BOROUGH OF OCEAN GATE
WATER TREATMENT FACILITY
ENERGY ASSESSMENT

for

NEW JERSEY
BOARD OF PUBLIC UTILITIES

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1.0 INTRODUCTION & BACKGROUND

The Ocean Gate Water Treatment Plant is a 2,210 square foot facility located on the property of the Municipal Building. The building is adjacent to the Volunteer Fire House, and was built in 1937. The original building has had two major additions since construction. An addition was built in the front part, which is the southern section of the building in the 1950s, and an expansion to the back (Northern portion) of the facility occurred in 1986. The southern portion of the building serves as a storage area and the middle part of the building contains the backup clear water pump. The northern area contains the two water filtration tanks as well as the chemical storage tanks. After the water passes through the facility it is pumped up to the Ocean Gate water tower located across the street.

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 Ocean Gate Water Treatment Plant, a 2,210 square foot facility, located on the Municipal Building property. The southern portion is a storage area, the middle contains the backup clear water pump, and northern area houses two water filtration tanks and chemical storage tanks. The building has had two major additions. The following areas were evaluated for energy conservation measures:

- Night setback
- Roof/wall insulation upgrades
- Premium efficiency motors
- Window replacement
- Lighting upgrades
- Unit heater replacement

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Potential annual savings of $2,300 for the recommended ECMs may be realized with a payback of 3.8 years.

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

ECM-1 Temperature Setback

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
600	0	0	310	500	12.2	NA	1.2	NA

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

ECM-3 Install Roof Insulation on South Section of the Building

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
3,700	0	0	610	1,000	4.2	NA	3.7	NA

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

ECM-4 Increase Wall Insulation on South Section of Building

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
2,200	0	0	180	300	1.5	NA	7.3	NA

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

ECM-7 Install Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
2,200	.4	3,260	0	500	2.9	100	4.4	4.2

* Incentive is shown from New Jersey Pay for Performance Program 2010.

3.0 EXISTING CONDITIONS

3.1 Building General

The Ocean Gate Water Treatment Plant was constructed in 1937 with major additions in the 1950s and in 1986. The one story building provides potable water to the town of Ocean Gate. The whole building is concrete block, and there have been no recent upgrades to the building shell. The roof is comprised of shingles and plywood, and also has not recently been upgraded. The front part of the building has vaulted ceilings with no insulation, the middle section has 10' ceilings with insulation, and the back part of the building has 12' high ceilings with insulation.

The building is sectioned into four rooms, including a main entrance room used for storage, clear water pump room located in the middle of the building, room housing chemicals in the northeast section, and chlorination tanks located in the northwest section of the building. There is also a large green water storage tank adjacent to the building on the south side.

Water enters the building from a well located under the middle section of the building. It is then treated with chemicals, filtered, and pumped to the water tower across the street by the main 30 HP clear water pump. This pump is not located inside the water treatment plant, and is housed in a dedicated building about 100 feet from the water treatment facility. This building, located next to the emergency generator for the municipal building, houses the pump and is utilized for miscellaneous storage.

The water treatment facility's windows and doors are in various conditions. The northern section of the building has double paned windows and an insulated single garage door. The middle and southern sections of the building have single paned windows that appear to be original to construction. Many of the windows are broken and do not seal well.

The building is used once a day for less than half an hour to enable a city worker to verify that the water treatment equipment is operating properly. The building is maintained at 58°F in the winter and does not have air conditioning. There are (5) 30,000 Btu gas fired unit heaters located throughout the building for heating.

3.2 Utility Usage

The building consumes electricity provided by Jersey Central Power and Light, and gas from New Jersey Natural Gas. There is no water consumption in the building. The small building that houses the main clear water pump uses only electricity and is included on the electricity bill for the main building.

Electric utility data for the building was available from January 2009 through December of 2009. During that time period, the building consumed about 103,280 kWh of electricity, and averaged about 40 kW of demand. The water treatment facility paid about $16,000 in consumption charges which amounts to about $0.155 per kWh. The building also paid about $2,400 in demand charges, or $4.96 per kW. Blending these two costs together, the water treatment plant paid about $18,400 for electricity, or $0.178 per kWh. A chart is shown in Appendix A which outlines the building's monthly usage.

Gas usage data was also provided from January 2009 through December 2009. In 2009, the building consumed about 1,830 therms of natural gas at a cost of $2,900. The building paid an average of $1.59 per therm of natural gas. Natural gas usage increased in the building in the winter months which accounts for heating the space. A chart of natural gas usage is provided in Appendix A.

Electricity and natural gas commodity supply and delivery is presently purchased from JCP&L. The delivery component will always be the responsibility of the utility that connects the facility to the power grid 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.

The statewide average for commercial natural gas customers in the state of New Jersey was about $1.01/therm in 2009. If the Water Treatment Facility paid a rate closer to the statewide average, the facility would save about $1,100 per year. The commercial statewide average for electricity in 2009 for the state of New Jersey was about $0.144/kWh. If the building paid a rate closer to the statewide average the Water Treatment Facility would save about $3,400 per year.

3.3 HVAC Systems

The building is heated by five identical Modine natural gas fired unit heaters, each with a 30,000 Btu input capacity. One heater is located in the front part of the building facing the main entrance, and two heaters in the middle part of the building where the secondary water pump is located. There is also one heater located in the chlorine tank room on the northwest corner of the building, and one heater located in the chemical storage room on the northeast corner. Each of the heaters is controlled by dedicated manual thermostats.

There is a 2'x2' exhaust fan located in the chemical storage room which is not used often. The fan is controlled by a manual switch. The building does not have air conditioning.

3.4 Lighting/Electrical Systems

The Ocean Gate Water Treatment Facility is illuminated with 8 foot T12 fixtures with magnetic ballasts. There are (2) 2 lamp fixtures in the front room, (6) 2 lamp fixtures in the middle and northwest room, and (5) 2 lamp fixtures in the chlorination tank room. These lights are controlled by switches in each room and are used only when the building is occupied. The lights are turned off when the building is not occupied.

The building has a mobile 75 kW gas generator for emergency backup power. The unit is on the side of the building and according to maintenance personnel, has not been used in many years.

3.5 Control Systems

There is no central control system for the Water Treatment Facility. As stated previously, the gas unit heaters in the building are each controlled by dedicated manual thermostats. These thermostats are set to 58°F for the winter months. The building's heating system cannot be completely turned off because of the sensitive nature of the water treatment equipment and piping.

3.6 Plumbing System

The building has no domestic plumbing systems and no water usage. All water that enters and exits the building is for the water treatment process.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Temperature Setback

The Ocean Gate Water Treatment Facility is heated to 58°F during the heating season with (5) 30 MBH Modine gas fired unit heaters. Each unit heater is controlled by a mechanical thermostat without the ability to be programmed for setback. Not all the thermostats are set to precisely to 58°F which causes irregularities in temperature from one building zone to another, and also increases energy consumption. By installing a single programmable thermostat, and control system that ties in all five unit heaters, the building temperature could be more accurately controlled. This would allow the 58°F setpoint to be lowered for additional savings. This ECM proposes lowering the temperature setpoint from 58°F to 55°F, which will save heating costs and the equipment will still be able to function properly.

To calculate the savings that can be achieved with temperature setback, a block load model of the building was created. This model takes into account parameters such as roof and wall insulation, internal thermal gains, building infiltrations, heating efficiency, and many other details that affect the energy consumption of the building. This block load model was then compared with temperature bin data from Newark, NJ, the closest town to Ocean Gate with available data.

The block load was analyzed under both the existing and proposed heating conditions of 58°F and 55°F. The savings that can be realized by temperature setback was calculated to be about 310 therms of natural gas per year.

Programmable thermostats have a life expectancy of about 15 years according to the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE). The total savings over the life of the project would be about 4,650 therms and $7,500.

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

ECM-1 Temperature Setback

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
600	0	0	310	500	12.2	NA	1.2	NA

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

This measure is recommended.

4.2 ECM-2 Replace Unit Heaters with Infrared

As stated in the previous ECM, the building is heated with five gas fired unit heaters manufactured by Modine. Each unit heater has a rated efficiency of 80%. This ECM recommends replacing the unit heaters with gas fired infrared heaters which have efficiencies of about 85%. IR heaters use infrared radiant waves to heat the space more effectively than unit heaters, which rely on blower fans to circulate the air through the facility. Blower fans create convective heating currents in the building which can sometimes cause uneven heat distribution in certain spaces. The effectiveness of unit heaters is approximately 85%. The heating effectiveness of IR heaters is 100% because the infrared heaters radiate

heat the surfaces of the equipment in the building, creating a more evenly heated, comfortable environment.

To calculate the savings resulting from installing infrared heaters, the efficiencies and effectiveness of each technology was compared in a block load similar to the one from the previous ECM. An accurate representation of current heating usage was provided by one year's utility data information which was used as a baseline for energy consumption with the unit heaters. It was determined that by replacing the unit heaters with IR heaters, the facility could save about 340 therms of natural gas.

IR heaters have a life expectancy of 18 years, according to ASHRAE. The savings over the life of the project would be about 6,120 therms and $9,000.

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

ECM-2 Replace Unit Heaters with Infrared

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
11,500	0	(234)	340	500	(0.3)	NA	23.0	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 Install Roof Insulation on South Section of the Building

As previously noted, the building was constructed in 1937 and has had several additions. As a result, the wall and roof construction is different in each section of the building. The northern part of the building constructed in 1986 has an insulated roof; the southern part of the building has a vaulted ceiling, with no insulation. This ECM proposes adding insulation to the ceiling on the southern section of the building.

Based on thermal resistances of materials found in the ASHRAE handbooks, the existing ceiling was calculated to have a thermal resistance (or R-Value) of about 2.54 $ft^2*hr*^oF/$ Btu. This value is extremely low by today's standards. By adding roof insulation, this value could be increased to 22 $ft^2*hr*^oF/$ Btu. The difference between these two numbers, multiplied by the square footage of the roof and outdoor air temperature provided a savings of about 610 therms of natural gas per year.

Roofing insulation has an expected life of 20 years, according to ASHRAE, and total energy savings over the life of the project is estimated at 12,200 therms, and about $20,000.

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

ECM-3 Install Roof Insulation on South Section of the Building

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
3,700	0	0	490	800	4.7	NA	4.7	NA

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

This measure is recommended.

4.4 ECM-4 Increase Wall Insulation on South Section of Building

The walls on the southern part of the facility are constructed of concrete block with an exterior plaster finish. The walls are uninsulated and were calculated to have a thermal resistance of about 5.4 $ft^2*hr*^oF/$ Btu. Poorly insulated walls can cause excessive heat loss, which increases energy consumption. This ECM proposes adding wall insulation to the south side of the building which will increase the wall's thermal resistance and save energy.

By adding wall insulation to the southern section of the building, the thermal resistance will increase from 5.4 $ft^2*hr*^oF/$ Btu to about 12.4 $ft^2*hr*^oF/$ Btu. The differences between the two R-values were compared with the outdoor air temperature for Newark, NJ bin data. The total energy savings that could be achieved from implementing wall insulation into the southern part of the building would be about 180 therms or approximately $300.

Wall insulation has an expected life of about 20 years according to ASHRAE. The energy savings over the life of the project would be about 3,600 therms and $6,000.

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

ECM-4 Increase Wall Insulation on South Section of Building

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
2,200	0	0	180	300	1.5	NA	7.3	NA

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

This measure is recommended.

4.5 ECM-5 Lighting Replacement

The lighting in the facility consists of 8 foot T12 fixtures. The fixtures each have two lamps with magnetic ballasts, and there are 13 fixtures in the building. The lights are controlled by switches in each room and are turned on when someone checks the water treatment equipment (about 3 hours per week). T12 fixtures with magnetic ballasts are considered inefficient by today's standards. This ECM proposes replacing the existing fixtures with high efficient T8 lamps and electronic ballasts.

To calculate the savings that could be realized with this lighting upgrade, the existing wattages of the lights were compared with the proposed wattages. It was determined that by replacing the existing lighting fixtures, the building could save approximately 130 kWh per year.

The savings for this measure were less than $100; therefore, it is not recommended as part of the study. The usage of the lights is not enough to justify a replacement. See Appendix F for calculations.

T8 fixtures have an expected life of 15 years according to lighting manufacturers. The total energy savings over the life of the project would be 1,950 kWh and $400.

4.6 ECM-6 Window Replacement/Upgrades

A comprehensive window survey was conducted to determine the condition of each window. The building has many different types of windows in varying conditions. Each window in the northern section of the building is 4'X4', double paned and sealed well. The windows on the southern end of the building are single paned and in very poor condition. They do not seal well, and have a variety of holes and cracks. Five windows are in poor condition, three are 3' X 5' and two are 3' X 4.25'. This ECM proposes replacing all windows on the southern part of the building with double paned, low emissivity coated windows.

To calculate the savings from installing new windows, the existing window's thermal resistances and infiltration rates were compared with those of the new windows. Older windows typically have thermal resistances of about 0.9 $ft^2*hr*^oF/$ Btu and infiltration rates ranging from 0.3 to 0.6 cfm per linear foot. Because these windows are in such poor condition, it was determined from the window survey that they have a thermal resistance of about R-.75 and allow in 0.6 cfm of air per linear foot. The new windows that would be installed would have a thermal resistance of about R-2 and an infiltration rate of 0.2 cfm per linear foot. The difference between the existing conditions and the proposed conditions yielded a savings of about 120 therms of natural gas.

Windows have an expected life of 25 years according to manufacturers. The total energy savings over the life of the project would be 3,000 therms and $5,000.

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

ECM-6 Window Replacement/ Upgrades

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
5,800	0	0	120	200	(0.2)	NA	>25	NA

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

This measure is not recommended.

