ENERGY SAVINGS PLAN

SUBMITTED BY:
DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648
Final
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ENERGY SAVINGS PLAN

SECTION 1 – PROJECT OVERVIEW

Project Overview

The Energy Savings Plan (ESP) is the core of the Energy Savings Improvement Program (ESIP) process. It describes Ventnor's preferred Energy Conservation Measures (ECMs), the budget cost for each ECM and the ECM energy savings calculations that self-fund the project via reduced operating costs. The ESP provides Ventnor the necessary information to decide which proposed ECMs to implement as part of your (ESIP) project. Working with the Municipality's staff, your selected ESIP project would:

1. Self-fund a $8,216,094 project
2. Generate $409,970 in annual energy savings – 43% of current utility spend
3. Eligible for $536,121 in rebates and incentives - 50%, $268,061, has been applied to the project financial analysis
4. Reduce utility related annual CO2 emissions by 1,149 metric tons – a 43% reduction

NOTE: This submitted ESP doesn't constitute any contractual obligation between Ventnor and DCO Energy (DCO). Any contractual obligations will be performed under separate legal documents per mutual signed agreement of the parties involved and subject to the applicable laws and requirements of the ESIP legislation and State of New Jersey.

To ensure conformance with the requirements of Public Finance Notice LFN 2009-11, the ESP must address the following elements:

- *The results of the energy audit (APPENDIX I)*
- *A description of the energy conservation measures that will comprise the program; (Section 4)*
- *An estimate of greenhouse gas reductions resulting from those energy savings (Section 4);*
- *Identification of all design and compliance issues and identification of who will provide these services; (Section 6)*
- *An assessment of risks involved in the successful implementation of the plan; (Section 6)*
- *Identify the eligibility for, and costs and revenues associated with the PJM Independent System Operator for demand response and curtailable service activities; (Section 4)*
- *Schedules showing calculations of all costs of implementing the proposed energy conservation measures and the projected energy savings; (Section 4)*
- *Maintenance requirements necessary to ensure continued energy savings, and describe how they will be provided; and (Section 7)*

- *If developed by an ESCO, a description of, and cost estimates of a proposed energy savings guarantee. (Section 8)*

In addition, and per LFN 2009-11, the ESP requires several other important elements:

- *The calculations of energy savings must be made in accordance with protocols for their calculation adopted by the BPU. The calculation shall include all applicable State and federal rebates and tax credits, but shall not include the cost of an energy audit and the cost of verifying energy savings. (Section 5)*
- *An independent third party must review the plan and certify that the plan savings were properly calculated pursuant to the BPU protocols.*
- *If an ESCO is used to prepare the plan, the ESCO must provide an estimate of the cost of a guarantee of energy savings. When adopting the plan, the local unit must decide whether or not to accept the guarantee (covered below). (Section 8)*
- *The plan must be verified by an independent third party to ensure that the calculations were made in accordance with the BPU standards and that all required elements of the ESP are covered.*
- *After verification is completed, the governing body must formally adopt the plan. At that point, the plan must be submitted to the Board of Public Utilities where it will be posted on the BPU website. BPU approval is not required. If the contracting unit maintains its own website, the plan must also be posted on that site.*

DCO Energy looks forward to the third-party review of our energy calculations and Ventnor's approval of the Energy Savings Plan to implement via the requirements of the ESIP legislation. Your time, effort, and support is appreciated.

ENERGY SAVINGS PLAN

SECTION 2 – FACILITY DESCRIPTION

Ventnor City Hall

Ventnor City Hall was built in 1929 and is 29,376 square feet. The building consists of town offices, police station and court room. The building is occupied 8 AM to 5 PM on weekdays but portions, such as the Police Department, remain open 24/7.

Description of Building Envelope

The building is masonry construction with steel structure. The walls are brick with plaster interior finishes. The building has precast concrete floors. The roof is peaked with slate exterior.

The windows are double pane with aluminum frames. The windows are about 20 years old. Overall the building envelope is in good condition.

Description of Building HVAC

The building is heated by hot water radiators, unit heaters and hot water coils in air handlers. The zones have electronic valves controlled by the DDC system. The hot water is supplied by three (3) Hydrotherm condensing hot water boilers. Each boiler is gas fired, and rated 370,799 btu/h output. The hot water is circulated by 2 pumps. The pumps are controlled by a VFD on temperature differential.

The building has an air handler for the courtroom. This unit has a hot water coil and a dx cooling coil. The remainder of the occupied spaces have radiators and ductless split system. The spaces are controlled by wall thermostats.

Domestic water heating is produced by a Bradford White gas fired, storage water heater that was installed in 2009. The unit is rated at 30 MBH input with 80% combustion efficiency and has 30 gallons of storage.

Description of Building Lighting

The building lighting systems are primarily T8 fluorescent fixtures in the office areas. A few occupancy sensors were observed. The screw in fixtures have CFL's installed. Lighting levels are generally appropriate for the space function. Exterior lighting is metal halide controlled by daylight sensors.

Ventnor Public Work / Water Works

The Public Works and Water Works buildings were built in 1923 and are approximately 25,000 square feet. The buildings contain maintenance facilities, workshops and offices. It is assumed to be occupied 60 hours per week by 20 employees.

Description of Building Envelope

The Public Works and Water Works building is masonry with stucco exterior. The roof is a mix of flat and sloped roof with ceramic tile. Portions of the building have added steel studded walls with fiberglass batts and drywall interior. No roof insulation was observed. The building has limited windows. The windows are 20 years old, double pane and aluminum frame.

Description of Building HVAC

The fleet building is heated by gas fired unit heaters. The fleet break room and security offices are heated by a gas furnace. The public works building is heated by finned tube radiators and hot water unit heaters. The heating water is provided by a dual-fuel hot water boiler. The boiler is natural gas fired or no. 2 fuel oil and made by Hydrotherm, and rated at 770 MBH input gas or 5.5 gph, gallons per hour, of light oil. The boiler is rated at 75% combustion efficiency. The building has 4 zones, each controlled by local thermostats.

The buildings are cooled by window air conditioners installed in the offices. These windows have unit mounted controls.

The water works building has a Bradford gas fired storage water heater that was installed in 2000. This unit is rated at 34 MBH input, 80% combustion efficiency and 40 gallons of storage. The water meter room has a 10 gallon electric storage water heater rated at 2000 watts. The fleet building has an AO Smith electric storage water heater that is about 10 years old. The unit is rated at 2500 watts and 10 gallons of storage.

Description of Building Lighting

The Public Works and fleet building has T8 fluorescent lighting. The garage bays have high bay T5 fixtures. Two spaces have T12 fixtures with magnetic ballasts. The fleet building has high bay metal halides in the breakroom and high bay.

Ventnor Cultural Arts / Senior Center

The Cultural Arts Center was built in 2005 is approximately 24,464 square feet. The building houses the library, art studio, local museum, multipurpose room and senior center. The Cultural Arts Center has regular hours of 8:30 am to 4:30 pm Monday thru Friday with some classes ending at 8 pm.

Description of Building Envelope

The building is masonry with steel structure. The building is insulated by EIFS with stucco. The exterior walls are assumed to be rated R-11. The roof has both flat and peaked portions. The peaked portions have tile surface. The flat portions of the roof are rubber membrane roofing. The roof is assumed to have R-19 insulation installed. The windows are double pane with wood frames and exterior aluminum cladding. These window are original 2005 construction. Overall the building envelope is in good condition and is currently providing a sufficient level of insulation.

Description of Building HVAC

The building is heated and cooled by roof top air handlers. The air handlers have hot water heating coil and chilled water cooling coil. The building has 2 exterior restrooms that have electric wall heaters. The boiler room has a hot water unit heater on a manual thermostat.

The heating water is generated by 4 Hydrotherm condensing gas boilers. Each boiler is rated at 95% combustion efficient and 199 MBH input. The boilers were installed in 2009. The hot water is circulated by 2 hot water pumps with variable speed drives.

The chilled water is generated by a York air cooled chiller. The chiller was installed in 2016 and is in good condition. The chilled water is pumped by 2 constant volume pumps. The building HVAC controls are York DDC.

The domestic hot water is generated by a Bradford gas fired storage water heater. The unit is rated 80% combustion efficiency, 60 MBH input and has 48 gallons of storage.

Description of Building Lighting

The lighting system is primarily 2X4 recessed T8 fixtures and CFL recessed can fixtures. There are a few fixtures that have incandescent lamps. Display lighting in the library, lobby, and historical museum is halogen track lighting.

Ventnor Firehouse 1

Fire House #1 was built around 1930 and is approximately 10,775 square feet. Fire House #1 is continuously staffed by an average of 10 firemen.

Description of Building Envelope

The Fire House 1 is located on the ocean side of town. The building has 12 inch thick brick walls. The roof is a mix of flat and peaked. The flat roof is white membrane surface. The peaked roof is tiled over wood framing and decking. There was no insulation observed in the walls or roof.

The windows are double pane with aluminum pane that were replaced about 20 years ago.

Description of Building HVAC

The building is heated by hot water unit heaters and convectors. The hot water is supplied by two (2) gas fired Weil McLain condensing boilers installed in 2012. These boilers are rated at 299 MBH input and 99% combustion efficiency. The building is divided into 6 heating zones, each controlled by single set point thermostats.

The building is cooled by 3 split systems that were installed in 2012. These units cool the kitchen, offices and the dorm area. These units are made by Arcaware and Goodman and total 11 tons of cooling.

The domestic hot water is supplied by a Bradford gas fired storage water heater installed in 2012. The unit is rated at 76 MBH input, 82% efficient and 75 gallons of storage.

Description of Building Lighting

The garage and boiler rooms have high bay T5 fluorescent fixtures. The remainder of the building has T8 fixtures. The building has occupancy sensors in the offices. The remainder of the lighting controls are manual.

Ventnor City Park

The City Park building is about 30 years old and approximately 2,500 square feet. The building has storage for the sports clubs, landscaping and field offices.

Description of Building Envelope

City Park building is 2x4 construction with vinyl siding, R-11 batts, and drywall interior. The roof is peaked with asphalt shingles. The ceiling has R-11 batt insulation. The building has 2 storage areas with overhead doors. The building windows are double pane vinyl clad wood windows.

Overall the building envelope is in good condition and is currently providing a sufficient level of insulation.

Description of Building HVAC

The building is heated and cooled by 3, packaged terminal air conditions, PTAC, with electric resistance heat. These units average ¾ ton cooling capacity and 12.0 EER. The heating capacity is 9,000 btu/h. The PTAC's have onboard temperature controls. Each storage area has a 5 kW electric unit heater with onboard controls. The bathroom has a 4 kW electric wall heater with onboard controls and an exhaust fan.

Description of Building Lighting

The City Park building has surface mounted T12 fixtures controlled by a wall switches.

Ventnor Fishing Pier

The Fishing Pier was built around 2000 and is approximately 780 square feet. The Fishing Pier is occupied by 1 person. The hours vary by season.

Description of Building Envelope

The fishing pier office is timber framed. The exterior walls are plywood siding with drywall interior surfaces. The roof is peaked with asphalt shingles. The space would not be considered finished, the drywall is not taped and the ceiling has no interior finished surface. The walls and roof are assumed to be insulated with R-11 batts. The building windows are double pane with wood frame.

Description of Building HVAC

The fishing pier is seasonal and has no permanent heating system. The office has a window air conditioner for cooling. The bathroom has an exhaust fan for cooling and ventilation.

Description of Building Lighting

The building has LED lights in the bathroom and office. The pier exterior lighting is LED.

Ventnor Street Lights

Ventnor has 1,167 street lights throughout the city. The street lights are owned by the utility - Atlantic City Electric. The majority of the street lights are 150W high pressure sodium cobra head fixtures on the Street and Private Light tariff. The street lights can be converted to LED and switched to the Contributed Street Lighting tariff for on bill savings.

Ventnor Educational Community Complex

The Ventnor Education Community Complex is located at 400 North Lafayette Street in Ventnor City, New Jersey. The 152,357 SF building was originally built in 1969 with renovations in 1974, 1997, and 2001. The building is a single-story facility comprised of a main office, classrooms, gymnasium, a cafeteria, a kitchen, a library, a nurse's offices, a music room, a band room, a faculty room, restrooms, Board of Education Offices, boiler rooms and other utility/storage rooms.

Description of Building Envelope

Exterior walls for school are masonry brick faced with concrete block interior walls. The windows throughout are in good condition and are double pane, operable, ¼" coated glass with aluminum frames. The roof is a flat built up roof with rubber overlay. Insulation is estimated to range between 2 and 5 inches.

Description of Building HVAC

The Educational Complex is conditioned through a variety of systems including packaged rooftop units, split system cooling air handlers, Airedale self-contained units, and two central hot water boiler plants. Overall the entire building is heated and cooled via one of these systems.

The Boiler Room located in the 600 wing consists of two Paterson Kelley C-2000 natural gas fired condensing boilers. These units were installed in 2010 and have an input rating of 2,000 MBH and efficiency rating up to 95%. Each boiler has a primary circulator pump to maintain minimum flow through the boiler rated at 1 horsepower. Heating water is distributed to the systems via two pairs of pumps, one rated at 3 horsepower, and the second at 5 horsepower.

The Boiler Room located in the 300 wing consists of two Paterson Kelley C-2500 natural gas fired condensing boilers. These units were installed in 2014 and have an input rating of 2,500 MBH and efficiency rating up to 93.4%. Each boiler has a primary circulator pump to maintain minimum flow through the boiler rated at ¾ horsepower. Heating water is distributed to the systems via two pairs of pumps with variable frequency drives, and both sets have 5 horsepower motors.

The classrooms in the 100, 200, and 300 wings are conditioned by vertical Airedale unit ventilators with packaged direct expansion cooling, hot water heating, and energy recovery. These units are each rated for 3-tons of cooling and are located in the room they are serving. Areas in these classroom wings not conditioned by an Airedale unit, have a packaged rooftop unit satisfying the space. Typical rooftops range from 2 to 20 tons of cooling capacity, dependent on the size of the zone they are feeding.

The Gymnasium is conditioned by two large energy recovery rooftop air handling units with 700 MBH of gas fired heating and 80 tons of direct expansion cooling. The existing units were manufactured by Annex Air and were installed during summer 2015.

The Cafeteria is conditioned by a single rooftop air handling unit with 700 MBH of gas-fired heating and 30 tons of direct expansion cooling. The unit is manufactured by Trane and was installed in 2018. The Kitchen has a direct make up air unit with gas fired heating manufactured by ARES, in addition to a Carrier packaged rooftop unit that serves the kitchen.

The HVAC systems within the building are controlled by a CM3 DDC system. Systems not controlled by DDC, are controlled through local thermostats.

Description of Building Lighting

The building has a mixture of fluorescent and incandescent fixtures. Various spaces have occupancy based lighting controls.

ENERGY SAVINGS PLAN

SECTION 3 – ENERGY BASELINE

Total Utility Consumption and Site EUI

The Ventnor Energy Savings Plan includes 7 buildings and the city's 1,167 street lights. To develop the ESP, DCO Energy was provided with all available utility data (electric, solar panel production, natural gas). DCO Energy tracked and documented this utility data from January 2019 thru December 2019. A listing of the buildings, the total utility consumption, and Energy Usage Index for the 7 buildings is detailed below.

BUILDINGS & FACILITIES		
BUILDING #	BUILDING/FACILITY NAME	SQFT
1	**Ventnor City Hall**	**29,376**
2	**Ventnor Public / Water Works**	**55,000**
3	**Ventnor Cultural Arts / Senior Center**	**24,464**
4	**Ventnor Firehouse 1**	**10,775**
5	**Ventnor City Park**	**2,500**
6	**Ventnor Fishing Pier**	**780**
7	**Ventnor Street Lights**	
8	**Ventnor Educational Community Complex**	**152,357**

VENTNOR BUILDINGS/FACILITIES		ELECTRIC					
BUILDING/FACILITY NAME	SQFT	USAGE kWh	DEMAND kW	USAGE kWh / SQFT	USAGE BTU / SQFT	TOTAL COST $$	BLENDED COST $$ / kWh
Ventnor City Hall	29,376	404,520	82	13.8	46,985	$52,343	$0.129
Ventnor Public / Water Works	55,000	709,200	254	12.9	43,996	$99,180	$0.140
Ventnor Cultural Arts / Senior Center	24,464	390,463	156	16.0	54,458	$62,789	$0.161
Ventnor Firehouse 1	10,775	100,354	27	9.3	31,778	$15,989	$0.159
Ventnor City Park	2,500	59,160	169	23.7	80,742	$12,426	$0.210
Ventnor Fishing Pier	780	10,735	4	13.8	46,959	$1,824	$0.170
Ventnor Street Lights	0	1,024,460	0	-	-	$296,510	$0.289
Ventnor Educational Community Complex	152,357	1,831,709	541	12.0	41,021	$299,259	$0.163
TOTALS	**275,252**	**4,530,601**	**1,233**	**16.5**	**56,161**	**$840,322**	**$0.185**

VENTNOR BUILDINGS/FACILITIES		NATURAL GAS			
BUILDING/FACILITY NAME	SQFT	USAGE THERMS	USAGE BTU / SQFT	TOTAL COST $$	BLENDED COST $$ / THERM
Ventnor City Hall	29,376	9,931	33,806	$11,212	$1.129
Ventnor Public / Water Works	55,000	23,805	43,281	$25,068	$1.053
Ventnor Cultural Arts / Senior Center	24,464	0	0	$389	$0.00
Ventnor Firehouse 1	10,775	4,357	40,438	$7,568	$1.737
Ventnor City Park	2,500	0	0	$0	$0.00
Ventnor Fishing Pier	780	0	0	$0	$0.00
Ventnor Street Lights	0	0	0	$0	$0.00
Ventnor Educational Community Complex	152,357	48,156	31,608	$58,404	$1.213
TOTALS	**275,252**	**86,249**	**31,335**	**$102,641**	**$1.190**

VENTNOR BUILDINGS/FACILITIES		SITE ENERGY	SOURCE ENERGY	TOTAL COST
BUILDING/FACILITY NAME	SQFT	USAGE BTUs	USAGE BTUs	$$
Ventnor City Hall	29,376	2,373,306,240	4,907,360,472	$63,555
Ventnor Public / Water Works	55,000	4,800,254,400	9,274,900,320	$124,248
Ventnor Cultural Arts / Senior Center	24,464	1,332,259,756	3,730,327,317	$63,178
Ventnor Firehouse 1	10,775	778,129,848	1,416,250,074	$23,557
Ventnor City Park	2,500	201,853,920	565,190,976	$12,426
Ventnor Fishing Pier	780	36,627,820	102,557,896	$1,824
Ventnor Street Lights	0	3,495,457,520	9,787,281,056	$296,510
Ventnor Educational Community Complex	152,357	11,065,419,108	22,555,824,502	$357,663
TOTALS	**275,252**	**24,083,308,612**	**52,339,692,614**	**$942,963**

VENTNOR BUILDINGS/FACILITIES		SITE EUI			SITE ECI		
BUILDING/FACILITY NAME	SQFT	USAGE BTU / SQFT	NATIONAL MEDIAN BTU / SQFT	NATIONAL MEDIAN +/- %	COST $$ / SQFT	NATIONAL MEDIAN $$ / SQFT	NATIONAL MEDIAN +/- %
Ventnor City Hall	29,376	80,791	77,800	-4%	$2.16	$1.56	-39%
Ventnor Public / Water Works	55,000	87,277	60,300	-45%	$2.26	$1.21	-87%
Ventnor Cultural Arts / Senior Center	24,464	54,458	86,300	37%	$2.58	$1.73	-49%
Ventnor Firehouse 1	10,775	72,216	92,200	22%	$2.19	$1.85	-18%
Ventnor City Park	2,500	80,742	34,100	-137%	$4.97	$0.68	-627%
Ventnor Fishing Pier	780	46,959	34,100	-38%	$2.34	$0.68	-242%
Ventnor Street Lights	0	0	0	0%	$0.00	$0.00	0%
Ventnor Educational Community Complex	152,357	72,628	68,800	-6%	$2.35	$1.38	-70%
TOTALS	**275,252**	**87,495**	**70,120**	**-25%**	**$3.43**	**$1.41**	**-144%**

Below is a detailed account of each of the utility accounts and meters provided to DCO Energy.

Atlantic City Electric

Entity	Account Number	Bill Description	ESIP Building	Tariff	Notes
Ventnor City	50012185265	Cambridge Ave & Theb	Ventnor Fishing Pier	General Service Secondary	Fishing Pier
Ventnor City	55000249312	City Hall	Ventnor Street Lights	Street and Private Lighting	
Ventnor City	55000249783	City Hall	Ventnor Street Lights	Contributed Street Lighting	
Ventnor City	55002901563	Atlantic and Suffolk	Ventnor Street Lights	Street and Private Lighting	Tennis Courts
Ventnor City	55002923286	Balfour & Surrey	Ventnor City Park	General Service Secondary	Ballfield
Ventnor City	55002948846	6201 Atlantic Ave	Ventnor City Hall	General Service Secondary	
Ventnor City	55002986523	6500 Atlantic Ave	Ventnor Cultural/Senior Center	General Service Secondary	
Ventnor City	55002986895	Balfour Ave	Ventnor City Park	General Service Secondary	Ballfield
Ventnor City	55002987836	Multiple Locations	Ventnor Street Lights	Direct Distribution Connection	
Ventnor City	55002988305	Burke & Dorset Ave	Ventnor Street Lights	Street and Private Lighting	Ski Beach
Ventnor City	55002988800	Atlantic and Newport	Ventnor Street Lights	Street and Private Lighting	Cultural Center/Library
Ventnor City	55002989212	6500 Atlantic Ave	Ventnor Cultural/Senior Center	General Service Secondary	
Ventnor City	55003686155	Balfour & Surrey Ave	Ventnor City Park	General Service Secondary	Ballfield
Ventnor City	55003462177	New Haven & Winchest	Ventnor Firehouse 1	General Service Secondary	
Ventnor City	55003502345	Cornwall & Wincheste	Ventnor Public / Water Works	General Service Secondary	
Ventnor City	55003686155	Balfour & Surrey Avenue	Ventnor Street Lights	Street and Private Lighting	Ballfield
Ventnor City	55003686601	Balfour & Surrey Ref	Ventnor City Park	General Service Secondary	Ballfield
Ventnor City	55004431916	Surrey & Balfour Ave	Ventnor City Park	General Service Secondary	Ballfield
Ventnor City	55008264750	Beach and Cambridge	Ventnor Fishing Pier	General Service Secondary	
Ventnor City	55010934614	Various Locations	Ventnor Street Lights	Direct Distribution Connection	
Ventnor BOE	55011781121	400 N Lafayette	Ventnor Educational Community Complex	General Service Secondary	
Ventnor BOE	55011781469	400 N Lafayette	Ventnor Educational Community Complex	General Service Secondary	
Ventnor BOE	55011781832	500 N Lafayette	Ventnor Educational Community Complex	General Service Secondary	

South Jersey Gas

Entity	SJG Account Number	Bill Description	ESIP Building	Tariff	Notes
Ventnor City	4722600000	6201 Atlantic Ave	Ventnor City Hall	General Service	Ventnor Police
Ventnor City	8233700000	6600 Winchester Ave	Ventnor Fire House 1	General Service	
Ventnor City	9533700000	6500B Atlantic Ave	Ventnor Cultural Arts/Senior Center	General Service	Ventnor Library/Cultural Arts
Ventnor City	8012600000	Cornwall Ave	Ventnor Public Works	General Service	Ventnor Maintenance Garage
Ventnor City	0802600000	Cornwall Ave	Ventnor Public Works	General Service	Water Works
Ventnor BOE	3878700000	400 N Lafayette Ave	Ventnor Educational Community Complex	General Service	
Ventnor BOE	9438700000	400 N Lafayette Ave	Ventnor Educational Community Complex	General Service	

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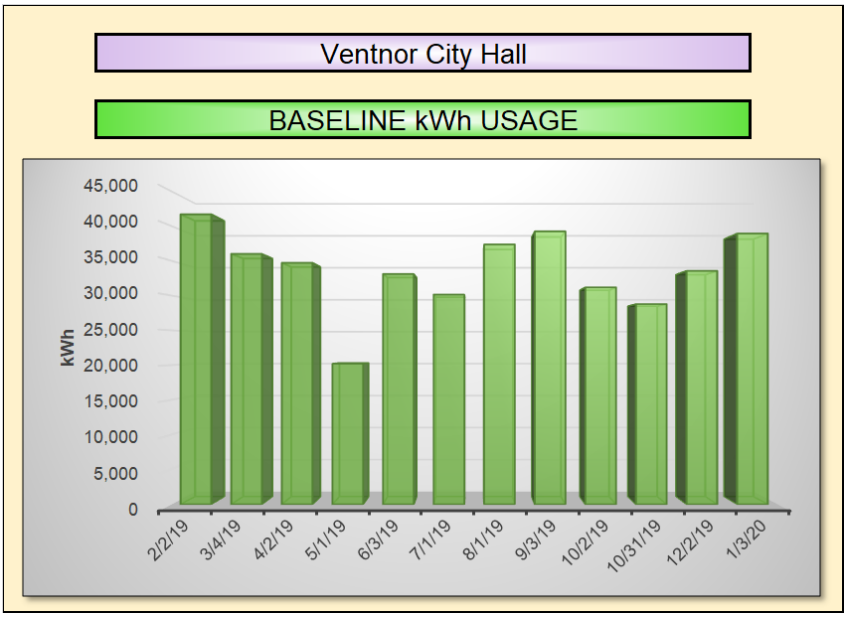
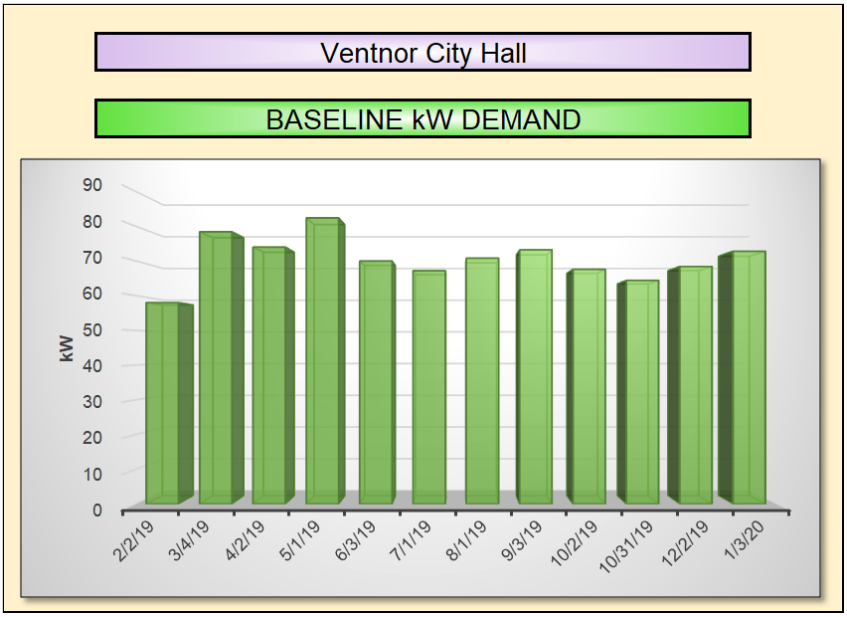
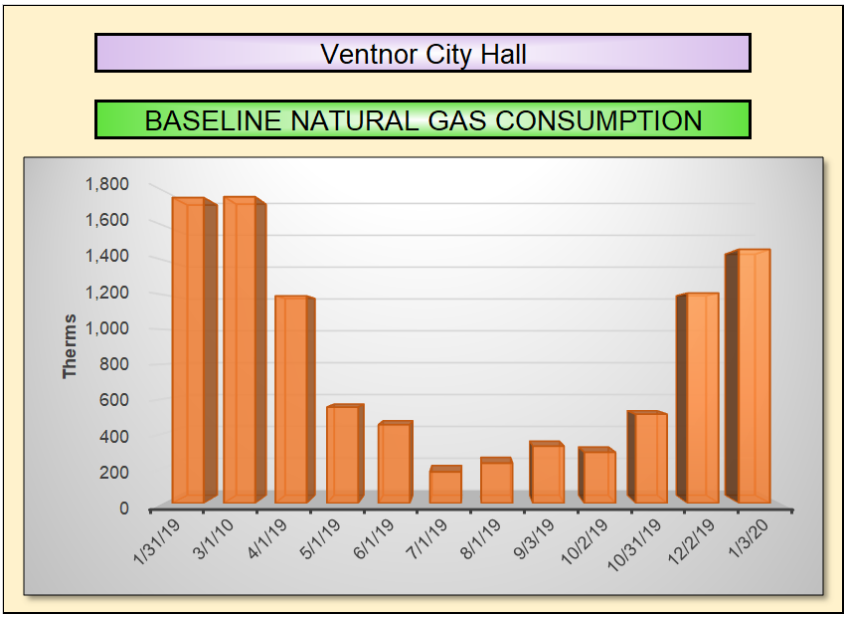
Ventnor City Hall Baseline Energy Use



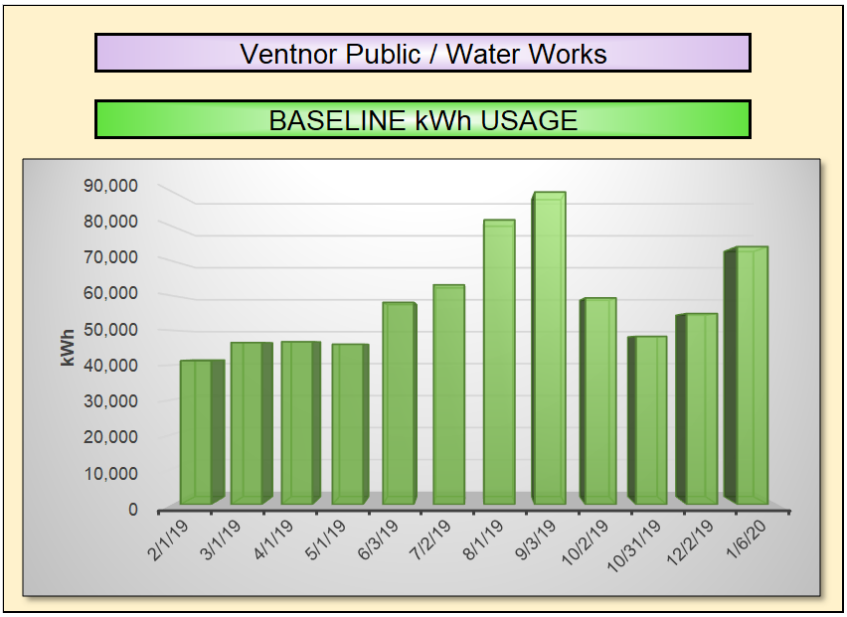


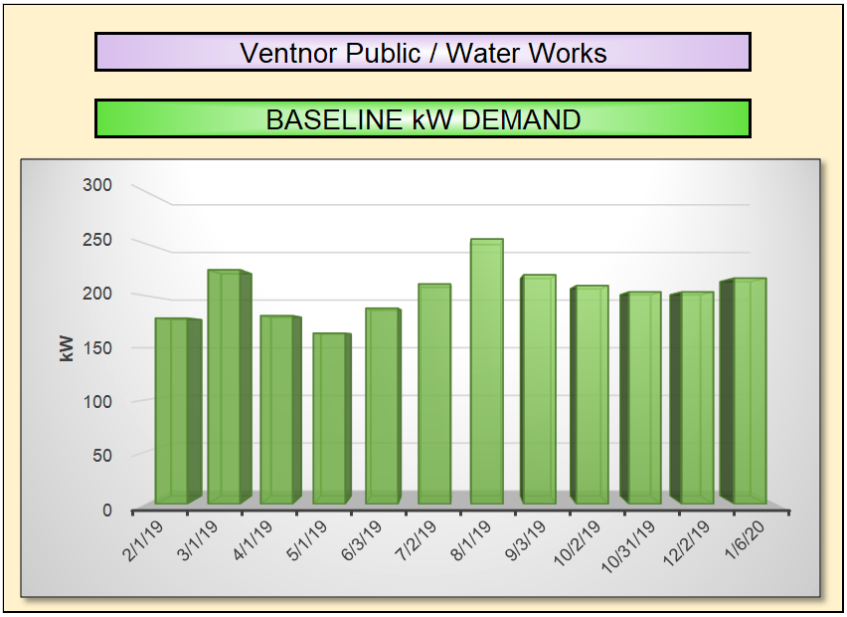
Ventnor City Hall								ELECTRIC METER #1			
Provider:	Atlantic City Electric			Account #:	5500 2948 846			Meter #:	KZG013132681		
Commodity:	Constellation New Energy			Commodity:	6201 Atlantic Ave Cty Hl			Rate Tariff:	Annual General Service Secondary		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Electric Demand Charges**	**Total Electric Charges**	**Cost / kWh Checksum**	**Days**	**Load Factor**	**BTU**
1/4/19	2/2/19	41,640	58	$827	$3,237	$923	$4,987	$0.120	30	100%	142,075,680
2/3/19	3/4/19	35,960	78	$737	$2,795	$735	$4,268	$0.119	30	64%	122,695,520
3/5/19	4/2/19	34,680	74	$713	$2,696	$679	$4,089	$0.118	29	67%	118,328,160
4/3/19	5/1/19	20,200	82	$552	$1,570	$882	$3,004	$0.149	29	35%	68,922,400
5/2/19	6/3/19	33,080	70	$889	$2,572	$852	$4,313	$0.130	33	60%	112,868,960
6/4/19	7/1/19	30,120	67	$846	$2,335	$694	$3,874	$0.129	28	67%	102,769,440
7/2/19	8/1/19	37,320	71	$1,024	$2,891	$810	$4,725	$0.127	31	71%	127,335,840
8/2/19	9/3/19	39,200	73	$1,970	$3,037	$891	$5,898	$0.150	33	68%	133,750,400
9/4/19	10/2/19	31,160	68	$878	$2,415	$723	$4,016	$0.129	29	66%	106,317,920
10/3/19	10/31/19	28,760	64	$860	$2,230	$690	$3,781	$0.131	29	64%	98,129,120
11/1/19	12/2/19	33,520	68	$991	$2,598	$809	$4,398	$0.131	32	64%	114,370,240
12/3/19	1/3/20	38,880	73	$1,116	$3,013	$861	$4,990	$0.128	32	70%	132,658,560
TOTALS		404,520	82	$11,402	$31,390	$9,552	$52,343	$0.129	365	56%	1,380,222,240



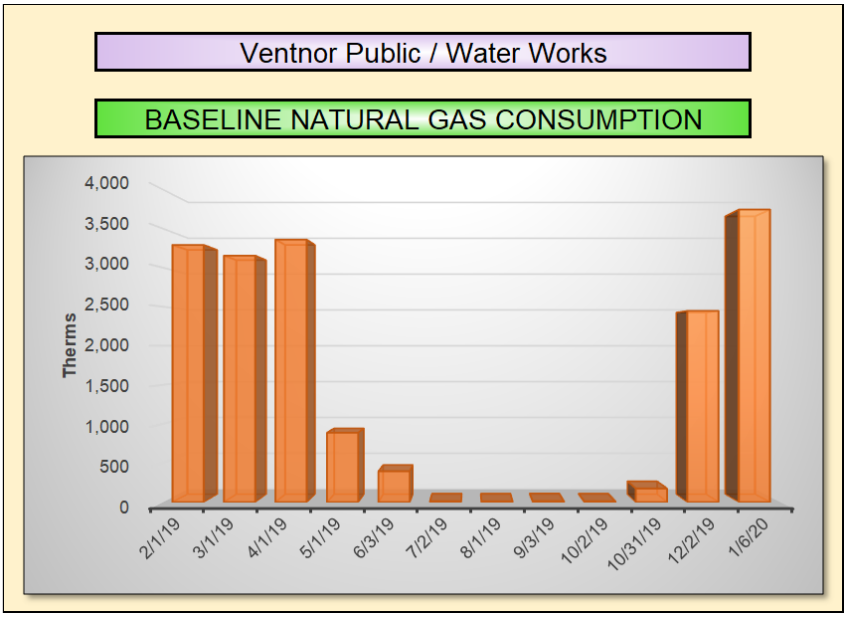
Ventnor City Hall								Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	4722600000				Meter #	0517290
Commodity	UGI Energy Services		Commodity	6201 Atlantic Ave				Rate Tariff:	General Service
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Demand Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
1/4/19	1/31/19	1,758	$1,164	$30		$790	$1,984	$1.11	175,809,000
2/1/19	3/1/10	1,763	$1,162	$31		$803	$1,996	$1.11	176,290,000
3/2/10	4/1/19	1,193	$786	$33		$509	$1,329	$1.09	119,255,000
4/2/19	5/1/19	553	$364	$32		$236	$632	$1.09	55,262,000
5/2/19	6/1/19	452	$296	$35		$193	$524	$1.08	45,158,000
6/2/19	7/1/19	180	$118	$30		$77	$225	$1.08	18,043,000
7/2/19	8/1/19	230	$151	$33		$99	$283	$1.08	23,036,000
8/2/19	9/3/19	328	$215	$35		$140	$390	$1.08	32,810,000
9/4/19	10/2/19	293	$192	$31		$125	$348	$1.08	29,280,000
10/3/19	10/31/19	512	$338	$31		$219	$587	$1.09	51,241,000
11/1/19	12/2/19	1,209	$796	$34		$516	$1,347	$1.09	120,861,000
12/3/19	1/3/20	1,460	$962	$34		$571	$1,567	$1.05	146,039,000
TOTALS		9,931	$6,545	$389	$0	$4,278	$11,212	$1.09	993,084,000

Ventnor Public Works Baseline Energy Use





Ventnor Public / Water Works						ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	5500 3502 345			Meter #	99G007369723		
Commodity:	Constellation New Energy			Commodity:	Cornwall & Winchester			Rate Tariff:	Annual General Service Secondary		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Electric Demand Charges**	**Total Electric Charges**	**Cost / kWh Checksum**	**Days**	**Load Factor**	**BTU**
1/4/19	2/1/19	41,280	178.4	$826	$3,209	$1,618	$5,652	$0.137	29	33%	140,847,360
2/2/19	3/1/19	46,480	224.8	$895	$3,613	$1,968	$6,476	$0.139	28	31%	158,589,760
3/2/19	4/1/19	46,720	180.8	$916	$3,632	$1,763	$6,310	$0.135	31	35%	159,408,640
4/2/19	5/1/19	46,000	164.0	$1,022	$3,576	$1,815	$6,413	$0.139	30	39%	156,952,000
5/2/19	6/3/19	58,000	188.0	$1,399	$4,652	$2,289	$8,340	$0.144	33	39%	197,896,000
6/4/19	7/2/19	63,040	211.2	$1,579	$4,896	$2,260	$8,735	$0.139	29	43%	215,092,480
7/3/19	8/1/19	81,680	254.4	$1,997	$6,334	$2,816	$11,148	$0.136	30	45%	278,692,160
8/2/19	9/3/19	89,680	220.0	$2,193	$6,955	$2,679	$11,827	$0.132	33	51%	305,988,160
9/4/19	10/2/19	59,280	209.6	$1,501	$4,606	$2,243	$8,351	$0.141	29	41%	202,263,360
10/3/19	10/31/19	48,240	203.5	$1,316	$3,755	$2,182	$7,253	$0.150	29	34%	164,594,880
11/1/19	12/2/19	54,800	203.5	$1,489	$4,264	$2,408	$8,161	$0.149	32	35%	186,977,600
12/3/19	1/6/20	74,000	216.8	$1,958	$5,752	$2,805	$10,515	$0.142	35	41%	252,488,000
TOTALS		709,200	254	$17,090	$55,244	$26,846	$99,180	$0.140	368	32%	2,419,790,400

