SADDLE RIVER
MUSEUM
ENERGY ASSESSMENT

for

NEW JERSEY
BOARD OF PUBLIC UTILITIES

CHA PROJECT NO. 21351

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1.0 INTRODUCTION AND BACKGROUND

The Borough of Saddle River Museum is a 1,600 square foot, two story structure located at 88 East Allendale Road. The historically registered building was originally constructed in 1830 as a barn, converted into a house in 1937, and has been renovated several times since. Spaces within the museum include a kitchen, exhibit galleries, restroom, utility room, and storage rooms. The facility has no set operating schedule and is very seldom utilized.

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

2.0 EXECUTIVE SUMMARY

This report details the results of the Borough of Saddle River Museum, a 1,600 square foot, two story structure. The facility includes a kitchen, exhibit galleries, restroom, utility room, and storage rooms. The facility has no set operating schedule and is very seldom utilized. The following areas were evaluated for energy conservation measures:

- Insulation upgrade
- Lighting replacement
- Window upgrades
- Domestic hot water heater

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Potential annual savings of $600 for the recommended ECMs may be realized with a payback of 7.3 years.

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

ECM-1 Install Wall Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
2,400	0	30	290	300	2.0	NA	8.0	NA

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

ECM-2 Install Storm Windows

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,800	0	20	190	200	1.8	NA	9.0	NA

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

ECM-4 Lighting Replacements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
200	1.1	280	0	100	6.5	NA	2.0	NA

*Incentives per the New Jersey Smart Start Program for this measure are not shown because their total is less than $50.

3.0 EXISTING CONDITIONS

3.1 Building - General

The Borough of Saddle River Museum is a historically registered, 1,600 square foot two story structure constructed in 1830 as a barn. In 1937, it was converted into a house and has undergone several renovations. The most recent modifications were completed within the past five years, and included converting the first floor utility room into a smaller utility room and restroom, installing new mechanical equipment, and removing the other two restrooms. Other spaces within the museum include a kitchen, exhibit galleries, and storage rooms.

The facility has no set operating schedule, and is only utilized for scheduled events. According to borough personnel, one event was held at the museum in the past year.

The building is constructed of wood framing with wood planking on the interior, wood panels on the exterior, and no insulation. The roof is pitched and consists of asphalt shingles over felt paper, wood planking, a small amount of insulation, and finished with wood planking on the interior. Windows and doors are all wood frame with single pane glass. Most windows are single hung with aluminum frame exterior screens.

3.2 Utility Usage

Utilities include electricity, natural gas, and potable water. Electricity is purchased from Orange & Rockland (O&R) and natural gas is purchased from Public Service Electric & Gas Company (PSE&G). Potable water is provided by the municipally owned water department.

In 2009, electric usage was approximately 2,130 kWh at a cost of about $400. Analyzing electricity bills during this period showed that the building was not charged for demand and paid an average unit cost of $0.188 per kWh. Electricity usage was highest in the winter when the furnace is utilized for heating due to the blower. During the same timeframe, the building heat produced by natural gas-fired equipment required about 1,540 therms. Based on the annual cost of about $1,800, the blended price for natural gas was $1.179 per therm. Natural gas consumption is highest in the winter months when the building is in heating mode. Utility data can be found in Appendix A.

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

3.3 HVAC Systems

The museum's HVAC system consists of a Rheem high efficiency condensing furnace equipped with direct expansion DX cooling. The furnace has a heating input of 120,000 Btuh at an efficiency of 93.5%. Four tons of cooling are provided by a remote condensing unit located outside on grade. Both the furnace remote condensers were installed in 2006 and are in excellent condition.

A small window AC unit is mounted in an upstairs storage room. This unit has been disconnected and is no longer used. The restroom is equipped with an exhaust fan that operates with the light switch.

3.4 Lighting/Electrical Systems

Lighting fixtures and lamps throughout the building are considered inefficient per modern standards and a number of them could be updated to more efficient technology; however, the building has very low usage. Lighting within the building includes the following: three, two lamp, 2', T-12 fixtures in the kitchen; a single hanging fixture over the kitchen table with five 60W incandescent bulbs; two, recessed 100W flood lamps in the restroom and one in the hallway; and a single hanging fixture in the main gallery with four 60W incandescent bulbs. There are also three exit signs which utilize energy efficient LED technology.

The building also has three antique lighting fixtures on the exterior. These fixtures each utilize 60W incandescent lamps. Additionally, above the front and rear entrances are two bulb fixtures equipped with 100W flood lamps.

3.5 Control Systems

Heating and cooling is controlled by a standard household programmable thermostat. Temperature setpoints at the time of the audit included 62°F for heating and 85°F for cooling. Adjustments are made to the thermostat as required for building functions.

3.6 Plumbing Systems

Domestic hot water (DHW) for the museum is generated by an 80 gallon, A.O. Smith 4,500W electric water heater. Installed in 2006, the unit is located in the utility room and is in excellent condition. Plumbing fixtures in the restroom consist of a toilet and hand sink. The kitchen is equipped with standard household fixtures and appliances (refrigerator, stove, dishwasher); all are in good working condition.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Install Wall Insulation

Exterior walls are wood frame construction with wood planking interior and wood panel exterior. Borough maintenance personnel indicated that the walls are not insulated, and, therefore, have a thermal resistance, or R-Value of about 5.0. This ECM addressed blowing in 4" of loose-fill cellulose insulation (R-3.5/inch) into the exterior wall cavities to minimize heating and cooling energy losses.

To calculate the savings, the heat losses through the exterior walls of the museum were found using the existing wall's R-value and bin weather data for nearby Newark, NJ. The values were then totaled to determine the existing annual energy losses. Heating and cooling energy loss values were then determined with a thermal resistance which included the additional R-14.0 of loose-fill insulation. The annual energy savings of blowing insulation into the exterior walls is expected to be about 290 therms and 30 kWh.

Loose-fill insulation has an expected life of 24 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 6,960 therms and 720 kWh, totaling $7,200.

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

ECM-1 Install Wall Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
2,400	0	30	290	300	2.0	NA	8.0	NA

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

This measure is recommended.

4.2 ECM-2 Install Storm Windows

Windows are single pane glass with wooden frames and exterior screens. Due to age, construction type, and condition, the windows incur excess air infiltration and offer little thermal resistance to heat transfer. It is proposed that exterior storm windows be installed to decrease heating and cooling energy losses.

Per the building energy audit and engineering knowledge, it was estimated that the existing windows have a U-value of 1.10 and an infiltration rate of about 0.50 CFM/LF. To calculate the savings for this measure, the baseline energy loss was found by applying these values to the total square footage and perimeter length of the existing windows in conjunction with weather bin data. The proposed energy loss was then determined using the expected U-value of 0.50 and infiltration rate of 0.25 CFM/LF, with exterior storm windows installed. The difference in heating and cooling losses through the windows resulted in an annual savings of about 190 therms and 20 kWh.

Storm windows have an expected life of 25 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 4,750 therms and 500 kWh, totaling $5,000.

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

ECM-2 Install Storm Windows

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,800	0	20	190	200	1.8	NA	9.0	NA

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

This measure is recommended.

4.3 ECM-3 Replace Domestic Hot Water Heater

Domestic hot water for the building is generated by an 80 gallon, 4,500W electric hot water heater. As previously noted, the museum is used very infrequently throughout the year; therefore, there are extended periods with little or no hot water use. However, the unit must still heat the water within the storage tank. Energy required to maintain the hot water temperature setpoint during times of zero demand are known as standby losses. Due to the building's minimal usage, savings were not evaluated based on hot water consumption. Therefore, this ECM evaluated the savings expected from eliminating standby losses only, by replacing the existing electric DHW heater with a tankless, gas-fired, condensing hot water heater.

According to the U.S. Department of Energy, 2.5% of stored capacity is lost every hour during hot water heater standby. This value was adjusted to 1.0% to account for the R-16 insulation built into the storage tank and applied to the total volume of the existing hot water heater tank to determine annual standby losses. Proposed efficiency was based on a Navien tankless, condensing hot water heater; and it was calculated that 870 kWh would be saved per year by eliminating standby losses. No natural gas is required to offset this electric energy because the proposed DHW heater is tankless and only operates when hot water is called for. The new water heater will require gas piping, venting, electrical connections, and minor water piping modifications.

Tankless hot water heaters have an expected life of 18 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 15,660 kWh, totaling $3,600.