4.7 ECM-7 Install Premium Efficiency Motors

During the site visit, an inventory of all motors was taken to evaluate the potential for replacement with higher efficiency models. Small motors, below 3 HP, do not generally provide sufficient payback when replaced; therefore, any motor below 3 HP was not taken into consideration. Three motors were considered for replacement; the main clear well pump located in the remote building, standby pump in the middle room of the facility, and recirculation pump in water filtration room. The motor sizes and efficiencies are as follows:

Motor	Size (HP)	Size (kW)	Efficiency
Main Clear Well	30	22.38	92.4%
Standby Clear Well	20	14.92	91.7%
Recirculation Pump	5	3.73	83.8%

Based on information provided by borough staff, the recirculation and stand by pumps comes on only a few hours per week, and the main clear well pump remains on almost continuously. To calculate the savings associated with this ECM, each motor's horsepower was converted into a kilowatt amount, and multiplied by annual usage hours. The standby clear well and recirculation pump are not sufficiently utilized for a replacement to be economically feasible; therefore, they were disregarded in the final savings calculation. The main clear well pump would be replaced with a 94.1% efficient motor.

Replacing the main clear well pump, the building could expect to save about 3,260 kWh per year.

Premium efficiency motors have a life expectancy of about 18 years. The total energy savings over the life of the project would be 58,680 kWh and $9,000.

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

ECM-7 Install Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
2,200	0.4	3,260	0	500	2.9	100	4.4	4.2

* Incentive is shown from New Jersey Pay for Performance Program 2010.

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 $1.80/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

The 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 by 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 building is eligible for all three incentives available from the New Jersey P4P program. Incentive #1 is for the development of an energy reduction plan and will pay $.05/ square foot of the building footprint, which equates to about $100. Implementation of the energy conservation measures discussed in this report is expected to reduce the building's energy usage by over 15% which qualifies it for both incentives #2 and #3. Combining incentives #2 and #3 will provide maximum savings of $0.18/ kWh and $1.80/ therm not to exceed 50% of the total project cost. The building is projected to save about 2,670 kWh which amounts to about $500 in incentives. The building is also projected to save about 1,320 therms of natural gas. With New Jersey's current incentive structure, this would qualify for about $2,400 in incentive money. Combining all incentives in the P4P program would amount to approximately $2,900, reducing the overall payback of the project from 12.6 years to 11.5 years. See appendix I for calculations.

5.2.2 New Jersey Smart Start Program

The Ocean Gate Water Treatment Facility is eligible for only incentives from the New Jersey Smart Start Program.

If the 30 hp main clear well pump is replaced with a NEMA Premium efficiency motor, the New Jersey Smart Start Program will incentivize the purchase for $100.

5.2.3 Energy Efficient and Conservation Block Grant

The Ocean Gate 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 Ocean Gate Water Treatment Facility does pay the Societal Benefits Charge so it is not eligible to receive this incentive.

5.2.5 Direct Install Program

The Water Treatment Facility will be eligible to receive funding from the Direct Install Program. This money will be in conjunction with the Energy Efficiency and Conservation Block Grant. The total implementation cost for all ECMs in the Water Treatment Facility is about $28,400. This program would pay 60%, or about $17,000 of these initial costs. This funding has the potential to significantly affect the payback periods of Energy Conservation Measures. For The Water Treatment Facility, the Direct Install Program brings the simple payback from about 10.3 years, to approximately 4.1 years.

In order to apply for this program the borough must contact the Direct Install contractor for Ocean County, Hutchinson Mechanical Services. Contact information is available on the New Jersey Clean Energy Website.

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 gas-fired, unit heaters to meet its HVAC needs, which are not compatible with a geothermal energy source. Therefore, to take advantage of a GHP system, the existing mechanical equipment would have to be removed or overhauled; and either a low temperature closed loop water source heat pump system or a water to water heat pump system would have to be installed to realize the benefit of the consistent temperature of the ground.

The building has an abundance of well water passing through it which remains a constant temperature of about 55°F. This water could potentially be used with geothermal water to air heat pump which has the potential to heat the building. A calculation was done to determine the feasibility of implementing a geothermal system to replace all five unit heaters in the facility.

The implementation and cost savings related to adding a geothermal system are presented in Appendix O and summarized as follows:

Geothermal

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
15,800	(11.6)	(9,730)	1,830	1,200	0.3	NA	13.2	NA

Despite this lengthy payback, when a new heating system is required, a geothermal system should be considered due to the lifetime of the equipment. Further research needs to be done to determine the safety precautions of implementing a geothermal unit into a system for drinking water.

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 but it would need to be angled south for maximum efficiency. 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 J.

The State of New Jersey incentives for non-residential PV applications is $0.75/watt up to 30 kW of installed PV array. Projects up to 50 kW are eligible to apply. Federal tax credits are also available for renewable energy projects up to 30% of installation cost. Municipalities do not pay federal taxes and 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 periods of 15 years from the date of installation. The cost of the ACP penalty for 2009 was $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 40.5 kW and a minimum of 39.2 kW, over the previous 12 months. The monthly average over the observed 12 month period was 39.8 kW. The existing load justifies the use of the maximum incentive cap of 30 kW of installed PV solar array. A larger array could be implemented; however after 30 kW there would not be any incentive. 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 approximately $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 J and summarized below:

Photovoltaic (PV) Rooftop Solar Power Generation – 30 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
240,000	0	35,490	0	6,300	6,300	22,500	17,300	>25	9.2

*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

The Water Treatment Facility does have some southern facing roof area, but not enough to house an entire 30 kW array. Solar cells work best when they are south facing, with no surrounding obstructions (mostly trees and other buildings) that could cast shadows over the panels. There is very little open land area around the Water Treatment facility for arrays to be built. Mounting kits do exist that allow east and west facing roofs to have solar arrays face south but this can often add to the implementation costs.

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

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

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

This measure is not recommended for the Water Treatment Facility because there is no demand for domestic hot water in the building.

6.3 Wind

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

To avoid turbulence and capture greater wind energy, turbines are mounted on towers. Turbines should be mounted at least 30 feet above any structure or natural feature within 300 feet of the installation. Smaller turbines can utilize shorter towers. For example, a 250-watt turbine may be mounted on a 30-50 foot tower, while a 10 kW turbine will usually need a tower of 80-120 feet. Tower designs include tubular or latticed, guyed or self-supporting. Wind turbine manufacturers also provide towers.

The New Jersey Clean Energy Program for small wind installations has designated numerous pre-approved wind turbines for installation in the State of New Jersey. Incentives for wind turbine installations are based on kilowatt hours saved in the first year. Systems sized under 16,000 kWh per year of production will receive a $3.20 per kWh incentive. Systems producing over 16,000 kWh will receive $51,200 for the first 16,000 kWh of production with an additional $0.50 per kWh up to a maximum cap of 750,000 kWh per year. Federal tax credits are also available for renewable energy projects up to 30% of installation cost for systems less than 100 kW. However, as noted previously, municipalities do not pay federal taxes and 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 Ocean Gate Borough area, the map shown in the appendices indicates a mean annual wind speed of less than 12.8 miles per hour. For the building, there are site restrictions, such trees, roads and surrounding structures which would greatly affect a tower location.

A wind speed map and aerial site photo are included in appendix K.

The borough already is planning the installation of a wind turbine to offset the electricity usage of Water Treatment Facility.

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 building does not have an excessively large electricity demand, and it does not have a heating load to use

the thermal byproduct in the summer. 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 due to the extent of HVAC system renovation needed for implementation. Additionally, the building's minimal heating requirements do not justify such an extensive renovation and the project would not payback within the useful 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 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 by the Portfolio Manager with a Site Energy Usage Index (EUI) of 252 kBTU/ft^2/year. Several factors contribute to the unfavorable EUI, including, but not limited to, wasted energy from poor wall insulation, lack of heating controls, and inefficient lighting. By implementing the measures discussed in this report, it is expected that the EUI can be reduced to approximately 185 kBTU/ft^2/year; the national average for this building type is 90 kBTU/ft^2/year. The EPA Portfolio Manager generated an energy rating score for this building of about 29. This number represents how energy efficient a building is on a scale from 1 to 100 with 100 being the best. In order for a building to receive and energy star label, this energy benchmark rating must be at least 75. As energy use decreases from the implementation of the proposed ECMs, this rating will increase.

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

The user name and password for the EPA Portfolio Manager Account has been provided to Paulette Konopka, the Ocean Gate Chief Financial Officer.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Ocean Gate Water Treatment Plant, in Ocean Gate, New Jersey identified potential ECMs for night setback, roof/wall insulation upgrades, and premium efficiency motors. Potential annual savings of $2,300 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-1 Temperature Setback

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
600	0	0	310	500	12.2	NA	1.2	NA

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

ECM-3 Install Roof Insulation on South Section of the Building

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
3,700	0	0	610	1,000	4.2	NA	3.7	NA

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

ECM-4 Increase Wall Insulation on South Section of Building

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
2,200	0	0	180	300	1.5	NA	7.3	NA

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

ECM-7 Install Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Therms	Total				
$	kW	kWh	Natural Gas	$		$	Years	Years
2,200	.4	3,260	0	500	2.9	100	4.4	4.2

* Incentive is shown from New Jersey Pay for Performance Program 2010.

APPENDIX A

Utility Usage Analysis

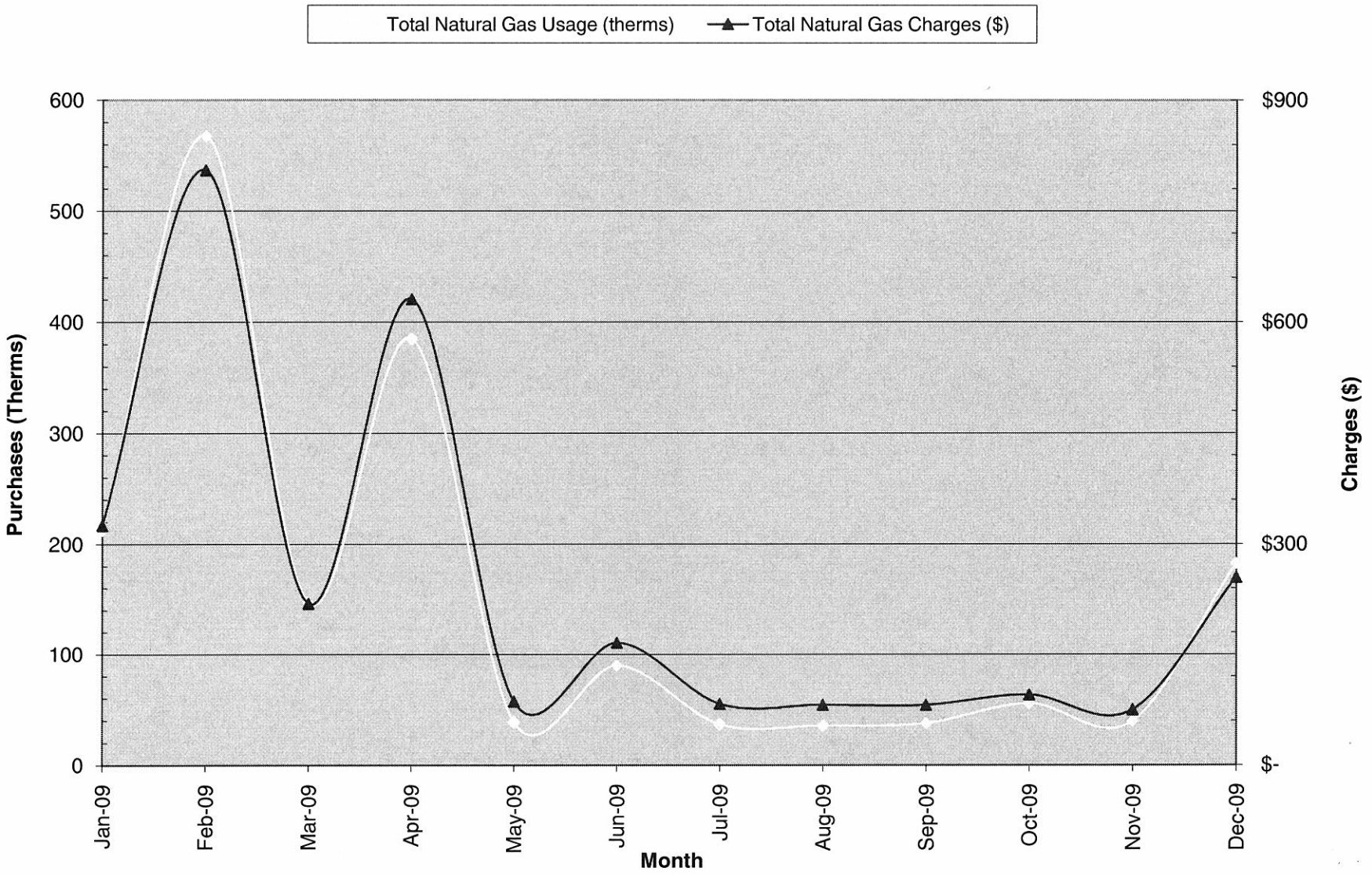
New Jersey BPU Energy Audit Program
CHA Project Number: 21611
Ocean Gate Water Treatment Facility
New Jersey Natural Gas

Borough of Ocean Gate - Natural Gas
Account Number: 16-4672-6260-12

Month	Therms	Charges ($)	($/therm)
January-09	213	$ 325.50	$ 1.53
February-09	568	$ 805.07	$ 1.42
March-09	147	$ 219.27	$ 1.49
April-09	385	$ 630.61	$ 1.64
May-09	39	$ 85.83	$ 2.22
June-09	90	$ 165.94	$ 1.85
July-09	36	$ 82.41	$ 2.26
August-09	35	$ 81.01	$ 2.29
September-09	37	$ 80.85	$ 2.16
October-09	55	$ 94.63	$ 1.72
November-09	39	$ 74.58	$ 1.89
December-09	182	$ 254.55	$ 1.39

