Incentive is available through the New Jersey Smart Start Program.

ECM-4 is recommended when natural gas service becomes available.

APPENDIX A

Utility Usage Analysis

New Jersey BPU Energy Audit Program
CHA #20435
Building: Ocean County Soil Conservation District Office Building

Account Number: 10 00 18 0933 3 4
Jersey Central Power and Lighting

Electricity						
Period	Supply kWH	Delivery KW	Cost ($)	Blended Rate ($/kWH)	Unit Cost ($/kWH)	Unit Cost ($/kW)
June-08	1,942	9.1	368.56	0.1898	0.1898	-
July-08	2,306	8.3	429.55	0.1863	0.1863	-
August-08	1,867	9.0	359.25	0.1924	0.1924	-
September-08	1,608	8.8	309.66	0.1926	0.1926	-
October-08	1,231	9.0	223.19	0.1813	0.1813	-
November-08	1,177	5.5	216.71	0.1841	0.1841	-
December-08	1,238	5.4	232.66	0.1879	0.1879	-
January-09	1,336	5.9	249.47	0.1867	0.1867	-
February-09	1,270	6.9	240.10	0.1891	0.1891	-
March-09	1,175	6.1	222.08	0.1890	0.1890	-
April-09	1,219	7.5	228.08	0.1871	0.1871	-
May-09	1,154	7.9	218.86	0.1897	0.1897	-
June-09	1,244	8.1	268.81	0.2161	0.2161	-
July-09	1,660	8.2	321.06	0.1934	0.1934	-
Total	20,427	9.1	$ 3,888	0.1903	0.0209	0.0000
Most Recent 12 months	16,179	9.0	$ 3,090	0.1910		-

Electricity											
Customer Charge	Energy Charge	Transmission Charge	Reconciliation Charge	Delivery Charge kWH	Delivery Charge kW	Non-Utility Gen. Chg	Societal Benefit	Transitional Assessment Charge	System Control Charge	RGGI Recovery Charge	Total
$3.25	$244.66	$9.85	-$5.73	$66.67	$0.00	$32.94	$11.08	$5.69	$0.15	$0.00	$368.56
$3.25	$293.46	$11.69	-$6.53	$68.48	$0.00	$39.11	$13.16	$6.75	$0.18	$0.00	$429.55
$3.25	$237.59	$9.47	-$5.29	$66.30	$0.00	$31.66	$10.65	$5.47	$0.15	$0.00	$359.25
$3.25	$204.63	$8.15	-$12.67	$65.01	$0.00	$27.27	$9.18	$4.71	$0.13	$0.00	$309.66
$3.25	$133.94	$6.53	-$10.69	$58.52	$0.00	$20.88	$7.06	$3.60	$0.10	$0.00	$223.19
$3.25	$128.06	$6.29	-$10.22	$58.25	$0.00	$19.96	$7.58	$3.45	$0.09	$0.00	$216.71
$3.25	$134.70	$6.62	-$3.16	$58.55	$0.00	$21.00	$7.98	$3.62	$0.10	$0.00	$232.66
$3.25	$145.36	$8.37	-$1.84	$59.04	$0.00	$22.66	$8.61	$3.91	$0.11	$0.00	$249.47
$3.25	$138.18	$8.17	-$1.75	$58.71	$0.00	$21.54	$8.18	$3.72	$0.10	$0.00	$240.10
$3.25	$127.84	$7.56	-$5.84	$58.24	$0.00	$19.93	$7.57	$3.44	$0.09	$0.00	$222.08
$3.25	$132.63	$7.84	-$6.40	$58.46	$0.00	$20.67	$7.86	$3.57	$0.10	$0.10	$228.08
$3.25	$125.56	$7.43	-$6.06	$58.13	$0.00	$19.57	$7.44	$3.38	$0.09	$0.07	$218.86
$3.25	$164.71	$8.39	-$6.25	$63.62	$0.00	$22.49	$8.54	$3.88	$0.10	$0.08	$268.81
$3.25	$205.86	$10.49	-$7.76	$65.27	$0.00	$28.15	$10.70	$4.86	$0.13	$0.11	$321.06
											$0.00
$45.50	$2,417.18	$116.85	-$90.19	$863.25	$0.00	$347.83	$125.59	$60.05	$1.62	$0.36	$3,888.04
$39.00	$1,879.06	$95.31	-$77.93	$728.10	$0.00	$275.78	$101.35	$47.61	$1.29	$0.36	$3,089.93

Account Number: 10 00 18 0932 3 5
Jersey Central Power and Lighting

Electricity						
Period	Supply kWH	Delivery KW	Cost ($)	Blended Rate ($/kWH)	Unit Cost ($/kWH)	Unit Cost ($/kW)
June-08	1,276	0.0	262.85	0.2060	0.2060	-
July-08	1,876	0.0	360.70	0.1923	0.1923	-
August-08	1,558	0.0	309.77	0.1988	0.1988	-
September-08	1,104	0.0	231.50	0.2097	0.2097	-
October-08	658	0.0	127.27	0.1934	0.1934	-
November-08	650	0.0	126.26	0.1942	0.1942	-
December-08	628	0.0	125.95	0.2006	0.2006	-
January-09	712	0.0	143.85	0.2020	0.2020	-
February-09	710	0.0	143.58	0.2022	0.2022	-
March-09	596	0.0	118.91	0.1995	0.1995	-
April-09	659	0.0	130.94	0.1987	0.1987	-
May-09	763	0.0	151.14	0.1981	0.1981	-
June-09	849	0.0	185.19	0.2181	0.2181	-
July-09	1,223	0.0	252.42	0.2064	0.2064	-
Total	13,262	0.0	$ 2,670	0.2014	#DIV/0!	#DIV/0!
Most Recent 12 months	10,110	0.0	$ 2,047	0.2025		-

Electricity											
Customer Charge	Energy Charge	Transmission Charge	Reconciliation Charge	Delivery Charge kWH	Delivery Charge kW	Non-Utility Gen. Chg	Societal Benefit	Transitional Assessment Charge	System Control Charge	RGGI Recovery Charge	Total
$3.25	$160.76	$6.47	-$3.76	$63.37	$0.00	$21.64	$7.28	$3.74	$0.10	$0.00	$262.85
$3.25	$238.74	$9.51	-$5.31	$66.34	$0.00	$31.82	$10.71	$5.49	$0.15	$0.00	$360.70
$3.25	$198.27	$7.90	-$4.41	$64.77	$0.00	$26.42	$8.89	$4.56	$0.12	$0.00	$309.77
$3.25	$140.49	$5.60	-$8.70	$62.52	$0.00	$18.72	$6.30	$3.23	$0.09	$0.00	$231.50
$3.25	$71.59	$3.48	-$5.71	$37.75	$0.00	$11.16	$3.77	$1.93	$0.05	$0.00	$127.27
$3.25	$70.72	$3.48	-$5.64	$37.29	$0.00	$11.02	$4.19	$1.90	$0.05	$0.00	$126.26
$3.25	$68.33	$3.36	-$1.61	$36.03	$0.00	$10.65	$4.05	$1.84	$0.05	$0.00	$125.95
$3.25	$77.47	$4.46	-$0.98	$40.84	$0.00	$12.08	$4.59	$2.08	$0.06	$0.00	$143.85
$3.25	$77.25	$4.57	-$0.98	$40.73	$0.00	$12.04	$4.58	$2.08	$0.06	$0.00	$143.58
$3.25	$64.85	$3.84	-$2.97	$34.19	$0.00	$10.11	$3.84	$1.75	$0.05	$0.00	$118.91
$3.25	$71.70	$4.24	-$3.46	$37.80	$0.00	$11.18	$4.25	$1.93	$0.05	$0.00	$130.94
$3.25	$83.02	$4.91	-$4.00	$43.77	$0.00	$12.94	$4.92	$2.23	$0.06	$0.04	$151.14
$3.25	$105.45	$5.37	-$4.00	$52.64	$0.00	$14.40	$5.47	$2.49	$0.07	$0.05	$185.19
$3.25	$151.67	$7.73	-$5.72	$63.11	$0.00	$20.74	$7.88	$3.58	$0.10	$0.08	$252.42
											$0.00
$45.50	$1,580.31	$74.92	-$57.25	$681.15	$0.00	$224.92	$80.72	$38.83	$1.06	$0.17	$2,670.33
$39.00	$1,180.81	$58.94	-$48.18	$551.44	$0.00	$171.46	$62.73	$29.60	$0.81	$0.17	$2,046.78

New Jersey BPU Energy Audit Program
CHA #20435
Building: Ocean County Soil Conservation District Office Building
Account Number: 10 00 18 0933 9 1
Jersey Central Power and Lighting

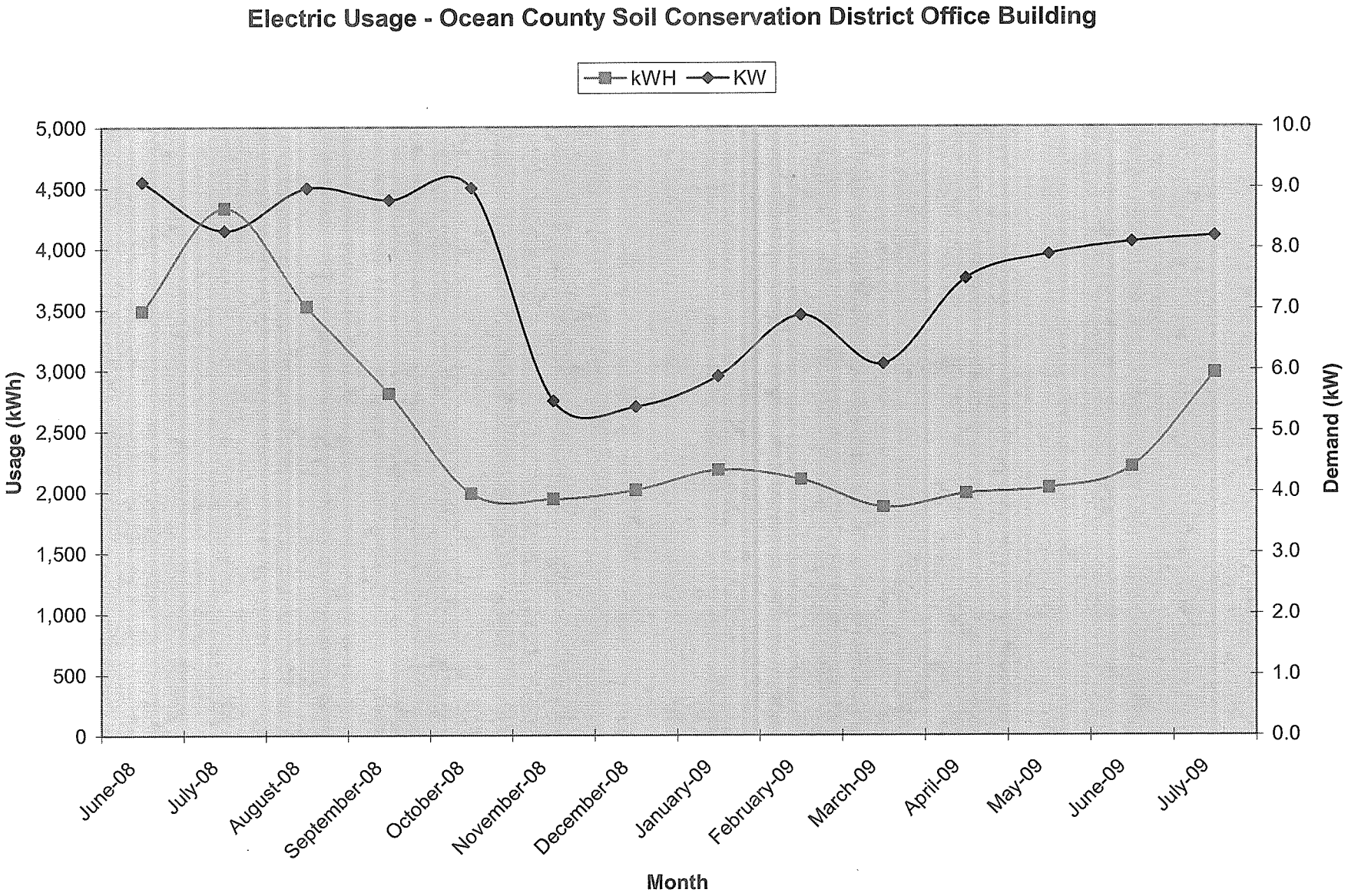
Electricity						
Period	Supply kWH	Delivery KW	Cost ($)	Blended Rate ($/kWH)	Unit Cost ($/kWH)	Unit Cost ($/kW)
June-08	268	0.0	61.10	0.2280	0.2280	-
July-08	152	0.0	36.26	0.2386	0.2386	-
August-08	101	0.0	25.18	0.2493	0.2493	-
September-08	98	0.0	24.04	0.2453	0.2453	-
October-08	98	0.0	21.73	0.2217	0.2217	-
November-08	115	0.0	25.02	0.2176	0.2176	-
December-08	149	0.0	32.37	0.2172	0.2172	-
January-09	129	0.0	28.73	0.2227	0.2227	-
February-09	122	0.0	27.37	0.2243	0.2243	-
March-09	102	0.0	23.05	0.2260	0.2260	-
April-09	108	0.0	24.18	0.2239	0.2239	-
May-09	113	0.0	25.16	0.2227	0.2227	-
June-09	113	0.0	27.48	0.2432	0.2432	-
July-09	92	0.0	22.95	0.2495	0.2495	-
Total	1,760	0.0	$ 405	0.2299	#DIV/0!	#DIV/0!
Most Recent 12 months	1,340	0.0	$ 307	0.2293		-