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

ECM-3 Replace Domestic Hot Water Heater

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
3,200	4.5	870	0	200	0.1	300	16.0	14.5

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

This measure is not recommended.

4.4 ECM-4 Lighting Replacements

During the energy audit, interior and exterior lighting fixtures were identified, as well as their approximate operating times and existing wattage consumption. There is the potential to upgrade the lamps in the majority of lighting fixtures throughout the museum to reduce site electricity usage. Lighting fixtures analyzed for energy conservation improvements include the three, two lamp, T-12 fixtures in the kitchen; single hanging fixture over the kitchen table with five 60W incandescent bulbs; two, recessed 100W flood lamps in the restroom and one in the hallway. The single hanging fixture in the main gallery with four 60W incandescent bulbs; three antique lighting fixtures on the building exterior with 60W incandescent lamps; and are two dual bulb fixtures above the front and rear entrances equipped with 100W flood lamps were also assessed for energy conservation opportunities.

Energy savings for this measure were calculated by applying the existing and proposed fixture wattages to the estimated time of operation to determine annual electricity consumption. The difference resulted in an annual savings of about 280 kWh per year. Supporting calculations, including all assumptions for lighting hours and the annual energy usage for each fixture, is provided in Appendix E. Only lighting upgrades with a payback period of less than 15 years were included in the overall recommended measure.

Lighting has an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 4,200 kWh, totaling $1,500.

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

ECM-4 Lighting Replacements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
200	1.1	280	0	100	6.5	NA	2.0	NA

*Incentives per the New Jersey Smart Start Program for this measure are not shown because their total is less than $50.

This measure is recommended.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance Program

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

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

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

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

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

5.1.2 New Jersey Smart Start Program

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

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

5.1.3 Energy Efficient and Conservation Block Grant

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

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

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

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

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

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

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

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

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

application must be submitted to TRC Energy Solutions for review. TRC will then determine the amount of the incentive based on projected energy savings of the project. It is important to note that all applications for this incentive must be submitted before implementation of energy conservation measures.

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

5.2 Building Incentives

5.2.1 New Jersey Pay For Performance Program

Under incentive #1 of the New Jersey Pay for Performance Program, the 1,600 square foot building is eligible for about $100 for development of an Energy Reduction Plan. When calculating the total amount under Incentives #2 and #3, all energy conservation measures are applicable as the amount received is based on building wide energy improvements. Since the overall energy reduction for the building is estimated to exceed the 15% minimum, the building is eligible to receive monies based as discussed above in section 5.1.1. Combined, incentives through the NJ P4P program are expected to total about $1,200, reducing the total project payback from 9.5 years to 8.1 years. See Appendix F for calculations.

5.2.2 New Jersey Smart Start Program

The museum is eligible for two incentives available under New Jersey Smart Start Programs. The total amount of all qualified incentives is about $300 for new gas-fired DHW heater and lighting improvements.

Incentives cannot be accepted under multiple NJCEP programs.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Geothermal

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

To meet the HVAC requirements, the building uses a gas-fired furnace with DX cooling. This existing equipment is not compatible with a geothermal energy source. Therefore, to take advantage of a GHP system, the existing mechanical equipment would have to be completely removed and a low temperature closed loop water source heat pump system would have to be installed to realize the benefit of the consistent temperature of the ground.

This measure is not recommended due to the extent of HVAC system renovation needed for implementation. Additionally, the building's heating and cooling loads are far too small to justify a renovation of this magnitude.

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

The facility was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter.

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

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey solar renewable energy certificates program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. The cost of the ACP penalty for 2009 is $700; this is the amount that must be paid per SERC by the high emission producers. The expected dollar amount that will be paid to the PV producer for 2009 is expected to be $600/SREC credit. Payments that will be received from the PV

producer will change from year to year dependent upon supply and demand. Renewable Energy Consultants is a third party SREC broker that has been approved by the New Jersey Clean Energy Program. As stated above there is no definitive way to calculate an exact price that will be received by the PV producer per SREC over the next 15 years. Renewable Energy Consultants estimated an average of $487/ SERC per year and this number was utilized in the cash flow for this report.

Due to the museum's very low usage, the total annual electric consumption in 2009 was only about 2,130 kWh. An annual electrical load of such a minute quantity does not justify the installation of an on-site power source. Furthermore, the installation cost of a photovoltaic solar power generation system greatly outweighs the potential savings over the life of the equipment.

This measure is not recommended.

6.2.2 Solar Thermal Hot Water Plant

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

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

Several options exist for using active solar thermal systems for space heating. The most common method involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system). The most practical system would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for domestic hot water production.

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

This measure is not recommended do to the extremely low hot water demand in the building.

6.3 Wind

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

To avoid turbulence and capture greater wind energy, turbines are mounted on towers. Turbines should be mounted at least 30 feet above any structure or natural feature within 300 feet of the installation. Smaller

turbines can utilize shorter towers. For example, a 250-watt turbine may be mounted on a 30-50 foot tower, while a 10 kW turbine will usually need a tower of 80-120 feet. Tower designs include tubular or latticed, guyed or self-supporting. Wind turbine manufacturers also provide towers.

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

The most important part of any small wind generation project is the mean annual wind speed at the height of which the turbine will be installed. In the Saddle River area, the map indicates a mean annual wind speed of 10 miles per hour. Additionally, the museum has site restrictions such as trees and surrounding structures that would greatly affect a tower location.

A wind speed map is included in Appendix G.

This measure is not recommended due to the low mean annual wind speed. Furthermore, the installation cost of a wind turbine greatly outweighs the potential savings over the life of the equipment.

6.4 Combined Heat and Power Generation (CHP)

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

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. The museum does not have sufficient need for electrical generation and therefore the system would not operate regularly to produce heat when required in the winter months.

This measure is not recommended.

6.5 Biomass Power Generation

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

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

- Wood wastes not adulterated with chemicals, glues or adhesives
- Agricultural residues (corn stover, rice hulls or nut shells, manures, poultry litter, horse manure, etc) and/or methane gases from landfills
- Food wastes
- Municipal tree trimming and grass clipping wastes
- Paper and cardboard wastes
- Non adulterated construction wood wastes, pallets

The NJDEP evaluates biomass resources not identified in the RPS.

Examples of eligible facilities for a CORE incentive include:

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

* from NJOCE Website

This measure is not recommended due to the museum's very low annual electric and natural gas usage. Small utility demands do not justify the installation of an on-site power source.

6.6 Demand Response Curtailment

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

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

A PSE&G pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. The electrical demand for the Borough of Saddle River museum is small enough that the building is not charged a demand rate by the utility company.

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

7.0 EPA PORTFOLIO MANAGER

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

The museum is considered an average energy consumer per the Portfolio Manager with a Site Energy Usage Index (EUI) of 101 kBTU/ft^2/year. However, the EUI can be improved upon by addressing items such as poor insulation and windows, the electric DHW heater and inefficient lighting. By implementing the measures discussed in this report, it is expected that the EUI can be reduced to approximately 68 kBTU/ft^2/year. The EPA Portfolio Manager did not generate an energy rating score for this building because the building type (other) is currently not eligible for an energy star rating.

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

The user name and password for the building's EPA Portfolio Manager Account has been provided to Charles Cuccia of the Borough of Saddle River.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Borough of Saddle River Museum identified potential ECMs for insulation upgrade, lighting replacement, and window upgrades. Potential annual savings of $600 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-1 Install Wall Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
2,400	0	30	290	300	2.0	NA	8.0	NA

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

ECM-2 Install Storm Windows

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,800	0	20	190	200	1.8	NA	9.0	NA

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

ECM-4 Lighting Replacements

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
200	1.1	280	0	100	6.5	NA	2.0	NA

*Incentives per the New Jersey Smart Start Program for this measure are not shown because their total is less than $50.