Total	1,827	$ 2,900	$ 1.59
Most Recent Yr	1,827	$ 2,900	$ 1.59

Natural Gas Usage - Water Treatment Facility

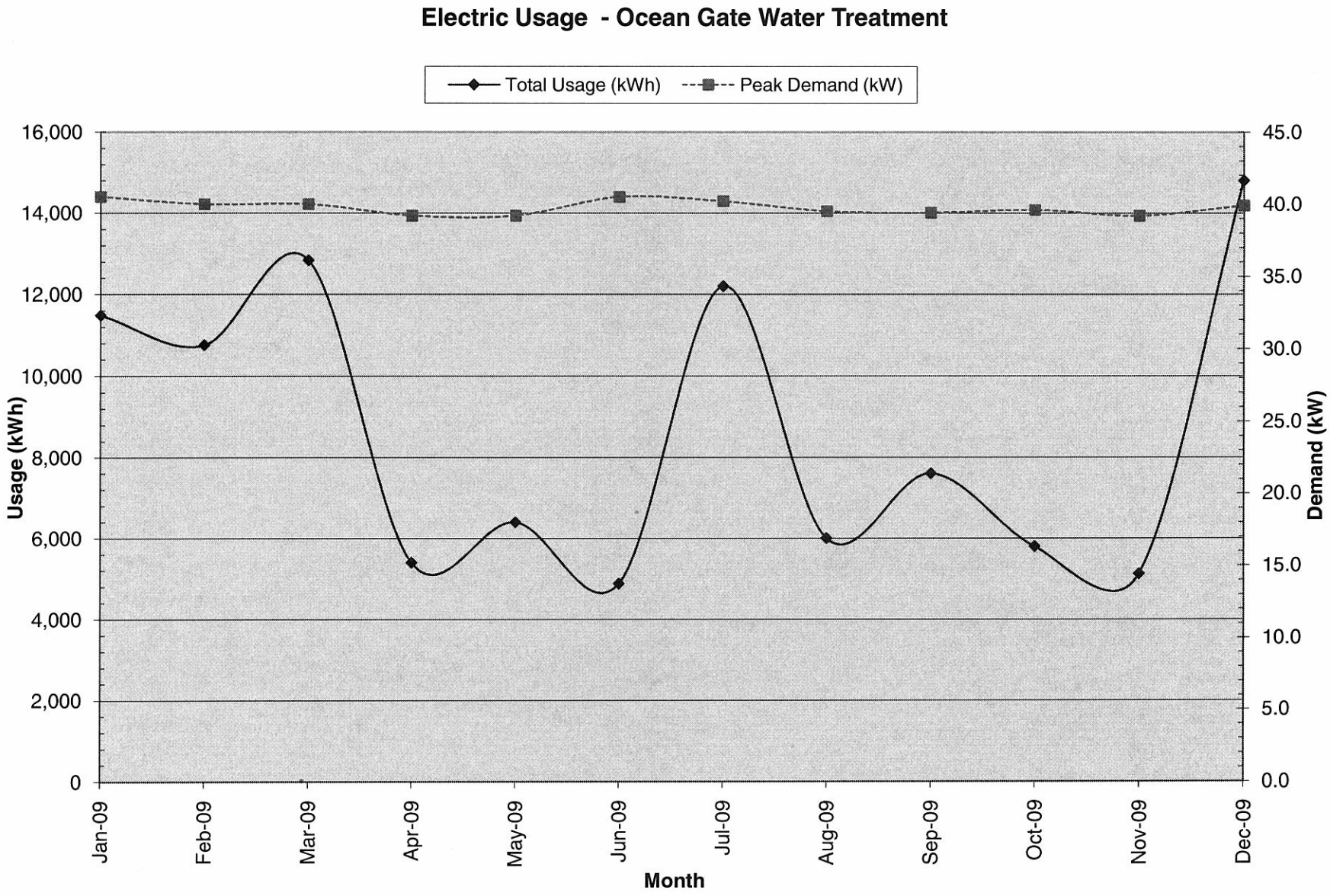


Utility Data - Ocean Gate Water Treatment
Natural Gas Chart

New Jersey BPU Energy Audit Program
CHA Project Number: 21611
Ocean Gate Water Treatment Facility
JCP&L - Electric Service

Borough of Ocean Gate - Electricity
Account Number: 100015850116

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
January-09	11,480	40.5	$1,923.39	$197.34	$1,726.05	0.1675	0.1504	4.87
February-09	10,760	40.0	$1,820.85	$194.10	$1,626.75	0.1692	0.1512	4.85
March-09	12,840	40.0	$2,090.88	$194.10	$1,896.78	0.1628	0.1477	4.85
April-09	5,400	39.2	$1,016.33	$188.92	$827.41	0.1882	0.1532	4.82
May-09	6,400	39.2	$1,157.92	$188.92	$969.00	0.1809	0.1514	4.82
June-09	4,880	40.5	$1,052.10	$211.67	$840.43	0.2156	0.1722	5.23
July-09	12,200	40.2	$2,194.77	$209.59	$1,985.18	0.1799	0.1627	5.21
August-09	6,000	39.5	$1,215.95	$204.73	$1,011.22	0.2027	0.1685	5.18
September-09	7,600	39.4	$1,440.04	$204.04	$1,236.00	0.1895	0.1626	5.18
October-09	5,800	39.6	$1,069.51	$191.51	$878.00	0.1844	0.1514	4.84
November-09	5,120	39.2	$970.99	$188.92	$782.07	0.1896	0.1527	4.82
December-09	14,800	39.9	$2,391.22	$193.45	$2,197.77	0.1616	0.1485	4.85
Total	103,280	40.5	$18,343.95	$2,367.29	$15,976.66	0.1776	0.1547	4.96
Most Recent Yr	103,280	40.5	$18,343.95	$2,367.29	$15,976.66	0.1776	0.1547	4.96



Utility Data - Ocean Gate Water Treatment
Electricity 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 Temperature Setback

Borough of Ocean Gate
CHA #21611
Building: Water Treatment Facility

ECM 1 Temperature Setback

Building Footprint	2,120	SF	Ex Occupied Clng Temp.	74	°F	Ex Occupied Htg Temp.	58	°F	**Heating Energy Savings** 309 therms
Heating Efficiency	80%		Ex Unoccupied Clng Temp.	74	°F	Ex Unoccupied Htg Temp.	58	°F	**Cooling Energy Savings** 0 kWh
Cooling Efficiency	0	kW/ton	Prop Occupied Clng Temp.	74	°F	Prop Occupied Htg Temp.	55	°F	
Building Balance Temp.	50	°F	Prop Unoccupied Clng Temp.	74	°F	Prop Unoccupied Htg Temp.	55	°F	
Internal Gains	14,238	btu/h	Occupied Cooling UA	-3,003	btu/hr/°F	Occupied Heating UA	1,263	btu/hr/°F	
Unoc Internal Gain factor	0.25		Unoccupied Cooling UA	-2,775	btu/hr/°F	Unoccupied Heating UA	1,263	btu/hr/°F	
Ave Occ Internal Gain Factor	0.4		Cooling Occ Enthalpy Setpoint	27.5	Btu/lb				
			Cooling Unocc Enthalpy Setpoint	27.5	Btu/lb				

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

					EXISTING LOADS						PROPOSED LOADS									
					Occupied			Unoccupied			Occupied			Unoccupied						
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	K	L	M	N
102.5	49.1	0	0	0	-85,587	-49,991	-5,695	-79,089	-49,991	-3,559	-85,587	-49,991	-5,695	-79,089	-49,991	-3,559	0	0	0	0
97.5	42.5	3	0	3	-70,572	-34,716	-5,695	-65,214	-34,716	-3,559	-70,572	-34,716	-5,695	-65,214	-34,716	-3,559	0	0	0	0
92.5	39.5	34	1	33	-55,556	-27,773	-5,695	-51,339	-27,773	-3,559	-55,556	-27,773	-5,695	-51,339	-27,773	-3,559	0	0	0	0
87.5	36.6	131	2	129	-40,541	-21,061	-5,695	-37,463	-21,061	-3,559	-40,541	-21,061	-5,695	-37,463	-21,061	-3,559	0	0	0	0
82.5	34	500	9	491	-25,526	-15,044	-5,695	-23,588	-15,044	-3,559	-25,526	-15,044	-5,695	-23,588	-15,044	-3,559	0	0	0	0
77.5	31.6	620	11	609	-10,511	-9,489	-5,695	-9,713	-9,489	-3,559	-10,511	-9,489	-5,695	-9,713	-9,489	-3,559	0	0	0	0
72.5	29.2	664	12	652	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0	0	0
67.5	27	854	15	839	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0	0	0
62.5	24.5	927	17	910	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0	0	0
57.5	21.4	600	11	589	632	278	-5,695	632	278	-3,559	0	0	-5,695	0	0	-3,559	0	0	0	0
52.5	18.7	610	11	599	6,948	3,055	-5,695	6,948	3,055	-3,559	3,158	1,389	-5,695	3,158	1,389	-3,559	0	0	49	0
47.5	16.2	611	11	600	13,265	5,832	-5,695	13,265	5,832	-3,559	9,475	4,166	-5,695	9,475	4,166	-3,559	0	0	118	77
42.5	14.4	656	12	644	19,581	8,610	-5,695	19,581	8,610	-3,559	15,791	6,943	-5,695	15,791	6,943	-3,559	0	0	202	157
37.5	12.6	1,023	18	1,005	25,897	11,387	-5,695	25,897	11,387	-3,559	22,108	9,720	-5,695	22,108	9,720	-3,559	0	0	431	361
32.5	10.7	734	13	721	32,214	14,164	-5,695	32,214	14,164	-3,559	28,424	12,498	-5,695	28,424	12,498	-3,559	0	0	393	342
27.5	8.6	334	6	328	38,530	16,941	-5,695	38,530	16,941	-3,559	34,741	15,275	-5,695	34,741	15,275	-3,559	0	0	217	194
22.5	6.8	252	5	248	44,847	19,719	-5,695	44,847	19,719	-3,559	41,057	18,052	-5,695	41,057	18,052	-3,559	0	0	192	175
17.5	5.5	125	2	123	51,163	22,496	-5,695	51,163	22,496	-3,559	47,373	20,830	-5,695	47,373	20,830	-3,559	0	0	109	101
12.5	4.1	47	1	46	57,480	25,273	-5,695	57,480	25,273	-3,559	53,690	23,607	-5,695	53,690	23,607	-3,559	0	0	47	43
7.5	2.6	22	0	22	63,796	28,050	-5,695	63,796	28,050	-3,559	60,006	26,384	-5,695	60,006	26,384	-3,559	0	0	24	23
2.5	1	13	0	13	70,113	30,828	-5,695	70,113	30,828	-3,559	66,323	29,161	-5,695	66,323	29,161	-3,559	0	0	16	15
-2.5	0	0	0	0	76,429	33,605	-5,695	76,429	33,605	-3,559	72,639	31,939	-5,695	72,639	31,939	-3,559	0	0	0	0
-7.5	-1.5	0	0	0	82,746	36,382	-5,695	82,746	36,382	-3,559	78,956	34,716	-5,695	78,956	34,716	-3,559	0	0	0	0
TOTALS		8,760	156	8,604													0	0	1,797	1,488

Existing Building Ventilation & Infiltration (occ)	514 cfm
Overheat Ventilation Factor	1.00
Additional ventilation to offset overheat	0 cfm
Existing Building Ventilation & Infiltration (unocc)	514 cfm

Borough of Ocean Gate
CHA #21611
Building: Water Treatment Facility

ECM 1 Temperature Setback

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.		
						$ -	$ -	$ -	$ -	
Programmable thermostat	1	ea	$ 50	$ 50	$ -	$ 49	$ 61	$ -	$ 110	
Miscellaneous Wiring and Programming	200	ft/wire	$ 1.00	$ 0.50		$ 196	$ 121	$ -	$ 317	Need to sync up all heaters on a single T-stat which will add cost
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 427	Subtotal
$ 64	15% Contingency
$ 74	15% Contractor O&P
$ -	0% Engineering
$ 564	**Total**

APPENDIX C

ECM-2 Replace Unit Heaters with Infrared

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 2: Replace Unit Heaters with Infrared Heaters

Building Footprint	2,120	SF	Ex Occupied Htg Temp.	58	°F	**Heating Energy Savings**	334 Therms/year
Propane gas Heat Content	100,000	Btu/gallon	Ex Unoccupied Htg Temp.	58	°F	**Electric Energy Savings**	-234 kWh/yr
Building Balance Temp.	65	°F	Occupied Heating UA	1,253	btu/hr/°F		
Internal Gains	14,238	btu/h	Unoccupied Heating UA	1,253	btu/hr/°F		
Unocc Internal Gain factor	0.25						
Ave Occ Internal Gain Factor	0.4						

Existing Burner Efficiency	80.0%	Existing unit heater burner efficiency
Existing Heat Distribution Effectiveness	65.0%	Heat Distribution Factor per ASHRAE Handbook - Fundamentals for Unit Heaters
Proposed Burner Efficiency	85.0%	Based on Reznor Infrared Tube Heaters
Proposed Heat Distribution Effectiveness	95%	Heat Distribution Factor per ASHRAE Handbook - Fundamentals for Infrared Heaters