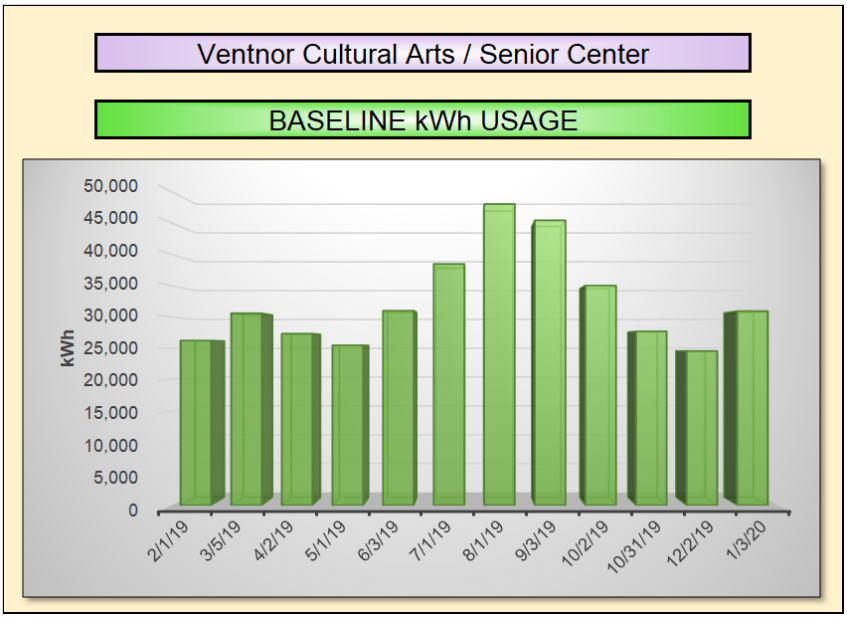


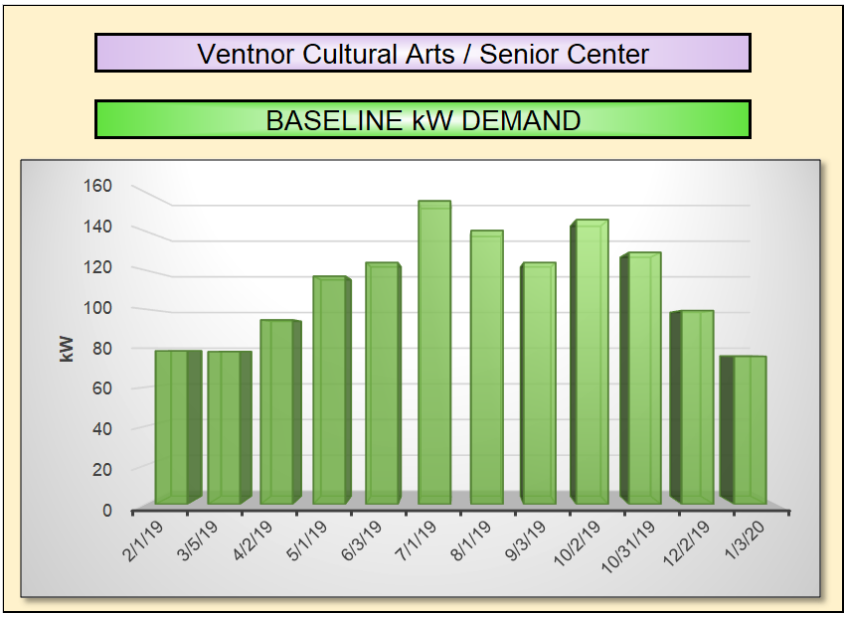
Ventnor Public / Water Works								Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	8012600000				Meter #	0397220
Commodity	UGI Energy Services		Commodity	Cornwall Ave - Maintenance Garage				Rate Tariff:	General Service
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Demand Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
1/4/19	2/1/19	3,289	$2,177	$31		$1,479	$3,687	$1.11	328,930,000
2/2/19	3/1/19	3,152	$2,078	$30		$1,414	$3,522	$1.11	315,248,000
3/2/19	4/1/19	3,357	$2,213	$33		$1,434	$3,679	$1.09	335,677,000
4/2/19	5/1/19	889	$586	$32		$380	$997	$1.09	88,872,000
5/2/19	6/3/19	396	$259	$35		$169	$463	$1.08	39,590,000
6/4/19	7/2/19	10	$7	$31		$5	$42	$1.10	1,031,000
7/3/19	8/1/19	9	$6	$32		$4	$42	$1.06	930,000
8/2/19	9/3/19	12	$8	$35		$5	$48	$1.06	1,242,000
9/4/19	10/2/19	10	$7	$31		$5	$42	$1.10	1,031,000
10/3/19	10/31/19	175	$115	$31		$75	$221	$1.09	17,527,000
11/1/19	12/2/19	2,446	$1,612	$34		$1,045	$2,690	$1.09	244,614,000
12/3/19	1/6/20	3,742	$2,465	$37		$1,463	$3,965	$1.05	374,153,000
TOTALS		17,488	$11,534	$392	$0	$7,475	$19,401	$1.09	1,748,845,000

Ventnor Public / Water Works							Natural Gas Meter #2		
Provider	South Jersey Gas		Account #	0802600000			Meter #	636696	
Commodity	UGI Energy Services		Commodity	Cornwall Ave - Water Works			Rate Tariff	General Service	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	Cost / Unit Checksum	BTU
1/4/19	2/1/19	1,167	$773	$31		$525	$34	$1.11	116,737,000
2/2/19	3/1/19	1,094	$721	$30		$489	$37	$1.11	109,404,000
3/2/19	4/1/19	1,112	$733	$33		$475	$36	$1.09	111,166,000
4/2/19	5/1/19	395	$260	$32		$169	$32	$1.09	39,487,000
5/2/19	6/3/19	138	$91	$35		$59	$73	$1.08	13,815,000
6/4/19	7/2/19	5	$3	$31		$2	$679	$1.06	516,000
7/3/19	8/1/19	6	$4	$32		$3	$1,443	$1.06	620,000
8/2/19	9/3/19	5	$3	$35		$2	$984	$1.06	518,000
9/4/19	10/2/19	5	$3	$31		$2	$791	$1.06	516,000
10/3/19	10/31/19	187	$123	$31		$80	$1,008	$1.09	18,661,000
11/1/19	12/2/19	895	$589	$34		$382	$488	$1.09	89,458,000
12/3/19	1/6/20	1,307	$861	$37		$511	$63	$1.05	130,721,000
TOTALS		6,316	$4,166	$392	$0	$2,699	$5,667	$1.09	631,619,000

Ventnor Public / Water Works							
TOTAL NATURAL GAS							
Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	Cost / Unit Checksum	BTU
4,457	$2,950	$62	$0	$2,004	$3,722	$1.11	445,667,000
4,247	$2,799	$60	$0	$1,903	$3,559	$1.11	424,652,000
4,468	$2,946	$66	$0	$1,908	$3,716	$1.09	446,843,000
1,284	$846	$64	$0	$549	$1,030	$1.09	128,359,000
534	$350	$70	$0	$228	$536	$1.08	53,405,000
15	$10	$62	$0	$7	$721	$1.09	1,547,000
16	$10	$64	$0	$6	$1,485	$1.06	1,550,000
18	$12	$70	$0	$7	$1,032	$1.06	1,760,000
15	$10	$62	$0	$7	$833	$1.09	1,547,000
362	$238	$62	$0	$155	$1,229	$1.09	36,188,000
3,341	$2,201	$68	$0	$1,427	$3,178	$1.09	334,072,000
5,049	$3,326	$74	$0	$1,974	$4,028	$1.05	504,874,000
23,805	$15,700	$784	$0	$10,174	$25,068	$1.09	2,380,464,000

Ventnor Cultural Center / Senior Center Baseline Energy Use

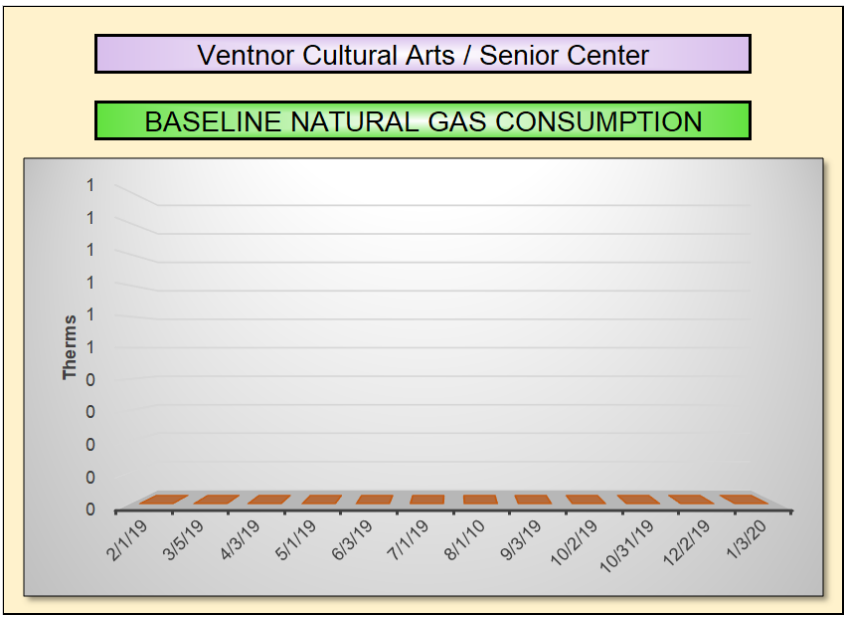




Ventnor Cultural Arts / Senior Center						ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	5500 2986 523			Meter #	KZG012464023		
Commodity:	South Jersey Energy			Commodity:	6500 Atlantic Ave			Rate Tariff:	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/4/19	2/1/19	23,440	65	$1,375	$1,895	$106	$3,376	$0.144	29	52%	79,977,280
2/2/19	3/5/19	28,000	68	$1,643	$2,263	$123	$4,028	$0.144	32	54%	95,536,000
3/6/19	4/2/19	25,280	85	$1,496	$2,043	$137	$3,676	$0.145	28	44%	86,255,360
4/3/19	5/1/19	23,680	107	$1,605	$1,914	$228	$3,747	$0.158	29	32%	80,796,160
5/2/19	6/3/19	28,320	107	$2,003	$2,289	$265	$4,556	$0.161	33	33%	96,627,840
6/4/19	7/1/19	34,000	138	$2,645	$2,748	$344	$5,737	$0.169	28	37%	116,008,000
7/2/19	8/1/19	43,120	121	$3,353	$3,485	$335	$7,172	$0.166	31	48%	147,125,440
8/2/19	9/3/19	40,640	106	$3,161	$3,285	$314	$6,760	$0.166	33	48%	138,663,680
9/4/19	10/2/19	31,680	127	$2,455	$2,561	$325	$5,341	$0.169	29	36%	108,092,160
10/3/19	10/31/19	25,680	114	$1,879	$2,076	$242	$4,196	$0.163	29	32%	87,620,160
11/1/19	12/2/19	22,240	86	$1,630	$1,798	$201	$3,628	$0.163	32	34%	75,882,880
12/3/19	1/3/20	28,160	66	$2,060	$2,276	$154	$4,490	$0.159	32	56%	96,081,920
TOTALS		354,240	138	$25,304	$28,631	$2,772	$56,707	$0.160	365	29%	1,208,666,880

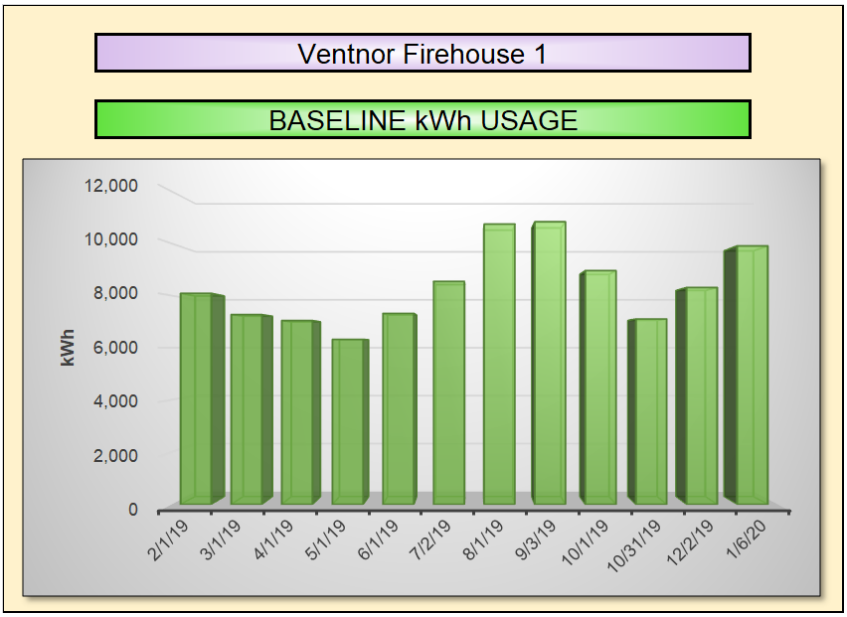
Ventnor Cultural Arts / Senior Center						ELECTRIC METER #2					
Provider:	Atlantic City Electric			Account #	5500 2989 212			Meter #	99G001602317		
Commodity:	South Jersey Energy			Account #	6500 Atlantic Ave			Meter #	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/4/19	2/1/19	2,787	14	$172	$225	$23	$420	$0.151	29	29%	9,509,244
2/2/19	3/6/19	2,574	10	$161	$208	$19	$388	$0.151	33	32%	8,782,488
3/7/19	4/2/19	2,051	10	$129	$166	$15	$310	$0.151	27	33%	6,998,012
4/3/19	5/1/19	1,801	10	$153	$146	$21	$319	$0.177	29	27%	6,145,012
5/2/19	6/3/19	2,657	17	$199	$215	$41	$455	$0.171	33	20%	9,065,684
6/4/19	7/1/19	4,410	18	$352	$356	$45	$754	$0.171	28	37%	15,046,920
7/2/19	8/1/19	4,837	20	$387	$391	$54	$832	$0.172	31	33%	16,503,844
8/2/19	9/3/19	4,722	18	$379	$382	$52	$812	$0.172	33	34%	16,111,464
9/4/19	10/2/19	3,301	19	$266	$267	$48	$580	$0.176	29	25%	11,263,012
10/3/19	10/31/19	2,014	16	$158	$163	$33	$353	$0.175	29	19%	6,871,768
11/1/19	12/2/19	2,316	14	$181	$187	$32	$400	$0.173	32	22%	7,902,192
12/3/19	1/3/20	2,753	10	$213	$223	$24	$459	$0.167	32	35%	9,393,236
TOTALS		36,223	20	$2,749	$2,928	$406	$6,082	$0.168	365	21%	123,592,876

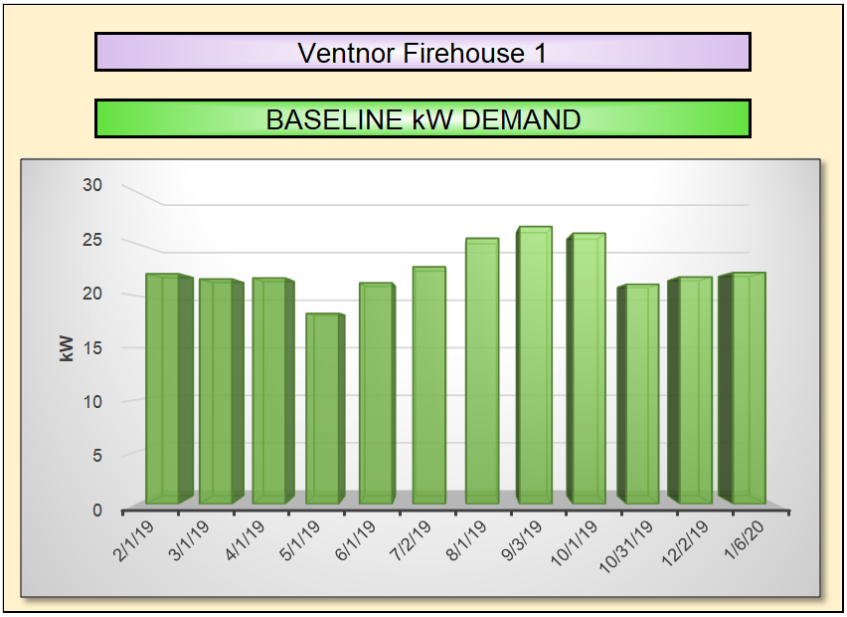
Ventnor Cultural Arts / Senior Center											
TOTAL ELECTRIC											
Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kW Checksum	Cost / kWh Checksum	Total Cost / kWh Checksum	Days	Load Factor	BTU
26,227	79	$1,547	$2,120	$128	$3,795	$1.63	$0.140	$0.145	29	48%	89,486,524
30,574	78	$1,803	$2,471	$142	$4,416	$1.81	$0.140	$0.144	32	51%	104,318,488
27,331	95	$1,625	$2,209	$152	$3,986	$1.61	$0.140	$0.146	28	43%	93,253,372
25,481	117	$1,758	$2,059	$249	$4,066	$2.13	$0.150	$0.160	29	31%	86,941,172
30,977	124	$2,202	$2,504	$306	$5,012	$2.47	$0.152	$0.162	33	32%	105,693,524
38,410	156	$2,997	$3,104	$389	$6,491	$2.50	$0.159	$0.169	28	37%	131,054,920
47,957	140	$3,739	$3,876	$389	$8,004	$2.77	$0.159	$0.167	31	46%	163,629,284
45,362	124	$3,540	$3,666	$365	$7,572	$2.95	$0.159	$0.167	33	46%	154,775,144
34,981	146	$2,721	$2,827	$373	$5,921	$2.56	$0.159	$0.169	29	34%	119,355,172
27,694	129	$2,036	$2,238	$275	$4,549	$2.13	$0.154	$0.164	29	31%	94,491,928
24,556	99	$1,810	$1,985	$233	$4,028	$2.35	$0.155	$0.164	32	32%	83,785,072
30,913	76	$2,273	$2,499	$178	$4,949	$2.35	$0.154	$0.160	32	53%	105,475,156
390,463	156	$28,053	$31,559	$3,178	$62,789	$2.33	$0.153	$0.161	365	29%	1,332,259,756



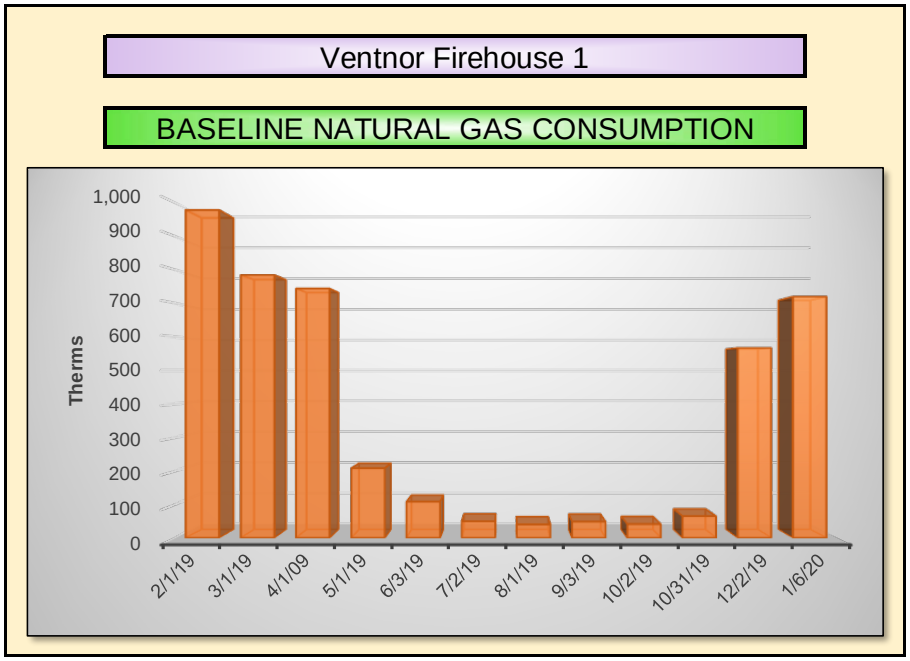
Ventnor Cultural Arts / Senior Center								Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	9533700000				Meter #	0496958
Commodity	UGI Energy Services		Commodity	6500B Atlantic Ave				Rate Tariff:	General Service
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Demand Charge**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
1/4/19	2/1/19	0	$0	$31		$0	$31	-	0
2/2/19	3/5/19	0	$0	$34		$0	$34	-	0
3/6/19	4/3/19	0	$0	$30		$0	$30	-	0
4/4/19	5/1/19	0	$0	$31		$0	$31	-	0
5/2/19	6/3/19	0	$0	$35		$0	$35	-	0
6/4/19	7/1/19	0	$0	$30		$0	$30	-	0
7/2/19	8/1/10	0	$0	$33		$0	$33	-	0
8/2/10	9/3/19	0	$0	$35		$0	$35	-	0
9/4/19	10/2/19	0	$0	$31		$0	$31	-	0
10/3/19	10/31/19	0	$0	$31		$0	$31	-	0
11/1/19	12/2/19	0	$0	$34		$0	$34	-	0
12/3/19	1/3/20	0	$0	$34		$0	$34	-	0
TOTALS		0	$0	$389	$0	$0	$389	-	0

Ventnor Fire House #1 Baseline Energy Use



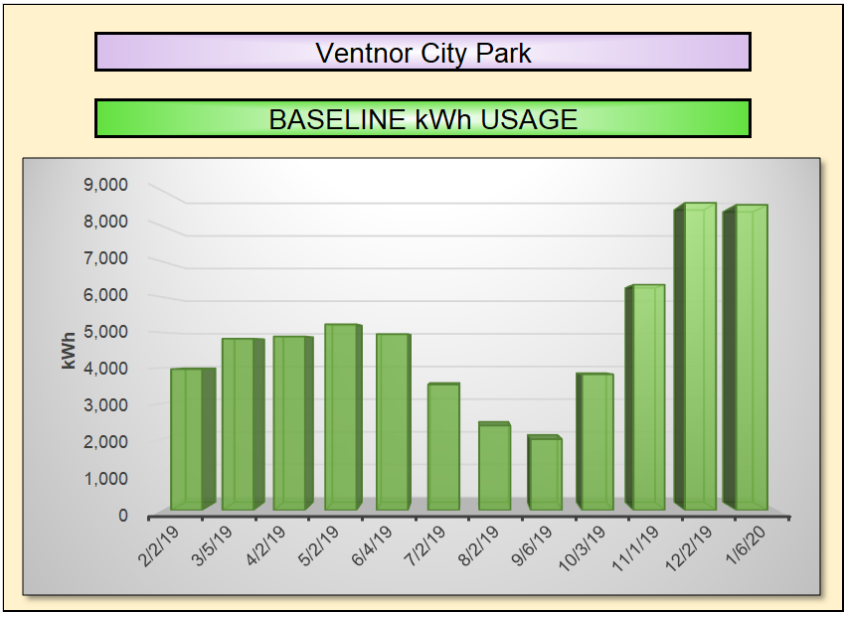


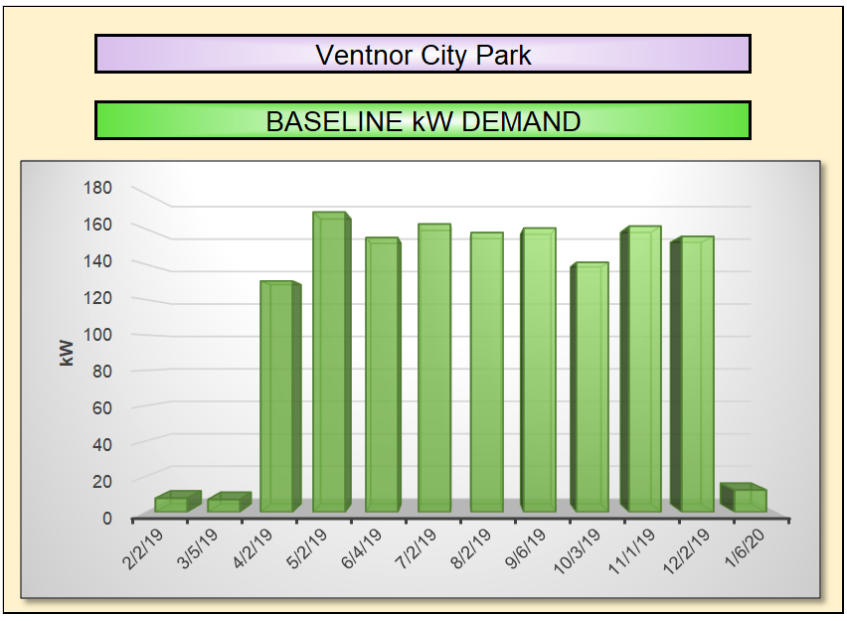
Ventnor Firehouse 1						ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	5500 3462 177			Meter #	TEG014783414		
Commodity:	South Jersey Energy			Commodity:	New Haven & Winchester			Rate Tariff:	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/4/19	2/1/19	8,081	22.1	$480.2	$653	$36.1	$1,169.5	$0.145	29	53%	27,572,372
2/2/19	3/1/19	7,267	21.6	$445.1	$587	$21.6	$1,054.1	$0.145	28	50%	24,795,004
3/2/19	4/1/19	7,039	21.7	$422.0	$569	$38.3	$1,029.2	$0.146	31	44%	24,017,068
4/2/19	5/1/19	6,321	18.3	$436.7	$511	$40.3	$987.8	$0.156	30	48%	21,567,252
5/2/19	6/1/19	7,313	21.2	$526.5	$591	$52.3	$1,169.9	$0.160	31	46%	24,951,956
6/2/19	7/2/19	8,537	22.8	$672.6	$690	$59.1	$1,421.7	$0.167	31	50%	29,128,244
7/3/19	8/1/19	10,732	25.5	$843.0	$867	$68.3	$1,778.8	$0.166	30	58%	36,617,584
8/2/19	9/3/19	10,819	26.6	$851.0	$874	$78.4	$1,803.8	$0.167	33	51%	36,914,428
9/4/19	10/1/19	8,949	26.0	$701.6	$732	$66.5	$1,500.4	$0.168	28	51%	30,533,988
10/2/19	10/31/19	7,098	21.1	$527.3	$574	$44.9	$1,145.9	$0.161	30	47%	24,218,376
11/1/19	12/2/19	8,302	21.8	$616.0	$671	$51.2	$1,338.2	$0.161	32	50%	28,326,424
12/3/19	1/6/20	9,896	22.2	$733.1	$800	$57.0	$1,589.9	$0.161	35	53%	33,765,152
TOTALS		100,354	271	$7,255	$8,120	$614	$15,989	$0.159	368	4%	342,407,848



Ventnor Firehouse 1								Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	8233700000				Meter #	0692928
Commodity	UGI Energy Services		Account #	6600 Winchester Ave				Rate Tariff	General Service Non-Heat
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Delivery Constant**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
1/4/19	2/1/19	979	$648	$31		$440	$1,119	$1.11	97,902,000
2/2/19	3/1/19	785	$518	$30		$355	$902	$1.11	78,501,000
3/2/19	4/1/09	745	$491	$33		$318	$842	$1.09	74,457,000
4/2/09	5/1/19	208	$137	$32		$89	$258	$1.09	20,826,000
5/2/19	6/3/19	108	$71	$35		$46	$152	$1.08	10,826,000
6/4/19	7/2/19	49	$32	$31		$21	$84	$1.08	4,949,000
7/3/19	8/1/19	40	$26	$32		$17	$76	$1.08	4,029,000
8/2/19	9/3/19	49	$32	$35		$21	$88	$1.08	4,865,000
9/4/19	10/2/19	41	$27	$31		$18	$76	$1.08	4,124,000
10/3/19	10/31/19	65	$43	$31		$28	$102	$1.09	6,495,000
11/1/19	12/2/19	567	$374	$34		$242	$650	$1.09	56,712,000
12/3/19	1/6/20	720	$475	$37		$282	$794	$1.05	72,036,000
TOTALS		4,357	$2,874	$392	$0	$1,876	$5,141	$1.09	435,722,000

Ventnor City Park Baseline Energy Use



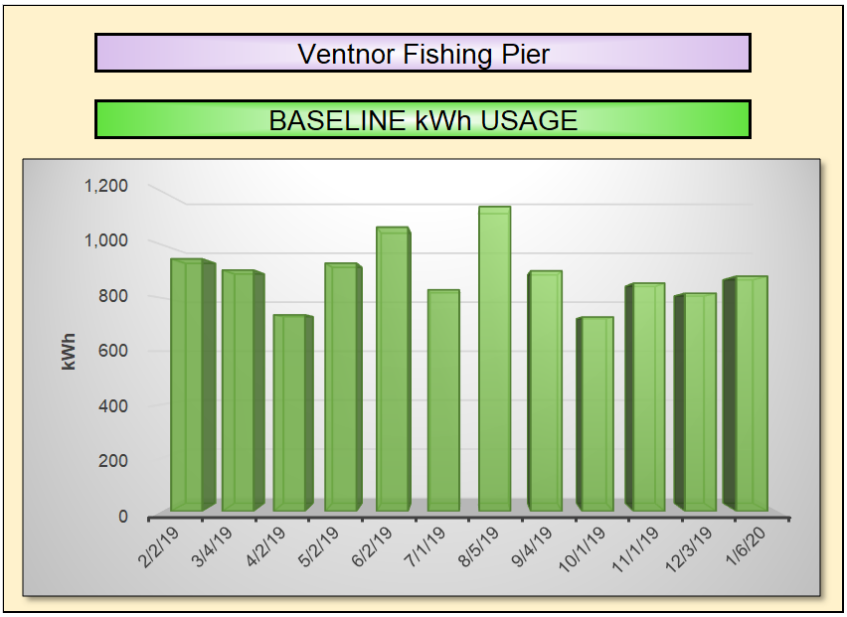


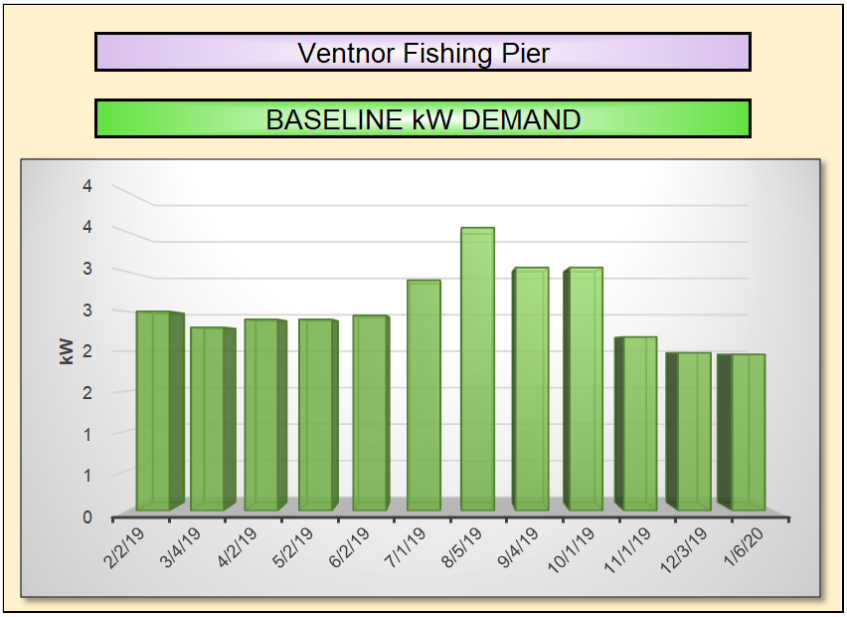
Ventnor City Park						ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	5500 3686 601			Meter #	99A088200576		
Commodity:	South Jersey Energy			Commodity:	Balfour & Surrey (Ref			Rate Tariff:	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/8/19	2/2/19	3,967	8	$238	$321	$12	$571	$0.144	26	81%	13,535,404
2/3/19	3/5/19	4,825	7	$290	$390	$12	$692	$0.143	31	91%	16,462,900
3/6/19	4/2/19	4,425	37	$268	$358	$60	$686	$0.155	28	18%	15,098,100
4/3/19	5/2/19	2,943	62	$208	$238	$135	$581	$0.198	30	7%	10,041,516
5/3/19	6/4/19	2,037	47	$155	$165	$117	$437	$0.214	33	5%	6,950,244
6/5/19	7/2/19	1,827	55	$151	$148	$138	$437	$0.239	28	5%	6,233,724
7/3/19	8/2/19	1,727	51	$144	$140	$141	$425	$0.246	31	5%	5,892,524
8/3/19	9/6/19	1,873	54	$156	$151	$160	$468	$0.250	35	4%	6,390,676
9/7/19	10/3/19	1,440	33	$120	$116	$85	$322	$0.224	27	7%	4,913,280
10/4/19	11/1/19	1,794	54	$140	$145	$115	$400	$0.223	29	5%	6,121,128
11/2/19	12/2/19	7,642	51	$566	$618	$120	$1,304	$0.171	31	20%	26,074,504
12/3/19	1/6/20	8,586	12	$636	$694	$31	$1,361	$0.158	35	82%	29,295,432
TOTALS		43,086	62	$3,073	$3,482	$1,128	$7,683	$0.178	364	8%	147,009,432

Ventnor City Park						ELECTRIC METER #2					
Provider:	Atlantic City Electric			Account #	5500 2923 286			Meter #	TEG021009152		
Commodity:	South Jersey Energy			Account #	Balfour & Surrey Avenue			Rate Tariff	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/8/19	2/2/19	0	0	$0	$0	$0	$0	$0.00	26	0%	0
2/3/19	3/5/19	0	0	$0	$0	$0	$0	$0.00	31	0%	0
3/6/19	4/2/19	463	93	$27	$37	$150	$215	$0.464	28	1%	1,579,756
4/3/19	5/2/19	2,286	108	$154	$185	$237	$576	$0.252	30	3%	7,799,832
5/3/19	6/4/19	2,917	108	$206	$236	$268	$709	$0.243	33	3%	9,952,804
6/5/19	7/2/19	1,705	107	$132	$138	$269	$539	$0.316	28	2%	5,817,460
7/3/19	8/2/19	653	107	$51	$53	$296	$399	$0.611	31	1%	2,228,036
8/3/19	9/4/19	124	106	$10	$10	$312	$332	$2.678	33	0%	423,088
9/5/19	10/3/19	2,380	108	$183	$192	$273	$649	$0.273	29	3%	8,120,560
10/4/19	11/1/19	4,546	108	$331	$367	$229	$927	$0.204	29	6%	15,510,952
11/2/19	12/3/19	1,000	104	$73	$81	$245	$399	$0.399	32	1%	3,412,000
12/4/19	1/6/20	0	0	$0	$0	$0	$0	$0.00	34	0%	0
TOTALS		16,074	108	$1,166	$1,299	$2,279	$4,744	$0.295	364	2%	54,844,488

Ventnor City Park											
TOTAL ELECTRIC											
Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kW Checksum	Cost / kWh Checksum	Total Cost / kWh Checksum	Days	Load Factor	BTU
3,967	8	$238	$321	$12	$571	$1.47	$0.141	$0.144	26	81%	13,535,404
4,825	7	$290	$390	$12	$692	$1.75	$0.141	$0.143	31	91%	16,462,900
4,888	130	$295	$395	$210	$901	$1.61	$0.141	$0.184	28	6%	16,677,856
5,229	169	$363	$423	$373	$1,158	$2.20	$0.150	$0.221	30	4%	17,841,348
4,954	155	$360	$400	$385	$1,146	$2.48	$0.154	$0.231	33	4%	16,903,048
3,532	163	$283	$285	$407	$975	$2.50	$0.161	$0.276	28	3%	12,051,184
2,380	158	$195	$192	$437	$824	$2.77	$0.163	$0.346	31	2%	8,120,560
1,997	160	$166	$161	$473	$800	$2.95	$0.164	$0.401	35	1%	6,813,764
3,820	141	$304	$309	$359	$971	$2.54	$0.160	$0.254	27	4%	13,033,840
6,340	161	$471	$512	$343	$1,326	$2.13	$0.155	$0.209	29	6%	21,632,080
8,642	156	$639	$698	$365	$1,703	$2.35	$0.155	$0.197	31	7%	29,486,504
8,586	12	$636	$694	$31	$1,361	$2.50	$0.155	$0.158	35	82%	29,295,432
59,160	169	$4,238	$4,782	$3,406	$12,426	$2.40	$0.152	$0.210	364	4%	201,853,920

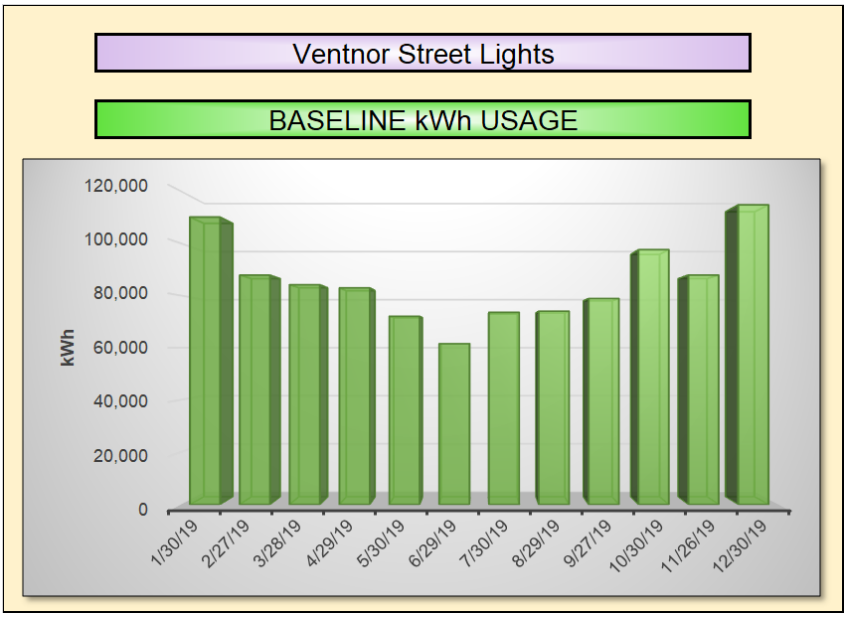
Ventnor Fishing Pier Baseline Energy Use