APPENDIX A

Utility Usage Analysis

New Jersey BPU Energy Audit Program
CHA Project No.: 21351
Borough of Saddle River - Museum
Orange & Rockland - Electric Service

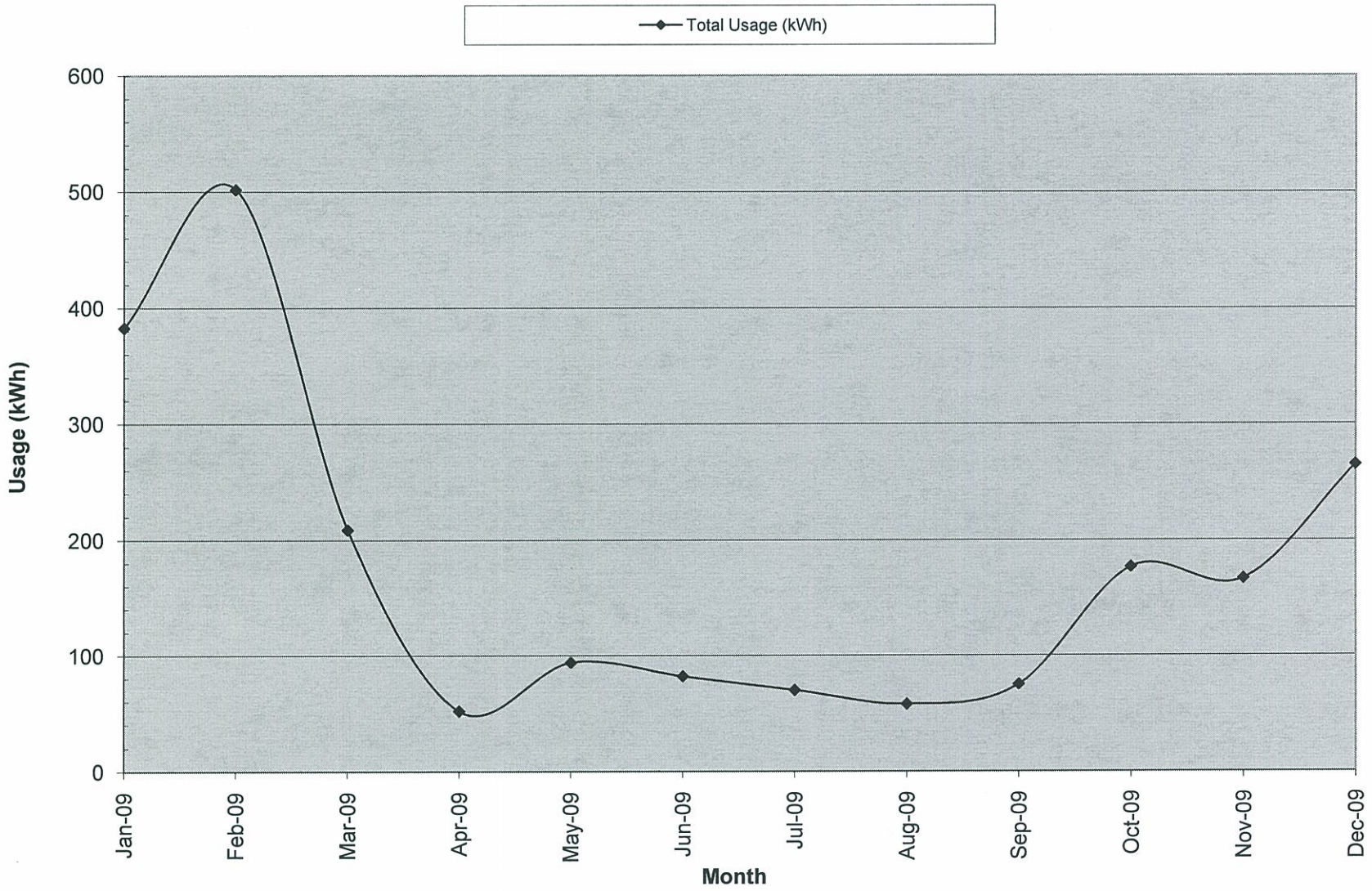
Address: **88 E Allendale Rd.**
Account No.: **48728-43086**
Meter No.: **-**

***Electric demand is not monitored or billed to this building**

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand* (kW)	Total ($)	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
January-09	383		$69.26			$ 0.181		
February-09	502		$73.81			$ 0.147		
March-09	209		$38.90			$ 0.186		
April-09	52		$16.15			$ 0.311		
May-09	94		$19.97			$ 0.212		
June-09	82		$18.09			$ 0.221		
July-09	70		$16.20			$ 0.231		
August-09	58		$14.36			$ 0.248		
September-09	75		$16.29			$ 0.217		
October-09	177		$32.88			$ 0.186		
November-09	167		$32.27			$ 0.193		
December-09	265		$52.79			$ 0.199		
Total	2,134	0.0	$400.97	$0.00	$0.00	$ 0.188	$ -	#DIV/0!

Note: Cost and usage in June estimated. Bill unavailable.

Electric Usage - Borough of Saddle River - Museum



Utility Data - Museum.xls
Electricity Chart

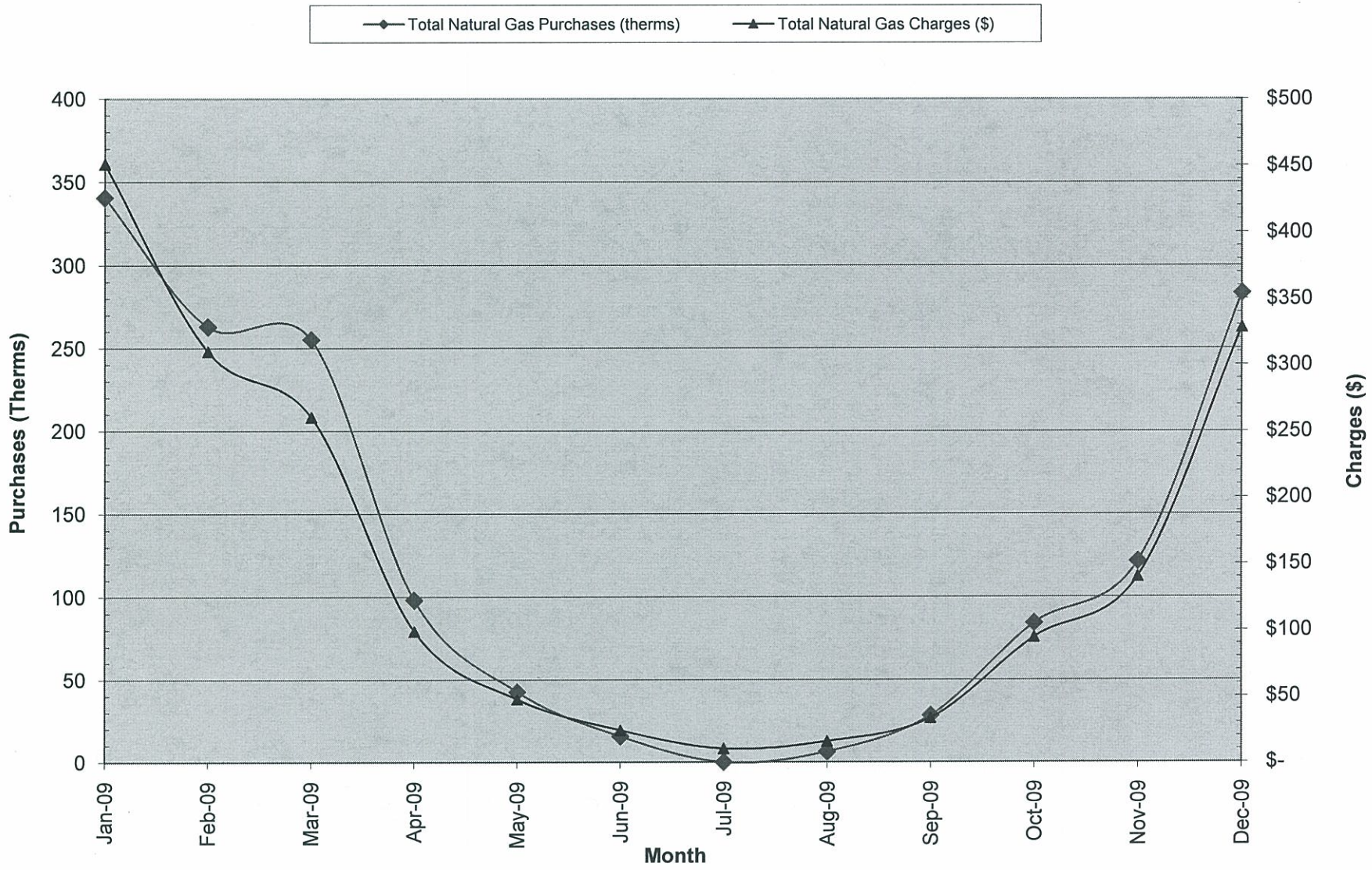
New Jersey BPU Energy Audit Program
CHA Project No.: 21351
Borough of Saddle River - Museum
PSE&G - Natural Gas Service