Electricity											
Customer Charge	Energy Charge	Transmission Charge	Reconciliation Charge	Delivery Charge kWH	Delivery Charge kW	Non-Utility Gen. Chg	Societal Benefit	Transitional Assessment Charge	System Control Charge	RGGI Recovery Charge	Total
$3.25	$33.78	$1.36	-$0.79	$16.62	$0.00	$4.55	$1.53	$0.78	$0.02	$0.00	$61.10
$3.25	$19.34	$0.77	-$0.43	$9.42	$0.00	$2.58	$0.87	$0.45	$0.01	$0.00	$36.26
$3.25	$12.85	$0.51	-$0.29	$6.26	$0.00	$1.71	$0.58	$0.30	$0.01	$0.00	$25.18
$3.25	$12.47	$0.50	-$0.78	$6.08	$0.00	$1.66	$0.56	$0.29	$0.01	$0.00	$24.04
$3.25	$10.66	$0.52	-$0.85	$5.62	$0.00	$1.66	$0.57	$0.29	$0.01	$0.00	$21.73
$3.25	$12.51	$0.62	-$1.00	$6.60	$0.00	$1.95	$0.74	$0.34	$0.01	$0.00	$25.02
$3.25	$16.21	$0.80	-$0.38	$8.55	$0.00	$2.53	$0.96	$0.44	$0.01	$0.00	$32.37
$3.25	$14.04	$0.81	-$0.18	$7.40	$0.00	$2.19	$0.83	$0.38	$0.01	$0.00	$28.73
$3.25	$13.27	$0.79	-$0.17	$7.00	$0.00	$2.07	$0.79	$0.36	$0.01	$0.00	$27.37
$3.25	$11.10	$0.66	-$0.51	$5.85	$0.00	$1.73	$0.66	$0.30	$0.01	$0.00	$23.05
$3.25	$11.75	$0.69	-$0.57	$6.20	$0.00	$1.83	$0.70	$0.32	$0.01	$0.00	$24.18
$3.25	$12.29	$0.73	-$0.59	$6.48	$0.00	$1.92	$0.73	$0.33	$0.01	$0.01	$25.16
$3.25	$14.04	$0.72	-$0.54	$7.01	$0.00	$1.92	$0.73	$0.33	$0.01	$0.01	$27.48
$3.25	$11.41	$0.58	-$0.43	$5.70	$0.00	$1.56	$0.59	$0.27	$0.01	$0.01	$22.95
											$0.00
$45.50	$205.72	$10.06	-$7.51	$104.79	$0.00	$29.86	$10.84	$5.18	$0.15	$0.03	$404.62
$39.00	$152.60	$7.93	-$6.29	$78.75	$0.00	$22.73	$8.44	$3.95	$0.12	$0.03	$307.26

Combined Electric Meters

Electricity						
Period	Supply kWH	Delivery KW	Cost ($)	Blended Rate ($/kWH)	Unit Cost ($/kWH)	Unit Cost ($/kW)
June-08	3,486	9.1	692.51	0.1987	0.1987	-
July-08	4,334	8.3	814.93	0.1880	0.1880	-
August-08	3,526	9.0	684.73	0.1942	0.1942	-
September-08	2,810	8.8	558.34	0.1987	0.1987	-
October-08	1,987	9.0	367.85	0.1851	0.1851	-
November-08	1,942	5.5	363.06	0.1870	0.1870	-
December-08	2,015	5.4	385.97	0.1915	0.1915	-
January-09	2,177	5.9	416.63	0.1914	0.1914	-
February-09	2,102	6.9	405.68	0.1930	0.1930	-
March-09	1,873	6.1	359.54	0.1920	0.1920	-
April-09	1,986	7.5	378.25	0.1905	0.1905	-
May-09	2,030	7.9	389.51	0.1919	0.1919	-
June-09	2,206	8.1	475.28	0.2154	0.2154	-
July-09	2,975	8.2	587.96	0.1976	0.1976	-
Total	35,449	9.1	$ 6,880	0.1941	0.0213	0.0000
Most Recent 12 months	27,629	9.0	$ 5,373	0.1945		-

Electricity											
Customer Charge	Energy Charge	Transmission Charge	Reconciliation Charge	Delivery Charge kWH	Delivery Charge kW	Non-Utility Gen. Chg	Societal Benefit	Transitional Assessment Charge	System Control Charge	RGGI Recovery Charge	Total
$9.75	$439.20	$17.68	-$10.28	$146.66	$0.00	$59.13	$19.89	$10.21	$0.27	$0.00	$692.51
$9.75	$551.54	$21.97	-$12.27	$144.24	$0.00	$73.51	$13.16	$12.69	$0.34	$0.00	$814.93
$9.75	$448.71	$17.88	-$9.99	$137.33	$0.00	$59.79	$10.65	$10.33	$0.28	$0.00	$684.73
$9.75	$357.59	$14.25	-$22.15	$133.61	$0.00	$47.65	$9.18	$8.23	$0.23	$0.00	$558.34
$9.75	$216.19	$10.53	-$17.25	$101.89	$0.00	$33.70	$7.06	$5.82	$0.16	$0.00	$367.85
$9.75	$211.29	$10.39	-$16.86	$102.14	$0.00	$32.93	$7.58	$5.69	$0.15	$0.00	$363.06
$9.75	$219.24	$10.78	-$5.15	$103.13	$0.00	$34.18	$7.98	$5.90	$0.16	$0.00	$385.97
$9.75	$236.87	$13.64	-$3.00	$107.28	$0.00	$36.93	$8.61	$6.37	$0.18	$0.00	$416.63
$9.75	$228.70	$13.53	-$2.90	$106.44	$0.00	$35.65	$8.18	$6.16	$0.17	$0.00	$405.68
$9.75	$203.79	$12.06	-$9.32	$98.28	$0.00	$31.77	$7.57	$5.49	$0.15	$0.00	$359.54
$9.75	$216.08	$12.77	-$10.43	$102.46	$0.00	$33.68	$7.86	$5.82	$0.16	$0.10	$378.25
$9.75	$220.87	$13.07	-$10.65	$108.38	$0.00	$34.43	$7.44	$5.94	$0.16	$0.12	$389.51
$9.75	$284.20	$14.48	-$10.79	$123.27	$0.00	$38.81	$8.54	$6.70	$0.18	$0.14	$475.28
$9.75	$368.94	$18.80	-$13.91	$134.08	$0.00	$50.45	$10.70	$8.71	$0.24	$0.20	$587.96
											$0.00
$136.50	$4,203.21	$201.83	-$154.95	$1,649.19	$0.00	$602.61	$134.40	$104.06	$2.83	$0.56	$6,880.24
$117.00	$3,212.47	$162.18	-$132.40	$1,358.29	$0.00	$469.97	$101.35	$81.16	$2.22	$0.56	$5,372.80

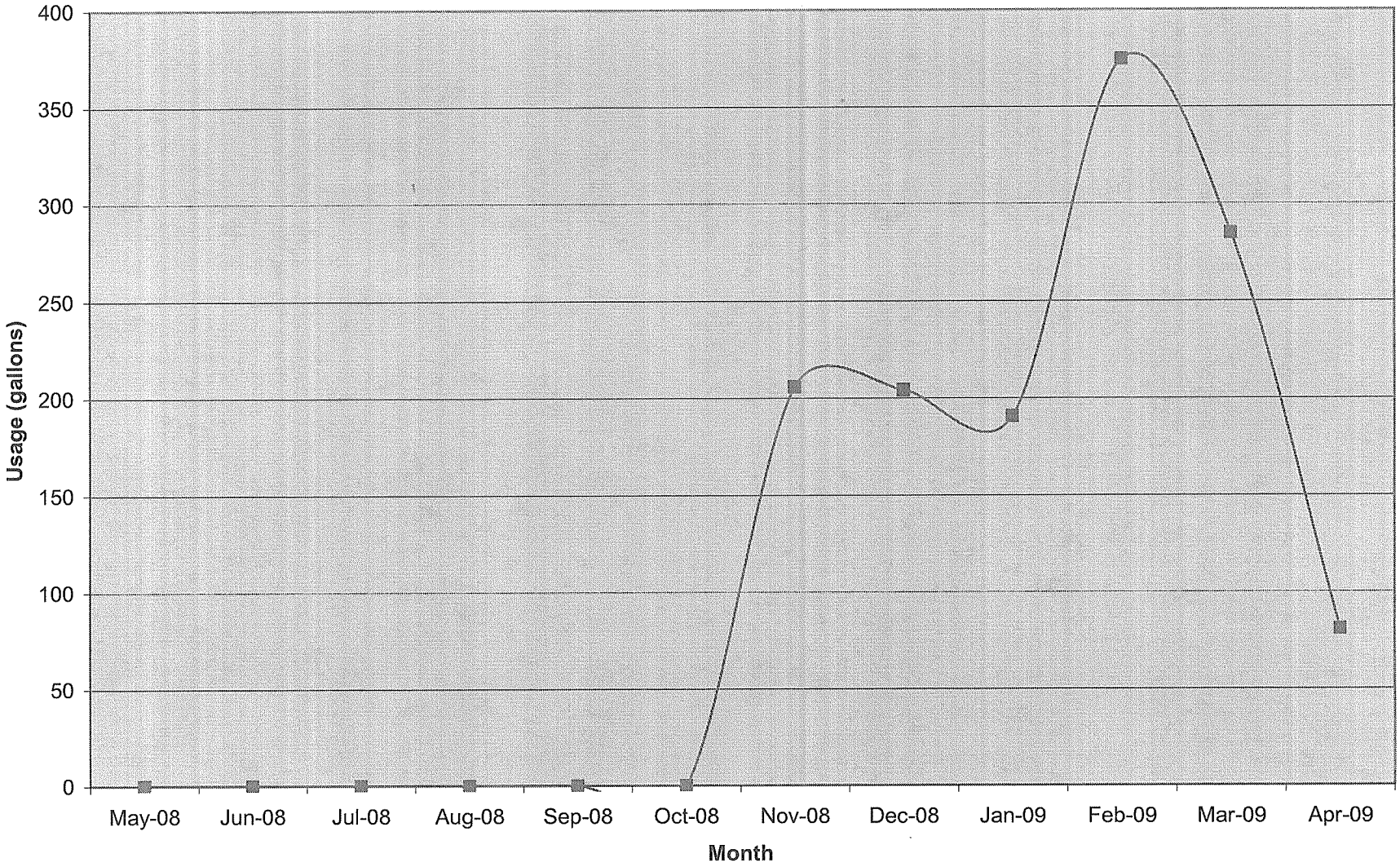

Electric Usage - Ocean County Soil Conservation District Office Building
kWH
KW
Usage (kWh)
Demand (kW)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
June-08
July-08
August-08
September-08
October-08
November-08
December-08
January-09
February-09
March-09
April-09
May-09
June-09
July-09
Month

New Jersey BPU Energy Audit Program
CHA #20435
Ocean County Soil Conservation District

#2 Fuel Oil

Date	Office Building Charge ($)	Gallons	$/gal
May-08	0	0	0.00
June-08	0	0	0.00
July-08	0	0	0.00
August-08	0	0	0.00
September-08	0	0	0.00
October-08	0	0	0.00
November-08	555	206	2.70
December-08	551	204	2.70
January-09	438	191	2.30
February-09	861	375	2.30
March-09	640	285	2.25
April-09	182	81	2.25
Total	$ 3,228	1,341	$2.41
Most Recent 12 months	$ 3,228	1,341	$2.41

Fuel Oil Usage - Ocean County Soil conservation District Office Building



New Jersey BPU Energy Audit Program
CHA #20435
Building: Ocean County Soil Conservation District Office Building

Account Number: 16009809 Meter Number: B 44643731
Provider: Lacey Municipal Utilities Authority
Service: Office Building - Water/Sewer Charges

Period	Meter Readings			Charges				Totals	Water Volume Cost (Vol $ / gal)	Water Blended Cost (TOTAL $ / gal)
	Present-Actual	Last-Actual	Gallons Used	Service	Consumption	Total Water Charges	Sewer Charges	TOTAL		
Jun-08	440000	433000	7000	$39.88	$30.94	$70.82	$85.27	$156.09	0.0044	0.0223
Sep-08	447000	440000	7000	$39.88	$30.94	$70.82	$85.27	$156.09	0.0044	0.0223
Dec-08	455000	447000	8000	$40.32	$35.36	$75.68	$86.20	$161.88	0.0044	0.0202
Mar-09	473000	455000	18000	$73.15	$123.25	$196.40	$93.16	$289.56	0.0068	0.0161
Total	---	---	40000	$193.23	$220.49	$413.72	$349.90	$763.62	---	---
Monthly Ave.	---	---	3333.3	$16.10	$18.37	$34.48	$29.16	$63.64	0.0050	0.0202

Notes:
1. Water/Sewer combined on bill.
2. Billing period is quarterly.

$/kgal:	20.23

APPENDIX B

ECM-1 Setback – Modify Work Week Hours

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-1 Setback - Modify Work Week

Existing Conditions:

Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Existing Cooling Energy kWh	Existing Heating Energy therms
3,129	5,631	8,118	1,979

Proposed Conditions:

Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Proposed Cooling Energy kWh	Proposed Heating Energy therms
2,661	6,099	7,188	2,051

Savings:

Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Existing Cooling Energy kWh	Existing Heating Energy therms
-468	468	929	-72

Notes:
1. This ECM evaluates changing occupied hours from a 5 day work week to a 4 day work week.
2. There is an existing setback programmed into both thermostats.
3. Analysis strictly pertains to energy savings. The lost value of employees not producing is not accounted for.

