BOROUGH OF TENAFLY
RICHARD STREET PUMP STATION
ENERGY ASSESSMENT

for

NEW JERSEY
BOARD OF PUBLIC UTILITIES

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1.0 INTRODUCTION AND BACKGROUND

The Richard Street Pump Station in the Borough of Tenafly is a 180 square foot single story structure located in a residential circle on Richard Street. Built in 1992, the facility consists of a small, pre-manufactured generator/equipment shed and outside sump pit where the two sewage pumps are located. The purpose of the pumping station is to transfer sewage and storm water collected from the adjacent low-lying residential area to a higher elevation. The equipment operates 24/7 and there are no building occupants. Maintenance personnel check on the station weekly.

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 Richard Street Pump Station in Tenafly, New Jersey. Constructed in 1992, it consists of a small, pre-manufactured generator/equipment shed and outside sump pit where the two sewage pumps are located. The station, which is operational 24/7, transfers sewage and storm water from the adjacent low-lying residential area to a higher elevation. The following areas were evaluated for energy conservation measures:

- Unit heater replacement
- Lighting replacement
- Pump replacement

A potential Energy Conservation Measure (ECM) was identified for the above categories. Potential annual saving of $900 for the recommended ECM may be realized with a payback of 2.2 years.

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

ECM-1 Unit Heater Replacement

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
$	kW	kWh	Therms	kGals	$	$	$		$	Years	Years
2,000	5.0	8,950	(380)	0	900	0	900	4.7	NA	2.2	NA

* There is no incentive available through the New Jersey Smart Start Program for this ECM. Also, this measure is potentially eligible for Direct Install funding. See section 5.0 for other incentive opportunities.

In addition, the following measures are recommended if they qualify for funding through the Direct Install Program (see section 5.2.4). Under this program, incentives can be potentially awarded for up to 60% of a project's budgetary cost with a maximum incentive of $50,000, when the work is performed by a participating Direct Install contractor.

- ECM-2 Pump Replacement
- ECM-3 Lighting Replacements

3.0 EXISTING CONDITIONS

3.1 Building - General

The Richard Street Pump Station was constructed in 1992 and consists of a small, pre-manufactured generator/equipment shed and outside sump pit where the two sewage pumps are located. The station transfers sewage and storm water from the adjacent low-lying residential area to a higher elevation. The equipment operates 24/7 with no building occupants. Maintenance personnel check on the station weekly and maintain records.

As previously noted, the generator/equipment shed is a pre-manufactured structure. All exterior envelope components including walls, ceiling, and floor are insulated steel, soundproof panels. Additionally, the shed's construction is very tight, allowing minimal, if any, outside air infiltration.

3.2 Utility Usage

Utilities include electricity and natural gas which are purchased from Public Service Electric & Gas Company (PSE&G). There is no potable water account for this facility.

From January 2009 through December 2009, electric usage was approximately 65,840 kWh at a cost of about $10,600. Analyzing electricity bills during this period showed that the building was charged at the following rates: supply unit cost of $0.125 per kWh; demand unit cost of $11.01 per kW; and a blended unit cost of $0.162 per kWh. Electrical usage is partially dependent on the amount of precipitation received during the month since the pumps collect storm water as well as sewage. The electrical spike seen for January is most likely the result of a snowmelt and increased storm water. During the same timeframe, the natural gas-fired generator required about 220 therms. Based on the annual cost of about $320, the blended price for natural gas was $1.467 per therm. Natural gas consumption was generally stable throughout the year; however, a large increase in consumption occurred in August and September which was most likely due to electrical power outages. Utility data can be found in Appendix A.

Electricity and natural gas commodity supply and delivery is presently purchased from PSE&G. The delivery component will always be the responsibility of the utility that connects the facility to the power grid or gas line; however, the supply can be purchased from a third party. The electricity or natural gas commodity supply entity will require submission of one to three years of past energy bills. Contract terms can vary among suppliers. A list of approved electrical and natural gas energy commodity suppliers can be found in Appendix A. According to the U.S. Energy Information Administration, the average commercial unit costs of electricity and natural gas in New Jersey during July 2010 was $0.152 per kWh and $1.09 per therm. Based on the fact that the building is currently paying above the state average for electricity and natural gas, it is recommended that a third party supplier be pursued for both utilities.

3.3 HVAC Systems

The generator/equipment shed is heated by a Dayton 5 kW electric unit heater, which is mounted on the wall. Temperature control for the unit heater is performed by a mechanical thermostat set to maintain 66°F. Ventilation air is provided by a small exhaust fan that forces hot air out and pulls in fresh air when the shed becomes overheated. This unit is also controlled by a mechanical thermostat.

3.4 Lighting/Electrical Systems

Lighting within the shed provided by four fixtures each utilizing two 4' T-12 fluorescent lamps and magnetic ballasts. Exterior lighting for the sump pit includes two 100 W floodlamps. All lighting is switch operated and only used when maintenance personnel are on site.

Emergency backup power for the sewage pumps is provided by a Magna Plus natural gas-fired generator. This unit is capable of producing 115 kW and 144 kVA of power. Additionally, the generator is equipped with a block heater to keep the engine warm for rapid starts.

3.5 Pump Equipment and Control Systems

The Richard Street pump stations utilizes two 47 HP, 35 kW submersible pumps to eject sewage water from the sump pit. Both pumps are original to the facility; however, Pump #2 was rebuilt in January 2009. Energized by a float switch, the pumps operate in a lead/standby configuration, where the lead pump alternates each time the switch is triggered by the rising sump pit water level. According to maintenance personnel, each pump runs up to 40 hours/week in wet weather, and 14 hours/week during non-precipitation conditions. All electronics for the pumps are housed in the generator/equipment shed.

3.6 Plumbing Systems

There are no standard plumbing systems utilized at the Richard Street pump station.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Unit Heater Replacement

Heat for the pump station generator shed is currently provided by a 5 kW electric unit heater and maintains a space temperature of about 66°F year round. While electric heating equipment is more efficient, the cost of electricity relative to natural gas is overall less economical. Replacing the existing electric unit heater with a gas-fired unit heater would reduce the annual cost of heating the generator shed.