Address: **88 E Allendale Rd.**
Account No.: **65 117 693 05**
Meter No.: **3359452**

Month	Therms	Charges ($)	($/Therm)
January-09	340.5	$ 450.95	$ 1.324
February-09	262.9	$ 309.82	$ 1.178
March-09	255.1	$ 260.38	$ 1.021
April-09	98.1	$ 99.07	$ 1.010
May-09	42.7	$ 47.56	$ 1.114
June-09	15.6	$ 24.02	$ 1.540
July-09	0.0	$ 10.12	$ -
August-09	6.3	$ 15.61	$ 2.478
September-09	28.3	$ 33.32	$ 1.177
October-09	84.3	$ 94.64	$ 1.123
November-09	121.4	$ 140.22	$ 1.155
December-09	283.4	$ 328.08	$ 1.158

Total	1,539	$ 1,813.79	$ 1.179

Natural Gas Usage - Borough of Saddle River - Museum



Utility Data - Museum.xls
Natural Gas Chart

ELECTRIC MARKETERS LIST

The following is a listing of marketers/suppliers/brokers that have been licensed by the NJ Board of Public Utilities to sell electricity to residential, small commercial and industrial customers served by the Public Service Electric and Gas Company distribution system. **This listing is provided for informational purposes only and PSE&G makes no representations or warranties as to the competencies of the entities listed herein or to the completeness of this listing.**

American Powernet Management
867 Berkshire Blvd, Suite 101
Wyomissing, PA 19610
www.americanpowernet.com

BOC Energy Services
575 Mountain Avenue
Murray Hill, NJ 07974
www.boc-gases.com

Commerce Energy Inc.
535 Route 38, Suite 138
Cherry Hill, NJ 08002
(888) 817-8572 or
(858) 910-8099
www.commerceenergy.com

ConEdison Solutions
701 Westchester Avenue
Suite 201 West
White Plains, NY 10604
(800) 316-8011
www.ConEdSolutions.com

Constellation NewEnergy, Inc.
1199 Route 22 East
Mountainside, NJ 07092
908 228-5100
www.newenergy.com

Credit Suisse (USA), Inc.
700 College Road East
Princeton, NJ 08450
www.creditsuisse.com

Direct Energy Services, LLC
One Gateway Center, Suite 2600
Newark, NJ 07102
(973) 799-8568
www.directenergy.com

FirstEnergy Solutions
395 Ghent Road Suite 407
Akron, OH 44333
(800) 977-0500
www.fes.com

Gerdau Ameristeel Energy Co.
North Crossman Road
Sayreville, NJ 08872

Gexa Energy LLC New Jersey
20 Greenway Plaza, Suite 600
Houston, TX 77046
(866) 304-GEXA
Beth.miller@gexaenergy.com

Glacial Energy of New Jersey
2602 McKinney Avenue, Suite 220
Dallas, TX 75204
www.glacialenergy.com

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095
www.hess.com

Integrys Energy Services, Inc
99 Wood Avenue, Suite 802
Iselin, NJ 08830
www.integrysenergy.com

Liberty Power Delaware, LLC
1901 W Cypress Road, Suite 600
Fort Lauderdale, FL 33309
(866) Power-99
(866) 769-3799
www.libertypowercorp.com

Liberty Power Holdings, LLC
1901 W Cypress Creek Road, Suite 600
Fort Lauderdale, FL 33309
(866) Power-99
(866) 769-3799
www.libertypowercorp.com

Pepco Energy Services, Inc.
d/b/a Power Choice
23 S. Kinderkamack Rd Ste D
Montvale, NJ 07645
(800) 363-7499
www.pepco-services.com

PPL EnergyPlus, LLC
Energy Marketing Center
Two North Ninth Street
Allentown, PA 18101
1-866-505-8825
http://www.pplenergyplus.com/

Sempra Energy Solutions
The Mac-Cali Building
581 Main Street, 8th Floor
Woodbridge, NJ 07095
(877) 273-6772
www.SempraSolutions.com

South Jersey Energy Company
1 South Jersey Plaza, Route 54
Folsom, NJ 08037
(800) 756-3749
www.sjindustries.com

Strategic Energy, LLC
6 East Main Street, Suite 6E
Ramsey, NJ 07446
(888) 925-9115
www.sel.com

Suez Energy Resources NA
333 Thornall Street FL6
Edison, NJ 08818
866.999.8374(toll free)
www.suezenergyresources.com

UGI Energy Services, Inc.
d/b/a POWERMARK
1 Meridian Blvd. Suite 2C01
Wyomissing, PA 19610
(800) 427-8545
www.ugienergyservices.com

Jan 14, 2009

GAS MARKETERS LIST

The following is a listing of marketers/suppliers/brokers that have been licensed by the NJ Board of Public Utilities to sell natural gas to residential, small commercial and industrial customers served by the Public Service Electric and Gas Company distribution system. **This listing is provided for informational purposes only and PSE&G makes no representations or warranties as to the competencies of the entities listed herein or to the completeness of this listing.**

Gateway Energy Services
44 Whispering Pines Lane
Lakewood, NJ 08701
(800) 805-8586
www.gesc.com

Metro Energy Group, LLC
14 Washington Place
Hackensack, NJ 07601
www.metroenergy.com

RPL Holdings, Inc
601 Carlson Pkwy
Minnetonka, MN 55305

Great Eastern Energy
3044 Coney Island Ave. PH
Brooklyn, NY 11235
888-651-4121
www.greateasterngas.com

Metromedia Energy, Inc.
6 Industrial Way
Eatontown, NJ 07724
(800) 828-9427
www.metromediaenergy.com

South Jersey Energy Company
One South Jersey Plaza, Rte 54
Folsom, NJ 08037
(800) 756-3749
www.sjindustries.com/sje.htm

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095
(800) 437-7872
www.hess.com

Mitchell- Supreme Fuel
(NATGASCO)
532 Freeman Street
Orange, NJ 07050
(800) 840-4GAS
www.mitchellsupreme.com

Sprague Energy Corp.
Two International Drive, Ste 200
Portsmouth, NH 03801
800-225-1560
www.spragueenergy.com

Hudson Energy Services, LLC
545 Route 17 South
Ridgewood, NJ 07450
(201) 251-2400
www.hudsonenergyservices.com

MxEnergy Inc.
P.O. Box 177
Annapolis Junction, MD 20701
800-375-1277
www.mxenergy.com

Stuyvesant Energy LLC
642 Southern Boulevard
Bronx, NY 10455
(718) 665-5700
www.stuyfuel.com

Intelligent Energy
7001 SW 24th Avenue
Gainesville, FL 32607
Sales: 1 877 I've Got Gas
(1 877 483-4684)
Customer Service:
1 800 927-9794
www.intelligentenergy.org

Pepco Energy Services, Inc.
23 S Kinderkamack Rd, Suite D
Montvale, NJ 07645
(800) 363-7499
www.pepco-services.com

Tiger Natural Gas, Inc.
1422 E. 71st Street, Suite J.
Tulsa, OK 74136
1-888-875-6122
www.tigernaturalgas.com

Systrum Energy
877-SYSTRUM
(877-797-8786)
www.systrumenergy.com

Plymouth Rock Energy, LLC
165 Remsen Street
Brooklyn, NJ 11201
866-539-6450
www.plymouthrockenergy.com

UGI Energy Services, Inc.
d/b/a GASMARK
704 E. Main Street, Suite I
Moorestown, NJ 08057
856-273-9995
www.ugienergyservices.com

Macquarie Cook Energy, LLC
10100 Santa Monica Blvd, 18th
Fl
Los Angeles, CA 90067

PPL EnergyPlus, LLC
Energy Marketing Center
Two North Ninth Street
Allentown, PA 18101
1-866-505-8825
www.pplenergyplus.com/natural+gas/

Woodruff Energy
73 Water Street
P.O. Box 777
Bridgeton, NJ 08302
(856) 455-1111
www.woodruffenergy.com

APPENDIX B

ECM-1 Install Wall Insulation

Saddle River, NJ
CHA #21351
Building: Museum

ECM-1 Install Wall Insulation

Total Existing Wall Area	1,678	sf	
Existing U-value	0.200	Btu/hr/(sf*F)	
Proposed U-value	0.053	Btu/hr/(sf*F)	with 4" of Loose-Fill Cellulose Insulation (R-3.5/inch)
Heating Efficiency	94%		
Cooling Efficiency	0.92	kW/ton	