					EXISTING LOADS						PROPOSED LOADS							
					Occupied			Unoccupied			Occupied			Unoccupied				
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Existing Heating Therms	Proposed Heating Therms
A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	M	N
102.5	0	0	0	0	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0
97.5	49.1	3	0	3	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0
92.5	42.5	34	1	33	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0
87.5	39.5	131	2	129	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0
82.5	36.6	500	9	491	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0
77.5	34	620	11	609	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0
72.5	31.6	664	12	652	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0
67.5	29.2	854	15	839	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0
62.5	27	927	17	910	0	0	-5,695	0	0	-3,559	0	0	-5,695	0	0	-3,559	0	0
57.5	24.5	600	11	589	632	278	-5,695	632	278	-3,559	632	278	-5,695	632	278	-3,559	0	0
52.5	21.4	610	11	599	6,948	3,055	-5,695	6,948	3,055	-3,559	6,948	3,055	-5,695	6,948	3,055	-3,559	57	48
47.5	18.7	611	11	600	13,265	5,832	-5,695	13,265	5,832	-3,559	13,265	5,832	-5,695	13,265	5,832	-3,559	139	117
42.5	16.2	656	12	644	19,581	8,610	-5,695	19,581	8,610	-3,559	19,581	8,610	-5,695	19,581	8,610	-3,559	237	200
37.5	14.4	1,023	18	1,005	25,897	11,387	-5,695	25,897	11,387	-3,559	25,897	11,387	-5,695	25,897	11,387	-3,559	507	427
32.5	12.6	734	13	721	32,214	14,164	-5,695	32,214	14,164	-3,559	32,214	14,164	-5,695	32,214	14,164	-3,559	462	389
27.5	10.7	334	6	328	38,530	16,941	-5,695	38,530	16,941	-3,559	38,530	16,941	-5,695	38,530	16,941	-3,559	255	215
22.5	8.6	252	5	248	44,847	19,719	-5,695	44,847	19,719	-3,559	44,847	19,719	-5,695	44,847	19,719	-3,559	226	190
17.5	6.8	125	2	123	51,163	22,496	-5,695	51,163	22,496	-3,559	51,163	22,496	-5,695	51,163	22,496	-3,559	129	108
12.5	5.5	47	1	46	57,480	25,273	-5,695	57,480	25,273	-3,559	57,480	25,273	-5,695	57,480	25,273	-3,559	55	46
7.5	4.1	22	0	22	63,796	28,050	-5,695	63,796	28,050	-3,559	63,796	28,050	-5,695	63,796	28,050	-3,559	29	24
2.5	2.6	13	0	13	70,113	30,828	-5,695	70,113	30,828	-3,559	70,113	30,828	-5,695	70,113	30,828	-3,559	19	16
-2.5	-1.5	0	0	0	76,429	33,605	-5,695	76,429	33,605	-3,559	76,429	33,605	-5,695	76,429	33,605	-3,559	0	0
-7.5	0	0	0	0	82,746	36,382	-5,695	82,746	36,382	-3,559	82,746	36,382	-5,695	82,746	36,382	-3,559	0	0
TOTALS		**8,760**	**156**	**8,604**													**2,114**	**1,780**

Existing Building Ventilation & Infiltration (occ)	**514 cfm**
Overheat Ventilation Factor	**1.00**
Additional ventilation to offset overheat	**0 cfm**
Existing Building Ventilation & Infiltration (unocc)	**514 cfm**

Electrical Requirements for Heating Equipment

Existing Equipment

Unit	Htng Hrs	Motor HP	Motor kW	Annual kWh
UH-1	1,998	0.125	0.09325	186
UH-2	1,998	0.125	0.09325	186
UH-3	1,998	0.125	0.09325	186
UH-4	1,998	0.125	0.09325	186
UH-5	1,998	0.125	0.09325	186
Total				**373**

Proposed Equipment

Unit	Htng Hrs	Amps	Volts	Phase	Power Factor	Annual kWh
Infrared Htr	1,998	1.1	115	1	0.8	202
Infrared Htr	1,998	1.1	115	1	0.8	202
Infrared Htr	1,998	1.1	115	1	0.8	202
Total						**606**

*Electrical data based on Reznor VR Series Infrared Heaters

Avg. OA Temp °F	Heating Hrs	Assumed % Time of Operatio	hrs of Operation
102.5	0	0%	0
97.5	0	0%	0
92.5	0	0%	0
87.5	0	0%	0
82.5	0	0%	0
77.5	0	0%	0
72.5	0	0%	0
67.5	0	0%	0
62.5	0	8%	0
57.5	0	15%	0
52.5	610	23%	141
47.5	611	31%	188
42.5	656	38%	252
37.5	1023	46%	472
32.5	734	54%	395
27.5	334	62%	206
22.5	252	69%	174
17.5	125	77%	96
12.5	47	85%	40
7.5	22	92%	20
2.5	13	100%	13
-2.5	0	100%	0
-7.5	0	100%	0
	4,427	45%	1998

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 2: Replace Unit Heaters with Infrared Heaters

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.		
						$ -	$ -	$ -	$ -	
Unit Heater Removal	5	EA		$ 250		$ -	$ 1,513	$ -	$ 1,513	
50 Mbtu Input IR Heater	3	EA	$ 948	$ 400		$ 2,787	$ 1,452	$ -	$ 4,239	
Miscellaneous Gas Piping, Valves, etc.	3	EA	$ 400	$ 250		$ 1,176	$ 908	$ -	$ 2,084	
Miscellaneous electrical	1	LS	$ 250	$ 250		$ 245	$ 303	$ -	$ 548	
Exhaust Flue	3	EA	$ 150	$ 100		$ 441	$ 363	$ -	$ 804	Use existing venting holes

Unit Pricing based on Detroit RH 50-20 Heater found on www.shophmac.com

$9,187	Subtotal
$1,378	15% Contingency
$1,585	15% Contractor O&P
$0	0% Engineering
$12,149	**Total**

APPENDIX D

ECM-3 Install Roof Insulation in South Section of Building

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 3 Install Roof Insulation in South Section of Building

Existing Roof Area	1,288	sf
Existing U-value	0.39	Btu/hr/(sf*F)
Proposed R-value	22	
Proposed U-value	0.05	Btu/hr/(sf*F)
Heating System Efficiency	80%	
Cooling System Efficiency	0.00	kW/ton

Existing Cooling

Existing Cooling Load Temp Diff.	0	F
Existing Max. Roof Cooling Load	0	Btu/hr

Proposed Cooling

Proposed Cooling Load	-	Btu/hr
Occupied Cooling Setpoint	74	F
Unoccupied Cooling Setpoint	80	F

Existing Heating

Existing Heating Load Temp Diff.	58	F
Existing Max. Roof Heating Load	29,177	Btu/hr
Occupied Heating Setpoint	58	F
Unoccupied Heating Setpoint	58	F

Proposed Heating

Proposed Heating Load	3,366	Btu/hr

Existing Heating Total	44,700,371	Btu/yr
Proposed Heating Total	5,157,474	Btu/yr
Savings	39,542,897	Btu/yr
Input	494	**therms**

Existing Cooling Total	-	kWh/yr
Proposed Cooling Total	-	kWh/yr
Savings	-	kWh/yr

				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)
102.5	0	0	0	14,461	1,669	-	-	11,417	1,317	-	-	-	-	-	-
97.5	3	0	3	11,924	1,376	-	-	8,880	1,025	-	-	-	-	-	-
92.5	34	1	33	9,387	1,083	-	-	6,343	732	-	-	-	-	-	-
87.5	131	4	127	6,850	790	-	-	3,806	439	-	-	-	-	-	-
82.5	500	9	491	4,313	498	-	-	1,269	146	-	-	-	-	-	-
77.5	620	14	606	1,776	205	-	-	-	-	-	-	-	-	-	-
72.5	664	20	644	-	-	-	-	-	-	-	-	-	-	-	-
67.5	854	22	832	-	-	-	-	-	-	-	-	-	-	-	-
62.5	927	23	904	-	-	-	-	-	-	-	-	-	-	-	-
57.5	600	22	578	-	-	254	29	-	-	254	29	-	152,226	-	17,564
52.5	610	20	590	-	-	2,791	322	-	-	2,791	322	-	1,702,393	-	196,420
47.5	611	20	591	-	-	5,328	615	-	-	5,328	615	-	3,255,351	-	375,598
42.5	656	20	636	-	-	7,865	907	-	-	7,865	907	-	5,159,443	-	595,290
37.5	1,023	22	1,001	-	-	10,402	1,200	-	-	10,402	1,200	-	10,641,351	-	1,227,786
32.5	734	21	713	-	-	12,939	1,493	-	-	12,939	1,493	-	9,497,373	-	1,095,795
27.5	334	16	318	-	-	15,476	1,786	-	-	15,476	1,786	-	5,169,084	-	596,403
22.5	252	9	243	-	-	18,013	2,078	-	-	18,013	2,078	-	4,539,376	-	523,748
17.5	125	7	118	-	-	20,550	2,371	-	-	20,550	2,371	-	2,568,812	-	296,386
12.5	47	5	42	-	-	23,088	2,664	-	-	23,088	2,664	-	1,085,117	-	125,199
7.5	22	3	19	-	-	25,625	2,957	-	-	25,625	2,957	-	563,743	-	65,044
2.5	13	1	12	-	-	28,162	3,249	-	-	28,162	3,249	-	366,103	-	42,241
-2.5	0	1	-1	-	-	30,699	3,542	-	-	30,699	3,542	-	-	-	-
-7.5	0	0	0	-	-	33,236	3,835	-	-	33,236	3,835	-	-	-	-
TOTALS	**8,760**	**261**	**8,499**									**-**	**44,700,371**	**-**	**5,157,474**

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 3 Install Roof Insulation in South Section of Building

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.		
3.5" thick batt insulation (R-13)	1,288	SF	$ 0.38	$ 0.47	$ 0	$ 480	$ 732	$ 309	$ 1,521	Costs from Means
1" Polyisocyanurate Board	1288	SF	$ 0.66	$ 0.41		$ 833	$ 639	$ -	$ 1,472	With Fire Protection
batt insulation hangers	322	hangers	$ 0.25			$ 79	$ -	$ -	$ 79	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 3,072	Subtotal
$ 307	10% Contingency
$ 338	10% Contractor O&P
$ -	Engineering
$ 3,717	**Total**

APPENDIX E

ECM-4 Install Wall Insulation in South Section of Building

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 4 Increase Wall Insulation on South Section of Building

Total Existing Wall Area	1,200	sf
Existing U-value	0.18	Btu/hr/(sf*F)
Proposed R-Value	12.42	
Proposed U-value	0.08	Btu/hr/(sf*F)
Heating Efficiency	80%	
Cooling Efficiency	0.00	kW/ton

Existing Cooling		
Max. North Wall Cooling Load	3,073	Btu/hr
Max. East Wall Cooling Load	3,938	Btu/hr
Max. South Wall Cooling Load	4,343	Btu/hr
Max. West Wall Cooling Load	1,089	Btu/hr
Proposed Cooling		
Max. North Wall Cooling Load	1,341	Btu/hr
Max. East Wall Cooling Load	1,718	Btu/hr
Max. South Wall Cooling Load	1,895	Btu/hr
Max. West Wall Cooling Load	475	Btu/hr
Occupied Cooling Setpoint	74	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.	58	F
Existing Max. Wall Heating Load	4,632	Btu/hr
Proposed Heating		
Proposed Max. Heating Load	2,021	Btu/hr
Occupied Heating Setpoint	58	F
Unoccupied Heating Setpoint	58	F
Existing Heating Total	25,179,405	Btu/yr
Proposed Heating Total	10,986,209	Btu/yr
Savings	14,193,196	Btu/yr
Input	177	therms

				Occupied				Unoccupied							
Avg Outdoor Air Temp. Bins °F	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Existing Heat Gain	Proposed Heat Gain	Existing Heat Loss	Proposed Heat Loss	Existing Heat Gain	Proposed Heat Gain	Existing Heat Loss	Proposed Heat Loss	Existing Cooling Load	Existing Heating Load	Proposed Cooling Load	Proposed Heating Load
				(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(kWh/yr)	(Btu/yr)	(kWh/yr)	(Btu/yr)
97.5	0	0	0	12,443	5,429	-	-	12,443	5,429	-	-	-	-	-	-
92.5	3	0	3	9,796	4,274	-	-	8,888	3,878	-	-	-	-	-	-
87.5	34	1	33	7,148	3,119	-	-	5,333	2,327	-	-	-	-	-	-
82.5	131	2	129	4,501	1,964	-	-	1,778	776	-	-	-	-	-	-
77.5	500	9	491	1,853	809	-	-	-	-	-	-	-	-	-	-
72.5	620	11	609	-	-	-	-	-	-	-	-	-	-	-	-
67.5	664	12	652	-	-	-	-	-	-	-	-	-	-	-	-
62.5	854	15	839	-	-	-	-	-	-	-	-	-	-	-	-
57.5	927	17	910	-	-	111	48	-	-	111	48	-	102,651	-	44,789
52.5	600	11	589	-	-	1,218	531	-	-	1,218	531	-	730,852	-	318,883
47.5	610	11	599	-	-	2,325	1,015	-	-	2,325	1,015	-	1,418,517	-	618,924
42.5	611	11	600	-	-	3,433	1,498	-	-	3,433	1,498	-	2,097,435	-	915,147
37.5	656	12	644	-	-	4,540	1,981	-	-	4,540	1,981	-	2,978,333	-	1,299,498
32.5	1,023	18	1,005	-	-	5,647	2,464	-	-	5,647	2,464	-	5,777,386	-	2,520,773
27.5	734	13	721	-	-	6,755	2,947	-	-	6,755	2,947	-	4,958,056	-	2,163,286
22.5	334	6	328	-	-	7,862	3,430	-	-	7,862	3,430	-	2,625,974	-	1,145,758
17.5	252	5	248	-	-	8,970	3,914	-	-	8,970	3,914	-	2,260,326	-	986,219
12.5	125	2	123	-	-	10,077	4,397	-	-	10,077	4,397	-	1,259,613	-	549,591
7.5	47	1	46	-	-	11,184	4,880	-	-	11,184	4,880	-	525,660	-	229,354
2.5	22	0	22	-	-	12,292	5,363	-	-	12,292	5,363	-	270,415	-	117,987
-2.5	13	0	13	-	-	13,399	5,846	-	-	13,399	5,846	-	174,186	-	76,001
-7.5	0	0	0	-	-	14,506	6,329	-	-	14,506	6,329	-	-	-	-
TOTALS	**8,760**	**156**	**8,604**									**-**	**25,179,405**	**-**	**10,986,209**