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-1 Setback - Modify Work Week

Building Footprint	4,258 SF	Occupied Clng Temp.	74 *F	Occupied Htg Temp.	68 *F
Heating Efficiency	75%	Unoccupied Clng Temp.	78 *F	Unoccupied Htg Temp.	64 *F
Cooling Efficiency	1.20 kW/ton	Occupied Cooling UA	(3,754) btu/hr/*F	Occupied Heating UA	1,057 btu/hr/*F
Internal Gains	58,305 btu/h	Unoccupied Cooling UA	(1,681) btu/hr/*F	Unoccupied Heating UA	1,057 btu/hr/*F
Unoc Internal Gain factor	0.03	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb		
Ave Occ Internal Gain Factor	0.7	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb		
Economizer available (Y/N)	No				

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

					EXISTING LOADS									
					Occupied			Unoccupied						
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Total Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Available Economizer Cooling kWh	Necessary Cooling Energy kWh	Existing Cooling Energy kWh	Existing Heating Energy therms
A		B	C	D	E	F	G	H	I	J	K	L	M	M
102.5	49.1	0	0	0	-106,996	-59,455	-40,813	-41,192	-49,735	-1,749	0	0	0	0
97.5	42.5	6	2	4	-88,225	-41,288	-40,813	-32,786	-34,538	-1,749	0	60	60	0
92.5	39.5	45	14	31	-69,453	-33,031	-40,813	-24,379	-27,631	-1,749	0	364	364	0
87.5	36.6	146	44	102	-50,682	-25,048	-40,813	-15,973	-20,953	-1,749	0	910	910	0
82.5	34.0	298	91	208	-31,911	-17,892	-40,813	-7,566	-14,967	-1,749	0	1,325	1,325	0
77.5	31.6	476	145	332	-13,140	-11,285	-40,813	0	0	-1,749	0	1,002	1,002	0
72.5	29.2	662	201	461	0	0	-40,813	0	0	-1,749	0	902	902	0
67.5	27.0	740	225	515	529	330	-40,813	0	0	-1,749	0	989	989	0
62.5	24.5	765	232	533	5,814	3,633	-40,813	1,586	829	-1,749	0	729	729	0
57.5	21.4	733	223	511	11,099	6,936	-40,813	6,871	3,592	-1,749	0	507	507	0
52.5	18.7	668	203	465	16,384	10,240	-40,813	12,156	6,355	-1,749	0	288	288	0
47.5	16.2	659	200	459	21,669	13,543	-40,813	17,441	9,118	-1,749	0	112	112	0
42.5	14.4	685	208	477	26,954	16,846	-40,813	22,726	11,881	-1,749	0	0	0	217
37.5	12.6	739	225	515	32,239	20,149	-40,813	28,011	14,644	-1,749	0	0	0	315
32.5	10.7	717	218	499	37,524	23,452	-40,813	33,296	17,407	-1,749	0	0	0	385
27.5	8.6	543	165	378	42,810	26,755	-40,813	38,581	20,170	-1,749	0	0	0	351
22.5	6.8	318	97	222	48,095	30,058	-40,813	43,867	22,933	-1,749	0	0	0	240
17.5	5.5	245	74	171	53,380	33,361	-40,813	49,152	25,697	-1,749	0	0	0	212
12.5	4.1	156	47	109	58,665	36,664	-40,813	54,437	28,460	-1,749	0	0	0	152
7.5	2.6	92	28	64	63,950	39,967	-40,813	59,722	31,223	-1,749	0	0	0	100
2.5	1.0	36	11	25	69,235	43,270	-40,813	65,007	33,986	-1,749	0	0	0	43
-2.5	0.0	19	6	13	74,520	46,573	-40,813	70,292	36,749	-1,749	0	0	0	25
-7.5	-1.5	8	2	6	79,805	49,876	-40,813	75,577	39,512	-1,749	0	0	0	11
TOTALS		8,760	2,661	6,099								7,188	7,188	2,051

Existing Building Ventilation & Infiltration (occ)	612 cfm
Overheat Ventilation Factor	1.00
Additional ventilation to offset overheat	0 cfm
Existing Building Ventilation & Infiltration (unocc)	512 cfm
Economizer Ventilation (from AHU's)	0 cfm

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-1 Setback - Modify Work Week

Multipliers	
Material:	0.99
Labor:	1.22
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Reprogram thermostats	2	ea	$ -	$ 100	$ -	$ -	$ 244	$ -	$ 244	per new setback schedule
			$ -		$ -	$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 244	Subtotal
$ 24.40	10% Contingency
$ 26.84	10% Contractor O&P
$ -	0% Engineering
$ 295	**Total**

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

Reconcile Thermal Model

Building Footprint	4,258 SF	Ex Occupied Clng Temp.	74 °F	Ex Occupied Htg Temp.	68 °F
Heating Efficiency	75%	Ex Unoccupied Clng Temp.	78 °F	Ex Unoccupied Htg Temp.	64 °F
Cooling Efficiency	1.20 kW/ton	Occupied Cooling UA	(3,754) btu/hr/°F	Occupied Heating UA	1,057 btu/hr/°F
Internal Gains	58,305 btu/h	Unoccupied Cooling UA	(1,681) btu/hr/°F	Unoccupied Heating UA	1,057 btu/hr/°F
Unoc Internal Gain factor	0.03	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb		
Ave Occ Internal Gain Factor	0.7	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb		
Economizer available (Y/N)	No				

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

					EXISTING LOADS									
					Occupied			Unoccupied						
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Total Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Available Economizer Cooling kWh	Necessary Cooling Energy kWh	Existing Cooling Energy kWh	Existing Heating Energy therms
A		B	C	D	E	F	G	H	I	J	K	L	M	M
102.5	49.1	0	0	0	-106,996	-59,455	-40,813	-41,192	-49,735	-1,749	0	0	0	0
97.5	42.5	6	2	4	-88,225	-41,288	-40,813	-32,786	-34,538	-1,749	0	63	63	0
92.5	39.5	45	16	29	-69,453	-33,031	-40,813	-24,379	-27,631	-1,749	0	386	386	0
87.5	36.6	146	52	94	-50,682	-25,048	-40,813	-15,973	-20,953	-1,749	0	971	971	0
82.5	34.0	298	106	192	-31,911	-17,892	-40,813	-7,566	-14,967	-1,749	0	1,430	1,430	0
77.5	31.6	476	170	306	-13,140	-11,285	-40,813	0	0	-1,749	0	1,163	1,163	0
72.5	29.2	662	237	426	0	0	-40,813	0	0	-1,749	0	1,040	1,040	0
67.5	27.0	740	264	476	529	330	-40,813	0	0	-1,749	0	1,140	1,140	0
62.5	24.5	765	273	492	5,814	3,633	-40,813	1,586	829	-1,749	0	857	857	0
57.5	21.4	733	262	471	11,099	6,936	-40,813	6,871	3,592	-1,749	0	597	597	0
52.5	18.7	668	239	430	16,384	10,240	-40,813	12,156	6,355	-1,749	0	339	339	0
47.5	16.2	659	235	424	21,669	13,543	-40,813	17,441	9,118	-1,749	0	132	132	0
42.5	14.4	685	245	441	26,954	16,846	-40,813	22,726	11,881	-1,749	0	0	0	203
37.5	12.6	739	264	475	32,239	20,149	-40,813	28,011	14,644	-1,749	0	0	0	300
32.5	10.7	717	256	461	37,524	23,452	-40,813	33,296	17,407	-1,749	0	0	0	370
27.5	8.6	543	194	349	42,810	26,755	-40,813	38,581	20,170	-1,749	0	0	0	340
22.5	6.8	318	114	205	48,095	30,058	-40,813	43,867	22,933	-1,749	0	0	0	234
17.5	5.5	245	88	158	53,380	33,361	-40,813	49,152	25,697	-1,749	0	0	0	207
12.5	4.1	156	56	100	58,665	36,664	-40,813	54,437	28,460	-1,749	0	0	0	149
7.5	2.6	92	33	59	63,950	39,967	-40,813	59,722	31,223	-1,749	0	0	0	98
2.5	1.0	36	13	23	69,235	43,270	-40,813	65,007	33,986	-1,749	0	0	0	42
-2.5	0.0	19	7	12	74,520	46,573	-40,813	70,292	36,749	-1,749	0	0	0	24
-7.5	-1.5	8	3	5	79,805	49,876	-40,813	75,577	39,512	-1,749	0	0	0	11
TOTALS		8,760	3,129	5,631								8,118	8,118	1,979

Existing Building Ventilation & Infiltration (occ)	612 cfm
Overheat Ventilation Factor	1.00
Additional ventilation to offset overheat	0 cfm
Existing Building Ventilation & Infiltration (unocc)	512 cfm
Economizer Ventilation (from AHU's)	0 cfm

Energy Use Indices (calculated)

	Base Case
Heating	1,979
Target ->	1,877
	105.4%

	Base Case
Cooling	8,118
Target ->	300
	2705.9%

HEAT GAIN/LOSS WORKSHEET

Project Name:	NJBPU Energy Audit	**Project No.:**	CHA #20435		
Location		**Site Elevation:**	460 Feet	**Specific Volume**	14.00 CF/#
Building Name	Ocean County Soil Conservation District Office Bui	**Date:**	08/04/09		
Engineer:	Dennis Gonzalez				

Building/Facility Designation OCSCD Office Building

Outdoor Winter Design DB Temperature	-1 *F	**Indoor Winter Design DB Temperature**	68 *F
Outdoor Summer Design DB Temperature	90 *F	**Indoor Summer Design DB Temperature**	74 *F
Outdoor Summer Design WB Temperature	73 *F	**Indoor Summer Design WB Temperature**	60 *F
Outdoor Summer Humidity Ratio	0.0121 #/#	**Indoor Air (70*F) Humidity Ratio**	0.0079 #/#

ENVELOPE DESCRIPTIONS (Descriptions are from Interior to Exterior)

Walls (Select One - Type X)

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

Roofs (Select One)

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

Windows (Select One)

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

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

BUILDING CHARACTERISTICS

Roof Area	2,300 SF		
Occupied Area	4,258 SF	**Return Plenum?**	n

	Gross Wall Length	Average Wall Height	Ceiling Height	Window Area	Door Area	Net Wall Area
North Exposure	55 Ft	24.0 Ft	24.0 Ft	218 SF	0 SF	1,109 SF
East Exposure	42 Ft	24.0 Ft	24.0 Ft	182 SF	21 SF	813 SF
South Exposure	55 Ft	24.0 Ft	24.0 Ft	202 SF	0 SF	1,126 SF
West Exposure	42 Ft	24.0 Ft	24.0 Ft	165 SF	21 SF	829 SF

Forced Ventilation 100 cfm

HEAT GAIN/LOSS WORKSHEET

Project Name:	NJBPU Energy Audit	Project No.:	CHA #20435		
Location		Site Elevation:	460 Feet	Specific Volume	14.00 CF/#
Building Name	Ocean County Soil Conservation District Office Bui	Date:	08/04/09		
Engineer:	Dennis Gonzalez				

Building/Facility Designation: OCSCD Office Building

COOLING HEAT GAINS TO THE ROOM - SENSIBLE

SOLAR GAINS

WINDOWS	AREA (SF)	SHGF	Shade Coef	Cooling Load Factor		Solar Heat Gain
North Exposure	218	38 btu/h/sf	0.8	0.75	Glass Type C	4,980 Btu/hr
East Exposure	182	216 btu/h/sf	0.8	0.31	Glass Type C	9,723 Btu/hr
South Exposure	202	109 btu/h/sf	0.8	0.58	Glass Type C	10,196 Btu/hr
West Exposure	165	216 btu/h/sf	0.8	0.29	Glass Type C	8,268 Btu/hr
						33,167 Btu/h

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain
North Exposure	1,109	0.13	20 *F	1.0	2,861 Btu/hr
East Exposure	813	0.13	39 *F	1.0	4,089 Btu/hr
South Exposure	1,126	0.13	27 *F	1.0	3,920 Btu/hr
West Exposure	829	0.13	22 *F	1.0	2,353 Btu/hr
Roof	2,300	0.04	73 *F	1.0	7,388 Btu/hr
Fenestration	767	0.50	16 *F		6,132 Btu/hr
Doors	42	0.14	27 *F		158 Btu/hr
Ceiling	4,258	0.14	0 *F		0 Btu/hr
Partition		0.05	0 *F		0 Btu/hr
Floor	4,258	0.04	0 *F		0 Btu/hr
					26,901 Btu/h

INTERNAL HEAT GAINS

							Room Heat Gain
Lights	1.50 w/sf x	4,258 Occ Area =	6.4 kW x 3.4x	1.0 RAF =			21,799 Btu/h
Plug Load	0.75 w/sf x	4,258 Occ Area =	3.2 kW x 3.4x	1.0 RAF =			10,899 Btu/h
People	15 people x	255 btu/person x	27% time in space =				1,033 Btu/h
Computer Work Stations		35 Units x	120 W/Unit x	3414 =			14,335 Btu/h
Equipment	3.0 kW x 3.413 =						10,239 Btu/h
Misc.							0 Btu/h
							58,305 Btu/h

VENTILATION AND INFILTRATION

		Infiltration Factor	Perimeter Ratio	Coef	Temp. Diff.	Room Heat Gain
Walls	3,876 SF	0.10 CFM/SF		1.04	16 *F	6,992 Btu/h
Doors	42 SF	0.15 CFM/LF	0.95 LF/SF	1.04	16 *F	108 Btu/h
Windows	767 SF	0.15 CFM/LF	1.03 LF/SF	1.04	16 *F	2,129 Btu/h
Ventilation	100 cfm			1.04	16 *F	1,804 Btu/h
						11,033 Btu/h

COOLING HEAT GAINS TO THE RA PLENUM - SENSIBLE

4,950

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain
North Exposure	0	0.13	20	1.0	0 Btu/hr
East Exposure	0	0.13	39	1.0	0 Btu/hr
South Exposure	0	0.13	27	1.0	0 Btu/hr
West Exposure	0	0.13	22	1.0	0 Btu/hr
Roof	2,300	0.04	73	0.0	0 Btu/hr
					0 Btu/h

