

**BOROUGH OF OCEAN GATE
MUNICIPAL BUILDING
ENERGY ASSESSMENT**

for

**NEW JERSEY
BOARD OF PUBLIC UTILITIES**

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1.0 INTRODUCTION & BACKGROUND

The Ocean Gate Municipal Building is a single story 11,500 square foot structure constructed in 2005. It includes a courtroom, municipal administrative offices, and police department. The building is open from 8am – 4:30pm Monday through Thursday and is occupied by about 35 people. The police department has a rear entrance which is accessed 24 hours a day with a card reader for after hours security.

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 Municipal Building, a 11,500 square foot building constructed in 2005. The following areas were evaluated for energy conservation measures:

- Temperature setback
- Lighting & control upgrades
- Domestic hot water heater replacement

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Potential annual savings of \$6,900 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 Heating and Cooling Setback

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
2,900	0	3,600	1,700	2,700	14	NA	1.1	NA

*There is no incentive for this ECM

ECM-4 Replacement of Exterior Lights and Reduce Parking Lot Hours

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
8,500	3	12,300	0	2,100	14	500	4.0	3.8

* Incentive shown is per the New Jersey Prescriptive Lighting Program.

ECM-5 Replacement of T-12 Fixtures

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
500	0.1	1,200	0	200	14	100	2.5	2.0

* Incentive shown is per the New Jersey Smart Start Program, 2010 Prescriptive Lighting Application.

ECM-6 Occupancy Sensors for Interior Lighting

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
1,500	0	6,900	0	1,000	14	NA	1.5	NA

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

3.0 EXISTING CONDITIONS

3.1 Building - General

The Ocean Gate Municipal Building, constructed in 2005, includes a courtroom, municipal administrative offices, and police department. The building is open from 8am – 4:30pm Monday through Thursday with approximately 35 employees. The police department has a rear entrance accessible 24 hours a day with a card reader for after hours security.

The building's exterior walls consist of vinyl siding with wood framed studs and furred out on the interior with a plaster finish. The building has many windows along the building exterior which are all double pane glass and in excellent condition. The building's roof is pitched with asphalt shingles. There is a layer of insulation of approximately 8" thick above the hung ceiling.

3.2 Utility Usage

The utilities include electricity and natural gas. The electric utility is Jersey Central Power and Light (JCP&L) and the gas utility is New Jersey Natural Gas. The facility does not pay for water.

From January 2009 through December 2009, electric usage was approximately 139,160 kWh at a cost of about \$23,500. Analyzing electricity bills during this period, the building was charged an average demand unit cost of \$4.00 per kW and a blended unit cost of \$0.1685 per kWh. Electricity usage was fairly consistent throughout the year, while the summer months yielded slightly higher consumption rates. Annually, the building required about 7,440 therms of natural gas. Based on the annual cost of about \$9,400, the blended price per therm was about \$1.26. Gas consumption was the highest in the winter months to heat the building. Utility data can be found in Appendix A.

Electricity commodity supply and delivery is presently purchased from JCP&L. The delivery component will always be the responsibility of the utility that connects the facility to the power grid or gas line; however, the supply can be purchased from a third party. The electricity 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 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 Municipal Building paid a rate closer to the statewide average, the facility would save about \$1,900 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 Municipal Building would save about \$3,400 per year.

3.3 HVAC Systems

3.3.1 Space Heating System

The building has two gas fired natural draft boilers manufactured by Weil McLain, model PFG-5-PIDN. Each boiler has an input rating of 244,000 Btuh. The boilers are hot water and serve the entire building. The hot water is pumped from the mechanical room to a hot water heating coil located in each air handling unit (AHU). There are 3 way valves on the seven AHUs and the pumps run constantly during the winter months. All AHUs are located above the ceiling and the condensing units are located outside

on grade. There are two B&G inline circulating pumps, ¾ HP, model AQA56A17D. They circulate the water to all AHUs.

3.3.2 Air Conditioning Systems

The building uses a series of air cooled split systems which have condensers located outside on grade and AHUs located inside above the ceiling. There are seven split systems of various sizes serving portions of the building. Each AHU is controlled by a room thermostat. The systems are constant volume and have plenum return. The efficiencies of the AC systems is approximately 13 energy efficiency ratio (EER). Following is data for the condensing units:

<u>UNIT</u>	<u>MAKE</u>	<u>MODEL</u>	<u>SERIAL NO.</u>	<u>CONDITION</u>
AC-1	TRANE	2TTA0042A3000AA	2422SDA3F	Good
AC-2	TRANE	2TTA006OA3000AA	2401L2M3F	Good
AC-3	TRANE	TTA150B80SDA	2455YM1AD	Good
AC-4	TRANE	TTBO30C100A2	2175RL35F	Good
AC-5	TRANE	TTA090A30SEA	2431K9RAD	Good
AC-6	TRANE	TTB030C100A2	2175RH55F	Good
AC-7	TRANE	TTA090A30SEA	2431KERAD	Good

3.3.3 Building Ventilation and Exhaust Systems

Primary ventilation is provided by dedicated outside air ducts which run in the attic space and are connected to the return side of each AHU, which pulls in air from outside when running. There is one toilet exhaust fan serving the common toilets.

3.4 Control Systems

AHU controls consist of local thermostats located in various rooms. There is one thermostat for each AHU, which controls heating and cooling. The boilers run from an internal aquastat to maintain boiler temperatures throughout the heating season.

The space temperature setpoints for the occupied and unoccupied modes are 72°F in the heating and 70°F in the cooling seasons. Due to the lack of air balancing, the building needs to set the cooling at 70°F.

3.5 Lighting/Electrical Systems

Most of the light fixtures are F32T-8 lamps that use 32 watts per lamp, and recessed lighting utilizes compact fluorescent lamps.

Lighting in the municipal office areas are controlled by individual switches at the entrance to each room. Lights are left on during normal business hours.

There are several outdoor lighting fixtures which serve the parking lot and exterior building illumination; these use 175 watt lamps. The parking lot fixtures are pole mounted while the building fixtures are located under the exterior soffit.

3.6 Plumbing Systems

Domestic hot water is generated by two electric tank heaters; one having an input of 4 kW and the other has 9 kW. These units are located in separate rooms and are in excellent condition.

There are restrooms located at the main entrance, and the fixtures are water conservation type.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Heating and Cooling Setback

Heating and cooling are provided by air handlers with DX coils and hot water coils. Hot water is produced by two boilers; each heating coil has a 3 way control valve managed by a local wall mounted thermostat. Cooling is produced by air cooled split system condensing units located outside on grade, and controlled by the same local thermostat. The original controls were not properly commissioned and it is intended to reprogram the existing thermostats to properly controlling heating and cooling.

This measure will save energy by modifying the unoccupied setpoints. It is intended to lower the unoccupied heating setpoint from 70°F to 60°F and raise the unoccupied cooling setpoint of 72°F to 80°F.

The controls have an expected life of 15 years, according to ASHRAE, and total energy savings over the life of the project are estimated at 25,500 therms, 54,000 kWh, and \$40,500.

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

ECM-1 Heating and Cooling Setback

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity	Gas	Total					
\$	kW	kWh	Therms	\$	\$	Years	Years	
2,900	0	3,600	1,700	2,700	14	NA	1.1	NA

*There is no incentive for this ECM

This measure is recommended.

4.2 ECM-2 Replace Domestic Hot Water Heater in Main Portion of the Building

The central area of the building contains the offices and public restrooms. There is one domestic hot water heater which serves this area. It is a 40 gallon tank with input of 4kW.

Using electricity to produce domestic hot water is very costly. A new natural gas heater would save energy since gas is a less expensive source of energy. This measure will replace the existing electric domestic hot water heater to natural gas heater. The new heater will be a direct vent unit and be vented directly to the outdoors.

The tank has an expected life of 10 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 22,000 kWh and \$3,000.

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

ECM-2 Replace Domestic Hot Water Heater in Main Portion of the Building

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Gas				
\$	kW	kWh	Therms	\$	\$	Years	Years
6,500	0	2,200	(35)	300	9.0	NA	21.7

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

This measure is not recommended.

4.3 ECM-3 Replace Domestic Hot Water Heater for Police Section

The area of the building that houses the police department, obtains hot water from one domestic hot water heater. It is a 50 gallon tank with input of 9 kW.

Using electricity for domestic hot water production is very costly. A new natural gas heater would save energy since gas is a less expensive source of energy. This measure will replace the existing domestic hot water heater from an electric type to natural gas. The new heater will be a direct vent unit and be vented directly to the outdoors.

The tank has an expected life of 10 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 50,000 kWh and \$6,000.

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

ECM-3 Replace Domestic Hot Water Heater for Police Section

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Gas				
\$	kW	kWh	Therms	\$	\$	Years	Years
6,400	0	5,000	(130)	600	9	NA	10.7

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

This measure is not recommended.

4.4 ECM-4 Replacement of Exterior Lights and Reduce Parking Lot Hours

The building has outdoor lights under the roof soffit which are operational the entire nighttime. There are approximately 23 fixtures that vary between 100 and 175 watts. The parking lot contains 17 fixtures of 175 watts each. These are also on during the entire night.