Using bin weather data for nearby Newark, NJ, the annual hours of operation required to maintain the shed at 66°F were estimated and then applied to the unit heater's electrical power requirements. This yielded the existing unit's annual utility consumption, or about 8,950 kWh. Using the efficiency of a standard gas-fired unit heater, the amount of natural gas required to produce the equivalent amount of heating energy was found to be about 380 therms. In conjunction with the electrical demand reduction, switching from an electric to a gas-fired unit heater is expected to save approximately $900 annually.

Gas-fired unit heaters have an expected life of 13 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 116,350 kWhk, (4,940) therms, and $11,700.

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

ECM-1 Unit Heater Replacement

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
$	kW	kWh	Therms	kGals	$	$	$		$	Years	Years
2,000	5.0	8,950	(380)	0	900	0	900	4.7	NA	2.2	NA

* There is no incentive available through the New Jersey Smart Start Program for this ECM. Also, this measure is potentially eligible for Direct Install funding. See section 5.0 for other incentive opportunities.

This measure is recommended.

4.2 ECM-2 Pump Replacement

The pump station utilizes two 47 HP, 35 kW submersible sewage pumps operating in a lead/standby configuration to transfer waste water to a higher elevation. Originally installed in 1992, advancements in pump design and high efficiency motors render modern sewage pumps overall more energy efficient.

Installing new pumping units result in improvements in motors and pump assemblies. The existing units have a full load motor efficiency of 87.5%, and pump efficiency of 58.9%. As noted, each pump runs about 14 hours/week in non-wet weathe r and up to 40 hours/week during periods of precipitation. Reviewing local precipitation values, it was estimated that the area experiences approximately 12 weeks of wet weather and 40 weeks of dry weather over the course of a year. This information was used to generate an annual operating time of about 1,040 hours for each pump. Since the pump efficiency value is representative of the amount of energy going into the pump assembly compared to the rate that water is being pumped, units with higher pump efficiencies will require less power and have to operate a fewer number of hours to move the same amount of water as units with lower pump efficiencies.

Suitable replacement pumps would be 45 HP, 33 kW with a full load motor efficiency of 91.0% and pump efficiency of 70.5%. With improved efficiency, the new units would operate about 919 hours per year to move the same amount of water as the current units. Comparing the electrical utility requirements for the existing and proposed pumps yielded an annual savings of about 4.1 kW and 12,140 kWh.

Submersible sewage pumps have an expected life of 10 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 121,400 kWh and $21,000.

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

ECM-2 Pump Replacement

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
$	kW	kWh	Therms	kGals	$	$	$		$	Years	Years
52,100	4.1	12,140	0	0	2,100	0	2,100	(0.6)	NA	>25	NA

* There is no incentive available through the New Jersey Smart Start Program for this ECM. Also, this measure is potentially eligible for Direct Install funding. See section 5.0 for other incentive opportunities.

This measure is not recommended.

4.3 ECM-3 Lighting Replacements

Lighting for the pump station consist of four 4', 2-lamp T-12 fixtures with magnetic ballasts in the generator shed and two 100 W incandescent floodlamps outside. To reduce energy consumption, the T-12 fixtures can be retrofitted to utilize more efficient T-8 lamps and electronic ballasts; the incandescent floodlamps can be replaced with lower wattage compact fluorescent floodlamps.

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 consumptions. Due to extremely low operating hours, the difference resulted in an annual savings of only about 10 kWh per year. Supporting calculations, including all assumptions for lighting hours and the annual energy usage for each fixture is provided in Appendix D.

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 150 kWh, totaling $450.

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

ECM-3 Lighting Replacements

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
$	kW	kWh	Therms	kGals	$	$	$		$	Years	Years
500	0.2	10	0	0	30	0	30	(0.1)	100	16.7	13.3

* Incentive shown is per the New Jersey Smart Start Program, Prescriptive Lighting Application. Also, this measure is potentially eligible for Direct Install funding. See section 5.0 for other incentive opportunities.

This measure is not 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.

5.1.5 Direct Install Program

The Direct Install Program targets small and medium sized facilities where the peak electrical demand does not exceed 200 kW in any of the previous 12 months. Buildings must be located in New Jersey and served by one of the state's public, regulated electric or natural gas utility companies. On a case-by-case basis, the program manager may accept a project for a customer that is within 10% of the 200 kW peak demand threshold.

The 200 kW peak demand threshold has been waived for local government entities that receive and utilize their Energy Efficiency and Conservation Block Grant as discussed in section 5.1.3 in conjunction with Direct Install.

Direct Install is funded through New Jersey's Clean Energy Program and is designed to provide capital for building energy upgrade projects to fast track implementation. The program will pay up to 60% of the costs for lighting, HVAC, motors, natural gas, refrigeration, and other equipment upgrades with higher efficiency alternatives. If a building is eligible for this funding, the Direct Install Program can significantly reduce the implementation cost of energy conservation projects.

The program pays a maximum amount of $50,000 per building, and up to $250,000 per customer per year. Installations must be completed by a Direct Install participating contractor, a list of which can be found on the New Jersey Clean Energy Website at http://www.njcleanenergy.com. Contractors will coordinate with the applicant to arrange installation of recommended measures identified in a previous energy assessment, such as this document.

5.2 Building Incentives

5.2.1 New Jersey Pay For Performance Program

The extremely small size of the facility does not justify applying for monies under incentive #1 of the New Jersey Pay for Performance Program. 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 facility is estimated to not meet the 15% minimum, the building is not eligible to receive monies based on Incentives #2 and #3 as discussed above in section 5.1.1. See Appendix E for calculations.

5.2.2 New Jersey Smart Start Program

The Borough of Tenafly Richard Street pump station is eligible for incentives available under New Jersey Smart Start Programs. The total amount of all qualified incentives is about $100 for upgrades to the lighting system.

5.2.3 Energy Efficient and Conservation Block Grant

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

5.2.4 Direct Install Program

The pump station is potentially eligible to receive funding from the Direct Install Program. This money can be in conjunction with the Energy Efficiency and Conservation Block Grant. The total implementation cost for all ECMs potentially eligible for Direct Install funding is about $54,600. This program would pay 60%, or about $32,800 of these initial costs. This funding has the potential to significantly affect the payback periods of Energy Conservation Measures. For the pump station, the Direct Install Program brings the simple payback from about 18.0 years, to approximately 7.2 years.