INTERNAL HEAT GAINS

Lights	1.50 w/sf x	4,258 Occ Area =	6.4 kW x3413x	0.00 RAF =	0 Btu/h
Misc.					0 Btu/h
					0 Btu/h

SENSIBLE HEAT GAINS - TEMP. DEPENDENT		SENSIBLE HEAT GAINS - TEMP. INDEPENDENT	
Solar	33,167	Internal Gains to Room	58,305
Conduction to Room	26,901	Internal Gains to Plenum	0
Conduction to Plenum	0		
Ventilaton and Infiltration	11,033		
Sub Total	71,101	Sub Total	58,305

HEAT GAIN/LOSS WORKSHEET

Project Name:	NJBPU Energy Audit	Project No.:	CHA #20435		
Location		Site Elevation:	460 Feet	Specific Volume	14.00 CF/#
Building Name	Ocean County Soil Conservation District Office Buil	Date:	08/04/09		
Engineer:	Dennis Gonzalez				

Building/Facility Designation: OCSCD Office Building

LATENT COOLING LOADS

Infiltration

		Infiltration Factor	Air Density	Humidity Ratio Dif.	Room Heat Gain
Walls	2,300 SF	0.10 CFM/SF	4,629	0.0042 ##/#	4,517 Btu/h
Doors	42 SF	0.15 CFM/LF	4,629	0.0042 ##/#	118 Btu/h
Windows	767 SF	0.15 CFM/LF	4,629	0.0042 ##/#	2,318 Btu/h
Ventilation	100 cfm		4,629	0.0042 ##/#	1,964 Btu/h
People	15 people	0.27 time in space		250 Btu/hr/person	1,013 Btu/h
					9,929 Btu/h

Cooling Load Summary

	Sensible	Latent	Total	
Temperature Dependent Gains	71,101	9,929	81,030	
Temperature Indep. Gains	58,305		58,305	SHR= 0.93
Total	129,405	9,929	139,335	

Building Cooling Load: 11.6 Tons at 367 SF/Ton

Building Air Flow to Condition Space based on a 12*F Temp Rise is: 10,331 CFM; 2.43 CFM/sf

HEATING CALCULATION

CONDUCTION

	NET AREA (SF)	U-VALUE	Heating Load Temp. Dif.	Room Heat Gain
North Exposure	1,109	0.13	69	9,869 Btu/h
East Exposure	813	0.13	69	7,234 Btu/h
South Exposure	1,126	0.13	69	10,019 Btu/h
West Exposure	829	0.13	69	7,381 Btu/h
Fenestration	767	0.50	69	26,444 Btu/h
Roof	2,300	0.04	69	6,983 Btu/h
Doors	42	0.14	69	405 Btu/h
Ceiling	4,258	0.14	0	0 Btu/h
Partition	0	0.05	0	0 Btu/h
Floor	2,300	0.04	50	4,600 Btu/h

Ventilation and Infiltration

		Infiltration Factor	Coef	Temp. Difference	Air Flow	Room Heat Gain
Walls	3,876 SF	0.10 CFM/SF	1.04	69	388 cfm	27,918 Btu/h
Doors	42 SF	0.15 CFM/LF	1.04	69	6 cfm	432 Btu/h
Windows	767 SF	0.15 CFM/LF	1.04	69	118 cfm	8,502 Btu/h
Ventilation Load	100 cfm		1.04	69	100 cfm	7,778 Btu/h
Total Ventilation & Infiltration Load					612 cfm	44,631 Btu/h

Building Heating Load: 117,566 btu/h

27.6 btu/sf

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	0.0	0.0	0	0.0	0.0
	0.0	0.0	0	0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	0.0	0.0
East	3.0	7.0	1	21.0	20.0
				0.0	0.0
				0.0	0.0
			Sub-total	21.0	20.0
South	0.0	0.0	0	0.0	0.0
	0.0	0.0	0	0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	0.0	0.0
West	3.0	7.0	1	21.0	20.0
				0.0	0.0
			Sub-total	21.0	20.0
			Total	**42.0**	**40.0**

LF/SF
0.95

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet		
North	55.3	24.0	1	1327.2	158.6		All wall quantities must remain equal to 1
	0.0	0.0	0	0.0	0.0		
	0.0	0.0	0	0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	55.3			1327.2	158.6	24.0	Average height wall automatically linked
East	42.3	24.0	1	1015.2	132.6		
	0.0	0.0	0	0.0	0.0		
	0.0	0.0	0	0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	42.3			1015.2	132.6	24.0	Average height wall automatically linked
South	55.3	24.0	1	1327.2	158.6		
	0.0	0.0	0	0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	55.3			1327.2	158.6	24.0	Average height wall automatically linked
West	42.3	24.0	1	1015.2	132.6		
	0.0	0.0	0	0.0	0.0		
	0.0	0.0	0	0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	42.3			1015.2	132.6	24.0	Average height auto linked to block load sheet

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	3.0	5.6	13	218.4	223.6
	0.0	0.0	0	0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	218.4	223.6
East	3.0	5.5	11	181.5	187.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	181.5	187.0
South	3.0	5.6	12	201.6	206.4
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	201.6	206.4
West	3.0	5.5	10	165.0	170.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	165.0	170.0
					LF/SF
			Total	**766.5**	**787.0** 1.03

APPENDIX C

ECM-2 Install Piping Insulation

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-2 Pipe Insulation

Description Insulate heating system piping which are not currently insulated to reduce heat loss from piping and heat gain to the spaces.

Given

		Pipe #1	Pipe #2	Pipe #3	Pipe #4	
Fuel Energy Cost	=				$ 2.41	$/gal (Fuel Oil #2)
Operation (Hours/Week)	=				45	Hours/Week
Operation (Heating Weeks/Year)	=				28	Weeks/Year
Operation (Hours/Year)	=				1260	Hours/Year
Heating Media	=				Water	
Piping Material	=				Copper	
Ambient Temperature	=				68	°F
Pipe Diameter	=	3/4 .00	1/2	4 .0	2 .00	inches
Pipe Length	=	10.00	40.00	0.00	0.00	feet

Assumption

		Pipe #1	Pipe #2	Pipe #3	Pipe #4	
Min. Pipe Insulation Recommended	=	1.00	1.00	1.50	1.00	inches
Circulating Temperature	=				120	°F
Heating Efficiency	=				75%	
Pipe Insulation Conductivity	=				0.29	Btu*in./(h*ft2*F)

Formula

Piping Correction Factor = (Current Transmission Coefficient / Reference Transmission Coefficient)
Temperature Correction Factor = (Circulating Temperature - Ambient Temperature) / (Circulating Temperature - Reference Temperature)
Hourly Heat Loss per pipe size and length = (Heat loss per foot [from chart]) x (Piping Correction Factor) x (Temperature Correction Factor) x (Pipe Length)
Seasonal Heat Loss = (Hourly Heat Loss Total) x (Operating hours) / (Heating Efficiency) / (1,000 btu/Mbtu)

Energy Loss = (Seasonal Heat Loss) / (Conversion Factor [MBtu/Unit])
Energy Loss Cost = (Energy Loss) x (cost/unit)

Calculation

Existing

Piping Correction Factor = (Current Transmission Coefficient 2.25 / Reference Transmission Coefficient 2.00) = **1.13**

Temperature Correction Factor = (Circulating Temp. 120 - Ambient Temp. 68) / (Circulating Temp. 120 - Reference Temp. 80) = **1.30**

	Heat Loss per foot	Piping CF	Temperature CF	Pipe Length		
Heat Loss Pipe #1 (Hourly)	= (19.85) x (	1.13) x (	1.30) x (	10.00) =	290	Btuh
Heat Loss Pipe #2 (Hourly)	= (14.85) x (	1.13) x (	1.30) x (	40.00) =	869	Btuh
Heat Loss Pipe #3 (Hourly)	= (76.95) x (	1.13) x (	1.30) x (	0.00) =	-	Btuh
Heat Loss Pipe #4 (Hourly)	= (42.93) x (	1.13) x (	1.30) x (	0.00) =	-	Btuh
					1,159	**Btuh**

Seasonal Heat Loss = Hourly Heat Loss 1,159) x (operating Hours 1,260) / (Heating Efficiency 75%) / (Factor 1,000) = **1,947 Mbtu**

Existing Energy Loss = (Seasonal Heat Loss 1,947) / (Btu/unit 139) = **14 gallons**

Existing Energy Loss Cost = (Unit 14) x (Cost per Unit $ 2.41) = **$ 34**

New

	Heat Loss per foot	Piping CF	Temperature CF	Pipe Length		
Heat Loss Pipe #1 (Hourly)	= (8.50) x (	1.13) x (	1.30) x (	10.00) =	124	Btuh
Heat Loss Pipe #2 (Hourly)	= (7.45) x (	1.13) x (	1.30) x (	40.00) =	436	Btuh
Heat Loss Pipe #3 (Hourly)	= (16.00) x (	1.13) x (	1.30) x (	0.00) =	-	Btuh
Heat Loss Pipe #4 (Hourly)	= (13.00) x (	1.13) x (	1.30) x (	0.00) =	-	Btuh
					560	**Btuh**

Seasonal Heat Loss = Hourly Heat Loss 560) x (operating Hours 1,260) / (Heating Efficiency 75%) / (Factor 1,000) = **941 Mbtu**

New Energy Loss = (Seasonal Heat Loss 941) / (Btu/unit 139) = **7 gallons**

New Energy Loss Cost = (Unit 7) x (Cost per Unit $ 2.41) = **$ 16**

Result

Existing Heat Loss		**14 gallons**	**$**	**34**	
New Heat Loss		**7 gallons**	**$**	**16**	
Savings	**100%**	**7 gallons**	**$**	**17**	**51.7%**

Comment

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-2 Pipe Insulation

Multipliers	
Material:	0.99
Labor:	1.22
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
3/4" fiberglass w/ jacket	40	lf	$ 0.97	$ 2.45	$ -	$ 38	$ 120	$ -	$ 158	1" wall size
1/2" fiberglass w/ jacket	10	lf	$ 0.89	$ 2.34	$ -	$ 9	$ 29	$ -	$ 37	1" wall size
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 195	Subtotal
$ 20	10% Contingency
$ 21	10% Contractor O&P
$ -	Engineering
$ 236	**Total**

APPENDIX D

ECM-3 Replace Air-cooled Condensing Units

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-3 Replace Air-cooled Condensing Units
(Reuse existing furnaces but replace condensers & cooling coil)

ASSUMPTIONS			Comments
Electric Cost	$0.195	/ kWh	
Average run hours per Week	65	Hours	Automatic control during occupied hours and setback during unoccupied hours
Space Balance Point	55	F	
Space Temperature Setpoint	76	deg F	setpoint
Avg. BTU / Hr Rating of existing AC unit	48,000	Btu / Hr	typical size of 4 ton condenser
Average EER	7.0		Units appear to average 25+ years old

Item	Value	Units	Comments
Total Number of Units	2		
Existing Annual Electric Usage	2,860	kWh	
Proposed EER	16.0		Trane XL15i 4 ton condenser
Proposed Annual Electric Usage	1,251	kWh	Unit will cycle on w/ temp of room. Possible operating time shown below

ANNUAL SAVINGS		
Annual Savings	1,609	kWh
Annual Cost Savings	$313	

OAT - DB Bin Temp F	Annual Hours	Cooling Hrs at Temp Above balance point	Assumed % of time of operation	Assumed hrs of Operation
102.5	0	0	100%	0
97.5	6	2	89%	2
92.5	45	17	79%	14
87.5	146	57	68%	39
82.5	298	115	58%	67
77.5	476	184	47%	87
72.5	662	0	0%	0
67.5	740	0	0%	0
62.5	765	0	0%	0
57.5	733	0	0%	0
52.5	668	0	0%	0
47.5	659	0	0%	0
42.5	685	0	0%	0
37.5	739	0	0%	0
32.5	717	0	0%	0
27.5	543	0	0%	0
22.5	318	0	0%	0
17.5	245	0	0%	0
12.5	156	0	0%	0
7.5	92	0	0%	0
2.5	36	0	0%	0
-2.5	19	0	0%	0
-7.5	8	0	0%	0
Total	8,760	376	55%	209

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-3 Replace Air-cooled Condensing Units

Multipliers	
Material:	1.10
Labor:	1.35
Equipment:	1.10

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
4 ton, 16 EER, air cooled cond.	2	Ea	$ 1,175	$ 690		$ 2,585	$ 1,863	$ -	$ 4,448	
4 ton cooling coil for furnace	2	Ea	$ 296	$ 194		$ 651	$ 524	$ -	$ 1,175	
Electrical disc/reconnect	4	Ea		$ 75		$ -	$ 405	$ -	$ 405	
Demolition	4	Ea		$ 60		$ -	$ 324	$ -	$ 324	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 6,352	Subtotal
	30% Contingency
$ 953	15% Contractor O&P
$ 953	20% Engineering
$ 8,258	**Total**