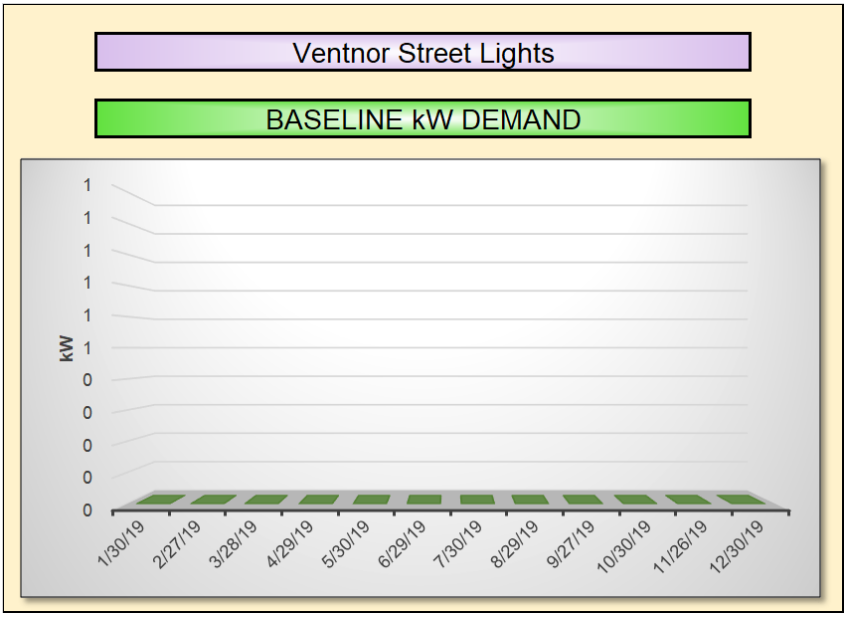




Ventnor Fishing Pier						ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	5500 8264 750			Meter #	1NF105766124		
Commodity:	South Jersey Energy			Commodity:	Beach & Cambridge Ave			Rate Tariff:	Monthly General Service Secondary		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Electric Demand Charges**	**Total Electric Charges**	**Cost / kWh Checksum**	**Days**	**Load Factor**	**BTU**
1/4/19	2/2/19	946	2.5	$63.4	$76	$4	$144	$0.152	30	53%	3,227,752
2/3/19	3/4/19	904	2.3	$61.0	$73	$4	$138	$0.153	30	55%	3,084,448
3/5/19	4/2/19	736	2.4	$51.4	$60	$4	$115	$0.156	29	44%	2,511,232
4/3/19	5/2/19	930	2.4	$72.6	$75	$5	$153	$0.165	30	54%	3,173,160
5/3/19	6/2/19	1,065	2.5	$86.0	$86	$6	$178	$0.167	31	58%	3,633,780
6/3/19	7/1/19	830	2.9	$73.6	$81	$7	$162	$0.195	29	41%	2,831,960
7/2/19	8/5/19	1,142	3.6	$99.8	$92	$11	$203	$0.178	35	38%	3,896,504
8/6/19	9/4/19	901	3.1	$79.8	$73	$8	$161	$0.179	30	41%	3,074,212
9/5/19	10/1/19	728	3.1	$65.4	$59	$8	$132	$0.181	27	37%	2,483,936
10/2/19	11/1/19	855	2.2	$72.2	$69	$5	$146	$0.171	31	53%	2,917,260
11/2/19	12/3/19	817	2.0	$70.0	$66	$5	$141	$0.172	32	54%	2,787,604
12/4/19	1/6/20	881	2.0	$75.4	$71	$5	$152	$0.172	34	55%	3,005,972
TOTALS		10,735	4	$871	$882	$72	$1,824	$0.170	368	34%	36,627,820

Ventnor Street Lights Baseline Energy Use





Ventnor Street Lights						ELECTRIC METER #1					
Provider:	AC Elec.			Account #	5500 0249 783			Meter #	N/A - (49) Lights		
Commodity:	Constellation New Energy			Commodity:	City Hall			Rate Tariff:	Contributed Street Lighting		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Tariff Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
12/29/18	1/30/19	2,564		-$3	$117	$335	$449	$0.175	33	0%	8,748,368
1/31/19	2/27/19	2,025		-$2	$93	$284	$375	$0.185	28	0%	6,909,300
2/28/19	3/28/19	1,930		-$2	$88	$294	$380	$0.197	29	0%	6,585,160
3/29/19	4/29/19	1,887		$1	$86	$386	$473	$0.251	32	0%	6,438,444
4/30/19	5/30/19	1,610		$5	$78	$380	$463	$0.288	31	0%	5,493,320
5/31/19	6/29/19	1,368		$7	$62	$343	$412	$0.301	30	0%	4,667,616
6/30/19	7/30/19	1,643		$8	$70	$404	$482	$0.294	31	0%	5,605,916
7/31/19	8/29/19	1,663		$8	$75	$368	$451	$0.271	30	0%	5,674,156
8/30/19	9/27/19	1,798		$9	$81	$355	$445	$0.248	29	0%	6,134,776
9/28/19	10/30/19	2,246		$14	$101	$405	$520	$0.232	33	0%	7,663,352
10/31/19	11/26/19	2,027		$13	$91	$331	$436	$0.215	27	0%	6,916,124
11/27/19	12/30/19	2,672		$17	$120	$417	$555	$0.208	34	0%	9,116,864
TOTALS		23,433	0	$77	$1,062	$4,302	$5,441	$0.232	367	0%	79,953,396

Ventnor Street Lights						ELECTRIC METER #2					
Provider:	Atlantic City Electric			Account #	5501 0934 614			Meter #	N/A - (15?) Lights		
Commodity:	Constellation New Energy			Commodity	Various Locations			Rate Tariff	Direct Distribution Connection		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Connect & Load Charge	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
12/29/18	1/30/19	6,551		$100	$477	$292	$869	$0.133	33	-	22,352,012
1/31/19	2/27/19	5,558		$85	$405	$247	$738	$0.133	28	-	18,963,896
2/28/19	3/28/19	5,757		$88	$420	$256	$764	$0.133	29	-	19,642,884
3/29/19	4/29/19	6,352		$107	$463	$283	$853	$0.134	32	-	21,673,024
4/30/19	5/30/19	6,154		$120	$449	$274	$843	$0.137	31	-	20,997,448
5/31/19	6/27/19	5,558		$118	$403	$247	$769	$0.138	28	-	18,963,896
6/28/19	7/30/19	6,551		$140	$475	$292	$907	$0.138	33	-	22,352,012
7/31/19	8/29/19	5,955		$127	$432	$265	$824	$0.138	30	-	20,318,460
8/30/19	9/27/19	5,757		$123	$418	$256	$797	$0.138	29	-	19,642,884
9/28/19	10/30/19	6,551		$148	$475	$292	$915	$0.140	33	-	22,352,012
10/31/19	11/26/19	5,360		$122	$389	$239	$749	$0.140	27	-	18,288,320
11/27/19	12/30/19	6,749		$153	$490	$301	$944	$0.140	34	-	23,027,588
TOTALS		72,853	0	$1,431	$5,296	$3,244	$9,971	$0.137	367	-	248,574,436

Ventnor Street Lights						ELECTRIC METER #3					
Provider:	Atlantic City Electric			Account #	5500 0249 312			Meter #	N/A - (1,042) Lights		
Commodity:	Constellation New Energy			Commodity	City Hall			Rate Tariff	Street and Private Lighting		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Tariff Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
12/29/18	1/30/19	97,843		($100)	$4,470	$18,216	$22,587	$0.23	33	-	333,840,316
1/31/19	2/27/19	77,300		($77)	$3,532	$15,456	$18,911	$0.24	28	-	263,747,600
2/28/19	3/28/19	73,682		($73)	$3,366	$16,008	$19,301	$0.26	29	-	251,402,984
3/29/19	4/29/19	71,976		$42	$3,289	$20,816	$24,147	$0.34	32	-	245,582,112
4/30/19	5/30/19	61,431		$201	$2,973	$20,482	$23,656	$0.39	31	-	209,602,572
5/31/19	6/27/19	52,243		$261	$2,355	$18,500	$21,116	$0.40	28	-	178,253,116
6/28/19	7/30/19	62,646		$318	$2,656	$21,803	$24,777	$0.40	33	-	213,748,152
7/31/19	8/29/19	63,454		$322	$2,859	$19,821	$23,002	$0.36	30	-	216,505,048
8/30/19	9/27/19	68,677		$348	$3,094	$19,160	$22,603	$0.33	29	-	234,325,924
9/28/19	10/30/19	85,715		$539	$3,862	$21,822	$26,222	$0.31	33	-	292,459,580
10/31/19	11/26/19	77,348		$495	$3,485	$17,856	$21,835	$0.28	27	-	263,911,376
11/27/19	12/30/19	102,072		$653	$4,599	$22,485	$27,737	$0.27	34	-	348,269,664
TOTALS		894,387	0	$2,929	$40,539	$232,425	$275,893	$0.31	367	-	3,051,648,444

Ventnor Street Lights						ELECTRIC METER #4					
Provider:	Atlantic City Electric			Account #	5500 3686 155			Meter #	N/A - (4) Lights		
Commodity:	Constellation New Energy			Commodity	Balfour & Surrey Ave			Rate Tariff	Street & Private Lighting		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Tariff Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/5/19	2/4/19	634		($1)	$29	$87	$116	$0.183	31	$0.00	2,163,208
2/5/19	3/5/19	549		($1)	$25	$82	$106	$0.194	29	$0.00	1,873,188
3/6/19	4/3/19	505		($1)	$23	$83	$106	$0.210	29	$0.00	1,723,060
4/4/19	5/3/19	460		$1	$21	$101	$123	$0.267	30	$0.00	1,569,520
5/4/19	6/5/19	450		$2	$22	$111	$134	$0.298	33	$0.00	1,535,400
6/6/19	7/3/19	365		$2	$15	$94	$112	$0.306	28	$0.00	1,245,380
7/4/19	8/5/19	445		$2	$20	$111	$133	$0.300	33	$0.00	1,518,340
8/6/19	9/5/19	468		$2	$21	$104	$128	$0.273	31	$0.00	1,596,816
9/6/19	9/27/19	471		$2	$21	$94	$118	$0.250	22	$0.00	1,607,052
9/28/19	11/4/19	592		$4	$27	$108	$138	$0.234	38	$0.00	2,019,904
11/5/19	12/4/19	605		$4	$27	$101	$132	$0.218	30	$0.00	2,064,260
12/5/19	1/6/20	692		$4	$31	$111	$147	$0.212	33	$0.00	2,361,104
TOTALS		6,236	0	$22	$283	$1,189	$1,493	$0.239	367	$0.00	21,277,232

Ventnor Street Lights						ELECTRIC METER #5					
Provider:	Atlantic City Electric			Account #	5500 2988 305			Meter #	N/A - (1) Light		
Commodity:	Constellation New Energy			Commodity	Burke & Dorset Ave			Rate Tariff	Street and Private Lighting		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Tariff Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/4/19	2/2/19	124		($0)	$6	$17	$22	$0.181	30	$0.00	423,088
2/3/19	3/4/19	114		($0)	$5	$17	$22	$0.193	30	$0.00	388,968
3/5/19	4/2/19	102		($0)	$5	$17	$21	$0.207	29	$0.00	348,024
4/3/19	5/2/19	92		$0	$4	$20	$25	$0.267	30	$0.00	313,904
5/3/19	6/4/19	90		$0	$4	$22	$27	$0.298	33	$0.00	307,080
6/5/19	7/2/19	73		$0	$3	$19	$22	$0.305	28	$0.00	249,076
7/3/19	8/2/19	83		$0	$4	$21	$25	$0.301	31	$0.00	283,196
8/3/19	9/4/19	99		$0	$4	$22	$27	$0.274	33	$0.00	337,788
9/5/19	10/2/19	94		$1	$4	$19	$24	$0.251	28	$0.00	320,728
10/3/19	11/2/19	114		$1	$5	$21	$27	$0.235	31	$0.00	388,968
11/3/19	12/3/19	125		$1	$6	$21	$27	$0.219	31	$0.00	426,500
12/4/19	1/3/20	130		$1	$6	$21	$28	$0.212	31	$0.00	443,560
TOTALS		1,240	0	$4	$56	$236	$297	$0.239	365	$0.00	4,230,880

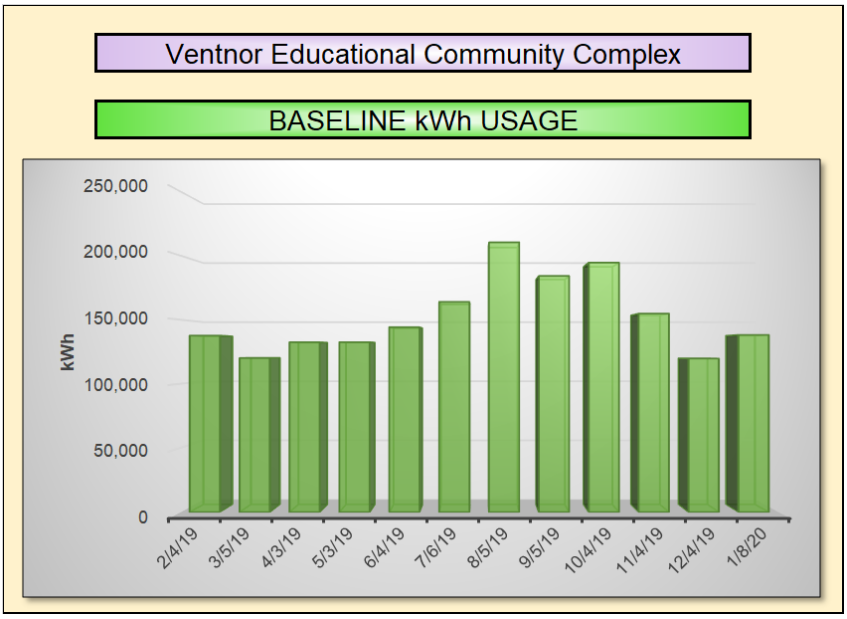
Ventnor Street Lights						ELECTRIC METER #6					
Provider:	Atlantic City Electric			Account #	5500 2901 563			Meter #	N/A - (1) Light		
Commodity:	Constellation New Energy			Commodity	Atlantic & Suffolk			Rate Tariff	Street and Private Lighting		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Tariff Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/4/19	2/2/19	246		($0)	$11	$34	$45	$0.182	30	$0.00	839,352
2/3/19	3/4/19	228		($0)	$10	$34	$44	$0.193	30	$0.00	777,936
3/5/19	4/2/19	203		($0)	$9	$33	$42	$0.208	29	$0.00	692,636
4/3/19	5/2/19	185		$0	$8	$40	$49	$0.265	30	$0.00	631,220
5/3/19	6/4/19	181		$1	$9	$44	$54	$0.297	33	$0.00	617,572
6/5/19	7/2/19	146		$1	$6	$38	$45	$0.306	28	$0.00	498,152
7/3/19	8/2/19	166		$1	$7	$42	$50	$0.302	31	$0.00	566,392
8/3/19	9/4/19	198		$1	$9	$44	$54	$0.275	33	$0.00	675,576
9/5/19	10/2/19	188		($1)	$8	$38	$45	$0.240	28	$0.00	641,456
10/3/19	11/2/19	228		$1	$10	$42	$53	$0.235	31	$0.00	777,936
11/3/19	12/3/19	250		$2	$11	$42	$55	$0.219	31	$0.00	853,000
12/4/19	1/3/20	261		$2	$12	$42	$55	$0.212	31	$0.00	890,532
TOTALS		2,480	0	$6	$112	$473	$591	$0.239	365	$0.00	8,461,760

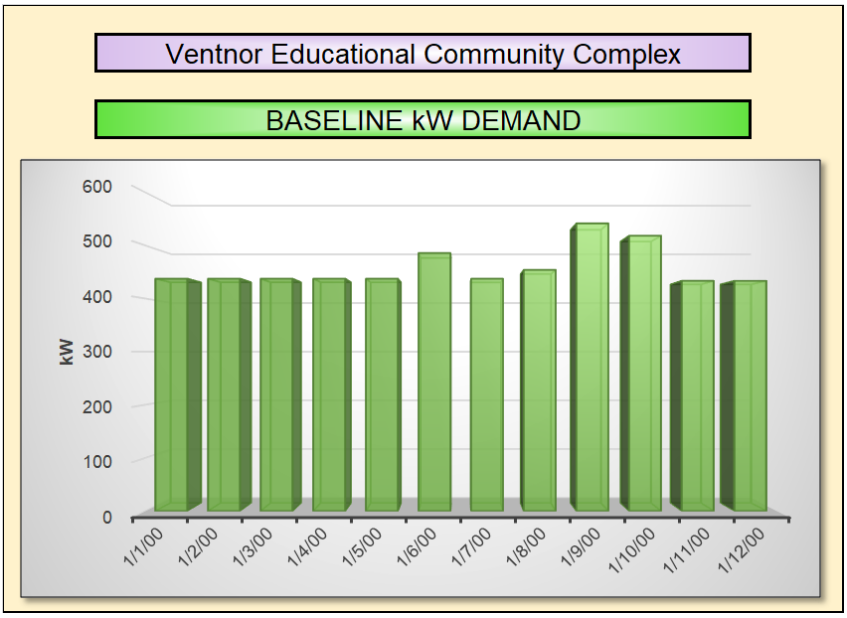
Ventnor Street Lights						ELECTRIC METER #7					
Provider:	Atlantic City Electric			Account #	5500 2987 836			Meter #	N/A - (5?) Lights		
Commodity:	Constellation New Energy			Commodity	Multiple Locations			Rate Tariff	Direct Distribution Connection		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Connect & Load Charge	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/4/19	2/2/19	1,800		$27	$82	$82	$192	$0.107	30	0%	6,141,600
2/3/19	3/4/19	1,800		$28	$82	$82	$192	$0.107	30	0%	6,141,600
3/5/19	4/2/19	1,740		$27	$79	$80	$186	$0.107	29	0%	5,936,880
4/3/19	5/2/19	1,800		$31	$82	$82	$196	$0.109	30	0%	6,141,600
5/3/19	6/4/19	1,980		$39	$95	$91	$225	$0.114	33	0%	6,755,760
6/5/19	7/2/19	1,680		$36	$71	$77	$184	$0.109	28	0%	5,732,160
7/3/19	8/2/19	1,860		$40	$84	$85	$209	$0.112	31	0%	6,346,320
8/3/19	9/4/19	1,980		$42	$89	$91	$222	$0.112	33	0%	6,755,760
9/5/19	10/2/19	1,680		$36	$76	$77	$189	$0.112	28	0%	5,732,160
10/3/19	11/2/19	1,860		$42	$84	$85	$211	$0.113	31	0%	6,346,320
11/3/19	12/3/19	1,860		$42	$84	$85	$211	$0.114	31	0%	6,346,320
12/4/19	1/3/20	1,860		$42	$84	$85	$211	$0.114	31	0%	6,346,320
TOTALS		21,900	0	$433	$992	$1,003	$2,427	$0.111	365	0%	74,722,800

Ventnor Street Lights						ELECTRIC METER #8					
Provider:	Atlantic City Electric			Account #	5500 2988 800			Meter #	N/A - (1) Light		
Commodity:	Constellation New Energy			Commodity	Atlantic & Newport Ave			Rate Tariff	Street and Private Lighting		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Tariff Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/4/19	2/2/19	192		($0)	$9	$22	$30	$0.16	30	$0.00	655,104
2/3/19	3/4/19	178		($0)	$8	$22	$30	$0.17	30	$0.00	607,336
3/5/19	4/2/19	158		($0)	$7	$21	$28	$0.18	29	$0.00	539,096
4/3/19	5/2/19	143		$0	$7	$26	$33	$0.23	30	$0.00	487,916
5/3/19	6/4/19	140		$1	$7	$28	$36	$0.25	33	$0.00	477,680
6/5/19	7/2/19	114		$1	$5	$24	$30	$0.26	28	$0.00	388,968
7/3/19	8/2/19	129		$1	$6	$27	$33	$0.26	31	$0.00	440,148
8/3/19	9/4/19	155		$1	$7	$28	$36	$0.23	33	$0.00	528,860
9/5/19	10/2/19	146		$1	$7	$24	$31	$0.22	28	$0.00	498,152
10/3/19	11/2/19	178		$1	$8	$27	$36	$0.20	31	$0.00	607,336
11/3/19	12/3/19	195		$1	$9	$27	$37	$0.19	31	$0.00	665,340
12/4/19	1/3/20	203		$1	$9	$27	$37	$0.18	31	$0.00	692,636
TOTALS		1,931	0	$7	$88	$302	$396	$0.21	365	$0.00	6,588,572

Ventnor Street Lights											
TOTAL ELECTRIC											
Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Tariff Charges	Total Electric Charges	Cost / kW Checksum	Cost / kWh Checksum	Total Cost / kWh Checksum	Days	Load Factor	BTU
109,954	0	$24	$5,202	$19,085	$24,310	$0.00	$0.048	$0.221	33	$0.00	375,163,048
87,752	0	$33	$4,160	$16,224	$20,417	$0.00	$0.048	$0.233	28	$0.00	299,409,824
84,077	0	$39	$3,998	$16,792	$20,829	$0.00	$0.048	$0.248	29	$0.00	286,870,724
82,895	0	$183	$3,960	$21,755	$25,898	$0.00	$0.050	$0.312	32	$0.00	282,837,740
72,036	0	$369	$3,636	$21,432	$25,437	$0.00	$0.056	$0.353	31	$0.00	245,786,832
61,547	0	$426	$2,920	$19,342	$22,688	$0.00	$0.054	$0.369	30	$0.00	209,998,364
73,523	0	$510	$3,322	$22,785	$26,617	$0.00	$0.052	$0.362	31	$0.00	250,860,476
73,972	0	$504	$3,496	$20,744	$24,744	$0.00	$0.054	$0.335	30	$0.00	252,392,464
78,811	0	$519	$3,709	$20,024	$24,252	$0.00	$0.054	$0.308	29	$0.00	268,903,132
97,484	0	$750	$4,572	$22,801	$28,123	$0.00	$0.055	$0.288	33	$0.00	332,615,408
87,770	0	$679	$4,102	$18,702	$23,483	$0.00	$0.054	$0.268	27	$0.00	299,471,240
114,639	0	$874	$5,350	$23,489	$29,713	$0.00	$0.054	$0.259	34	$0.00	391,148,268
1,024,460	0	$4,909	$48,428	$243,174	$296,510	$0.00	$0.052	$0.289	367	$0.00	3,495,457,520

Ventnor Educational Community Complex Baseline Energy Use



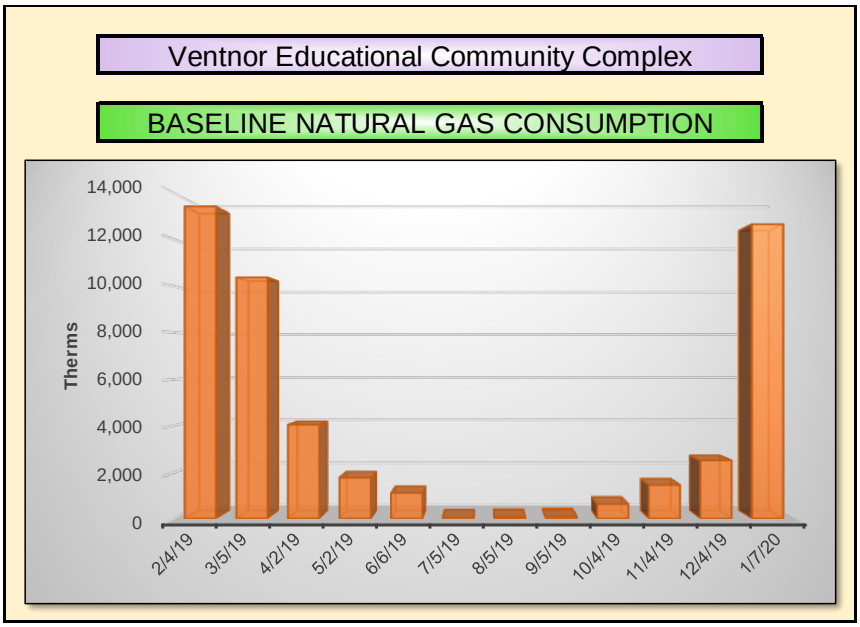


Ventnor Educational Community Complex						ELECTRIC METER #1					
Provider:	AC Elec.			Account #	5501 1781 121			Meter #	1NF105795777		
Commodity:	South Jersey Energy			Commodity:				Rate Tariff:	General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/8/19	2/4/19	213	0.5	$20	$17	$1	$48	$0.225	28	63%	726,756
2/5/19	3/5/19	226	0.5	$21	$18	$1	$39	$0.172	29	65%	771,112
3/6/19	4/3/19	229	0.5	$22	$18	$1	$41	$0.179	29	66%	781,348
4/4/19	5/3/19	244	0.5	$26	$20	$1	$42	$0.171	30	68%	832,528
5/4/19	6/4/19	273	0.5	$31	$22	$1	$48	$0.177	32	79%	931,476
6/5/19	7/6/19	231	0.5	$28	$18	$1	$55	$0.238	32	61%	788,172
7/7/19	8/5/19	245	0.4	$29	$19	$1	$48	$0.196	30	90%	835,940
8/6/19	9/5/19	247	0.4	$29	$19	$1	$51	$0.205	31	83%	842,764
9/6/19	10/4/19	230	0.5	$27	$17	$1	$51	$0.220	29	70%	784,760
10/5/19	11/4/19	247	0.5	$28	$19	$1	$47	$0.190	31	68%	842,764
11/5/19	12/4/19	238	0.5	$27	$18	$1	$49	$0.207	30	64%	812,056
12/5/19	1/8/20	262	0.5	$31	$20	$1	$48	$0.182	35	66%	893,944
TOTALS		2,885	1	$320	$225	$13	$566	$0.196	366	63%	9,843,620

Ventnor Educational Community Complex						ELECTRIC METER #2					
Provider:	AC Elec.			Account #	5501 1781 469			Meter #	99F105761700		
Commodity:	South Jersey Energy			Commodity				Rate Tariff	General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
1/8/19	2/5/19	41	0	$7.85	$0.00	$0.16	$9	$0.229	29	0%	139,892
2/6/19	3/5/19	25	0	$9.20	$1.91	$0.16	$8	$0.327	28	37%	85,300
3/6/19	4/3/19	34	0	$10.19	$2.60	$0.17	$11	$0.336	29	49%	116,008
4/4/19	5/3/19	34	0	$12.26	$2.60	$0.22	$13	$0.386	30	47%	116,008
5/4/19	6/6/19	38	0	$13.99	$2.91	$0.26	$15	$0.403	34	78%	129,656
6/7/19	7/5/19	30	0	$11.96	$2.29	$0.26	$17	$0.581	29	86%	102,360
7/6/19	8/5/19	29	0	$12.53	$2.22	$0.28	$15	$0.509	31	78%	98,948
8/6/19	9/5/19	30	0	$12.62	$2.29	$0.28	$15	$0.510	31	81%	102,360
9/6/19	10/4/19	29	0	$11.86	$2.22	$0.25	$15	$0.533	29	83%	98,948
10/5/19	11/4/19	33	0	$12.67	$2.52	$0.23	$15	$0.442	31	89%	112,596
11/5/19	12/4/19	33	0	$12.34	$2.52	$0.22	$16	$0.474	30	76%	112,596
12/5/19	1/8/20	39	0	$14.46	$2.98	$0.26	$15	$0.392	35	77%	133,068
TOTALS		395	0	$142	$27	$3	$166	$0.420	366	45%	1,347,740

Ventnor Educational Community Complex						ELECTRIC METER #3					
Provider:	AC Elec.			Account #	5501 1781 832			Meter #	KZA017563393		
Commodity:	South Jersey Energy			Account #				Meter #	General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
12/31/18	1/30/19	137,363	437	$2,400	$10,501	$4,234	$21,369	$0.16	31	42%	468,682,556
1/31/19	2/27/19	119,858	437	$2,104	$9,163	$3,824	$18,915	$0.16	28	41%	408,955,496
2/28/19	3/28/19	132,187	437	$2,306	$10,106	$3,961	$20,333	$0.15	29	43%	451,022,044
3/29/19	4/29/19	132,204	437	$2,610	$10,107	$5,084	$22,885	$0.17	32	39%	451,080,048
4/30/19	5/30/19	143,827	437	$3,235	$10,996	$4,997	$24,223	$0.17	31	44%	490,737,724
5/31/19	6/27/19	163,535	485	$3,905	$12,502	$5,011	$26,430	$0.16	28	50%	557,981,420
6/28/19	7/30/19	209,887	437	$5,010	$16,046	$5,319	$31,694	$0.15	33	61%	716,134,444
7/31/19	8/29/19	183,769	453	$4,374	$9,393	$5,019	$23,804	$0.13	30	56%	627,019,828
8/30/19	9/29/19	194,161	541	$4,618	$14,844	$6,187	$31,835	$0.16	31	48%	662,477,332
9/30/19	10/30/19	154,416	518	$5,874	$11,805	$5,931	$29,541	$0.19	31	40%	526,867,392
10/31/19	11/26/19	119,407	433	$4,810	$9,129	$4,319	$22,576	$0.19	27	43%	407,416,684
11/27/19	12/30/19	137,815	433	$3,510	$10,536	$5,438	$24,922	$0.18	34	39%	470,224,780
TOTALS		1,828,429	541	$44,756	$135,127	$59,322	$298,527	$0.16	365	39%	6,238,599,748

Ventnor Educational Community Complex											
TOTAL ELECTRIC											
Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kW Checksum	Cost / kWh Checksum	Total Cost / kWh Checksum	Days	Load Factor	BTU
137,617	437	$2,428	$10,519	$4,235	$21,426	$9.68	$0.094	$0.156	28	47%	469,549,204
120,109	437	$2,135	$9,183	$3,825	$18,962	$8.74	$0.094	$0.158	29	39%	409,811,908
132,450	437	$2,338	$10,127	$3,962	$20,385	$9.06	$0.094	$0.154	29	44%	451,919,400
132,482	437	$2,649	$10,129	$5,085	$22,940	$11.63	$0.096	$0.173	30	42%	452,028,584
144,138	437	$3,279	$11,020	$4,998	$24,287	$11.43	$0.099	$0.168	32	43%	491,798,856
163,796	486	$3,944	$12,522	$5,013	$26,502	$10.32	$0.101	$0.162	32	44%	558,871,952
210,161	437	$5,052	$16,067	$5,320	$31,756	$12.17	$0.100	$0.151	30	67%	717,069,332
184,046	454	$4,416	$9,414	$5,020	$23,870	$11.06	$0.075	$0.130	31	55%	627,964,952
194,420	541	$4,658	$14,863	$6,188	$31,902	$11.43	$0.100	$0.164	29	52%	663,361,040
154,696	518	$5,915	$11,826	$5,932	$29,602	$11.45	$0.115	$0.191	31	40%	527,822,752
119,678	433	$4,850	$9,149	$4,320	$22,641	$9.97	$0.117	$0.189	30	38%	408,341,336
138,116	433	$3,555	$10,559	$5,440	$24,985	$12.56	$0.102	$0.181	35	38%	471,251,792
1,831,709	541	$45,218	$135,379	$59,338	$299,259	$10.81	$0.099	$0.163	366	39%	6,249,791,108



Ventnor Educational Community Complex								Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	3878700000				Meter #	0351270 & 0570229
Commodity			Account #					Meter #	General Service
Billing Period Start Date	**Actual Reading**	**Therms**	**Gas Delivery Charges**	**Gas Customer Charge**	**Gas Delivery Constant**	**Gas Commodity Charges**	**Gas Total Charges**	**$/Therm Marginal Rate**	**BTU**
1/8/19	2/4/19	13,427	$9,339	$30		$6,444	$15,813	$1.18	1,342,656,000
2/5/19	3/5/19	10,380	$7,195	$31		$4,455	$11,680	$1.12	1,038,037,000
3/6/19	4/2/19	4,044	$2,803	$31		$1,941	$4,775	$1.17	404,430,000
4/3/19	5/2/19	1,763	$1,221	$32		$846	$2,099	$1.17	176,301,000
5/3/19	6/6/19	1,103	$760	$36		$529	$1,326	$1.17	110,317,000
6/7/19	7/5/19	41	$28	$31		$20	$79	$1.17	4,124,000
7/6/19	8/5/19	52	$36	$33		$25	$93	$1.17	5,165,000
8/6/19	9/5/19	72	$50	$33		$35	$118	$1.17	7,245,000
9/6/19	10/4/19	619	$431	$31		$297	$759	$1.18	61,860,000
10/5/19	11/4/19	1,443	$1,077	$33		$693	$1,803	$1.23	144,340,000
11/5/19	12/4/19	2,500	$1,865	$32		$1,200	$3,097	$1.23	249,986,000
12/5/19	1/7/20	12,670	$8,818	$36		$7,471	$16,325	$1.29	1,267,028,000
TOTALS		48,115	$33,622	$389	$0	$23,955	$57,966	$1.20	4,811,489,000

Ventnor Educational Community Complex							Natural Gas Meter #2		
Provider	South Jersey Gas		Account #	9438700000				Meter #	0555965
Commodity	South Jersey Energy		Account #					Tariff	General Service
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Delivery Constant	Gas Commodity Charges	Gas Total Charges	Cost / Unit Checksum	BTU
1/7/19	2/4/19	10	$7	$30		$6	$43	$1.27	1,036,000
2/5/19	3/5/19	0	$0	$31		$0	$31	-	0
3/6/19	4/3/19	0	$0	$31		$0	$31	-	0
4/4/19	5/3/19	0	$0	$32		$0	$32	-	0
5/4/19	6/6/19	0	$0	$36		$0	$36	-	0
6/7/19	7/5/19	0	$0	$31		$0	$31	-	0
7/6/19	8/5/19	10	$7	$33		$5.94	$46	$1.26	1,033,000
8/6/19	9/5/19	21	$14	$33		$11.91	$59	$1.26	2,070,000
9/6/19	10/4/19	0	$0	$31		$0	$31	-	0
10/5/19	11/5/19	0	$0	$34		$0	$34	-	0
11/6/19	12/5/19	0	$0	$32		$0	$32	-	0
12/6/19	1/5/19	0	$0	$32		$0	$32	-	0
TOTALS		41	$29	$386	$0	$24	$438	$1.27	4,139,000

Ventnor Educational Community Complex							
TOTAL NATURAL GAS							
Therms	Gas Delivery Charges	Gas Delivery Constant	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	Cost / Unit Checksum	BTU
13,437	$9,346	$6		$6,450	$15,855	$1.18	1,343,692,000
10,380	$7,195	$0		$4,455	$11,711	$1.12	1,038,037,000
4,044	$2,803	$0		$1,941	$4,806	$1.17	404,430,000
1,763	$1,221	$0		$846	$2,131	$1.17	176,301,000
1,103	$760	$0		$529	$1,362	$1.17	110,317,000
41	$28	$0		$20	$110	$1.17	4,124,000
62	$43	$6		$31	$139	$1.18	6,198,000
93	$64	$12		$47	$177	$1.19	9,315,000
619	$431	$0		$297	$790	$1.18	61,860,000
1,443	$1,077	$0		$693	$1,837	$1.23	144,340,000
2,500	$1,865	$0		$1,200	$3,129	$1.23	249,986,000
12,670	$8,818	$0		$7,471	$16,357	$1.29	1,267,028,000
48,156	$33,651	$24		$23,979	$58,404	$1.20	4,815,628,000

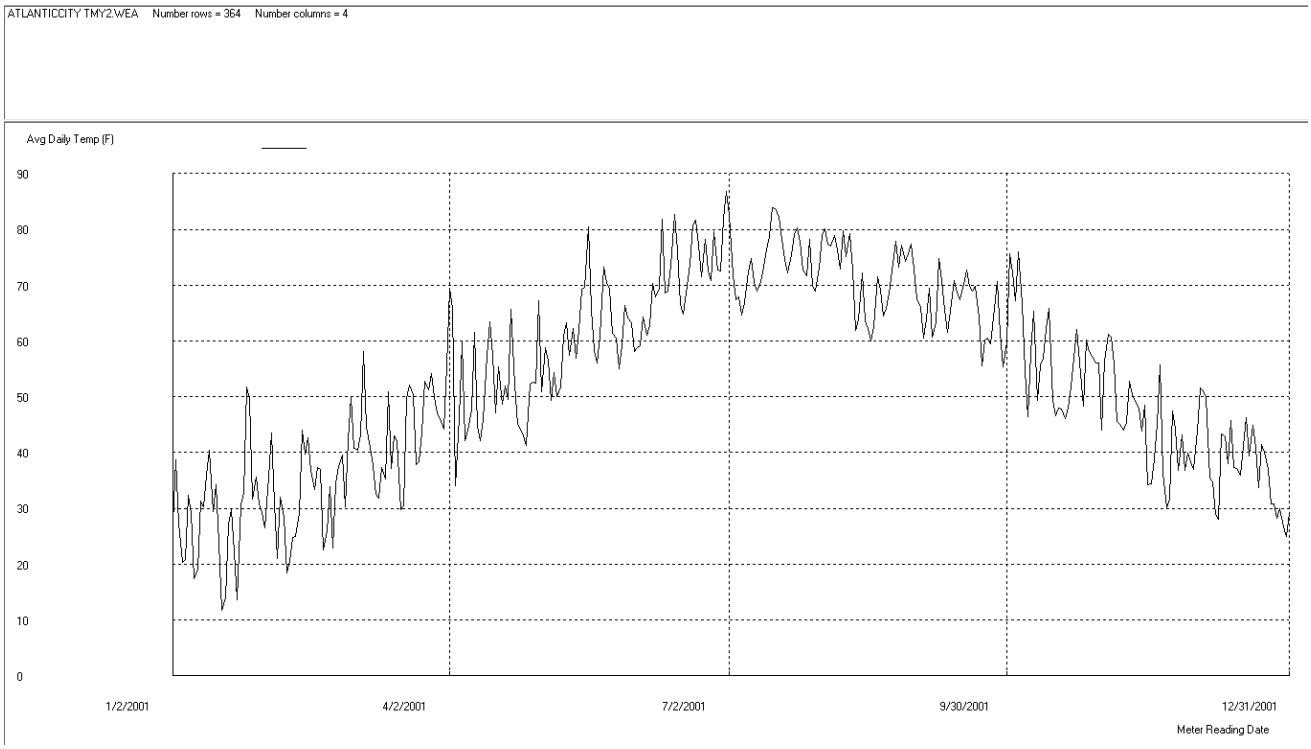
Energy Savings Utility Rates

DCO Energy used the following marginal rates to calculate energy cost savings:

CALCULATED UTILITY RATES - MARGINAL RATES USED FOR SAVINGS				
BUILDING/FACILITY	ELECTRIC			NATURAL GAS
	$ / kW	$ / kWh Marginal Rate	$ / kWh Blended Rate	$ / Therm Marginal Rate
Ventnor City Hall	$11.27	$0.106	$0.129	$1.09
Ventnor Public / Water Works	$10.93	$0.102	$0.140	$1.09
Ventnor Cultural Arts / Senior Center	$2.33	$0.153	$0.161	$0.00
Ventnor Firehouse 1	$2.27	$0.153	$0.159	$1.09
Ventnor City Park	$2.40	$0.152	$0.210	$0.00
Ventnor Fishing Pier	$2.35	$0.163	$0.170	$0.00
Ventnor Street Lights	$0.00	$0.052	$0.289	$0.00
Ventnor Educational Community Complex	$10.81	$0.099	$0.163	$1.20

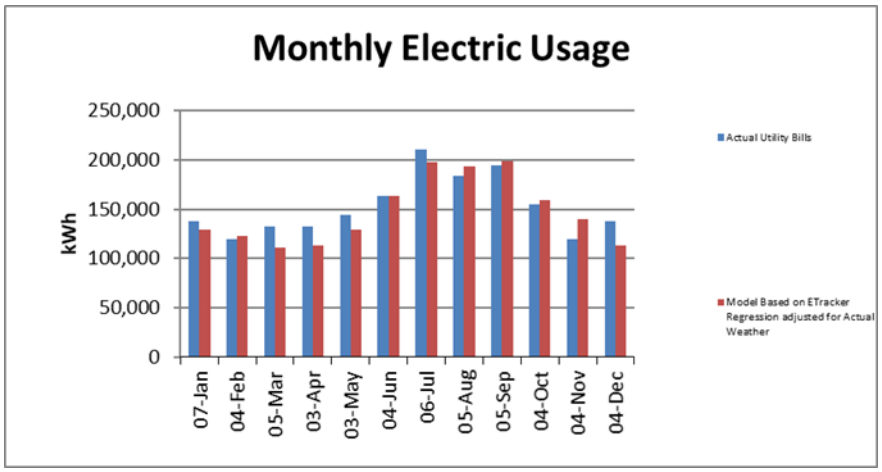
Ventnor – Baseline Weather Data

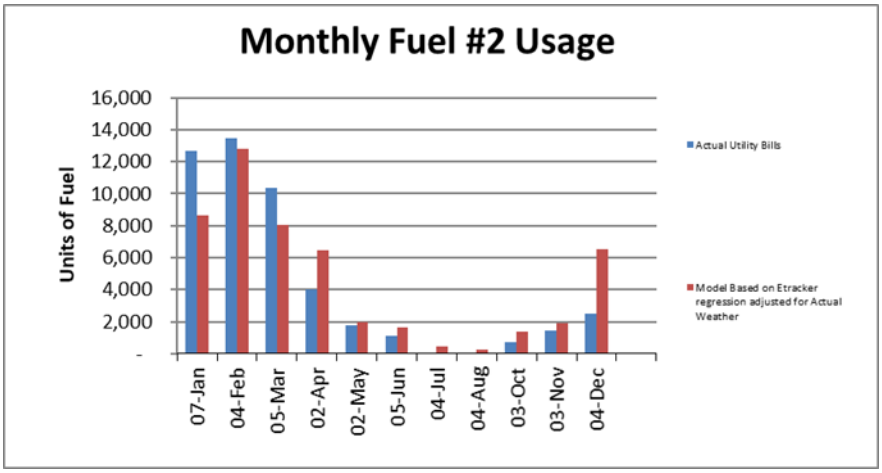
In accordance with the New Jersey Pay for Performance incentive program, TMY2 weather data was used for all weather normalized calculations and energy models utilizing weather data. The graph below represents the Atlantic City TMY2 weather file used for the Ventnor area.



