SUSSEX BOROUGH
WATER TREATMENT FACILITY
ENERGY ASSESSMENT

for

NEW JERSEY
BOARD OF PUBLIC UTILITIES

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CHA PROJECT NO. 21181

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Prepared by:

CHA

6 Campus Drive
Parsippany, NJ 07054

(973) 538-2120

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1.0 INTRODUCTION & BACKGROUND

The Sussex Borough Water Treatment Facility is a 4,000 square foot facility located about five miles north of the Borough of Sussex on Route 23. The building was constructed in 1995 and has not had any major renovations. Water is fed from a reservoir into the water treatment plant where it is cleaned and filtered, then pumped to a storage tank for use in the borough. The building consists of a large chemical storage room, offices for the engineers and technicians, and a large water cleaning and filtering room.

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 Sussex Borough Water Treatment Facility, a 4,000 square foot facility located in the Town of Sussex. The building was constructed in 1995 and has not had any major renovations. The building consists of a large chemical storage room, offices for the engineers and technicians, and a large water cleaning and filtering room. The following areas were evaluated for energy conservation measures:

- Lighting replacement
- Heat conversion from electric to propane
- Insulation upgrades

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Potential annual savings of $8,800 for the recommended ECMs 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 costs, savings, and paybacks for the recommended ECMs follows:

ECM-3 Lighting Replacement

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
4,300	4.3	10,870	0	1,700	5.0	800	2.5	2.1

* Incentive shown is per the 2009 New Jersey Smart Start Program's Prescriptive Lighting Application.

ECM-4 Change Electric Heat to Propane

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
16,100	78	91,250	(3,980)	$7,100	7.0	NA	2.3	NA

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

3.0 EXISTING CONDITIONS

3.1 Building General

The Sussex Borough Water Treatment facility supplies all of the borough's drinking water needs. There are two main rooms, consisting chemical storage and water treatment areas; the southwest corner of the facility contains an office area. Water enters the building in the chemical room where various chemicals are added for treatment. The water then travels through piping to the main flocculators where sediment is removed. After this process, the water goes through filters which further enhance purity, and then it is pumped to the large storage tank behind the building. The operating engineer of the facility stated that the water treatment process is only operating at about half capacity.

The building walls and roof are insulated metal panels attached to an internal steel structure. The building has three doors and two windows. The office area is located in the southwest corner and includes the electrical transformer room, desks for the two full time staff, storage space, and a restroom with a shower. Above the offices is a large storage area (approximately 800 square feet) for various spare parts.

The building is operated seven days a week by a staff of two engineers. Monday through Friday the building is occupied from 8:00 AM to 3:00 PM and on the weekends from 8 AM to 12:00 noon. The temperature of the building remains at a constant 55°F in the winter except for the office spaces which are heated and cooled by three packaged terminal air conditioner (PTAC) units. The two large rooms are not air conditioned. If the temperature is permitted to go below 55°F condensation can occur causing issues with the water treatment equipment.

The building stores chemicals used in the water treatment process and has large chlorinated tanks of water which create a corrosive environment. As a result, the water treatment equipment is deteriorating faster than it would in a noncorrosive setting. Most noticeably, the 14 electric heaters that are used in the building are showing signs of rust, along with some of the motor components in the main water treatment room.

3.2 Utility Usage

The facility uses only electricity and water. The water usage is not metered. Electricity is generated by Jersey Central Power and Light (JCP&L) and delivered by First Energy. To determine energy costs, generation and delivery charges were added to obtain a blended kWh cost.

From January 2009 through December 2009 electricity usage totaled about 248,480 kWh at a cost of $37,800. After breaking down the energy bills, it was determined that the facility was charged a supply charge of $0.138 per kWh and a demand charge of $4.19 per kW. The sum of the supply and demand charges result in a blended rate of $0.152 kWh. There is a noticeable spike in energy use during winter months because the building uses electricity for heat.

3.3 HVAC Systems

Primary heating is provided by 14 QMark electric space heaters, each drawing 5 kW of power. These units are suspended at about 10' from the floor in various locations throughout the chemical storage room and the main room. There are also two Marley Electric wall mounted electric heaters in the office area hallway that each draws 4 kW.

The water treatment area of the building and chemical storage area are not air conditioned. The offices have three GE PTAC units that provide one ton of cooling each. These units are also capable of providing 11,700 Btu of heat to the office spaces.

Ventilation is achieved with a manual switch that controls fans in the chemical storage area. There is also a 24" diameter fan located in the storage area above the office space that is controlled by a manual switch. These fans are not run very often according to the building operator; therefore, only minimal ventilation was accounted for in the building load calculations. Buildings with chemical storage can exhaust excessive amounts of air which may be a potential energy conservation measure. It was determined through field work that the water treatment facility's exhaust system is working properly, so a retrofit of the current system would not be feasible.

3.4 Lighting/Electrical Systems

The facility is lit by a variety of lights, mainly high intensity discharge (HID) fixtures, each containing a halogen bulb and metal halide bulb. These lights are located in the water treatment and chemical storage rooms. The metal halide bulbs in the building consist of (9) 175 W, (6) 150 W, and (5) 250 W fixtures. All 175 watt HIDs have a 150 W halogen bulb, 150 W HIDs have a 100 W, and all 250 W HIDs have a 250 W bulb. HID fixtures take about five minutes to reach maximum brightness; halogens are significantly faster.

In addition to the HID fixtures, there are (14) 2-lamp T12 fixtures that light the main hallway, offices, and restroom. There are also two 300 W incandescent bulbs in the storage area above the office space.

All lights in this facility are considered inefficient by industry standards and more efficient lights could be implemented for energy savings.

3.5 Controls Systems

The 14 electric unit heaters are controlled by two mechanical thermostats located on the southern end of the building. The main rooms have no air conditioning in the summer, and the temperature remains at 55°F when heating is required. Temperature setback is not an option for this building because of the sensitive nature of the water treatment equipment. Additionally, setback would not make economic sense because the 55°F temperature setpoint is already very low.

The office area's electric heaters and PTAC units are operated manually and do not have set temperatures.

3.6 Plumbing Systems

Domestic hot water is produced by an on-demand hot water heater located in the restroom. The only domestic hot water usage is hand washing and occasional shower. The one restroom in the facility contains a toilet, sink, and shower which are low flow.