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. The pump station does not have an adequate heating load to consider a geothermal heat pump system.

This measure is not recommended.

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

The facility was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter. The building's roof has sufficient room to install a large solar cell array. A structural analysis would be required to determine if the roof framing could support a cell array.

The PVWATTS solar power generation model was utilized to calculate PV power generation. The New Jersey Clean Power Estimator provided by the New Jersey Clean Energy Program is presently being updated; therefore, the site recommended use of the PVWATT solar grid analyzer version 1. The closest city available in the model is Newark, New Jersey and a fixed tilt array type was utilized to calculate energy production. The PVWATT solar power generation model is provided in Appendix F.

The State of New Jersey incentives for non-residential PV applications is $0.75/watt up to 30 kW of installed PV array with a maximum system capacity of 50 kW. 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 2010 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.

In 2009 the pump station had a maximum electricity demand of 44.8 kW and a minimum of 11.2 kW. The monthly average over the observed 12 month period was 18.3 kW. The existing load does not justify the use of the maximum incentive cap of 30 kW of installed PV solar array; therefore, an 18 kW system size

was selected for the calculations. The system costs for PV installations were derived from the most recent NYSERDA (New York State Energy Research and Development Agency) estimates of total cost of system installation. It should be noted that the cost of installation is currently $8 per watt or $8,000 per kW of installed system. This has increased in the past few years due to the rise in national demand for PV power generator systems. Other cost considerations will also need to be considered. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will need to be replaced multiple times during the useful life of the PV system.

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

Photovoltaic (PV) Rooftop Solar Power Generation – 18 kW System

Budgetary Cost	Annual Utility Savings				Total Savings	New Jersey Renewable Energy Incentive*	New Jersey Renewable SREC**	Payback (without incentive)	Payback (with incentives)
	Electricity		Natural Gas	Total					
$	kW	kWh	Therms	$	$	$	$	Years	Years
144,000	0	21,294	0	3,400	3,400	13,500	10,400	>25	9.5

*Incentive based on New Jersey Renewable Energy Program for non-residential applications of $0.75 per Watt of installed capacity
** Estimated Solar Renewable Energy Certificate Program (SREC) for 15 years at $487/1000 kWh

While the payback period is within the parameters for recommended measures, further investigation of possible installation locations, required system maintenance, and local installation costs are suggested prior to consideration for implementation.

6.2.2 Solar Thermal Hot Water Plant

There is no demand for hot water at the facility.

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. The pump station sits on a small, wooded, residential lot with limited space. Additionally, the wind speed map indicates a mean annual wind speed of only 10 miles per hour in the Tenafly area.

A wind speed map is included in Appendix G.

This measure is not recommended due to site constraints and the low mean annual wind speed.

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 pump station has sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter, thermal usage during the summer months is low. Thermal energy produced by the CHP plant in the warmer months will be wasted. An absorption chiller could be installed to utilize the heat to produce chilled water; however, there is no chilled water distribution system in the building. The most viable selection for a CHP plant at this location would be a reciprocating engine natural gas-fired unit. However, the pump station does not have an adequate heating load to justify the installation of this system.

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 noise and site issues.

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 Borough of Tenafly Ric hard Street pump station had a monthly average electricity demand of 18.3 kW and a maximum demand of 44.8 kW in 2009.

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 States 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.

Due to the very small building size and sizable electric utility consumption, the pump station has a high Site Energy Usage Index (EUI) of 1,373 kBTU/ft^2/year. The EUI can be improved by addressing wasted energy from electric heating, inefficient pumps, and old lighting systems. By implementing the measures discussed in this report, it is expected that the EUI can be reduced to approximately 1,183 kBTU/ft^2/year. The EPA Portfolio Manager did not generate an energy rating score for this building because the building type (other) is 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 Bob Beutel, Director of Public Works of the Borough of Tenafly.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Richard Street Pump Station in Tenafly, New Jersey identified a potential ECM for unit heater replacement. Potential annual saving of $900 may be realized for the recommended ECM, with a summary of the cost, saving, and payback as follows:

ECM-1 Unit Heater Replacement

Budgetary Cost	Annual Utility Savings					Estimated Maintenance Savings	Total Savings	ROI	Potential Incentive*	Payback (without Incentive)	Payback (with Incentive)
	Electricity		Natural Gas	Water	Total						
$	kW	kWh	Therms	kGals	$	$	$		$	Years	Years
2,000	5.0	8,950	(380)	0	900	0	900	4.7	NA	2.2	NA

* There is no incentive available through the New Jersey Smart Start Program for this ECM. Also, this measure is potentially eligible for Direct Install funding. See section 5.0 for other incentive opportunities.

In addition, the following measures are recommended if they qualify for funding through the Direct Install Program (see section 5.2.4). Under this program, incentives can be potentially awarded for up to 60% of a project's budgetary cost with a maximum incentive of $50,000, when the work is performed by a participating Direct Install contractor.