It is intended to change the soffit lighting to more efficient fixtures which consume less power. The hours that these fixtures are on will not change. For the parking lot lights, it is intended to change all the

existing 175 lamps to newer high efficiency induction lighting of approximately 125 watts. In addition, some of the parking lot lights will be turned off at night since they are not needed. The energy saving for this measure was calculated by applying the existing and proposed fixture wattages and burn hours. Supporting calculations, including all assumptions for lighting hours and annual energy usage for each fixture is provided in Appendix E.

The signs have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 184,500 kWh, totaling \$31,500.

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

ECM-4 Replacement of Exterior Lights and Reduce Parking Lot Hours

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
8,500	3	12,300	0	2,100	14	500	4.0	3.8

* Incentive shown is per the New Jersey Prescriptive Lighting Program.

This measure is recommended.

4.5 ECM-5 Replacement of T-12 Fixtures

This building is a modern facility and has new T-8 lamps and electronic ballasts throughout the spaces. The only area which had older technology T-12 lamps was the sallyport area. Newer technology T-8 lamps and electronic ballasts are proposed for these six older fixtures.

The total energy saving for this measure was calculated by applying the existing and proposed fixture wattages to the estimated times of operation. The difference resulted in an annual savings of 1,200 kWh per year. Supporting calculations, including all assumptions for lighting hours and the annual energy usage for each fixture is provided in Appendix F.

Lighting has an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 18,000 kWh, totaling \$3,000.

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

ECM-5 Replacement of T-12 Fixtures

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
500	0.1	1,200	0	200	14	100	2.5	2.0

* Incentive shown is per the New Jersey Smart Start Program, 2010 Prescriptive Lighting Application.

This measure is recommended.

4.6 ECM-6 Occupancy Sensors for Interior Lighting

All of the existing lighting in the interior offices is controlled by wall switches. There are various offices which could benefit from occupancy sensors.

The energy savings for this measure was calculated by applying the fixture wattages to the times the fixtures could be shut off during the day. The annual savings resulted in 6,900 kWh per year. Supporting calculations, including lighting hours and annual energy usage are provided in Appendix G.

It is intended to install ceiling mounted sensors to shut off the fixtures when the rooms are unoccupied.

Occupancy sensors have an expected life of 15 years, according to the manufacturer. The total energy savings over the life of the project are estimated at 103,500 kWh, and \$15,000.

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

ECM-6 Occupancy Sensors for Interior Lighting

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
1,500	0	6,900	0	1,000	14	NA	1.5	NA

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

This measure is recommended.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance Program

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

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

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

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

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

5.1.2 New Jersey Smart Start Program

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

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

5.1.3 Energy Efficient and Conservation Block Grant

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

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

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

- 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

Under incentive #1 of the New Jersey Pay for Performance Program, the 11,500 square foot building is eligible for about \$575 towards the development of an Energy Reduction Plan. When calculating the total amount under Incentives #2 and #3, all energy conservation measures are applicable as the amount received is based on building wide energy improvements. However, since the overall energy reduction for the building is less than the 15% minimum, the building is not eligible to receive monies based as discussed above in section 5.1.1.

5.2.2 New Jersey Smart Start Program

The Ocean Gate Municipal Building is eligible for several incentives available under New Jersey Smart Start Programs. The total amount of all qualified incentives is about \$545 and includes installing new premium efficiency motors and upgrades to the lighting system.

Incentives cannot be accepted under multiple NJCEP programs.

5.2.5 Direct Install Program

The Municipal Building 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 Municipal Building is about \$26,400. This program would pay 60%, or about \$15,800 of these initial costs. This funding has the potential to significantly affect the payback periods of Energy Conservation Measures. For the Municipal Building, the Direct Install Program brings the simple payback from about 3.9 years, to approximately 1.6 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 400-500 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.

This building has air cooled split system units and a natural gas boiler plant, all of which would have to be removed and replaced with heat pumps. Due to the cost of implementation, this measure is not recommended.

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

The Municipal Building 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 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 Atlantic City, NJ and a fixed tilt array type was utilized to calculate energy production. The PVWATT solar power generation model is provided in Appendix I.

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

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

The building had a maximum electricity demand of 55 kW and a minimum of 43 kW, from January 2009 through December 2009. The monthly average over the observed 12 month period was 45 kW. It should be noted that the estimated cost of installation is about \$8,000 per kW of installed system. 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 chart below shows preliminary cost and savings for a sample 10 kW system. This is based upon the available size and orientation of the roof. The unobstructed roof area would be approximately 1,000 square feet. Refer to Appendix I for further information.

Photovoltaic (PV) Rooftop Solar Power Generation – 10 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	
80,000	0	12,503	0	2,100	2,100	7,500	6,090	>25	>25

*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 costs and savings were estimated and although the payback period listed above is greater than 25 years, it is recommended to pursue this technology further and secure firm vendor quotes.

6.2.2 Solar Thermal Hot Water Plant

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

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

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

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.

It is not recommended at this time because of the high initial cost of installation vs actual use of hot water.

6.3 Wind

The Borough of Ocean Gate currently has one new wind turbine and has already decided to install a second one at this time.

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 municipal building does not have sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter, thermal usage during the summer months is low. Thermal energy produced by the CHP plant in the warmer months will be wasted. Purchasing the CHP equipment and performing modifications to the existing HVAC and electrical systems would greatly outweigh the savings over the life of the equipment; hence this measure is not recommended.

6.5 Biomass Power Generation

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

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

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

The NJDEP evaluates biomass resources not identified in the RPS.

Examples of eligible facilities for a CORE incentive include:

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

* from NJOCE Website

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

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 Municipal Building is considered a high energy consumer by the Portfolio Manager with a Site Energy Usage Index (EUI) of 106 kBTU/ft²/year. Several factors contribute to the unfavorable EUI, including, but not limited to, higher than necessary temperature setpoints and longer equipment run times. By implementing the measures discussed in this report, it is expected that the EUI can be reduced to approximately 88 kBTU/ft²/year. The EPA Portfolio Manager generated a rating score of 24 for the Municipal Building. 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 an 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 AND RECOMMENDATIONS

The energy audit conducted by CHA at the Ocean Gate Municipal Building in Ocean Gate, New Jersey identified potential ECMs for temperature setback and lighting & control upgrades. Potential annual savings of \$6,200 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-1 Heating and Cooling Setback

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
2,900	0	3,600	1,700	2,700	14	NA	1.1	NA

*There is no incentive for this ECM

ECM-4 Replacement of Exterior Lights and Reduce Parking Lot Hours

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
8,500	3	12,300	0	2,100	14	500	4.0	3.8

* Incentive shown is per the New Jersey Prescriptive Lighting Program.

ECM-5 Replacement of T-12 Fixtures

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
500	0.1	1,200	0	200	14	100	2.5	2.0

* Incentive shown is per the New Jersey Smart Start Program, 2010 Prescriptive Lighting Application.

ECM-6 Occupancy Sensors for Interior Lighting

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Gas					Total
\$	kW	kWh	Therms	\$	\$	Years	Years	
1,500	0	6,900	0	1,000	14	NA	1.5	NA