3.7 Water Treatment Process

The water treatment process requires a very complex plumbing system with 16 different motors performing multiple tasks. The larger motors (5 HP and above) are NEMA premium efficiency. They do not run for extended periods of time; therefore, variable speed drives (VSDs) are not economically feasible. The smaller motors are standard efficiency but run infrequently; therefore, considering conversion to premium efficiency was not warranted. A summary of all motors, sizes, run times, and functions are as follows:

Pump Type	Qty	Manufacturer	Model #	Size/Capacity	Usage/year
Clear Well Pumps	1	GE	5K5213QPM303 4ABL	7.5 HP, 90.2% efficient, 1755 RPM	8,760 hours
Clear Well Pumps	1	GE	5K5213QPM303 4ABL	7.5 HP, 90.2% efficient, 1755 RPM	4,380 hours, staged with load requirements
Clear Well Pumps	1	GE	5K5213QPM303 4ABL	7.5 HP, 90.2% efficient, 1755 RPM	staged with load requirements
Blower Pump	1	Siemens	REZ5D	5 HP, 3475 RPM, 82.8% Efficient	100 hours
Blower Pump	1	Siemens	REZ5D	5 HP, 3475 RPM, 82.8% Efficient	100 hours
Filter Sample Pump	1	GE	5KC37RN35G	1/2 HP	8,760 hours
Flocculator Motor	1	SEW Eurodrive Motor	OF241F80T9084 8MSCTF	1.5 HP at 1700 RPM. Standard efficiency	8,760 hours
Flocculator Motor	1	SEW Eurodrive Motor	OF241F80T9084 8MSCTF	1.5 HP at 1700 RPM. Standard efficiency	back up for other flocculator motor
Air Compressor Motor	1	Baldor	unknown	3 HP at 3450 RPM Standard Efficiency	2,920 hours per year
Air Compressor Motor	1	Baldor	unknown	3 HP at 3450 RPM Standard Efficiency	2,920 hours per year
Carbon Feeder	2	GE	345322W369	.5 HP 1725 RPM, Standard efficiency	Never used
Decant Pump	1	A.O. Smith	F-391315-63	1 HP, 1755 RPM, 82.5% efficient	5,475 hours
Decant Pump	1	Baldor	M35A01539661	1 HP, 1755 RPM, 82.5% efficient	staged with other decant pump
Sludge Pump	1	Baldor	M35A15746E7	1.5 HP, 86.5% efficient	100 hours
Sludge Pump	1	Baldor	M35A15746E8	1.5 HP, 86.5% efficient	100 hours

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Install Roof Insulation

The roof of the facility consists of insulated metal panels with a thermal resistance (R-value) of about 15. Thermal resistance determines how much heat can be transferred through the material. There is no attic space in the building, and the roof is pitched so the ceiling has varying heights. The ceiling height is about 18 feet on the sides of the building, and about 25 feet at the apex. The roof has a very low thermal resistance by today's standards and this ECM proposes installing 3" of polyisocyanurate foam board to the ceiling to increase the thermal resistance to R-29.

To determine the potential savings for this ECM, the existing thermal resistance of the roof was compared with the proposed thermal resistance after adding the foam board. Heat loss in both existing and proposed conditions was determined by analyzing temperature bin data from Newark, NJ. The difference between heat losses at existing and proposed conditions resulted in a savings of about 2,920 kWh per year.

Before implementing this ECM, further analysis is required to determine that polyisocyanurate board would be compatible with the caustic environment of the water treatment facility. Another material or a special coating may need to be used to prolong the life of this ECM. A contingency factor of 20% has been added to the cost estimate to account for this variable.

Roof insulation material has a life expectancy of about 20 years according to manufacturer data, and total energy savings over the life of the project would be 58,400 kWh and $8,000.

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

ECM-1 Install Roof Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
10,900	0	2,920	0	400	(.2)	NA	>25	NA

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

This measure is not recommended.

4.2 ECM-2 Increase Wall Insulation

The walls of the facility are constructed of the same insulated metal panels as the roof. The material has a thermal resistance, or R-value, of about 15. This ECM proposes adding 2" of polyisocyanurate foam board to the interior of the walls for a total R-value of 29.

To determine the savings for this ECM, the existing thermal resistance was compared with the proposed thermal resistance of the walls after addition of the foam board. Heat loss was determined by analyzing temperature bin data from Newark, NJ; the difference between both heat losses showed a savings of about 3,440 kWh per year.

Similarly to the roof insulation, further investigation may be necessary to determine if polyisocyanurate board would be compatible with the chemically influenced environment of the water treatment facility. A 20% contingency cost has been added to account for this possibility.

Wall insulation material has a life expectancy of about 20 years according to manufacturer data, and the total energy savings over the life of the project would be 68,800 kWh and $10,000.

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

ECM-2 Increase 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
12,300	0	3,440	0	500	(.2)	NA	24.6	NA

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

This measure is not recommended.

4.3 ECM-3 Lighting Replacement

The main areas of the water treatment facility are lit primarily with metal halide and halogen bulbs. There are a total of 20 metal halide fixtures that are paired with a halogen bulb. As stated previously, the metal halides take time to reach their full illumination while halogens provide light almost instantaneously. HIDs are inefficient by today's standards, and this ECM proposes replacement with T5 high output bulbs and ballasts.

In addition, there are (14) 2-lamp T12 fixtures in the office area and restrooms. Each fixture has magnetic ballasts which are considered inefficient by today's standards. The ECM assesses changing out the magnetic ballast T12 lights with more efficient electronic ballast T8 fixtures.

This ECM also proposes changing out the two 300 W incandescent bulbs in the storage area above the offices. These lights would be replaced with compact fluorescent lights that have the same lighting output but use significantly less energy.

To calculate the savings associated with this ECM, the energy usage of the existing and proposed lighting was determined. The difference, about 10,870 kWh per year, is the savings.

Lighting has a life expectancy of about 15 years according to manufacturer data, and the total energy savings over the life of the project would be 163,050 kWh and $25,500.

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

ECM-3 Lighting Replacement

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
4,300	4.3	10,870	0	1,700	5.0	800	2.5	2.1

* Incentive shown is per the 2009 New Jersey Smart Start Program's Prescriptive Lighting Application.

This measure is recommended.

4.4 ECM-4 Change Electric Heat to Propane

The water treatment facility is heated by (14) electric units which are controlled by two thermostats. The building is maintained at 55°F during the winter. This temperature setpoint is not very high; however, electric heat is expensive, which causes a significant rise in electricity cost for the winter months. This ECM proposes eliminating the unit heaters, and replacing them with three 90 MBtu infrared (IR) heaters. This amount of heat output would be comparable to what is currently in the building. Propane is a cheaper heating option, and infrared heaters are more efficient than regular gas unit heaters, operating at about 85% efficiency. The heaters use radiation to heat surfaces rather than circulating heat throughout the building air stream; therefore, operate without a fan.

To determine savings associated with switching electric heat to propane, the summer kWh usages were averaged together for the months of May through September. The resulting kWh of 13,330 was established as a base electrical load for the year, which is the amount of electricity used independent of weather conditions. It was then assumed that kWh usage above the base load is attributable to electric heating.