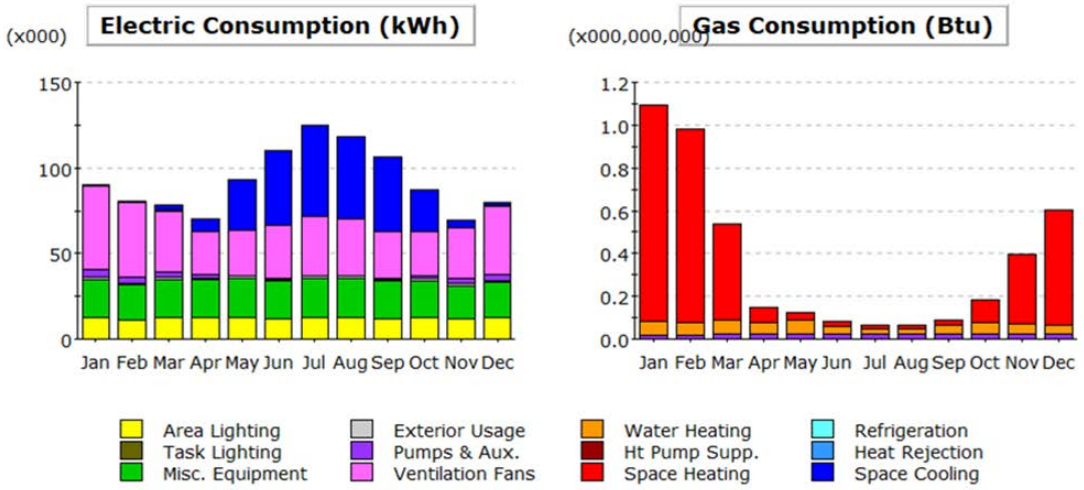
Ventnor Educational Community Complex – Energy Modeling Baseline

Baseline energy use has been analyzed using eQuest energy simulation software. The New Jersey Pay for Performance incentive program requires +/- 5% accuracy when simulating baseline annual energy use. To calibrate the model, eTracker weather normalization software was used to establish the relationship between weather and energy use of each building. Shown below are the comparison charts and the modeling software baseline output reports. The reports show the model baseline produced by DCO Energy is within acceptable tolerances.





Below is the monthly energy consumption output for the baseline model.



Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	0.0	0.0	3.5	6.9	29.4	43.4	53.2	48.4	44.2	23.9	4.4	1.2	258.6
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	0.6	0.6	0.3	0.0	-	-	-	-	-	0.1	0.2	0.4	2.1
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	48.8	43.5	35.4	25.6	26.4	31.6	35.1	33.3	27.3	26.1	29.5	39.9	402.6
Pumps & Aux.	4.1	3.8	3.2	1.7	0.5	0.2	0.2	0.2	0.2	1.1	2.7	3.7	21.7
Ext. Usage	1.4	1.2	1.4	1.3	1.4	1.3	1.4	1.4	1.3	1.4	1.3	1.4	16.0
Misc. Equip.	22.4	20.3	22.4	21.7	22.4	21.7	22.4	22.4	21.7	21.4	19.8	20.5	259.1
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	12.5	11.3	12.5	12.7	12.9	12.0	12.9	12.9	12.0	12.9	11.6	12.5	148.3
Total	89.8	80.6	78.6	69.9	92.9	110.2	125.1	118.5	106.7	86.9	69.6	79.5	1,108.4

Gas Consumption (Btu x000,000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	1.01	0.90	0.45	0.07	0.04	0.02	0.02	0.02	0.02	0.11	0.32	0.54	3.52
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	0.07	0.06	0.07	0.06	0.07	0.04	0.02	0.02	0.05	0.06	0.05	0.04	0.59
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.25
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	1.10	0.98	0.54	0.15	0.12	0.08	0.06	0.06	0.09	0.18	0.40	0.60	4.37

ENERGY SAVINGS PLAN

SECTION 4 – ENERGY CONSERVATION MEASURES

Energy Conservation Measure Breakdown by Building

The matrix below details which ECMs were applied and evaluated by building.

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor City Hall	Ventnor Public / Water Works	Ventnor Cultural Arts / Senior Center	Ventnor Firehouse 1	Ventnor City Park	Ventnor Fishing Pier	Ventnor Street Lights	Ventnor Educational Community Complex
1	LED Lighting Replacement with Controls	✔	✔	✔	✔	✔			✔
1a	LED Street Lights							✔	
2	Energy Management System	✔	✔	✔					✔
3	Boiler Replacement		✔						
4	Premium Efficiency Pump Motors and VFDs		✔						
5	Rooftop Unit Replacement			✔					✔
6	AHU / Split System Replacement								✔
7	Forced-Air Heating Fuel Economizer		✔						
8	Destratification Fans								✔
9	Domestic Water Heater Replacement		✔						
10	Pipe and Valve Insulation			✔	✔				
11	Building Envelope Weatherization	✔	✔	✔	✔				✔
12	Water Conservation	✔							
13	High Efficiency Transformers		✔						✔
14	Solar PPA		✔						
15	Combined Heat & Power Unit								✔
16	Electrical Vehicle Charging Stations			✔					
17	Roof Replacement		✔						
18	Streetscape							✔	

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM Breakdown by Cost & Savings (overall ESIP)

VENTNOR COMBINED		INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Solar PPA (kWh) COST SAVINGS	ANNUAL ENERGY COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$	$	YEARS
1	LED Lighting Replacement with Controls	Y	$810,348	$79,277	($3,419)	$0	$75,857	10.7
1a	LED Street Lights	Y	$1,568,605	$232,530	$0	$0	$232,530	6.7
2	Energy Management System	Y	$774,731	$31,634	$16,893	$0	$48,527	16.0
3	Boiler Replacement	Y	$154,875	$0	$689	$0	$689	224.6
4	Premium Efficiency Pump Motors and VFDs	Y	$24,780	$114	$0	$0	$114	217.1
5	Rooftop Unit Replacement	Y	$136,620	$2,544	$225	$0	$2,769	49.3
6	AHU / Split System Replacement	Y	$149,175	$149	$0	$0	$149	1,003.5
7	Forced-Air Heating Fuel Economizer	Y	$670	$0	$323	$0	$323	2.1
8	Destratification Fans	Y	$70,720	$5,680	$2,712	$0	$8,391	8.4
9	Domestic Water Heater Replacement	Y	$3,717	$0	$8	$0	$8	465.5
10	Pipe and Valve Insulation	Y	$1,515	$0	$17	$0	$17	90.7
11	Building Envelope Weatherization	Y	$115,791	$1,752	$5,670	$0	$7,422	15.6
12	Water Conservation	Y	$221	$0	$121	$0	$121	1.8
13	High Efficiency Transformers	Y	$85,639	$6,096	$0	$0	$6,096	14.0
14	Solar PPA	Y	$0	$30,945	$0	($12,743)	$18,202	0.0
15	Combined Heat & Power Unit	Y	$303,875	$17,859	($9,105)	$0	$8,754	34.7
16	Electrical Vehicle Charging Stations	Y	$30,606	$0	$0	$0	$0	0.0
17	Roof Replacement	Y	$798,805	$0	$0	$0	$0	0.0
18	Streetscape	Y	$1,000,000	$0	$0	$0	$0	0.0
TOTALS			$6,030,694	$408,579	$14,133	($12,743)	$409,970	14.7

ECM Breakdown by Cost & Savings (per entity)

VENTNOR CITY		INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Solar PPA (kWh) COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES
ECM #	ENERGY CONSERVATION MEASURE	$	$	$	$	$	YEARS
1	LED Lighting Replacement with Controls	$338,894	$36,214	($388)	$0	$35,826	9.5
1a	LED Street Lights	$1,568,605	$232,530	$0	$0	$232,530	6.7
2	Energy Management System	$393,506	$4,881	$3,356	$0	$8,237	47.8
3	Boiler Replacement	$154,875	$0	$689	$0	$689	224.6
4	Premium Efficiency Pump Motors and VFDs	$24,780	$114	$0	$0	$114	217.1
5	Rooftop Unit Replacement	$37,170	$1,884	$0	$0	$1,884	19.7
6	AHU / Split System Replacement	$0	$0	$0	$0	$0	0.0
7	Forced-Air Heating Fuel Economizer	$670	$0	$323	$0	$323	2.1
9	Domestic Water Heater Replacement	$3,717	$0	$8	$0	$8	465.5
10	Pipe and Valve Insulation	$1,515	$0	$17	$0	$17	90.7
11	Building Envelope Weatherization	$76,071	$1,741	$5,385	$0	$7,126	10.7
12	Water Conservation	$221	$0	$121	$0	$121	1.8
13	High Efficiency Transformers	$20,444	$1,122	$0	$0	$1,122	18.2
14	Solar PPA	$0	$30,945	$0	($12,743)	$18,202	0.0
15	Combined Heat & Power Unit	$0	$0	$0	$0	$0	0.0
16	Electrical Vehicle Charging Stations	$30,606	$0	$0	$0	$0	0.0
17	Roof Replacement	$798,805	$0	$0	$0	$0	0.0
18	Streetscape	$1,000,000	$0	$0	$0	$0	0.0
TOTALS		$4,449,878	$309,431	$9,511	($12,743)	$306,199	14.5

VENTNOR BOE		INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Solar PPA (kWh) COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES
ECM #	ENERGY CONSERVATION MEASURE	$	$	$	$	$	YEARS
1	LED Lighting Replacement with Controls	$471,455	$43,063	($3,031)	$0	$40,031	11.8
2	Energy Management System	$381,225	$26,753	$13,537	$0	$40,291	9.5
5	Rooftop Unit Replacement	$99,450	$661	$225	$0	$885	112.3
6	AHU / Split System Replacement	$149,175	$149	$0	$0	$149	1,003.5
8	Destratification Fans	$70,720	$5,680	$2,712	$0	$8,391	8.4
11	Building Envelope Weatherization	$39,720	$11	$285	$0	$296	134.1
13	High Efficiency Transformers	$65,195	$4,974	$0	$0	$4,974	13.1
15	Combined Heat & Power Unit	$303,875	$17,859	($9,105)	$0	$8,754	34.7
TOTALS		$1,580,815	$99,148	$4,622	$0	$103,770	15.2

ECM Breakdown by Greenhouse Gas Reduction

VENTNOR COMBINED		INCLUDED IN PROJECT	Reduction of CO_2	Reduction of Nox	Reduction of SO_2	Reduction of Hg
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	LBS	LBS	LBS	LBS
1	LED Lighting Replacement with Controls	Y	633,201	549	1,340	2,821
1a	LED Street Lights	Y	710,098	613	1,427	3,003
2	Energy Management System	Y	546,789	455	661	1,390.4
3	Boiler Replacement	Y	7,422	6	0	0
4	Premium Efficiency Pump Motors and VFDs	Y	860	1	2	4
5	Rooftop Unit Replacement	Y	27,112	22	29	62
6	AHU / Split System Replacement	Y	405	0	1	2
7	Forced-Air Heating Fuel Economizer	Y	3,473	3	0	0.0
8	Destratification Fans	Y	89,877	76	127	268
9	Domestic Water Heater Replacement	Y	86	0	0	0.0
10	Pipe and Valve Insulation	Y	447	0	0	0.0
11	Building Envelope Weatherization	Y	90,607	72	31	65
12	Water Conservation	Y	1,302	1	0	0.0
13	High Efficiency Transformers	Y	62,100	54	125	263
14	Solar PPA	Y	333,738	288	671	1,411
15	Combined Heat & Power Unit	Y	80,680	77	341	718
16	Electrical Vehicle Charging Stations	Y	0	0	0	0.0
17	Roof Replacement	Y	0	0	0	0
18	Streetscape	Y	0	0	0	0
TOTALS			2,588,196	2,218	4,754	10,006

Note: Factors used to calculate Greenhouse Gas Reductions are as follows:

	UTILITIES		
	ELECTRIC	NATURAL GAS	OTHER ENERGY #2
UNITS	kW & kWh	Therms	Solar PPA (kWh)
BTU MULTIPLIER	3,412	100,000	3,412
CO2 EMISSION FACTOR (LB CO2/UNIT FUEL)	1.10	11.70	0.00
SITE-SOURCE MULTIPLIER	2.80	1.05	1.00

- ***NOx = (0.00095*kWh Savings) + (0.0092*Therm Savings)***
- ***SO2 = (0.00221*kWh Savings)***
- ***Hg = (0.00465*kWh Savings)***

ECM Breakdown by Building

Please see Appendix F for ECM Breakdown by Building.

ECM Budgeting Narrative

Detailed plans, schematics and specifications for Ventnor were not available to deliver a cost estimate for each ECM. The budgetary costs carried in the project are based on good faith estimates, contractor supplied budgets for similar ECMs on other recent projects and a database of actual installed costs for various ECMs.

VENTNOR COMBINED		INCLUDED IN PROJECT	INSTALLED COST
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$
1	LED Lighting Replacement with Controls	Y	$810,348
1a	LED Street Lights	Y	$1,568,605
2	Energy Management System	Y	$774,731
3	Boiler Replacement	Y	$154,875
4	Premium Efficiency Pump Motors and VFDs	Y	$24,780
5	Rooftop Unit Replacement	Y	$136,620
6	AHU / Split System Replacement	Y	$149,175
7	Forced-Air Heating Fuel Economizer	Y	$670
8	Destratification Fans	Y	$70,720
9	Domestic Water Heater Replacement	Y	$3,717
10	Pipe and Valve Insulation	Y	$1,515
11	Building Envelope Weatherization	Y	$115,791
12	Water Conservation	Y	$221
13	High Efficiency Transformers	Y	$85,639
14	Solar PPA	Y	$0
15	Combined Heat & Power Unit	Y	$303,875
16	Electrical Vehicle Charging Stations	Y	$30,606
17	Roof Replacement	Y	$798,805
18	Streetscape	Y	$1,000,000
TOTALS			$6,030,694

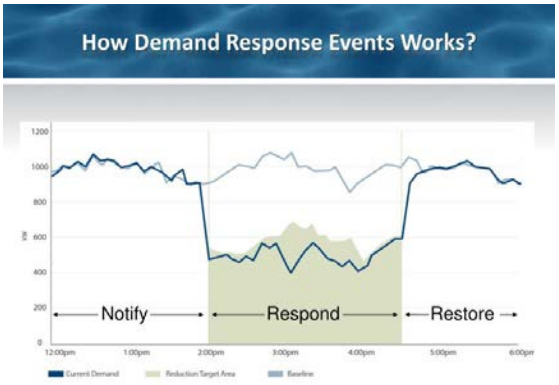
Demand Response & Project Incentives Analysis

Demand Response

Demand Response (DR) is a voluntary Pennsylvania-Jersey-Maryland (PJM) Interconnection program that allows end use customers to reduce their electricity usage during periods of higher power prices. In exchange, end-use customers are compensated through PJM members known as Curtailment Service Providers (CSPs) for decreasing their electricity use when requested by PJM.

Common reduction strategies used in Demand Response include:

- Manual or automatic load drop
- Energy management systems
- Load shedding strategies
- Lighting control strategies
- Backup generation
- Ice storage systems



Benefits of the program include:

- Significant source of new revenue
- Helps to ensure local grid reliability
- Reduces the need for new environmentally taxing energy generation

In the base product, customers commit to reducing their load at the direction of PJM during emergency conditions during the summer months. In the Capacity Performance product, the customer will need to be able to reduce load when directed during the entire year.

Direct Install

Created specifically for existing small to mid-sized facilities, Direct Install is a turnkey project solution that makes it easy and affordable to upgrade to high-efficiency equipment. The program provides a free energy assessment and a participating contractor will work with you to cut your facility's energy costs by replacing lighting, HVAC and other outdated operational equipment with energy efficient alternatives.

The DI Program is open to all eligible commercial and industrial customers whose *average* demand did not exceed 200 kW in any of the preceding twelve months, have their gas or electricity provided by one of New Jersey's Investor Owned Utilities (IOUs), and pay into the Societal Benefits Charge (SBC).

To dramatically improve your payback on the project, the program pays up to 80% of retrofit costs to facilities within an Urban Enterprise Zone, Opportunity Zone, owned or operated by a local government, K-12 public school, or designated as affordable housing. Other types of facilities receive an incentive up to 70% of retrofit costs.

In 2019 the Direct Install program surpassed $200 million in incentives provided since its inception.

Systems and Equipment Addressed by the Program:

- Lighting & Lighting Controls
- Heating, Cooling & Ventilation (HVAC) and HVAC Controls
- Refrigeration
- Motors
- Variable Frequency Drives
- Hot Water Conservation Measures

SmartStart

The SmartStart Buildings Program offers incentives to upgrade many different technologies in your building. Equipment incentives are calculated based on type, efficiency, size, and application and are evaluated on a case-by-case basis.

SmartStart Buildings Program

Prescriptive Lighting Application

FY20 July 1, 2019 – June 30, 2020

New Jersey's cleanenergy program™ njcleanenergy.com

MEASURE DESCRIPTION

Prescriptive Lighting incentives are available for simple, one for one replacements of existing fixtures with most common interior and exterior LED bulbs, retrofit kits and fixtures in commercial and industrial facilities. Incentive rates are pre-determined based on the LED category type as listed by Design Lights Consortium or ENERGY STAR®. Ground up new construction and major renovations of existing buildings are not eligible for Prescriptive Lighting incentives and should pursue incentives using the Performance Lighting application. For fixtures that are ENERGY STAR® or DLC listed under a category not appearing on this application may be provided incentives through the SmartStart Custom application. Please contact us to discuss the Custom application as additional requirements apply.

	Design Lights Consortium® Qualified Products	Measure Code	Incentive Rate
LED TUBES	2′ Linear Replacement Lamps (UL Type A, Type B, Type C)	PL1	$3/tube
	3′ Linear Replacement Lamps (UL Type A, Type B, Type C)	PL2	$5/tube
	4′ Linear Replacement Lamps (UL Type A, Type B, Type C)	PL3	$5/tube
	8′ Linear Replacement Lamps (UL Type A, Type B, Type C)	PL4	$10/tube
	U-Bend Linear Replacement Lamps (UL Type A, Type B, Type C)	PL5	$5/tube

	Design Lights Consortium® Qualified Products	Measure Code	Incentive Rate
EXTERIOR LIGHTING	Architectural Flood and Spot Luminaires	PL27	$75/fixture
	Bollards	PL28	$50/fixture
	Fuel Pump Canopy Luminaires	PL29	$100/fixture
	Outdoor Wall-Mounted Area Luminaires *(Includes Full-Cutoff, Non-Cutoff and Semi-cutoff)*	PL30	$100/fixture
	Outdoor Pole/Arm-Mounted Area and Roadway Luminaires *(Includes Retrofit Kits)*	PL31	$100/fixture
	Outdoor Pole/Arm-Mounted Decorative Luminaires *(Includes Retrofit Kits)*	PL32	$50/fixture
	Parking Garage Luminaires	PL33	$100/fixture
	Retrofit Kits for Large Outdoor Pole/Arm-Mounted Area and Roadway Luminaires	PL34	$150/fixture

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

SmartStart - Ventnor City Street Lights

Existing Conditions				Proposed		Rebate	
LIGHT STYLE	LAMP TYPE	LAMP (W)	VENTNOR QTY	LIGHT STYLE	LAMP TYPE	REBATE ($/FIXT)	VENTNOR REBATE
Cobra Head	High Pressure Sodium	50	113	Cobra Head	LED	$100	$11,300
Cobra Head	High Pressure Sodium	70	42	Cobra Head	LED	$100	$4,200
Cobra Head	High Pressure Sodium	100	181	Cobra Head	LED	$100	$18,100
Cobra Head	High Pressure Sodium	150	428	Cobra Head	LED	$100	$42,800
Cobra Head	High Pressure Sodium	175	21	Cobra Head	LED	$100	$2,100
Cobra Head	High Pressure Sodium	250	4	Cobra Head	LED	$100	$400
Cobra Head	High Pressure Sodium	400	180	Cobra Head	LED	$100	$18,000
Cobra Head	Mercury Vapor	50	2	Cobra Head	LED	$100	$200
Cobra Head	Mercury Vapor	70	11	Cobra Head	LED	$100	$1,100
Cobra Head	Mercury Vapor	100	22	Cobra Head	LED	$100	$2,200
Flood	High Pressure Sodium	250	15	Flood	LED	$100	$1,500
Flood	High Pressure Sodium	400	40	Flood	LED	$100	$4,000
Flood	Metal Halide	400	5	Flood	LED	$100	$500
Flood	Metal Halide (Pulse Start)	400	1	Flood	LED	$100	$100
Granville III	High Pressure Sodium	100	1	Granville III	LED	$50	$50
Traditionaire	High Pressure Sodium	100	2	Traditionaire	LED	$50	$100
TOTAL			**1,153**				**$106,650**

Combined Heat & Power

One of the goals of the State of New Jersey is to enhance energy efficiency through on-site power generation with recovery and productive use of waste heat, and to reduce existing and new demands to the electric power grid. The Board of Public Utilities seeks to accomplish this goal by providing generous financial incentives for Combined Heat & Power (CHP) and Fuel Cell (FC) installations.

Eligible CHP or Waste Heat to Power (WHP) projects must achieve an annual system efficiency of at least 60% (Higher Heating Value - HHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

In order to qualify for incentives, systems must operate a minimum of 5,000 full-load equivalent hours per year (i.e. run at least 5,000 hours per year at full rated kW output). The Office of Clean Energy (OCE) may grant exceptions to this minimum operating hours requirement for Critical Facilities, provided the proposed system operates a minimum of 3,500 full-load equivalent hours per year and is equipped with blackstart and islanding capability. For this program, a Critical Facility is defined as any:

(a) public facility, including any federal, state, county, or municipal facility,

(b) non-profit and/or private facility, including any hospital, police station, fire station, water/wastewater treatment facility, school, multifamily building, or similar facility that:

(A) is determined to be either Tier 1 or critical infrastructure by the New Jersey Office of Emergency Management or the State Office of Homeland Security and Preparedness or

(B) could serve as a Shelter during a power outage. A Shelter is a facility able to provide food, sleeping arrangements, and other amenities to its residents and the community.

The CHP, FC, or WHP system must have a ten (10) year all-inclusive warranty. The warranty must cover the major components of the system eligible for the incentive, to protect against breakdown or degradation in electrical output of more than ten percent from the originally rated electrical output. The warranty shall cover the full cost of repair or replacement of defective components or systems, including coverage for labor costs to remove and reinstall defective components or systems. In the event the system warranty does not meet program requirements, customer must purchase an extended warranty or a ten (10) year maintenance/service contract. The cost of the ten (10) year warranty or service contract may be considered as part of the cost of the project. Notwithstanding the foregoing, public entities that are prohibited from entering into agreements for the full ten (10) years may comply with the 10-year requirement by:

(a) providing an agreement for the longest lawful term,
(b) committing the entity to purchase an agreement for the remaining years, and
(c) either:
(i) providing the vendor's commitment for specific pricing for those remaining years, or
(ii) assuming the pricing for the remaining years will increase by 2.5% each year

Incentive Structure:

Eligible Technologies	Size (Installed Rated Capacity)	Incentive ($/kW)	% of Total Cost Cap per project[3]	$ Cap per project[3]
Powered by non-renewable or renewable fuel source, or combination[4]: Gas Internal Combustion Engine	≤500 kW	$2,000	30-40%[2]	$2 million
	>500 kW - 1 MW	$1,000		
Gas Combustion Turbine Microturbine	> 1 MW - 3 MW	$550	30%	$3 million
Fuel Cells with Heat Recovery (FCHR)	>3 MW	$350		
Fuel Cell without Heat Recover (FCwoHR)	Same as above(1)	Applicable amount above	30%	$1 million
Waste Heat to Power	≤ 1MW	$1,000	30%	$2 million
	> 1MW	$500		$3 million

Footnotes:

(1) Incentives are tiered, which means the incentive levels vary based upon the installed rated capacity, as listed in the chart above. For example, a 4 MW CHP system would receive $2.00/watt for the first 500 kW, $1.00/watt for the second 500 kW, $0.55/watt for the next 2 MW and $0.35/watt for the last 1 MW (up to the caps listed).

(2) The maximum incentive will be limited to 30% of total project. For CHP-FC projects up to 1 MW, this cap will be increased to 40% where a cooling application is used or included with the CHP system (e.g. absorption chiller).

(3) Projects will be eligible for incentives shown above, not to exceed the lesser of % of total project cost per project cap or maximum $ per project cap. Projects installing CHP or FC with WHP will be eligible for incentive shown above, not to exceed the lesser caps of the CHP or FC incentive. Minimum efficiency will be calculated based on annual total electricity generated, utilized waste heat at the host site (i.e. not lost/rejected), and energy input.

(4) Systems fueled by a Class 1 Renewable Fuel Source, as defined by N.J.A.C. 14:8-2.5, are eligible for a 30% incentive bonus. If the fuel is mixed, the bonus will be prorated accordingly. For example, if the mix is 60/40 (60% being a Class 1 renewable), the bonus will be 18%. This bonus will be included in the final performance incentive payment, based on system performance and fuel mix consumption data. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

(5) CHP or FC systems located at Critical Facility and incorporating blackstart and islanding technology are eligible for a 25% incentive bonus. This bonus incentive will be paid with the second/Installation incentive payment. Total incentive, inclusive of bonus, shall not exceed above stipulated caps.

Incentive Payment Schedule

The total incentive is divided into three partial payments. Each stage of payment requires additional documentation and/or has conditions that must be met. At approval, the maximum incentive partial payment amounts are calculated by multiplying the total incentive by the ratios listed in the following table.

Purchase	Installation	Acceptance of 12 months post-installation performance data
30%	50%	20%

(e.g., for the purpose of calculating a payback period)

Pay for Performance Incentives

Ventnor Educational Community Complex is eligible for Pay for Performance Incentives. The P4P Guidelines require that a building be over the threshold of 200 kW based on the 12 months of utility bills submitted with the application. The P4P Guidelines were used to calculate incentive values. The program incentive structure is as follows:

NEW JERSEY'S CLEAN ENERGY PROGRAM
P4P
PAY FOR PERFORMANCE

Incentive #1: Energy Reduction Plan			
Incentive Amount:		$0.15	per sq ft
Minimum Incentive:		$7,500	
Maximum Incentive:		$50,000	or 50% of facility annual energy cost
Incentive #2: Installation of Recommended Measures			
Minimum Savings Target:		**15%**	
Electric Incentives	Base Incentive based on 15% savings:	$0.09	per projected kWh saved
	For each % over 15% add:	$0.005	
	Maximum Incentive:	$0.11	
Gas Incentives	Base Incentive based on 15 % savings:	$0.90	per projected Therm saved
	For each % over 15% add:	$0.05	
	Maximum Incentive:	$1.25	
Incentive Cap:		**25%**	**of total project cost**
Incentive #3: Post-Construction Benchmarking Report			
Minimum Savings Target:		**15%**	
Electric Incentives	Base Incentive based on 15% savings:	$0.09	per actual kWh saved
	For each % over 15% add:	$0.005	
	Maximum Incentive:	$0.11	
Gas Incentives	Base Incentive based on 15% savings:	$0.90	per actual Therm saved
	For each % over 15% add:	$0.05	
	Maximum Incentive:	$1.25	
Incentive Cap:		**25%**	**of total project cost**

Enhanced Incentives are available for certain facility types as listed below:

- Commercial and Industrial
- Owned or operated by Municipalities
- Owned or operated by K-12 public schools
- Located within Urban Enterprise Zones (UEZ)
- Located within Opportunity Zones (OZ)

Ventnor qualifies for enhanced incentives. Enhanced incentives are equal to an additional 100% of the incentives #2 and #3 listed above. The incentives are subject to a cap of 80% of the Applicant's cost for the project allocated between Incentive #2 and #3:

Incentive #2: Installation of Recommended Measures			
Enhanced Incentives	Electric Savings Additional Incentive	$0.09-$0.11	per projected kWh saved
	Gas Savings Additional Incentive	$0.90-$1.25	per projected Therm saved
	Incentive Cap:	40%	of total project cost
Incentive #3: Post-Construction Benchmarking Report			
Enhanced Incentives	Electric Savings Additional Incentive	$0.09-$0.11	per actual kWh saved
	Gas Savings Additional Incentive	$0.90-$1.25	per actual Therm saved
	Incentive Cap:	40%	of total project cost

Incentive Calculations

Estimated incentive values were calculated in accordance with the New Jersey Clean Energy Program Guidelines. The total incentive amount was calculated to be $536,121 in rebates and incentives - 50%, $268,061, has been applied to the project financial analysis (See Section 4). Please see below, Appendix E and Appendix F for building-by-building details.

Incentive Totals

BUILDING	INCENTIVE TYPE	SOURCE	QUANTITY	UNITS	INCENTIVE $/UNIT	INSTALL INCENTIVE	YEAR 1 INCENTIVE	YEAR 2 INCENTIVE	SUBTOTAL	TOTAL
VENTNOR	P4P 2&3 (electric)	NJ Clean Energy Program	627,544	kWh	$0.36	$0	$112,958	$112,958	$225,916	$536,121
	P4P 2&3 (natural gas)	NJ Clean Energy Program	8,779	therms	$3.60	$0	$15,802	$15,802	$31,604	
	Direct Install	NJ Clean Energy Program	$73,722	$		$73,722	$0	$0	$73,722	
	SmartStart	NJ Clean Energy Program	Various	Various	Various	$0	$111,380	$0	$111,380	
	Combined Heat & Power	NJ Clean Energy Program	35	kW	$2,500	$26,250	$43,750	$17,500	$87,500	
	EV Charging Station	NJ DEP	1	each	$6,000	$0	$6,000	$0	$6,000	
					TOTALS	$99,972	$289,890	$146,260	$536,121	

Incentive Data

BUILDING	INCENTIVE TYPE	SOURCE	QUANTITY	UNITS	INCENTIVE $/UNIT	INSTALL INCENTIV	YEAR 1 INCENTIV	YEAR 2 INCENTIV	SUBTOTAL	TOTAL
Ventnor City Hall	Direct Install	NJ Clean Energy Program	$21,269	Various	80%	$21,269			$21,269	$21,269
Ventnor Public / Water Works	Direct Install	NJ Clean Energy Program	$34,293	Various	80%	$34,293			$34,293	$34,293
Ventnor Cultural Arts / Senior Center	Direct Install	NJ Clean Energy Program	$6,232	Various	80%	$6,232			$6,232	$12,232
Ventnor Cultural Arts / Senior Center	EV Charging Station	NJ DEP	1	each	$6,000		$6,000		$6,000	
Ventnor Firehouse 1	Direct Install	NJ Clean Energy Program	$11,929	Various	80%	$11,929			$11,929	$11,929
Ventnor City Park	SmartStart	NJ Clean Energy Program	Various	Various	Various		$4,730		$4,730	$4,730
Ventnor Street Lights	SmartStart	NJ Clean Energy Program	Various	Various	Various		$106,650		$106,650	$106,650
Ventnor Educational Community Complex	P4P 2&3 (electric)	NJ Clean Energy Program	627,544	kWh	$0.36		$112,958	$112,958	$225,916	$345,020
Ventnor Educational Community Complex	P4P 2&3 (natural gas)	NJ Clean Energy Program	8,779	therms	$3.60		$15,802	$15,802	$31,604	
Ventnor Educational Community Complex	Combined Heat & Power	NJ Clean Energy Program	35	kW	$2,500	$26,250	$43,750	$17,500	$87,500	

No implied and/or written guarantee is being made with respective to the receipt of incentives. All incentives estimates carry inherent risks that may jeopardize the receipt of them. Therefore, Ventnor acknowledges and accepts that any project proposed should not rely on the receipt of incentives as a reason to implement it.

ECM 1 – LED Lighting Replacement with Controls

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor City Hall	Ventnor Public / Water Works	Ventnor Cultural Arts / Senior Center	Ventnor Firehouse 1	Ventnor City Park	Ventnor Street Lights	Ventnor Educational Community Complex
1	LED Lighting Replacement with Controls	✔	✔	✔	✔	✔		✔
1a	LED Street Lights						✔	

Lighting retrofits can greatly reduce energy consumption and lower energy bills, while maintaining lighting levels and quality by upgrading lighting components to more efficient and advanced technologies. Upgrading technologies can also offer employees greater control over lighting, allowing for additional energy savings

Improvements in lighting technologies have led to increased lifetimes for components that will result in fewer failures and lengthen the time between maintenance activities.

The implementation of a routine maintenance program in addition to the lighting retrofit will greatly simplify the maintenance practices and reduce the operational costs.

Several new LED lighting lamp and fixture products are now available that were not viable a few years ago. While conventional HID fixtures are controlled only by photocell and timer technologies to turn either on and off, the use of LED fixtures and digital technology allows additional trimming and the use of motion/occupancy-based controls to limit the output of exterior fixtures when sufficient natural lighting is present or for periods when the parking lots and authority grounds are unoccupied.

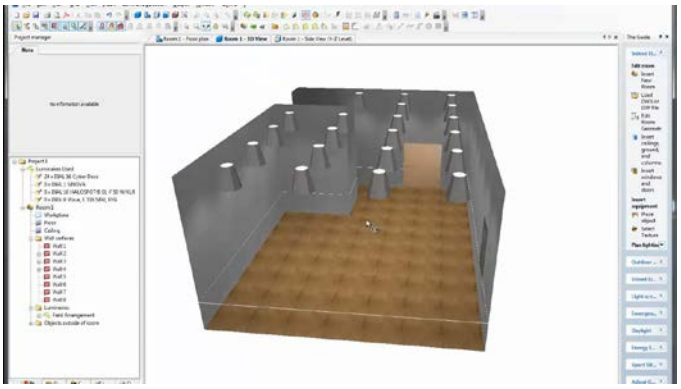
The replacement of existing fixture heads with premium efficiency / LED-based fixtures is the basis of this listed ECM.



Lighting Level Testing and Commissioning

Assuring that the lighting levels of the interior and exterior spaces are a critical component of lighting retrofit project. Each space being retrofitted will have lighting levels measured and recorded during the design phase of the project.

The lighting system will be designed to assure that the lighting levels meet code and either meet or exceed the existing levels. Lighting measurements will be taken per IES Standards.



When the retrofit has been completed, the lighting levels in each space will be measured again to assure compliance with the system design. All documentation will be delivered to Ventnor – Margate for approval and record.

LED Street Lights

With 1,167 Street and Parking Lot Lights throughout the city, Ventnor will benefit by the installation of upgraded high efficiency LED lighting. The lights are owned by Ventnor's utility, Atlantic City Electric. Ventnor receives an electric bill from Atlantic City Electric each month for the use of the lights (see sample bill on the following pages in the ECM Calculation section). A large portion of the bill are tariff charges associated with the Street and Private Lighting tariff. Atlantic City Electric permits its customers to pay upfront to replace the street lights with LEDs. By doing so, Ventnor will be switched to the LED Contributed Street Lighting tariff and save an average of $16,000 each month. In addition, Ventnor will be charged for less energy use associated with the LED lights - an additional average savings of $2,800 per month.

Several new LED exterior lighting lamp and fixture products are now available that were not viable a few years ago. While conventional fixtures are controlled only by photocell and timer technologies to turn either on or off, the use of LED fixtures and digital technology allows additional trimming and the use of motion/occupancy-based controls to limit the output of exterior fixtures when sufficient natural lighting is present or for periods when the parking lots and authority grounds are unoccupied.

These existing street and parking lot lights will be retrofitted to the newest technology available of LED lighting. LED lamps are capable of retro-fits into existing fixtures. In addition, light meter readings will be taken throughout the facility to ensure proper lighting levels exist. Where the foot candles are not up to current codes the retro-fit of the lighting in the space will be designed to bring the area back up to code.

Existing Conditions

Existing interior lighting at Ventnor Cultural Center/Library & Ventnor Educational Complex

Ventnor City Hall

The building lighting systems are primarily T8 fluorescent fixtures in the office areas. A few occupancy sensors were observed. The screw in fixtures have CFL's installed. Lighting levels are generally appropriate for the space function. Exterior lighting is metal halide controlled by daylight sensors.

Ventnor Public Works / Water Works

The Public Works and fleet building has T8 fluorescent lighting. The garage bays have high bay T5 fixtures. Two spaces have T12 fixtures with magnetic ballasts. The fleet building has high bay metal halides in the breakroom and high bay.

Ventnor Cultural Arts / Senior Center

The lighting system is primarily 2X4 recessed T8 fixtures and CFL recessed can fixtures. There are a few fixtures that have incandescent lamps. Display lighting in the library, lobby, and historical museum is halogen track lighting.

Ventnor Firehouse 1

The garage and boiler rooms have high bay T5 fluorescent fixtures. The remainder of the building has T8 fixtures. The building has occupancy sensors in the offices. The remainder of the lighting controls are manual.

Ventnor City Park

The City Park building has surface mounted T12 fixtures controlled by a wall switches.

Ventnor Educational Community Complex

The building has a mixture of fluorescent and incandescent fixtures. Various spaces have occupancy based lighting controls.