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

APPENDIX A

Utility Usage Analysis



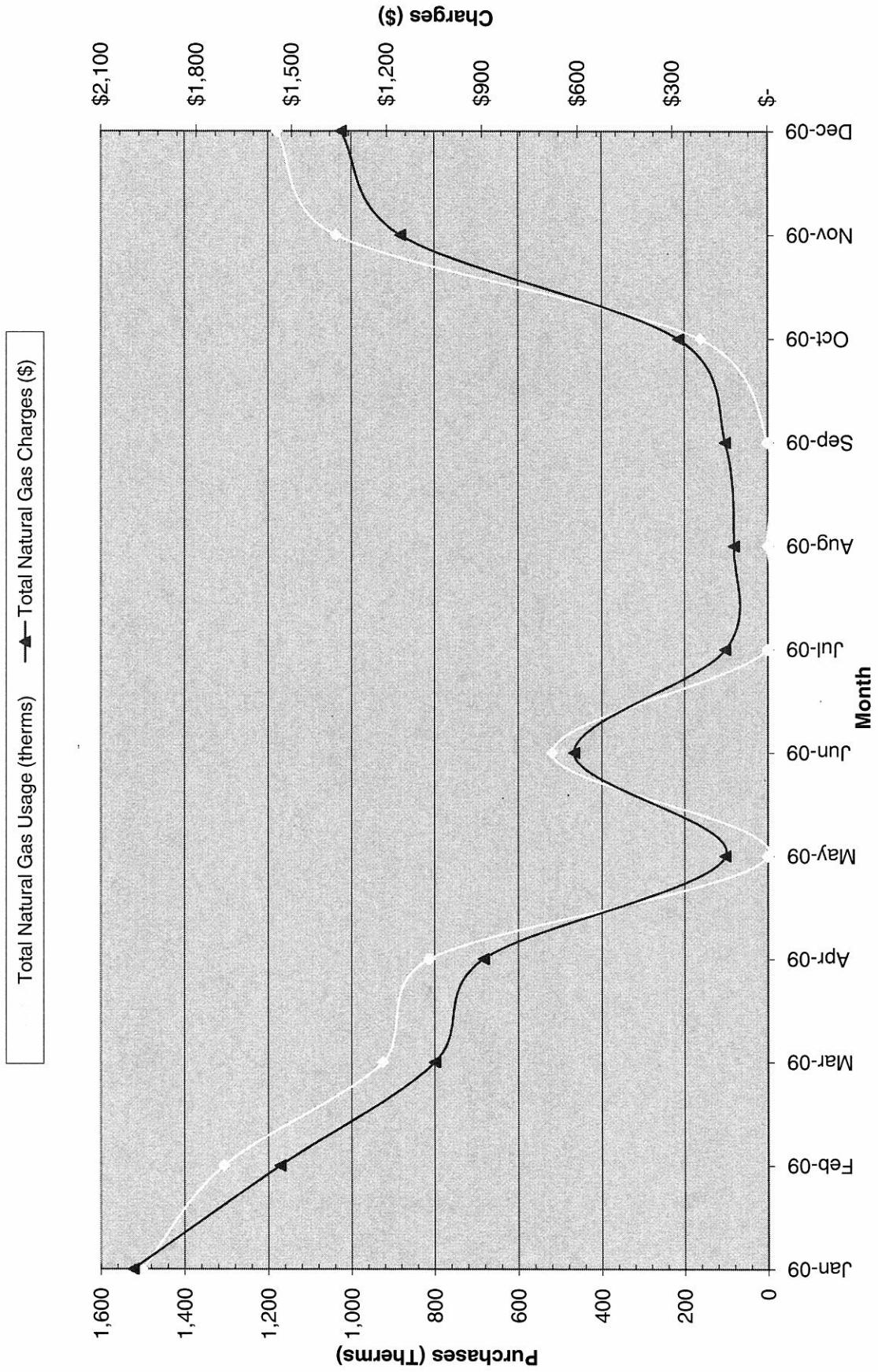
New Jersey BPU Energy Audit Program
CHA Project Number: 21611
Borough of Ocean Gate
New Jersey Natural Gas

801 Ocean Gate Ave, Ocean Gate, NJ 08740
Account Number: 22-0008-2553-40

Month	Therms	Charges (\$)	(\$/therm)
January-09	1501	\$ 1,998.68	\$ 1.33
February-09	1,306	\$ 1,537.79	\$ 1.18
March-09	925	\$ 1,049.19	\$ 1.13
April-09	812	\$ 896.29	\$ 1.10
May-09	0	\$ 133.26	
June-09	518	\$ 611.97	\$ 1.18
July-09	0	\$ 133.26	
August-09	0	\$ 106.60	
September-09	0	\$ 133.26	
October-09	161	\$ 280.82	\$ 1.74
November-09	1,037	\$ 1,156.74	\$ 1.12
December-09	1,178	\$ 1,344.48	\$ 1.14

Total	7,438	\$ 9,382	\$ 1.26
Most Recent Yr	7,438	\$ 9,382	\$ 1.26

Natural Gas Usage - Municipal

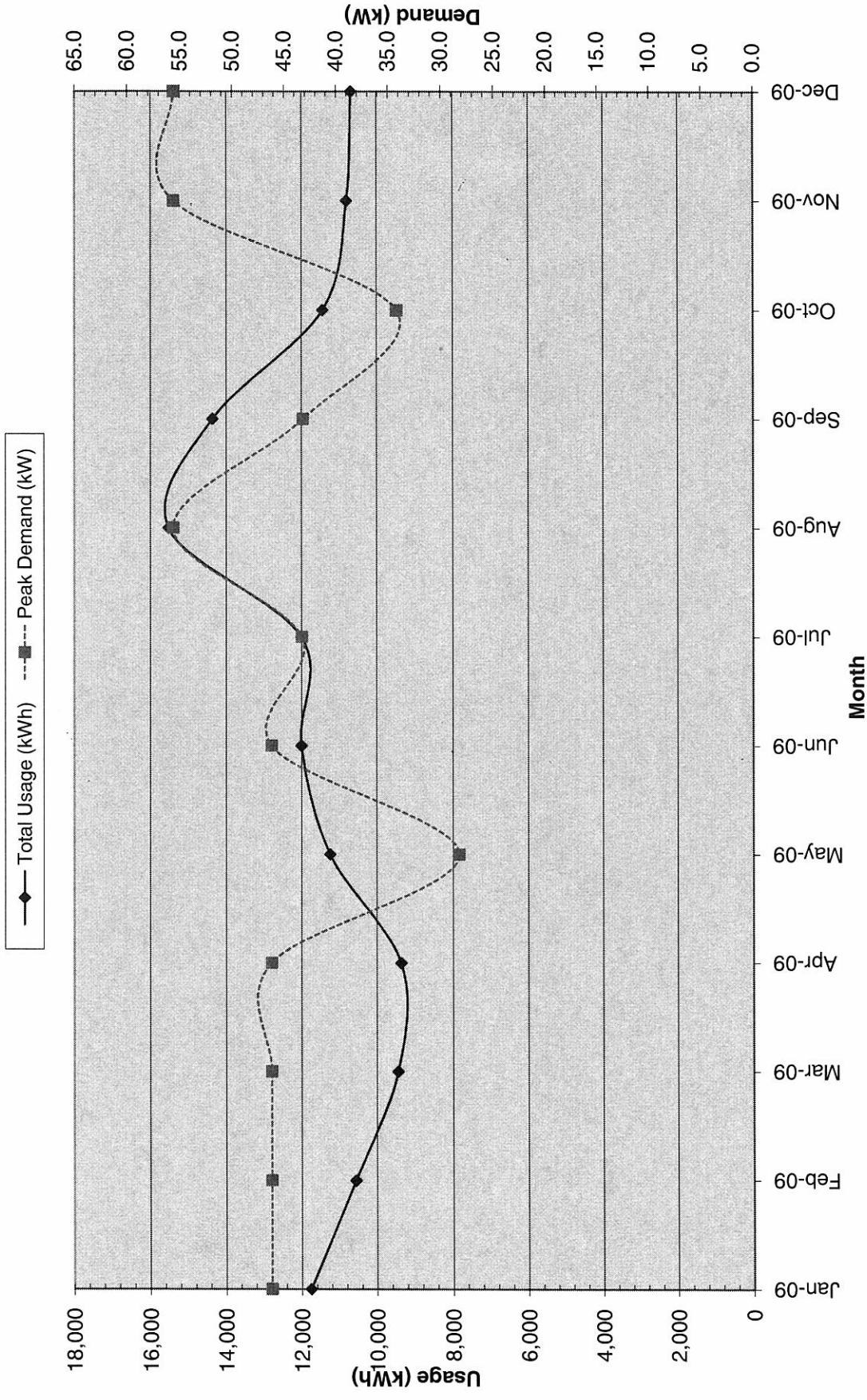


New Jersey BPU Energy Audit Program
CHA Project Number: 21611
Ocean Gate Municipal Building
JCP&L - Electric Service

801 Ocean Gate Ave, Ocean Gate, NJ 08740
Account Number: 100043569860

Month	Consumption (kWh)		Billed Demand (kW)	Charges		Unit Costs			
				Total (\$)	Demand (\$)	Consumption (\$)	Blended Rate (\$/kWh)	Consumption (\$/kWh)	Demand (\$/kW)
January-09	11,760		46.2	\$1,880.98	\$114.39	\$1,766.59	0.1599	0.1502	2.48
February-09	10,560		46.2	\$1,712.09	\$114.39	\$1,597.70	0.1621	0.1513	2.48
March-09	9,440		46.2	\$1,525.90	\$114.39	\$1,411.51	0.1616	0.1495	2.48
April-09	9,360		46.2	\$1,501.59	\$114.39	\$1,387.20	0.1604	0.1482	2.48
May-09	11,240		28.3	\$1,771.78	\$118.40	\$1,653.38	0.1576	0.1471	4.18
June-09	12,000		46.2	\$2,217.63	\$251.23	\$1,966.40	0.1848	0.1639	5.44
July-09	12,000		43.3	\$2,184.89	\$231.10	\$1,953.79	0.1821	0.1628	5.34
August-09	15,520		55.6	\$2,823.18	\$316.46	\$2,506.72	0.1819	0.1615	5.69
September-09	14,360		43.2	\$2,504.75	\$230.41	\$2,274.34	0.1744	0.1584	5.33
October-09	11,440		34.2	\$1,826.06	\$153.90	\$1,672.16	0.1596	0.1462	4.50
November-09	10,800		55.6	\$1,722.69	\$222.40	\$1,500.29	0.1595	0.1389	4.00
December-09	10,680		55.6	\$1,783.26	\$205.72	\$1,577.54	0.1670	0.1477	3.70
Total	139,160		55.6	\$23,454.80	\$2,187.18	\$21,267.62	0.1685	0.1528	4.00
Most Recent Yr	139,160		55.6	\$23,454.80	\$1,958.40	\$17,903.33	0.1685	0.1287	4.31