- ECM-2 Pump Replacement
- ECM-3 Lighting Replacements

APPENDIX A

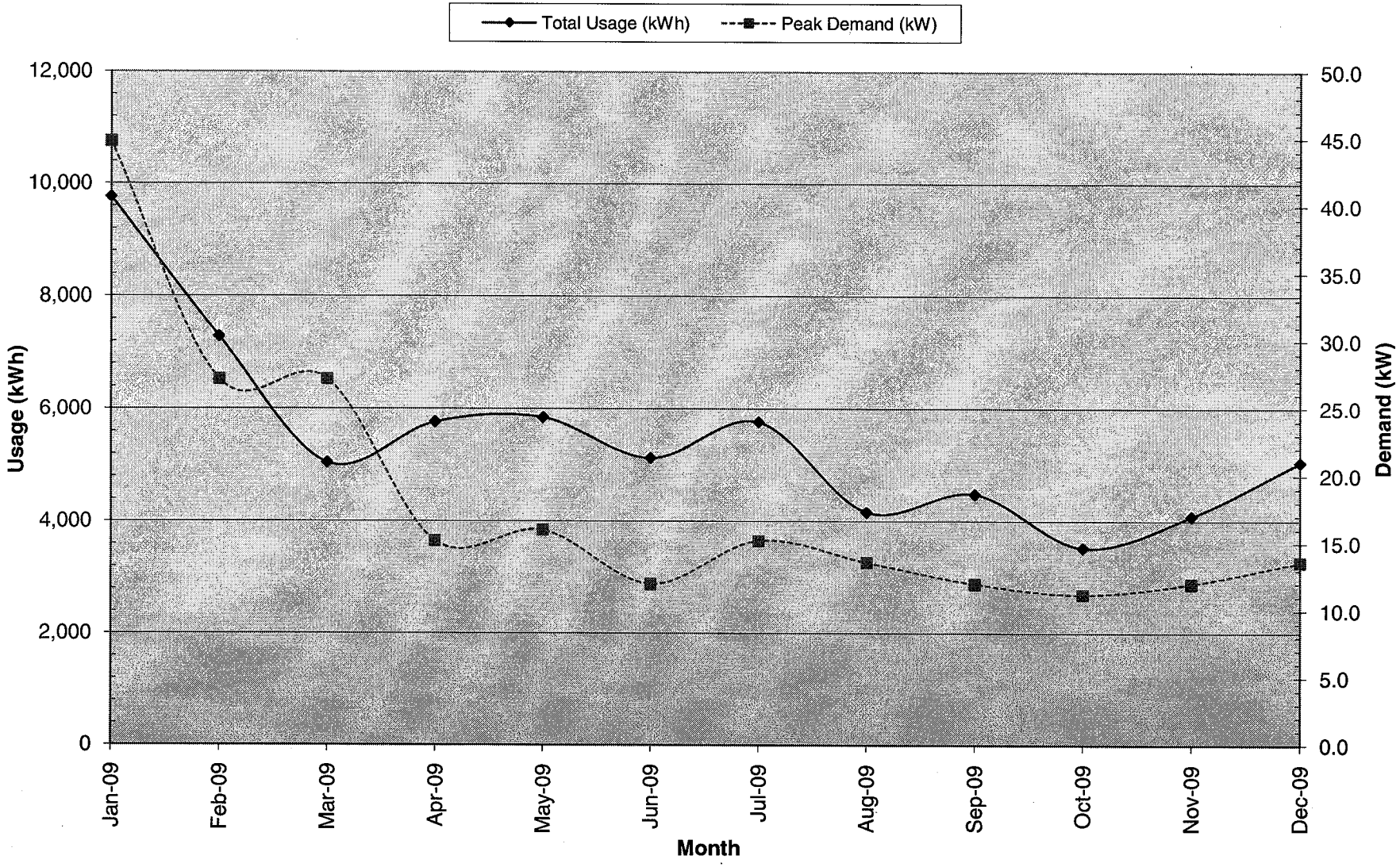
Utility Usage Analysis

New Jersey BPU Energy Audit Program
CHA Project No.: 21794
Borough of Tenafly
PSE&G - Electric Service

Richard Street Pump Station
Account No.: **41 503 065 08**
Meter No.: **728003298**

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
January-09	9,760	44.8	$1,372.91	$261.49	$1,111.42	$ 0.141	$ 0.114	$ 5.84
February-09	7,280	27.2	$1,056.41	$194.10	$862.31	$ 0.145	$ 0.118	$ 7.14
March-09	5,040	27.2	$808.42	$194.10	$614.32	$ 0.160	$ 0.122	$ 7.14
April-09	5,760	15.2	$828.42	$147.37	$681.05	$ 0.144	$ 0.118	$ 9.70
May-09	5,840	16.0	$834.58	$150.68	$683.90	$ 0.143	$ 0.117	$ 9.42
June-09	5,120	12.0	$905.47	$230.99	$674.48	$ 0.177	$ 0.132	$ 19.25
July-09	5,760	15.2	$1,107.43	$276.45	$830.98	$ 0.192	$ 0.144	$ 18.19
August-09	4,160	13.6	$865.29	$258.53	$606.76	$ 0.208	$ 0.146	$ 19.01
September-09	4,480	12.0	$885.53	$240.93	$644.60	$ 0.198	$ 0.144	$ 20.08
October-09	3,520	11.2	$597.98	$151.46	$446.52	$ 0.170	$ 0.127	$ 13.52
November-09	4,080	12.0	$632.66	$155.19	$477.47	$ 0.155	$ 0.117	$ 12.93
December-09	5,040	13.6	$750.32	$161.46	$588.86	$ 0.149	$ 0.117	$ 11.87
Total	65,840	44.8	$10,645.42	$2,422.75	$8,222.67	$ 0.162	$ 0.125	$ 11.01