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 4 Increase Wall Insulation on South Section of Building

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.		
1" Polyisocyanurate Board	1200	SF	$ 0.66	$ 0.41		$ 776	$ 591	$ -	$ 1,367	With Flame resistant backing
Miscellaneous Finish Work	1	LS	$ 500.00	$ -		$ 490	$ -	$ -	$ 490	

$ 1,857	Subtotal
$ 186	10% Contingency
$ 204	10% Contractor O&P
$ -	Engineering
$ 2,247	**Total**

APPENDIX F

ECM-5 Replace T12 Lights

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 5 Replacement T-12 lights

Building Schedule:
Existing conditions (master switch): 3 hrs/week
Blended Electric Rate $ 0.178 /kWh

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

	EXISTING CONDITIONS										RETROFIT CONDITIONS								COST ANALYSIS				
Area Description	**Number of Fixtures**	**Fixture Code**	**Watts per Fixture**	**Number of Non-Operational Fixtures**	**Watts per Non-Operational Fixtures**	**kW/Space**	**Exist Control**	**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**
Front, Middle, and Back Rooms	13	F82SS	173	0	176.46	2.249	switch		156	351	13	F82ILL	109	1.417	switch		156	221	1	130	$ 23	$ 1,631	70.8
					0	0				-							-	-	-	-	$ -	$ -	
					0	0				-							-	-	-	-	$ -	$ -	
TOTALS -	**13**			**0**		**2.2**				**351**	**13**			**1.4**				**221**	**0.8**	**130**	**$ 23**	**$ 1,631**	**70.8**

APPENDIX G

ECM-6 Window Replacement/Upgrade

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 6 Window Replacement/Upgrade

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

	Occupied Cooling Hours per Week	0	Hours		
	Occupied Heating Hours per Week	168	Hours		
Given	Heating Energy Cost	$1.59	$/therm		
	Cooling Cost	$0.210	$/kWh		
	Occupied Cooling Setpoint Temperature	72.0	Degrees F		(Assumption)
	Occupied Cooling Avg Space Air Enthalpy	25.5	btu/# air		(Assumption)
	Occupied Heatng Setpoint Temperature	58.0	Degrees F	Occupied	(Assumption)
	Unoccupied Heating Setpoint Temperature	58.0	Degrees F	Unoccupied	(Assumption)
	Window Area	71	sq.ft.		(From window survey)
	Window Perimeter	77	ft		(From window survey)
	Proposed U factor	0.50	Btu/(h*sqft*degf)		(From window vendor)
	Proposed Air Infiltration	0.15	cfm/ft		(From window vendor)
	Cooling Conversion	12,000	Btu/ton		
	Heating Btu Conversion	1,000,000	Btu/MMBtu		
Assumptions	Existing U factor	1.20	Btu/(h*sqft*degf)		From fieldwork
	Existing Air Infiltration	0.60	cfm/ft		From fieldwork
	Heating System Efficiency	80%			
	Cooling System Efficiency	-	kW/ton		

Formula

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

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

Existing Operation	OA Enthalphy	OA Temp	Total Hours	Cooling Occupied Hours	Heating Occupied Hours	Heating Unoccupied Hours	Cooling Occupied Conduction	Heating Occupied Conduction	Heating Unoccupied Conduction	Cooling Occupied Infiltration	Heating Occupied Infiltration	Heating Unoccupied Infiltration
Cooling	38.3	92.5	51	0.0	0.0	0.0	0	0	0	0	0	0
Cooling	36.6	87.5	146	0.0	0.0	0.0	0	0	0	0	0	0
Cooling	33.5	82.5	298	0.0	0.0	0.0	0	0	0	0	0	0
Cooling	31.6	77.5	476	0.0	0.0	0.0	0	0	0	0	0	0
Cooling	30.3	72.5	662	0.0	0.0	0.0	0	0	0	0	0	0
Heating	27.9	67.5	740	0.0	0.0	0.0	0	0	0	0	0	0
Heating	24.6	62.5	765	0.0	0.0	0.0	0	0	0	0	0	0
Heating	21.6	57.5	733	0.0	733.3	0.0	0	31,240	0	0	18,374	0
Heating	18.7	52.5	668	0.0	668.3	0.0	0	313,167	0	0	184,195	0
Heating	16.2	47.5	659	0.0	659.3	0.0	0	589,809	0	0	346,908	0
Heating	14.3	42.5	685	0.0	685.3	0.0	0	905,022	0	0	532,306	0
Heating	12.4	37.5	739	0.0	739.3	0.0	0	1,291,323	0	0	759,517	0
Heating	10.4	32.5	717	0.0	717.3	0.0	0	1,558,461	0	0	916,640	0
Heating	8.7	27.5	543	0.0	543.2	0.0	0	1,411,680	0	0	830,308	0
Heating	7	22.5	318	0.0	318.1	0.0	0	962,259	0	0	565,972	0
Heating	5.4	17.5	245	0.0	245.1	0.0	0	845,781	0	0	497,463	0
Heating	3.9	12.5	156	0.0	156.1	0.0	0	605,024	0	0	355,857	0
Heating	2.5	7.5	92	0.0	92.0	0.0	0	396,019	0	0	232,926	0
Heating	1.2	2.5	36	0.0	36.0	0.0	0	170,307	0	0	100,169	0
Heating	-0.2	-2.5	19	0.0	19.0	0.0	0	97,982	0	0	57,630	0
Heating	-1.4	-7.5	8	0.0	8.0	0.0	0	44,645	0	0	26,259	0
Subtotal =			**8,760**	**0**	**5,621**	**0**	**0**	**9,222,720**	**0 btu**	**0**	**5,424,524**	**0 btu**

	Conduction		Infiltration		
Cooling Load =	(0) + (	0) =			**0 btu**
	Cooling Load				
Cooling Energy =	(0)/(	12000) * (	0.00) =		**0 kWh**
	Cooling Energy	Cooling Cost			
Cooling Energy Cost =	(0.00) x (	$0.210) =			**$ -**
	Conduction		Infiltration		
Heating Load =	(9222720) + (	5424524) =			**14,647,244 btu**
	Heating Load	Heat Content			
Heating Energy =	(14647244)/(	80%)/(	100000) =		**183 therms**
	Heating Energy	Heating Cost			
Heating Energy Cost =	(183.09) x (	$1.588) =			**$ 291**

Operation	OA Enthalpy	OA Temp	Total Hours	Cooling Occupied Hours	Heating Occupied Hours	Heating Unoccupied Hours	Cooling Occupied Conduction	Heating Occupied Conduction	Heating Unoccupied Conduction	Cooling Occupied Infiltration	Heating Occupied Infiltration	Heating Unoccupied Infiltration
Cooling	38.3	92.5	51	0.0	0.0	0.0	0	0	0	0	0	0
Cooling	36.6	87.5	146	0.0	0.0	0.0	0	0	0	0	0	0
Cooling	33.5	82.5	298	0.0	0.0	0.0	0	0	0	0	0	0
Cooling	31.6	77.5	476	0.0	0.0	0.0	0	0	0	0	0	0
Cooling	30.3	72.5	662	0.0	0.0	0.0	0	0	0	0	0	0
Heating	27.9	67.5	740	0.0	0.0	0.0	0	0	0	0	0	0
Heating	24.6	62.5	765	0.0	0.0	0.0	0	0	0	0	0	0
Heating	21.6	57.5	733	0.0	733.3	0.0	0	13,017	0	0	4,594	0
Heating	18.7	52.5	668	0.0	668.3	0.0	0	130,486	0	0	46,049	0
Heating	16.2	47.5	659	0.0	659.3	0.0	0	245,754	0	0	86,727	0
Heating	14.3	42.5	685	0.0	685.3	0.0	0	377,092	0	0	133,077	0
Heating	12.4	37.5	739	0.0	739.3	0.0	0	538,051	0	0	189,879	0
Heating	10.4	32.5	717	0.0	717.3	0.0	0	649,359	0	0	229,160	0
Heating	8.7	27.5	543	0.0	543.2	0.0	0	588,200	0	0	207,577	0
Heating	7	22.5	318	0.0	318.1	0.0	0	400,941	0	0	141,493	0
Heating	5.4	17.5	245	0.0	245.1	0.0	0	352,409	0	0	124,366	0
Heating	3.9	12.5	156	0.0	156.1	0.0	0	252,093	0	0	88,964	0
Heating	2.5	7.5	92	0.0	92.0	0.0	0	165,008	0	0	58,232	0
Heating	1.2	2.5	36	0.0	36.0	0.0	0	70,961	0	0	25,042	0
Heating	-0.2	-2.5	19	0.0	19.0	0.0	0	40,826	0	0	14,407	0
Heating	-1.4	-7.5	8	0.0	8.0	0.0	0	18,602	0	0	6,565	0
Subtotal =			8,760	0	5,621	0	0	3,842,800	0 btu	0	1,356,131	0 btu

Cooling Load =	Conduction + Infiltration: (0) + (0) =	0 btu
Cooling Energy =	Cooling Load: (0)/(12000) * (0.00) =	0 kWh
Cooling Energy Cost =	Cooling Energy x Cooling Cost: (0.00) x ($0.210) =	$ -
Heating Load =	Conduction + Infiltration: (3842800) + (1356131) =	5,198,931 btu
Heating Energy =	Heating Load / Heat Content: (5198931)/(80%) / (100000) =	65 therms
Heating Energy Cost =	Heating Energy x Heating Cost: (64.99) x ($1.588) =	$ 103

Summary

EXISTING COOLING ENERGY	**0.00**	**kWh**	**$ -**
EXISTING HEATING ENERGY	**183.09**	**therms**	**$ 290.67**
EXISTING ENERGY COST			**$ 290.67**

PROPOSED COOLING ENERGY	**0.00**	**kWh**	**$ -**
PROPOSED HEATING ENERGY	**64.99**	**therms**	**$ 103.17**
PROPOSED ENERGY COST			**$ 103.17**

COOLING ENERGY SAVINGS	**0.00**	**kWh**	**$ -**	**#DIV/0! of existing**
HEATING ENERGY SAVINGS	**118.10**	**therms**	**$ 187.50**	**64.5% of existing**
ENERGY COST SAVINGS			**$ 187.50**	**64.5% of existing**

Comments

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 6 Window Replacement/Upgrade

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.		
						$ -	$ -	$ -	$ -	
36" x 52 Vinyl Casement Windows	9	ea	$ 355	$ 41.00	$ -	$ 3,131	$ 446	$ -	$ 3,578	
36" x 48" Vinyl Casement	2	ea	$ 370	$ 37	$ -	$ 725	$ 90	$ -	$ 815	
Window Removal of 56" x 80"	9	ea		$ 29.50		$ -	$ 321	$ -	$ 321	
Window Removal of 36" x 48"	2	ea		$ 21		$ -	$ 50	$ -	$ 50	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

All Costs are from RS Means 2010

$ 4,763	Subtotal
$ 476	10% Contingency
$ 524	Contractor 10% O&P
$ -	0% Engineering
$ 5,763	**Total**

APPENDIX H

ECM-7 Install Premium Efficiency Motors

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 7 Install Premium Efficiency Motors

Demand Cost $/kW-month
$ 4.96

Energy Cost $/kWh
$ 0.15

Multipliers		
Material	Labor	Equipment
0.98	1.21	1.09

Savings Analysis

Cost Estimates

#	Description	Location	Existing HP	Load Factor	Existing Efficiency[a]	Existing kW	New HP[b]	New Load Factor	New Efficiency[a]	New kW	Demand Savings	Demand Savings $	Annual Hours	kWh Savings	$ kWh Savings	Total $ Savings	Estimated Cost	Payback Years	Unit Costs Materials	Unit Costs Labor	Unit Costs Equipment	Subtotal Costs Materials	Subtotal Costs Labor	Subtotal Costs Equipment	Total Cost	Remarks
1	Clearwater Supply Pump	Remote building near Municipal Building	30	0.85	92.4%	20.6	30	0.85	0.941	20.2	0.372	$ 22	8,760	3,257	$ 504	$ 526	$ 2,306	4.4	$ 1,736	$ 500	$ -	$ 1,701	$ 605	$ -	$ 2,306	
		Total	**30**			**20.6**	**30**			**20.2**	**0.37**	**$ 22**		**3,257**	**$ 504**	**$ 526**	**$ 2,306**	4.4								

Notes
a

APPENDIX I

New Jersey Pay For Performance Incentive Program

Borough of Ocean Gate
CHA #21611
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 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)	2,120
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)	$18,344	$2,900
Existing Usage (from utility)	103,280	1,827
Proposed Savings	2,670	1,323
Existing Total MMBtus	535	
Proposed Savings MMBtus	141	
% Energy Reduction	**26.4%**	
Proposed Annual Savings	$2,519	

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

	Incentives $		
	Elec	Gas	Total
Incentive #1	$0	$0	$106
Incentive #2	$294	$1,455	$1,749
Incentive #3	$187	$926	$1,113
Total All Incentives	**$481**	**$2,381**	**$2,968**

Total Project Cost	$31,851

		Allowable Incentive
% Incentives #1 of Utility Cost*	0.5%	$106
% Incentives #2 of Project Cost**	5.5%	$1,749
% Incentives #3 of Project Cost**	3.5%	$1,113
Total Eligible Incentives***	**$2,968**	
Project Cost w/ Incentives	$28,883	

Project Payback (years)	
w/o Incentives	w/ Incentives
12.6	11.5

* 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 J

Photovoltaic (PV) Rooftop Solar Power Generation

Ocean Gate
Water Treatment Facility

Cost of Electricity $0.178 $/kWh

Photovoltaic (PV) Rooftop Solar Power Generation-6kW 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
$240,000	**0.0**	**35,490**	**0**	**$6,300**	**0**	**$6,300**	**$22,500**	**$17,300**	**38.1**	**9.2**

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**

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:	30.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	23.1 kW
Array Type:	Fixed Tilt
Array Tilt:	40.7°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	17.8 ¢/kWh

Results			
Month	Solar Radiation (kWh/m²/day)	AC Energy (kWh)	Energy Value ($)
1	3.36	2483	440.98
2	4.05	2682	476.32
3	4.58	3253	577.73
4	4.84	3179	564.59
5	5.30	3503	622.13
6	5.33	3304	586.79
7	5.27	3336	592.47
8	5.25	3302	586.44
9	5.06	3203	568.85
10	4.46	3016	535.64
11	3.15	2153	382.37
12	2.87	2076	368.70
Year	4.46	35490	6303.02

Output Hourly Performance Data

About the Hourly Performance Data

Output Results as Text

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.