APPENDIX E

ECM-4 Replace Furnaces

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

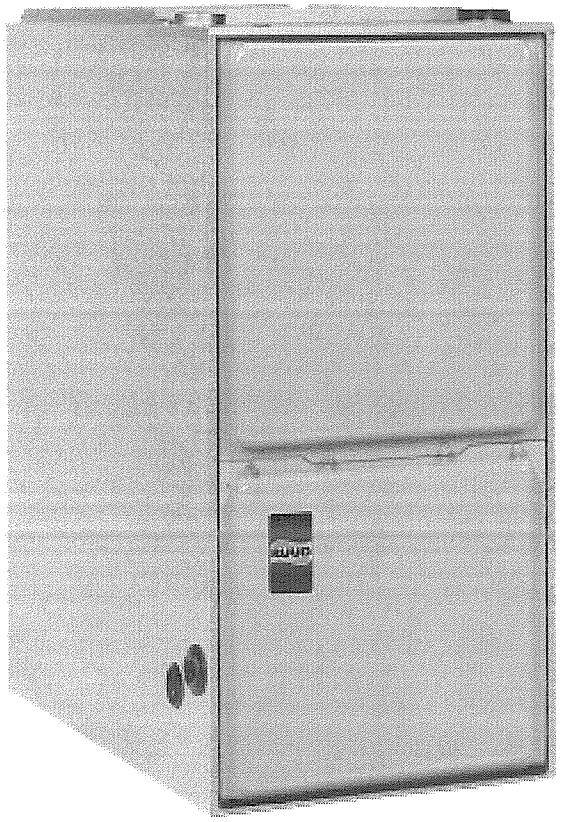
ECM-4 Furnace Replacement

Existing Fuel	#2 Oil
Proposed Fuel	Nat.Gas

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 2.41		
Proposed Fuel Cost	$ 1.39		
Baseline Fuel Use	1,341	Gals #2	Based on historical utility data
Existing Boiler Plant Efficiency	75%		Estimated or Measured
Baseline Boiler Load	139,498	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 138.7 Mbtu/Gals #2
Baseline Fuel Cost	$ 3,232		
Proposed Boiler Plant Efficiency	92%		New Boiler Efficiency
Proposed Fuel Use	1,516	Therms	Baseline Boiler Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Fuel Cost	$ 2,108		
Annual Savings	1,341	Gals #2	
	(1,516)	Therms	
Annual Savings	**$ 1,124**	**/yr**	

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

FORM NO. G22-498 REV. 2
Supersedes Form No. G22-498 Rev. 1



90 HIGH EFFICIENCY DOWNFLOW/ HORIZONTAL GAS FURNACES

The Ruud Value Series 90 High Efficiency line of downflow/horizontal gas furnaces are designed for utility rooms, closets, alcoves, attics or crawl spaces. The 90TS is shipped in the downflow configuration and is easily converted for horizontal **left-hand** airflow applications.

The design is certified by CSA.

Features

- Low profile "34 inch" design is lighter and easier to handle and leaves room for optional accessories.
- Top electrical connections, left or right gas and condensate drainage connections on downflow models.
- Condensate drain for horizontal application provided standard.
- Integrated control board manages all operational functions and provides hookups for an electronic air cleaner.
- A slow-opening gas valve and a specially designed inducer system make it one of the quietest furnaces on the market today.
- Galvanized steel cabinet.
- Optional indoor or outdoor combustion air.
- Control board diagnostics.

A variety of cooling coils and plenums designed to use with the Ruud Value Series 90 gas furnaces are available as optional accessories for air conditioning models.

†A.F.U.E. (Annual Fuel Utilization Efficiency) calculated in accordance with Department of Energy test procedures.

90TS- SERIES

Models with Input Rates from 45,000 to 120,000 BTU/HR [13.19 to 35.17 kW]

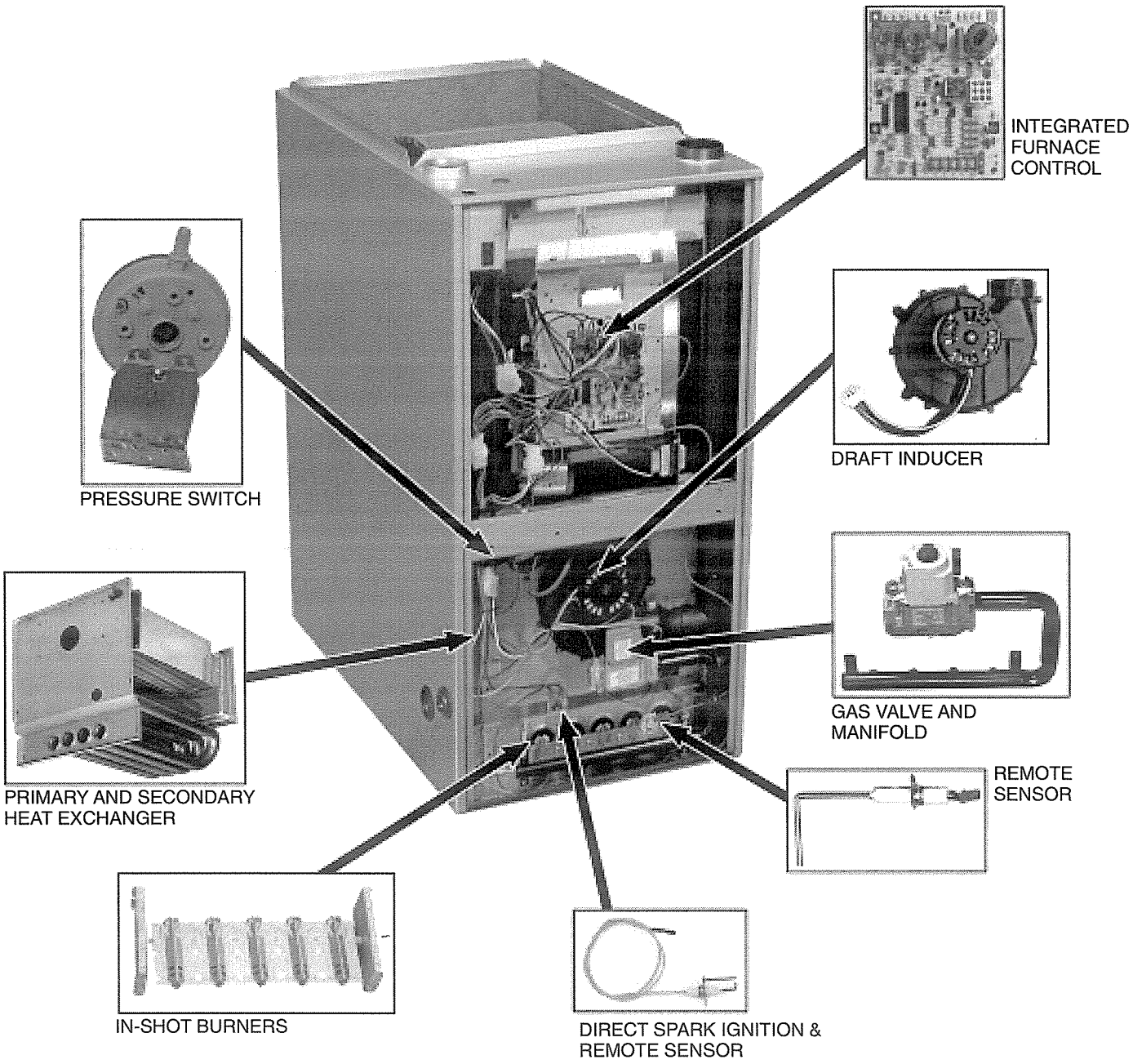
(All Models 90% A.F.U.E.† or Above)

ISO 9001:2000
Certificate Number: 30164

ENERGY STAR PARTNER

member gama

90 HIGH EFFICIENCY DOWNFLOW/HORIZONTAL GAS FURNACE



STANDARD EQUIPMENT

Completely assembled and wired; heat exchanger; primary: 409 stainless steel, secondary: 29-4C stainless steel; induced draft; pressure switch; redundant main gas control; blower compartment door safety switch; solid state time on/off blower control; limit controls; manual shut-off valve; 100% safety lock out; cool fan off delay; field selectable heat fan off delay; one hour automatic retry; self-test diagnostics; control diagnostics; electronic air cleaner connections; pressure regulator for natural and L.P. (propane) gases; transformer; direct drive, multi-speed blower motor.
(Please note: a thermostat is not included as standard equipment.)

OPTIONAL EQUIPMENT

(See Accessory Page)

All models can be converted by a qualified distributor or local service dealer to use L.P. (propane) gas without changing burners. Factory approved kits must be used to convert from natural to L.P. (propane) gas and may be ordered as optional accessories from a parts distributor.

For L.P. (propane) operation, refer to Conversion Kit Index Form.

WARNING

THIS FURNACE IS NOT APPROVED OR RECOMMENDED FOR USE IN MOBILE HOMES

BEFORE PURCHASING THIS APPLIANCE, READ IMPORTANT ENERGY COST AND EFFICIENCY INFORMATION AVAILABLE FROM YOUR RETAILER.

PHYSICAL DATA AND SPECIFICATIONS
DOWNFLOW/HORIZONTAL MODELS U.S. and Canadian Models

MODEL NUMBERS 90TS- SERIES	04EES**	06EES**	07EES**	07EFS**	09EJS**	09EGS**	10EGS**	12EHS**
INPUT-BTU/HR [kW] ①	45,000 [13.19]	60,000 [17.58]	75,000 [21.98]	75,000 [21.98]	90,000 [26.37]	90,000 [26.37]	105,000 [30.77]	120,000 [35.17]
HEATING CAPACITY BTU/HR [kW]	42,000 [12.31]	56,000 [16.41]	70,000 [20.51]	70,000 [20.51]	84,000 [24.61]	84,000 [24.61]	97,000 [28.43]	113,000 [33.12]
HIGH ALTITUDE INPUT [kW] ②	40,500 [11.87]	54,000 [15.83]	67,500 [19.78]	67,500 [19.78]	81,000 [23.73]	81,000 [23.73]	94,500 [27.70]	108,000 [31.65]
HIGH ALTITUDE OUTPUT CAPACITY [kW] ②	37,800 [11.07]	50,400 [14.77]	63,000 [18.46]	63,000 [18.46]	76,000 [22.27]	76,000 [22.27]	87,500 [25.64]	100,000 [29.31]
BLOWER (D x W) [mm]	11 x 7 [279 x 178]	11 x 7 [279 x 178]	11 x 7 [279 x 178]	12 x 7 [305 x 178]	12 x 11 [305 x 279]	12 x 11 [305 x 279]	12 x 11 [305 x 279]	11 x 10 [279 x 254]
MOTOR H.P. [W] SPEEDS-TYPE	1/2 [373] 4-PSC	1/2 [373] 3-PSC	1/2 [373] 3-PSC	3/4 [559] 3-PSC	1/2 [373] 3-PSC	3/4 [559] 3-PSC	3/4 [559] 3-PSC	3/4 [559] 3-PSC
MOTOR FULL LOAD AMPS	6.8	6.8	6.8	9.5	8.0	9.5	9.5	9.5
HEATING SPEED	Med-Low	Low	Med	Low	Med	Low	Low	Low
COOLING SPEED	High	High	High	High	High	High	High	High
HEAT EXT. STATIC PRESSURE (IN. W.C.) [kPA]	.10 [.025]	.12 [.029]	.12 [.029]	.12 [.029]	.15 [.037]	.15 [.037]	.20 [.049]	.20 [.049]
RATED EXT. STATIC PRESSURE (IN. W.C.) [kPA]	.50 [.12]	.50 [.12]	.50 [.12]	.50 [.12]	.50 [.12]	.50 [.12]	.50 [.12]	.50 [.12]
HEATING C.F.M. @ .2" W.C. E.S.P. [L/s]	890 [420]	885 [418]	1060 [500]	1275 [602]	1400 [661]	1400 [661]	1425 [673]	1565 [739]
COOLING C.F.M. @ .5" W.C. E.S.P. [L/s]	1220 [576]	1180 [557]	1150 [543]	1625 [767]	1570 [740]	1850 [873]	1820 [859]	2040 [963]
TEMPERATURE RISE RANGE °F [°C]	30-60 [16.7-33.3]	40-70 [22.2-38.9]	45-75 [25-41.7]	35-65 [19.4-36.1]	35-65 [19.4-36.1]	35-65 [19.4-36.1]	50-80 [27.8-44.4]	50-80 [27.8-44.4]
STANDARD FILTER [mm]	(2) 12" x 20" [305 x 508]	(2) 12" x 20" [305 x 508]	(2) 12" x 20" [305 x 508]	(2) 12" x 20" [305 x 508]	(2) 12" x 20" [305 x 508]	(2) 12" x 20" [305 x 508]	(2) 12" x 20" [305 x 508]	(2) 14" x 20" [609 x 508]
APPROX. SHIPPING WEIGHT (LBS.) [kG]	111 [50.3]	117 [53.1]	123 [55.8]	123 [55.8]	148 [67.1]	148 [67.1]	152 [68.9]	160 [72.6]
AFUE ③	92.0%	92.4%	92.0%	92.3%	92.4%	92.4%	92.0%	92.1%
CALIFORNIA SEASONAL EFFICIENCY ③	84.35%	86.46%	89.96%	85.00%	86.40%	86.40%	87.02%	87.37%

NOTES: All models are 115V, 60HZ, 1Ø. Gas connection size for all models is 1/2" [13 mm] N.P.T.
① See Conversion Kit Index Form for high altitude derate.
② Canadian installations only.
③ In accordance with D.O.E. test procedures.