Electric Usage - Borough of Tenafly Richard Street Pump Station



Utility Data - Tenafly.xls
Pump Station-Electricity Chart

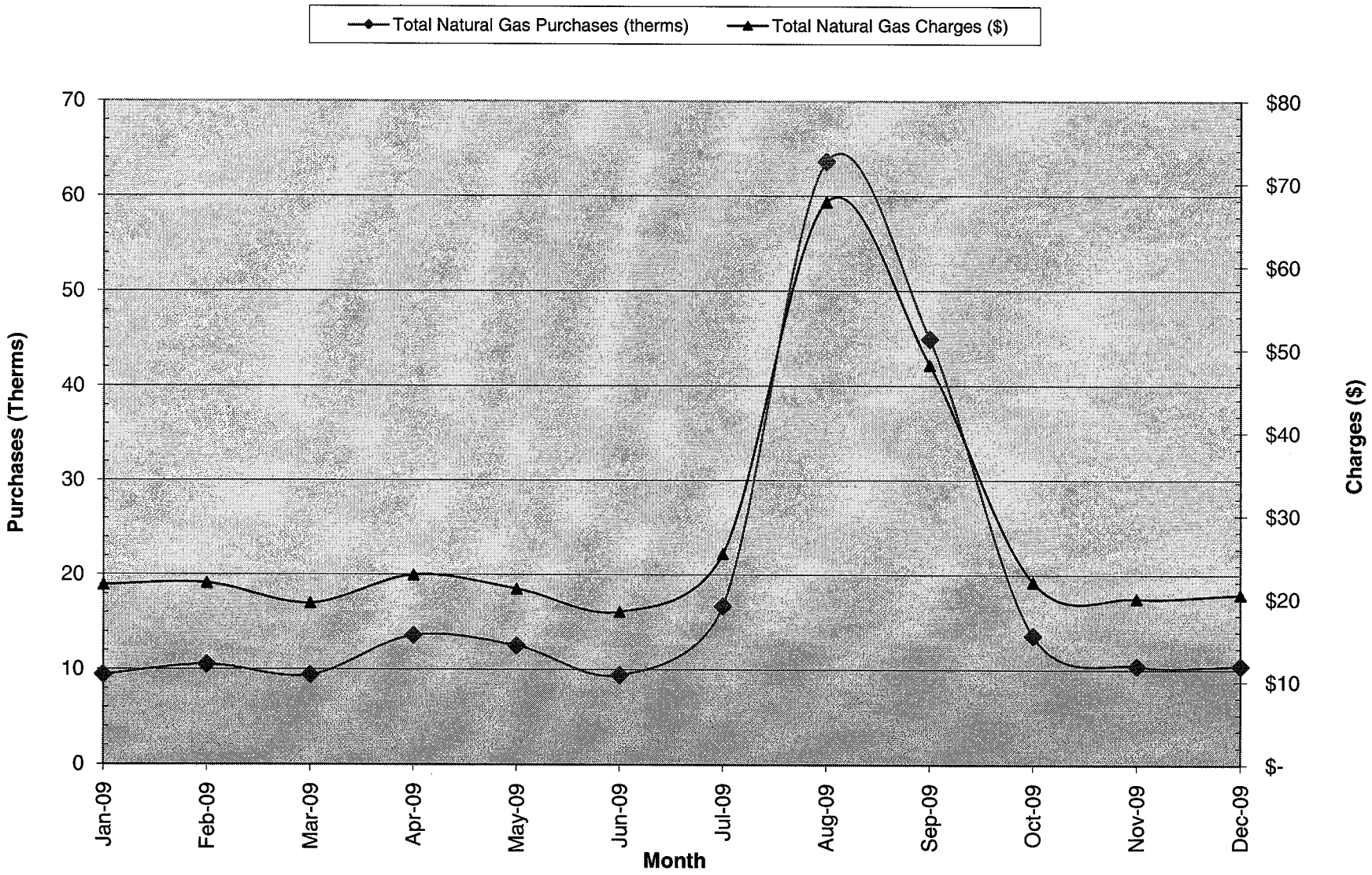
New Jersey BPU Energy Audit Program
CHA Project No.: 21794
Borough of Tenafly
PSE&G - Natural Gas Service

Richard Street Pump Station
Account No.: 41 503 065 08
Meter No.: 2522775

Month	Therms	Charges ($)	($/Therm)
January-09	9.4	$ 21.61	$ 2.299
February-09	10.5	$ 21.84	$ 2.080
March-09	9.4	$ 19.42	$ 2.066
April-09	13.6	$ 22.81	$ 1.677
May-09	12.5	$ 21.17	$ 1.694
June-09	9.4	$ 18.40	$ 1.957
July-09	16.7	$ 25.40	$ 1.521
August-09	63.6	$ 67.82	$ 1.066
September-09	44.9	$ 48.21	$ 1.074
October-09	13.6	$ 22.01	$ 1.618
November-09	10.4	$ 20.04	$ 1.927
December-09	10.4	$ 20.51	$ 1.972

Total	224	$ 329.24	$ 1.467

Natural Gas Usage - Borough of Tenafly Richard Street Pump Station



Utility Data - Tenafly.xls
Pump Station-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 Unit Heater Replacement

NJBPU - Borough of Tenafly
CHA #21794
Building: Richard Street Pump Station

ECM-1 Unit Heater Replacement

Existing Fuel	Electric
Proposed Fuel	Nat.Gas

Item	Value	Units	Formula/Comments
Baseline Electric Cost	$ 0.162	$/kWh	
Proposed Fuel Cost	$ 1.467	$/therm	
Temperature Setpoint	66	°F	Per thermostat setpoint
Total Heating Capacity	5	kW	Per existing equipment
Annual Hours of Operation	1,790	hrs/year	Calculated Below
Baseline Annual Electric Use	8,949	kWh	
Existing Unit Heater Efficiency	100%		Electric Heat
Baseline Unith Heater Load	30,544	Mbtu/yr	Baseline Fuel Use x Existing Efficiency x 3.413 Mbtu/kWh
Baseline Electricity Cost	$ 1,450		
Proposed Unit Heater Efficiency	80%		New Unit Heater Efficiency
Proposed Annual Fuel Use	382	Therms	Baseline UH Load / Proposed Efficiency / 100 Mbtu/Therms
Proposed Annual Fuel Cost	$ 560		
Annual Savings	8,949	kWh	
	(382)	Therms	
Annual Savings	**$ 890**	**/yr**	

OAT - DB Bin Temp F	Annual Hours	Heating Hours	% Time of Operation	Hours of Operation
102.5	0	0	0%	0
97.5	3	0	0%	0
92.5	34	0	0%	0
87.5	131	0	0%	0
82.5	500	0	0%	0
77.5	620	0	0%	0
72.5	664	0	0%	0
67.5	854	0	0%	0
62.5	927	927	5%	44
57.5	600	600	12%	69
52.5	610	610	18%	112
47.5	611	611	25%	154
42.5	656	656	32%	210
37.5	1,023	1,023	39%	397
32.5	734	734	46%	335
27.5	334	334	52%	175
22.5	252	252	59%	149
17.5	125	125	66%	82
12.5	47	47	73%	34
7.5	22	22	80%	18
2.5	13	13	86%	11
-2.5	0	0	93%	0
-7.5	0	0	100%	0
Total	8,760	5,954	30%	1790