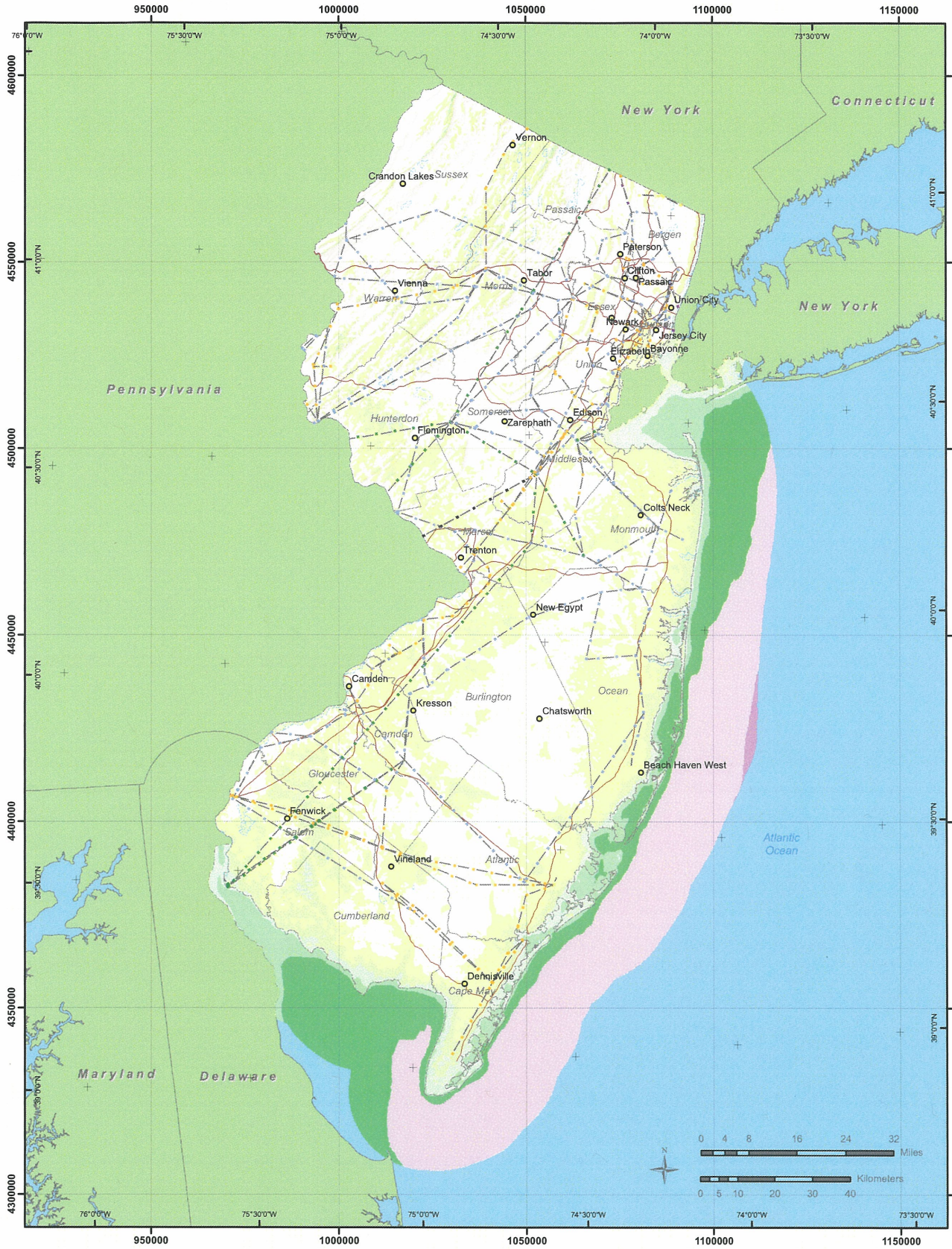
If net-metering isn't available and the PV system sends surplus electricity to the utility grid, the utility generally buys the electricity from the owner at a lower price than the owner pays the utility for electricity. In this case, the cost savings shown in the table should be reduced.

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.

APPENDIX K

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.


E Cape May Ave
E Cape May Ave
E Arverne Ave
E Arverne Ave
Asbury Ave
bing
© GlobeXplorer © 2010 Navteq © 2010 Microsoft

APPENDIX L

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Water Treatment Facility

Building ID: 2366478
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: July 07, 2010

Facility
Water Treatment Facility
Borough of Ocean Gate
Ocean Gate, NJ 08740

Facility Owner
Borough of OceanGate
801 Ocean Gate Ave
Ocean Gate, NJ 08740

Primary Contact for this Facility
Paulette Konopka
801 Ocean Gate Ave
Ocean Gate, NJ 08740

Year Built: 1927
Gross Floor Area (ft²): 2,120

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

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	352,391
Natural Gas (kBtu)[4]	182,600
Total Energy (kBtu)	534,991

Energy Intensity[5]

Site (kBtu/ft²/yr)	252
Source (kBtu/ft²/yr)	645

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	63

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	90
National Average Source EUI	189
% Difference from National Average Source EUI	242%
Building Type	Public Order and Safety

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	Water Treatment Facility	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Public Order and Safety	Is this an accurate description of the space in question?		☐
Location	Borough of Ocean Gate, Ocean Gate, NJ 08740	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 (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	
Gross Floor Area	2,120 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	N/A(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	N/A(Optional)	Is this the total number of hours per week that the space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	N/A(Optional)	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100.		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

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

Fuel Type: Electricity

Meter: Water Treatment Facility (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	14,800.00
11/01/2009	11/30/2009	5,120.00
10/01/2009	10/31/2009	5,800.00
09/01/2009	09/30/2009	7,600.00
08/01/2009	08/31/2009	6,000.00
07/01/2009	07/31/2009	12,200.00
06/01/2009	06/30/2009	4,880.00
05/01/2009	05/31/2009	6,400.00
04/01/2009	04/30/2009	5,400.00
03/01/2009	03/31/2009	12,840.00
02/01/2009	02/28/2009	10,760.00
01/01/2009	01/31/2009	11,480.00
Water Treatment Facility Consumption (kWh (thousand Watt-hours))		**103,280.00**
Water Treatment Facility Consumption (kBtu (thousand Btu))		**352,391.36**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**352,391.36**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Water Treatment Facility Gas (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
12/01/2009	12/31/2009	182.00
11/01/2009	11/30/2009	39.00
10/01/2009	10/31/2009	55.00
09/01/2009	09/30/2009	37.00
08/01/2009	08/31/2009	35.00
07/01/2009	07/31/2009	36.00
06/01/2009	06/30/2009	90.00
05/01/2009	05/31/2009	39.00
04/01/2009	04/30/2009	385.00
03/01/2009	03/31/2009	147.00

02/01/2009	02/28/2009	568.00
01/01/2009	01/31/2009	213.00
Water Treatment Facility Gas Consumption (therms)		**1,826.00**
Water Treatment Facility Gas Consumption (kBtu (thousand Btu))		**182,600.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**182,600.00**
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
Water Treatment Facility
Borough of Ocean Gate
Ocean Gate, NJ 08740

Facility Owner
Borough of OceanGate
801 Ocean Gate Ave
Ocean Gate, NJ 08740

Primary Contact for this Facility
Paulette Konopka
801 Ocean Gate Ave
Ocean Gate, NJ 08740

General Information

Water Treatment Facility	
Gross Floor Area Excluding Parking: (ft²)	2,120
Year Built	1927
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

Water Treatment	
Space Type	Other - Public Order and Safety
Gross Floor Area(ft²)	2,120
Number of PCs°	N/A
Weekly operating hours°	N/A
Workers on Main Shift°	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 12/31/2009)	**Baseline** (Ending Date 12/31/2009)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	252	252	0	N/A	90
Source (kBtu/ft²)	645	645	0	N/A	189
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/ft²/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	63	63	0	N/A	22
$kgCO_2e/ft^2$/year	30	30	0	N/A	11

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

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

APPENDIX M

Equipment Inventory & Lighting

New Jersey BPU Energy Audit Program
CHA #21611
Borough of Ocean Gate
Water Treatment Facility

Description	Qty	Manufacturer Name	Model No.	Serial Number	Equipment Type	Capacity/Size	Operating Hours	Location	Areas Served	Estimated Efficiency	Approximate Age	Useable Life Expectancy (years)
Standby Pump	1	GE	F429A	NA	Motor	20 HP	2 hours/week	Main Room	Well	91.70%	10	18
Recirculating Pump	1	NA	NA	NA	Motor	5 hp	2 hours/ week	Filter Tank Room	Filter Tanks	83.60%	20	18
Main Clear Well Pump	1	U.S. Motors	BF39B	H030V2BLE	Motor	1770 rpm, 30 HP, Head: 6W-16, 92.4% efficient	8760 hours/year	Remote Building	Treatment Facility	92.40%	8	18
Gas Unit Heaters	5	Modine	NA	NA	NA	30000 Btu	5027 hours/year	Water Treatment Facility	Water Treatment Facility	80%	5	13
Chemical Feed Mixer	1	Eastern Mixers	3/13865-4	34-6193-116	Motor	1/3 hp	2 hours/ week	Chemical Room	Water Treatment Tanks	56%	5	18
Chemical Mixer	2	NA	NA	NA	Motor	1/3 hp	2 hours/ week	Middle Room	Water Treatment Tanks	73%	10	18

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

Existing Lighting

Building Schedule:

Existing conditions (master switch): 3 hrs/week
Blended Electric Rate $ 0.178 /kWh

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**
Front, Middle, and Back Rooms	13	F82SS	173	0	176.46	2.249	switch		156	351
					0	0				-
					0	0				-
TOTALS -	**13**			**0**		**2.2**				**351**

APPENDIX N

Block Load Models

HEAT GAIN/LOSS WORKSHEET

Project Name:	Borough of Ocean Gate	**Project No.:**	CHA #21611		
Location	Ocean Gate, NJ	**Site Elevation:**	460 Feet	**Specific Volume**	14.00 CF/#
Building Name	Water Treatment Facility	**Date:**	06/15/10		
Engineer:	Matt Pittinger				

Building/Facility Designation Water Treatment Facility

Outdoor Winter Design DB Temperature	2.5 *F	**Indoor Winter Design DB Temperature**	60 *F
Outdoor Summer Design DB Temperature	90 *F	**Indoor Summer Design DB Temperature**	74 *F
Outdoor Summer Design WB Temperature	73 *F	**Indoor Summer Design WB Temperature**	60 *F
Outdoor Summer Humidity Ratio	0.0121 #/#	**Indoor Air (70*F) Humidity Ratio**	0.0079 #/#

ENVELOPE DESCRIPTIONS (Descriptions are from Interior to Exterior)

Walls (Select One - Type X)

		R Value	Wall Type
	Steel Siding, 4" Insulation, Steel Siding	15.2	1
	Plaster or Gypsum, frame construction, 5" Insulation, 1" stucco	18.2	1
	4" WH CMU, 1" Insulation, Finished Exterior	5.2	2
	Plaster or Gypsum, frame construction, 3" Insulation, 8" LW CMU	7.8	5
	4" Face Brick, 2" Concrete, 1" Insulation, Exterior Finish	5.1	12
	4" Face Brick, 4" Concrete, 1" Insulation, Exterior Finish	4.0	11
	Interior Finish, 2" Insulation, 8" CMU, 4" Face Brick	10.9	16
	Finished Surface, 8" LW CMU (filled), Air Space, 4" Face Brick	11.1	16
	Stucco or Gypsum, 2.5" Insul, Face Brick	14.3	10
	4" Block, 1" insulation, 8" Block	19.9	16
x	Outside Air Resistance, Concrete Block, Inside Air Resistence	5.4	

Wall Material	
Outside Air Resistance	
Stucco Finish	
Air Space	
Filled Concrete Block	
Inside Air Resistance	
Total	

Roofs (Select One)

		R Value	Roof Type
	Tectum Deck, 3.3" Insul., BU Roof	13.0	1
	Steel Deck, 5" Insul., BU Roof	18.2	1
	Attic Roof with 6" Insul.	25.0	4
	4" HW Concrete Deck, BU Roof	2.7	2
	Ceiling, 3" Insulation, 4" Concrete Deck, BU Roof	14.9	4
	Ceiling, 4" Concrete Deck, 3" Insulation, BU Roof	18.5	13
	Ceiling, 4" Concrete Deck, 6" Insulation, BU Roof	21.7	14
	Ceiling, Wood Deck, 6" Insulation, Felt & Membrane	22.7	10
	Wood Deck, 6" insulation, Felt & Membrane	18.0	
x	Outside Air Resistance, Wood Deck, Shingles, Inside Air Resistance	2.54	