Existing Cooling		
Max. North Wall Cooling Load	1,898	Btu/hr
Max. East Wall Cooling Load	2,539	Btu/hr
Max. South Wall Cooling Load	2,274	Btu/hr
Max. West Wall Cooling Load	2,013	Btu/hr

Existing Heating		
Existing Heating Load Temp Diff	58	F
Existing Max. Wall Heating Load	19,466	Btu/hr

Proposed Cooling		
Max. North Wall Cooling Load	502	Btu/hr
Max. East Wall Cooling Load	673	Btu/hr
Max. South Wall Cooling Load	603	Btu/hr
Max. West Wall Cooling Load	533	Btu/hr

Proposed Heating		
Proposed Max. Heating Load	5,159	Btu/hr

Occupied Cooling Setpoint	66	F
Unoccupied Cooling Setpoint	85	F

Occupied Heating Setpoint	72	F
Unoccupied Heating Setpoint	62	F

Existing Cooling Total	36	kWh/yr
Proposed Cooling Total	10	kWh/yr
Savings	**27**	**kWh/yr**

Existing Heating Total	36,440,827	Btu/yr
Proposed Heating Total	9,656,819	Btu/yr
Savings	**26,784,008**	**Btu/yr**
Input	**286**	**therms**

				Occupied				Unoccupied							
Avg Outdoor Air Temp. Bins °F	**Existing Equipment Bin Hours**	**Occupied Equipment Bin Hours**	**Unoccupied Equipment Bin Hours**	**Existing Heat Gain**	**Proposed Heat Gain**	**Existing Heat Loss**	**Proposed Heat Loss**	**Existing Heat Gain**	**Proposed Heat Gain**	**Existing Heat Loss**	**Proposed Heat Loss**	**Existing Cooling Load**	**Existing Heating Load**	**Proposed Cooling Load**	**Proposed Heating Load**
				(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(kWh/yr)	(Btu/yr)	(kWh/yr)	(Btu/yr)
97.5	3	0	3	8,722	2,311	-	-	8,722	2,311	-	-	2	-	1	-
92.5	34	0	34	7,338	1,944	-	-	5,233	1,387	-	-	14	-	4	-
87.5	131	1	130	5,953	1,578	-	-	1,744	462	-	-	18	-	5	-
82.5	500	3	497	4,569	1,211	-	-	-	-	-	-	1	-	0	-
77.5	620	4	616	3,184	844	-	-	-	-	-	-	1	-	0	-
72.5	664	4	660	1,800	477	-	-	-	-	-	-	1	-	0	-
67.5	854	5	849	503	110	1,510	400	-	-	-	-	0	7,677	0	2,035
62.5	927	6	921	-	-	3,188	845	-	-	-	-	-	17,593	-	4,662
57.5	600	4	596	-	-	4,867	1,290	-	-	1,510	400	-	918,174	-	243,316
52.5	610	4	606	-	-	6,545	1,734	-	-	3,188	845	-	1,957,133	-	518,640
47.5	611	4	607	-	-	8,223	2,179	-	-	4,867	1,290	-	2,985,676	-	791,204
42.5	656	4	652	-	-	9,901	2,624	-	-	6,545	1,734	-	4,306,420	-	1,141,201
37.5	1,023	6	1,017	-	-	11,579	3,068	-	-	8,223	2,179	-	8,432,374	-	2,234,579
32.5	734	4	730	-	-	13,257	3,513	-	-	9,901	2,624	-	7,281,952	-	1,929,717
27.5	334	2	332	-	-	14,935	3,958	-	-	11,579	3,068	-	3,874,079	-	1,026,631
22.5	252	2	251	-	-	16,613	4,403	-	-	13,257	3,513	-	3,345,846	-	886,649
17.5	125	1	124	-	-	18,292	4,847	-	-	14,935	3,958	-	1,869,411	-	495,394
12.5	47	0	47	-	-	19,970	5,292	-	-	16,613	4,403	-	781,771	-	207,169
7.5	22	0	22	-	-	21,648	5,737	-	-	18,292	4,847	-	402,854	-	106,756
2.5	13	0	13	-	-	23,326	6,181	-	-	19,970	5,292	-	259,866	-	68,864
-2.5	0	0	0	-	-	25,004	6,626	-	-	21,648	5,737	-	-	-	-
-7.5	0	0	0	-	-	26,682	7,071	-	-	23,326	6,181	-	-	-	-
TOTALS	**8,760**	**52**	**8,708**									**36**	**36,440,827**	**10**	**9,656,819**

Saddle River, NJ
CHA #21351
Building: Museum

ECM-1 Install Wall Insulation

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
4" Loose-Fill Cellulose Insulation	1,678	SQFT	$ 0.23	$ 0.15	$ 0.06	$ 380	$ 313	$ 101	$ 793	
Installation Conditions	1,678	SQFT		$ 0.50		$ -	$ 1,015	$ -	$ 1,015	Install behind wood planking
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 1,808	Subtotal
$ 271	15% Contingency
$ 312	15% Contractor O&P
$ -	Engineering
$ 2,392	**Total**

APPENDIX C

ECM-2 Install Storm Windows

Saddle River, NJ
CHA #21351
Building: Museum

ECM-2 Install Storm Windows

Description Windows can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss. Replacing older windows with more panes and low-emissivity coatings and insulated frames can decrease energy usage.

Given

Occupied Cooling Hours per Week	7	Hours		
Occupied Heating Hours per Week	7	Hours		
Heating Energy Cost	$1.18	$/therm		
Cooling Cost	$0.188	$/kWh		
Occupied Cooling Setpoint Temperature	86.0	Degrees F		(Assumption)
Occupied Cooling Avg Space Air Enthalpy	26.0	btu/# air		(Assumption)
Occupied Heatng Setpoint Temperature	72.0	Degrees F	Occupied	(Assumption)
Unoccupied Heating Setpoint Temperature	62.0	Degrees F	Unoccupied	(Assumption)
Window Area	185	sq.ft.		(From window survey)
Window Perimeter	235	ft		(From window survey)
Proposed U factor	0.50	Btu/(h*sqft*degf)		(From window vendor)
Proposed Air Infiltration	0.25	cfm/ft		(From window vendor)
Cooling Conversion	12,000	Btu/ton		
Heating Btu Conversion	1,000,000	Btu/MMBtu		

Assumptions

Existing U factor	1.10	Btu/(h*sqft*degf)	(From ASHRAE Fundamentals)
Existing Air Infiltration	0.50	cfm/ft	(From ASHRAE Fundamentals)
Heating System Efficiency	94%		
Cooling System Efficiency	0.92	kW/ton	

Formula

Cooling Energy Conduction = (Existing U x Area x (OA Temp - RA Temp) x Op Hours)

Heating Energy Conduction = (Existing U x Area x (RA Temp - OA Temp) x Op Hours)
Cooling Energy Infiltration = (4.5 x Leakage x Perimeter x (OA Enthalpy - RA Enthalpy) x Op Hours)
Heating Energy Infiltration = 1.08 x Leakage x Perimeter x (RA temp - OA temp) x Op Hours)
Load = (Conduction) + (Infiltration)
Cooling Energy = (Cooling Load) / (12,000 Btu/Ton) x (kw/Ton)
Heating Energy = (Heating Load) / (1,000,000 Btu/MMBtu) / (Boiler Efficiency)
Energy Cost = (Energy) x (Cost/Unit)