Electric Usage - Municipal Building



APPENDIX B

ECM-1 Heating and Cooling Night Setback



Borough of OceanGate
CHA #Z1611
Building: Municipal Building

ECM-1 Heating and Cooling Night Setback

Building Footprint	11,500 SF
Heating Efficiency	80%
Cooling Efficiency	73 kW/ton
Building Balance Temp.	60 F
Internal Climate	74.5 Btu/h
Unoccupied Cooling UA	0.03
Unoccupied Heating UA	0.7
Avg Occ Internal Gain Factor	

Ex Occupied Cing Temp.	70 F
Ex Unoccupied Cing Temp.	70 F
Prop Occupied Cing Temp.	70 F
Prop Unoccupied Cing Temp.	70 F
Unoccupied Heating UA	1,438 Btu/hr/F
Unoccupied Cooling UA	27.8 Btu/h
Cooling Occ Enthalpy Setpoint	27.8 Btu/h
Cooling Unocc Enthalpy Setpoint	27.8 Btu/h

Heating Energy Savings
Cooling Energy Savings

1,668 therms
3,553 kWh

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

Avg Outdoor Air Temp. Bins F	EXISTING LOADS										PROPOSED LOADS									
	Occupied					Unoccupied					Occupied					Unoccupied				
	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	-125,678	-235,896	-52,159	-100,503	-101,496	-2,235	-125,678	-235,896	-52,159	-63,579	-101,496	-2,235	0	0	0	0
97.5	42.5	6	0	5	-67,006	-164,307	-52,159	-85,041	-70,484	-2,235	-106,343	-205,484	-52,159	-54,117	-70,484	-2,235	133	0	0	0
92.5	39.5	45	1	35	-164,307	-164,307	-52,159	-63,579	-36,367	-2,235	-67,006	-164,307	-52,159	-32,653	-36,367	-2,235	639	0	0	0
87.5	36.6	146	0	21	-48,338	-169,043	-52,159	-39,655	-30,543	-2,235	-48,338	-169,043	-52,159	-2,689	-30,543	-2,235	2,089	0	0	0
82.5	33.7	208	0	6	-29,003	-96,898	-52,159	-23,193	-19,265	-2,235	-29,003	-96,898	-52,159	3,170	-30,543	-2,235	3,170	0	0	0
77.5	31.6	476	0	369	-9,668	-23,288	-52,159	-7,731	-7,988	-2,235	-9,668	-23,288	-52,159	2,387	0	-2,235	2,387	0	0	0
72.5	29.2	662	150	512	6,419	14,795	-52,159	6,419	5,075	-2,235	6,419	14,795	-52,159	0	0	-2,235	561	0	0	0
67.5	27	740	167	573	13,550	31,233	-52,159	13,550	10,713	-2,235	13,550	31,233	-52,159	0	0	-2,235	138	0	0	0
62.5	24.5	765	173	592	20,682	47,672	-52,159	20,682	16,352	-2,235	20,682	47,672	-52,159	3,566	0	-2,235	0	280	0	63
57.5	21.4	733	166	567	27,814	64,111	-52,159	27,814	21,991	-2,235	27,814	64,111	-52,159	10,698	8,458	-2,235	0	383	0	185
52.5	18.7	668	151	517	34,945	80,550	-52,159	34,945	27,630	-2,235	34,945	80,550	-52,159	17,829	14,097	-2,235	0	503	0	307
47.5	16.2	659	149	510	42,077	96,898	-52,159	42,077	33,268	-2,235	42,077	96,898	-52,159	24,961	19,735	-2,235	0	653	0	450
42.5	14.4	685	155	530	49,209	113,427	-52,159	49,209	38,907	-2,235	49,209	113,427	-52,159	32,093	25,374	-2,235	0	845	0	626
37.5	12.6	739	167	572	56,341	129,866	-52,159	56,341	44,546	-2,235	56,341	129,866	-52,159	39,225	31,013	-2,235	0	956	0	744
32.5	10.7	717	162	555	63,472	146,304	-52,159	63,472	50,184	-2,235	63,472	146,304	-52,159	46,356	36,651	-2,235	0	828	0	667
27.5	8.6	543	123	420	70,604	162,743	-52,159	70,604	58,823	-2,235	70,604	162,743	-52,159	53,488	42,290	-2,235	0	545	0	451
22.5	6.8	318	72	246	77,736	179,182	-52,159	77,736	61,462	-2,235	77,736	179,182	-52,159	60,620	47,929	-2,235	0	467	0	394
17.5	5.5	245	55	190	84,888	195,620	-52,159	84,888	67,100	-2,235	84,888	195,620	-52,159	67,751	53,567	-2,235	0	370	0	281
12.5	4.1	156	35	121	91,999	212,059	-52,159	91,999	72,739	-2,235	91,999	212,059	-52,159	74,863	59,206	-2,235	0	347	0	261
7.5	2.6	92	21	75	99,131	228,938	-52,159	99,131	84,378	-2,235	99,131	228,938	-52,159	83,464	65,468	-2,235	0	317	0	234
2.5	1	36	8	28	105,262	244,936	-52,159	105,262	89,147	-2,235	105,262	244,936	-52,159	89,147	70,484	-2,235	0	284	0	178
-2.5	0	19	4	15	113,394	261,275	-52,159	113,394	89,655	-2,235	113,394	261,275	-52,159	96,278	76,122	-2,235	0	251	0	145
-7.5	-1.5	8	2	6	113,394	261,275	-52,159	113,394	89,655	-2,235	113,394	261,275	-52,159	96,278	76,122	-2,235	0	223	0	120
TOTALS		8,760	1,981	6,779										12,675	9,106		12,675	9,106	6,159	4,433

Existing Building Ventilation & Infiltration (occ)
Overheat Ventilation Factor
Additional Ventilation to offset overheat
Existing Building Ventilation & Infiltration (unocc)

3,044 cfm
1.00
0 cfm
1,044 cfm

Borough of OceanGate

CHA #21611

Building: Municipal Building

ECM-1 Heating and Cooling Night 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.		
Reprogram all thermostats&provide locking cover	1	ea	\$ 500	\$ 400	\$ -	\$ 490	\$ 484	\$ -	\$ 974	
Commission Boiler controls to optimize efficiency.	1	ea	\$ 500	\$ 1,000		\$ 490	\$ 1,210	\$ -	\$ 1,700	

\$	2,674	Subtotal
\$	-	0% Contingency
\$	267.40	Contractor
\$	-	10% O&P
\$	-	0% Engineering
\$	2,941	Total

APPENDIX C

ECM-2 Replace Electric DHW Heater for Maine Portion of Building

**Borough of OceanGate
CHA #21611
Municipal Building**

ECM-2 Replace Electric DHW Heater for Main Portion of Building

Summary

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

Item	Value	Units	Formula/Comments
Occupied days per week	4	days/wk	
Water supply Temperature	50	F	Temperature of water coming into building
Hot Water Temperature	120	F	
Hot Water Usage per day	26	gal/day	Calculated from usage below
Annual Hot Water Energy Demand	3,184	MBTU/yr	Energy required to heat annual quantity of hot water to setpoint
Existing Tank Size	40	Gallons	Per manufacturer nameplate
Hot Water Temperature	120	F	Per setpoint
Average Room Temperature	70	F	
Standby Losses (% by Volume)	2.5%		
Standby Losses (Heat Loss)	0.4	MBH	
Annual Standby Hot Water Load	3,650	MBTU/yr	
Total Annual Hot Water Demand (w/ standby losses)	6,834	Mbtu/yr	Building demand plus standby losses
Existing Water Heater Efficiency	93%		Per Manufacturer
Total Annual Energy Required	7,348	Mbtu/yr	
Total Annual Electric Required	2,153	kWh/yr	Electrical Savings
Average Annual Electric Demand	0.25	kw	
Peak Electric Demand		kw	Per Manufacturer's Nameplate (Demand Savings)
New Tank Size	0	Gallons	tankless
Hot Water Temperature	120	F	
Average Room Temperature	70	F	
Standby Losses (% by Volume)	2.5%		
Standby Losses (Heat Loss)	0.0	MBH	
Annual Standby Hot Water Load	0	MBTU/yr	
Prop Annual Hot Water Demand (w/ standby losses)	3,184	MBTU/yr	
Proposed Avg. Hot water heater efficiency	92%		Based on Navien CR180 instantaneous, condensing DHW Heater
Proposed Total Annual Energy Required	3,472	MBTU/yr	
Proposed Fuel Use	35	Therms/yr	Standby Losses and inefficient DHW heater eliminated
Elec Utility Demand Unit Cost	\$4.00	\$/kW	
Elec Utility Supply Unit Cost	\$0.15	\$/kWh	
NG Utility Unit Cost	\$1.26	\$/Therm	
Existing Operating Cost of DHW	\$329	\$/yr	
Proposed Operating Cost of DHW	\$44	\$/yr	
Annual Utility Cost Savings	\$285	\$/yr	

Daily Hot Water Demand

FIXTURE	*BASE WATER USE GPM	DURATION OF USE (MIN)	#USES PER DAY				FULL TIME				TOTAL HW GAL/DAY
			MALE	FEMALE	MALE	FEMALE	TOTAL GAL/DAY	% HOT WATER	TOTAL HW GAL/DAY		
LAVATORY (Low-Flow Lays use 0.5 GPM)	2.5	0.25	3	3	12	12	45	50%	23		
SHOWER	2.5	5	0	0	0	0	0	75%	0		
KITCHEN SINK	2.5	0.5	0	0	0	0	0	75%	0		
MOP SINK	2.5	2	1	0	1	0	5	75%	4		
Dishwasher (gal per l	10	1	0	0	0	0	0	100%	0		
TOTAL			3	3	12	12	45		23	26	

*GPM is per standard fixtures, adjust as necessary if actual GPM is known.