Roof Material	
Outside Air Resistance	
Shingles	
Felt Paper	
Wood Deck	
Inside Air Resistance	
Total	

Windows (Select One)

		U Value
x	Aluminum Frame, 1/8" SP Glazing	1.20
	Aluminum Frame, 1/4" DP Glazing	0.60
	Aluminum Frame, 3/16" DP Glazing	
	Aluminum Frame, 1/2" DP Glazing	0.50
	Skylights	0.90
	Other	

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

BUILDING CHARACTERISTICS

Roof Area	1,288 SF		
Occupied Area	1,152 SF	**Return Plenum?**	n

	Gross Wall Length	Average Wall Height	Ceiling Height	Window Area	Door Area	Net Wall Area
North Exposure	0 Ft	10.0 Ft	10.0 Ft	0 SF	0 SF	0 SF
East Exposure	48 Ft	10.0 Ft	10.0 Ft	26 SF	18 SF	437 SF
South Exposure	24 Ft	10.0 Ft	10.0 Ft	0 SF	85 SF	155 SF
West Exposure	48 Ft	10.0 Ft	10.0 Ft	45 SF	0 SF	435 SF

Forced Ventilation 0 cfm

HEAT GAIN/LOSS WORKSHEET

Project Name:	Borough of Ocean Gate	Project No.:	CHA #21611		
Location	Ocean Gate, NJ	Site Elevation:	460 Feet	Specific Volume	14.00 CF/#
Building Name	Water Treatment Facility	Date:	06/15/10		
Engineer:	Matt Pittinger				

Building/Facility Designation: Water Treatment Facility

COOLING HEAT GAINS TO THE ROOM - SENSIBLE

SOLAR GAINS

WINDOWS	AREA (SF)	SHGF		Shade Coef	Cooling Load Factor		Solar Heat Gain	
North Exposure	0	0	btu/h/sf	0.8	0.75	Glass Type C	0 Btu/hr	
East Exposure	26	216	btu/h/sf	0.8	0.31	Glass Type C	1,393 Btu/hr	
South Exposure	0	109	btu/h/sf	0.8	0.58	Glass Type C	0 Btu/hr	
West Exposure	45	216	btu/h/sf	0.8	0.29	Glass Type C	2,255 Btu/hr	
								3,648 Btu/h

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain	
North Exposure	0	0.18	0 °F	1.0	0 Btu/hr	
East Exposure	437	0.18	39 °F	1.0	3,142 Btu/hr	
South Exposure	155	0.18	27 °F	1.0	772 Btu/hr	
West Exposure	435	0.18	22 °F	1.0	1,766 Btu/hr	
Roof	1,288	0.39	73 °F	1.0	37,042 Btu/hr	
Fenestration	71	1.20	16 °F		1,363 Btu/hr	
Doors	103	0.14	22 °F		316 Btu/hr	
Ceiling	1,152	0.14	0 °F		0 Btu/hr	
Partition		0.05	0 °F		0 Btu/hr	
Floor	1,152	0.04	0 °F		0 Btu/hr	
						44,401 Btu/h

INTERNAL HEAT GAINS

							Room Heat Gain	
Lights	0.40	w/sf x	1,152	Occ Area =	0.5 kW x 3.4x	1.0 RAF =	1,573 Btu/h	
Plug Load	0.15	w/sf x	1,152	Occ Area =	0.2 kW x 3.4x	1.0 RAF =	590 Btu/h	
People	1	people x	255	btu/person x	3% time in space =		6 Btu/h	
Computer Work Stations			0	Units x	120 W/Unit x	3414 =	0 Btu/h	
Equipment	2.0	kW x 3.413 =					6,826 Btu/h	
Misc.							0 Btu/h	
								8,995 Btu/h

VENTILATION AND INFILTRATION

		Infiltration Factor		Perimeter Ratio		Coef	Temp. Diff.		Room Heat Gain	
Walls	1,027 SF	0.18	CFM/SF			1.04	16 °F		3,333	Btu/h
Doors	103 SF	0.30	CFM/LF	0.69	LF/SF	1.04	16 °F		384	Btu/h
Windows	71 SF	0.60	CFM/LF	1.09	LF/SF	1.04	16 °F		837	Btu/h
Ventilation	0 cfm					1.04	16 °F		0	Btu/h
										4,554 Btu/h

COOLING HEAT GAINS TO THE RA PLENUM - SENSIBLE

4,950

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain	
North Exposure	0	0.18	0	1.0	0 Btu/hr	
East Exposure	0	0.18	39	1.0	0 Btu/hr	
South Exposure	0	0.18	27	1.0	0 Btu/hr	
West Exposure	0	0.18	22	1.0	0 Btu/hr	
Roof	1,288	0.39	73	0.0	0 Btu/hr	
						0 Btu/h

INTERNAL HEAT GAINS

Lights	0.40	w/sf x	1,152	Occ Area =	0.5 kW x3413x	0.00 RAF =	0 Btu/h	
Misc.							0 Btu/h	
								0 Btu/h

SENSIBLE HEAT GAINS - TEMP. DEPENDENT		SENSIBLE HEAT GAINS - TEMP. INDEPENDENT	
Solar	3,648	Internal Gains to Room	8,995
Conduction to Room	44,401	Internal Gains to Plenum	0
Conduction to Plenum	0		
Ventilaton and Infiltration	4,554		
Sub Total	52,603	Sub Total	8,995

HEAT GAIN/LOSS WORKSHEET

Project Name:	Borough of Ocean Gate	**Project No.:**	CHA #21611		
Location	Ocean Gate, NJ	**Site Elevation:**	460 Feet	**Specific Volume**	14.00 CF/#
Building Name	Water Treatment Facility	**Date:**	06/15/10		
Engineer:	Matt Pittinger				

Building/Facility Designation Water Treatment Facility

LATENT COOLING LOADS

Infiltration

		Infiltration Factor	Air Density	Humidity Ratio Dif.	Room Heat Gain	
Walls	1,288 SF	0.18 CFM/SF	4,629	0.0042 #/#	4,553	Btu/h
Doors	103 SF	0.30 CFM/LF	4,629	0.0042 #/#	418	Btu/h
Windows	71 SF	0.60 CFM/LF	4,629	0.0042 #/#	911	Btu/h
Ventilation	0 cfm		4,629	0.0042 #/#	0	Btu/h
People	1 people	0.03 time in space		250 Btu/hr/person	6	Btu/h
						5,889 Btu/h

Cooling Load Summary

	Sensible	Latent	Total		
Temperature Dependent Gains	52,603	5,889	58,491		
Temperature Indep. Gains	8,995		8,995	SHR=	0.91
Total	61,597	5,889	67,486		

Building Cooling Load 5.6 Tons at 205 SF/Ton

Building Air Flow to Condition Space based on a 12°F Temp Rise is 4,918 CFM / 4.27 CFM/sf

HEATING CALCULATION

CONDUCTION

	NET AREA (SF)	U-VALUE	Heating Load Temp. Dif.	Room Heat Gain	
North Exposure	0	0.18	58	0	Btu/h
East Exposure	437	0.18	58	4,632	Btu/h
South Exposure	155	0.18	58	1,645	Btu/h
West Exposure	435	0.18	58	4,616	Btu/h
Fenestration	71	1.20	58	4,899	Btu/h
Roof	1,288	0.39	58	29,177	Btu/h
Doors	103	0.14	58	825	Btu/h
Ceiling	1,152	0.14	0	0	Btu/h
Partition	0	0.05	0	0	Btu/h
Floor	1,288	0.04	10	515	Btu/h

Ventilation and Infiltration

		Infiltration Factor	Coef	Temp. Difference	Air Flow	Room Heat Gain	
Walls	1,027 SF	0.18 CFM/SF	1.04	58	185 cfm	11,090	Btu/h
Doors	103 SF	0.30 CFM/LF	1.04	58	21 cfm	1,278	Btu/h
Windows	71 SF	0.60 CFM/LF	1.04	58	46 cfm	2,785	Btu/h
Ventilation Load	0 cfm		1.04	58	0 cfm	0	Btu/h
Total Ventilation & Infiltration Load					252 cfm	15,153	Btu/h

Building Heating Load 61,462 btu/h

53.4 btu/sf

HEAT GAIN/LOSS WORKSHEET

Project Name:	Borough of Ocean Gate	**Project No.:**	CHA #21611		
Location	Ocean Gate, NJ	**Site Elevation:**	460 Feet	**Specific Volume**	14.00 CF/#
Building Name	Water Treatment Facility	**Date:**	06/15/10		
Engineer:	Matt Pittinger				

Building/Facility Designation Water Treatment Facility

Outdoor Winter Design DB Temperature	2.5 *F	**Indoor Winter Design DB Temperature**		58 *F	
Outdoor Summer Design DB Temperature	90 *F	**Indoor Summer Design DB Temperature**		74 *F	
Outdoor Summer Design WB Temperature	73 *F	**Indoor Summer Design WB Temperature**		60 *F	
Outdoor Summer Humidity Ratio	0.0121 #/#	**Indoor Air (70*F) Humidity Ratio**		0.0079 #/#	

ENVELOPE DESCRIPTIONS (Descriptions are from Interior to Exterior)

Walls (Select One - Type X)

		R Value	Wall Type
	Steel Siding, 4" Insulation, Steel Siding	15.2	1
	Plaster or Gypsum, frame construction, 5" Insulation, 1" stucco	18.2	1
	4" WH CMU, 1" Insulation, Finished Exterior	5.2	2
	Plaster or Gypsum, frame construction, 3" Insulation, 8" LW CMU	7.8	5
	4" Face Brick, 2" Concrete, 1" Insulation, Exterior Finish	5.1	12
	4" Face Brick, 4" Concrete, 1" Insulation, Exterior Finish	4.0	11
	Interior Finish, 2" Insulation, 8" CMU, 4" Face Brick	10.9	16
	Finished Surface, 8" LW CMU (filled), Air Space, 4" Face Brick	11.1	16
	Stucco or Gypsum, 2.5" Insul, Face Brick	14.3	10
	4" Block, 1" insulation, 8" Block	19.9	16
x	Concrete Block, Air Space, Framing, Insulation, Stucco finishing	5.0	

Wall Material
Outside Air Resistance
Concrete Block
Inside Air Resistance
Total

Roofs (Select One)

		R Value	Roof Type
	Tectum Deck, 3.3" Insul., BU Roof	13.0	1
	Steel Deck, 5" Insul., BU Roof	18.2	1
	Attic Roof with 6" Insul.	25.0	4
	4" HW Concrete Deck, BU Roof	2.7	2
	Ceiling, 3" Insulation, 4" Concrete Deck, BU Roof	14.9	4
	Ceiling, 4" Concrete Deck, 3" Insulation, BU Roof	18.5	13
	Ceiling, 4" Concrete Deck, 6" Insulation, BU Roof	21.7	14
	Ceiling, Wood Deck, 6" Insulation, Felt & Membrane	22.7	10
	Wood Deck, 6" insulation, Felt & Membrane	18.0	
x	Ceiling, Insulation, Wood Deck, Felt membrane, shingles	9.00	

Roof Material
Outside Air Resistance
Wood Deck
Shingles
Inside Air Resistance
Total

Roof Area
Skylights
Normal Roof

Windows (Select One)

		U Value
	Aluminum Frame, 1/8" SP Glazing	1.20
	Aluminum Frame, 1/4" DP Glazing	0.60
x	Aluminum Frame, 3/16" DP Glazing	0.62
	Aluminum Frame, 1/2" DP Glazing	0.50
	Skylights	0.90
	Other	

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

BUILDING CHARACTERISTICS

Roof Area	968 SF		
Occupied Area	968 SF	**Return Plenum?**	n

	Gross Wall Length	Average Wall Height	Ceiling Height	Window Area	Door Area	Net Wall Area
North Exposure	44 Ft	12.0 Ft	12.0 Ft	32 SF	0 SF	496 SF
East Exposure	48 Ft	12.0 Ft	12.0 Ft	0 SF	64 SF	512 SF
South Exposure	20 Ft	12.0 Ft	12.0 Ft	0 SF	21 SF	219 SF
West Exposure	22 Ft	12.0 Ft	12.0 Ft	32 SF	0 SF	232 SF

Forced Ventilation 0 cfm

HEAT GAIN/LOSS WORKSHEET

Project Name:	Borough of Ocean Gate	**Project No.:**	CHA #21611		
Location	Ocean Gate, NJ	**Site Elevation:**	460 Feet	**Specific Volume**	14.00 CF/#
Building Name	Water Treatment Facility	**Date:**	06/15/10		
Engineer:	Matt Pittinger				

Building/Facility Designation Water Treatment Facility

COOLING HEAT GAINS TO THE ROOM - SENSIBLE

SOLAR GAINS

WINDOWS	AREA (SF)	SHGF	Shade Coef	Cooling Load Factor		Solar Heat Gain	
North Exposure	32	38 btu/h/sf	0.8	0.75	Glass Type C	730 Btu/hr	
East Exposure	0	216 btu/h/sf	0.8	0.31	Glass Type C	0 Btu/hr	
South Exposure	0	109 btu/h/sf	0.8	0.58	Glass Type C	0 Btu/hr	
West Exposure	32	216 btu/h/sf	0.8	0.29	Glass Type C	1,604 Btu/hr	
							2,333 Btu/h

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain	
North Exposure	496	0.20	0 °F	1.0	0 Btu/hr	
East Exposure	512	0.20	39 °F	1.0	3,994 Btu/hr	
South Exposure	219	0.20	27 °F	1.0	1,183 Btu/hr	
West Exposure	232	0.20	22 °F	1.0	1,021 Btu/hr	
Roof	968	0.11	73 °F	1.0	7,852 Btu/hr	
Fenestration	64	0.62	16 °F		635 Btu/hr	
Doors	85	0.14	22 °F		262 Btu/hr	
Ceiling	968	0.14	0 °F		0 Btu/hr	
Partition		0.05	0 °F		0 Btu/hr	
Floor	968	0.04	0 °F		0 Btu/hr	
						14,945 Btu/h