It was determined the facility uses about 91,250 kWh per year for heating. By changing from electric to propane IR heaters, electrical usage would be eliminated saving about $13,900 per year. The PTAC units in the offices would still be used for heat which slightly reduces the kWh savings. IR heaters work best in large open spaces and would not be practical in the office areas. Because the switch is being made from electrical heat to propane heat, the amount of propane usage must be determined. Propane usage was calculated by using conversion factors between the amount of energy in 1 kWh versus 1 gallon of propane. It was determined that the building would require about 3,980 gallons of propane for annual heating. The cost of propane was assumed to be about $1.70/gallon based on costs from the Sussex Borough DPW building. It would cost about $6,800 per year to heat the building with propane.

Infrared heaters have a life expectancy of 18 years, according to ASHRAE, and the total energy savings over the life of the project would be approximately 1,642,500 kWh and $127,800.

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

ECM-4 Change Electric Heat to Propane

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
16,100	78	91,250	(3,980)	$7,100	7.0	NA	2.3	NA

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

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

The building is only eligible for Incentive #1 through the New Jersey P4P program. Incentive #1 is for the development of an energy reduction plan and will pay $.05/ square foot of the building footprint, which equates to about $200. Implementation of measures discussed in this report is only expected to save 0.5% of the building's annual energy usage, which does not qualify for Incentives #2 or #3. While a significant amount of electricity usage is expected to be eliminated by converting from electric to propane heating equipment, there is no net energy savings due to the increase in propane usage. Therefore, a sufficient percentage of energy reduction could not be achieved for the additional incentives. See appendix F for calculations.

5.2.2 New Jersey Smart Start Program

The water treatment facility is eligible for a lighting incentive through the New Jersey Smart Start Program. This incentive is for replacing the existing metal halide fixtures for more efficient, T5 fluorescent fixtures. The total incentive amount would be about $800 and is expected to reduce the payback period of the ECM from about 2.5 to 2.1 years.

5.2.3 Energy Efficient and Conservation Block Grant

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

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

The water treatment facility does pay the societal benefits charge which makes it ineligible for this program.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Geothermal

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

The building uses electric heating equipment and PTAC units for air conditioning in the office area. To take advantage of a GHP system, the existing HVAC 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.

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

The water treatment 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 G.

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 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.

The building had a maximum electricity demand of 81.7 kW and a minimum of 49.3 kW, from January 2009 through December 2009. The monthly average over the observed 12 month period was 71.6 kW. The existing load is large enough to justify the maximum incentive amount of 50 kW provided by the state of New Jersey. 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 G and summarized below:

Photovoltaic (PV) Rooftop Solar Power Generation – 50 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
400,000	0	59,150	0	9,000	9,000	50,000	28,800	>25	9.3

*Incentive based on New Jersey Renewable Energy Program for non-residential applications of $1.00 per Watt of installed capacity
** Estimated Solar Renewable Energy Certificate Program (SREC) for 15 years at $487/1000 kWh

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

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. DHW is presently produced by a natural gas fired water heater and, therefore, this measure would not save site electricity.

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

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

Solar Thermal Domestic Hot Water Plant

Budgetary Cost	Annual Utility Savings				Total Savings	New Jersey Renewable Energy Incentive	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	$	$	Years	Years
27,100	0	630	0	100	100	NA	>25	NA

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

This measure is not recommended.

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 are 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 Sussex Borough area, the map shown in the appendices indicates a mean annual wind speed of under 10 miles per hour. For the water treatment facility, there are site restrictions. Parking lots, trees and surrounding structures would greatly affect a tower location.

A wind speed map and aerial site photo are included in Appendix I.

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

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 water treatment facility 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 very 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 and no need for cooling. The most viable selection for a CHP plant at this location would be a reciprocating engine natural gas-fired unit. Purchasing this system and performing modifications to the existing HVAC and electrical systems would greatly outweigh the savings over the life of the equipment.

This measure is not recommended.

6.5 Biomass Power Generation

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

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

- Wood wastes not adulterated with chemicals, glues or adhesives
- Agricultural residues (corn stover, rice hulls or nut shells, manures, poultry litter, horse manure, etc) and/or methane gases from landfills

- Food wastes
- Municipal tree trimming and grass clipping wastes
- Paper and cardboard wastes
- Non adulterated construction wood wastes, pallets

The NJDEP evaluates biomass resources not identified in the RPS.

Examples of eligible facilities for a CORE incentive include:

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

* from NJOCE Website

This measure is not recommended because of noise issues, potential zoning issues, and because the water treatment facility does not have a steady waste stream to fuel the power generation system. Additionally, purchasing this system and performing modifications to the existing HVAC and electrical systems would greatly outweigh the savings over the life of the equipment.

6.6 Demand Response Curtailment

Utility Curtailment is an agreement with the 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 incentives are offered 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 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.

JCP&L does not currently have a Demand Response Curtailment, or Load shedding program for its customers so this is not an option for the water treatment facility.

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 water treatment facility is considered a high energy consumer per the Portfolio Manager with a Site Energy Usage Index (EUI) of 209 kBTU/ft^2/year. Several factors contribute to the unfavorable EUI, including, poorly insulated walls and ceilings; inefficient lighting; and the use of electric heating equipment. By implementing the measures discussed in this report, it is expected that the EUI can be reduced to approximately 118 kBTU/ft^2/year. The EPA Portfolio Manager did not generate an energy rating score for this building because utility data was not provided for months within the last 120 days.

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

The user name and password for the water treatment facility's EPA Portfolio Manager Account has been provided to Cathy Gleason, the Clerk of Sussex Borough.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Sussex Borough Water Treatment Facility in Sussex, New Jersey identified potential ECMs for lighting replacement and heat conversion from electric to propane. Potential annual savings of $8,800 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-3 Lighting Replacement

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
4,300	4.3	10,870	0	1,700	5.0	800	2.5	2.1

* Incentive shown is per the 2009 New Jersey Smart Start Program's Prescriptive Lighting Application.

ECM-4 Change Electric Heat to Propane

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
16,100	78	91,250	(3,980)	$7,100	7.0	NA	2.3	NA