**These are the occupant that use the fixtures. If fixture does not exist change to (0).

Borough of OceanGate
 CHA #21611
 Municipal Building

ECM-2 Replace Electric DHW Heater for Main Portion 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.		
DHW Heater Removal	1	LS		\$ 50		\$ -	\$ -	\$ -	\$ -	
Tankless condensing DHW Heater	1	EA	\$ 1,175	\$ 280		\$ 1,152	\$ 339	\$ -	\$ 1,490	Navien CR180
Miscellaneous Electrical	1	LS	\$ 500	\$ 500		\$ 490	\$ 605	\$ -	\$ 1,095	
Venting Kit	1	EA	\$ 350	\$ 350		\$ 343	\$ 424	\$ -	\$ 767	
Water Piping and Valves	1	LS	\$ 200	\$ 500		\$ 196	\$ 605	\$ -	\$ 801	
Gas Piping and Valves	1	LS	\$ 450	\$ 600		\$ 441	\$ 726	\$ -	\$ 1,167	Gasite from Main
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

\$	5,380	Subtotal
\$	538	10% Contingency
\$	592	Contractor 10% O&P
\$	-	0% Engineering
\$	6,510	Total

Description	QTY	UNIT	\$/UNIT	TOTAL SAVINGS	Cost W/O INCENTIVE	Cost W/ INCENTIVE
New Jersey Smart Start Incentive						
Gas Water Heater ≤ 50 Gallons	1	EA	\$50	\$50	\$ 1,490	\$ 1,440
				\$50	\$1,490	\$1,440

Total ECM Cost w/ Incentives \$6,460

APPENDIX D

ECM-3 Replace Electric DHW Heater for Police Section



Borough of OceanGate
CHA #21611
Municipal Building

ECM-3 Replace Electric DHW Heater for Police Section

Summary

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

Item	Value	Units	Formula/Comments
Occupied days per week	7	days/wk	
Water supply Temperature	50	F	Temperature of water coming into building
Hot Water Temperature	120	F	
Hot Water Usage per day	96	gal/day	Calculated from usage below
Annual Hot Water Energy Demand	11,939	MBTU/yr	Energy required to heat annual quantity of hot water to setpoint
Existing Tank Size	40	Gallons	Per manufacturer nameplate
Hot Water Temperature	120	F	Per setpoint
Average Room Temperature	70	F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	0.4	MBH	
Annual Standby Hot Water Load	3,650	MBTU/yr	
Total Annual Hot Water Demand (w/ standby losses)	15,589	Mbtu/yr	Building demand plus standby losses
Existing Water Heater Efficiency	93%		Per Manufacturer
Total Annual Energy Required	16,782	Mbtu/yr	
Total Annual Electric Required	4,911	kWh/yr	Electrical Savings
Average Annual Electric Demand	0.56	kW	
Peak Electric Demand		kW	Per Manufacturer's Nameplate (Demand Savings)
New Tank Size	0	Gallons	Rankless
Hot Water Temperature	120	F	
Average Room Temperature	70	F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	0.0	MBH	
Annual Standby Hot Water Load	0	MBTU/yr	
Prop Annual Hot Water Demand (w/ standby losses)	11,939	MBTU/yr	
Proposed Avg. Hot water heater efficiency	92%		Based on Navien CRI 80 instantaneous, condensing DHW Heater
Proposed Total Annual Energy Required	13,020	MBTU/yr	
Proposed Fuel Use	130	Therms/yr	Standby Losses and inefficient DHW heater eliminated
Elec Utility Demand Unit Cost	\$4.00	\$/kWh	
Elec Utility Supply Unit Cost	\$0.15	\$/kWh	
NG Utility Unit Cost	\$1.26	\$/Therm	
Existing Operating Cost of DHW	\$751	\$/yr	
Proposed Operating Cost of DHW	\$164	\$/yr	
Annual Utility Cost Savings	\$586	\$/yr	

Daily Hot Water Demand

FIXTURE	*BASE WATER USE GPM	DURATION OF USE (MIN)	#USES PER DAY				FULL TIME			
			MALE	FEMALE	MALE	FEMALE	TOTAL GAL/DAY	% HOT WATER	TOTAL HW GAL/DAY	
LAVATORY (Low-Flow Lavs use 0.5 GPM)	2.5	0.25	3	6	12	12	68	50%	34	
SHOWER	2.5	5	1	1	1	1	25	75%	19	
KITCHEN SINK	2.5	0.5	0	0	0	0	0	75%	0	
MCP SINK	2.5	2	1	0	1	0	5	75%	4	
Dishwasher (gal per use)	10	1	0	0	0	0	0	100%	0	
TOTAL			0	0	0	0	98		56	

*GPM is per standard fixtures, adjust as necessary if actual GPM is known.

**These are the occupants that use the fixtures. If fixture does not exist change to (0).

Borough of OceanGate
 CHA #21611
 Municipal Building

ECM-3 Replace Electric DHW Heater for Police Section

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.		
DHW Heater Removal	1	LS		\$ 50		\$ -	\$ 61	\$ -		
Tankless condensing DHW Heater	1	EA	\$ 1,175	\$ 280		\$ 1,152	\$ 339	\$ 1,490	Navien CR180	
Miscellaneous Electrical	1	LS	\$ 500	\$ 500		\$ 490	\$ 605	\$ 1,095		
Venting Kit	1	EA	\$ 350	\$ 350		\$ 343	\$ 424	\$ 767		
Water Piping and Valves	1	LS	\$ 200	\$ 500		\$ 196	\$ 605	\$ 801		
Gas Piping and Valves	1	LS	\$ 350	\$ 600		\$ 343	\$ 726	\$ 1,069	Gasite from main	
						\$ -	\$ -	\$ -		
						\$ -	\$ -	\$ -		
						\$ -	\$ -	\$ -		
						\$ -	\$ -	\$ -		

\$ 5,282	Subtotal
\$ 528	10% Contingency
\$ 581	Contractor 10% O&P
\$ -	0% Engineering
\$ 6,392	Total

Description	QTY	UNIT	\$/UNIT	TOTAL SAVINGS	Cost W/O INCENTIVE	Cost W/O INCENTIVE	Cost W/ INCENTIVE
New Jersey Smart Start Incentive							
Gas Water Heater ≤ 50 Gallons	1	EA	\$50	\$50	\$ 1,490	\$ 1,440	
				\$50	\$1,490	\$1,440	

Total ECM Cost w/ Incentives \$6,342

APPENDIX E

ECM-4 Replacement of Exterior Lights & Reduce Parking Lot Lighting

Borough of OceanGate
 CHA #21611
 Building: Municipal Building

ECM-4 Replacement of Exterior Lights & Reduce Parking Light Hours

Building Schedule:

Supply Electric Rate \$ 0.163 /kWh
 Demand Rate \$ 4.00 /kW

Area Description	EXISTING CONDITIONS										RETROFIT CONDITIONS										COST ANALYSIS			
	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	
Parking Area	3	MH175/1	215	0	0	0.645	Timer	12	4,380	2,825	3	Induction	125	0.375	None	12	4,380	1,643	0	1,183	\$ 194	\$ 2,400	12.4	
Parking Area	4	MH175/1	215	0	0	0.86	Timer	5	1,825	1,570	4	Induction	125	0.5	None	5	1,825	913	0	657	\$ 118	\$ 3,200	27.2	
Soffit (front)	12	MH100/1	128	0	0	1.536	Timer	12	4,380	6,728	12	CFT28/2	66	0.792	None	12	4,380	3,459	1	3,259	\$ 534	\$ 1,506	2.8	
Soffit (remainder)	11	MH175/1	215	0	0	2.365	Timer	12	4,380	10,359	11	CFT28/2	66	0.726	None	12	4,380	3,180	2	7,179	\$ 1,176	\$ 1,380	1.2	
TOTALS -	30			0		5.4				21,481	30			2.4			9,204	3.0	12,277	\$ 2,021	\$ 6,486	4.2		

APPENDIX F

ECM-5 Replacement of T-12 Fixtures

Borough of OceanGate
 CHA #21811
 Building: Municipal Building
 ECM-5 Replacement of T-12 Fixtures

Building Schedule:

Supply Electric Rate \$ 0.153 /kWh
 Demand Rate \$ 4.99 /kW

Area Description	EXISTING CONDITIONS						RETROFIT CONDITIONS						COST ANALYSIS										
	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
Sally Area	6	F-42EIS	82	0	0	0.492	None	24	8,760	4,310	6	F-42EEL	60	0.36	None	24	8,760	3,154	0	1,156	\$ 183	\$ 540	2.9
TOTALS -	6			0		0.5				4,310	6		0.4				3,154	0.1	1,156	\$ 183	\$ 540	2.9	

APPENDIX G

ECM-6 Occupancy Sensors for Interior Lighting



APPENDIX H

**New Jersey Pay For Performance
Incentive Program**



Borough of OceanGate
CHA #21611
Building: Municipal Building

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 governments or non-profit organizations. The incentive values represented below are applicable through December 31, 2010.