MODEL IDENTIFICATION

90	T	S	04E	E	S	01
Efficiency	T = Downflow/ Horizontal Condensing	Design Series S = 3rd Design Series	Heating Input Designation	Blower Designation [mm]	Fuel Designation	Ruud Value Series

Heating Input Designation

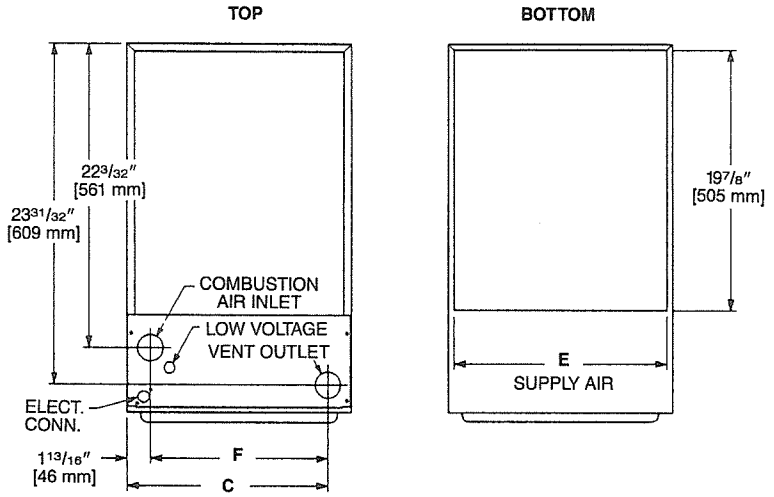
Electric Ignition	Input BTU/HR [kW]
04E	45,000 [13.1]
06E	60,000 [17.6]
09E	75,000 [21.9]
07E	90,000 [26.4]
10E	105,000 [30.7]
12E	120,000 [35.2]

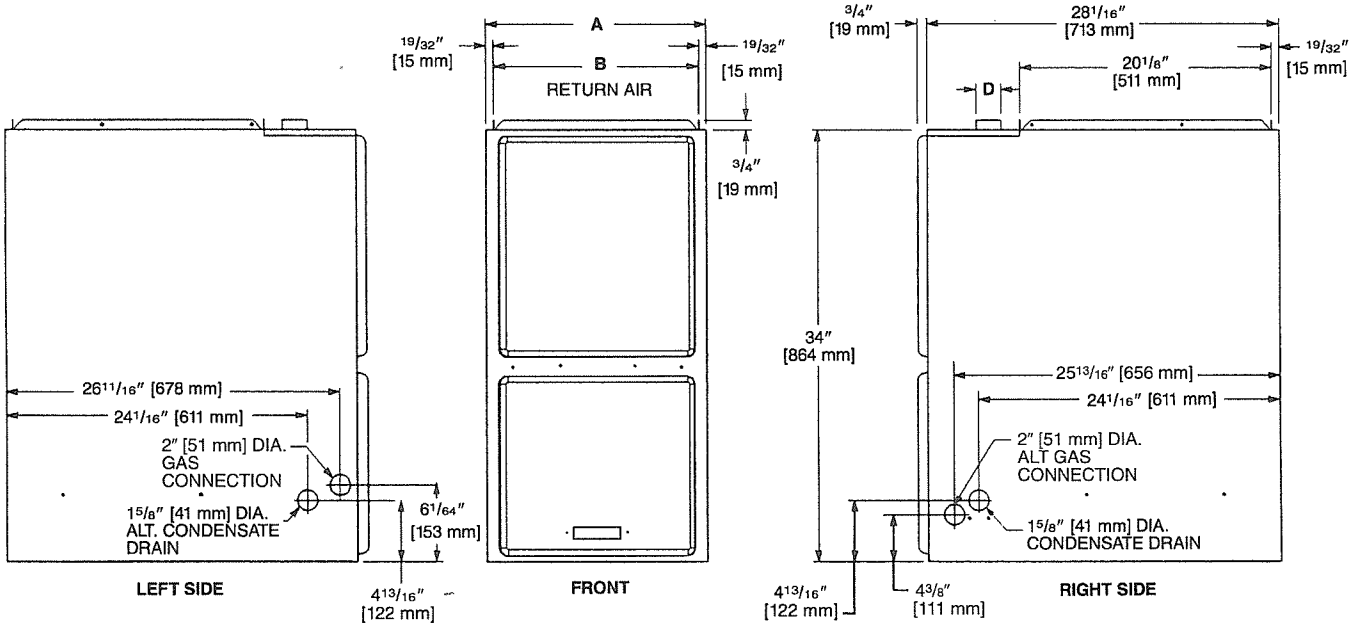
Blower Designation [mm]
E = Standard Cabinet 11 x 7 [279 x 178] 1/2 H.P. PSC
F = Wide Cabinet 12 x 7 [305 x 178] 3/4 H.P. PSC
G = Standard Cabinet 12 x 11 [305 x 279] 3/4 H.P. PSC
H = Standard Cabinet 11 x 10 [279 x 254] 3/4 H.P. PSC
J = Standard Cabinet 12 x 11 [305 x 279] 1/2 H.P. PSC

Fuel Designation
S = Natural Gas - CSA - United States & Canada (North American)

[ ] Designates Metric Conversions

DOWNFLOW MODELS



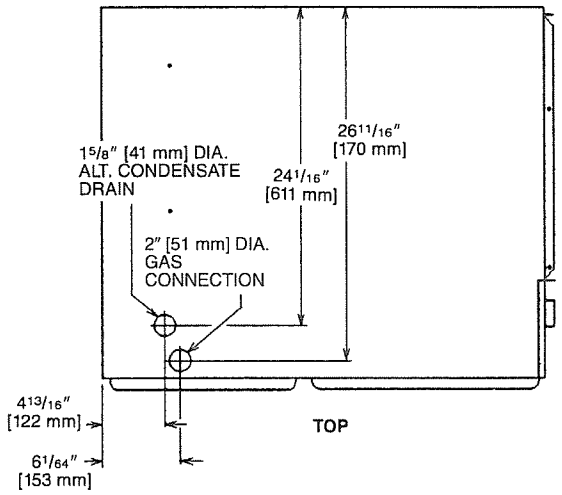


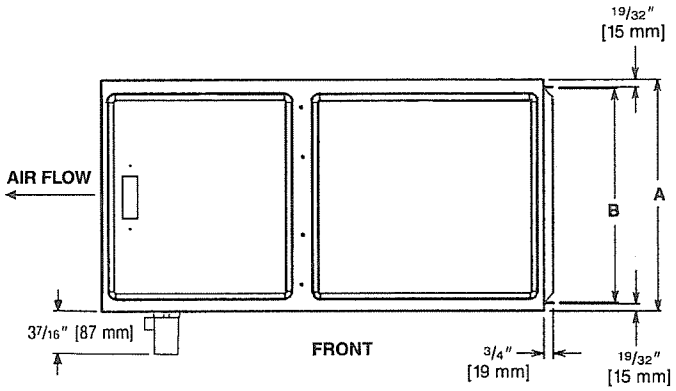
MODEL 90TS-	A	B	C	D	E	F	LEFT SIDE	MINIMUM CLEARANCE (IN.) [mm]					SHIP WGTS. [kg]
								RIGHT SIDE	BACK	TOP	FRONT	VENT	
04	17 1/2 [445]	16 11/32 [415]	15 5/8 [397]	2 [51]	16 5/8 [422]	13 7/8 [352]	0	0	0	1 [25]	2 [51]	0	111 [50]
06	17 1/2 [445]	16 11/32 [415]	15 5/8 [397]	2 [51]	16 5/8 [422]	13 7/8 [352]	0	0	0	1 [25]	2 [51]	0	117 [53]
07EE	17 1/2 [445]	16 11/32 [415]	15 5/8 [397]	2 [51]	16 5/8 [422]	13 7/8 [352]	0	0	0	1 [25]	2 [51]	0	123 [56]
07EF	21 [533]	19 27/32 [504]	19 3/16 [486]	2 [51]	20 1/8 [511]	17 3/8 [441]	0	0	0	1 [25]	2 [51]	0	123 [56]
09	21 [533]	19 27/32 [504]	19 3/16 [486]	2 [51]	20 1/8 [511]	17 3/8 [441]	0	0	0	1 [25]	2 [51]	0	148 [67]
10	21 [533]	19 27/32 [504]	19 3/16 [486]	2 [51]	20 1/8 [511]	17 3/8 [441]	0	0	0	1 [25]	2 [51]	0	152 [69]
12	24 1/2 [622]	23 11/32 [593]	22 5/8 [575]	2 [51]	23 5/8 [600]	20 7/8 [530]	0	0	0	1 [25]	2 [51]	0	160 [73]

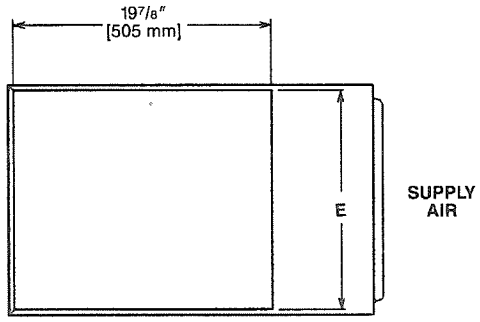
IMPORTANT NOTE: Horizontal furnace maybe installed for horizontal left hand air supply **ONLY**. The condensate trap provided for horizontal application must be installed in the field beneath the unit as directed in the furnace Installation & Operating Instructions.

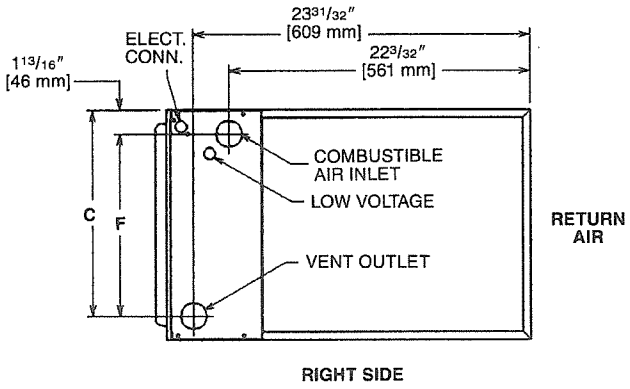
[ ] Designates Metric Conversions

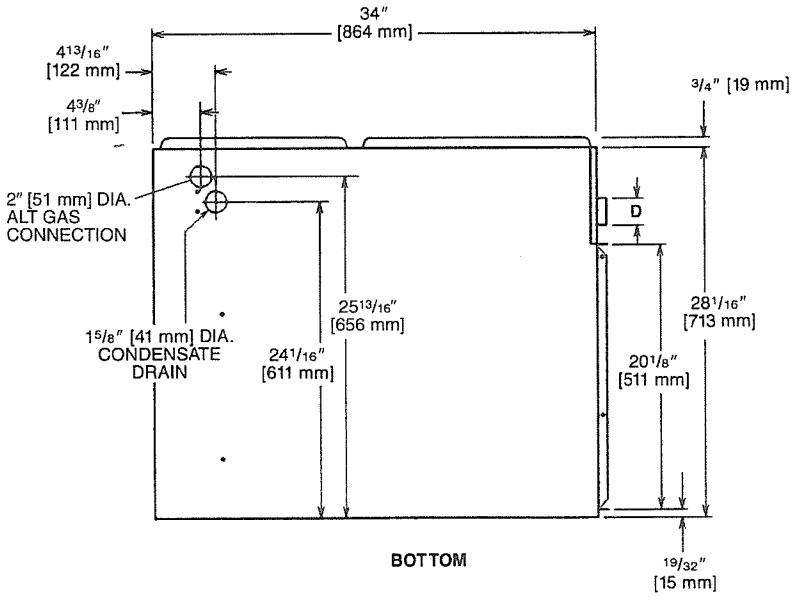
HORIZONTAL MODELS











IMPORTANT NOTE: Horizontal furnace may be installed for horizontal left hand air supply **ONLY.** The condensate trap provided for horizontal application must be installed in the field beneath the unit as directed in the furnace Installation & Operating Instructions.

[ ] Designates Metric Conversions

BLOWER PERFORMANCE DATA—90TS MODELS

MODEL 90TS-	BLOWER SIZE IN. [mm]	MOTOR H.P. [W]	BLOWER SPEED	CFM [L/s] AIR DELIVERY EXTERNAL STATIC PRESSURE INCHES WATER COLUMN [kPa]						
				0.1 [.02]	0.2 [.05]	0.3 [.07]	0.4 [.10]	0.5 [.12]	0.6 [.15]	0.7 [.17]
04EES**	11 x 7 [279 x 178]	1/2 [373]	LOW	820 [387]	790 [373]	760 [359]	725 [342]	690 [326]	650 [306]	610 [288]
			MED-LO	**930 [439]**	**890 [420]**	**850 [401]**	**815 [384]**	**785 [370]**	**750 [354]**	**720 [340]**
			MED-HI	1150 [543]	1120 [528]	1090 [514]	1045 [493]	1002 [473]	950 [448]	900 [425]
			HIGH	1414 [667]	1365 [644]	1320 [622]	1270 [599]	1220 [576]	1165 [550]	1115 [526]
06EES**	11 x 7 [279 x 178]	1/2 [373]	**LOW**	**910 [429]**	**885 [418]**	**860 [406]**	**815 [384]**	**770 [363]**	**725 [342]**	**680 [321]**
			MED	1115 [526]	1080 [510]	1045 [493]	1005 [474]	965 [455]	920 [434]	875 [413]
			HIGH	1365 [644]	1315 [620]	1270 [600]	1225 [578]	1180 [557]	1125 [491]	1070 [505]
07EES**	11 x 7 [279 x 178]	1/2 [373]	LOW	890 [420]	860 [406]	835 [394]	790 [373]	750 [354]	705 [332]	660 [311]
			MED	**1100 [519]**	**1060 [500]**	**1025 [484]**	**980 [462]**	**940 [443]**	**890 [420]**	**845 [399]**
			HIGH	1340 [632]	1295 [611]	1250 [590]	1200 [566]	1150 [543]	1090 [514]	1025 [484]
07EFS**	12 x 7 [305 x 178]	3/4 [559]	**LOW**	**1405 [668]**	**1375 [649]**	**1350 [637]**	**1310 [618]**	**1270 [599]**	**1235 [583]**	**1195 [564]**
			MED	1595 [753]	1560 [736]	1525 [720]	1480 [698]	1440 [679]	1380 [651]	1325 [625]
			HIGH	1835 [866]	1780 [840]	1730 [816]	1675 [791]	1625 [767]	1555 [734]	1480 [698]
09EJS**	12 x 11 [305 x 279]	1/2 [373]	LOW	1155 [545]	1125 [531]	1100 [519]	1080 [510]	1060 [500]	1000 [472]	940 [443]
			MED	**1420 [670]**	**1400 [661]**	**1380 [651]**	**1365 [644]**	**1350 [637]**	**1260 [594]**	**1175 [554]**
			HIGH	1605 [757]	1575 [743]	1550 [732]	1560 [736]	1570 [740]	1480 [698]	1395 [656]
09EGS**	12 x 11 [305 x 279]	3/4 [559]	**LOW**	**1420 [670]**	**1400 [661]**	**1380 [651]**	**1365 [644]**	**1350 [637]**	**1260 [594]**	**1175 [554]**
			MED	1605 [757]	1575 [743]	1550 [732]	1560 [736]	1570 [740]	1480 [698]	1395 [656]
			HIGH	2005 [946]	1965 [927]	1930 [910]	1890 [892]	1850 [873]	1765 [833]	1680 [793]
10EGS**	12 x 11 [305 x 279]	3/4 [559]	**LOW**	**1460 [689]**	**1425 [672]**	**1390 [656]**	**1375 [649]**	**1360 [642]**	**1280 [604]**	**1200 [566]**
			MED	1680 [793]	1645 [776]	1615 [762]	1585 [748]	1560 [736]	1490 [703]	1420 [670]
			HIGH	2055 [970]	2000 [944]	1940 [915]	1880 [887]	1820 [859]	1745 [823]	1675 [790]
12EHS**	11 x 10 [279 x 245]	3/4 [559]	**LOW**	**1590 [750]**	**1565 [738]**	**1540 [727]**	**1505 [710]**	**1475 [696]**	**1425 [672]**	**1375 [649]**
			MED	1840 [868]	1820 [860]	1800 [850]	1750 [826]	1700 [802]	1645 [776]	1590 [750]
			HIGH	2315 [1093]	2250 [1062]	2185 [1031]	2110 [996]	2040 [963]	1965 [927]	1890 [892]