Scope of Work

- Retrofit or replace existing fixtures with LED bulbs/fixtures as proposed in the line-by-lines in Appendix G. The new LED tubes do not require the existing fluorescent ballasts to operate.
    - Disconnect power at the breaker panel for the existing fixture circuit
    - Remove and dispose of existing bulbs and ballasts in a responsible manner
    - Install new sockets (as necessary)
    - Install new bulbs
    - Test new fixture for operation and performance
    - Test existing space for proper lighting levels
    - All Retrofit Components will be UL Listed
    - Bid documents will call for UL Inspection of each retrofitted fixture

- Atlantic City Owned Street Lighting – the LED street lights will be installed by Atlantic City Electric or one of their subcontractors. A general procedure is as follows:
  - Provide photometric calculations for the new fixtures
  - Investigate existing light poles for stability and suitability for the new lighting fixture replacement
  - Secure the necessary permits and police escorts for retrofitting the Street Lights
  - Disconnect power for fixtures prior to retrofit
  - Remove existing fixture and dispose in a responsible manner
  - Reconnect power and test fixture
  - Test new fixture performance for light levels and photocell operation

ECM Model Calculations

Energy Savings from the installation of new LED lighting is based on the reduction in electric power (Watts) from the existing bulbs/fixtures to new LED bulbs/fixture and were modeled using eQuest. A 57% coincidence factor was applied to the model demand savings to account for unknowns associated with estimating building peak demand. The simulation results from the LED Lighting Replacement are shown below.

LED Lighting Replacement Savings									
BUILDING	SQFT	MODEL % DEMAND SAVINGS	COINCIDENCE FACTOR	INTERACTIVE FACTOR	kW Savings	MODEL % ELECTRIC SAVINGS	kWh SAVINGS	MODEL % THERM SAVINGS	THERM SAVINGS
Ventnor Educational Community Complex	152,357	18.9%	57%	0%	58.3	19.7%	360,114	-5.3%	(2,533)

ECM Calculations

BPU Protocols were used to calculate LED lighting savings. A coincidence factor is applied in order to estimate peak demand savings. The impact on the HVAC systems are captured as well. See Appendix G for Lighting Line-by-Lines. The proposed LED fixtures are shown in the Direct Install documents in Appendix E for qualifying buildings.

LED Lighting Replacement Savings												
BUILDING	SPACE	kW_b	kW_q	ΔkW	CF	Hours per Year	HVACd	HVACe	HVACg	Peak Demand Savings (kW)	Energy Savings (kWh)	Fuel Savings (therms)
Ventnor City Hall	INTERIOR	12.07	4.83	7.24	0.66	4,573	0.34	0.08	-0.001075	6.41	35,772	-356
Ventnor City Hall	EXTERIOR	2.26	0.90	1.36	0.00	4,200				0.00	5,698	0
Ventnor City Hall	SPECIAL			0.00						0.00	0	0
Ventnor Public / Water Works	INTERIOR	16.63	6.65	9.98	0.68	3,799	0.22	0.02	-0.001075	8.28	38,672	-408
Ventnor Public / Water Works	EXTERIOR	2.72	1.09	1.63	0.00	4,200				0.00	6,847	0
Ventnor Public / Water Works	SPECIAL			0.00						0.00	0	0
Ventnor Cultural Arts / Senior Center	INTERIOR	45.50	18.20	27.30	0.67	2,950	0.35	0.10	-0.001075	24.69	88,588	-866
Ventnor Cultural Arts / Senior Center	EXTERIOR	8.68	3.47	5.21	0.00	4,200				0.00	21,871	0
Ventnor Cultural Arts / Senior Center	SPECIAL			0.00						0.00	0	0
Ventnor Firehouse 1	INTERIOR	6.93	2.77	4.16	0.66	4,573	0.34	0.08	-0.001075	3.68	20,545	-204
Ventnor Firehouse 1	EXTERIOR			0.00						0.00	0	0
Ventnor Firehouse 1	SPECIAL			0.00						0.00	0	0
Ventnor City Park	INTERIOR	6.43	1.85	4.58	0.68	1,008	0.34	-0.18		4.17	3,786	0
Ventnor City Park	EXTERIOR	21.49	4.68	16.81	0.00	1,456				0.00	24,475	0
Ventnor City Park	SPECIAL			0.00						0.00	0	0

Algorithms

$$\text{DkW} = (\#\ of\ replaced\ fixtures) * (Watts_b) - (\#\ of\ fixtures\ installed) * (Watts_q) = (LPD_b - LPD_q) * (\text{SF})$$

$$\text{Energy Savings}\left(\frac{\text{kWh}}{\text{yr}}\right) = (\Delta\text{kW}) * (\text{Hrs}) * (1 + HVAC_e)$$

$$\text{Peak Demand Savings (kW)} = (\Delta\text{kW}) * (\text{CF}) * (1 + HVAC_d)$$

$$\text{Fuel Savings}\left(\frac{\text{MMBtu}}{\text{yr}}\right) = (\Delta\text{kW}) * (\text{Hrs}) * (\text{HVAC}_g)$$

Definition of Variables

- ΔkW = Change in connected load from baseline to efficient lighting
- $\text{Watts}_{b,q}$ = Wattage of existing baseline and qualifying equipment
- LPD_b = Baseline lighting power density in Watt per square foot of space floor area
- LPD_q = Lighting power density of qualified fixtures, equal to the sum of installed fixture wattage divided by floor area of the space where the fixtures are installed.
- SF = Space floor area, in square feet
- CF = Coincidence factor
- Hrs = Annual operating hours
- HVAC_d = HVAC Interactive Factor for peak demand savings
- HVAC_e = HVAC Interactive Factor for annual energy savings
- HVAC_g = HVAC Interactive Factor for annual energy savings

Summary of Inputs

Lighting Verification Performance Lighting

Component	Type	Value	Source
$\text{Watts}_{b,q}$	Variable	See NGrid Fixture Wattage Table Fixture counts and types, space type, floor area from customer application.	1
SF	Variable	From Customer Application	Application
CF	Fixed	See Table by Building Type	4
Hrs	Fixed	See Table by Building Type	4
HVAC_d	Fixed	See Table by Building Type	3, 5
HVAC_e	Fixed	See Table by Building Type	3, 5
HVAC_g	Fixed	See Table by Building Type	6
LPD_b	Variable	Lighting Power Density for, W/SF	2
LPD_q	Variable	Lighting Power Density, W/SF	Application

Hours of Operation and Coincidence Factor by Building Type

Building Type	Sector	CF	Hours
Grocery	Large Commercial/Industrial & Small Commercial	0.96	7,134
Medical - Clinic	Large Commercial/Industrial & Small Commercial	0.8	3,909
Medical - Hospital	Large Commercial/Industrial & Small Commercial	0.8	8,760[54]
Office	Large Commercial/Industrial	0.7	2,969
	Small Commercial	0.67	2,950
Other	Large Commercial/Industrial & Small Commercial	0.66	4,573
Retail	Large Commercial/Industrial	0.96	4,920
	Small Commercial	0.86	4,926
School	Large Commercial/Industrial & Small Commercial	0.50	2,575
Warehouse/ Industrial	Large Commercial/Industrial	0.7	4,116
	Small Commercial	0.68	3,799

Building Type	Sector	CF	Hours
Multifamily – Common Areas[55]	Multifamily	0.86	5,950
Multifamily – In-Unit[36]	Multifamily	0.59	679
Multifamily – Exterior[36]	Multifamily	0.00	3,338

HVAC Interactive Effects

Building Type	Demand Waste Heat Factor ($HVAC_d$)		Annual Energy Waste Heat Factor by Cooling/Heating Type ($HVAC_e$)			
	AC (Utility)	AC (PJM)	AC/ NonElec	AC/ ElecRes	Heat Pump	NoAC/ ElecRes
Office	0.35	0.32	0.10	-0.15	-0.06	-0.25
Retail	0.27	0.26	0.06	-0.17	-0.05	-0.23
Education	0.44	0.44	0.10	-0.19	-0.04	-0.29
Warehouse	0.22	0.23	0.02	-0.25	-0.11	-0.27
Other[56]	0.34	0.32	0.08	-0.18	-0.07	-0.26

Interactive Factor ($HVAC_g$) for Annual Fuel Savings

Project Type	Fuel Type	Impact (MMBtu/ΔkWh)
Large Retrofit (> 200 kW)	C&I Gas Heat	-0.00023
Large Retrofit (> 200 kW)	Oil	-0.00046
Small Retrofit (≤ 200 kW)	Gas Heat	-0.001075
Small Retrofit (> 200 kW)	Oil Heat	-0.000120

Sources

1. Device Codes and Rated Lighting System Wattage Table Retrofit Program, National Grid, January 13, 2015. https://www1.nationalgridus.com/files/AddedPDF/POA/RILightingRetrofit1.pdf

Street Lighting ECM Calculations

LED Street Lighting Replacement Savings Summary							
BUILDING	**TYPE**	**QTY**	**Monthly kWh**	**Annual kWh**	**Avg. Tariff Charge per Fixture ($**	**Avg. Monthly Tariff Charges ($)**	**Annual Tariff Charges ($)**
Ventnor Street Lights	EXISTING - SPL Tariff	1,167	88,421	1,061,050	$17.36	$20,265	$243,174
	PROPOSED - LED CSL Tariff	1,167	34,626	415,507	$3.16	$3,688	$44,253
	SAVINGS		53,795	645,543	$14.20	$16,577	$198,921

Street and Private Lighting tariff charges were calculated using 12 months of utility invoices (see Section 3). The annual sum of tariff charges was $243,174. The LED Contributed Street Lighting tariff charge is $3.16 per fixture totaling to $44,253 per year – a $198,921 annual savings. Energy savings are calculated using 645,543 kWh reduction at the marginal rate of $0.052 per kWh – which equals $33,568 per year. A sample utility bill for 1,042 of the 1,167 street lights is shown below.

Details of your Electric Charges

Street and Private Lighting - service number 0550 0024 9312 7000 7516 07
Electricity you used this period

Lamp size	Quantity	Total use
150S B	2	106
150S B2	4	423
50S PS	6	117
150S FH	1	53
250S FH	1	93
3500	34	1359
3500 PS	12	480
3500 OWPP	22	879
110W SFLED	4	139
11000 SOD	408	22853
150W WHPS	43	2409
11000 OSOD	14	784
150W OHPS	17	952
11000 OWSOD	1	56
30000 SOD	35	4604
400W WHPS	165	21703
30000 SOP1	2	263
50W S	114	2225
70W S	22	581
70W SOW	1	26
100W S	47	1730
100W SO	2	74
150W S	28	1480
150W SO	53	2802
250W S	2	186
400W S	2	289
Total	**1,042**	**66,666**

Type of charge	How we calculate this charge	Amount($)
Distribution Charge	2 X $24.2300000	48.46
Distribution Charge	2 X $20.3550000	40.71
Distribution Charge	53 X $20.5520755	1,089.26
Distribution Charge	28 X $14.1400000	395.92
Distribution Charge	2 X $19.2100000	38.42
Distribution Charge	47 X $12.7772340	600.53
Distribution Charge	1 X $18.4100000	18.41
Distribution Charge	22 X $11.9931818	263.85
Distribution Charge	114 X $11.4613158	1,306.59
Distribution Charge	2 X $25.6100000	51.22
Distribution Charge	165 X $25.6106667	4,225.76
Distribution Charge	35 X $22.6520000	792.82
Distribution Charge	1 X $22.8600000	22.86
Distribution Charge	17 X $19.9170588	338.59
Distribution Charge	14 X $19.9171429	278.84
Distribution Charge	43 X $13.4960465	580.33
Distribution Charge	408 X $12.1333333	4,950.40
Distribution Charge	4 X $14.6725000	58.69
Distribution Charge	22 X $10.9013636	239.83
Distribution Charge	12 X $13.1600000	157.92
Distribution Charge	34 X $9.9026471	336.69
Distribution Charge	1 X $15.9100000	15.91
Distribution Charge	1 X $12.5800000	12.58
Distribution Charge	6 X $12.0116667	72.07
Distribution Charge	4 X $31.3600000	125.44
Distribution Charge	2 X $15.6800000	31.36
Market Transition Tax	66666 kWh X $0.0011720 per kWh	78.13
Transition Bond Charge	66666 kWh X $0.0035529 per kWh	236.86
Non-Utility Generation Charge	66666 kWh X $0.0097890 per kWh	652.59
Societal Benefits Charge	66666 kWh X $0.0066691 per kWh	444.60
RGGI Energy Efficiency	66666 kWh X $0.0003911 per kWh	26.07
Total Electric Delivery Charges		**17,531.71**

Supply Charges: These charges reflect the cost of producing electricity for you. You can compare this part of your bill to offers from competitive suppliers. The class average annual price to compare is 4.67 cents per kWh.

Total Electric Charges - Street and Private Lighting **17,531.71**

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Existing Conditions								Proposed Conditions						Savings	
LIGHT STYLE	LAMP TYPE	LAMP (W)	FIXTURE (W)	ANNUAL HOURS	VENTNOR QTY	VENTNOR (kW)	VENTNOR (kWh)	LIGHT STYLE	LAMP TYPE	LED FIXTURE (W)	ANNUAL HOURS	VENTNOR (kW)	VENTNOR (kWh)	VENTNOR (kW)	VENTNOR (kWh)
Acorn	High Pressure Sodium	150	188	4,200	9	1.7	7,106	Acorn	LED	81	4,200	0.7	3,062	1.0	4,045
Cobra Head	High Pressure Sodium	50	66	4,200	113	7.5	31,324	Cobra Head	LED	19	4,200	2.1	9,017	5.3	22,306
Cobra Head	High Pressure Sodium	70	95	4,200	42	4.0	16,758	Cobra Head	LED	31	4,200	1.3	5,468	2.7	11,290
Cobra Head	High Pressure Sodium	100	138	4,200	181	25.0	104,908	Cobra Head	LED	47	4,200	8.5	35,729	16.5	69,178
Cobra Head	High Pressure Sodium	150	188	4,200	428	80.5	337,949	Cobra Head	LED	76	4,200	32.5	136,618	47.9	201,331
Cobra Head	High Pressure Sodium	175	213	4,200	21	4.5	18,787	Cobra Head	LED	76	4,200	1.6	6,703	2.9	12,083
Cobra Head	High Pressure Sodium	250	295	4,200	4	1.2	4,956	Cobra Head	LED	164	4,200	0.7	2,755	0.5	2,201
Cobra Head	High Pressure Sodium	400	465	4,200	180	83.7	351,540	Cobra Head	LED	164	4,200	29.5	123,984	54.2	227,556
Cobra Head	Incandescent	150	150	4,200	1	0.2	630	Cobra Head	LED	35	4,200	0.0	145	0.1	485
Cobra Head	Mercury Vapor	50	74	4,200	2	0.1	622	Cobra Head	LED	31	4,200	0.1	260	0.1	361
Cobra Head	Mercury Vapor	70	93	4,200	11	1.0	4,297	Cobra Head	LED	31	4,200	0.3	1,432	0.7	2,864
Cobra Head	Mercury Vapor	100	125	4,200	22	2.8	11,550	Cobra Head	LED	47	4,200	1.0	4,343	1.7	7,207
Cobra Head	Mercury Vapor	150	180	4,200	15	2.7	11,340	Cobra Head	LED	64	4,200	1.0	4,010	1.7	7,330
Cobra Head	Mercury Vapor	175	205	4,200	3	0.6	2,583	Cobra Head	LED	64	4,200	0.2	802	0.4	1,781
Cobra Head	Mercury Vapor	250	290	4,200	1	0.3	1,218	Cobra Head	LED	164	4,200	0.2	689	0.1	529
Flood	High Pressure Sodium	100	138	4,200	1	0.1	580	Flood	LED	71	4,200	0.1	298	0.1	281
Flood	High Pressure Sodium	150	188	4,200	8	1.5	6,317	Flood	LED	94	4,200	0.8	3,158	0.8	3,158
Flood	High Pressure Sodium	250	295	4,200	15	4.4	18,585	Flood	LED	177	4,200	2.7	11,151	1.8	7,434
Flood	High Pressure Sodium	400	465	4,200	40	18.6	78,120	Flood	LED	261	4,200	10.4	43,848	8.2	34,272
Flood	Mercury Vapor	150	180	4,200	1	0.2	756	Flood	LED	54	4,200	0.1	227	0.1	529
Flood	Metal Halide	400	458	4,200	5	2.3	9,618	Flood	LED	261	4,200	1.3	5,481	1.0	4,137
Flood	Metal Halide (Pulse Start)	400	458	4,200	1	0.5	1,924	Flood	LED	261	4,200	0.3	1,096	0.2	827
Granville III	High Pressure Sodium	100	138	4,200	1	0.1	580	Granville III	LED	60	4,200	0.1	252	0.1	328
Shoebox	High Pressure Sodium	150	188	4,200	34	6.4	26,846	Shoebox	LED	76	4,200	2.6	10,853	3.8	15,994
Shoebox	High Pressure Sodium	250	295	4,200	1	0.3	1,239	Shoebox	LED	110	4,200	0.1	462	0.2	777
Traditionaire	High Pressure Sodium	50	66	4,200	5	0.3	1,386	Traditionaire	LED	26	4,200	0.1	546	0.2	840
Traditionaire	High Pressure Sodium	70	95	4,200	6	0.6	2,394	Traditionaire	LED	39	4,200	0.2	983	0.3	1,411
Traditionaire	High Pressure Sodium	100	138	4,200	2	0.3	1,159	Traditionaire	LED	72	4,200	0.1	605	0.1	554
Traditionaire	Mercury Vapor	50	74	4,200	2	0.1	622	Traditionaire	LED	26	4,200	0.1	218	0.1	403
Traditionaire	Mercury Vapor	70	93	4,200	7	0.7	2,734	Traditionaire	LED	26	4,200	0.2	764	0.5	1,970
Traditionaire	Mercury Vapor	100	125	4,200	5	0.6	2,625	Traditionaire	LED	26	4,200	0.1	546	0.5	2,079
TOTAL					**1,167**	**252.6**	**1,061,050**					**98.9**	**415,507**	**153.7**	**645,543**

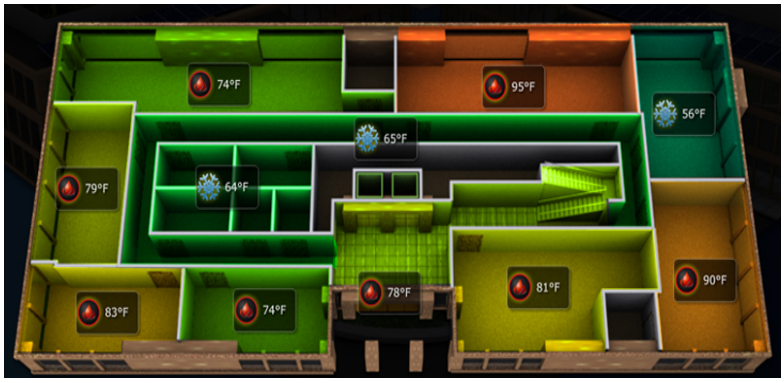
ECM 2 – Energy Management System

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor City Hall	Ventnor Public / Water Works	Ventnor Cultural Arts / Senior Center	Ventnor Educational Community Complex
2	Energy Management System	✔	✔	✔	✔

A direct digital controls (DDC) building automation systems (BAS) is an intelligent network of sensors, operators, processors, and a web-based user interface that controls and monitors electrical and mechanical building systems. Such systems provide automated control and monitoring of the heating, ventilation, lighting and other needs of a building or group of buildings. An effective BAS can provide facilities with monitoring and reporting of all utility consumption data.

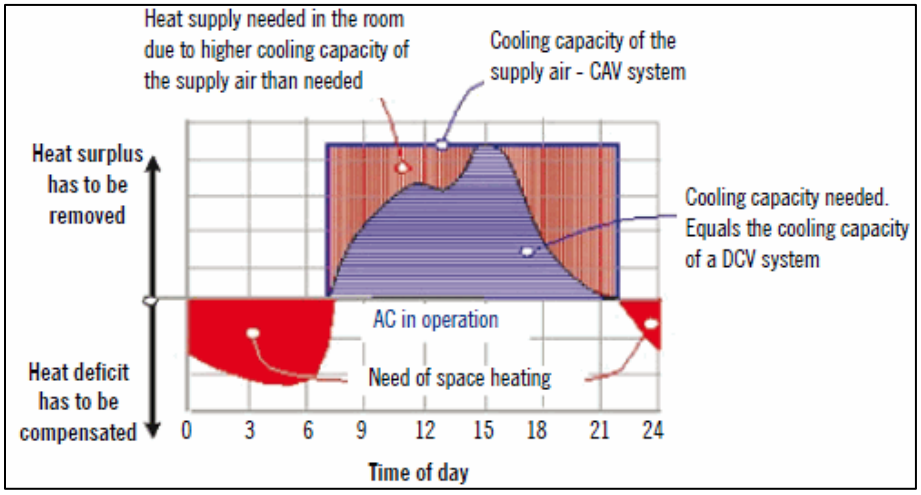


Web Based Building Automation Interface

By being able to monitor building systems from a central location, the operator is able to receive alerts and anticipate problems when a failure or troublesome condition occurs. Also, the data obtained from the BAS can then be used to produce a trend analysis and annual consumption forecasts. From these trends, energy saving strategies can be developed. Consumption can be managed through advanced control strategies such as time scheduling, optimum start and stop, night set-back, demand controlled ventilation, and peak demand limiting. Once trained, Operators are able to use the BAS to diagnose current building system problems as well as tailor specific energy savings strategies that utilize the full capability of the given BAS.

Demand Control Ventilation - Background & Existing Conditions

In most commercial occupancies, ventilation is provided to deal with two types of indoor pollution: (1) odors from people, and (2) off-gassing from building components and furniture. When a space is vacant, it has no people pollution, so the people-related ventilation rate is not needed. Many types of high-occupancy spaces, such as classrooms, multipurpose rooms, theaters, conference rooms, or lobbies have ventilation designed for a high peak occupancy that rarely occurs. Ventilation can be reduced during the many hours of operation when spaces are vacant or at lower than peak occupancy. When ventilation is reduced, building owners or operators save energy because it is not necessary to heat or cool as much outside air. In colder climates, heating for ventilation air is greater and DCV saves the most energy.



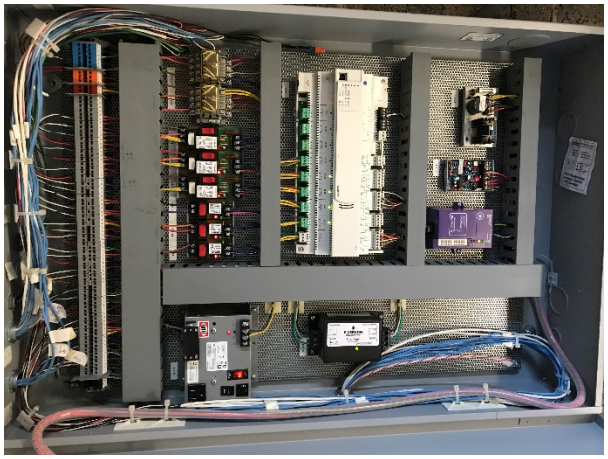
Demand Control Ventilation Operation

The objective of a CO2 control strategy is to modulate ventilation to maintain target cfm/person ventilation rates based on actual occupancy. The strategy should allow for reduced overall ventilation during periods of less than full occupancy which will save energy. Typical control approaches have used a proportional or proportional-integral control algorithm to modulate ventilation between a base ventilation rate established for non-occupant-related sources and the design ventilation rate for the space. Typically, modulation of outside air above base ventilation begins when indoor CO2 is 100 ppm above outside levels and continues until the target CO2 levels are reached and the design ventilation rate is provided.

Duct sensors are best used where a single space or multiple spaces with common occupancy patterns are being ventilated. An example of this approach would be to place a sensor in the return duct of an air handler that serves multiple classrooms, using an upper limit set point of 500 or 600 ppm CO2 above ambient (instead of 700 ppm). Polarized-media electronic air cleaners can allow for the upper CO2 limit to be raised to 1,500 ppm. This approach works

best when the AHU system is serving spaces that are occupied with very similar schedules and rates.

Existing Conditions



Existing Conditions at Ventnor City Hall

Ventnor City Hall

The building zones have electronic valves controlled by the DDC system. Hot water pumps are controlled by a VFD on temperature differential.

Ventnor Public Works / Water Works

The building has 4 zones, each controlled by local thermostats. Offices are cooled by Window Air Conditioners which have unit mounted controls.

Ventnor Cultural Arts / Senior Center

The building HVAC controls are York DDC. The hot water is circulated by 2 hot water pumps with variable speed drives.

Ventnor Educational Community Complex

The HVAC systems within the building are controlled by a CM3 DDC system. Systems not controlled by DDC, are controlled through local thermostats.

Scope of Work – Web Based, Municipality Wide Energy Management System

This measure involves replacing the existing control system with an open-protocol, web-based Energy Management system. This will include replacing control valves with DDC for heating equipment, outdoor air dampers, start up and shut down of the exhaust fans and

sensors for controlling these devices. All new equipment will also be integrated into a Municipality-wide front-end. Municipality assigned operators will have remote access to system

The proposed energy management system will be able to vary the operation of the unit, outdoor air damper, space temperature set points, and air conditioning systems (if applicable). This will include zone scheduling, temperature setback and unoccupied outdoor air shut off. Each building will be provided with electric and natural gas submetering for continuous monitoring and reporting of building energy consumption via Energy Dashboards.

A more specific scope of work includes:

- Building Automation Systems shall be accessible via the Internet.
- User shall have the ability to view the system graphics, change set points, perform overrides, view schedules, change schedules, view alarms, acknowledge alarms, view trend information as well as print, save & e-mail trend information.
- A Secure Internet Connection to the Municipality Network shall be provided and managed by the Municipality IT Department.
- 3-D Graphics Package will be provided for navigating the Building Automation System as well as viewing floor plans, system graphics and equipment graphics.

Remote access and mobile interface

- An Energy Monitoring Dashboard will be provided to display and report Gas & Electrical Consumption for each building detailed in this proposal.
- The Municipality Facilities and IT Staff will receive full training on the operation of the system.
- Portable tablets will be provided for remote and mobile BAS Interface.

<u>General Scope Notes</u>

- If an existing control system is a proprietary system (Trane, York, etc.) and adding new sensors to the existing controller cannot be programmed by CM3, we will provide a BACnet space Humidity & CO2 sensors and adjust OA damper position via programming.
- If the existing outside air (OA) dampers are currently 2 position, we will upgrade controllers & actuators as required in order to provide modulating damper control.

- In addition to adding any CO2 sensors or damper control upgrades for demand control ventilation, re-programming of unit's controller is required. Humidity sensors (RH) are just for monitoring.
- To improve remote access and remove the impact of JAVA, we propose to upgrade the existing front end to N4 and add one (1) Enterprise Server software license to be hosted at a new server hardware machine (location to be determined).

Scope of Work – Ventnor Public Works/Water Works

	System	Qty	Scope
1.	Front End	1	Provide system remote access
2.	Front End	1	Revise: Occ/Unoccupied schedule & setpoints/ Add global OA CO2 sensor
3.	New Boiler	1	Provide new DDC controls for new boiler
4.	New HW Pumps	4	Provide new DDC controls for new pumps
5.	Office Zones	4	Space Temp & RH for monitoring and control
6.	Utility Meters	1	Provide interfaces to monitor elec, gas & water meters
7.	Dashboard	1	Provide web-based energy dashboard screens for all systems

Scope of Work – Ventnor Cultural Center/Library

	System	Qty	Scope
1.	Front End	1	Provide system remote access
2.	Front End	1	Revise: Occ/Unoccupied schedule & setpoints/ Add global OA CO2 sensor
3.	Library VAV Boxes	53	Space RH & CO2 for monitoring
4.	Library Packaged RTUs	2	Control upgrades for demand-controlled ventilation
5.	Senior Center Packaged RTU	1	Return air RH for monitoring, CO2 for demand-controlled ventilation
6.	Unit Heaters	3	Space RH & CO2 for monitoring
7.	Utility Meters	1	Provide interfaces to monitor elec, gas & water meters
8.	Dashboard	1	Provide web-based energy dashboard screens for all systems

Scope of Work – Ventnor City Hall

	System	Qty	Scope
1.	Front End	1	Provide system remote access
2.	Front End	1	Revise: Occ/Unoccupied schedule & setpoints/ Add global OA CO2 sensor
3.	Office Zones	48	Space RH & CO2 for monitoring
4.	Court Room AHU	1	Space RH for monitoring, CO2 for demand-controlled ventilation
5.	Utility Meters	1	Provide interfaces to monitor elec, gas & water meters
6.	Dashboard	1	Provide web-based energy dashboard screens for all systems

Scope of Work – Ventnor Educational Community Complex

	System	Qty	Scope
1.	Front End	1	Provide system remote access
2.	Front End	1	Revise: Occ/Unoccupied schedule & setpoints/ Add global OA CO2 sensor
3.	Packaged RTU	20	Space RH for monitoring, CO2 for demand-controlled ventilation.
4.	Packaged RTU	39	Space RH for monitoring.
5.	Packaged RTU	1	Upgrades for demand-controlled ventilation.
6.	Air Handling Units (AHU)	6	Space CO2 for demand-controlled ventilation.
7.	VVT Box	27	Space CO2 for demand-controlled ventilation.
8.	Energy Recovery UVs	40	Space CO2 for demand-controlled ventilation.
9.	Make-Up Air Unit	1	Space CO2 for demand-controlled ventilation
10.	Utility Meters	1	Provide interfaces to monitor elec, gas & water meters
11.	Dashboard	1	Provide web-based energy dashboard screens for all systems

ECM Model Calculations

Energy Savings from the installation of an Energy Management System at Ventnor Educational Community Complex were modeled using eQuest. The simulation results are shown below.

Energy Management System Savings							
BUILDING	MODEL % ELECTRIC SAVINGS	kWh SAVINGS	MODEL % DEMAND SAVINGS	kW SAVINGS	MODEL % THERM SAVINGS	MAX % HEATING SAVINGS	THERM SAVINGS
Ventnor Educational Community Complex	15%	267,430	0.6%	3	23%	30.0%	11,312

Note:

- See setback temperatures and schedules below. In general, the existing temperatures at VECC were set back at 11 pm. This ECM sets the building temperature back at 6pm and sets the minimum ventilation to 5% of supply air when the spaces are unoccupied. The existing building temperature set points, setbacks and design ventilation rates are unchanged.
- Although three out of four buildings already have DDC controls, the existing systems will be upgraded and optimized to achieve savings. Savings will be achieved through the installation of CO2 and relative humidity sensors, demand control ventilation damper control, optimized scheduling (holiday, special events, etc.), and the ability to control the systems remotely by updating the existing front ends and adding an Enterprise Server software license.

Baseline Temperature Schedules

Schedule Name: Baseline VECC Temperature Schedule (Typical)						
	School Year - 1/1 to 6/23, 9/14 to 12/31			Summer – 6/24 to 9/13		
	Occ Hrs	Occ Heat/Cool Setpoint	Unocc Heat/Cool Setpoint	Occ Hrs	Occ Heat/Cool Setpoint	Unocc Heat/Cool Setpoint
Monday-Thursday	5am-11pm	70F/72F	60F/85F	5am-11pm	70F/72F	60F/85F
Friday	5am-11pm	70F/72F	60F/85F	5am-11pm	70F/72F	60F/85F
Saturday – Sunday	5am-11pm	70F/72F	60F/85F	5am-11pm	70F/72F	60F/85F
Holiday	5am-11pm	70F/72F	60F/85F	5am-11pm	70F/72F	60F/85F

Proposed Temperature Schedules

Schedule Name: EMS VECC Temperature Schedule (Typical)						
	School Year - 1/1 to 6/23, 9/14 to 12/31			Summer – 6/24 to 9/13		
	Occ Hrs	Occ Heat/Cool Setpoint	Unocc Heat/Cool Setpoint	Occ Hrs	Occ Heat/Cool Setpoint	Unocc Heat/Cool Setpoint
Monday-Thursday	5am-6pm	70F/72F	60F/85F	5am-6pm	70F/72F	60F/85F
Friday	5am-6pm	70F/72F	60F/85F	5am-6pm	70F/72F	60F/85F
Saturday – Sunday	5am-6pm	70F/72F	60F/85F	5am-6pm	70F/72F	60F/85F
Holiday	5am-6pm	70F/72F	60F/85F	5am-6pm	70F/72F	60F/85F

Typical DCV Schedules

Schedule Name: DCV Schedule - Classroom						
	School Year - 1/1 to 6/23, 9/14 to 12/31			Summer – 6/24 to 9/13		
	Occ Hrs	Occ OA	Unocc OA	Occ Hrs	Occ OA	Unocc OA
Monday-Thursday	6am-6pm	Design OA	5% of SA CFM	8am-3pm	Design OA	5% of SA CFM
Friday	6am-6pm	Design OA	5% of SA CFM	8am-3pm	Design OA	5% of SA CFM
Saturday – Sunday	N/A	N/A	5% of SA CFM	N/A	N/A	5% of SA CFM
Holiday	N/A	N/A	5% of SA CFM	N/A	N/A	5% of SA CFM

Schedule Name: DCV Schedule - Cafeteria						
	School Year - 1/1 to 6/23, 9/14 to 12/31			Summer – 6/24 to 9/13		
	Occ Hrs	Occ OA	Unocc OA	Occ Hrs	Occ OA	Unocc OA
Monday-Thursday	10am-2pm	Design OA	5% of SA CFM	10am-2pm	10% of SA CFM	5% of SA CFM
Friday	10am-2pm	Design OA	5% of SA CFM	10am-2pm	10% of SA CFM	5% of SA CFM
Saturday – Sunday	N/A	N/A	5% of SA CFM	N/A	N/A	5% of SA CFM
Holiday	N/A	N/A	5% of SA CFM	N/A	N/A	5% of SA CFM

Schedule Name: DCV Schedule - Gym						
	School Year - 1/1 to 6/23, 9/14 to 12/31			Summer – 6/24 to 9/13		
	Occ Hrs	Occ OA	Unocc OA	Occ Hrs	Occ OA	Unocc OA
Monday-Thursday	7am-6pm	20% of SA CFM	5% of SA CFM	7am-3pm	Design OA	5% of SA CFM
Friday	7am-6pm	20% of SA CFM	5% of SA CFM	7am-3pm	Design OA	5% of SA CFM
Saturday – Sunday	7am-4pm	20% of SA CFM	5% of SA CFM	7am-4pm	20% of SA CFM	5% of SA CFM
Holiday	N/A	N/A	5% of SA CFM	N/A	N/A	5% of SA CFM

Schedule Name: DCV Schedule- Auditorium						
	School Year - 1/1 to 6/23, 9/14 to 12/31			Summer – 6/24 to 9/13		
	Occ Hrs	Occ OA	Unocc OA	Occ Hrs	Occ OA	Unocc OA
Monday-Thursday	7am-6pm	20% of SA CFM	5% of SA CFM	8am-3pm	10% of SA CFM	5% of SA CFM
Friday	7am-6pm	20% of SA CFM	5% of SA CFM	8am-3pm	20% of SA CFM	5% of SA CFM
Saturday – Sunday	7am-4pm	20% of SA CFM	5% of SA CFM	7am-3pm	20% of SA CFM	5% of SA CFM
Holiday	N/A	N/A	5% of SA CFM	N/A	N/A	5% of SA CFM

ECM Calculations

Energy Savings from the installation of a Municipality Wide Energy Management System were calculated using the BPU protocols. Separate calculations are required for Night Setback and Demand Control Ventilation. Refer to existing conditions for the occupancy schedule for each building. The calculations are shown below.

EMS Savings - Night Setback							
BUILDING	Weekly Occupied Hours [H]	Heat Pump Cooling (tons) [CAPhp]	Heat Pump Cooling Efficiency (EER) [EERhp]	RTU Cooling (tons) [CAPrtu]	RTU Cooling Efficiency (EER) [EERrtu]	Chiller Cooling (tons) [CAPchiller]	Chiller Cooling Efficiency (EER) [EERchiller]
Ventnor City Hall	84	69	11.18	15	10.80		
Ventnor Public / Water Works	60						
Ventnor Cultural Arts / Senior Center	60			15	9.70	79	10.1
				10	12.40		

EMS Savings - Night Setback								
BUILDING	RTU Heating (Btu/hr) [CAPrtu]	RTU Heating Efficiency (%) [AFUEh]	Boiler Heating (Btu/hr) [CAPboiler]	Boiler Heating Efficiency (%) [AFUEh]	HVAC Electric Use (% of bldg use) [HVACe]	HVAC Electric Use (kWh) [HVACe]	HVAC Heating Use (% of bldg use) [HVACg]	HVAC Heating Use (therms) [HVACg]
Ventnor City Hall			1,112,397	92.7%	40%	161,808	95%	9,434
Ventnor Public / Water Works			652,500	87.0%	N/A	N/A	95%	22,614
Ventnor Cultural Arts / Senior Center	284,000	81%	688,540	86.5%	30%	117,139	95%	0
	204,520	80%						

EMS Savings - Night Setback								
BUILDING	Heat Pump Cooling Energy Savings (kWh)	RTU Cooling Energy Savings (kWh)	Chiller Cooling Energy Savings (kWh)	Heat Pump Heating Energy Savings(kWh)	RTU Heating Energy Savings (therms)	Boiler Heating Energy Savings (therms)	Total Electric Savings (kWh)	Total Gas Savings (therms)
Ventnor City Hall	3,986	896	0		0	762	4,882	762
Ventnor Public / Water Works	0	0	0		0	621	0	621
Ventnor Cultural Arts / Senior Center	0	1,300	6,548		290	659	8,921	1,160
	0	1,073			212			

Occupancy Controlled Thermostat Savings Calculation	
Th (F)	70
Tc (F)	73
Sh (F)	65
Sc (F)	78
H (hrs per week)	Varies
EFLHc (hrs per year)	381
EFLHh (hrs per year)	900
Ph (%)	3%
Pc (%)	6%
AFUEh (%)	Varies
EERhp	Varies

Algorithms

Cooling Energy Savings (kWh) = $(((T_c*(H+5)+S_c*(168-(H+5)))/168)$
$T_c)*(P_c*Cap_{hp}*12*EFLH_c/EER_{hp})$

Heating Energy Savings (kWh) = $(((T_h*(H+5)+S_h*(168-(H+5)))/168)$-
$T_h)*(P_h*Cap_{hp}*12*EFLH_h/EER_{hp})$

Heating Energy Savings (Therms) = $(T_h-(T_h*(H+5)+S_h*(168-$
$(H+5)))/168)*(P_h*Cap_h*EFLH_h/AFUE_h/100{,}000)$

Definition of Variables

T_h = Heating Season Facility Temp. (°F)
T_c = Cooling Season Facility Temp. (°F)
S_h = Heating Season Setback Temp. (°F)
S_c = Cooling Season Setup Temp. (°F)
H = Weekly Occupied Hours

Cap_{hp} = Connected load capacity of heat pump/AC (Tons) – Provided on Application.
Cap_h = Connected heating load capacity (Btu/hr) – Provided on Application.
$EFLH_c$ = Equivalent full load cooling hours
$EFLH_h$ = Equivalent full load heating hours
P_h = Heating season percent savings per degree setback
P_c = Cooling season percent savings per degree setup
$AFUE_h$ = Heating equipment efficiency – Provided on Application.
EER_{hp} = Heat pump/AC equipment efficiency – Provided on Application
12 = Conversion factor from Tons to kBtu/hr to acquire consumption in kWh.
168 = Hours per week.
5 = Assumed weekly hours for setback/setup adjustment period (based on 1 setback/setup per day, 5 days per week).