Total Building Area (Square Feet)	11,500
Is this audit funded by the NJ BPU (Y/N)	Yes

Bureau of Public Utilities (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)	\$23,455	\$9,382
Existing Usage (from utility)	139,160	7,438
Proposed Savings	27,362	1,501
Existing Total MMBtus	1,219	
Proposed Savings MMBtus	244	
% Energy Reduction	20.0%	
Proposed Annual Savings	\$6,828	

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

	Incentives \$		
	Elec	Gas	Total
Incentive #1	\$0	\$0	\$575
Incentive #2	\$3,010	\$1,651	\$4,661
Incentive #3	\$1,915	\$1,051	\$2,966
Total All Incentives	\$4,925	\$2,702	\$8,203

Total Project Cost	\$26,420
---------------------------	-----------------

		Allowable Incentive
% Incentives #1 of Utility Cost*	1.8%	\$575
% Incentives #2 of Project Cost**	17.6%	\$4,661
% Incentives #3 of Project Cost**	11.2%	\$2,966
Total Eligible Incentives***	\$8,203	
Project Cost w/ Incentives	\$18,218	

Project Payback (years)	
w/o Incentives	w/ Incentives
3.9	2.7

* 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 I

Photovoltaic (PV) Rooftop Solar Power Generation



**Borough of OceanGate
Borough Hall Municipal Building**

Cost of Electricity \$0.169 \$/kWh

Photovoltaic (PV) Rooftop Solar Power Generation-10kW 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						
\$80,000	0.0	12,503	0	\$2,106	0	\$2,106	\$7,500	\$6,090	>25	>25

Note: Budgetary cost is based on \$8,000/kW.
 *Incentive based on New Jersey renewable energy program for non-residential applications(PV)= \$0.75/W of installed PV system
 ** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= \$487/1000kwh



AC Energy
&
Cost Savings



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

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	10.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	7.7 kW
Array Type:	Fixed Tilt
Array Tilt:	39.5°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	16.9 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	3.61	895	150.81
2	4.20	932	157.04
3	4.78	1124	189.39
4	5.23	1155	194.62
5	5.44	1211	204.05
6	5.48	1133	190.91
7	5.55	1171	197.31
8	5.41	1155	194.62
9	5.23	1106	186.36
10	4.60	1034	174.23
11	3.59	821	138.34
12	3.17	766	129.07
Year	4.69	12503	2106.76

[Output Hourly Performance Data](#)

[Output Results as Text](#)

*

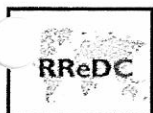
[About the Hourly Performance Data](#)

[Saving Text from a Browser](#)

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

Please send questions and comments regarding PVWATTS to Webmaster

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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 $\pm 30\%$ for monthly values and $\pm 10\%$ 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.

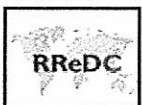
If net-metering isn't available and the PV system sends surplus electricity to the utility grid, the utility generally buys the electricity from the owner at a lower price than the owner pays the utility for electricity. In this case, the cost savings shown in the table should be reduced.

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.

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APPENDIX J

Solar Thermal Domestic Hot Water Plant



NJBPU Energy Audits
 CHA #21611
 Building: Municipal 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.		
Synergy Solar Thermal System	2	ea			\$ 3,600	\$ -	\$ -	\$ 7,848	\$ 7,848	
Piping modifications	1	ls	\$ 2,000	\$ 3,500		\$ 1,960	\$ 4,235	\$ -	\$ 6,195	
Electrical modifications	1	ls	\$ 1,000	\$ 1,000		\$ 980	\$ 1,210	\$ -	\$ 2,190	
65 Gallon Storage Tanks	2	ea	\$ 200	\$ 250		\$ 400	\$ 500	\$ -	\$ 900	
10 Gallon Drip Tank	2	ea	\$ 100	\$ 78		\$ 200	\$ 156	\$ -	\$ 356	

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

Interactive Energy Calculators

RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

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- [Electric Power Pollution Calculator](#)
- [PV System Economics](#)
- [Solar Water Heating](#)
- [What's a Watt?](#)

Solar Water Heating Calculator

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

Water Heater Characteristics			
Physical		Thermal	
<input type="checkbox"/> Diameter (feet)	1.5	<input type="checkbox"/> Water Inlet Temperature (Degrees F)	58
<input type="checkbox"/> Capacity (gallons)	50	<input type="checkbox"/> Ambient Temperature (Degrees F)	70
<input type="checkbox"/> Surface Area (calculated - sq ft)	21.36	<input type="checkbox"/> Hot Water Temperature (Degrees F)	135
<input type="checkbox"/> Effective R-value	NaN	<input type="checkbox"/> Hot Water Usage (Gallons per Day)	64.3
Energy Use			
1694		<input type="checkbox"/> Heat Delivered in Hot Water (BTU/hr)	
0		<input type="checkbox"/> Heat loss through insulation (BTU/hr)	

Gas vs. Electric Water Heating		
Gas		Electric
.8	<input type="checkbox"/> Overall Efficiency	.98
0.98	<input type="checkbox"/> Conversion Efficiency	0.98
2118 BTU/hr	<input type="checkbox"/> Power Into Water Heater	1729 BTU/hr
Cost		
\$ 1.3 /Therm	<input type="checkbox"/> Utility Rates	\$ 0.168 /kWh
\$ 241.197†	<input type="checkbox"/> Yearly Water Heating Cost	\$ 745.230†
How Does Solar Compare?		
<input type="checkbox"/> Solar Water Heater Cost: \$ 21700		<input type="checkbox"/> Percentage Solar: 70
128.525† years for gas	<input type="checkbox"/> Payback Time for Solar System	41.5978† years for electric

More information on solar water heating:

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

APPENDIX K

Wind



APPENDIX L

EPA Portfolio Manager



STATEMENT OF ENERGY PERFORMANCE

Municipal Building

Building ID: 2365166
For 12-month Period Ending: December 31, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: August 03, 2010

Facility
Municipal Building
801 Ocean Gate Ave
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: 2008
Gross Floor Area (ft²): 11,500

Energy Performance Rating² (1-100) 24

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	474,814
Natural Gas (kBtu) ⁴	743,800
Total Energy (kBtu)	1,218,614

Energy Intensity⁵

Site (kBtu/ft ² /yr)	106
Source (kBtu/ft ² /yr)	206

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	112
---	-----

Electric Distribution Utility

FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	80
National Average Source EUI	154
% Difference from National Average Source EUI	33%
Building Type	Office

Meets Industry Standards⁶ 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.

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

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	Municipal Building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	Office	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	801 Ocean Gate Ave, Ocean Gate, NJ 08740	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
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		<input type="checkbox"/>
Main Office (Office)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
Gross Floor Area	11,500 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.		<input type="checkbox"/>
Weekly operating hours	38 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		<input type="checkbox"/>
Workers on Main Shift	35	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		<input type="checkbox"/>
Number of PCs	25	Is this the number of personal computers in the Office?		<input type="checkbox"/>
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		<input type="checkbox"/>
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		<input type="checkbox"/>

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: Electric (kWh (thousand Watt-hours)) Space(s): Main Office Generation Method: Grid Purchase		
Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2009	12/31/2009	10,680.00
11/01/2009	11/30/2009	10,800.00
10/01/2009	10/31/2009	11,440.00
09/01/2009	09/30/2009	14,360.00
08/01/2009	08/31/2009	15,520.00
07/01/2009	07/31/2009	12,000.00
06/01/2009	06/30/2009	12,000.00
05/01/2009	05/31/2009	11,240.00
04/01/2009	04/30/2009	9,360.00
03/01/2009	03/31/2009	9,440.00
02/01/2009	02/28/2009	10,560.00
01/01/2009	01/31/2009	11,760.00
Electric Consumption (kWh (thousand Watt-hours))		139,160.00
Electric Consumption (kBtu (thousand Btu))		474,813.92
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		474,813.92
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		<input type="checkbox"/>
Fuel Type: Natural Gas		
Meter: Gas (therms) Space(s): Main Office		
Start Date	End Date	Energy Use (therms)
12/01/2009	12/31/2009	1,178.00
11/01/2009	11/30/2009	1,037.00
10/01/2009	10/31/2009	161.00
09/01/2009	09/30/2009	0.00
08/01/2009	08/31/2009	0.00
07/01/2009	07/31/2009	0.00
06/01/2009	06/30/2009	518.00
05/01/2009	05/31/2009	0.00
04/01/2009	04/30/2009	812.00
03/01/2009	03/31/2009	925.00