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

APPENDIX A

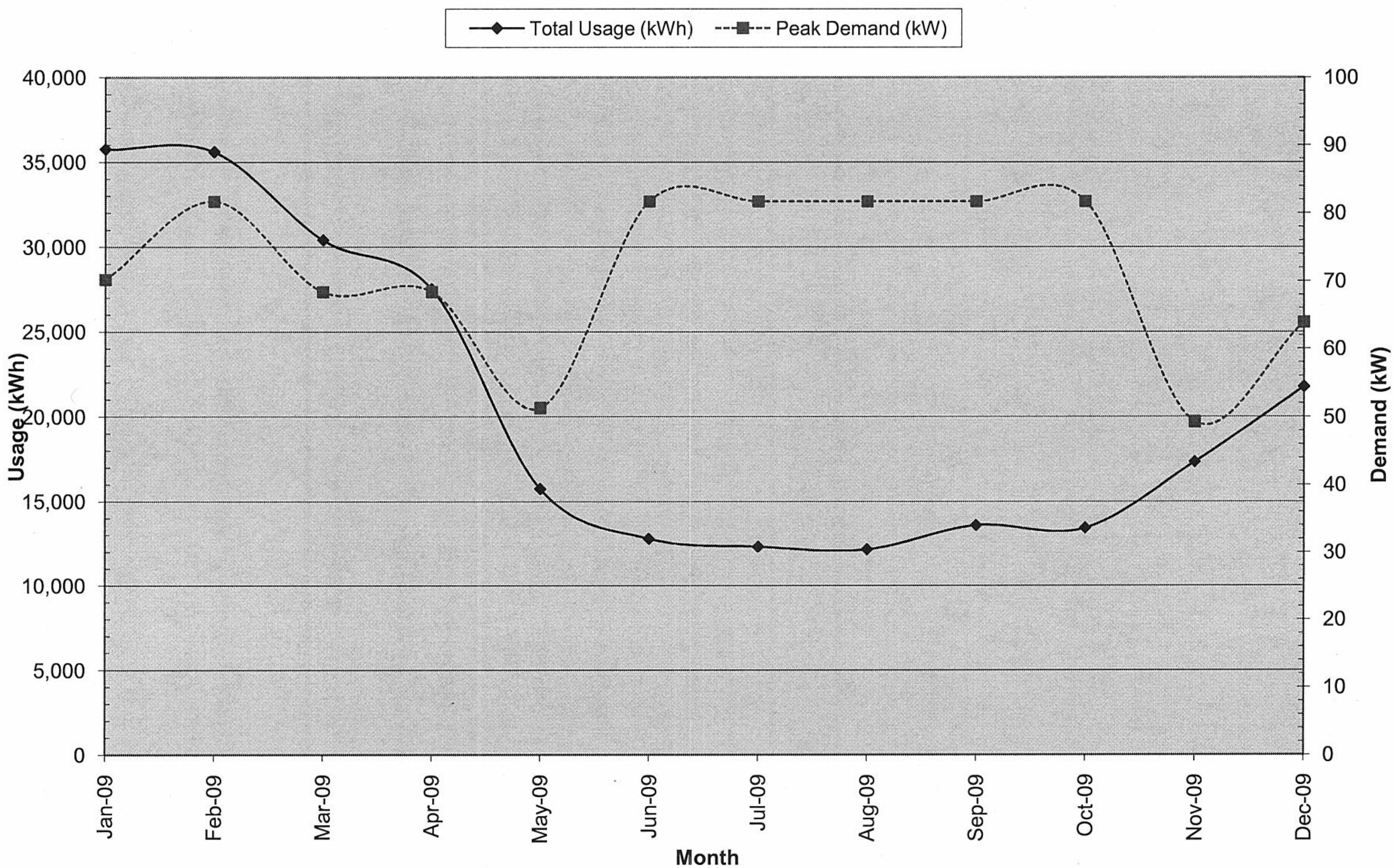
Utility Usage Analysis

New Jersey BPU Energy Audit Program
CHA Project Number: 21181
Borough of Sussex Water Treatment Facility
JCP&L - Electric Service

1182 Route 23 Sussex, NJ
Account Number: 100001609997

			Charges					Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Supply	Delivery	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
January-09	35,760	70.2	$ 5,615.58	$ 4,996.38	$ 619.20	$ 389.49	$ 5,226.09	0.1570	0.1461	5.55
February-09	35,600	81.7	$ 5,689.80	$ 4,996.98	$ 692.82	$ 463.90	$ 5,225.90	0.1598	0.1468	5.68
March-09	30,400	68.4	$ 4,797.42	$ 4,216.43	$ 580.99	$ 377.85	$ 4,419.57	0.1578	0.1454	5.52
April-09	27,520	68.4	$ 4,323.72	$ 3,757.01	$ 566.71	$ 377.85	$ 3,945.87	0.1571	0.1434	5.52
May-09	15,760	51.3	$ 2,278.73	$ 1,460.95	$ 817.78	$ 267.21	$ 2,011.52	0.1446	0.1276	5.21
June-09	12,800	81.7	$ 1,875.76	$ 1,186.56	$ 689.20	$ 226.57	$ 1,649.19	0.1465	0.1288	2.77
July-09	12,320	81.7	$ 1,816.17	$ 1,142.06	$ 674.11	$ 226.57	$ 1,589.60	0.1474	0.1290	2.77
August-09	12,160	81.7	$ 1,813.44	$ 1,144.36	$ 669.08	$ 226.57	$ 1,586.87	0.1491	0.1305	2.77
September-09	13,600	81.7	$ 1,975.07	$ 1,260.72	$ 714.35	$ 226.57	$ 1,748.50	0.1452	0.1286	2.77
October-09	13,440	81.7	$ 1,949.84	$ 1,245.89	$ 703.95	$ 226.57	$ 1,723.27	0.1451	0.1282	2.77
November-09	17,360	49.3	$ 2,551.65	$ 1,699.27	$ 852.38	$ 254.27	$ 2,297.38	0.1470	0.1323	5.16
December-09	21,760	63.9	$ 3,144.31	$ 2,059.98	$ 1,084.33	$ 348.73	$ 2,795.58	0.1445	0.1285	5.46
Total	248,480	81.7	$37,831.49			$3,612.15	$34,219.34	0.1523	0.1377	4.19
Most Recent Yr	248,480	81.7	$37,831.49			$3,612.15	$34,219.34	0.1523	0.1377	4.19

Electric Usage - Sussex Borough Water Treatment Facility



APPENDIX B

ECM-1 Install Roof Insulation

Borough of Sussex
CHA #21181
Building: Water Treatment Facility

ECM 1 Install Roof Insulation

Existing Roof Area	4,160	sf
Existing U-value	0.07	Btu/hr/(sf*F)
Proposed R-value	29	
Proposed U-value	0.03	Btu/hr/(sf*F)
Heating System Efficiency	100%	
Cooling System Efficiency	0.00	kW/ton

Existing Cooling

Existing Cooling Load Temp Diff.	73	F
Existing Max. Roof Cooling Load	50,613	Btu/hr

Proposed Cooling

Proposed Cooling Load	26,179	Btu/hr
Occupied Cooling Setpoint	72	F
Unoccupied Cooling Setpoint	80	F

Existing Heating

Existing Heating Load Temp Diff.	63	F
Existing Max. Roof Heating Load	36,400	Btu/hr

Proposed Heating

Proposed Heating Load	18,828	Btu/hr
Occupied Heating Setpoint	55	F
Unoccupied Heating Setpoint	55	F

Existing Heating Total	20,664,800	Btu/yr
Proposed Heating Total	10,688,690	Btu/yr
Savings	9,976,110	Btu/yr
Input	2,924	**kWh**
Existing Cooling Total	-	kWh/yr
Proposed Cooling Total	-	kWh/yr
Savings	-	kWh/yr