Occupancy Controlled Thermostats

Component	Type	Value	Source
T_h	Variable		Application
T_c	Variable		Application
S_h	Fixed	T_h-5°	
S_c	Fixed	T_c+5°	
H	Variable		Application; Default of 56 hrs/week
Cap_{hp}	Variable		Application
Cap_h	Variable		Application
$EFLH_c$	Fixed	381	1
$EFLH_h$	Fixed	900	PSE&G
P_h	Fixed	3%	2
P_c	Fixed	6%	2
$AFUE_h$	Variable		Application
EER_{hp}	Variable		Application

EMS Savings - Demand Control Ventilation						
BUILDING	Ventilation SQFT	Component	People Outdoor Air Rate (cfm/person)	Area Outdoor Air Rate (cfm/sqft)	Occupant Density (#/1000 sqft)	Combined Outdoor Air Rate (cfm/person)
Ventnor City Hall	29,376	Office	5	0.06	5	17
	29,376					
	29,376					
Ventnor Public / Water Works	25,000	N/A - the Public Works and Water Works buildings do not have mechanical ventilation.				
	25,000					
	25,000					
Ventnor Cultural Arts / Senior Center	24,464	Library/Assembly	5	0.12	10	17
	24,464					
	24,464					

EMS Savings - Demand Control Ventilation									
BUILDING	Ventilation SQFT	Design Occupants	Ventilation CFM	CESF	CDSF	HSF	Total Electric Savings (kWh)	Total Demand Savings (kW)	Total Gas Savings (Th)
Ventnor City Hall	29,376	147	2,498	2.544	0.0013	0.0680	6,354	3	1,698
	29,376								
	29,376								
Ventnor Public / Water Works	25,000	N/A - the Public Works and Water Works buildings do not have mechanical ventilation.					0	0	0
	25,000								
	25,000								
Ventnor Cultural Arts / Senior Center	24,464	245	4,161	2.720	0.0014	0.0740	11,317	6	3,079
	24,464								
	24,464								

Demand Control Ventilation (2020 BPU Protocols):

Algorithms

Energy Savings (kWh/yr) = CESF * CFM

Peak Demand Savings (kW) = CDSF * CFM

Fuel Savings (MMBtu/yr) = HSF * CFM

Definition of Variables

CESF = Cooling Energy Savings Factor (kWh/CFM)

CDSF = Cooling Demand Savings Factor (kW/CFM)

HSF = Heating Savings Factor (MMBtu/CFM)

CFM = Baseline Design Ventilation Rate of Controlled Space (CFM)

Summary of Inputs

Demand Controlled Ventilation Using CO_2 SensorsComponent	Type	Value	Source
CESF	Fixed	0.0484 MMBtu/CFM See Table 2	1

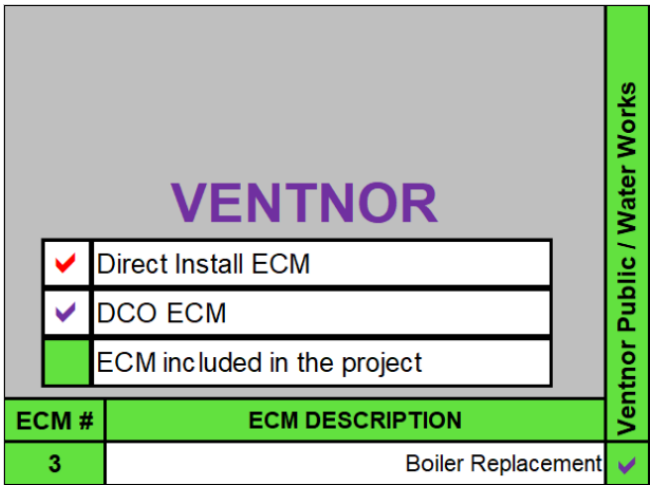
Demand Controlled Ventilation Using CO_2 SensorsComponent	Type	Value	Source
CDSF	Fixed		1
HSF	Fixed		1
CFM	Variable		Application

Savings Factors for Demand-Controlled Ventilation Using CO_2 Sensors

Component	CESF	CDSF	HSF
Assembly	2.720	0.0014	0.074
Auditorium – Community Center	1.500	0.0015	0.043
Gymnasium	2.558	0.0013	0.069
Office Building	2.544	0.0013	0.068
Elementary School	1.079	0.0013	0.029
High School	2.529	0.0015	0.072
Shopping Center	1.934	0.0012	0.050
Other	2.544	0.0013	0.068

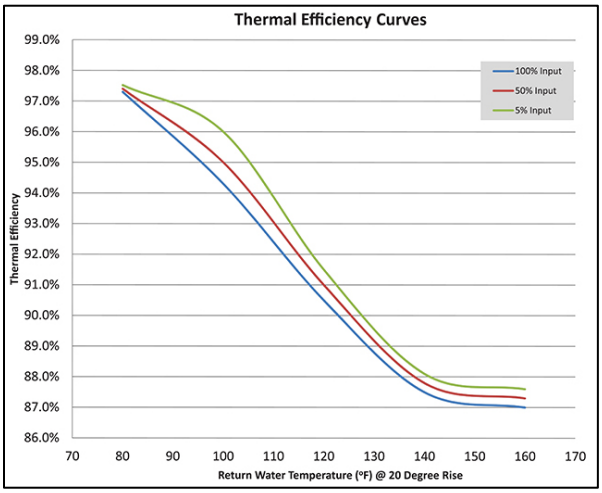
Note: Design ventilation CFM was determined using ASHRAE Standard 62.1 – 2016 ventilation rate procedure.

ECM 3 – Boiler Replacement



Background & Existing Conditions

Old, oversized boiler systems have efficiencies in the range of 56%–75%. A condensing boiler hot water heating system can achieve efficiencies as high as 97%, converting nearly all the fuel to useful heat. The efficiency of the boiler increases at lower return water temperature. Lower return water temperatures allow more water vapor from the exiting flue gas to condense, allowing its latent heat of vaporization to be recovered.



Existing Conditions

Ventnor Public Works/ Water Works has (1) 770 MBH Hydrotherm hot water boiler and (4) constant speed hot water system pumps. Existing equipment to be replaced with (1) 750 MBH high efficiency hot water boiler and (4) variable speed hot water system pumps.

ECM Calculations

Energy Savings from the installation of a high efficiency condensing boiler were calculated using the BPU protocols. Existing boiler is from 1984 and estimated to be 78% efficient.

Boiler Replacement Savings								
BUILDING	Existing Qty	Input Capacity (mbh) [CAPin]	Equivalent Full Load Hours [EFLHh]	Boiler Baseline Efficiency [EFFb]	Proposed Qty	Boiler Proposed Efficiency [EFFq]	Conversion from kBtu to therm	Calculated Annual Fuel Savings (Th)
Ventnor Public / Water Works	1	770	714	78%	1	87%	100	634

Algorithms

Fuel Savings (MMBtu/yr) = Cap_{in} * $EFLH_h$ * ((Eff_q/Eff_b)-1) / 1000 kBtu/MMBtu

Definition of Variables

Cap_{in} = Input capacity of qualifying unit in kBtu/hr

$EFLH_h$ = The Equivalent Full Load Hours of operation for the average unit during the heating season in hours

Eff_b = Boiler Baseline Efficiency

Eff_q = Boiler Proposed Efficiency

1000 = Conversion from kBtu to MMBtu

Summary of Inputs

Prescriptive Boilers

Component	Type	Value	Source
Cap_{in}	Variable		Application
$EFLH_h$	Fixed	See Table Below	1
Eff_b	Variable	See Table Below	2
Eff_q	Variable		Application

$EFLH_h$ Table

Facility Type	Heating EFLH
Assembly	603
Auto repair	1910
Dormitory	465
Hospital	3366
Light industrial	714
Lodging – Hotel	1077
Lodging – Motel	619
Office – large	2034
Office – small	431
Other	681
Religious worship	722

Facility Type	Heating EFLH
Restaurant – fast food	813
Restaurant – full service	821
Retail – big box	191
Retail – Grocery	191
Retail – small	545
Retail – large	2101
School – Community college	1431
School – postsecondary	1191
School – primary	840
School – secondary	901
Warehouse	452

Multi-family EFLH by Vintage

Facility Type	Prior to 1979	From 1979 to 2006	From 2007 through Present
Low-rise, Heating	757	723	503
High-rise, Heating	526	395	219

Baseline Boiler Efficiencies (Eff_b)

Boiler Type	Size Category (kBtu input)	Standard 90.1-2016
Hot Water – Gas fired	< 300 ≥ 300 and ≤ 2,500 > 2,500	82% AFUE 80% Et 82% Ec
Hot Water – Oil fired	< 300 ≥ 300 and ≤ 2,500 > 2,500	84% AFUE 82% Et 84% Ec
Steam – Gas fired	< 300	80% AFUE
Steam – Gas fired, all except natural draft	≥ 300 and ≤ 2,500	79% Et
Steam – Gas fired, all except	> 2,500	79% Ec

Boiler Type	Size Category (kBtu input)	Standard 90.1-2016
Steam – Gas fired, natural draft	≥ 300 and ≤ 2,500	79% Et
Steam – Gas fired, natural draft	> 2,500	79% Ec
Steam – Oil fired	< 300	82% AFUE
	≥ 300 and ≤ 2,500	81% Et
	> 2,500	81% Ec

Sources

1. New York State Joint Utilities, *New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs*, V7, April 2019. Appendix G – Equivalent Full-Load Hours (EFLH), For Heating and Cooling. P. 675-680. EFLH values for NYC due to proximity to NJ.
2. ASHRAE Standards 90.1-2016. *Energy Standard for Buildings Except Low Rise Residential Buildings*; available at: https://www.ashrae.org/standards-research--technology/standards--guidelines. Table 6.8.1-6

ECM 4 – Premium Efficiency Pump Motors and VFDs

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor Public / Water Works
4	Premium Efficiency Pump Motors and VFDs	✔

Background & Existing Conditions

Premium efficiency electric motors will help optimize fan and pump efficiency, reduce electrical power consumption and improve system reliability. These motors are designed to run cooler, last longer, and require less maintenance than the existing standard efficiency motors. Premium efficiency motors can be as high as 95% efficient (as opposed to standard efficiency motors of 78% to 88%) and are capable of operating at varying speeds allowing Variable Frequency Drive (VFD) installations where applicable.

Existing Conditions

Ventnor Public Works/Water Works has (4) constant speed hot water system pumps. Existing equipment to be replaced with variable speed pumps.

ECM Calculations

Energy Savings from the installation of variable speed pumps were calculated using BPU protocols. The calculations are shown below.

VFD Savings					
BUILDING	SYSTEM AND SERVICE	QUANTITY	MOTOR HP	EXISTING MOTOR EFFICIENCY (Nbase)	REPLACEMENT MOTOR EFFICIENCY (Nprem)
Ventnor Public / Water Works	HW Supply Pumps	4	0.25	75.0%	82.5%

VFD Savings							
BUILDING	LF	CF	IFvfd	HRS	ΔkW	PREM. MOTOR DEMAND SAVINGS (kW)	PREM. MOTOR ELECTRIC SAVINGS (kWh)
Ventnor Public / Water Works	0.75	0.74	1.0	2,745	0.09	0.07	186

VFD Savings							
BUILDING	VFD ESF	VFD DSF	VFD DEMAND SAVINGS (kW)	VFD ELECTRIC SAVINGS (kWh)	TOTAL DEMAND SAVINGS (kW)	TOTAL DEMAND SAVINGS (kW)	TOTAL ELECTRIC SAVINGS (kWh)
Ventnor Public / Water Works	0.24	0.216	0.20	596	0.26	0.26	782

Algorithms

Energy Savings (kWh) = $0.746*HP*HRS*(ESF/\eta_{motor})$

Demand Savings (kW) = $0.746*HP*(DSF/\eta_{motor})$

Definitions of Variables

HP = nameplate motor horsepower or manufacturer spec. sheet per application

η_{motor} = Motor efficiency at the peak load. Motor efficiency varies with load. At low loads relative to the rated hp (usually below 50%) efficiency often drops dramatically.

ESF = Energy Savings Factor. The energy savings factor is calculated by determining the ratio of the power requirement for baseline and VFD control at peak conditions.

DSF = Demand Savings Factor. The demand savings factor is calculated by determining the ratio of the power requirement for baseline and VFD control at peak conditions

HRS = annual operating hours

Variable Frequency Drives

Component	Type	Value	Source
Motor HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
η_{motor}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
ESF	Variable	See Table Below	Connecticut Light and Power
DSF	Variable	See Table Below	Connecticut Light and Power
HRS	Variable	>2,000	Application

VFD Savings Factors

Component	Energy Savings Factor, ESF	Demand Savings Factor, DSF
Airfoil/Backward Inclined Fans	0.475	0.448
Forward Curved Fans	0.240	0.216
Chilled Water Pumps	0.580	0.201
Cooling Tower Fans	0.580	0.000

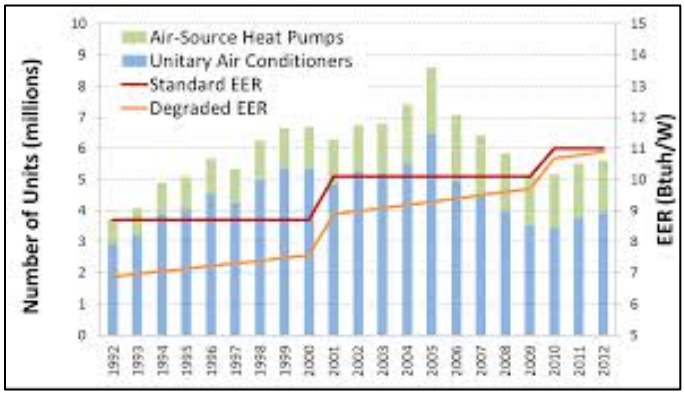
ECM 5 – Roof Top Unit Replacement

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor Cultural Arts / Senior Center	Ventnor Educational Community Complex
5	Rooftop Unit Replacement	✔	✔

Background & Existing Conditions



Many commercial buildings are operating with older and inefficient HVAC systems. The average life expectancy of commercial HVAC RTU equipment is 10 to 15 years—which means that many commercial buildings are ready for new natural gas rooftop units. Technology improvements and demand have led to greater energy efficiency and more choices in systems. Installing new, higher efficiency units will provide energy savings as well as deliver enhanced technology and controls of the RTUs when compared to the existing units.

The following RTUs will be replaced with high efficiency units:

HVAC Replacement Scope

BUILDING	CATEGORY	AREA SERVED	Tons	QUANTITY
Ventnor Cultural Arts / Senior Center	10 Ton DX/Furnace RTU	Senior Center	10	1
Ventnor Educational Community Complex	RTU-7	Cafeteria Hallway	2	1
	Old Gym RTU	Old Gym	20	1

Note: The RTU at the Ventnor Senior Center has already been replaced. The cost and savings are included in the ESIP so Ventnor can reimburse themselves.

Existing Conditions


Existing roof top units at Ventnor Cultural Arts/Senior Center and Ventnor Educational Community Complex

ECM Model Calculations

Energy Savings from the installation of high efficiency rooftop units were modeled using eQuest. The simulation results are shown below.

ENERGY MODELING OUTPUTS

RTU Replacement Savings

BUILDING	SQFT	MODEL % ELECTRIC SAVINGS	kWh SAVINGS	MODEL % DEMAND SAVINGS	kW SAVINGS	MODEL % THERM SAVINGS	THERMS SAVINGS
Ventnor Educational Community Complex	152,357	0.11%	2,070	0.65%	4	0.39%	188

ECM Calculations

Energy Savings from the installation of high efficiency rooftop units were calculated using BPU protocols. The calculations are shown below.

HVAC Replacement - VFD Fan Savings

BUILDING	SQFT	INSTALL? (Y/N)	SYSTEM	Areas Served	QTY	Type	CFM	EXISTING FAN HP
Ventnor Cultural Arts / Senior Center	24,464	Y	15 Ton DX/Furnace RTU	Library	1	supply	6,000	3.00

HVAC Replacement - VFD Fan Savings

BUILDING	PROPOSED FAN HP	MOTOR RPM	EXISTING MOTOR EFFICIENCY (Nbase)	REPLACEMENT MOTOR EFFICIENCY (Nprem)	LF	CF	IFvfd	HRS	ΔkW
Ventnor Cultural Arts / Senior Center	2.75	1,740	87.0%	89.5%	0.75	0.74	0.9	2,745	0.25

HVAC Replacement - VFD Fan Savings								
BUILDING	PREM. MOTOR DEMAND SAVINGS (kW)	PREM. MOTOR ELECTRIC SAVINGS (kWh)	VFD ESF	VFD DSF	VFD DEMAND SAVINGS (kW)	VFD ELECTRIC SAVINGS (kWh)	TOTAL DEMAND SAVINGS (kW)	TOTAL ELECTRIC SAVINGS (kWh)
Ventnor Cultural Arts / Senior Center	0.19	519	0.24	0.216	0.5	1,510	0.7	2,029

HVAC Replacement - Cooling Savings							
BUILDING	SQFT	SYSTEM	Areas Served	Existing Qty	Tons Per Unit	Total Existing Tons	EERb
Ventnor Cultural Arts / Senior Center	24,464	15 Ton DX/Furnace RTU	Library	1	15	15.0	9.7

HVAC Replacement - Cooling Savings									
BUILDING	Proposed Qty	Tons Per Unit	Total Proposed Tons	Proposed SF/Ton	EERq	CF	EFLH Cooling	Demand Savings (kW)	Energy Savings (kWh)
Ventnor Cultural Arts / Senior Center	1	10	10.0		11.5	0.67	1,131	5	9,186

Electric HVAC Systems

The measurement of energy and demand savings for C/I Efficient HVAC program for Room AC, Central AC, and air cooled DX is based on algorithms. (Includes split systems, air to air heat pumps, packaged terminal systems, water source heat pumps, central DX AC systems, ground water or ground source heat pumps)

Algorithms

Air Conditioning Algorithms:

Demand Savings = (BtuH/1000) X ($1/EER_b$-$1/EER_q$) X CF

Energy Savings = (BtuH/1000) X ($1/EER_b$-$1/EER_q$) X EFLH

Definition of Variables

BtuH = Cooling capacity in Btu/Hour – This value comes from ARI/AHRI or AHAM rating or manufacturer data.

CF = Coincidence Factor – This value represents the percentage of the total load which is on during electric system's Peak Window. This value will be based on existing measured usage and determined as the average number of operating hours during the peak window period.

EFLH = Equivalent Full Load Hours – This represents a measure of energy use by season during the on-peak and off peak periods. This value will be determined by existing measured data of kWh during the period divided by kW at design conditions.

HVAC Replacement - Heating Savings

BUILDING NAME	SYSTEM	Areas Served	Qty	Estimated Existing Efficiency (COPb)	Efficiency Units	Baseline RTU Rated Input MBH
Ventnor Cultural Arts / Senior Center	15 Ton DX/Furnace RTU	Library	1	78%	%AFUE	350
	0	0	0		%AFUE	
	0	0	0		%AFUE	

HVAC Replacement - Heating Savings

BUILDING NAME	SYSTEM	Areas Served	Qty	Estimated Existing Efficiency (COPb)	Efficiency Units	Baseline RTU Rated Input MBH	Qualifying RTU Capacity MBH	Qualifying RTU Efficiency (COPq)	Efficiency Units	EFLH	Conversion of BTU to kWh	Annual Gas Savings (Therms)
Ventnor Cultural Arts / Senior Center	15 Ton DX/Furnace RTU	Library	1	78%	%AFUE	350	114	83%	%AFUE	1,131	3,412	3,522

Energy Savings-Heating = $BtuH_h/1000 \text{ X } ((1/ (COP_b \text{ X } 3.412))-(1/ (COP_q \text{ X } 3.412))) \text{ X } EFLH_h$

Where $_c$ is for cooling and $_h$ is for heating.

HVAC Replacement - Economizer Savings

BUILDING	SQFT	SYSTEM	Areas Served	QUANTITY	Cap (Tons)	EFF	SF	HOURS	OTF	Demand Savings (kW)	Energy Savings (kWh)
Ventnor Cultural Arts / Senior Center	24,464	15 Ton DX/Furnace RTU	Library	0	15	12.4	3318	4,438	0.8	0.0	0

HVAC Replacement - Total Savings

BUILDING NAME	SYSTEM	Areas Served	Annual Electric Savings (kWh)	Total Electric Savings (kWh)	Annual Demand Savings (kW)	Total Demand Savings (kW)	Annual Gas Savings (Therms)	Total Gas Savings (Therms)
Ventnor Cultural Arts / Senior Center	15 Ton DX/Furnace RTU	Library	11,215	11,215	6	6	3,522	3,522

ECM 6 – Split System AC/AHU Replacement

VENTNOR		Ventnor Educational Community Complex
✔	Direct Install ECM	
✔	DCO ECM	
	ECM included in the project	
ECM #	**ECM DESCRIPTION**	
6	AHU / Split System Replacement	✔

Background & Existing Conditions

Variable speed condensing systems give you precise comfort by running at the exact speed needed to keep your home comfortable. This allows the variable speed compressor, outdoor fan, and indoor fan to vary operating speed and BTU as the temperature outside changes, slowing down or speeding up gradually in as little as 1/10 of 1% increments to keep comfort within 1/2° of the thermostat setting.

The following split system units will be replaced with high efficiency units:

Split System AC/AHU Replacement Estimate				
BUILDING	**SQFT**	**CATEGORY**	**Tons**	**QUANTITY**
Ventnor Educational Community Complex	152,357	HW-DX-1	8.5	1
		HW-DX-7	3.0	1
		HW-DX-8	3.0	1
		RTU-6	20	1

Existing split system condensing unit at Ventnor Educational Community Complex

ECM Model Calculations

Energy Savings from the installation of new split system units were modeled using eQuest. The cooling efficiency was increased to comply with P4P minimum required efficiencies. The simulation results are shown below.

ENERGY MODELING OUTPUTS							
Split System Replacement Savings							
BUILDING	**SQFT**	**MODEL % ELECTRIC SAVINGS**	**kWh SAVINGS**	**MODEL % DEMAND SAVINGS**	**kW SAVINGS**	**MODEL % THERM SAVINGS**	**THERMS SAVINGS**
Ventnor Educational Community Complex	152,357	0.0%	368	0%	1	0%	48

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 7 – Forced-Air Heating Fuel Economizer

VENTNOR

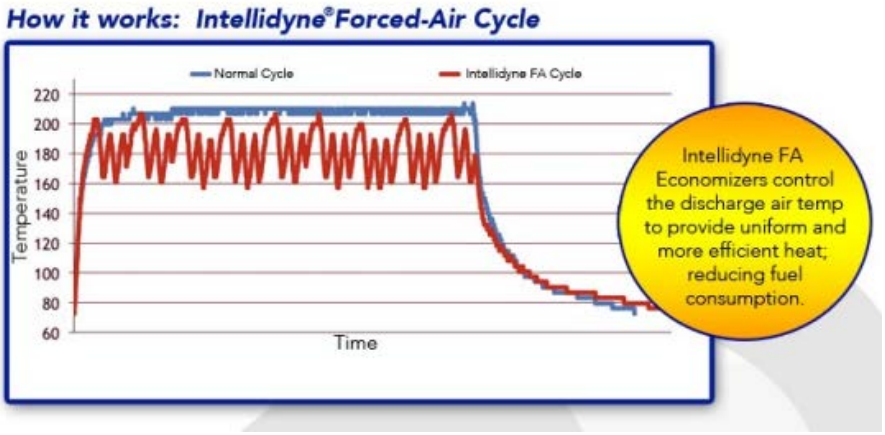
✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor Public / Water Works
7	Forced-Air Heating Fuel Economizer	✔

Most forced-air heating systems are 50% to 100% larger than necessary to maintain a comfortable temperature on average days. This excess capacity causes the burner to cycle on and off continuously to prevent the furnace from overheating.

The Intellidyne FA saves energy by adjusting the burner run pattern to match the system's heat load. The FA analyzes the system's load by monitoring the discharge air temperature and number of burner cycles. The FA then optimizes the running cycle for maintaining the desired heat level calculated as opposed to the simplistic on/off control action of the thermostat.

Intellidyne FA reduces fuel consumption by 10-20%. Installation is easily done by a qualified service technician and requires no follow-up maintenance.



Existing Conditions

Existing unit heater at Ventnor Public Works

Scope of Work

Install a forced-air heating fuel economizer on the unit heater identified as part of the Direct Install program.

ECM Calculations

Heating energy use is reduced by a minimum of 10% by using a forced-air heating fuel economizer. The BPU gas heating calculation has been modified by making the proposed capacity zero to calculate gas use instead of gas savings. The temperature difference is the difference between the outdoor air and heating degree day base temperature (65F-13F).

Forced-Air Heating Fuel Economizer						
BUILDING	System	Qty	CAPb (Btu/hr)	CAPq (Btu/hr)	Total CAPb (Btu/hr)	Total CAPq (Btu/hr)
Ventnor Public / Water Works	Modine Unit Heater	1	328,000	0	328,000	0

Forced-Air Heating Fuel Economizer									
BUILDING	AFUEb	AFUEq	OF	ICF	ΔT	HDD	Gas Use (therms)	Gas Savings %	Gas Savings (therms)
Ventnor Public / Water Works	78%	78%	0.80	1.00	52	1,912	2,969	10%	297

$$\textit{Gas Savings (Therms)} = \frac{OF \times ((CAPY_{Bi} \times EFF_Q) - (CAPY_{Qi} \times EFF_B \times ICF)) \times HDD_{mod} \times 24}{\Delta T \times HC_{fuel} \times EFF_B \times ICF \times EFF_Q}$$

Definition of Variables

OF = Oversize factor of standard boiler or furnace (OF=0.8)

$CAPY_{Bi}$ = Total input capacity of the baseline furnace, boiler or heater in Btu/hour

$CAPY_{Qi}$ = Total input capacity of the qualifying furnace, boiler or heater in Btu/hour

HDD_{mod} = HDD by zone and building type

24 = Hours/Day

ΔT = design temperature difference

HC_{fuel} = Conversion from Btu to therms of gas or gallons of oil or propane (100,000 btu/therm; 138,700 btu/gal of #2 oil; 92,000 btu/gal of propane)

EFF_Q = Efficiency of qualifying heater(s) (AFUE %)

EFF_B = Efficiency of baseline heaters (AFUE %)

ICF = Infrared Compensation Factor (ICF = 0.8 for IR Heaters, 1.0 for furnaces/boilers)[2]

Adjusted Heating Degree Days by Building Type

Building Type	Heating Energy Density (kBtu/sf)	Degree Day Adjustment Factor	Atlantic City (HDD)	Newark (HDD)	Philadelphia (HDD)	Monticello (HDD)
Education	29.5	0.55	2792	2783	2655	3886
Food Sales	35.6	0.66	3369	3359	3204	4689
Food Service	39.0	0.73	3691	3680	3510	5137
Health Care	53.6	1.00	5073	5057	4824	7060
Lodging	15.0	0.28	1420	1415	1350	1976
Retail	29.3	0.55	2773	2764	2637	3859
Office	28.1	0.52	2660	2651	2529	3701
Public Assembly	33.8	0.63	3199	3189	3042	4452
Public Order/Safety	24.1	0.45	2281	2274	2169	3174
Religious Worship	29.1	0.54	2754	2745	2619	3833
Service	47.8	0.89	4524	4510	4302	6296
Warehouse/Storage	20.2	0.38	1912	1906	1818	2661

Heating Degree Days and Outdoor Design Temperature by Zone

Weather Station	HDD	Outdoor Design Temperature (F)
Atlantic City	5073	13
Newark	5057	14
Philadelphia, PA	4824	15
Monticello, NY	7060	8

ECM 8 – Destratification Fans

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

Ventnor Educational Community Complex

ECM #	ECM DESCRIPTION	
8	Destratification Fans	✔

Background & Existing Conditions

Large indoor spaces with high ceilings such as a gymnasium are prone to a condition called stratification. Stratification is a common property of air to separate due to temperature difference. Typically, a layer of warm air will sit on top of a layer of cold air. The lower cold air causes discomfort for occupants of the space as well as increased energy usage of air handling systems to overcome this condition. Destratification fans provide the turbulence in the space necessary for warm and cold air to mix. The result is a blended comfortable air temperature with less usage of the rooms HVAC systems.

Existing Conditions

Existing gymnasium at Ventnor Educational Community Complex

Scope of Work

Install destratification fans in the following gyms:

Destratification Fan Estimate				
BUILDING	SQFT	CATEGORY	NOTES	QUANTITY
Ventnor Educational Community Complex	152,357	Air Pear 45-EC	Large Gym	8
		Air Pear 25-EC	Small Gym	6

ECM Model Calculations

De-strat fans are estimated to save 19.8% to 26.3% of gym HVAC energy. Gym HVAC energy was extracted from the eQuest models. De-strat fans are conservatively estimated to run 8,760 hours per year.

ENERGY MODELING OUTPUTS					
Destratification Fan Savings					
BUILDING	SQFT	MODEL % ELECTRIC SAVINGS	kWh SAVINGS	MODEL % THERM SAVINGS	THERM SAVINGS
Ventnor Educational Community Complex	152,357	-0.58%	(10,624)	1.95%	938

REDUCING THE COST OF STRATIFICATION

ΔT in ° F	5.4 °	7.2 °	9 °	10.8 °	12.6 °	14.4 °	16.2 °	18 °	19.8 °
20 ft. ceiling	12.7%	14.7	16.2	17.5	18.7	19.8	21	22	23
26 ft. ceiling	15.8%	17.6	19	20.8	22.1	23.3	24.4	26	27
33 ft. ceiling	18%	20	21.8	23.2	24.8	26.3	27.3	28.8	30.5
40 ft. ceiling	20%	22	23.6	25.6	27	28.4	30	31.8	33.2

% of Energy Costs

EXAMPLE: According to a study by the Building Scientific Research Information Association, if you have a 33 ft. ceiling with a floor-to-ceiling temperature differential of 14.4 °F, then you could potentially reclaim up to 26.3% of lost heat energy with a destratification system.

ECM 9 – Domestic Water Heater Replacement

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

Ventnor Public / Water Works

ECM #	ECM DESCRIPTION	
9	Domestic Water Heater Replacement	✔

In a storage (tank) water heater, water is kept hot and ready for use at all times in insulated storage tanks with capacities ranging from 20 to 140 gallons. Many fuel options are available, including electricity, natural gas, oil, and propane. One drawback of these units is the energy used to keep the water hot at all times, otherwise known as "standby losses."

Condensing Domestic Water Heaters

Condensing gas water heaters are a very promising new entry to the market. A condensing gas water heater works like a normal tank-type water heater, except that before the combustion gases are vented outside, the heat in those gases is captured and used to help heat the water in the tank.

Existing Conditions

Existing domestic water heater at Ventnor Public Works

General Scope of Work

Replace existing 34 MBH standalone tank water heater with a high efficiency, condensing water heater.

ECM Calculations

Water Consumption

BUILDING NAME	Occupancy			Restroom Faucets				
	Qty	Days/Wk	Wk/Yr	Existing Daily Use / Person	Existing (GPM)	Existing Duration (Min)	% HW	Existing (Gal/Yr)
Ventnor Public / Water Works	20	5	52	2	2.0	0.50	75%	10,400

Hot Water Load

BUILDING NAME	Hot Water Usage (Gal/Yr)	Water Temp Rise (F)	Building DHW Demand (MBTU/YR)
	Existing	Baseline	Baseline
Ventnor Public / Water Works	7,800	73	4,749

Domestic Water Heater Replacement

BUILDING NAME	Heater Capacity (MBH)		Thermal Efficiency		Building DHW Demand (MBTU/YR)	Cold Water Inlet (F)		Hot Water Setpoint (F)		Gas Savings (Therms)
	Baseline	Proposed	Baseline	Proposed	Proposed	Baseline	Proposed	Baseline	Proposed	
Ventnor Public / Water Works	34	34	79%	90.0%	4,749	47	47	120	120	7

ECM 10 – Pipe and Valve Insulation

VENTNOR		Ventnor Cultural Arts / Senior Center	Ventnor Firehouse 1
✔	Direct Install ECM		
✔	DCO ECM		
	ECM included in the project		
ECM #	**ECM DESCRIPTION**		
10	Pipe and Valve Insulation	✔	✔

Piping insulation is a critical part of energy management. It controls condensation, pipe freezing, and noise amongst other things. A percentage of heating (or cooling) can be lost through conduction if a pipe is not properly insulated.

Higher operational costs are a direct result of this for both heating and cooling systems. This ECM entails wrapping the existing bare metal pipe with an approved high-performance fiberglass insulation jacketing material.

Uninsulated hot water piping

Existing Conditions

Damaged pipe and valve insulation at Ventnor Cultural Center and Ventnor Fire House 1

Scope of Work

Insulation will be installed on exposed pipes and valves through the NJ Direct Install rebate program – refer to Appendix E for the line-by-line scope.

ECM Calculations

Pipe and Valve Insulation Savings							
BUILDING	PIPE UNIT TAG	LENGTH (FT)	DIAMETER (IN)	SURFACE TEMP	AMBIENT TEMP	OPERATION HOURS/YEAR	HEATING EFFICIENCY (%)
Ventnor Cultural Arts / Senior Center	**Boiler Room**	22	2	180	70	4,000	86.5%
Ventnor Firehouse 1	**Laundry Room**	27	1	120	70	8,760	82.0%

Pipe and Valve Insulation Savings							
BUILDING	R-VALUE (BARE)	R-VALUE (INSULATED)	BARE HEAT LOSS (BTU/HR/FT)	BARE ENERGY USE (THERM)	INSULATED HEAT LOSS (BTU/HR/FT)	INSULATED ENERGY USE (THERM)	FUEL SAVINGS (THERM)
Ventnor Cultural Arts / Senior Center	2	10	28.78	28.62	5.8	5.7	23
Ventnor Firehouse 1	2	10	6.54	19.15	1.3	3.8	15

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 11 – Building Envelope Improvements

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor City Hall	Ventnor Public / Water Works	Ventnor Cultural Arts / Senior Center	Ventnor Firehouse 1	Ventnor Educational Community Complex
11	Building Envelope Weatherization	✔	✔	✔	✔	✔

An on-site survey of the existing air barrier continuity was conducted at all five Ventnor buildings. During the on-site inspection, several areas of the facilities were inspected for effective air barriers at the building envelope. Temperature, relative humidity, CO2 levels, smoke pencil testing and Infrared imaging was used to determine areas of uncontrolled air leakage into and out of the buildings.

Each of these facilities had varying degrees of uncontrolled air leakage into and out of the buildings. Typically, the exterior doors were found to have failed, missing or worn weather-seals and in some cases the exterior caulking had failed. Many of the facilities had insulation materials installed at the exterior roof/wall intersections. This can increase thermal values, however, the air leakage around the insulation and through the roof/wall joint was significant and results in increased energy costs.

Scope of Work

The scope of work for Ventnor includes weather-stripping and sealing the following building components, which have failed to varying degrees.

- Exterior Doors
- Overhead Doors
- Windows
- Roof Top Exhausts
- Roof/Wall Intersections

BUILDING NAME	SQ. FT. LEAKAGE AREA	COST*
VENTNOR CITY BOE:		
Ventnor Educational Community Complex	8.02	$ 35,946
VENTNOR CITY:		
Ventnor City Hall	2.41	$ 6,744
Ventnor Community Center/Library	3.81	$ 12,422
Ventnor City Fire Station #1	2.34	$ 14,297
Ventnor City Public Works	5.42	$ 13,902
Ventnor City Public Works - Garage	3.29	$ 13,855
TOTAL:	**57.84**	**$ 211,923**

- Attic Hatch
- Soffits

The implementation of the above recommended measures would greatly benefit the energy efficiency of the facility, improve the comfort levels of the occupants and can reduce premature building component failures of the structure. All the deficiencies are calculated to determine an effective hole area at the building envelope. The effective combined hole area for the entire Municipality is over 57 square feet. This whole area is used to run energy models of the facility to arrive at forecasted energy loss and potential dollar savings after implementation of the recommended measures.

Scope of Work – Ventnor Educational Community Complex

Component	Existing Condition	Recommendation
VENTNOR EDUCATIONAL COMMUNITY COMPLEX		
Roof/Wall Intersections	Multiple areas inspected and all found to have no visible signs of air leakage	No remedial measures required.
Exterior Doors	The majority of the exterior doors showed signs of air infiltration. In most cases was around the tops, sides and bottoms of single and double door sets.	Install new high-quality vinyl clad gasket materials to the exterior single and double doors. Install vinyl inset pile-type products between double doors and at door bottoms.

Ventnor Educational Community Complex has air leakages issues even with the newer door systems. Gaskets have dropped at the centers and perimeter seals do not have vinyl insets to prevent air from passing around the doors. Replacing the existing seals would reduce air leakage and improve efficiencies of the building.

Scope of Work – Ventnor City Hall

Component	Existing Condition	Recommendation
VENTNOR CITY HALL		
Windows	There are newer windows installed in the conditioned attic with no perimeter seals installed. Leakage is occurring around the perimeters.	Install low rise polyurethane foam to the window perimeters in the attic.
Exterior Doors	Leakage found with most doors.	New weather-stripping will be installed where necessary.

Windows in Ventnor City Hall building have air leakage around the perimeters. The heated attic is losing energy around these windows.

Scope of Work – Ventnor Cultural Center/Library

Component	Existing Condition	Recommendation
VENTNOR COMMUNITY CENTER / LIBRARY		
Roof/ Wall Intersection	The roof/wall intersection in most areas is either sealed or inaccessible. The Seniors Community room has boxed truss ends that are not sealed. These can be sealed to reduce air leakage.	Pull back existing fiberglass insulation and seal the perimeters of the blocking boards around the three sides of the Seniors Community Center with polyurethane foam.
Windows	The small number of operable windows in the Senior Community area are in poor condition and are at risk of falling out.	Sealing these few windows shut with high-quality silicone caulking is recommended until they can be replaced.
Exterior Doors	The majority of the exterior doors showed signs of air infiltration. In most cases was around the tops, sides and bottoms of single and double door sets.	Install new high-quality vinyl clad gasket materials to the exterior single and double doors. Install vinyl inset pile-type products between double doors and at door bottoms.

Ventnor Public Library and Cultural Center doors showed daylight around the doors and that air leakage is occurring. Retrofitting weather-seals is recommended.

The large Community Room at the Ventnor Library and Cultural Center has truss ends at the exterior walls. It is recommended to seal the perimeters of each of these trusses with polyurethane foam in areas that are accessible to eliminate air leakage at the roof/wall intersection. Some areas are not accessible doe to lard ceilings and mechanical equipment.

The older windows in the Cultural Center Seniors' Room are leaky and do not open safely. Sealing the units shut would eliminate the air leakage and save energy. Over time, the savings could be used to replace the windows.

Scope of Work – Ventnor Fire Station 1

Component	Existing Condition	Recommendation
VENTNOR FIRE STATION #1		
Roof/Wall Intersection	The roof to brick joint within the conditioned attic showed visible signs of air infiltration with the IR camera.	Seal the sill plate and roof/wall intersection with polyurethane foam to create an effective air barrier and increase R-values.
Exterior Doors	The majority of the exterior doors showed signs of air infiltration. In most cases was around the tops, sides and bottoms of single and double door sets.	Install new high-quality vinyl clad gasket materials to the exterior single and double doors. Install vinyl inset pile-type products between double doors and at door bottoms.