NJBPU - Borough of Tenafly
CHA #21794
Building: Richard Street Pump Station

ECM-1 Unit Heater Replacement

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 Unit Heater Demolition	1	LS	$ -	$ 50	$ -	$ -	$ 61	$ -	$ 61	
						$ -	$ -	$ -	$ -	
20 MBh Gas-Fired Unit Heater	1	EA	$ 985	$ 88	$ -	$ 965	$ 106	$ -	$ 1,072	
Miscellaneous gas piping & valves	1	LS	$ 200	$ 300		$ 196	$ 363	$ -	$ 559	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 1,691	Subtotal
$ 169	10% Contingency
$ 186	10% Contractor O&P
$ -	Engineering
$ 2,046	**Total**

APPENDIX C

ECM-2 Pump Replacement

NJBPU - Borough of Tenafly
CHA #21794
Building: Richard Street Pump Station

ECM-2 Pump Replacement

Demand Cost	Energy Cost
$/kW-month	$/kWh
$ 11.01	$ 0.125

Multipliers		
Material	Labor	Equipment
0.96	1.21	1.09

Savings Analysis

			Existing Conditions							Proposed Conditions							Savings						
				Motor	a			c		b	Motor	a			c		Demand	Electric					
			Motor	Load	Motor	Motor	Pump	Annual	Annual	Motor	Load	Motor	Motor	Pump	Annual	Annual	Savings	Savings	$ kW	$ kWh	Total $	Estimated	Payback
#	Description	Location	HP	Factor	Efficiency	kW	Efficiency	Hours	kWh	HP	Factor	Efficiency	kW	Efficiency	Hours	kWh	kW	kWh	Savings	Savings	Savings	Cost	Years
1	Pump #1	Pit	47	0.87	0.875	34.8	58.9%	1,040	36,242	45	0.89	0.910	32.8	70.5%	919	30,172	2.03	6,069	$ 268	$ 759	$ 1,027	$ 26,070	25.4
2	Pump #2	Pit	47	0.87	0.875	34.8	58.9%	1,040	36,242	45	0.89	0.910	32.8	70.5%	919	30,172	2.03	6,069	$ 268	$ 759	$ 1,027	$ 26,070	25.4
		Total	94			69.7			72,483	90			65.6			60,345	4.1	12,138	$ 536	$ 1,517	$ 2,053	$ 52,140	

Notes

a Existing and new efficiencies entered at full load.

b Resized to better match load

c Hours of operation calculation: Each pump averages 14 hrs/wk in normal weather and up to 40 hrs/wk in wet weather. Assume 12 weeks of wet weather and 40 weeks of normal weather. 12*40 + 40*14 = 1040 hours annually per pump. Proposed hours of operation reduced due to more efficient pump.

	Costs							
	Unit Costs			Subtotal Costs				
	Materials	Labor	Equipment	Materials	Labor	Equipment	Total Cost	Remarks
Pump #1	$ 24,750	$ 1,500	$ -	$ 24,255	$ 1,815	$ -	$ 26,070	
Pump #2	$ 24,750	$ 1,500	$ -	$ 24,255	$ 1,815	$ -	$ 26,070	

APPENDIX D

ECM-3 Lighting Replacements

NJBPU - Borough of Tenafly
CHA #21794
Building: Richard Street Pump Station

ECM-3 Lighting Replacement

Building Schedule:
Existing conditions: 1 hrs/week
Supply Electric Rate $ 0.125 /kWh
Demand Rate $ 11.00 /kW

	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	Daily Hours	Annual Hours	Annual kWh	Number of Fixtures	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Daily Hours	Annual Hours	Annual kWh	kW Saved	Annual kWh Saved	Annual $ Saved	Retrofit Cost	Simple Payback
Generator Shed	4	F42ES	80	0	81.6	0.32	switch	0	52	17	4	F42ILL	59	0.236	switch	0	52	12	0.1	4	$ 12	$ 502	43.1
Exterior Lighting	2	I100/1	100	0	102	0.2	switch	0	52	10	2	CF23/1	25	0.05	switch	0	52	3	0.2	8	$ 21	$ 28	1.4
					0	0			52	-			0	0	switch	0	52	-	-	-	$ -	$ -	
					0	0			52	-			0	0	switch	0	52	-	-	-	$ -	$ -	
					0	0			52	-			0	0	switch	0	52	-	-	-	$ -	$ -	
TOTALS -	6			0		0.5				27	6			0.3				15	0.2	12	$ 32	$ 530	16.3

New Jersey Smart Start Incentive Program	QTY	UNIT	$ / UNIT	TOTAL SAVINGS	Cost W/O INCENTIVE	Cost W/ INCENTIVE
T-12 Lighting Retrofit	4	EA	$15	$60	$ 502	$ 442
PAR 30 & PAR 38 Screw-In Lamps	2	EA	$7	$14	$ 28	$ 14
				$74	$530	$456

Total ECM Cost w/ Incentives	$456

APPENDIX E

New Jersey Pay For Performance Incentive Program

NJBPU - Borough of Tenafly
CHA #21794
Building: Richard Street Pump Station

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)	180
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)	$10,650	$330
Existing Usage (from utility)	65,840	224
Proposed Savings	21,100	(380)
Existing Total MMBtus	247.112	
Proposed Savings MMBtus	34.014	
% Energy Reduction	**13.8%**	
Proposed Annual Savings	$2,970	

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

	Incentives $		
	Elec	Gas	Total
Incentive #1	$0	$0	$9
Incentive #2	$0	$0	$0
Incentive #3	$0	$0	$0
Total All Incentives	**$0**	**$0**	**$9**

Total Project Cost	$54,720

		Allowable Incentive
% Incentives #1 of Utility Cost*	0.1%	$9
% Incentives #2 of Project Cost**	0.0%	$0
% Incentives #3 of Project Cost**	0.0%	$0
Total Eligible Incentives***	**$9**	
Project Cost w/ Incentives	$54,711	

Project Payback (years)	
w/o Incentives	w/ Incentives
18.4	18.4

* 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 F

Photovoltaic (PV) Rooftop Solar Power Generation

Borough of Tenafly
Richard Street Pump Station

Cost of Electricity	$0.162	$/kWh
System Capacity	18.0	kW

Photovoltaic (PV) Rooftop Solar Power Generation

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	New Jersey Renewable * Energy Incentive	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$144,000	**0.0**	**21,294**	**0**	**$3,400**	**0**	**$3,400**	**$13,500**	**$10,400**	**42.4**	**9.5**

Note: Budgetary cost is based on $8,000/kW.