NOTE: Recommended blower speeds are in bold.

[ ] Designates Metric Conversions

GENERAL TERMS OF LIMITED WARRANTY

ICECO[SM] will furnish a replacement for any part of this product which fails in normal use and service within the applicable period stated, in accordance with the terms of the limited warranty.

For Complete Details of the Limited Warranty, Including Applicable Terms and Conditions, See Your Local Installer or Contact the Manufacturer for a Copy.

Gas Heat Exchanger Limited Warranty .....Twenty (20) Years
*Any Other Part.....Five (5) Years

***This five year limited warranty is applicable only to single-phase products installed in residential applications on or after January 1, 2001.**

ACCESSORIES—DOWNFLOW

VENT TERMINATION KITS CONCENTRIC: Horizontal/Vertical = RXGY-E03

HORIZONTAL TWO PIPE: RXGY-D02, RXGY-D03, RXGY-D04

CONDENSATE PUMP KIT: RXGY-B01

NEUTRALIZER KIT: RXGY-A01

FOSSIL FUEL KIT: RXPF-F01, RXPF-F02 (TVA)

PLENUM DATA FOR "A" COILS

Plenum adapters are required in some applications when plenum and furnace size do not match.

FURNACE WIDTH IN. [mm]	PLENUM WIDTH IN. [mm]	PLENUM ADAPTER DOWNFLOW	COIL PLENUM
17½ [445]	16¼ [413]	RXAA-C186	RXAL-B16BU
17½ [445]	20¼ [514]	RXAA-C173	RXAL-B20BU
17½ [445]	21⅝ [549]	RXAA-C187	RXAL-B21BU
17½ [445]	25¼ [641]	RXAA-C174	RXAL-B25BU
21 [533]	25¼ [641]	RXAA-C175	RXAL-B25BU
21 [533]	22¼ [565]	RXAA-C176	RXAL-B22BU
21 [533]	21⅝ [549]	RXAA-C188	RXAL-B21BU
24½ [622]	25¼ [641]	RXAA-C177	RXAL-B25BU
24½ [622]	21⅝ [549]	RXAA-C187	RXAL-B21BU

COMBUSTIBLE FLOOR BASE: RXGC-B17, RXGC-B21, RXGC-B24

EXTERNAL TOP MOUNT FILTER RACK: RXGF-CC

INTERNAL FILTER RACK FOR AIR RETURN DUCT: RXGF-DB*

Each order contains (1) one box of 10 filter racks supplied without filters.

*Filters available through PROSTOCK®.

FILTER RACK FILTER SIZES® INCHES [mm]	
MODEL 90TS-	RXGF-CC
04	(2) 12 x 20 [305 x 508]
06	(2) 12 x 20 [305 x 508]
07	(2) 12 x 20 [305 x 508]
09	(2) 12 x 20 [305 x 508]
10	(2) 12 x 20 [305 x 508]
12	(2) 14 x 20 [305 x 508]

*Filter racks are shipped without filters.

RXGP-F03

TWINNING KIT—is for use with Ruud Value Series Gas Furnaces for parallel operation requirements.

FOR HIGH ALTITUDES:

*HIGH ALTITUDE KIT:
F04-105 KBTU/H
F06-45/60/90 KBTU/H
F05-120 KBTU/H
F07-75 KBTU/H

***For installations over 5000 ft.**

OPTION CODE FOR HIGH ALTITUDE: U.S. & Canada – 278

NOTE: High altitude kits and options do **NOT** include additional burner orifices. If a burner orifice change is necessary, they must be ordered through PROSTOCK®. See Installation Instructions for more information.

Option – 278 furnaces are shipped with #51 DMS orifices installed. This is one drill size smaller than standard furnaces to account for expected average elevations and heating values typically seen in these areas.

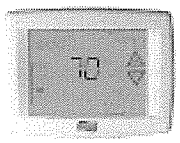
CAUTION: Always follow National Fuel Gas Code (NFGC) guidelines when converting furnaces for high altitudes.

For all installations above 2000 ft. (including all option – 278 models), the burner orifice size needs to be recalculated and verified. A burner orifice change may still be required. See Installation Instructions for more information.

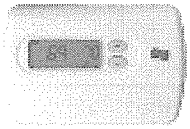
NOTE: For Canadian installations only, an optional derate (manifold gas pressure reduction) method may be used to adjust the furnace for altitude. See Installation Instructions for more information. This optional method may **NOT** be used for U.S. installations.

[ ] Designates Metric Conversions

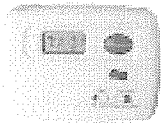
THERMOSTATS



300-Series *
Deluxe Programmable



200-Series *
Programmable



100-Series *
Non-Programmable

400-Series *
Special Applications/Programmable

Brand / Unique Model Number Prefix		Descriptor (3 Characters)	Series (3 Characters)	System (2 Characters)	Type (2 Characters)
UHC	-	TST	101	GE	MS
UHC=Ruud		TST=Thermostat	100=Non-Programmable 200=Programmable 300=Deluxe Programmable 400=Special Applications/ Programmable	GE=Gas/Oil/Electric HP=Heat Pump MD=Modulating Furnace DF=Dual Fuel UN=Universal AC/HP/GE	SS=Single-Stage MS=Multi-Stage

** Photos are representative. Actual models may vary.*

For detailed thermostat match-up information, see specification sheet form number T22-001.

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-4 Furnance Replacment

Multipliers	
Material:	0.99
Labor:	1.22
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Gas furnace, upflow, 150 MBH, 1200 CFM	2	Ea	$ 855	$ 217		$ 1,693	$ 529	$ -	$ 2,222	
Elec disc/reconnect	6	Ea		$ 75		$ -	$ 549	$ -	$ 549	
Demolition	8	Ea		$ 60		$ -	$ 586	$ -	$ 586	
Fuel piping, 1" steel, schedule 40	40	LF	$ 3	$ 6		$ 137	$ 315	$ -	$ 452	
Flue, 6" 304 SS liner, 1400 F rating	16	LF	$ 47	$ 11		$ 744	$ 222	$ -	$ 966	
Cooling coil	2	Ea	$ 237	$ 207		$ 469	$ 505	$ -	$ 974	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 5,750	Subtotal
$ 575	10% Contingency
$ 632	Contractor 10% O&P
$ -	Engineering
$ 6,957	**Total**

APPENDIX F

ECM-5 Replace EXIT Signs

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-5 Replace EXIT signs with LED type

Analysis

Referenced Data

Demand Rate	$ -	/kW
Supply Electrical Rate	$ 0.195	/kWh

Inputs

	Material	Labor
Demolition	$ -	$ 5
New Sign Install	$ 85	$ 10

Contingency	10% of Sub-Total
Contractor O&P	12% of Sub-Total
Engineering	0% of Sub-Total
Replacement Power	1.7 watts/sign

Sign Type	Wattage Per Side	Sides	Quantity
A	60	1	0
B	65	1	0
C	50	1	4

Results

Utility Savings	Electrical	1,692 kWh
	Demand	0.2 kW
	Steam	- klbs
Savings		**$330**
Implementation Cost		**$549**
Simple Payback (Yrs)		**1.7**

Calculations

Current Power Consumption = [(60 W/side x 1 side x 0 signs) + (65 W/side x 1 side x 0 signs) + (50 W/side x 1 side x 4 sign)] x 8,760 hrs/yr

= 0.2 kW x 8,760 hrs/yr

= 1,752 kWh

Proposed Power Consumption = (1.7 W/sign x 4 signs) x 8,760 hrs/yr

= 0. kW x 8,760 hrs/yr

= 60 kWh

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-5 Replace EXIT signs with LED type

Multipliers	
Material:	0.99
Labor:	1.22
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Demolition	4	Ea	$ -	$ 5		$ -	$ 24	$ -	$ 24	
New Sign Install	4	Ea	$ 85	$ 10		$ 337	$ 49	$ -	$ 385	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 410	Subtotal
$ 41	10% Contingency
$ 49	12% Contractor O&P
$ 49	0% Engineering
$ 549	**Total**

APPENDIX G

ECM-6 Install Occupancy Sensors

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

ECM-6 Use of motion sensors for interior lighting

Building Schedule:
Existing conditions (master switch): hrs/week
Retrofit conditions (motion sensors): hrs/week

Cost of Electricity: 0.195 $/kWh

Instructions and notes:
Input all applicable fixture codes from Light Table. In retrofit conditions indicate "Yes" if motion sensor is applicable
Use weekly hours if all fixtures on this sheet can be retrofitted with motion sensors, else use daily hours
*Motion sensor = Evaluate operating hours (location, traffic, etc.)
Tip: Motion sensors stays On for approx. 10 minutes when activated. It may save operating hours by 25%,30% or more.
Make sure that security or safety does not prevent installation of motion sensors
Make judgment when using Cost Tables

	EXISTING CONDITIONS									RETROFIT CONDITION				COST ANALYSIS			
Area Description	Number of Fixtures	Fixture Code	Watts per Fixture	Number of Non-Operational Fixtures	Watts per Non-Operational Fixtures	kW/Space	Daily Hours	Annual Hours	Annual kWh	Motion sensor Yes or No	Number of Sensors Required	Annual Hours	Annual kWh	Annual kWh Saved	Annual $ Saved	Retrofit Cost	Simple Payback
2nd flr. meeting room	6	F44ILL	112		114.24	0.7	9	2,340	1,572	Yes	2	780	524	1,048	$ 204	$ 517	2.5
2nd flr. NW office	2	F44ILL	112		114.24	0.224	9	2,340	524	Yes	1	1,820	408	116	$ 23	$ 259	11.4
2nd flr NE office	4	F44ILL	112		114.24	0.448	9	2,340	1,048	Yes	1	1,820	815	233	$ 45	$ 259	5.7
2nd flr E office	2	F44ILL	112		114.24	0.224	9	2,340	524	Yes	1	1,820	408	116	$ 23	$ 259	11.4
2nd flr SE office	2	F44ILL	112		114.24	0.224	9	2,340	524	Yes	1	1,820	408	116	$ 23	$ 259	11.4
2nd flr S office	4	F44ILL	112		114.24	0.448	9	2,340	1,048	Yes	1	1,820	815	233	$ 45	$ 259	5.7
2nd flr storage rm	2	F44ILL	112		114.24	0.224	1	365	82	Yes	1	182	41	41	$ 8	$ 259	32.4
2nd flr furnance rm			0		0	0	1	365	-	No	0	365	-	-	$ -	$ -	
2nd flr mens rm	1	F42LE	71		72.42	0.071	2	2,340	166	Yes	1	1,040	74	92	$ 18	$ 259	14.4
2nd flr womans rm	1	F42LE	71		72.42	0.071	2	2,340	166	Yes	1	1,040	74	92	$ 18	$ 259	14.4
2nd flr hall	4	I40/1	40		40.8	0.16	9	2,340	374	No	0	2,340	374	-	$ -		
1st flr entry vest.	2	CF42/1	48		48.96	0.096	9	2,340	225	No	0	2,340	225	-	$ -		
1st flr reception	6	I40/1	40		40.8	0.24	9	2,340	562	No	0	2,340	562	-	$ -		
1st flr womans rm	1	F42LE	71		72.42	0.071	2	2,340	166	Yes	1	1,040	74	92	$ 18		
1st floor mens rm	1	F42LE	71		72.42	0.071	2	2,340	166	Yes	1	1,040	74	92	$ 18		
1st flr utility rm	1	I40/1	40		40.8	0.04	1	365	15	No	0	365	15	-	$ -		
1st floor office area	18	F44ILL	112		114.24	2.016	9	2,340	4,717	Yes	4	1,820	3,669	1,048	$ 204		
1st floor kitchen	2	F44ILL	112		114.24	0.224	4	2,340	524	Yes	1	1,040	233	291	$ 57		
			0		0	0		-	-							$ -	
TOTALS -	59			0		5.5			12,405			24,832	8,791.4	3,613	$ 703	$ 2,585	3.7

APPENDIX H

New Jersey Pay for Performance Incentive Program

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per September, 20
The values represented below are only applicable through December 31, 2009.