Avg Outdoor Air Temp. Bins °F	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Occupied: Existing Heat Gain	Occupied: Proposed Heat Gain	Occupied: Existing Heat Loss	Occupied: Proposed Heat Loss	Unoccupied: Existing Heat Gain	Unoccupied: Proposed Heat Gain	Unoccupied: Existing Heat Loss	Unoccupied: 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)
102.5	0	0	0	8,459	4,375	-	-	6,240	3,228	-	-	-	-	-	-
97.5	3	1	2	7,072	3,658	-	-	4,853	2,510	-	-	-	-	-	-
92.5	34	9	25	5,685	2,941	-	-	3,467	1,793	-	-	-	-	-	-
87.5	131	34	97	4,299	2,223	-	-	2,080	1,076	-	-	-	-	-	-
82.5	500	128	372	2,912	1,506	-	-	693	359	-	-	-	-	-	-
77.5	620	159	461	1,525	789	-	-	-	-	-	-	-	-	-	-
72.5	664	170	494	139	72	-	-	-	-	-	-	-	-	-	-
67.5	854	219	635	-	-	-	-	-	-	-	-	-	-	-	-
62.5	927	237	690	-	-	-	-	-	-	-	-	-	-	-	-
57.5	600	154	446	-	-	-	-	-	-	-	-	-	-	-	-
52.5	610	156	454	-	-	693	359	-	-	693	359	-	422,933	-	218,759
47.5	611	156	455	-	-	2,080	1,076	-	-	2,080	1,076	-	1,270,880	-	657,352
42.5	656	168	488	-	-	3,467	1,793	-	-	3,467	1,793	-	2,274,133	-	1,176,276
37.5	1,023	262	761	-	-	4,853	2,510	-	-	4,853	2,510	-	4,964,960	-	2,568,083
32.5	734	188	546	-	-	6,240	3,228	-	-	6,240	3,228	-	4,580,160	-	2,369,048
27.5	334	85	249	-	-	7,627	3,945	-	-	7,627	3,945	-	2,547,307	-	1,317,572
22.5	252	65	188	-	-	9,013	4,662	-	-	9,013	4,662	-	2,271,360	-	1,174,841
17.5	125	32	93	-	-	10,400	5,379	-	-	10,400	5,379	-	1,300,000	-	672,414
12.5	47	12	35	-	-	11,787	6,097	-	-	11,787	6,097	-	553,973	-	286,538
7.5	22	6	16	-	-	13,173	6,814	-	-	13,173	6,814	-	289,813	-	149,903
2.5	13	3	10	-	-	14,560	7,531	-	-	14,560	7,531	-	189,280	-	97,903
-2.5	0	0	0	-	-	15,947	8,248	-	-	15,947	8,248	-	-	-	-
-7.5	0	0	0	-	-	17,333	8,966	-	-	17,333	8,966	-	-	-	-
TOTALS	**8,760**	**2,242**	**6,518**									-	**20,664,800**	-	**10,688,690**

Borough of Sussex
CHA #21181
Building: Water Treatment Facility

ECM 1 Install Roof 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.		
R-14 Polyisocyanurate Board Insulation	4160	ft^2	$ 0.84	$ 0.46		$ 3,425	$ 2,315	$ -	$ 5,740	
High Rising Work Platform	1	LS			$ 2,000	$ -	$ -	$ 2,180	$ 2,180	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 7,920	Subtotal
$ 1,584	20% Contingency
$ 1,426	Contractor 15% O&P
$ -	Engineering
$ 10,930	**Total**

APPENDIX C

ECM-2 Increase Wall Insulation

Borough of Sussex
CHA #21181
Building: Water Treatment Facility

ECM 2 Increase Wall Insulation

Total Existing Wall Area	4,893	sf
Existing U-value	0.07	Btu/hr/(sf*F)
Proposed U-value	0.03	Btu/hr/(sf*F)
Heating Efficiency	100%	
Cooling Efficiency	0.00	kW/ton

Existing Cooling		
Max. North Wall Cooling Load	3,443	Btu/hr
Max. East Wall Cooling Load	9,087	Btu/hr
Max. South Wall Cooling Load	4,743	Btu/hr
Max. West Wall Cooling Load	5,163	Btu/hr
Proposed Cooling		
Max. North Wall Cooling Load	1,781	Btu/hr
Max. East Wall Cooling Load	4,700	Btu/hr
Max. South Wall Cooling Load	2,453	Btu/hr
Max. West Wall Cooling Load	2,670	Btu/hr
Occupied Cooling Setpoint	72	F
Unoccupied Cooling Setpoint	80	F
Existing Cooling Total	-	kWh/yr
Proposed Cooling Total	-	kWh/yr
Savings	-	kWh/yr

Existing Heating		
Existing Heating Load Temp Diff.	53	F
Existing Max. Wall Heating Load	42,814	Btu/hr
Proposed Heating		
Proposed Max. Heating Load	22,145	Btu/hr
Occupied Heating Setpoint	55	F
Unoccupied Heating Setpoint	55	F
Existing Heating Total	24,305,978	Btu/yr
Proposed Heating Total	12,572,057	Btu/yr
Savings	11,733,920	Btu/yr
Input	3,439	kWh

				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	1	2	22,436	11,605	-	-	22,436	11,605	-	-	-	-	-	-
92.5	34	9	25	18,037	9,329	-	-	16,026	8,289	-	-	-	-	-	-
87.5	131	34	97	13,638	7,054	-	-	9,615	4,973	-	-	-	-	-	-
82.5	500	128	372	9,238	4,778	-	-	3,205	1,658	-	-	-	-	-	-
77.5	620	159	461	4,839	2,503	-	-	-	-	-	-	-	-	-	-
72.5	664	170	494	440	228	-	-	-	-	-	-	-	-	-	-
67.5	854	219	635	-	-	-	-	-	-	-	-	-	-	-	-
62.5	927	237	690	-	-	-	-	-	-	-	-	-	-	-	-
57.5	600	154	446	-	-	-	-	-	-	-	-	-	-	-	-
52.5	610	156	454	-	-	816	422	-	-	816	422	-	497,455	-	257,304
47.5	611	156	455	-	-	2,447	1,265	-	-	2,447	1,265	-	1,494,812	-	773,178
42.5	656	168	488	-	-	4,078	2,109	-	-	4,078	2,109	-	2,674,840	-	1,383,538
37.5	1,023	262	761	-	-	5,709	2,953	-	-	5,709	2,953	-	5,839,796	-	3,020,584
32.5	734	188	546	-	-	7,340	3,796	-	-	7,340	3,796	-	5,387,193	-	2,786,479
27.5	334	85	249	-	-	8,971	4,640	-	-	8,971	4,640	-	2,996,147	-	1,549,731
22.5	252	65	188	-	-	10,602	5,484	-	-	10,602	5,484	-	2,671,578	-	1,381,851
17.5	125	32	93	-	-	12,233	6,327	-	-	12,233	6,327	-	1,529,063	-	790,894
12.5	47	12	35	-	-	13,864	7,171	-	-	13,864	7,171	-	651,585	-	337,026
7.5	22	6	16	-	-	15,495	8,014	-	-	15,495	8,014	-	340,879	-	176,317
2.5	13	3	10	-	-	17,126	8,858	-	-	17,126	8,858	-	222,632	-	115,154
-2.5	0	0	0	-	-	18,757	9,702	-	-	18,757	9,702	-	-	-	-
-7.5	0	0	0	-	-	20,388	10,545	-	-	20,388	10,545	-	-	-	-
TOTALS	8,760	2,242	6,518									-	24,305,978	-	12,572,057