*Incentive based on New Jersey renewable energy program for non-residential applications(PV)= $0.75/W of installed PV system

** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= $487/1000kwh

Estimated Solar Renewable Energy Certificate Program (SREC) payments for 15 Years from RR Renewable Energy Consultants

Year	SREC
1	600
2	600
3	600
4	500
5	500
6	500
7	500
8	500
9	500
10	500
11	400
12	400
13	400
14	400
15	400
AVG	**487**

PVWatts * * * AC Energy & Cost Savings

Cautions for Interpreting the Results

(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	18.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	13.9 kW
Array Type:	Fixed Tilt
Array Tilt:	40.7°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	16.2 ¢/kWh

Results			
Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	3.36	1490	241.38
2	4.05	1609	260.66
3	4.58	1952	316.22
4	4.84	1908	309.10
5	5.30	2102	340.52
6	5.33	1982	321.08
7	5.27	2002	324.32
8	5.25	1981	320.92
9	5.06	1922	311.36
10	4.46	1810	293.22
11	3.15	1292	209.30
12	2.87	1245	201.69
Year	4.46	21294	3449.63

Output Hourly Performance Data * Output Results as Text

About the Hourly Performance Data Saving Text from a Browser

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

Please send questions and comments regarding PVWATTS to Webmaster

Disclaimer and copyright notice

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

Cautions for Interpreting the Results

The monthly and yearly energy production are modeled using the PV system parameters you selected and weather data that are typical or representative of long-term averages. For reference, or comparison with local information, the solar radiation values modeled for the PV array are included in the performance results.

Because weather patterns vary from year-to-year, the values in the tables are better indicators of long-term performance than performance for a particular month or year. PV performance is largely proportional to the amount of solar radiation received, which may vary from the long-term average by ± 30% for monthly values and ± 10% for yearly values. How the solar radiation might vary for your location may be evaluated by examining the tables in the *Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors* (*http://rredc.nrel.gov/solar/old_data/nsrdb/redbook/*).

For these variations and the uncertainties associated with the weather data and the model used to model the PV performance, future months and years may be encountered where the actual PV performance is less than or greater than the values shown in the table. The variations may be as much as 40% for individual months and up to 20% for individual years. Compared to long-term performance over many years, the values in the table are accurate to within 10% to 12%.

If the default overall DC to AC derate factor is used, the energy values in the table will overestimate the actual energy production if nearby buildings, objects, or other PV modules and array structure shade the PV modules; if tracking mechanisms for one- and two-axis tracking systems do not keep the PV arrays at the optimum orientation with respect to the sun's position; if soiling or snow cover related losses exceed 5%; or if the system performance has degraded from new. (PV performance typically degrades 1% per year.) If any of these situations exist, an overall DC to AC derate factor should be used with PVWATTS that was calculated using system specific component derate factors for *shading*, *sun-tracking*, *soiling*, and *age*.

The PV system size is the nameplate DC power rating. The energy production values in the table are valid only for crystalline silicon PV systems.

The cost savings are determined as the product of the number of kilowatt hours (kWh) and the cost of electricity per kWh. These cost savings occur if the owner uses all the electricity produced by the PV system, or if the owner has a net-metering agreement with the utility. With net-metering, the utility bills the owner for the net electricity consumed. When electricity flows from the utility to the owner, the meter spins forward. When electricity flows from the PV system to the utility, the meter spins backwards.

If net-metering isn't available and the PV system sends surplus electricity to the utility grid, the utility generally buys the electricity from the owner at a lower price than the owner pays the utility for electricity. In this case, the cost savings shown in the table should be reduced.

Besides the cost savings shown in the table, other benefits of PV systems include greater energy independence and a reduction in fossil fuel usage and air pollution. For commercial customers, additional cost savings may come from reducing demand charges. Homeowners can often include the cost of the PV system in their home mortgage as a way of accommodating the PV system's initial cost.

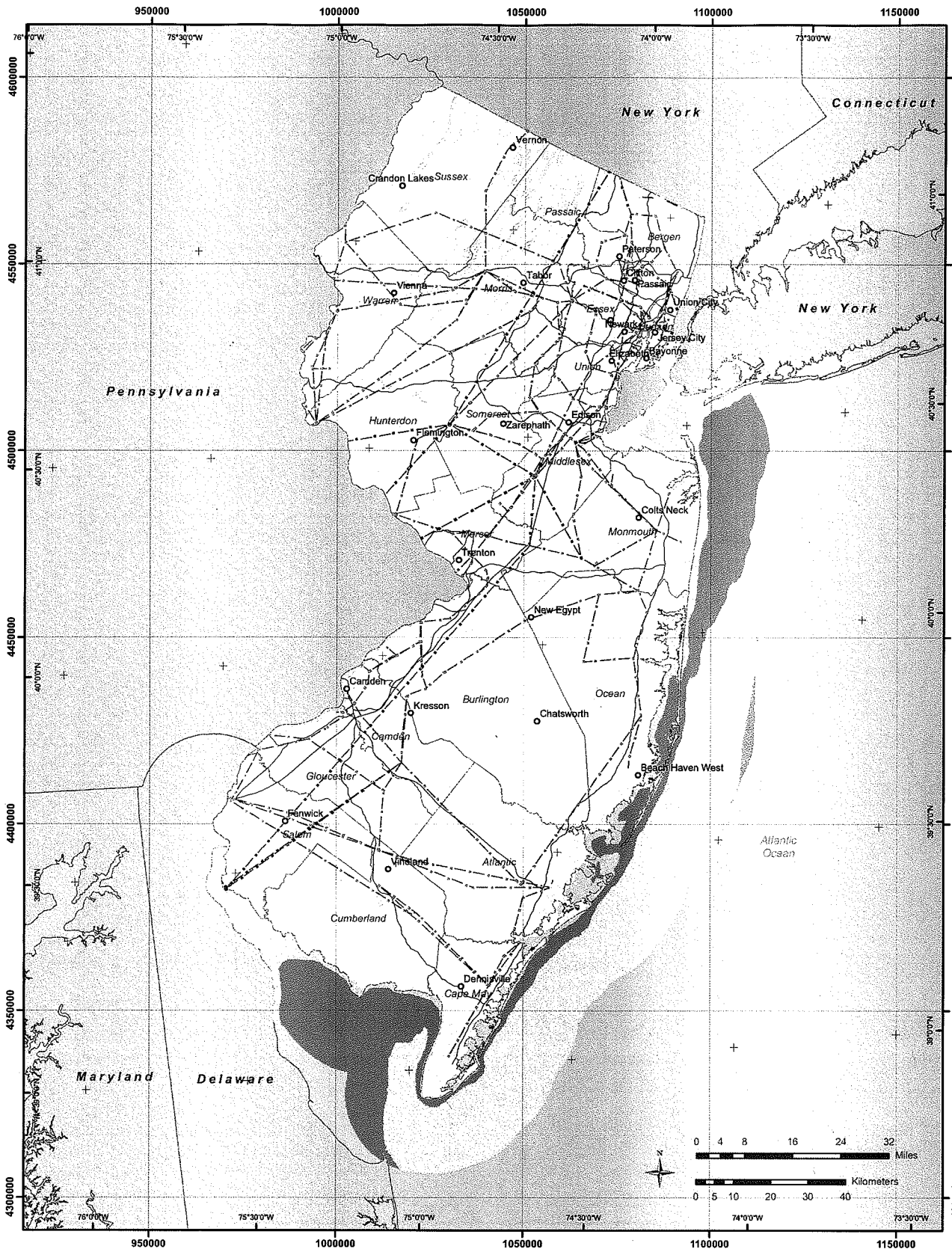
To accelerate the use of PV systems, many state and local governments offer financial incentives and programs. Go to http://www.nrel.gov/stateandlocal for more information.