Existing	Operation	OA Enthalphy	OA Temp	Total Hours	Cooling Occupied Hours	Heating Occupied Hours	Heating Unoccupied Hours	Cooling Occupied Conduction	Heating Occupied Conduction	Heating Unoccupied Conduction	Cooling Occupied Infiltration	Heating Occupied Infiltration	Heating Unoccupied Infiltration
	Cooling	38.3	92.5	37	1.5	0.0	0.0	7,432	0	0	10,005	0	0
	Cooling	36.6	87.5	131	5.5	0.0	0.0	21,348	0	0	30,528	0	0
	Cooling	33.5	82.5	500	20.8	0.0	0.0	62,532	0	0	82,441	0	0
	Cooling	31.6	77.5	620	25.8	0.0	0.0	54,043	0	0	76,330	0	0
	Cooling	30.3	72.5	664	27.7	0.0	0.0	32,714	0	0	62,770	0	0
	Cooling	27.9	67.5	854	35.6	35.6	0.0	9,710	29,129	0	35,672	20,277	0
	Heating	24.6	62.5	927	0.0	38.6	0.0	0	66,751	0	0	46,465	0
	Heating	21.6	57.5	600	0.0	25.0	575.0	0	65,943	470,699	0	45,903	327,655
	Heating	18.7	52.5	610	0.0	25.4	584.6	0	90,160	1,010,259	0	62,761	703,245
	Heating	16.2	47.5	611	0.0	25.5	585.5	0	113,464	1,544,502	0	78,983	1,075,134
	Heating	14.3	42.5	656	0.0	27.3	628.7	0	146,682	2,230,065	0	102,106	1,552,357
	Heating	12.4	37.5	1,023	0.0	42.6	980.4	0	267,514	4,369,390	0	186,217	3,041,550
	Heating	10.4	32.5	734	0.0	30.6	703.4	0	219,758	3,774,828	0	152,974	2,627,673
	Heating	8.7	27.5	334	0.0	13.9	320.1	0	112,657	2,008,837	0	78,421	1,398,359
	Heating	7	22.5	252	0.0	10.5	241.5	0	94,549	1,735,309	0	65,816	1,207,955
	Heating	5.4	17.5	125	0.0	5.2	119.8	0	51,637	969,726	0	35,944	675,030
	Heating	3.9	12.5	47	0.0	2.0	45.0	0	21,197	405,585	0	14,755	282,329
	Heating	2.5	7.5	22	0.0	0.9	21.1	0	10,756	209,025	0	7,487	145,503
	Heating	1.2	2.5	13	0.0	0.5	12.5	0	6,848	134,846	0	4,767	93,867
	Heating	-0.2	-2.5	0	0.0	0.0	0.0	0	0	0	0	0	0
	Heating	-1.4	-7.5	0	0.0	0.0	0.0	0	0	0	0	0	0
	Subtotal =			**8,760**	**117**	**284**	**4,818**	**187,779**	**1,297,044**	**18,863,072 btu**	**297,745**	**902,877**	**13,130,658 btu**

	Conduction		Infiltration			
Cooling Load =	(187779) + (		297745) =			**485,525 btu**
	Cooling Load					
Cooling Energy =	(485525)/(		12000) * (	0.92) =		**37 kWh**
	Cooling Energy	Cooling Cost				
Cooling Energy Cost =	(37.34) x (		$0.188) =			**$ 7.02**
	Conduction		Infiltration			
Heating Load =	(20160116) + (		14033535) =			**34,193,650 btu**
	Heating Load		Heat Content			
Heating Energy =	(34193650)/(		94%)/(	100000) =		**366 therms**
	Heating Energy	Heating Cost				
Heating Energy Cost =	(365.71) x (		$1.179) =			**$ 431**

Operation	OA Enthalpy	OA Temp	Total Hours	Cooling Occupied Hours	Heating Occupied Hours	Heating Unoccupied Hours	Cooling Occupied Conduction	Heating Occupied Conduction	Heating Unoccupied Conduction	Cooling Occupied Infiltration	Heating Occupied Infiltration	Heating Unoccupied Infiltration
Cooling	38.3	92.5	37	1.5	0.0	0.0	3,378	0	0	5,003	0	0
Cooling	36.6	87.5	131	5.5	0.0	0.0	9,704	0	0	15,264	0	0
Cooling	33.5	82.5	500	20.8	0.0	0.0	28,424	0	0	41,221	0	0
Cooling	31.6	77.5	620	25.8	0.0	0.0	24,565	0	0	38,165	0	0
Cooling	30.3	72.5	664	27.7	0.0	0.0	14,870	0	0	31,385	0	0
Cooling	27.9	67.5	854	35.6	35.6	0.0	4,413	13,240	0	17,836	10,138	0
Heating	24.6	62.5	927	0.0	38.6	0.0	0	30,341	0	0	23,233	0
Heating	21.6	57.5	600	0.0	25.0	575.0	0	29,974	213,954	0	22,952	163,828
Heating	18.7	52.5	610	0.0	25.4	584.6	0	40,982	459,208	0	31,380	351,622
Heating	16.2	47.5	611	0.0	25.5	585.5	0	51,575	702,046	0	39,491	537,567
Heating	14.3	42.5	656	0.0	27.3	628.7	0	66,674	1,013,666	0	51,053	776,179
Heating	12.4	37.5	1,023	0.0	42.6	980.4	0	121,597	1,986,087	0	93,109	1,520,775
Heating	10.4	32.5	734	0.0	30.6	703.4	0	99,890	1,715,831	0	76,487	1,313,836
Heating	8.7	27.5	334	0.0	13.9	320.1	0	51,208	913,108	0	39,210	699,180
Heating	7	22.5	252	0.0	10.5	241.5	0	42,977	788,777	0	32,908	603,978
Heating	5.4	17.5	125	0.0	5.2	119.8	0	23,471	440,785	0	17,972	337,515
Heating	3.9	12.5	47	0.0	2.0	45.0	0	9,635	184,357	0	7,378	141,165
Heating	2.5	7.5	22	0.0	0.9	21.1	0	4,889	95,011	0	3,743	72,752
Heating	1.2	2.5	13	0.0	0.5	12.5	0	3,113	61,294	0	2,384	46,934
Heating	-0.2	-2.5	0	0.0	0.0	0.0	0	0	0	0	0	0
Heating	-1.4	-7.5	0	0.0	0.0	0.0	0	0	0	0	0	0
Subtotal =			8,760	117	284	4,818	85,354	589,565	8,574,124 btu	148,873	451,439	6,565,329 btu

	Conduction	Infiltration		
Cooling Load =	(85354) + (	148873) =		234,227 btu
	Cooling Load			
Cooling Energy =	(234227)/(	12000) * (	0.92) =	18 kWh
	Cooling Energy	Cooling Cost		
Cooling Energy Cost =	(18.02) x (	$0.188) =		$ 3.39
	Conduction	Infiltration		
Heating Load =	(9163689) + (	7016767) =		16,180,456 btu
	Heating Load	Heat Content		
Heating Energy =	(16180456)/(	94%) / (	100000) =	173 therms
	Heating Energy	Heating Cost		
Heating Energy Cost =	(173.05) x (	$1.179) =		$ 204

Summary

EXISTING COOLING ENERGY	37.34	kWh	$	7.02
EXISTING HEATING ENERGY	365.71	therms	$	431.17
EXISTING ENERGY COST			$	438.19
PROPOSED COOLING ENERGY	18.02	kWh	$	3.39
PROPOSED HEATING ENERGY	173.05	therms	$	204.03
PROPOSED ENERGY COST			$	207.42
COOLING ENERGY SAVINGS	19.33	kWh	$	3.63
HEATING ENERGY SAVINGS	192.65	therms	$	227.14
ENERGY COST SAVINGS			$	230.77

51.8% of existing
52.7% of existing
52.7% of existing

Comments

Saddle River, NJ
CHA #21351
Building: Museum

ECM-2 Install Storm Windows

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
8'-6"x1'-6" Storm Window	2	EA	$ 125	$ 26		$ 245	$ 63	$ -	$ 308	
2'-6"x3'-6" Storm Window	11	EA	$ 50	$ 22		$ 539	$ 293	$ -	$ 832	
2'-0"x2'-6" Storm Window	3	EA	$ 35	$ 22		$ 103	$ 80	$ -	$ 183	
2'-6"x1'-6" Storm Window	2	EA	$ 30	$ 22		$ 59	$ 53	$ -	$ 112	
6'-6"x3'-4" Storm Window	1	EA	$ 98	$ 26		$ 96	$ 31	$ -	$ 128	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

Notes:

1) Pricing is for Double-Hung white aluminum frame storm window w/ combination window and screen.
2) Window sizes are approximate, more accurate measurements will be required.
2) Contractor Overhead & Profit not required if Borough maintenance personnel perform install.

$ 1,562	Subtotal
$ 234	15% Contingency
$ -	0% Contractor O&P
$ -	0% Engineering
$ 1,796	**Total**

APPENDIX D

ECM-3 Replace Domestic Hot Water Heater

Saddle River, NJ
CHA #21351
Building: Museum

ECM-3 Replace Domestic Hot Water Heater

Summary

* Replace Electric DHW Heater w/ Tankless, Condensing, Gas-Fired DHW Heater

The building experiences extremely low use. Savings shown is for standby losses only.
Further savings can be expected if the building and hot water use were to increase.