02/01/2009	02/28/2009	1,306.00
01/01/2009	01/31/2009	1,501.00
Gas Consumption (therms)		7,438.00
Gas Consumption (kBtu (thousand Btu))		743,800.00
Total Natural Gas Consumption (kBtu (thousand Btu))		743,800.00
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		<input type="checkbox"/>

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.	<input type="checkbox"/>

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.	<input type="checkbox"/>

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
Municipal Building
801 Ocean Gate Ave
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

Municipal Building	
Gross Floor Area Excluding Parking: (ft ²)	11,500
Year Built	2008
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

Main Office	
Space Type	Office
Gross Floor Area(ft ²)	11,500
Weekly operating hours	38
Workers on Main Shift	35
Number of PCs	25
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 12/31/2009)	Baseline (Ending Date 12/31/2009)	Rating of 75	Target	National Average
Energy Performance Rating	24	24	75	N/A	50
Energy Intensity					
Site (kBtu/ft ²)	106	106	59	N/A	80
Source (kBtu/ft ²)	206	206	114	N/A	154
Energy Cost					
\$/year	N/A	N/A	N/A	N/A	N/A
\$/ft ² /year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
MtCO ₂ e/year	112	112	62	N/A	84
kgCO ₂ e/ft ² /year	10	10	6	N/A	8

More than 50% of your building is defined as Office. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:

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

APPENDIX M

Block Load Models

HEAT GAIN/LOSS WORKSHEET

Project Name:
 Location:
 Building Name:
 Engineer:

Project No.:
 Site Elevation: Feet
 Date:

Specific Volume CF/#

Building/Facility Designation

Outdoor Winter Design DB Temperature	<input type="text" value="-1"/> °F	Indoor Winter Design DB Temperature	<input type="text" value="72"/> °F
Outdoor Summer Design DB Temperature	<input type="text" value="90"/> °F	Indoor Summer Design DB Temperature	<input type="text" value="70"/> °F
Outdoor Summer Design WB Temperature	<input type="text" value="73"/> °F	Indoor Summer Design WB Temperature	<input type="text" value="60"/> °F
Outdoor Summer Humidity Ratio	<input type="text" value="0.0121"/> #/#	Indoor Air (70°F) Humidity Ratio	<input type="text" value="0.0079"/> #/#

ENVELOPE DESCRIPTIONS (Descriptions are from Interior to Exterior)

Walls (Select One - Type X)	R Value	Wall Type
<input type="checkbox"/> Steel Siding, 4" Insulation, Steel Siding	15.2	1
<input type="checkbox"/> Plaster or Gypsum, frame construction, 5" Insulation, 1" stucco	18.2	1
<input type="checkbox"/> 4" WH CMU, 1" Insulation, Finished Exterior	5.2	2
<input type="checkbox"/> Plaster or Gypsum, frame construction, 3" Insulation, 8" LW CMU	7.8	5
<input type="checkbox"/> 4" Face Brick, 2" Concrete, 1" Insulation, Exterior Finish	5.1	12
<input type="checkbox"/> 4" Face Brick, 4" Concrete, 1" Insulation, Exterior Finish	4.0	11
<input type="checkbox"/> Interior Finish, 2" Insulation, 8" CMU, 4" Face Brick	10.9	16
<input type="checkbox"/> Finished Surface, 8" LW CMU (filled), Air Space, 4" Face Brick	11.1	16
<input type="checkbox"/> Stucco or Gypsum, 2.5" Insul, Face Brick	14.3	10
<input type="checkbox"/> 4" Block, 1" insulation, 8" Block	19.9	16
<input checked="" type="checkbox"/> Interior finished sheetrock with 3.5" insulation and siding	10.0	

Roofs (Select One)	R Value	Roof Type
<input type="checkbox"/> Tectum Deck, 3.3" Insul., BU Roof	13.0	1
<input type="checkbox"/> Steel Deck, 5" Insul., BU Roof	18.2	1
<input type="checkbox"/> Attic Roof with 6" Insul.	25.0	4
<input type="checkbox"/> 4" HW Concrete Deck, BU Roof	2.7	2
<input type="checkbox"/> Ceiling, 3" Insulation, 4" Concrete Deck, BU Roof	14.9	4
<input type="checkbox"/> Ceiling, 4" Concrete Deck, 3" Insulation, BU Roof	18.5	13
<input type="checkbox"/> Ceiling, 4" Concrete Deck, 6" Insulation, BU Roof	21.7	14
<input type="checkbox"/> Ceiling, Wood Deck, 6" Insulation, Felt & Membrane	22.7	10
<input type="checkbox"/> Wood Deck, 6" insulation, Felt & Membrane	18.0	
<input checked="" type="checkbox"/> Ceiling, 6" insulation, Wood, Shingles	20.00	

Windows (Select One)	U Value
<input type="checkbox"/> Aluminum Frame, 1/8" SP Glazing	1.05
<input type="checkbox"/> Aluminum Frame, 1/4" DP Glazing	0.60
<input type="checkbox"/> Aluminum Frame, 3/16" DP Glazing	0.62
<input checked="" type="checkbox"/> Aluminum Frame, 1/2" DP Glazing	0.50
<input type="checkbox"/> Skylights	0.90
<input type="checkbox"/> 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 SF
 Occupied Area SF
 Return Plenum?

	Gross Wall Length	Average Wall Height	Ceiling Height	Window Area	Door Area	Net Wall Area
North Exposure	115 Ft	15.0 Ft	9.0 Ft	88 SF	0 SF	1,638 SF
East Exposure	100 Ft	15.0 Ft	9.0 Ft	88 SF	42 SF	1,371 SF
South Exposure	115 Ft	15.0 Ft	9.0 Ft	88 SF	0 SF	1,638 SF
West Exposure	100 Ft	15.0 Ft	9.0 Ft	88 SF	42 SF	1,371 SF

Forced Ventilation cfm

HEAT GAIN/LOSS WORKSHEET

Project Name: Borough of OceanGate
 Location: 801 Ocean Gate Avenue
 Building Name: Municipal Building
 Engineer: Frank Cuttita

Project No.: CHA #21611
 Site Elevation: 460 Feet
 Date:

Specific Volume 14.00 CF/#

Building/Facility Designation Municipal Offices

COOLING HEAT GAINS TO THE ROOM - SENSIBLE

SOLAR GAINS

WINDOWS	AREA (SF)	SHGF	Shade Coef	Cooling Load Factor		Solar Heat Gain
North Exposure	88	38 btu/h/sf	0.8	0.75	Glass Type C	1,995 Btu/hr
East Exposure	88	216 btu/h/sf	0.8	0.31	Glass Type C	4,687 Btu/hr
South Exposure	88	109 btu/h/sf	0.8	0.58	Glass Type C	4,425 Btu/hr
West Exposure	88	216 btu/h/sf	0.8	0.29	Glass Type C	4,385 Btu/hr
						15,492 Btu/h

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor		Room Heat Gain
North Exposure	948	0.10	20 °F	1.0		1,895 Btu/hr
East Exposure	771	0.10	39 °F	1.0		3,005 Btu/hr
South Exposure	948	0.10	27 °F	1.0		2,558 Btu/hr
West Exposure	771	0.10	22 °F	1.0		1,695 Btu/hr
Roof	11,500	0.05	73 °F	1.0		41,975 Btu/hr
Fenestration	350	0.50	20 °F			3,500 Btu/hr
Doors	84	0.14	27 °F			317 Btu/hr
Ceiling	11,500	0.14	0 °F			0 Btu/hr
Partition		0.05	0 °F			0 Btu/hr
Floor	11,500	0.04	0 °F			0 Btu/hr
						54,945 Btu/h

INTERNAL HEAT GAINS

Lights	0.90 w/sf x 11,500 Occ Area =	10.4 kW x 3.4x	1.0 RAF =	35,325 Btu/h
Plug Load	0.35 w/sf x 11,500 Occ Area =	4.0 kW x 3.4x	1.0 RAF =	13,737 Btu/h
People	30 people x 255 btu/person x	65% time in space =		4,973 Btu/h
Computer Work Stations	30 Units x	100 W/Unit x 3414 =		10,239 Btu/h
Equipment	3.0 kW x 3.413 =			10,239 Btu/h
Misc.				0 Btu/h
				74,512 Btu/h