The brand new doors at the Ventnor City Fire Station had failed weather-seals. Side gaskets had fallen off and the door bottom sweep was not making contact. Daylight was easily visible under the door.

The old fireplace in the Ventnor Fire Department Chief's office was showing air leakage with the IR camera. Installing rigid insulation into the chimney opening (tie red ribbon to hang down) and sealing the perimeter would reduce the air leakage up the chimney and improve occupancy comfort.

Scope of Work – Ventnor Public Works Buildings

Component	Existing Condition	Recommendation
VENTNOR PUBLIC WORKS BUILDINGS		
Roof/Wall Intersection	Roof/wall in the service garage building has open flutes with paper-faced insulation. This is allowing air to exchange between inside and outside.	Spray SPF over the insulation to create an effective air barrier at the open truss ends.
Windows	The larger curved windows in the smaller building has air leakage at the perimeters, the corner gaskets and the operable windows.	Seal all accessible window perimeters and glazing gasket corners. Seal the operable windows in all systems except the office, due to request for ventilation by occupants.
Overhead Doors	Existing weather-seals at the overhead doors have failed or been damaged and are allowing considerable air leakage into and out of the buildings. This includes the inset man doors in the three overhead doors in the office building.	Installing new large leaf-type seals to the tops and sides of the doors will greatly reduce the amount of air flow at the overhead doors while still allowing for proper operation. Smaller leaf seals can be used at the inset man doors to reduce air leakage.
Exterior Doors	The majority of the exterior doors showed signs of air infiltration. In most cases was around the tops, sides and bottoms of single and double door sets.	Install new high-quality vinyl clad gasket materials to the exterior single and double doors. Install vinyl inset pile-type products between double doors and at door bottoms.

Ventnor Public Works overhead doors leading into service bays are very leaky. The inset main doors have gaps as large as 3/4” at the tops. The doors are also very leaky and require new rubber leaf seals to be installed.

Ventnor Public Works large Storage building lunch room has large fluted ends stuffed with very dirty fiberglass. This indicates air is passing through the insulation. Boxing and sealing these openings is recommended.

ECM Model Calculations

Energy Savings from the installation of Building Envelope Improvements were modeled using eQuest. Infiltration rate reduction and simulation results are shown below.

Building Envelope Savings							
BUILDING	INFILTRATION REDUCTION (CFM)	MODEL % ELECTRIC SAVINGS	kWh SAVINGS	MODEL % DEMAND SAVINGS	kW SAVINGS	MODEL % THERM SAVINGS	THERMS SAVINGS
Ventnor Educational Community Complex	1,127	0.0%	110	0.0%	0	0.5%	238

ECM Calculations

Energy Savings from the installation of building envelope improvements are calculated below

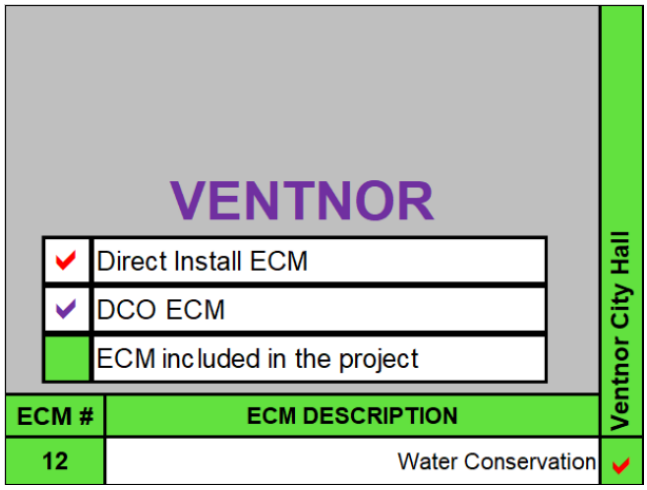
Building Envelope Savings						
BUILDING	INFILTRATION REDUCTION (CFM)	ANNUAL HEATING LOAD (MBTU/CFM)	ANNUAL HEATING SAVINGS (BTU)	BOILER HEATING EFFICIENCY	TOTAL GAS HEATING SAVINGS (THERM)	TOTAL GAS SAVINGS (therms)
Ventnor City Hall	423	200.41	84,773,430	93%	915	915
Ventnor Public / Water Works	762	200.41	152,712,420	85%	1,797	2,954
Ventnor Public Works/Water Works - Garage	462	200.41	92,589,420	80%	1,157	
Ventnor Cultural Arts / Senior Center	535	200.41	107,219,350	87%	1,240	1,240
Ventnor Firehouse 1	469	200.41	93,992,290	87%	1,080	1,080

Building Envelope Savings						
BUILDING	INFILTRATION REDUCTION (CFM)	ANNUAL COOLING LOAD (MBTU/CFM)	ANNUAL COOLING SAVINGS (BTU)	COOLING EFFICIENCY (EER - BTU/Wh)	COOLING SAVINGS (kWh)	TOTAL ELECTRIC SAVINGS (kWh)
Ventnor City Hall	423	65.7	27,791,100	11.1	2,504	2,504
Ventnor Public / Water Works	762	65.7	50,063,400	9.6	5,242	5,242
Ventnor Public Works/Water Works - Garage	462	65.7	30,353,400		0	0
Ventnor Cultural Arts / Senior Center	535	65.7	35,149,500	12.0	2,929	2,929
Ventnor Firehouse 1	469	65.7	30,813,300	9.6	3,227	3,227

Weather Data

City	Atlantic City		MB/CFM	*(Heating)*	200.41
State	NJ		Ton-Hr/CFM	*(Cooling)*	5.47
			Hr/Year	*(Cooling)*	1,875
Heating Degree Days	5113 HDD	*(Reference)*	Ton/CFM	*(Peak Cooling)*	0.00547
Cooling Degree Days	951 CDD	*(Reference)*	MB/CFM	*(Cooling)*	65.7
			Average Annual Wind Speed		9.89 mph

ECM 12 – Water Conservation



It takes a considerable amount of energy to deliver and treat the water you use every day. For example, letting your faucet run for five minutes uses about as much energy as letting a 60-watt light bulb run for 22 hours. Pump and water heating energy is required to deliver hot water to the end user. Installing new fixtures and aerators can conserve substantial energy while reducing water consumption as well.

New low flow fixtures are rated at 0.5 gallons per minute and can be fitted with time based automatic shut-offs.

New fixture with aerator

Scope of Work

Existing faucets within the facilities will be replaced with new low flow aerators through the Direct Install rebate program. A more specific scope of work includes:

- Check existing service records and maintenance reports
- Coordinate installation time and duration to ensure operations are unaffected
- Remove existing manual water faucet
- Install new battery powered sensor operated faucet
- Installation test and functional check

ECM Calculations

Water conservation from faucet aerators is estimated using occupancy levels and existing versus proposed flow rates. Approximately 75% of the faucet flow is estimated to be hot water. Domestic water heater savings are calculated using 120F supply and 47F inlet temperatures, giving a 73F temperature rise.

Water Consumption

BUILDING NAME	Occupancy			Restroom Faucets						
	Qty	Days/Wk	Wk/Yr	Existing Daily Use /	Proposed Daily Use /	Existing (GPM)	Proposed (GPM)	Existing Duration	% HW	Existing (Gal/Yr)
Ventnor City Hall	50	5	52	2	2	2.0	0.5	0.50	75%	26,000

Savings from Water Conservation

BUILDING NAME	Hot Water Usage (Gal/Yr)		Water Temp Rise (F)		Building DHW Demand (MBTU/YR)		Proposed Domestic Water Heater Efficiency	Gas Savings (Therms)
	Existing	Proposed	Baseline	Proposed	Baseline	Proposed		
Ventnor City Hall	19,500	4,875	73	73	11,872	2,968	80%	111

ECM 13 – High Efficiency Transformers

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor Public / Water Works	Ventnor Educational Community Complex
13	High Efficiency Transformers	✔	✔

High efficiency transformers are designed to improve power quality and reduce electricity waste. Optimized for lowest life cycle cost, the high efficiency transformer reduces waste by as much as 74% while treating power system harmonics in the electrical current that can disrupt equipment operation. They also enhance equipment reliability; lower operating costs and facilitate compliance with IEEE-519 in commercial and industrial facilities.

Quiet operation is ensured through the combination of imbedded structural and acoustic treatments. High efficiency transformers generate lower losses, they reduce power drawn from generating stations resulting in less smog and lower greenhouse gas emissions.

Existing Conditions

Existing transformer at Ventnor Educational Community Complex

ECM Calculations

Typically, transformers are rated at 35% loading. The savings were calculated using 15-20% loading during the day and 8% loading at night to be conservative. Estimated baseline efficiency was assumed to be 5% less than NEMA TP1 2002 rating at low load conditions. The new, harmonic mitigating transformers are designed to perform at low load conditions. Harmonic mitigation has been proven to save an additional 70% of the calculated savings from efficiency improvement. The harmonic mitigation savings were capped at 50% for the savings estimates below.

High Efficiency Transformer Savings											
BUILDING	SQFT	QUANTITY	EXISTING kVA	PROPOSED kVA	% DAY LOAD	HOURS PER WEEKDAY	DAYS PER WEEK	WEEKS PER YEAR	ANNUAL DAY HOURS	% NIGHT / WEEKEND LOAD	REMAINING HOURS
Ventnor Public / Water Works	55,000	1	112.5	112.5	15%	16	5	52	4,160	8%	4,600
Ventnor Educational Community Complex	152,357	1	500	500	15%	16	5	52	4,160	8%	4,600
Ventnor Educational Community Complex		1	25	25	20%	16	5	52	4,160	8%	4,600

High Efficiency Transformer Savings						
BUILDING	TP1 EXISTING EFFICIENCY	% LESS THAN NEMA EFFICIENCY	ESTIMATED BASELINE EFFICIENCY	PROPOSED EFFICIENCY	BASELINE ELECTRIC USE (kWh)	PROPOSED ELECTRIC USE (kWh)
Ventnor Public / Water Works	98.2%	5%	93.2%	98.77%	119,742	112,990
Ventnor Educational Community Complex	98.7%	5%	93.7%	99.16%	529,349	500,202
Ventnor Educational Community Complex	98.0%	5%	93.0%	98.29%	32,258	30,522

High Efficiency Transformer Savings							
BUILDING	CALCULATED ENERGY SAVINGS (kWh)	HARMONIC MITIGATING SAVINGS (%)	HARMONIC MITIGATING SAVINGS (kWh)	AVG. BASELINE DEMAND (kW)	AVG. PROPOSED DEMAND (kW)	DEMAND SAVINGS (kW)	TOTAL ENERGY SAVINGS (kWh)
Ventnor Public / Water Works	6,753	50%	3,376	12	11	1	10,129
Ventnor Educational Community Complex	29,147	50%	14,574	53	50	3	43,721
Ventnor Educational Community Complex	1,736	50%	868	4	3	0	2,604

Required vs. PQI Energy Efficiencies [1]

kVA Rating CSA C802.2	NEMA TP 1 2002 [2]	NEMA Premium [2]	DOE 2016 [3]	PQI Z3 exceeds CSL 3 [4]	PQI Z3+	PQI Z4 exceeds CSL 4 [4]
15	97.00	97.90	97.89	97.97	98.25	98.43
30	97.50	98.25	98.23	98.29	98.52	98.68
45	97.70	98.39	98.40	98.45	98.66	98.81
75	98.00	98.60	98.60	98.64	98.82	98.95
112.5	98.20	98.74	98.74	98.77	98.93	99.05
150	98.30	98.81	98.83	98.86	99.01	99.12
225	98.50	98.95	98.94	98.97	99.10	99.20
300	98.60	99.02	99.02	99.04	99.16	99.26
500	98.70	99.09	99.14	99.16	99.26	99.35
750	98.80	99.16	99.23	99.24	99.33	99.41
1000	98.90	99.23	99.28	99.29	99.38	99.45

Notes:

[1] Efficiency values are measured at 35% of nameplate rating.

[2] The efficiency of transformers manufactured after January 1, 2007, but before January 1, 2016 must meet the efficiency requirements of NEMA TP 1-2002 (US) or CSA C802.2-12 (Canada).

[3] The efficiency of transformers manufactured after January 1, 2016 must meet the US DOE 2016 efficiency requirements.

[4] PQI Z3 & Z4 efficiencies exceed the requirements of DOE Candidate Standard Level 3 & 4 (CSL 3 & CSL 4) respectively.

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ECM 14 – Solar PPA

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

Ventnor Public / Water Works

ECM #	ECM DESCRIPTION	
14	Solar PPA	✔

The renewable energy industry is one of the fastest growing and evolving components to modern building system design. The ability to capture solar energy will provide long term economic and environmental benefits. Technology improvements are rapidly evolving as well, and the market is flooded with new products with new features that have only been available within the last few years, with promising new technologies and updates on the verge of becoming available to the market.

Clients have the opportunity to purchase power through a Power Purchase Agreement, predetermining fixed low rates for the duration of the agreement, without having to manage any part of the process. This allows the solar provider to manage compliance reporting, filings, and maintenance of the equipment for the entire length of the contract.
A solar PPA makes going green easy. Work takes place around the client's schedule, and a safe and functional environment is maintained throughout installation of the system.

Assessment
A preliminary assessment of your facilities will allow for the design of a system that meets your energy needs and environmental goals.

Agreement
Power Purchase Agreements allow for the sale of the energy produced on a per kWh basis, while a lease agreement allows the solar provider to access the system they own so that they may monitor and maintain the system for you.

Installation
A turnkey system includes the design, construction, commissioning, and interconnection with local utilities.

Monitoring
The solar provider monitors the PV installation to ensure performance and for ease of billing. The client has the capability to track output and environmental benefits online.

Management
The solar provider handles all compliance and reporting requirements for the client. They will file documentation with federal and state agencies and participate in state and utility REC markets.

Scope of Work

- Savings estimates are calculated from proposals received during the Ventnor Solar PPA RFP process
- Installation of the Solar PV System shall be in accordance with NFPA 70. NEC 2011. ARTICLE 690.Solar Photovoltaic (PV) Systems.
- PPA Firm will receive any incentives available

HESP SOLAR

HESP SOLAR, LLC
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PROJECT DETAIL		SYSTEM DESCRIPTION				SHEET INFORMATION	
PROJECT #:	NJ-20-214	MODULE TYPE: TRINA SOLAR, TSM-DE14A(11) PERC MONO 385W	TILT ANGLE: 7	AZIMIUTH: VARIES	TOTAL STRINGS: 38	DATE: 02.21.20	SHEET NO: PV 0
PROJECT NAME:	PUBLIC WORKS/ WATER WORKS	MODULE QUANTITY: 616	RACKING STRUCTURE: CANOPY AND ROOF MOUNTED			DESIGNER: SY	
SITE ADDRESS:	101 N CORNWALL AVENUE VENTNOR CITY, NJ 08406	SYSTEM SIZE kW (DC): 237.16					
CLIENT NAME:	VENTNOR CITY	SYSTEM SIZE kW (AC): 180	INVERTER: SOLECTRIA PVI 36TL				SCALE: NTS

ECM Calculations

The energy savings shown below are a result of the reduced electrical cost from the PPA for the kWh generated by the solar panels. Actual rates and solar generation estimates were taken from the proposals received during the Ventnor Solar PPA RFP process. A comparison was done to ensure the generated kWh did not exceed the post-project estimated energy consumption. In cases where the generated kWh exceeded the post-project electrical consumption, the generation numbers were reduced to ensure the site would not generate more electric than it consumes. The PPA term is 15 years.

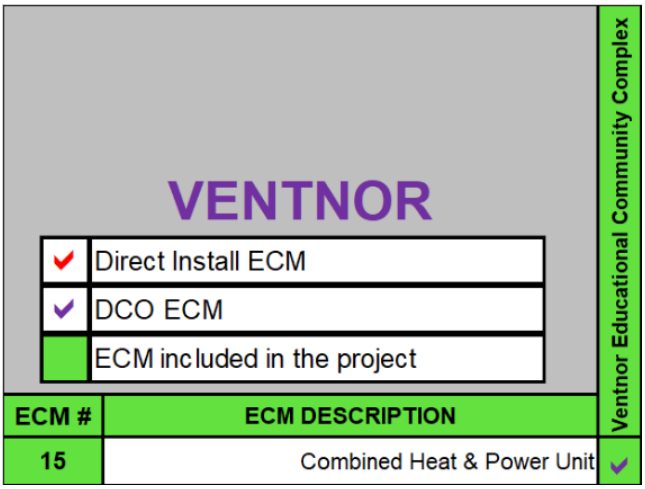
PPA RATE ($/kWh)	ANNUAL ESCALATION RATE	ANNUAL PANEL DERATING
$0.0420	1.50%	0.50%

INSTALLED CAPACITY (kWdc)	TOTAL ECM YEAR 1 SAVINGS
237	$18,202

BUILDING	MOUNTING CATEGORY	INSTALLED ARRAY (kW)	EFLH	INSTALLED kWh GENERATION	$$/kWh RATES		TOTAL SAVINGS
					UTILITY	SOLAR PPA	
Ventnor Public / Water Works	Canopy & Roof	237	1,279	303,398	$0.102	$0.0420	$18,202

Ventnor Public / Water Works						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	PPA COST	SAVINGS
	UTILITY	SOLAR PPA				
1	$0.102	$0.0420	303,398	$30,945	($12,743)	$18,202
2	$0.104	$0.0426	301,881	$31,467	($12,869)	$18,598
3	$0.107	$0.0433	300,372	$31,999	($12,997)	$19,002
4	$0.109	$0.0439	298,870	$32,539	($13,126)	$19,413
5	$0.111	$0.0446	297,375	$33,089	($13,256)	$19,833
6	$0.114	$0.0452	295,889	$33,648	($13,388)	$20,260
7	$0.116	$0.0459	294,409	$34,216	($13,521)	$20,696
8	$0.119	$0.0466	292,937	$34,794	($13,655)	$21,139
9	$0.121	$0.0473	291,472	$35,382	($13,790)	$21,591
10	$0.124	$0.0480	290,015	$35,979	($13,927)	$22,052
11	$0.127	$0.0487	288,565	$36,587	($14,065)	$22,522
12	$0.130	$0.0495	287,122	$37,205	($14,205)	$23,000
13	$0.132	$0.0502	285,686	$37,833	($14,346)	$23,487
14	$0.135	$0.0510	284,258	$38,472	($14,488)	$23,984
15	$0.138	$0.0517	282,837	$39,122	($14,632)	$24,490
Total			**4,395,086**	**$523,278**	**($205,009)**	**$318,269**

ECM 15 – Combined Heat & Power



CHP offers energy and environmental benefits over electric-only and thermal-only systems in both central and distributed power generation applications. CHP systems have the potential for a wide range of applications and the higher efficiencies result in lower emissions than separate heat and power generation.

The simultaneous production of useful thermal and electrical energy in CHP systems lead to increased fuel efficiency. CHP units can be strategically located at the point of energy use. Such onsite generation avoids the transmission and distribution losses associated with electricity purchased via the grid from central stations. CHP is versatile and can be coupled with existing and planned technologies for many different applications in the industrial, commercial, and residential sectors.

ECM Calculations

The CHP will act as the first stage of heating for the hot water heating loop and domestic hot water loop. The CHP is estimated to run at full load for over 4,400 hours per year. Run hours were determined using the post ECM monthly gas load. Non-displaceable gas use is estimated to be 10% (kitchen appliances, gas-fired RTUs, etc.) during the heating season. The remaining load is considered to be available for the CHP. For a more conservative energy savings calculation, the CHP is allowed to run during the heating season only. The installed CHP will

be available year round and will operate when adequate heating load exists. If necessary, heat can be rejected through a radiator when the full heating load is not required.

CHP Input Data		
Number of units	1	
Electrical output	35	kW
Thermal output	204,040	BTU/hr
Gas input (HHV)	407,144	Btu/hr
Overall efficiency	79.4%	

Runtime Analysis	
Run hours	4,408
Full load heat and electric hours	4,408
% Boiler load displaced by CHP	35%

		Fuel Usage Without CHP				
Month	Days	Total Gas - Post ECMs (Baseline reduced by 30%)	Proposed Boiler Efficiency	Non-Displaceable Gas Therms (10% Oct-Apr)	Displaceable Gas Therms	Displaceable Heat Therms
May	31	772	87%	772	0	0
Jun	30	29	87%	29	0	0
Jul	31	36	87%	36	0	0
Aug	31	51	87%	51	0	0
Sep	30	433	87%	433	0	0
Oct	31	1,010	87%	101	909	791
Nov	30	1,750	87%	175	1,575	1,370
Dec	31	8,869	87%	887	7,982	6,945
Jan	31	9,399	87%	940	8,459	7,359
Feb	28	7,266	87%	727	6,540	5,689
Mar	31	2,831	87%	283	2,548	2,217
Apr	30	1,234	87%	123	1,111	966
Total:	**365**	**33,680**		**4,557**	**29,124**	**25,337**

		35 kW Cogen Plant Thermal Operation				
Month	Days	Combined Cogen Run Hours	Utilized Cogen Heat Therms	Avoided Boiler Gas Therms	Full Load Run Hours	System Operating Efficiency
May	31	0	0	0	0	-
Jun	30	0	0	0	0	-
Jul	31	0	0	0	0	-
Aug	31	0	0	0	0	-
Sep	30	0	0	0	0	-
Oct	31	388	791	909	388	79%
Nov	30	672	1,370	1,575	672	79%
Dec	31	737	1,503	1,727	737	79%
Jan	31	737	1,503	1,727	737	79%
Feb	28	665	1,357	1,560	665	79%
Mar	31	737	1,503	1,727	737	79%
Apr	30	474	966	1,111	474	79%
Total:	**365**	**4,408**	**8,994**	**10,338**	**4,408**	**79%**

		Fuel Usage With CHP			Electric Savings With CHP			
Month	Days	Supplemental Boiler Gas Therms	Cogen Gas Therms	Total Gas	Run Hours	Avg Cogen Plant kW Output	kW Demand Savings	Cogen Electric Generation kWh
May	31	0	0	772	0	0	0	0
Jun	30	0	0	29	0	0	0	0
Jul	31	0	0	36	0	0	0	0
Aug	31	0	0	51	0	0	0	0
Sep	30	0	0	433	0	0	0	0
Oct	31	0	1,579	1,680	388	35	35	13,571
Nov	30	0	2,734	2,909	672	35	35	23,503
Dec	31	6,255	2,999	10,141	737	35	35	25,780
Jan	31	6,731	2,999	10,670	737	35	35	25,780
Feb	28	4,979	2,709	8,415	665	35	35	23,285
Mar	31	820	2,999	4,102	737	35	35	25,780
Apr	30	0	1,928	2,052	474	35	35	16,576
Total:	**365**	**18,786**	**17,946**	**41,289**	**4,408**			**154,273**

CHP Maintenance

The annual cost of a 10 year maintenance contract is included as required by the NJ Clean Energy incentive. See Form 6 – Annual Service Costs.

Ventnor Educational Community Complex			
YEAR	RUN HOURS	MAINTENANCE FEE ($/RUN HR)	MAINTENACE COST
1	4,408	$0.91	$4,011
2	4,408	$0.96	$4,231
3	4,408	$1.01	$4,452
4	4,408	$1.06	$4,672
5	4,408	$1.11	$4,893
6	4,408	$1.17	$5,157
7	4,408	$1.23	$5,422
8	4,408	$1.29	$5,686
9	4,408	$1.35	$5,951
10	4,408	$1.42	$6,259
TOTAL	**44,078**	**$1.15**	**$50,734**

Capital Improvement Measure 16 – Electric Vehicle Charging Stations

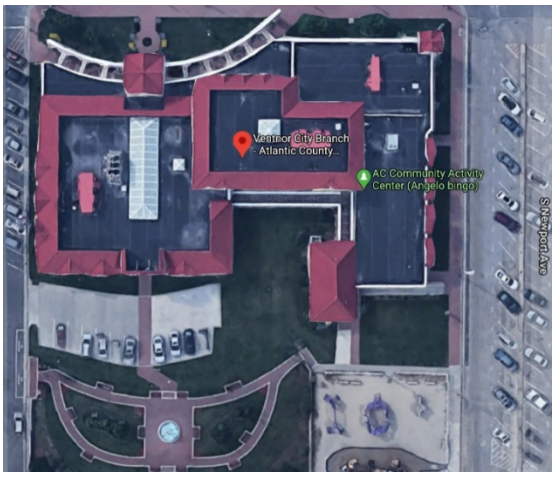
VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor Cultural Arts / Senior Center
16	Electrical Vehicle Charging Stations	✔

Hybrid electric vehicles (HEVs) typically use less fuel than similar conventional vehicles, because they employ electric-drive technologies to boost efficiency. Plug-in hybrid electric vehicles (PHEVs) and all-electric vehicles (EVs) have the benefit of flexible fueling: Since the electric grid is in close proximity to most locations where people park, PEVs can charge overnight at a residence, as well as at a fleet facility, workplace, or public charging station when available. Public charging stations are not as ubiquitous as gas stations, but charging equipment manufacturers, automakers, utilities, Clean Cities coalitions, municipalities, and government agencies are rapidly establishing a national network of charging stations. The number of publicly accessible charging stations reached about 18,000 in 2018, offering about 50,000 outlets.

- All Hardware is UL and CE certified for safety
- 24/7 driver support support & centralized station monitoring
- Remote diagnosis, repair, and upgrade of stations
- Smartphone support on Android and iPhone



Parking Lot at Ventnor Cultural Center/Library

The EV Charging Station was identified as a capital improvement by Ventnor to be included in the ESIP. The improvement will contribute points toward Ventnor's goal of achieving silver status in the Sustainable Jersey Program.

Scope of Work

- Location to be approved by Ventnor during design phase
- Furnish & Install (1) ChargePoint CT4021-GW1/Level II/Dual-Port/Bollard-Mount charging station with Cord Management Kit (CMK).
- Furnish & install new 120/208-Volt:100-Amp Electric Service. (Service shall consist of Service Lateral, Meter, & Distribution Panel.)
- Furnish & install related conduit/circuitry from new distribution panel to new charging station.
- Furnish & install (2) new 2-Pole/40-Amp Overcurrent Protection Devices within new distribution panel for new station.
- Furnish & install (1) concrete footing for new station.
- Remove and restore existing landscape as required.
- Furnish signed/sealed engineered design drawings to satisfy permitting requirements.
- Prepare Electrical permit application.
- Furnish & install (1) EV Only parking sign for each EV parking stall.
- Furnish & install Eco-Green striping in each EV parking stall.
- Furnish & install (2) Hi-Visibility protective bollards for new station.

Energy Savings Calculations

There are no energy savings included for this measure.

ECM 17 – Roof Replacement

VENTNOR

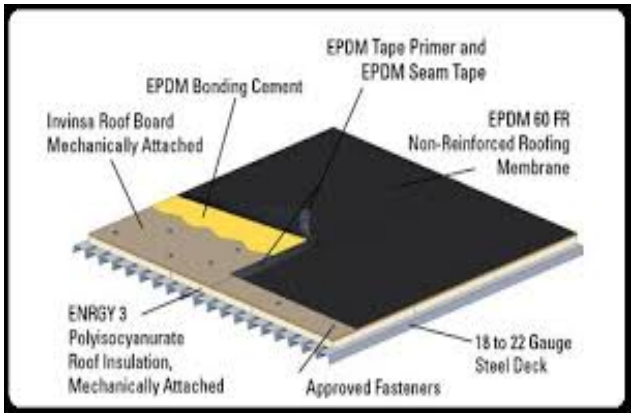
✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor Public / Water Works
17	Roof Replacement	✔

Background & Existing Conditions

Roof repairs are being evaluated in the ESIP project only where the existing roof systems do not have 15 years of warranty remaining and are being targeted for Solar PPA installation. By not including the roof repairs in the Solar PPA, Ventnor will be assured the lowest possible PPA Rate.

EPDM is a synthetic rubber that covers the entirety of your roof, forming a durable membrane that keeps the elements on the outside where they belong. However, while there's no questioning its strength, you don't have to worry that an EPDM roofing system is going to add a dangerous amount of weight onto your structure. EPDM generally weighs about 1/3 a pound per square foot. Just about any building out there is a candidate for EPDM, thanks to how lightweight it is.



Scope of Work

Ventnor City Public Works / Water Works

The existing slag surface built-up roof system is deteriorated and the roof is leaking throughout which means wet substrate. The existing roof insulation appears to be Phenolic foam insulation. The insulation must be removed, or it will corrode the deck and fasteners causing structural failure. This was a class action lawsuit that ended approximately 5-10 years ago.

- Approx. 19,390 SF
- Full Roof Replacement
- Possible steel deck paint, overlay repair or deck replacement

ECM Calculations

The Public Works garage is heavily used throughout the heating season. The open garage is nearly an unconditioned space, with gas fired unit heaters to prevent the space temperature from dropping too low. Therefore, the savings associated with replacing the roof are negligible and not included.

Capital Improvement Measure 18 – Streetscape

VENTNOR

✔	Direct Install ECM
✔	DCO ECM
	ECM included in the project

ECM #	ECM DESCRIPTION	Ventnor Street Lights
18	Streetscape	✔

Streetscapes are designs that add sidewalks, street furniture, trees, fountains, open spaces, etc. to enhance the appearance and functionality of the street. Streetscapes can be an important part of any town's culture. They affect how we get around and the experiences we have while doing it.

Some important things to consider when designing a streetscape include:

- Create a unique sense of place, i.e. materials, brick paving, signage, lighting, landscaping, crosswalk markings, and art of sculptural pieces.
- Implied separation between vehicles and pedestrians using trees, low vegetation, planters, bollards, or other elements.
- Design must allow for movement between vehicles and sidewalks.
- Views from the street to buildings, businesses, or points of interest are extremely important and must be maintained.
- Places to sit and interact along the street.

- Safety of the pedestrians is critical. Well-marked crosswalks and parking spaces, proper accessible spaces and curbs all contribute to the safety of the users.

Scope of Work

Scope includes four blocks of streetscape at $250,000 per block. Location and design to be provided by Ventnor during design phase.

Energy Savings Calculations

The energy savings associated with this measure are captured in ECM 1a – LED Street Lights.

ENERGY SAVINGS PLAN

SECTION 5 – FINANCIAL ANALYSIS

Form V – ESCO Construction and Service Fees (Overall ESIP)

FORM V - VENTNOR COMBINED		
ESCO's ENERGY SAVINGS PLAN (ESP): ESCOs PROPOSED FINAL PROJECT COST FORM VENTNOR ENERGY SAVING IMPROVEMENT PROGRAM		
ESCO Name: DCO Energy PROPOSED CONSTRUCTION FEES:		
Fee Category	**Fees [1] Dollar ($) Value**	**Percentage of Hard Costs**
Estimated Value of Hard Costs [2]	$ 6,030,694	N/A
ECM Contingency	$ 603,069	
Total Value of Hard Costs	$ 6,633,763	
Project Service Fees		
Investment Grade Energy Audit	$ 173,805	2.62%
Design Engineering Fees	$ 536,008	8.08%
Construction Management & Project Administration	$ 310,460	4.68%
System Commissioning	$ 54,397	0.82%
Equipment Initial Training Fees	$ 26,535	0.40%
ESCO Overhead	$ 266,014	4.01%
ESCO Profit	$ 206,973	3.12%
Project Service Fees Sub Total	$ 1,101,205	16.60%
TOTAL FINANCED PROJECT COSTS:	$ 8,207,955	23.73%
PROPOSED ANNUAL SERVICE FEES		
First Year Annual Service Fees	**Fees [1] Dollar ($) Value**	**Percentage of Hard Costs**
SAVINGS GUARANTEE *(OPTION)*	$0	0.00%
Measurement & Verification *(Associated w/ Savings Guarantee Option)*	$47,763	0.72%
ENERGY STAR Services *(optional)*	$0	0.00%
Post Construction Services *(if applicable)*	$0	0.00%
Performance Monitoring	w/ M&V	0.00%
On-going Training Services	w/ M&V	0.00%
Verification Reports	w/ M&V	0.00%
TOTAL FIRST YEAR ANNUAL SERVICES	$0	0.00%

NOTES:
(1) Fees should include all mark-ups, overhead, and profit. Figures stated as a range will NOT be accepted.
(2) The total value of Hard Costs is defined in accordance with standard AIA definitions that include: Labor Costs, Subcontractor Costs, Cost of Materials and Equipment, Temporary Facilities and Related Items, and Miscellaneous Costs such as Permits, Bonds Taxes, Insurance, Mark-ups, Overhead and Profit, etc.

ESCO's proposed interest rate at the time of submission: 5% TO BE USED BY ALL RESPONDING ESCOs FOR PROPOSAL PURPOSES

Form V – ESCO Construction and Service Fees (per entity)

FORM V - VENTNOR CITY		
ESCO's ENERGY SAVINGS PLAN (ESP): ESCOs PROPOSED FINAL PROJECT COST FORM VENTNOR ENERGY SAVING IMPROVEMENT PROGRAM		
ESCO Name: DCO Energy PROPOSED CONSTRUCTION FEES:		
Fee Category	**Fees [1] Dollar ($) Value**	**Percentage of Hard Costs**
Estimated Value of Hard Costs [2]	$ 4,449,878	N/A
ECM Contingency	$ 444,988	
Total Value of Hard Costs	$ 4,894,866	
Project Service Fees		
Investment Grade Energy Audit	$ 128,245	2.62%
Design Engineering Fees	$ 395,505	8.08%
Construction Management & Project Administration	$ 229,080	4.68%
System Commissioning	$ 40,138	0.82%
Equipment Initial Training Fees	$ 19,579	0.40%
ESCO Overhead	$ 196,284	4.01%
ESCO Profit	$ 152,720	3.12%
Project Service Fees Sub Total	$ 812,548	16.60%
TOTAL FINANCED PROJECT COSTS:	$ 6,056,418	23.73%
PROPOSED ANNUAL SERVICE FEES		
First Year Annual Service Fees	**Fees [1] Dollar ($) Value**	**Percentage of Hard Costs**
SAVINGS GUARANTEE *(OPTION)*	$0	0.00%
Measurement & Verification *(Associated w/ Savings Guarantee Option)*	$35,243	0.72%
ENERGY STAR Services *(optional)*	$0	0.00%
Post Construction Services *(if applicable)*	$0	0.00%
Performance Monitoring	w/ M&V	0.00%
On-going Training Services	w/ M&V	0.00%
Verification Reports	w/ M&V	0.00%
TOTAL FIRST YEAR ANNUAL SERVICES	$0	0.00%

NOTES:
(1) Fees should include all mark-ups, overhead, and profit. Figures stated as a range will NOT be accepted.
(2) The total value of Hard Costs is defined in accordance with standard AIA definitions that include: Labor Costs, Subcontractor Costs, Cost of Materials and Equipment, Temporary Facilities and Related Items, and Miscellaneous Costs such as Permits, Bonds Taxes, Insurance, Mark-ups, Overhead and Profit, etc.

ESCO's proposed interest rate at the time of submission: 5% TO BE USED BY ALL RESPONDING ESCOs FOR PROPOSAL PURPOSES

FORM V - VENTNOR BOE		
ESCO's ENERGY SAVINGS PLAN (ESP): ESCOs PROPOSED FINAL PROJECT COST FORM VENTNOR ENERGY SAVING IMPROVEMENT PROGRAM		
ESCO Name: DCO Energy PROPOSED CONSTRUCTION FEES:		
Fee Category	Fees [1] Dollar ($) Value	Percentage of Hard Costs
Estimated Value of Hard Costs [2]	$ 1,580,815	N/A
ECM Contingency	$ 158,082	
Total Value of Hard Costs	$ 1,738,897	
Project Service Fees		
Investment Grade Energy Audit	$ 45,559	2.62%
Design Engineering Fees	$ 140,503	8.08%
Construction Management & Project Administration	$ 81,380	4.68%
System Commissioning	$ 14,259	0.82%
Equipment Initial Training Fees	$ 6,956	0.40%
ESCO Overhead	$ 69,730	4.01%
ESCO Profit	$ 54,254	3.12%
Project Service Fees Sub Total	$ 288,657	16.60%
TOTAL FINANCED PROJECT COSTS:	$ 2,151,537	23.73%
PROPOSED ANNUAL SERVICE FEES		
First Year Annual Service Fees	Fees [1] Dollar ($) Value	Percentage of Hard Costs
SAVINGS GUARANTEE *(OPTION)*	$0	0.00%
Measurement & Verification *(Associated w/ Savings Guarantee Option)*	$12,520	0.72%
ENERGY STAR Services *(optional)*	$0	0.00%
Post Construction Services *(if applicable)*	$0	0.00%
Performance Monitoring	w/ M&V	0.00%
On-going Training Services	w/ M&V	0.00%
Verification Reports	w/ M&V	0.00%
TOTAL FIRST YEAR ANNUAL SERVICES	$0	0.00%

NOTES:
(1) Fees should include all mark-ups, overhead, and profit. Figures stated as a range will NOT be accepted.
(2) The total value of Hard Costs is defined in accordance with standard AIA definitions that include: Labor Costs, Subcontractor Costs, Cost of Materials and Equipment, Temporary Facilities and Related Items, and Miscellaneous Costs such as Permits, Bonds Taxes, Insurance, Mark-ups, Overhead and Profit, etc.