Item	Value	Units	Formula/Comments
Occupied days per week	0	days/wk	
Water supply Temperature	50	°F	Termperature of water coming into building
Hot Water Temperature	120	°F	
Hot Water Usage per day	0	gal/day	Calculating standby losses only.
Annual Hot Water Energy Demand	0	MBTU/yr	Energy required to heat annual quantity of hot water to setpoint
Existing Tank Size	80	Gallons	Per manufacturer nameplate
Hot Water Temperature	120	°F	Per building personnel
Average Room Temperature	70	°F	
Standby Losses (% by Volume)	1.0%		Tank constructed with R-16 Insulation helps reduce losses
Standby Losses (Heat Loss)	0.3	MBH	
Annual Standby Hot Water Load	2,920	MBTU/yr	
Total Annual Hot Water Demand (w/ standby losses)	2,920	Mbtu/yr	Building demand plus standby losses
Existing Water Heater Efficiency	98%		Per Manufacturer
Total Annual Energy Required	2,980	Mbtu/yr	
Total Annual Electric Required	**873**	**kWh/yr**	Electrical Savings
Average Annual Electric Demand	0.10	kW	
Peak Electric Demand	**4.50**	**kW**	Per Manufacturer's Nameplate (Demand Savings)
New Tank Size	0	Gallons	Tankless
Hot Water Temperature	120	°F	
Average Room Temperature	70	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	0.0	MBH	
Annual Standby Hot Water Load	0	MBTU/yr	
Prop Annual Hot Water Demand (w/ standby losses)	0	MBTU/yr	
Proposed Avg. Hot water heater efficiency	92%		Based on Navien tankless, condensing DHW Heater
Proposed Total Annual Energy Required	0	MBTU/yr	
Proposed Fuel Use	0	Therms/yr	Standby Losses and inefficient DHW heater eliminated
Elec Utility Demand Unit Cost	$0.00	$/kW	
Elec Utility Supply Unit Cost	$0.19	$/kWh	
NG Utility Unit Cost	$1.18	$/Therm	
Existing Operating Cost of DHW	$164	$/yr	
Proposed Operating Cost of DHW	$0	$/yr	
Annual Utility Cost Savings	**$164**	**$/yr**	

Saddle River, NJ
CHA #21351
Building: Museum

ECM-3 Replace Domestic Hot Water Heater

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Electric DHW Heater Removal	1	LS		$ 50		$ -	$ 61	$ -	$ 61	
						$ -	$ -	$ -	$ -	
Tankless Gas-Fired DHW Heater	1	EA	$ 1,500	$ 280		$ 1,470	$ 339	$ -	$ 1,809	
Miscellaneous Electrical	1	LS	$ 200			$ 196	$ -	$ -	$ 196	
PVC Venting Kit	1	EA	$ 125	$ 80		$ 123	$ 97	$ -	$ 219	
Gas Piping and Valves	1	LS	$ 200			$ 196	$ -	$ -	$ 196	
Water Piping and Valves	1	LS	$ 200			$ 196	$ -	$ -	$ 196	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 2,677	Subtotal
$ 268	10% Contingency
$ 294	Contractor 10% O&P
$ -	0% Engineering
$ 3,239	**Total**

New Jersey Smart Start Incentive Program	QTY	UNIT	$ / UNIT	TOTAL SAVINGS	Cost W/O INCENTIV	Cost W/ INCENTIV
					$ -	$ -
Gas-Fired Tankless DHW Heater	1	EA	$300	$300	$ 1,809	$ 1,509
				$300	$1,809	$1,509

Total ECM Cost w/ Incentives	**$2,939**

APPENDIX E

ECM-4 Lighting Replacements

Saddle River, NJ
CHA #21351
Building: Museum

ECM-4 Lighting Replacements

Building Schedule:
Existing conditions (master switch): 5 hrs/week
Supply Electric Rate $ 0.188 /kWh
Demand Rate $ - /kW

Instructions and notes:
Input existing fixtures and retrofit fixtures. Use light table

	EXISTING CONDITIONS									RETROFIT CONDITIONS							COST ANALYSIS						
Area Description	Number of Fixtures	Fixture Code	Watts per Fixture	Number of Non-Operational Fixtures	Watts per Non-Operational Fixtures	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	kW Saved	Annual kWh Saved	Annual $ Saved	Retrofit Cost	Simple Payback	Available Incentives	Payback w/ Incentives
Main Gallery Hanging Fixture	1	I60/4	240	0	244.8	0.24	switch	260	62	1	CF11/4	52	0.052	switch	260	14	0.2	49	$ 9	$ 41	4.4	$ -	4.4
Kitchen Over Table	1	I60/5	300	0	306	0.3	switch	260	78	1	CF11/5	65	0.065	switch	260	17	0.2	61	$ 11	$ 51	4.4	$ -	4.4
Kitchen	3	F22SS	56	0	57.12	0.168	switch	260	44	3	F22LL	31	0.093	switch	260	24	0.1	20	$ 4	$ 376	102.7	$ 45	90.4
Restroom and Hall	3	I100/1	100	0	102	0.3	switch	260	78	3	CF26/1	27	0.081	switch	260	21	0.2	57	$ 11	$ 42	3.9	$ 21	2.0
Exterior Entrances	2	I100/2	200	0	204	0.4	switch	260	104	2	CF26/1	54	0.108	switch	260	28	0.3	76	$ 14	$ 56	3.9	$ 14	2.9
Exterior	3	I60/1	60	0	61.2	0.18	switch	260	47	3	CF11/1	13	0.039	switch	260	10	0.1	37	$ 7	$ 31	4.4	$ -	4.4
TOTALS -	**13**			**0**		**1.6**			**413**	**13**			**0.4**			**114**	**1.2**	**299**	**$ 56**	**$ 597**	**10.6**	**$ 80**	**9.2**
Measures w/ <15 yr Payback	**10**			**0**		**1.4**			**369**	**10**			**0.3**			**90**	**1.1**	**280**	**$ 53**	**$ 220**	**4.2**	**$ 35**	**3.5**

APPENDIX F

New Jersey Pay For Performance Incentive Program

Saddle River, NJ
CHA #21351
Building: Museum

New Jersey Pay For Performance Incentive Program

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

Total Building Area (Square Feet)	1,600
Is this audit funded by the NJ BPU (Y/N)	Yes

Bureau of Public Utilites (BPU)

Incentive #1		
Audit not funded by NJ BPU	$0.10	$/sqft
Audit is funded by NJ BPU	$0.05	$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$400	$1,800
Existing Usage (from utility)	2,130	1,540
Proposed Savings	1,200	480
Existing Total MMBtus	161	
Proposed Savings MMBtus	52	
% Energy Reduction	**32.3%**	
Proposed Annual Savings	$800	

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

	Incentives $		
	Elec	Gas	Total
Incentive #1	$0	$0	$80
Incentive #2	$132	$528	$660
Incentive #3	$84	$336	$420
Total All Incentives	**$216**	**$864**	**$1,160**

Total Project Cost	$7,600

		Allowable Incentive
% Incentives #1 of Utility Cost*	3.6%	$80
% Incentives #2 of Project Cost**	8.7%	$660
% Incentives #3 of Project Cost**	5.5%	$420
Total Eligible Incentives***	**$1,160**	
Project Cost w/ Incentives	$6,440	