VENTILATION AND INFILTRATION

	Area	Infiltration Factor	Perimeter Ratio	Coef	Temp. Diff.	Room Heat Gain
Walls	3,436 SF	0.15 CFM/SF		1.04	20 °F	11,620 Btu/h
Doors	84 SF	0.30 CFM/LF	0.90 LF/SF	1.04	20 °F	514 Btu/h
Windows	350 SF	0.35 CFM/LF	0.97 LF/SF	1.04	20 °F	2,683 Btu/h
Ventilation	2,000 cfm			1.04	20 °F	45,092 Btu/h
						59,910 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	690	0.10	20	1.0		1,380 Btu/hr
East Exposure	600	0.10	39	1.0		2,340 Btu/hr
South Exposure	690	0.10	27	1.0		1,863 Btu/hr
West Exposure	600	0.10	22	1.0		1,320 Btu/hr
Roof	11,500	0.05	73	0.0		0 Btu/hr
						6,903 Btu/h

INTERNAL HEAT GAINS

Lights	0.90 w/sf x 11,500 Occ Area =	10.4 kW x 3413x	0.00 RAF =	0 Btu/h
Misc.				0 Btu/h
				0 Btu/h

SENSIBLE HEAT GAINS - TEMP. DEPENDENT

Solar	15,492
Conduction to Room	54,945
Conduction to Plenum	6,903
Ventilation and Infiltration	59,910
Sub Total	137,250

SENSIBLE HEAT GAINS - TEMP. INDEPENDENT

Internal Gains to Room	74,512
Internal Gains to Plenum	0
Sub Total	74,512

HEAT GAIN/LOSS WORKSHEET

Project Name: Borough of OceanGate
Location: 801 Ocean Gate Avenue
Building Name: Municipal Building
Engineer: Frank Cuffita

Project No.: CHA #21611
Site Elevation: 460 Feet
Date:

Specific Volume 14.00 CF/#

Building/Facility Designation Municipal Offices

LATENT COOLING LOADS

Infiltration		Infiltration Factor	Air Density	Humidity Ratio Dif.	Room Heat Gain
Walls	14,080 SF	0.15 CFM/SF	4,629	0.0042 ##	41,476 Btu/h
Doors	84 SF	0.30 CFM/LF	4,629	0.0042 ##	448 Btu/h
Windows	350 SF	0.35 CFM/LF	4,629	0.0042 ##	2,337 Btu/h
Ventilation	2,000 cfm		4,629	0.0042 ##	39,277 Btu/h
People	30 people	0.65 time in space		250 Btu/hr/person	4,875 Btu/h
					88,413 Btu/h

Cooling Load Summary

	Sensible	Latent	Total	SHR=	
Temperature Dependent Gains	137,250	88,413	225,663		
Temperature Indep. Gains	74,512		74,512	0.71	
Total	211,763	88,413	300,175		

Building Cooling Load 25.0 Tons at 460 SF/Ton

Building Air Flow to Condition Space based on a 12°F Temp Rise is

16,355 CFM
1.42 CFM/sf

HEATING CALCULATION

CONDUCTION

	NET AREA (SF)	U-VALUE	Heating Load Temp. Dif.	Room Heat Gain
North Exposure	1,638	0.10	73	11,954 Btu/h
East Exposure	1,371	0.10	73	10,005 Btu/h
South Exposure	1,638	0.10	73	11,954 Btu/h
West Exposure	1,371	0.10	73	10,005 Btu/h
Penetration	350	0.50	73	12,775 Btu/h
Roof	11,500	0.05	73	41,975 Btu/h
Doors	84	0.14	73	856 Btu/h
Ceiling	11,500	0.14	0	0 Btu/h
Partition	0	0.05	0	0 Btu/h
Floor	11,500	0.04	10	4,600 Btu/h

Ventilation and Infiltration

	NET AREA (SF)	Infiltration Factor	Coef	Temp. Difference	Air Flow	Room Heat Gain
Walls	6,016 SF	0.15 CFM/SF	1.04	73	902 cfm	68,761 Btu/h
Doors	84 SF	0.30 CFM/LF	1.04	73	23 cfm	1,737 Btu/h
Windows	350 SF	0.35 CFM/LF	1.04	73	119 cfm	9,068 Btu/h
Ventilation Load	2,000 cfm		1.04	73	2,000 cfm	164,588 Btu/h
Total Ventilation & Infiltration Load					3,044 cfm	244,153 Btu/h

Building Heating Load 348,277 btu/h
 30.3 btu/sf

Borough of OceanGate
CHA #21611
Building: Municipal Building

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	0.0	0.0
East	3.5	6.0	2	42.0	38.0
				0.0	0.0
				0.0	0.0
			Sub-total	42.0	38.0
South				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	0.0	0.0
West	3.5	6.0	2	42.0	38.0
				0.0	0.0
				0.0	0.0
			Sub-total	42.0	38.0
			Total	84.0	76.0

LF/SF
0.90

**Borough of OceanGate
CHA #21611
Building: Municipal Building**

Reconcile Thermal Model

Building Footprint	11,500 SF	Ex Occupied Cing Temp.	70 °F	Ex Occupied Htg Temp.	72 °F
Heating Efficiency	80%	Ex Unoccupied Cing Temp.	70 °F	Ex Unoccupied Htg Temp.	72 °F
Cooling Efficiency	1.30 kW/ton	Occupied Cooling UA	(3,867) btu/hr/°F	Occupied Heating UA	1,426 btu/hr/°F
Internal Gains	74,512 btu/h	Unoccupied Cooling UA	(3,092) btu/hr/°F	Unoccupied Heating UA	1,426 btu/hr/°F
Unocc Internal Gain factor	0.03	Cooling Occ Enthalpy Setpoint	27.5 Btu/lb		
Ave Internal Gain Factor	0.7	Cooling Unocc Enthalpy Setpoint	27.5 Btu/lb		
Economizer available (Y/N)	No				

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

Avg Outdoor Air Temp. Bins °F	EXISTING LOADS												
	Occupied					Unoccupied							
	Total Bin Hours	Occupied Hours	Equipment Bin Hours	Unoccupied Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH			
102.5	49.1	0	0	0	-125,678	-473,434	-52,159	-100,503	-101,496	-2,235	0	0	
97.5	42.5	6	1	5	-106,343	-328,774	-52,159	-85,041	-70,484	-2,235	0	0	
92.5	39.5	45	10	35	-87,008	-263,019	-52,159	-69,579	-56,387	-2,235	151	151	
87.5	36.6	146	33	113	-67,673	-199,456	-52,159	-54,117	-42,760	-2,235	928	928	
82.5	34.0	298	67	231	-48,338	-142,469	-52,159	-38,655	-30,543	-2,235	2,356	2,356	
77.5	31.6	476	108	369	-29,003	-89,665	-52,159	-23,193	-19,265	-2,235	3,560	3,560	
72.5	29.2	662	150	512	-9,668	-37,261	-52,159	-7,731	-7,988	-2,235	3,780	3,780	
67.5	27.0	740	167	573	6,419	23,672	-52,159	6,419	5,075	-2,235	400	400	
62.5	24.5	765	173	592	13,550	49,974	-52,159	13,550	10,713	-2,235	0	0	
57.5	21.4	733	166	567	20,682	76,275	-52,159	20,682	16,352	-2,235	0	0	
52.5	18.7	668	151	517	27,814	102,577	-52,159	27,814	21,991	-2,235	0	0	
47.5	16.2	659	149	510	34,945	128,879	-52,159	34,945	27,630	-2,235	0	0	
42.5	14.4	685	155	530	42,077	155,181	-52,159	42,077	33,288	-2,235	0	0	
37.5	12.6	739	167	572	49,209	181,483	-52,159	49,209	38,907	-2,235	0	0	
32.5	10.7	717	162	555	56,341	207,785	-52,159	56,341	44,546	-2,235	0	0	
27.5	8.6	543	123	420	63,472	234,087	-52,159	63,472	50,184	-2,235	0	0	
22.5	6.8	318	72	246	70,604	260,389	-52,159	70,604	55,823	-2,235	0	0	
17.5	5.5	245	55	190	77,736	286,691	-52,159	77,736	61,462	-2,235	0	0	
12.5	4.1	156	35	121	84,868	312,992	-52,159	84,868	67,100	-2,235	0	0	
7.5	2.6	92	21	71	91,999	339,294	-52,159	91,999	72,739	-2,235	0	0	
2.5	1.0	36	8	28	99,131	365,596	-52,159	99,131	78,378	-2,235	0	0	
-2.5	0.0	19	4	15	106,263	391,898	-52,159	106,263	84,016	-2,235	0	0	
-7.5	-1.5	8	2	6	113,394	418,200	-52,159	113,394	89,655	-2,235	0	0	
TOTALS		8,760	1,981	6,779							13,781	13,781	7,390

Existing Building Ventilation & Infiltration (occ)	3,044 cfm
Overheat Ventilation Factor	1.60
Additional ventilation to offset overheat	1,827 cfm
Existing Building Ventilation & Infiltration (unocc)	1,044 cfm
Economizer Ventilation (from AHU's)	2,000 cfm

Energy Use Indices (calculated)

Base Case	7,390
Heating	7,438
Target ->	7,438
	99.4%

Base Case	13,781
Cooling	13,376
Target ->	13,376
	103.0%