Borough of Sussex
CHA #21181
Building: Water Treatment Facility

ECM 2 Increase 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.		
2" R-14 Polyisocyanurate Insulation	4893	ft^2	$ 0.84	$ 0.46		$ 4,028	$ 2,723	$ -	$ 6,751	
High Rise Working Platform	1	LS			$ 2,000	$ -	$ -	$ 2,180	$ 2,180	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 8,931	Subtotal
$ 1,786	20% Contingency
$ 1,608	Contractor 15% O&P
$ -	Engineering
$ 12,325	**Total**

APPENDIX D

ECM-3 Lighting Replacement

Borough of Sussex
CHA #21181
Building: Water Treatment Facility

ECM 3 Replacement of Incandescent and T-12 lights

Building Schedule:
Existing conditions (master switch): hrs/week
Supply Electric Rate $ 0.138 /kWh
Demand Rate $ 4.19 /kW

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

	EXISTING CONDITIONS									
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
Main Area Metal Halide	9	MH175/1	215	0	219.3	1.935	switch	6	2,190	4,238
Main Area Halogen	6	MH150/1	190	0	193.8	1.14	switch	6	2,190	2,497
Main Area Metal Halide	5	MH250/1	295	0	300.9	1.475	switch	6	2,190	3,230
Main Area Halogen	9	H150/1	150	0	153	1.35	switch	6	2,190	2,957
Main Area Metal Halide	6	H100/1	100	0	102	0.6	switch	6	2,190	1,314
Main Area Halogen	5	H250/1	250	0	255	1.25	switch	6	2,190	2,738
Upper Storage Area	2	I300/1	300	0	306	0.6	switch	2	730	438
	14	EE	144	0	146.88	2.016	switch	6	2,190	4,415
TOTALS -	**56**			**0**		**10.4**				**21,826**

	RETROFIT CONDITIONS								COST ANALYSIS				
Area Description	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
Main Area Metal Halide	4	F44GHL	234	0.936	switch	6	2,190	6	1.00	4,232	$ 633	$ 502	0.8
Main Area Halogen	4	F44GHL	234	0.936	switch	6	2,190	2,050	0.20	447	$ 72	$ 502	7.0
Main Area Metal Halide	4	F44GHL	234	0.936	switch	6	2,190	2,050	0.54	1,180	$ 190	$ 502	2.6
Main Area Halogen	2	F44GHL	234	0.468	switch	6	2,190	1,025	0.88	1,932	$ 310	$ 251	0.8
Main Area Metal Halide	2	F44GHL	234	0.468	switch	6	2,190	1,025	0.13	289	$ 46	$ 251	5.4
Main Area Halogen	2	F44GHL	234	0.468	switch	6	2,190	1,025	0.78	1,713	$ 275	$ 251	0.9
Upper Storage Area	2	CFT50/2-BX	108	0.216	switch	2	730	158	0.38	280	$ 58	$ 251	4.3
	14	F44LL	118	1.652	switch	6	2,190	3,618	0.36	797	$ 128	$ 1,757	13.7
TOTALS -	**34**			**6.1**				**10,956**	**4.3**	**10,870**	**$ 1,712**	**$ 4,266**	**2.5**

APPENDIX E

ECM-4 Change Electric Heat to Propane

Borough of Sussex
CHA #21181
Building: Water Treatment Facility

ECM 4 Change Electric Heat to Propane

$	0.152	$/kWh blended
$	1.70	$/gallon propane

Conversion Factors	
3,412	Btu/kW
92,000	Btu/gal LP

Existing					
Heating kWh	Total equipment kW	Operating hours	Efficiency	Btu	Cost/year
91,248	78	1,170	100%	266,136	$ 13,897

Total Equipment			
Unit	Size (kW)	Quantity	Total kW
Electric Unit Heater	5	14	70
Electric Wall Heater	4	2	8
		Total	78

Proposed		
Efficiency	Gallons Propane	Cost/year
85%	3,981	$ 6,762

Month	Consumption (kWh)
January-09	35,760
February-09	35,600
March-09	30,400
April-09	27,520
May-09	15,760
June-09	12,800
July-09	12,320
August-09	12,160
September-09	13,600
October-09	13,440
November-09	17,360
December-09	21,760
Total	248,480
Most Recent Yr	248,480

Base Load 13,328

Month	Heating Consumption (kWh)
January-09	22,432
February-09	22,272
March-09	17,072
April-09	14,192
May-09	2,432
June-09	-
July-09	-
August-09	-
September-09	272
October-09	112
November-09	4,032
December-09	8,432
Total:	91,248

Borough of Sussex
CHA #21181
Building: Water Treatment Facility

ECM 4 Change Electric Heat to Propane

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 Removal	16	heaters		$ 30.00		$ -	$ 581	$ -	$ 581	
						$ -	$ -	$ -	$ -	
High Intensity Propane Heater 90MBH	3	heaters	$ 680.00	$ 250.00		$ 1,999	$ 908	$ -	$ 2,907	
Miscellaneous Gas Piping, Valves, etc.	3	LS	$ 750.00	$ 350.00		$ 2,205	$ 1,271	$ -	$ 3,476	
4" Class B Vent Piping	100	feet	$ 6.70	$ 10.00		$ 657	$ 1,210	$ -	$ 1,867	
Miscellaneous electrical	1	LS	$ 500.00	$ 250.00		$ 490	$ 303	$ -	$ 793	
Propane Line Piping	250	feet	$ 2.78	$ 6.30		$ 681	$ 1,906	$ -	$ 2,587	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 12,209	Subtotal
$ 1,831.34	15% Contingency
$ 2,106.04	15% Contractor O&P
$ -	0% Engineering
$ 16,146	**Total**

Cost is for (3) 90 MBH Modine Infrared Heaters

Cost for heater from www.shophmac.com
Engineering sizing analysis for the space may need to be performed.

APPENDIX F

New Jersey Pay For Performance Incentive Program

Borough of Sussex
CHA #21181
Water Treatment Facility

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per January, 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.