INTERNAL HEAT GAINS

							Room Heat Gain	
Lights	0.40 w/sf x	968 Occ Area =	0.4 kW x 3.4x		1.0 RAF =		1,322 Btu/h	
Plug Load	0.15 w/sf x	968 Occ Area =	0.1 kW x 3.4x		1.0 RAF =		496 Btu/h	
People	1 people x	255 btu/person x	5% time in space =				13 Btu/h	
Computer Work Stations		0 Units x	120 W/Unit x		3414 =		0 Btu/h	
Equipment	1.0 kW x 3.413 =						3,413 Btu/h	
Misc.							0 Btu/h	
								5,243 Btu/h

VENTILATION AND INFILTRATION

		Infiltration Factor	Perimeter Ratio	Coef	Temp. Diff.		Room Heat Gain	
Walls	1,459 SF	0.16 CFM/SF		1.04	16 °F		4,211	Btu/h
Doors	85 SF	0.30 CFM/LF	0.61 LF/SF	1.04	16 °F		281	Btu/h
Windows	64 SF	0.20 CFM/LF	1.00 LF/SF	1.04	16 °F		231	Btu/h
Ventilation	0 cfm			1.04	16 °F		0	Btu/h
								4,723 Btu/h

COOLING HEAT GAINS TO THE RA PLENUM - SENSIBLE

4,950

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain	
North Exposure	0	0.20	0	1.0	0 Btu/hr	
East Exposure	0	0.20	39	1.0	0 Btu/hr	
South Exposure	0	0.20	27	1.0	0 Btu/hr	
West Exposure	0	0.20	22	1.0	0 Btu/hr	
Roof	968	0.11	73	0.0	0 Btu/hr	
						0 Btu/h

INTERNAL HEAT GAINS

Lights	0.40 w/sf x	968 Occ Area =	0.4 kW x3413x	0.00 RAF =	0 Btu/h	
Misc.					0 Btu/h	
						0 Btu/h

SENSIBLE HEAT GAINS - TEMP. DEPENDENT	
Solar	2,333
Conduction to Room	14,945
Conduction to Plenum	0
Ventilaton and Infiltration	4,723
Sub Total	22,001

SENSIBLE HEAT GAINS - TEMP. INDEPENDENT	
Internal Gains to Room	5,243
Internal Gains to Plenum	0
Sub Total	5,243

HEAT GAIN/LOSS WORKSHEET

Project Name:	Borough of Ocean Gate	**Project No.:**	CHA #21611		
Location	Ocean Gate, NJ	**Site Elevation:**	460 Feet	**Specific Volume**	14.00 CF/#
Building Name	Water Treatment Facility	**Date:**	06/15/10		
Engineer:	Matt Pittinger				

Building/Facility Designation Water Treatment Facility

LATENT COOLING LOADS

Infiltration

		Infiltration Factor	Air Density	Humidity Ratio Dif.	Room Heat Gain
Walls	968 SF	0.16 CFM/SF	4,629	0.0042 #/#	3,042 Btu/h
Doors	85 SF	0.30 CFM/LF	4,629	0.0042 #/#	306 Btu/h
Windows	64 SF	0.20 CFM/LF	4,629	0.0042 #/#	251 Btu/h
Ventilation	0 cfm		4,629	0.0042 #/#	0 Btu/h
People	1 people	0.05 time in space		250 Btu/hr/person	13 Btu/h
					3,612 Btu/h

Cooling Load Summary

	Sensible	Latent	Total		
Temperature Dependent Gains	22,001	3,612	25,613		
Temperature Indep. Gains	5,243		5,243	SHR=	0.88
Total	27,244	3,612	30,856		

Building Cooling Load 2.6 Tons at 376 SF/Ton

Building Air Flow to Condition Space based on a 12°F Temp Rise is **2,175 CFM** / **2.25 CFM/sf**

HEATING CALCULATION

CONDUCTION

	NET AREA (SF)	U-VALUE	Heating Load Temp. Dif.	Room Heat Gain
North Exposure	496	0.20	56	5,506 Btu/h
East Exposure	512	0.20	56	5,683 Btu/h
South Exposure	219	0.20	56	2,431 Btu/h
West Exposure	232	0.20	56	2,575 Btu/h
Fenestration	64	0.62	56	2,202 Btu/h
Roof	968	0.11	56	5,969 Btu/h
Doors	85	0.14	56	660 Btu/h
Ceiling	968	0.14	0	0 Btu/h
Partition	0	0.05	0	0 Btu/h
Floor	968	0.04	10	387 Btu/h

Ventilation and Infiltration

		Infiltration Factor	Coef	Temp. Difference	Air Flow	Room Heat Gain
Walls	1,459 SF	0.16 CFM/SF	1.04	56	233 cfm	13,523 Btu/h
Doors	85 SF	0.30 CFM/LF	1.04	56	16 cfm	904 Btu/h
Windows	64 SF	0.20 CFM/LF	1.04	56	13 cfm	742 Btu/h
Ventilation Load	0 cfm		1.04	56	0 cfm	0 Btu/h
Total Ventilation & Infiltration Load					262 cfm	15,169 Btu/h

Building Heating Load	40,583	btu/h
		41.9 btu/sf

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet		
North	0.0	0.0	0	0.0	0.0		**All wall quantities must remain equal to 1**
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	0.0	0.0		0.0	0.0	#DIV/0!	Average height wall automatically linked
East	48.0	10.0	1	480.0	116.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	48.0	10.0		480.0	116.0	10.0	Average height wall automatically linked
South	24.0	10.0	1	240.0	68.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	24.0	10.0		240.0	68.0	10.0	Average height wall automatically linked
West	48.0	10.0	1	480.0	116.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	48.0	10.0		480.0	116.0	10.0	Average height auto linked to block load sheet

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
East	3.0	4.3	2	26.0	29.3	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	26.0	29.3	
South				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
West	3.0	5.0	3	45.0	48.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	45.0	48.0	
			Total	**71.0**	**77.3**	LF/SF 1.09

Borough of Ocean Gate
CHA #21611
Building: Water Treatment Facility

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
East	2.5	7.0	1	17.5	19.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	17.5	19.0	
South	8.0	8.0	1	64.0	32.0	
	3.0	7.0	1	21.0	20.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	85.0	52.0	
West				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
			Total	**102.5**	**71.0**	LF/SF 0.69

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet		
North	44.0	12.0	1	528.0	112.0		**All wall quantities must remain equal to 1**
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	44.0	12.0		528.0	112.0	12.0	Average height wall automatically linked
East	48.0	12.0	1	576.0	120.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	48.0	12.0		576.0	120.0	12.0	Average height wall automatically linked
South	20.0	12.0	1	240.0	64.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	20.0	12.0		240.0	64.0	12.0	Average height wall automatically linked
West	22.0	12.0	1	264.0	68.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	22.0	12.0		264.0	68.0	12.0	Average height auto linked to block load sheet

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North	4.0	4.0	2	32.0	32.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	32.0	32.0	
East				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
South				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
West	4.0	4.0	2	32.0	32.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	32.0	32.0	
			Total	**64.0**	**64.0**	LF/SF 1.00

Borough of Ocean Gate
CHA #21611
Building: Water Treatment Facility

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
East	8.0	8.0	1	64.0	32.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	64.0	32.0	
South	3.0	7.0	1	21.0	20.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
			Sub-total	21.0	20.0	
West				0.0	0.0	
				0.0	0.0	
			Sub-total	0.0	0.0	
			Total	**85.0**	**52.0**	LF/SF 0.61

Borough of Ocean Gate
CHA #21611
Building: Water Treatment Facility

Reconcile Thermal Model

Building Footprint	2,120	SF	Ex Occupied Clng Temp.	74	°F	Ex Occupied Htg Temp.	58 °F
Heating Efficiency	80%		Ex Unoccupied Clng Temp.	74	°F	Ex Unoccupied Htg Temp.	58 °F
Cooling Efficiency	0.00	kW/ton	Occupied Cooling UA	(3,003)	btu/hr/°F	Occupied Heating UA	1,263 btu/hr/°F
Internal Gains	14,238	btu/h	Unoccupied Cooling UA	(2,775)	btu/hr/°F	Unoccupied Heating UA	1,263 btu/hr/°F
Unoc Internal Gain factor	0.25		Cooling Occ Enthalpy Setpoint	27.5	Btu/lb		
Ave Occ Internal Gain Factor	0.4		Cooling Unocc Enthalpy Setpoint	27.5	Btu/lb		
Economizer available (Y/N)	No						

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

					EXISTING LOADS									
					Occupied			Unoccupied						
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Total Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Available Economizer Cooling kWh	Necessary Cooling Energy kWh	Existing Cooling Energy kWh	Existing Heating Energy therms
A		B	C	D	E	F	G	H	I	J	K	L	M	M
102.5	49.1	0	0	0	-85,587	-49,991	-5,695	-79,089	-49,991	-3,559	0	0	0	0
97.5	42.5	3	0	3	-70,572	-34,716	-5,695	-65,214	-34,716	-3,559	0	0	0	0
92.5	39.5	34	1	33	-55,556	-27,773	-5,695	-51,339	-27,773	-3,559	0	0	0	0
87.5	36.6	131	2	129	-40,541	-21,061	-5,695	-37,463	-21,061	-3,559	0	0	0	0
82.5	34.0	500	9	491	-25,526	-15,044	-5,695	-23,588	-15,044	-3,559	0	0	0	0
77.5	31.6	620	11	609	-10,511	-9,489	-5,695	-9,713	-9,489	-3,559	0	0	0	0
72.5	29.2	664	12	652	0	0	-5,695	0	0	-3,559	0	0	0	0
67.5	27.0	854	15	839	0	0	-5,695	0	0	-3,559	0	0	0	0
62.5	24.5	927	17	910	0	0	-5,695	0	0	-3,559	0	0	0	0
57.5	21.4	600	11	589	632	278	-5,695	632	278	-3,559	0	0	0	0
52.5	18.7	610	11	599	6,948	3,055	-5,695	6,948	3,055	-3,559	0	0	0	49
47.5	16.2	611	11	600	13,265	5,832	-5,695	13,265	5,832	-3,559	0	0	0	118
42.5	14.4	656	12	644	19,581	8,610	-5,695	19,581	8,610	-3,559	0	0	0	202
37.5	12.6	1,023	18	1,005	25,897	11,387	-5,695	25,897	11,387	-3,559	0	0	0	431
32.5	10.7	734	13	721	32,214	14,164	-5,695	32,214	14,164	-3,559	0	0	0	393
27.5	8.6	334	6	328	38,530	16,941	-5,695	38,530	16,941	-3,559	0	0	0	217
22.5	6.8	252	5	248	44,847	19,719	-5,695	44,847	19,719	-3,559	0	0	0	192
17.5	5.5	125	2	123	51,163	22,496	-5,695	51,163	22,496	-3,559	0	0	0	109
12.5	4.1	47	1	46	57,480	25,273	-5,695	57,480	25,273	-3,559	0	0	0	47
7.5	2.6	22	0	22	63,796	28,050	-5,695	63,796	28,050	-3,559	0	0	0	24
2.5	1.0	13	0	13	70,113	30,828	-5,695	70,113	30,828	-3,559	0	0	0	16
-2.5	0.0	0	0	0	76,429	33,605	-5,695	76,429	33,605	-3,559	0	0	0	0
-7.5	-1.5	0	0	0	82,746	36,382	-5,695	82,746	36,382	-3,559	0	0	0	0
TOTALS		8,760	156	8,604								0	0	1,797

Existing Building Ventilation & Infiltration (occ)	**514 cfm**
Overheat Ventilation Factor	**1.00**
Additional ventilation to offset overheat	**0 cfm**
Existing Building Ventilation & Infiltration (unocc)	**514 cfm**
Economizer Ventilation (from AHU's)	**0 cfm**

Energy Use Indices (calculated)

	Base Case
Heating	1,797
Target ->	1,827
	98.3%

	Base Case
Cooling	0
Target ->	300
	0.0%

APPENDIX O

Geothermal Calculation

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

Geothermal Heat Pump Calculation

Electric Cost	$ 0.178	/kWh	Existing Utility Cost	$	2,900
Natural Gas Cost	$ 1.59	/therm	Proposed Utility Cost	$	1,729
Heating System Usage	1,827	Therms	Savings	$	1,172
Heating System Efficiency	80%				
Heating System Output	146,160,000	Btu			
New Unit Heating Output	87,300	Btu/hr			
Equivalent Hour Runtime	1674	hours			
kW Input/Unit	5.81	kW			
Number of Units	2				
New unit COP	4.4				
Total kWh	9733	kWh			

Borough of Ocean Gate
CHA #21611
Water Treatment Facility

ECM 6 Window Replacement/Upgrade

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.		
						$ -	$ -	$ -	$ -	
Mcquay Geothermal Unit 70 Mbtu	2	EA	$ 4,165	$ 250.00		$ 8,163	$ 605	$ -	$ 8,768	
Circulator Pump	2	EA	$ 200	$ 100		$ 392	$ 242	$ -	$ 634	
Hot water Piping	100	LF	$ 3	$ 4.00		$ 294	$ 484	$ -	$ 778	
Piping modifications	2	LS	$ 250	$ 500		$ 490	$ 1,210	$ -	$ 1,700	
Unit Heater removal	5	EA		$ 200		$ -	$ 1,210	$ -	$ 1,210	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

Cost from ingramswaterandair.com

$	13,090	Subtotal
$	1,309	10% Contingency
$	1,440	Contractor 10% O&P
$	-	0% Engineering
$	**15,839**	**Total**