Please send questions and comments to Webmaster Disclaimer and copyright notice.

Return to RREDC Home Page (*http://rredc.nrel.gov/*)

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	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.

AWS Truewind, LCC

APPENDIX H

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Richard Street Pump Station

Building ID: 2413293
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 19, 2010

Facility
Richard Street Pump Station
Richard Street
Tenafly, NJ 07670

Facility Owner
Tenafly Department of Public Works
107 Grove Street
Tenafly, NJ 07670

Primary Contact for this Facility
Robert Beutel
107 Grove Street
Tenafly, NJ 07670

Year Built: 1992
Gross Floor Area (ft²): 180

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	224,646
Natural Gas (kBtu)[4]	22,440
Total Energy (kBtu)	247,086
Energy Intensity[5]	
Site (kBtu/ft²/yr)	1373
Source (kBtu/ft²/yr)	4299
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	35
Electric Distribution Utility	
Public Service Elec & Gas Co	
National Average Comparison	
National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	1918%
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) or a Registered Architect (RA) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE or RA in double-checking the information that the building owner or operator has entered into Portfolio Manager.

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

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Richard Street Pump Station	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	Richard Street, Tenafly, NJ 07670	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		☐
Generator Shed (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	180 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	0(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	168Hours(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: Public Service Elec & Gas Co

Fuel Type: Electricity

Meter: PSE&G 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	5,040.00
11/01/2009	11/30/2009	4,080.00
10/01/2009	10/31/2009	3,520.00
09/01/2009	09/30/2009	4,480.00
08/01/2009	08/31/2009	4,160.00
07/01/2009	07/31/2009	5,760.00
06/01/2009	06/30/2009	5,120.00
05/01/2009	05/31/2009	5,840.00
04/01/2009	04/30/2009	5,760.00
03/01/2009	03/31/2009	5,040.00
02/01/2009	02/28/2009	7,280.00
01/01/2009	01/31/2009	9,760.00
PSE&G Electric Consumption (kWh (thousand Watt-hours))		**65,840.00**
PSE&G Electric Consumption (kBtu (thousand Btu))		**224,646.08**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**224,646.08**
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	10.40
11/01/2009	11/30/2009	10.40
10/01/2009	10/31/2009	13.60
09/01/2009	09/30/2009	44.90
08/01/2009	08/31/2009	63.60
07/01/2009	07/31/2009	16.70
06/01/2009	06/30/2009	9.40
05/01/2009	05/31/2009	12.50
04/01/2009	04/30/2009	13.60
03/01/2009	03/31/2009	9.40

02/01/2009	02/28/2009	10.50
01/01/2009	01/31/2009	9.40
PSE&G Natural Gas Consumption (therms)		**224.40**
PSE&G Natural Gas Consumption (kBtu (thousand Btu))		**22,440.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**22,440.00**
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 PE or RA that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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

Facility
Richard Street Pump Station
Richard Street
Tenafly, NJ 07670

Facility Owner
Tenafly Department of Public Works
107 Grove Street
Tenafly, NJ 07670

Primary Contact for this Facility
Robert Beutel
107 Grove Street
Tenafly, NJ 07670

General Information

Richard Street Pump Station	
Gross Floor Area Excluding Parking: (ft^2)	180
Year Built	1992
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

Generator Shed	
Space Type	Other - Other
Gross Floor Area(ft^2)	180
Number of PCs[o]	0
Weekly operating hours[o]	168
Workers on Main Shift[o]	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/ft^2)	1373	1373	0	N/A	104
Source (kBtu/ft^2)	4299	4299	0	N/A	213
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/$ft^2$/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	35	35	0	N/A	3
$kgCO_2e/ft^2$/year	197	197	0	N/A	15

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 #21794
Borough of Tenafly - Richard Street Pump Station

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size/Efficiency	Location	Areas Served	Date Installed	Remaining Useful Life (years)	Other Info.
Sewage Pump	2	FLYGT	C3201 091 9773 15	9 230013 452	Submersible Pump / Electric	47 HP; 35 kW; 1750 RPM	Pit	Pit	1992	-8	Lead/Standby; #2 rebuilt 01/09
Generator	1	Magna Plus	3285B-1262B	AD 205020 SPJ	Natural Gas	115 kW; 144 kVA	Shed	Pumps	1992	-5	Good condition
Unit Heater	1	Dayton	2E670B	LN60720-024	Heating / Electric	5 kW	Shed	Shed	1992	-5	Good condition
Exhaust Fan	1	-	-	-	Exhaust / Electric	Fractional HP	Shed	Shed	1992	2	Good condition