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

Total Building Area (Square Feet)	4,000
Is this audit funded by the NJ BPU (Y/N)	Yes

Bureau of Public Utilites (BPU)

	Annual Utilities		
	kWh	Therms	Propane
Existing Cost (from utility)	$37,831	$0	$0
Existing Usage (from utility)	248,480	0	0
Proposed Savings	108,481	0	-3,981
Existing Total MMBtus	848		
Proposed Savings MMBtus	4		
% Energy Reduction	**0.5%**		
Proposed Annual Savings	$9,817		

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

	Incentives $		
	Elec	Gas	Total
Incentive #1	$0	$0	$200
Incentive #2	$0	$0	$0
Incentive #3	$0	$0	$0
Total All Incentives	**$0**	**$0**	**$200**

Total Project Cost	$43,667
% Incentives #1 of Utility Cost*	0.5%
% Incentives #2 & #3 of Project Cost**	0.0%
Total Eligible Incentives***	$200
Project Cost w/ Incentives	$43,467

Project Payback (years)	
w/o Incentives	w/ Incentives
4.4	4.4

* 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 & #3 is 80% 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 $2 million per gas account and $2 million per electric account

APPENDIX G

Photovoltaic (PV) Rooftop Solar Power Generation

PVWatts *** AC Energy & Cost Savings

Cautions for Interpreting the Results

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	50.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	38.5 kW
Array Type:	Fixed Tilt
Array Tilt:	40.7°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	15.2 ¢/kWh

Results

Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	3.36	4139	630.37
2	4.05	4469	680.63
3	4.58	5422	825.77
4	4.84	5299	807.04
5	5.30	5838	889.13
6	5.33	5506	838.56
7	5.27	5561	846.94
8	5.25	5503	838.11
9	5.06	5338	812.98
10	4.46	5027	765.61
11	3.15	3588	546.45
12	2.87	3460	526.96
Year	4.46	59150	9008.55

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

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.

Sussex Borough
Water Treatment Facility

Cost of Electricity $0.152 $/kWh

Photovoltaic (PV) Rooftop Solar Power Generation-25kW System

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
$400,000	**0.0**	**59,150**	**0**	**$9,000**	**0**	**$9,000**	**$50,000**	**$28,800**	**44.4**	**9.3**

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

*Incentive based on New Jersey renewable energy program for non-residential applications(PV)= $1.00/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**

APPENDIX H

Solar Thermal Domestic Hot Water Plant

www.InfinitePower.org
Texas State Energy Conservation Office

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What Can I Do?

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Home Energy

FAQs

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RARE

Interactive Energy Calculators

RENEWABLE ENERGY
THE INFINITE POWER OF TEXAS

Our calculators help you understand energy production and consumption in a whole new way. Use them to develop a personal profile of your own energy use.

Carbon Pollution Calculator
Electric Power Pollution Calculator
PV System Economics
Solar Water Heating
What's a Watt?

Solar Water Heating Calculator

Water heating is a major energy consumer. Although the energy consumed daily is often less than for air conditioning or heating, it is required year round, making it a good application of solar energy. Use this calculator to explore the energy usage of your water heater, and to estimate whether a solar water heater could save you money.

Water Heater Characteristics			
Physical		**Thermal**	
? Diameter (feet)	0	? Water Inlet Temperature (Degrees F)	50
? Capacity (gallons)	0	? Ambient Temperature (Degrees F)	70
? Surface Area (calculated - sq ft)	0	? Hot Water Temperature (Degrees F)	120
? Effective R-value	NaN	? Hot Water Usage (Gallons per Day)	10
Energy Use			
239.5		? Heat Delivered in Hot Water (BTU/hr)	
0		? Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		**Electric**
0	? Overall Efficiency	0.98
0	? Conversion Efficiency	0.98
NaN BTU/hr	? Power Into Water Heater	244.4 BTU/hr
Cost		
$ 1.15 /Therm	? Utility Rates	$ .1523 /kWh
$ NaN	? Yearly Water Heating Cost	$ 95.4965
How Does Solar Compare?		
	? Solar Water Heater Cost: $ 27100	? Percentage Solar: 70
NaN years for gas	? Payback Time for Solar System	405.399 years for electric

More information on solar water heating:

Fact sheet - Solar Water Heaters
Fact sheet - Solar Water Heaters for Swimming Pools
Kids fact sheet - Heat from the Sun

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Send comments, questions, and suggestions to **website manager**.

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State Energy Conservation Office (SECO)

NJBPU Energy Audits
CHA #21181
Building: Borough of Sussex Water Treatment Facility

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.		
Synergy Solar Thermal System	2	ea			$ 3,600	$ -	$ -	$ 7,848	$ 7,848	
Piping modifications	1	ls	$ 2,000	$ 3,500		$ 1,960	$ 4,235	$ -	$ 6,195	
Electrical modifications	1	ls	$ 1,000	$ 1,000		$ 980	$ 1,210	$ -	$ 2,190	
65 Gallon Storage Tanks	2	ea	$ 200	$ 250		$ 400	$ 500	$ -	$ 900	
10 Gallon Drip Tank	2	ea	$ 100	$ 78		$ 200	$ 156	$ -	$ 356	
						$ -	$ -	$ -	$ -	

$17,489	Subtotal
$ 2,623	15% Contingency
$ 2,623	15% Contractor O&P
$ 4,372	25% Engineering
$27,108	**Total**

APPENDIX I

Wind

Wind Resource of New Jersey *Mean Annual Wind Speed at 30 Meters*

Features

- City
- Interstate Highway
- County Boundary
- Water Body

Generalized Transmission Line

Category

- Under 100 kV
- 100 kV-161 kV
- 230 kV-287 kV
- 345 kV
- 500 kV
- 735 kV +
- Step-Up
- 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.

Print this page in a more readable format: Click **Print** next to the lower-left corner of the map.

Sussex, NJ

APPENDIX J

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Water Treatment Facility

Building ID: 2266159
For 12-month Period Ending: November 30, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: April 13, 2010

Facility
Water Treatment Facility
1182 Route 23
P.O. Box 7274
Sussex, NJ 07461

Facility Owner
Sussex Borough
2 Main Street
Sussex, NJ 07461

Primary Contact for this Facility
Cathy Gleason
2 Main Street
Sussex, NJ 07461

Year Built: 1996
Gross Floor Area (ft^2): 4,000

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	836,906
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	836,906
Energy Intensity[5]	
Site (kBtu/ft^2/yr)	209
Source (kBtu/ft^2/yr)	699
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	127
Electric Distribution Utility	
FirstEnergy - Jersey Central Power & Lt Co	
National Average Comparison	
National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	228%
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.