	Annual Utilities	
	kWh	Therms
Existing Usage (from utility)	27,630	0
Proposed Savings	7,840	(1,520)
Existing Total MMBtus	94	
Proposed Savings MMBtus	-125	
% Reduction	-132.8%	
Proposed Annual Savings	$4,700	

*Fuel oil savings is not included in calculations for this program.

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

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

	Incentives $		
	Elec	Gas	Total
Incentive #2	$0	$0	$0
Incentive #3	$0	$0	$0
Totals	**$0**	**$0**	**$0**

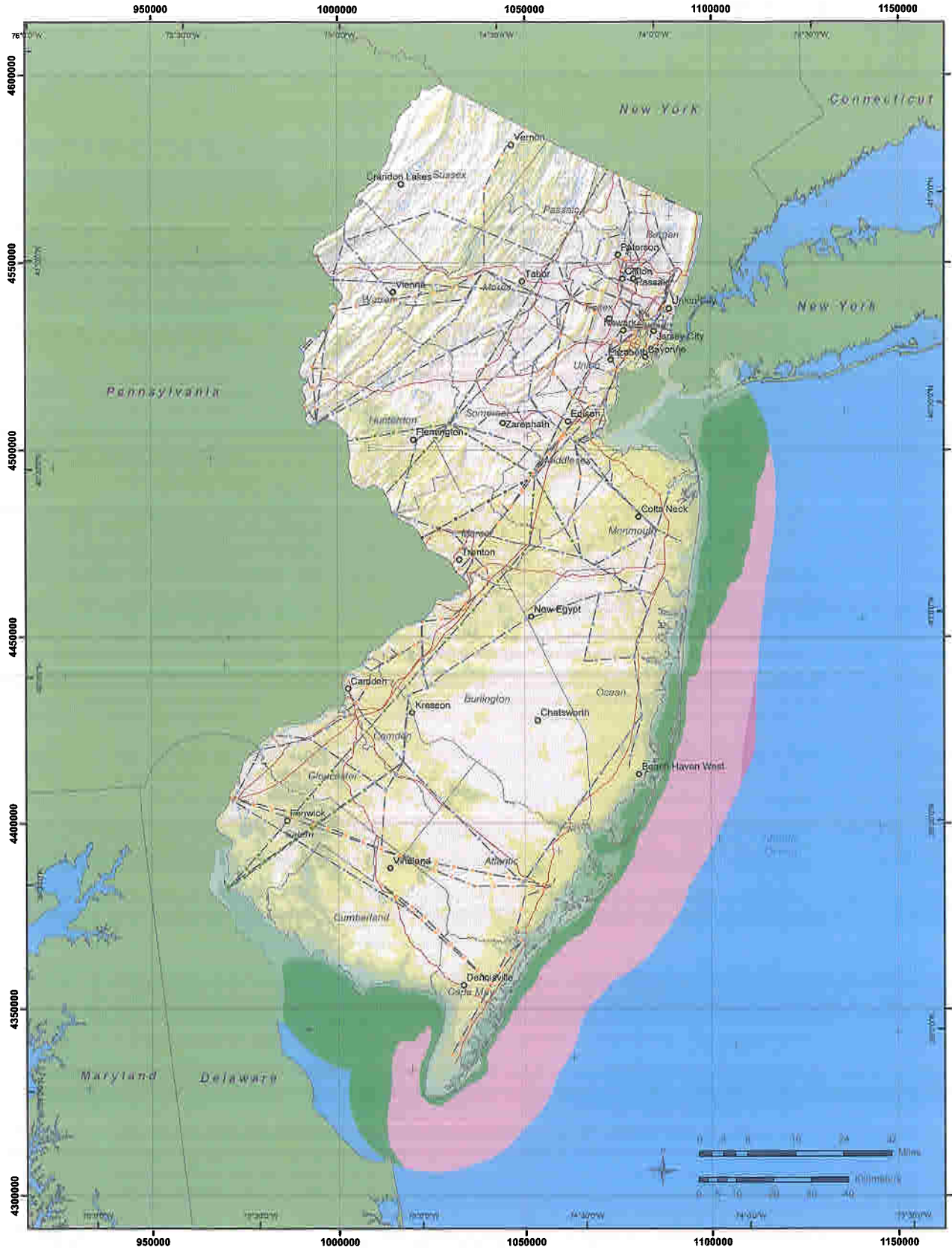
Total Project Cost	$18,900
% Incentives of Project Cost*	0.0%
Project Cost w/ Incentives*	$18,900

Project Payback (years)	
w/o Incentives	w/ Incentives
4.0	4.0

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

APPENDIX I

Wind



Wind Resource of New Jersey

Mean Annual Wind Speed at 30 Meters

Features

- City
- Interstate Highway
- County Boundary
- Water Body

Generalized Transmission Line

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

Mean Speed at 30 m			
mph	m/s		
< 10.1	< 4.5	13.4 - 14.5	6.0 - 6.5
10.1 - 11.2	4.5 - 5.0	14.5 - 15.7	6.5 - 7.0
11.2 - 12.3	5.0 - 5.5	15.7 - 16.8	7.0 - 7.5
12.3 - 13.4	5.5 - 6.0	16.8 - 17.9	7.5 - 8.0
		17.9 - 19.0	8.0 - 8.5
		> 19.0	> 8.5

AWS Truewind

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

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

APPENDIX J

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Ocean County Soil Conservation District Office Building

Building ID: 1959020
For 12-month Period Ending: April 30, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: December 17, 2009

Facility
Ocean County Soil Conservation District
Office Building
714 Lacey Road
Forked River, NJ 08731

Facility Owner
Ocean County Soil Conservation District
714 Lacey Road
Forked River, NJ 08731

Primary Contact for this Facility
N/A

Year Built: 1975
Gross Floor Area (ft²): 4,528

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	105,291
Fuel Oil (No. 2) (kBtu)	187,659
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	292,950

Energy Intensity[5]

Site (kBtu/ft²/yr)	65
Source (kBtu/ft²/yr)	120

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	30

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	77
National Average Source EUI	182
% Difference from National Average Source EUI	-34%
Building Type	Office

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	Ocean County Soil Conservation District Office Building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	714 Lacey Road, Forked River, NJ 08731	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		☐
Office Area (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	4,528 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	45 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	15	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	35	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: FirstEnergy - Jersey Central Power & Lt Co

Fuel Type: Electricity

Meter: JCPL Electric Meter 1 - First Floor (kWh (thousand Watt-hours))
Space(s): Office Area
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
04/01/2009	04/30/2009	1,219.00
03/01/2009	03/31/2009	1,175.00
02/01/2009	02/28/2009	1,270.00
01/01/2009	01/31/2009	1,336.00
12/01/2008	12/31/2008	1,238.00
11/01/2008	11/30/2008	1,177.00
10/01/2008	10/31/2008	1,231.00
09/01/2008	09/30/2008	1,608.00
08/01/2008	08/31/2008	1,867.00
07/01/2008	07/31/2008	2,306.00
06/01/2008	06/30/2008	1,942.00
JCPL Electric Meter 1 - First Floor Consumption (kWh (thousand Watt-hours))		**16,369.00**
JCPL Electric Meter 1 - First Floor Consumption (kBtu (thousand Btu))		**55,851.03**

Meter: JCPL Electric Meter 2 -Second Floor (kWh (thousand Watt-hours))
Space(s): Office Area
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
04/01/2009	04/30/2009	659.00
03/01/2009	03/31/2009	596.00
02/01/2009	02/28/2009	710.00
01/01/2009	01/31/2009	712.00
12/01/2008	12/31/2008	628.00
11/01/2008	11/30/2008	650.00
10/01/2008	10/31/2008	658.00
09/01/2008	09/30/2008	1,104.00
08/01/2008	08/31/2008	1,558.00
07/01/2008	07/31/2008	1,876.00
06/01/2008	06/30/2008	1,276.00
JCPL Electric Meter 2 -Second Floor Consumption (kWh (thousand Watt-hours))		**10,427.00**
JCPL Electric Meter 2 -Second Floor Consumption (kBtu (thousand Btu))		**35,576.92**

Meter: JCPL Electric Meter 3 Common Equipment (kWh (thousand Watt-hours))
Space(s): Office Area
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
04/01/2009	04/30/2009	108.00
03/01/2009	03/31/2009	102.00
02/01/2009	02/28/2009	122.00
01/01/2009	01/31/2009	129.00
12/01/2008	12/31/2008	149.00
11/01/2008	11/30/2008	115.00
10/01/2008	10/31/2008	98.00
09/01/2008	09/30/2008	98.00
08/01/2008	08/31/2008	101.00
07/01/2008	07/31/2008	152.00
06/01/2008	06/30/2008	268.00
JCPL Electric Meter 3 Common Equipment Consumption (kWh (thousand Watt-hours))		**1,442.00**
JCPL Electric Meter 3 Common Equipment Consumption (kBtu (thousand Btu))		**4,920.10**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**96,348.06**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Fuel Oil (No. 2)

Meter: #2 Fuel Oil - Dover Oil Co (Gallons)
Space(s): Office Area

Start Date	End Date	Energy Use (Gallons)
03/12/2009	04/11/2009	285.00
02/12/2009	03/11/2009	375.00
01/12/2009	02/11/2009	191.00
12/12/2008	01/11/2009	204.00
11/12/2008	12/11/2008	206.00
10/12/2008	11/11/2008	0.00
09/12/2008	10/11/2008	0.00
08/12/2008	09/11/2008	0.00
07/12/2008	08/11/2008	0.00
06/12/2008	07/11/2008	0.00
05/12/2008	06/11/2008	0.00
#2 Fuel Oil - Dover Oil Co Consumption (Gallons)		**1,261.00**
#2 Fuel Oil - Dover Oil Co Consumption (kBtu (thousand Btu))		**174,888.72**
Total Fuel Oil (No. 2) Consumption (kBtu (thousand Btu))		**174,888.72**
Is this the total Fuel Oil (No. 2) consumption at this building including all Fuel Oil (No. 2) meters?		☐

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

On-Site Solar and Wind Energy

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Ocean County Soil Conservation District
Office Building
714 Lacey Road
Forked River, NJ 08731

Facility Owner
Ocean County Soil Conservation District
714 Lacey Road
Forked River, NJ 08731

Primary Contact for this Facility
N/A

General Information

Ocean County Soil Conservation District Office Building	
Gross Floor Area Excluding Parking: (ft²)	4,528
Year Built	1975
For 12-month Evaluation Period Ending Date:	April 30, 2009

Facility Space Use Summary

Office Area	
Space Type	Office
Gross Floor Area(ft²)	4,528
Weekly operating hours	45
Workers on Main Shift	15
Number of PCs	35
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 04/30/2009)	**Baseline** (Ending Date 04/30/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	65	65	91	N/A	77
Source (kBtu/ft²)	120	120	169	N/A	182
Energy Cost					
$/year	$ 8,644.19	$ 8,644.19	$ 12,204.74	N/A	$ 10,287.52
$/ft²/year	$ 1.91	$ 1.91	$ 2.70	N/A	$ 2.27
Greenhouse Gas Emissions					
$MtCO_2e$/year	30	30	42	N/A	36
$kgCO_2e$/ft²/year	7	7	10	N/A	8

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

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

APPENDIX K

Equipment Inventory

NJBPU Energy Audit
CHA #20435
Building: Ocean County Soil Conservation District Office Building

HVAC Systems

Description	Manufacturer Name	Model No.	Equipment Type	Capacity/Size	Location	Date Installed	Useable Life Expectancy	Other Info.
1st Floor Furnance	Ruud	UOB B-1 30C (GF 117 M1088 3048)	Split System Furnance	163,00 btu/hr (input) 1.2 gph fuel oil	1st Floor Utility room	Estimated 1975		- Constant speed fan - Tied into 1st floor programmable thermostat
2nd Floor Furnance	Ruud	UOB B-1 30C (S/N GF 117 M0988 2727)	Split System Furnance	163,00 btu/hr (input) 1.2 gph fuel oil	2nd Floor Utility closet	Estimated 1975		- Constant speed fan - Tied into 2nd floor programmable thermostat
1st Floor Compressor	Ruud	Nameplate information worn off, estimated same size as 2nd floor compressor	Split system Compressor	3 HP, 1 Phase, 230 volts, min circuit ampacity 24.7 amps, fan motor 1/4 HP 1.8 FLA	Outside	Estimated 1975		
2nd Floor Compressor	Goodman Manufacturing Co.	CKL 49-1A	Split system Compressor	3 HP, 1 Phase, 230 volts, min circuit ampacity 24.7 amps, fan motor 1/4 HP 1.8 FLA	Outside	Estimated 1980		Different manufacturer of furnance and newer looking
Fuel Oil Tank & Pump	Roth	DWT Series type 1000 I Tank (S/N #0850705309730)	Oil tank and pump	275 gallon tank, pump is 1/6 HP, 115 V, 3 A	Tank Outdoors, Fuel Pump 1st Floor utility room	2008		
1st Floor Domestic Hot Water Tank	A.O. Smith	ELJF 6 917	DHW Tank	6 gallon, 1500 watts	1st Floor Utility Room	2008		
2nd Floor Domestic Hot Water Tank	A.O. Smith	ELJF 6 917	DHW Tank	6 gallon, 1500 watts	2nd Floor Utility Room	2008		