Project Payback (years)	
w/o Incentives	w/ Incentives
9.5	8.1

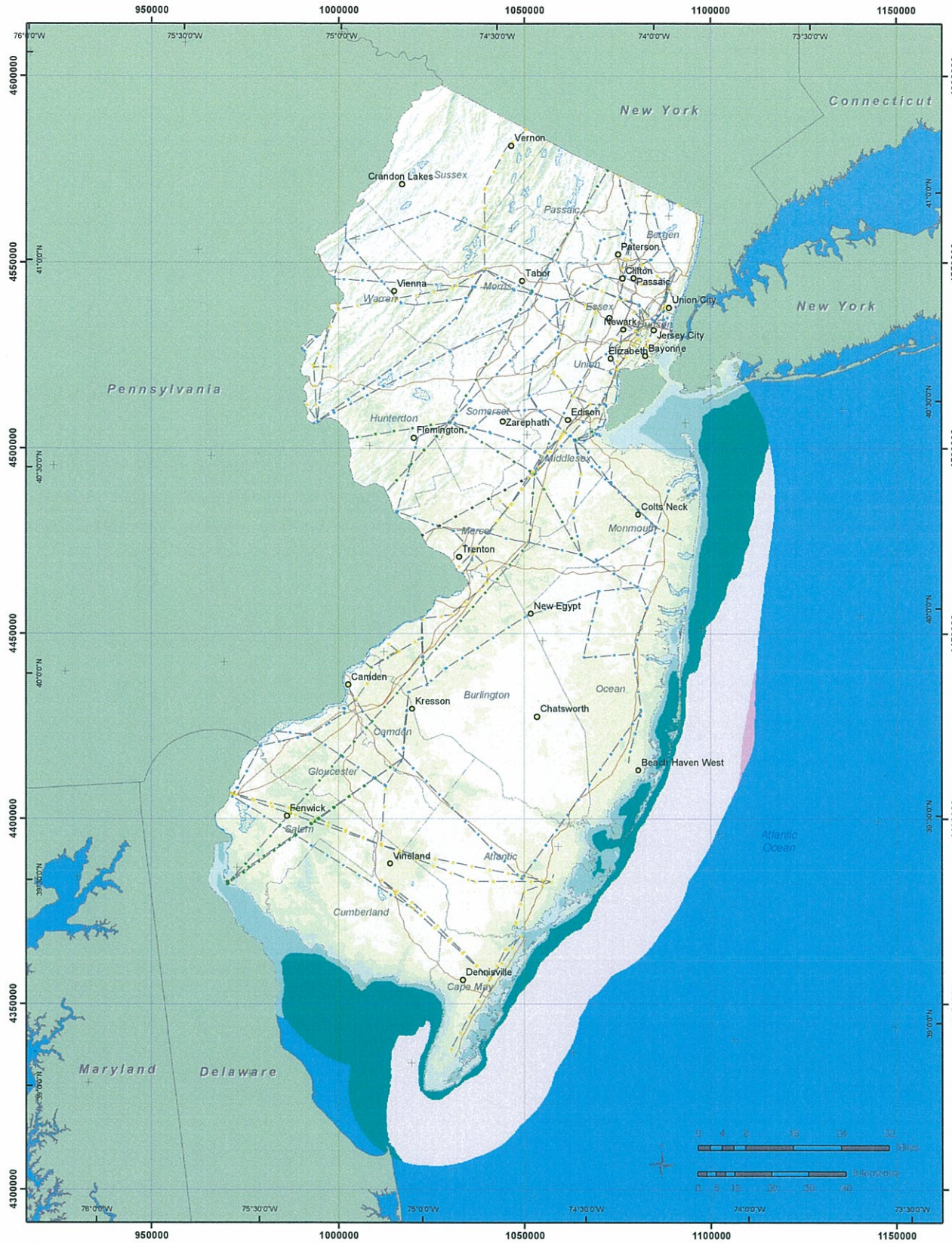
* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if it is.

** Maximum allowable amount of Incentive #2 is 30% of total project cost.
Maximum allowable amount of Incentive #3 is 20% of total project cost.

*** Maximum allowable amount of Incentive #1 is $50,000 if not funded by NJ BPU, and $25,000 if it is.
Maximum allowable amount of Incentive #2 & #3 is $1 million per gas account and $1 million per electric account

APPENDIX G

Wind



Wind Resource of New Jersey

Mean Annual Wind Speed at 30 Meters

Features
- City
- Interstate Highway
- County Boundary
- Water Body

Generalized Transmission Line

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

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

AWS Truewind

Projection: Tranverse Mercator, UTM Zone 17 WGS84
Spatial Resolution of Wind Resource Data: 200m
This map was created by AWS Truewind using the MesoMap system and historical weather data. Although it is believed to represent an accurate overall picture of the wind energy resource, estimates at any location should be confirmed by measurement.
The transmission line information was obtained by AWS Truewind from the Global Energy Decisions Velocity Suite. AWS does not warrant the accuracy of the transmission line information.

APPENDIX H

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Museum

Building ID: 2306527
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: May 13, 2010

Facility	**Facility Owner**	**Primary Contact for this Facility**
Museum	Borough of Saddle River	Charles Cuccia
88 East Allendale Road	100 East Allendale Road	100 East Allendale Road
Saddle River, NJ 07458	Saddle River, NJ 07458	Saddle River, NJ 07458

Year Built: 1830
Gross Floor Area (ft²): 1,600

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	7,281
Natural Gas (kBtu)[4]	153,860
Total Energy (kBtu)	161,141
Energy Intensity[5]	
Site (kBtu/ft²/yr)	101
Source (kBtu/ft²/yr)	116
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	9
Electric Distribution Utility	
Rockland Electric Co	
National Average Comparison	
National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	-46%
Building Type	Other

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	Museum	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Other	Is this an accurate description of the space in question?		☐
Location	88 East Allendale Road, Saddle River, NJ 07458	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		☐

Museum (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	1,600 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	1(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	5Hours(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	0(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Rockland Electric Co

Fuel Type: Electricity

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

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2009	12/31/2009	265.00
11/01/2009	11/30/2009	167.00
10/01/2009	10/31/2009	177.00
09/01/2009	09/30/2009	75.00
08/01/2009	08/31/2009	58.00
07/01/2009	07/31/2009	70.00
06/01/2009	06/30/2009	82.00
05/01/2009	05/31/2009	94.00
04/01/2009	04/30/2009	52.00
03/01/2009	03/31/2009	209.00
02/01/2009	02/28/2009	502.00
01/01/2009	01/31/2009	383.00
Orange & Rockland Electric Consumption (kWh (thousand Watt-hours))		**2,134.00**
Orange & Rockland Electric Consumption (kBtu (thousand Btu))		**7,281.21**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**7,281.21**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

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

Start Date	End Date	Energy Use (therms)
12/01/2009	12/31/2009	283.40
11/01/2009	11/30/2009	121.40
10/01/2009	10/31/2009	84.30
09/01/2009	09/30/2009	28.30
08/01/2009	08/31/2009	6.30
07/01/2009	07/31/2009	0.00
06/01/2009	06/30/2009	15.60
05/01/2009	05/31/2009	42.70
04/01/2009	04/30/2009	98.10
03/01/2009	03/31/2009	255.10

02/01/2009	02/28/2009	262.90
01/01/2009	01/31/2009	340.50
PSE&G Natural Gas Consumption (therms)		**1,538.60**
PSE&G Natural Gas Consumption (kBtu (thousand Btu))		**153,860.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**153,860.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

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

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

Certifying Professional

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

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Museum
88 East Allendale Road
Saddle River, NJ 07458

Facility Owner
Borough of Saddle River
100 East Allendale Road
Saddle River, NJ 07458

Primary Contact for this Facility
Charles Cuccia
100 East Allendale Road
Saddle River, NJ 07458

General Information

Museum	
Gross Floor Area Excluding Parking: (ft²)	1,600
Year Built	1830
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

Museum	
Space Type	Other - Other
Gross Floor Area(ft²)	1,600
Number of PCs°	1
Weekly operating hours°	5
Workers on Main Shift°	0

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2009)	**Baseline** (Ending Date 12/31/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	101	101	0	N/A	104
Source (kBtu/ft²)	116	116	0	N/A	213
Energy Cost					
$/year	$ 2,214.76	$ 2,214.76	N/A	N/A	$ 2,287.11
$/ft²/year	$ 1.38	$ 1.38	N/A	N/A	$ 1.43
Greenhouse Gas Emissions					
$MtCO_2e$/year	9	9	0	N/A	9
$kgCO_2e$/ft²/year	6	6	0	N/A	6

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

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

APPENDIX I

Equipment Inventory

New Jersey BPU Energy Audit Program
CHA #21351
Borough of Saddle River - Museum

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size	Location	Areas Served	Date Installed	Remaining Useful Life (years)	Other Info.
Furnace	1	Rheem	RGRA-12ERAJS	-	Heating & Cooling / Natural Gas & Electric	120 MBH input, 113 MBH output	Utility Room	Entire Building	2006	14	
Condensing Unit	1	Rheem	RAND-048JAZ	7303 M3806 13867	Cooling / Electric	46,500 Btuh	Outside	Entire Building	2006	16	Operates w/ Furnace
Domestic HW Heater	1	A.O. Smith	EES 80 920	MM01-1353115-920	DHW / Electric	80 Gal / 4,500 W	Utility Room	Entire Building	2006	14	