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**

Certifying Professional
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.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, PE facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

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	Water Treatment Facility	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	1182 Route 23,P.O. Box 7274, Sussex, NJ 07461	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		☐

Water Treatment Facility (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	4,000 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	3(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	2(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist
for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity		
Meter: Jersey Central Electric (kWh (thousand Watt-hours)) **Space(s):** Entire Facility **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
10/16/2009	11/17/2009	17,360.00
09/17/2009	10/16/2009	13,440.00
08/17/2009	09/17/2009	13,600.00
07/17/2009	08/17/2009	12,160.00
06/17/2009	07/17/2009	12,320.00
05/16/2009	06/17/2009	12,800.00
04/16/2009	05/16/2009	15,760.00
03/16/2009	04/16/2009	27,520.00
02/12/2009	03/16/2009	30,400.00
01/14/2009	02/12/2009	35,600.00
12/14/2008	01/14/2009	35,760.00
Jersey Central Electric Consumption (kWh (thousand Watt-hours))		**226,720.00**
Jersey Central Electric Consumption (kBtu (thousand Btu))		**773,568.64**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**773,568.64**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity 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
Water Treatment Facility
1182 Route 23
P.O. Box 7274
Sussex, NJ 07461

Facility Owner
Sussex Borough
2 Main Street
Sussex, NJ 07461

Primary Contact for this Facility
Cathy Gleason
2 Main Street
Sussex, NJ 07461

General Information

Water Treatment Facility	
Gross Floor Area Excluding Parking: (ft^2)	4,000
Year Built	1996
For 12-month Evaluation Period Ending Date:	November 30, 2009

Facility Space Use Summary

Water Treatment Facility	
Space Type	Other - Other
Gross Floor Area(ft^2)	4,000
Number of PCs°	3
Weekly operating hours°	168
Workers on Main Shift°	2

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 11/30/2009)	**Baseline** (Ending Date 11/30/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft2)	209	209	0	N/A	104
Source (kBtu/ft2)	699	699	0	N/A	213
Energy Cost					
$/year	$ 36,107.19	$ 36,107.19	N/A	N/A	$ 17,947.46
$/ft2/year	$ 9.03	$ 9.03	N/A	N/A	$ 4.49
Greenhouse Gas Emissions					
$MtCO_2e$/year	127	127	0	N/A	63
$kgCO_2e/ft^2$/year	32	32	0	N/A	16

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 K

Equipment Inventory

New Jersey BPU Energy Audit Program
CHA #21181
Sussex
Water Treatment Facility

Description	Qty	Manufacturer Name	Model No.	Serial Number	Equipment Type	Capacity/Size	Operating Hours	Location	Areas Served
PTAC Unit	1	GE	AZ31H12D3CU3	unknown	Heating and Cooling Unit	12000 Btu Cooling, 11700 Btu Heating. 9.0 EER	Heating in Winter, Cooling in Summer	Lab Area	Lab Area
PTAC Unit	1	GE	AZ31H12D3CU3	unknown	Heating and Cooling Unit	12000 Btu Cooling, 11700 Btu Heating. 9.0 EER	Heating in Winter, Cooling in Summer	Office Area	Office Area
PTAC Unit	1	GE	AZ31H12D3CU3	unknown	Heating and Cooling Unit	12000 Btu Cooling, 11700 Btu Heating. 9.0 EER	Heating in Winter, Cooling in Summer	Lab Area	Lab Area
Hot Water Heater	1			unknown	Electric, Tankless			Restroom	Restroom
Water Booster Pump	1	Paco Flow	35A13-82F5	unknown	Electric Booster Pump	1.5 HP	5 mibutes per day	Water Treatment Floor	Water Treatment Area
Space Heater	14	Qmark	MUH0571	unknown	Electric Space Heater	5000 W	Winter	Throughout Building	Entire Building
2'x2' box fan	1	GE Motor	unknown	unknown	exhaust fan	approximately 1/3 HP	summer	Upper Storage Room	Upper Storage Room
Clear Well Pumps	1	GE	5K5213QPM3034ABL	WKP5371MKJT18	Electric Water Pump to Tower	7.5 HP at 90.2% efficiency and 1755 RPM	continuously staged with other 2 motors	Water Treatment Floor	Clean Water Resevoir
Clear Well Pumps	1	GE	5K5213QPM3034ABL	WKP5371MKJT1A	Electric Water Pump to Tower	7.5 HP at 90.2% efficiency and 1755 RPM	continuously staged with other 2 motors	Water Treatment Floor	Clean Water Resevoir
Clear Well Pumps	1	GE	5K5213QPM3034ABL	WKP5371MKT1C	Electric Water Pump to Tower	7.5 HP at 90.2% efficiency and 1755 RPM	continuously staged with other 2 motors	Water Treatment Floor	Clean Water Resevoir
Blower Pump	1	Siemens	REZ5D	Unknown (Rusted Plate)	Electric Water Treatment Pump	5 HP at 3475 RPM and 82.8% Efficient	15 minutes per day	Water Treatment Floor	Water Treatment Area
Blower Pump	1	Siemens	REZ5D	A95T0041	Electric Water Treatment Pump	5 HP at 3475 RPM and 82.8% Efficient	15 minutes per day	Water Treatment Floor	Water Treatment Area
Filter Sample Pump	1	GE	5KC37RN35G	unknown	Electric Filter Water Pump	1/2 HP	8760 hours per year	Water Treatment Floor	Filter Pumps
Flocculator Motor	1	SEW Eurodrive Motor	OF241F80T90848MSCTF	unknown	Water Agitator	1.5 HP at 1700 RPM. Standard efficiency	8760 hours per year	Water Treatment Deck	Floccullator Tank
Flocculator Motor	1	SEW Eurodrive Motor	OF241F80T90848MSCTF	unknown	Water Agitator	1.5 HP at 1700 RPM. Standard efficiency	rarely	Water Treatment Deck	Floccullator Tank
Air Compressor Motor	1	Baldor	unknown	unknown	electric motor	3 HP at 3450 RPM Standard Efficiency	2920 hours per year	Water Treatment Floor	Air Compessors for flocculator
Air Compressor Motor	1	Baldor	unknown	unknown	electric motor	3 HP at 3450 RPM Standard Efficiency	2920 hours per year	Water Treatment Floor	Air Compessors for flocculator
Carbon Feeder	2	GE	345322W369	unknown	Electric Carbon Water Feeder	.5 HP 1725 RPM	Never used	Carbon Feeding System Room	Carbon Feeding System
Decant Pump	1	A.O. Smith	F-391315-63	unknown	electric decant pump	1 HP at 1755 RPM and 82.5% efficienct	15 hours per day	sludge/decant room	decant water
Decant Pump	1	Baldor	M35A01539661	unknown	electric decant pump	1 HP at 1755 RPM and 82.5% efficienct	0 hours (staged with the other motor)	sludge/decant room	decant water
Sludge Pump	1	Baldor	M35A15746E7	unknown	electric sludge pump	1.5 HP at 86.5% efficienct	15 minutes per day	sludge/decant room	sludge tanks
Sludge Pump	1	Baldor	M35A15746E8	unknown	electric sludge pump	1.5 HP at 86.5% efficienct	15 minutes per day	sludge/decant room	sludge tanks