ESCO's proposed interest rate at the time of submission: 5% TO BE USED BY ALL RESPONDING ESCOs FOR PROPOSAL PURPOSES

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Form VI – Project Cash Flow Analysis (overall ESIP)

FORM VI - VENTNOR COMBINED

ESCO's ENERGY SAVINGS PLAN (ESP):
ESCO's ANNUAL CASH FLOW ANALYSIS FORM
VENTNOR - ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: DCO Energy

Note: Respondents must use the following assumptions in all financial calculations:
(a) The cost of all types of energy should be assumed to inflate at **2.4% gas, 2.2%** electric per year and
1. Term of Agreement: **20** Years
2. Construction Period [2] (months): 18 Months
3. Cash Flow Analysis Format:

Miscellaneous Costs Financed:	
Cost of Issuance	$20,000
Consultant	$25,000
Total	$45,000

Project Cost[1]: **$8,207,955**
Direct Install Incentive Payment: **-$36,861**
Miscellaneous Costs Financed: **$45,000**
Financed Amount: **$8,216,094**

Interest Rate: **2.00%**

Year	Annual Energy Savings	Solar PPA Savings	Annual Operational Savings	Energy Rebates / Incentives	Total Annual Savings	Annual Project Costs	Board Costs[3]	Annual Service Costs[4]	Net Cash-Flow to Client	Cumulative Cash Flow
Installation	$ -		$ -	$ -	$ -				$ -	$ -
Year 1	$ 429,696	$ 18,202	$ -	$ 158,070	$ 605,968	$ (549,756)	$ (47,763)	$ (4,011)	$ 4,438	$ 4,438
Year 2	$ 400,415	$ 18,756	$ -	$ 73,130	$ 492,301	$ (483,632)		$ (4,231)	$ 4,438	$ 8,876
Year 3	$ 409,253	$ 19,324	$ -	$ -	$ 428,577	$ (419,687)		$ (4,452)	$ 4,438	$ 13,314
Year 4	$ 418,286	$ 19,906	$ -	$ -	$ 438,193	$ (429,082)		$ (4,672)	$ 4,438	$ 17,752
Year 5	$ 427,519	$ 20,503	$ -		$ 448,022	$ (438,691)		$ (4,893)	$ 4,438	$ 22,190
Year 6	$ 436,955	$ 21,114			$ 458,069	$ (448,474)		$ (5,157)	$ 4,438	$ 26,628
Year 7	$ 446,600	$ 21,740			$ 468,340	$ (458,481)		$ (5,422)	$ 4,438	$ 31,066
Year 8	$ 456,458	$ 22,382			$ 478,840	$ (468,716)		$ (5,686)	$ 4,438	$ 35,503
Year 9	$ 466,533	$ 23,039			$ 489,572	$ (479,184)		$ (5,951)	$ 4,438	$ 39,941
Year 10	$ 476,831	$ 23,712			$ 500,544	$ (489,847)		$ (6,259)	$ 4,438	$ 44,379
Year 11	$ 487,357	$ 24,402			$ 511,759	$ (507,321)			$ 4,438	$ 48,817
Year 12	$ 498,114	$ 25,109			$ 523,223	$ (518,785)			$ 4,438	$ 53,255
Year 13	$ 509,109	$ 25,833			$ 534,942	$ (530,504)			$ 4,438	$ 57,693
Year 14	$ 520,347	$ 26,574			$ 546,922	$ (542,484)			$ 4,438	$ 62,131
Year 15	$ 531,833	$ 27,334			$ 559,167	$ (554,730)			$ 4,438	$ 66,569
Year 16	$ 543,573	$ -			$ 543,573	$ (539,135)			$ 4,438	$ 71,007
Year 17	$ 555,572	$ -			$ 555,572	$ (551,134)			$ 4,438	$ 75,445
Year 18	$ 567,836	$ -			$ 567,836	$ (563,398)			$ 4,438	$ 79,883
Year 19	$ 580,371	$ -			$ 580,371	$ (575,933)			$ 4,438	$ 84,321
Year 20	$ 593,182	$ -			$ 593,182	$ (588,744)			$ 4,438	$ 88,759
Totals	$ 9,755,842	$ 337,932	$ -	$ 231,200	$ 10,324,974	$ (10,137,718)	$ (47,763)	$ (50,734)	$ 88,759	

NOTES:
(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"
(2) No payments are made by Ventnor during the construction period.
(3) Board Costs represent Measurement and Verification cost as shown on Form 5
(4) Annual Service Costs are for the maintenance on the Combined Heat and Power unit

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Form VI – Project Cash Flow Analysis (per entity)

FORM VI - VENTNOR CITY

ESCO's ENERGY SAVINGS PLAN (ESP):
ESCO's ANNUAL CASH FLOW ANALYSIS FORM
VENTNOR - ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: DCO Energy

Note: Respondents must use the following assumptions in all financial calculations:
(a) The cost of all types of energy should be assumed to inflate at **2.4% gas, 2.2%** electric per year and
1. Term of Agreement: **20** Years
2. Construction Period [2] (months): 18 Months
3. Cash Flow Analysis Format:

Miscellaneous Costs Financed:	
Cost of Issuance	$10,000
Consultant	$12,500
Total	$22,500

Project Cost[1]: **$6,056,418**
Direct Install Incentive Payment: **-$36,861**
Miscellaneous Costs Financed: **$22,500**
Financed Amount: **$6,042,057**

Interest Rate: **2.00%**

Year	Annual Energy Savings	Solar PPA Savings	Annual Operational Savings	Energy Rebates / Incentives	Total Annual Savings	Annual Project Costs	Board Costs[3]	Annual Service Costs[4]	Net Cash-Flow to Client	Cumulative Cash Flow
Installation	$ -			$ -	$ -				$ -	$ -
Year 1	$ 305,910	$ 18,202	$ -	$ 58,690	$ 382,802	$ (344,995)	$ (35,243)	$ -	$ 2,564	$ 2,564
Year 2	$ 294,352	$ 18,756	$ -	$ -	$ 313,109	$ (310,544)		$ -	$ 2,564	$ 5,128
Year 3	$ 300,847	$ 19,324	$ -	$ -	$ 320,172	$ (317,608)		$ -	$ 2,564	$ 7,693
Year 4	$ 307,486	$ 19,906	$ -	$ -	$ 327,393	$ (324,828)		$ -	$ 2,564	$ 10,257
Year 5	$ 314,271	$ 20,503	$ -		$ 334,774	$ (332,210)		$ -	$ 2,564	$ 12,821
Year 6	$ 321,206	$ 21,114			$ 342,320	$ (339,756)		$ -	$ 2,564	$ 15,385
Year 7	$ 328,294	$ 21,740			$ 350,034	$ (347,470)		$ -	$ 2,564	$ 17,949
Year 8	$ 335,538	$ 22,382			$ 357,920	$ (355,356)		$ -	$ 2,564	$ 20,514
Year 9	$ 342,943	$ 23,039			$ 365,982	$ (363,418)		$ -	$ 2,564	$ 23,078
Year 10	$ 350,510	$ 23,712			$ 374,223	$ (371,659)		$ -	$ 2,564	$ 25,642
Year 11	$ 358,245	$ 24,402			$ 382,647	$ (380,083)			$ 2,564	$ 28,206
Year 12	$ 366,151	$ 25,109			$ 391,260	$ (388,695)			$ 2,564	$ 30,770
Year 13	$ 374,231	$ 25,833			$ 400,064	$ (397,499)			$ 2,564	$ 33,334
Year 14	$ 382,489	$ 26,574			$ 409,064	$ (406,499)			$ 2,564	$ 35,899
Year 15	$ 390,930	$ 27,334			$ 418,264	$ (415,700)			$ 2,564	$ 38,463
Year 16	$ 399,557	$ -			$ 399,557	$ (396,993)			$ 2,564	$ 41,027
Year 17	$ 408,374	$ -			$ 408,374	$ (405,810)			$ 2,564	$ 43,591
Year 18	$ 417,386	$ -			$ 417,386	$ (414,822)			$ 2,564	$ 46,155
Year 19	$ 426,597	$ -			$ 426,597	$ (424,033)			$ 2,564	$ 48,720
Year 20	$ 436,011	$ -			$ 436,011	$ (433,447)			$ 2,564	$ 51,284
Totals	$ 7,161,330	$ 337,932	$ -	$ 58,690	$ 7,557,952	$ (7,471,425)	$ (35,243)	$ -	$ 51,284	

NOTES:
(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"
(2) No payments are made by Ventnor during the construction period.
(3) Board Costs represent Measurement and Verification cost as shown on Form 5
(4) Annual Service Costs are for the maintenance on the Combined Heat and Power unit

FORM VI - VENTNOR BOE

ESCO's ENERGY SAVINGS PLAN (ESP):
ESCO's ANNUAL CASH FLOW ANALYSIS FORM
VENTNOR - ENERGY SAVING IMPROVEMENT PROGRAM

ESCO Name: DCO Energy

Note: Respondents must use the following assumptions in all financial calculations:
(a) The cost of all types of energy should be assumed to inflate at **2.4% gas, 2.2%** electric per year and
1. Term of Agreement: **20** Years
2. Construction Period [2] (months): 18 Months
3. Cash Flow Analysis Format:

Miscellaneous Costs Financed:	
Cost of Issuance	$10,000
Consultant	$12,500
Total	$22,500

Project Cost[1]: **$2,151,537**
Direct Install Incentive Payment: **$0**
Miscellaneous Costs Financed: **$22,500**
Financed Amount: **$2,174,037**

Interest Rate: **2.00%**

Year	Annual Energy Savings	Solar PPA Savings	Annual Operational Savings	Energy Rebates / Incentives	Total Annual Savings	Annual Project Costs	Board Costs[3]	Annual Service Costs[4]	Net Cash-Flow to Client	Cumulative Cash Flow
Installation	$ -			$ -	$ -				$ -	$ -
Year 1	$ 123,786	$ -	$ -	$ 99,380	$ 223,166	$ (204,761)	$ (12,520)	$ (4,011)	$ 1,874	$ 1,874
Year 2	$ 106,063	$ -	$ -	$ 73,130	$ 179,193	$ (173,087)		$ (4,231)	$ 1,874	$ 3,747
Year 3	$ 108,405	$ -	$ -	$ -	$ 108,405	$ (102,080)		$ (4,452)	$ 1,874	$ 5,621
Year 4	$ 110,800	$ -	$ -	$ -	$ 110,800	$ (104,254)		$ (4,672)	$ 1,874	$ 7,495
Year 5	$ 113,248	$ -	$ -		$ 113,248	$ (106,481)		$ (4,893)	$ 1,874	$ 9,369
Year 6	$ 115,749	$ -			$ 115,749	$ (108,718)		$ (5,157)	$ 1,874	$ 11,242
Year 7	$ 118,306	$ -			$ 118,306	$ (111,011)		$ (5,422)	$ 1,874	$ 13,116
Year 8	$ 120,919	$ -			$ 120,919	$ (113,360)		$ (5,686)	$ 1,874	$ 14,990
Year 9	$ 123,591	$ -			$ 123,591	$ (115,766)		$ (5,951)	$ 1,874	$ 16,864
Year 10	$ 126,321	$ -			$ 126,321	$ (118,188)		$ (6,259)	$ 1,874	$ 18,737
Year 11	$ 129,111	$ -			$ 129,111	$ (127,238)			$ 1,874	$ 20,611
Year 12	$ 131,963	$ -			$ 131,963	$ (130,090)			$ 1,874	$ 22,485
Year 13	$ 134,879	$ -			$ 134,879	$ (133,005)			$ 1,874	$ 24,359
Year 14	$ 137,858	$ -			$ 137,858	$ (135,985)			$ 1,874	$ 26,232
Year 15	$ 140,904	$ -			$ 140,904	$ (139,030)			$ 1,874	$ 28,106
Year 16	$ 144,016	$ -			$ 144,016	$ (142,143)			$ 1,874	$ 29,980
Year 17	$ 147,198	$ -			$ 147,198	$ (145,324)			$ 1,874	$ 31,854
Year 18	$ 150,450	$ -			$ 150,450	$ (148,576)			$ 1,874	$ 33,727
Year 19	$ 153,774	$ -			$ 153,774	$ (151,900)			$ 1,874	$ 35,601
Year 20	$ 157,171	$ -			$ 157,171	$ (155,297)			$ 1,874	$ 37,475
Totals	$ 2,594,512	$ -	$ -	$ 172,510	$ 2,767,022	$ (2,666,293)	$ (12,520)	$ (50,734)	$ 37,475	

NOTES:
(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"
(2) No payments are made by Ventnor during the construction period.
(3) Board Costs represent Measurement and Verification cost as shown on Form 5
(4) Annual Service Costs are for the maintenance on the Combined Heat and Power unit

Utility Inflation Details

Per Form VI, the annual inflation rate for electric is 2.2%, natural gas 2.4% and 1.5% for solar per PPA bid results.

Utility Inflation Worksheet				
Year	NET ANNUAL ELECTRIC COST SAVINGS (EXCLUDING SOLAR PPA SAVINGS)	ANNUAL NATURAL GAS COST SAVINGS	Net Solar Savings	Total
2	$385,942.30	$14,472.53	$18,756.35	$419,171.19
3	$394,433.03	$14,819.87	$19,324.39	$428,577.30
4	$403,110.56	$15,175.55	$19,906.46	$438,192.57
5	$411,978.99	$15,539.76	$20,502.90	$448,021.66
6	$421,042.53	$15,912.72	$21,114.03	$458,069.28
7	$430,305.47	$16,294.62	$21,740.20	$468,340.29
8	$439,772.19	$16,685.69	$22,381.74	$478,839.63
9	$449,447.17	$17,086.15	$23,039.02	$489,572.35
10	$459,335.01	$17,496.22	$23,712.40	$500,543.63
11	$469,440.38	$17,916.13	$24,402.25	$511,758.76
12	$479,768.07	$18,346.12	$25,108.94	$523,223.12
13	$490,322.97	$18,786.42	$25,832.86	$534,942.25
14	$501,110.07	$19,237.30	$26,574.41	$546,921.78
15	$512,134.50	$19,698.99	$27,333.99	$559,167.48
16	$523,401.45	$20,171.77		$543,573.22
17	$534,916.29	$20,655.89		$555,572.18
18	$546,684.44	$21,151.63		$567,836.08
19	$558,711.50	$21,659.27		$580,370.77
20	$571,003.16	$22,179.09		$593,182.25

ENERGY SAVINGS PLAN

SECTION 6 – RISK, DESIGN, & COMPLIANCE

Assessment of Risks, Design & Compliance Issues

Moving from a conceptual design to engineered documents DCO has identified areas of the project that could change during the detailed design. The table below represents potential conceptual areas of concern that will need to be investigated further with a corresponding party responsible for the compliance of each item.

Issue	Category	Responsible Party
Alteration of expected Maintenance and Operational Savings	Risk	Ventnor
Disposition of Abandoned Equipment (Steam Piping, Condensate Piping, Oil Tanks, etc.)	Risk	Ventnor
New Natural Gas Distribution	Risk	Ventnor
Integrity of re-used Infrastructure	Risk	Ventnor
Life Safety System Coordination	Risk	Ventnor
Coordination with Ventnor Information Technology Department	Risk	Ventnor
Ventilation Compliance with Code	Compliance	Consulting Engineer
Temperature, Humidity and Air Change Compliance with Code	Compliance	Consulting Engineer
Boiler Capacity and Turndown	Design	Consulting Engineer
Natural Gas Regulator Compliance with Code	Compliance	Consulting Engineer
Undocumented Underground Utilities	Risk	Consulting Engineer
Code Compliance of Existing Electrical Infrastructure	Compliance	Consulting Engineer
Lighting Levels	Compliance	Consulting Engineer
Design Light Consortium rating for bulbs	Compliance	Consulting Engineer

Underwriters Laboratory Testing for retrofitted LED Lighting Systems	Compliance	Consulting Engineer
Lighting Retrofits within hard ceilings for fixtures and occupancy sensors	Risk	Consulting Engineer
Street/Parking Lot Pole Structural Integrity	Risk	Consulting Engineer
Unrealized Energy Savings 1. Energy Modeling 2. Performance Monitoring 3. Capacity of Equipment 4. Efficiency of Equipment 5. Run Hours of Equipment	Risk	DCO/ Consulting Engineer 1. DCO 2. DCO 3. Consulting Engineer / Basis of Design Vendor 4. Consulting Engineer / Basis of Design Vendor 5. Ventnor
Existing Plumbing Infrastructure with New Low Flow Devices	Design	Consulting Engineer
Adaptation to New RTUs (Curb, Electric, Ductwork, Condensate)	Design	Consulting Engineer / Basis of Design Manufacture
Structural Loads for Rooftop Equipment Replacement	Design	Consulting Engineer
Transformer Loading	Risk	Consulting Engineer
Site Work for Equipment	Design	Consulting Engineer
Condition of Roof Under Units	Risk	Consulting Engineer
Adequate Crane Lifts & Clearances	Design	Consulting Engineer / Rigger
Physical Space Constraints and Clearance for Equipment Replacement	Design	Consulting Engineer
Refrigerant Reclaim / Refrigerant Disposal	Compliance	Contractor

Existing Tie in Locations	Design	Consulting Engineer
Schedule Oversight	Risk	DCO Energy
Impact of Boiler Flue	Design	Consulting Engineer
Impact of Space Usage During Construction	Risk	Consulting Engineer & Ventnor
Scope changes relating to requests by Authorities Having Jurisdiction.	Risk	Ventnor (via contingency)
Department of Environmental Protection Permitting	Risk	Consulting Engineer
Modifications of Energy Saving Control Sequences and Setpoints impacting Energy Savings and Incentives	Risk	Ventnor
Post Construction Calibration of Sensors, Meters, & Safety Devices	Risk	Ventnor
Adequate time and access for bidding contractor site surveys	Risk	Ventnor
Utility Interconnection approval for the CHP Unit	Risk	Ventnor

Measurement & Verification (M&V) Plan

Our approach to M&V of energy savings aligns with the International Performance Measurement & Verification Protocol. More detailed information may be found below. It's most cost-effective to perform M&V using the least costly option that still adequately documents system performance and permits analysis of savings. This approach lowers the total cost of the program leaving more dollars available to perform more facility improvements. Depending upon which ECMs are implemented by Ventnor, the M&V plan proposed by DCO would incorporate one or more of the following options which outlines the four most common approaches for M&V:

Option A – Retrofit Isolation with Key Parameter Measurement	This option is based on a combination of measured and estimated factors when variations in factors are not expected. Measurements are spot or short-term and are taken at the component or system level, both in the baseline and post-installation cases. Measurements should include the key performance parameter(s) which define the energy use of the ECM. Estimated factors are supported by historical or manufacturer's data. Savings are determined by means of engineering calculations of baseline and post-installation energy use based on measured and estimated values.	Direct measurements and estimated values, engineering calculations and/or component or system models often developed through regression analysis. Adjustments to models are not typically required.
Option B – Retrofit Isolation with Parameter Measurement	This option is based on periodic or continuous measurements of energy use taken at the component or system level when variations in factors are expected. Energy or proxies of energy use are measured continuously. Periodic spot or short-term measurements may suffice when variations in factors are not expected. Savings are determined form analysis of baseline and reporting period energy use of proxies of energy use.	Direct measurements, engineering calculations, and/or component or system models often developed through regression analysis. Adjustments to models may be required.
Option C – Utility Data Analysis	This option is based on long-term, continuous, whole-building utility meter, facility level, or sub-meter energy (or water) data. Savings are determined from analysis of baseline and reporting period energy data. Typically, regression analysis is conducted to correlate with and adjust energy use to independent variables such as weather, but simple comparisons may also be used.	Based on regression analysis of utility meter data to account for factors that drive energy use. Adjustments to models are typically required.
Option D – Calibrated	Computer simulation software is used to model energy performance of a whole-facility (or sub-facility). Models must be calibrated with actual hourly or monthly billing data from the facility. Implementation of simulation modeling requires	Based on computer simulation model calibrated with whole-building or end-use

Computer Simulation	engineering expertise. Inputs to the model include facility characteristics; performance specifications of new and existing equipment or systems; engineering estimates, spot-, short-term, or long-term measurements of system components; and long-term whole-building utility meter data. After the model has been calibrated, savings are determined by comparing a simulation of the baseline with either a simulation of the performance period or actual utility data	metered data or both. Adjustments to models are required.

Each of the options can be used for a wide array of energy efficiency upgrades and each has different costs and complexities associated with it. When selecting an M&V approach, the following general rule of thumb can be applied:

OPTION A

- When magnitude of savings is low for the entire project or a portion of the project
- The risk for not achieving savings is low

OPTION B

- For simple equipment replacement projects
- When energy savings values per individual measure are desired
- When interactive effects are to be ignored or are estimated using estimating methods that do not involve long term measurements
- When sub-meters already exist that record the energy use of subsystems under consideration

OPTION C

- For complex equipment replacement and controls projects
- When predicted energy savings are in excess of 10 to 20 percent as compared with the record energy use
- When energy savings per individual measure are not desired
- When interactive effects are to be included
- When the independent variables that affect energy, use are complex and excessively difficult or expensive

OPTION D

- When new construction projects are involved
- When energy savings values per measure are desired
- When Option C tools cannot cost effectively evaluate particular measures or their interactions with the building when complex baseline adjustments are anticipated

DCO will perform measurement and verification of the energy units savings at the conclusion of each month in the first year of the energy units guarantee. After the first year, M&V will be performed and presented within 30 days of year end. Ventnor will work with DCO to provide necessary information and provide access to any buildings to allow DCO to properly verify and measure energy savings. DCO's energy guarantee will be based on units of energy saved as determined from the baseline provided in the RFP, or adjusted baseline if original baseline is determined by both parties to be inaccurate.

Adjustments to the baseline and associated savings will be taken for weather, hours of operation, building usage, utility rate increases, code or statute changes, requirements listed in Table 1, and any other actions that adversely affect the savings beyond the control of DCO. Any savings discrepancies will be resolved to the satisfaction of both the Ventnor and DCO in a timely manner.

As part of the optional energy guarantee, DCO uses weather normalization procedures to correct for the effect of weather variance on energy savings in subsequent years. Baseline energy and weather data are used to establish an algorithm to predict how the baseline building uses energy as a function of weather. The algorithm is then applied to subsequent years to correct for the impact weather may have on future building energy use. The weather normalization procedure and algorithms will be covered in detail as part of the optional energy guarantee contract provided to Ventnor.

Maintenance Plan

Owner Tasks and Responsibilities:

As a general statement, Ventnor or its 3rd party service providers shall be responsible for providing ongoing maintenance through the duration of the M&V period. DCO will review operational procedures and schedules associated with such things as the building automation/control upgrades as well as the manufacturers' published requirements for all installed equipment be it: quarterly, semi-annually or annually. In most cases, Ventnor is already aware of or self-implementing similar maintenance practices on campus or has contracted a 3rd party for such services. Failure to properly maintain the equipment may cause energy savings goals to fall short.

Specific Areas of Consideration:

In order to sustain energy savings Ventnor's Staff will be required to implement new maintenance tasks and even modify existing policies and practices. Outlined are two examples of specific instances.

Example 1. Advanced Building Operations Programming:

Ventnor will be given specific training on the changes and advancements in the environmental operations and energy savings strategies. Ventnor will be responsible for following the agreed upon guidelines associated with programmed schedules and any use of override functions.

Example 2. Verification of Proper Operations: Mechanical Equipment

Ventnor will be required to assure that proper mechanical maintenance continues to be implemented on its mechanical equipment. Example: outside air dampers will require proper operation with the appropriate seals in order to maintain ECM(s) such as demand ventilation. DCO will periodically spot check system operations to verify the Owner or its 3rd party representative is implementing proper maintenance. Any deficiencies that may be identified will be brought to Ventnor 's attention for correction.

ENERGY SAVINGS PLAN

SECTION 7 – OPERATION & MAINTENANCE

It is critical to the success of achieving continued energy savings that Ventnor develop and implement an Operation and Maintenance Plan. In this section are some recommendations for maintenance tasks for various pieces of equipment and systems to assist Ventnor and/or 3rd party maintenance contractors.

Air Handling Units

Comprehensive Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Inspect the unit for cleanliness.
   b) Inspect the fan wheel and shaft for wear and clearance.
   c) Check the sheaves and pulleys for wear and alignment.
   d) Check the belts for tension, wear, cracks, and glazing.
   e) Verify tight bolts, set screws, and locking collars.
   f) Check dampers for wear, security and linkage adjustment.
   g) Verify clean condensate pan.
   h) Verify proper operation of the condensate drain.
   i) Verify clean air filters.
   j) Verify clean coils.
   k) Verify proper operation of the spray pump, if applicable.
   l) Verify smooth fan operation.
   m) Log operating conditions after system has stabilized.
   n) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.
4. Lubrication
   a) Lubricate the fan shaft bearings, if applicable.
   b) Lubricate the motor bearings, if applicable.
5. Controls and Safeties
   a) Test the operation of the low temperature safety device, if applicable.
   b) Test the operation of the high static pressure safety device, if applicable.
   c) Test the operation of the low static pressure safety device, if applicable.
   d) Check the thermal cutout on electric heaters, if applicable.
   e) Check the step controller, if applicable.

f) Check and record supply air and control air pressure, if applicable.
g) Verify the operation of the control system and dampers while the fan is operating.

6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect the wiring and connections for tightness and signs of overheating and discoloration. This includes wiring to the electric heat, if applicable.
   c) Check the condition of the contacts for wear and pitting.
   d) Check the contactors for free and smooth operation.
   e) Meg the motor and record readings.

Heating Inspection

1. Gas Heat Option
   a) Visually inspect the heat exchanger.
   b) Inspect the combustion air blower fan, and clean, if required.
   c) Lubricate the combustion air blower fan motor, if applicable.
   d) Verify the operation of the combustion air flow-proving device.
   e) Test the operation of the high gas pressure safety device, if applicable. Calibrate, if necessary.
   f) Test the operation of the low gas pressure safety device, if applicable. Calibrate, if necessary.
   g) Verify the operation of the flame detection device.
   h) Test the operation of the high temperature limit switch.
   i) Verify the integrity of the flue system.
   j) Verify the operation of the operating controls.
   k) Verify the burner sequence of operation.
   l) Verify proper gas pressure to the unit and/or at the manifold, if applicable.
   m) Perform combustion test. Make adjustments as necessary.
2. Electric Heat Option
   a) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   b) Check and calibrate operating and safety controls, if applicable.
   c) Verify the operation of the heating elements.
   d) Check voltage and amperage and compare readings with the watt rating on the heater.
3. Hot Water / Steam Heat Option
   a) Inspect control valves and traps.
   b) Check and calibrate all operating and safety controls.
   c) Verify the operation of the heating coils.
   d) Verify the operation of the unit low temperature safety device.

Scheduled Running Inspection

1. Check the general condition of the fan.
2. Verify smooth fan operation.
3. Check and record supply and control air pressure, if applicable.
4. Verify the operation of the control system.
5. Log the operating conditions after the system has stabilized.
6. Review operating procedures with operating personnel.
7. Provide a written report of completed work, operating log, and indicate uncorrected deficiencies detected.

Oil Sample/Spectrographic Analysis

1. Pull oil sample for spectrographic analysis

Refrigerant Sample/Analysis

1. Pull refrigerant sample for spectrographic analysis for contaminants (oil, water, and acid), using approved containers

Boilers

Comprehensive Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Secure and drain the boiler.
   b) Open the fire and water side for cleaning and inspection.
   c) Check heating surfaces and water side for corrosion, pitting, scale, blisters, bulges, and soot.
   d) Inspect refractory.
   e) Clean fire inspection glass.
   f) Check blow-down valve packing, and lubricate.
   g) Check and test boiler blow-down valve.

h) Perform hydrostatic test, if required.
i) Verify proper operation of the level float.
j) Gas Train Burner Assembly
    1. Check the gas train isolation valves for leaks.
    2. Check the gas supply piping for leaks.
    3. Check the gas pilot solenoid valve for wear and leaks.
    4. Check the main gas and the pilot gas regulators for wear and leaks.
    5. Test the low gas pressure switch. Calibrate and record setting.
    6. Test the high gas pressure switch. Calibrate and record setting.
    7. Verify the operation of the burner fan air flow switch.
    8. Inspect and clean the burner assembly.
    9. Inspect and clean the pilot igniter assembly.
    10. Inspect and clean the burner fan.
    11. Run the fan and check for vibration.
    12. Inspect the flue and flue damper.
    13. Burner Control Panel:
        a) Inspect the panel for cleanliness.
        b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
k) Clean burner fan wheel and air dampers. Check fan for vibration.
l) Verify tightness on linkage set screws.
m) Check gas valves for leakage (where test cocks are provided).
n) Verify proper operation of the feed water pump.
o) Verify proper operation of the feed water treating equipment.

4. Controls and Safeties
    a) Disassemble and inspect low water cutoff safety device.
    b) Reassemble boiler low water cutoff safety device with new gaskets.
    c) Clean contacts in program timer, if applicable.
    d) Check the operation of the low water cutoff safety device and feed controls.
    e) Verify the setting and test the operation of the operating and limit controls.
    f) Verify the operation of the water level control.

Startup/Checkout Procedure

1. Verify proper water level in the boiler
2. Test the safety/relief valve after startup (full pressure test).
3. Clean or replace fuel filters.

4. Clean fuel nozzles.
5. Inspect clean, and functionally test the flame scanner and flame safeguard relay.
6. Clean and adjust the ignition electrode.
7. Replace the vacuum tube in the flame safeguard control, if applicable.
8. Perform pilot turn down test.
9. Verify proper steam pressure.
10. Perform combustion test and adjust the burner for maximum efficiency.
11. Test the following items:
    a) Firing rate
    b) Fuel/air ratio
    c) CO2
    d) CO
    e) NOX
    f) Perform smoke test.
12. Review operating procedures
13. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Mid-Season Running Inspection

1. Check the general condition of the unit.
2. Inspect the burner.
3. Adjust the burner controls to obtain proper combustion.
4. Check the operation of the pressure relief valve.
5. Check the operation of the low water cutoff and feed controls.
6. Check the setting and test the operation of the operating and limit controls.
7. Check the operation of the modulating motor.
8. Lift the safety/relief valves with at least 70% of rated pressure.
9. Blow down and try gauge cocks to confirm glass water level.
10. Check and test boiler blow down valve.
11. Log operating conditions after the system has stabilized.
12. Review operating procedures
13. Provide a written report of completed work, operating log, and indicate uncorrected deficiencies detected.

Seasonal Shut-down Procedure

1. Shut down boiler at boiler controls.
2. Shut off fuel lines at main valves.
3. Review operating procedures
4. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Burners

Gas Train

1. Check the gas train isolation valves for leaks.
2. Check the gas supply piping for leaks.
3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.
5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot ignitor assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.
12. Inspect the flue and flue damper.
13. Burner Control Panel:
    a) Inspect the panel for cleanliness.
    b) Inspect wiring and connections for tightness and signs of overheating.
14. Clean burner fan wheel and air dampers. Check the fan for vibration.
15. Verify tightness of the linkage set screws.
16. Check the gas valves against leakage (where test cocks are provided

Oil Train

1. Check the gas train isolation valves for leaks.
2. Check the gas supply piping for leaks.
3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.

5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot ignitor assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.
12. Inspect the flue and flue damper.
13. Burner Control Panel:
    a) Inspect the panel for cleanliness.
    b) Inspect wiring and connections for tightness and signs of overheating.
14. Clean burner fan wheel and air dampers. Check the fan for vibration.
15. Verify tightness of the linkage set screws.
16. Check the gas valves against leakage (where test cocks are provided).

Dual Fuel Train

1. Check the gas train isolation valves for leaks.
2. Check the gas supply piping for leaks.
3. Check the gas pilot solenoid valve for wear and leaks.
4. Check the main gas and the pilot gas regulators for wear and leaks.
5. Test the low gas pressure switch. Calibrate and record setting.
6. Test the high gas pressure switch. Calibrate and record setting.
7. Verify the operation of the burner fan air flow switch.
8. Inspect and clean the burner assembly.
9. Inspect and clean the pilot ignitor assembly.
10. Inspect and clean the burner fan.
11. Run the fan and check for vibration.
12. Inspect the flue and flue damper.
13. Burner Control Panel:
    a) Inspect the panel for cleanliness.
    b) Inspect wiring and connections for tightness and signs of overheating.
14. Clean burner fan wheel and air dampers. Check the fan for vibration.
15. Verify tightness of the linkage set screws.
16. Check the gas valves against leakage (where test cocks are provided)

Energy Management System

Maintenance Inspection

1. Review reports for operational problems and trends.
2. Make a back-up copy of the BAS program.
3. Check for loose or damaged parts or wiring.
4. Check for any accumulation of dirt or moisture. Clean if required.
5. Verify proper electrical grounding.
6. Verify control panel power supplies for proper output voltages.
7. Inspect interconnecting cables and electrical connections.
8. Verify that manual override switches are in the desired positions.
9. Check the operation of all binary and analog outputs, if applicable.
10. Calibrate control devices, if applicable.
11. Verify the correct time and date.
12. Check and update the holiday schedules and daylight savings time.
13. Via terminal mode, view the event log and input/output points for any unusual status or override conditions.
14. Clean the external surfaces of the panel enclosure.
15. Review operating program and parameters.
16. Check cable connections for security.
17. Review operating procedures
18. Provide a written report of completed work, and indicate any uncorrected deficiencies detected.

Maintenance Inspection (Control Panels)

1. Control Panel
   a) Verify secure connections on all internal wiring, LAN, and communication links.
   b) Check for loose or damaged parts or wiring.
   c) Check for any accumulation of dirt or moisture. Clean if required.
   d) Remove excessive dust from heat sink surfaces
   e) Verify proper system electrical grounding.
   f) Verify proper output voltages on control panel power supplies.
   g) Check LED Indications to verify proper operation
   h) Verify LAN communications

i) Verify that cards are seated and secured.
j) Check wiring trunks and check for possible Error Code Indications
k) Check voltage level of
l) Verify the proper operation of critical control processes and points associated with this unit an make adjustments if necessary.
m) Check Volatile memory available
n) Cheek Non volatile memory available
o) Check Processor idle time
p) Clean external surfaces of the panel enclosure.
q) Check modem operation, if applicable.
r) View the event log and input/output points for any unusual status or override conditions.
s) Verify correct time and date.
t) Check and update holiday schedules, if applicable, and daylight savings time.
u) Review operating procedures with operating personnel.
v) Provide a written report of completed work, and indicate any uncorrected deficiencies detected.

Maintenance Inspection (EMS - Sequence of Operations)

Central Plant

In order to assure effective environmental conditioning while minimizing the cost to operate the equipment, technicians will review operating sequences and practices for the chiller plant. An initial survey of current equipment operating parameters will be conducted within the first 60 days of the contract term during cooling season. This survey will include:

1. Chiller(s) operation
2. Cooling tower(s) operation
3. Pump(s) operation
4. Economizer operation (where applicable)
5. Environmental safety

A detailed report of findings and recommendations for changes, if any, will be made. Agreed upon operational changes which require only adjustment of controls or programming will be made during regularly scheduled maintenance visits as part of this agreement at no additional cost. Any recommended alterations that require addition of devices or equipment will be accompanied by a guaranteed cost proposal reflecting the applicable discounts determined by this agreement.

Building Systems

In order to assure effective environmental conditioning while minimizing the cost to operate the equipment, technicians will review operating sequences and practices for covered airside systems. An initial survey of current systems operating parameters will be conducted within the first 60 days of the contract term, except seasonally operated systems, which will be surveyed during the appropriate operating season. This survey will include:

1. Time schedule(s)
2. Reset schedule(s)
3. Economizer changeover (where applicable)
4. Setpoints
5. Energy Management routines

A detailed report of findings and recommendations for changes, if any, will be made. Agreed upon operational changes which require only adjustment of controls or programming will be made during regularly scheduled maintenance visits as part of this agreement at no additional cost. Any recommended alterations that require addition of devices or equipment will be accompanied by a guaranteed cost proposal reflecting the applicable discounts determined by this agreement.

Fans

Maintenance Procedure

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Check the general condition of the unit.
   b) Verify tightness of the fan, fan guards, louvers, etc.
   c) Verify clean burner assembly.
   d) Check sheaves and pulleys for wear and alignment, if applicable.
   e) Check belts for tension, wear, cracks, and/or glazing.
4. Lubrication
   a) Lubricate the fan motor, if applicable.

b) Lubricate the fan bearings as necessary.

5. Controls and Safeties
   a) Verify proper operation of the temperature control device.
   b) Verify proper operation of the high temperature control device.
   c) Verify proper operation of the fan switch.
   d) Verify proper operation of the pilot safety device, if applicable.
6. Electrical
   a) Inspect wiring and connections for tightness and signs of overheating and discoloration.
7. Startup and Checkout
   a) Start the unit.
   b) Verify proper combustion air to the burner.
   c) Verify proper gas pressure to the burner.
   d) Check the flame for proper combustion.

Comprehensive Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Disassemble all screens and panels necessary to gain access to the fan mechanism.
   b) Disassemble the control mechanism (AVPB only).
   c) Clean all accessible rotor components to include control pitch mechanism (AVPB only).
   d) Inspect blades for wear.
   e) Inspect blade arms for wear (AVPB only).
   f) Check blade tip clearance.
   g) Check for oil leak on the blade bearing housing (AVPB only).
   h) Clean motor and fan housing.
   i) Reassemble all removed screens and plates.
4. Lubrication
   a) Lubricate the motor bearings.
   b) Lubricate the shaft bearings (AVPA only).
5. Controls and Safeties
   a) Test the operation of the high static safety device. Calibrate and record setting.
   b) Test the operation of the low static safety device. Calibrate and record setting.
   c) Test the operation of the vibration safety device. Calibrate and record setting.
   d) Verify the operation of the phase monitor, if applicable.
   e) Inspect pneumatic and electrical controls for condition and calibration.

f) Verify proper operation.

6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Clean the disconnect switch and cabinet at the fan, if applicable.
   c) Inspect the wiring and connections for tightness and signs of overheating and discoloration.
   d) Check the condition of the contacts for wear and pitting.
   e) Check the contactors for free and smooth operation.
   f) Meg the motor and record readings.
7. Startup / Checkout Procedure
   a) Start the fan.
   b) Verify the operation of the starter.
   c) Check and record supply and control air pressure.
   d) Verify the operation of the control system while the fan is operating.
   e) Log the operating conditions after the system has stabilized.
   f) Review operating procedures with operating personnel.
   g) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Scheduled Running Inspection (fans)

1. Check the general operation of the fan.
2. Check and record supply and control air pressure.
3. Verify the operation of the control system.
4. Log the operating conditions after the system has stabilized.
5. Review operating procedures with operating personnel.
6. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Comprehensive Annual Inspection (fans)

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Verify tight bolts, set screws, and locking collars.
   b) Inspect sheaves and pulleys for wear and alignment.
   c) Inspect belts for tension, wear, cracks, and glazing.

d) Inspect dampers for wear, security, and clearances, if applicable.
e) Verify clean air filters.
f) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

4. Lubrication
   a) Lubricate fan bearings.
   b) Lubricate motor bearings, if applicable.
5. Controls and Safeties
   a) Verify the operation of the control system while the fan is operating.
   b) Verify the setting of the low temperature safety device, if applicable.
   c) Verify the operation of the pre-heat control device, if applicable.
   d) Verify the operation of the cooling control device, if applicable.
   e) Verify the operation of the re-heat control device, if applicable.
   f) Verify the operation of the humidity control device, if applicable.
6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect the wiring and connections for tightness and signs of overheating and discoloration.
   c) Check the condition of the contacts for wear and pitting.
   d) Check the contactors for free and smooth operation.
   e) Meg the motor and record readings.
   f) Check volts and amps of the motor.

Lubricate/Grease Bearings

1. Lubricate and/or grease bearings according to manufacturer's specifications

MEG Motor

1. Check the integrity of the insulation on the motor windings and the motor leads, using a megohm meter.

Coils

Maintenance Procedure

1. Record and report abnormal conditions.
2. Visually inspect the coil for leaks.
3. Inspect the coil for cleanliness.

Pumps

Annual Inspection

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Check motor shaft and pump shaft for alignment, if applicable.
   b) Inspect the coupling for wear.
   c) Verify that the shaft guard is in place and tight, if applicable.
   d) Verify water flow through the pump.
   e) Check for leaks on the mechanical pump seals, if applicable.
   f) Verify proper drip rate on the pump seal packing, if applicable.
   g) Verify smooth operation of the pump.
   h) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.
4. Lubrication
   a) Lubricate the motor bearings as necessary.
   b) Lubricate the pump bearings as necessary.
5. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Meg the motor.
   d) Verify tight connections on the motor terminals.
   e) Check the condition of the contacts for wear and pitting, if applicable.
   f) Check the contactors for free and smooth operation.
   g) Verify proper volts and amps.

Pump Run Inspection

1. Verify smooth operation of the pump.
2. Check for leaks on the mechanical pump seals, if applicable.
3. Verify proper drip rate on the pump seal packing, if applicable.
4. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Mechanical Starters with Electronic Controls

Comprehensive Annual Maintenance

1. Clean the starter and cabinet.
2. Inspect wiring and connections for tightness and signs of overheating and discoloration.
3. Check condition of the contacts for wear and pitting.
4. Check contactors for free and smooth operation.
5. Check the mechanical linkages for wear, security, and clearances.
6. Verify the overload settings.

VFD Starters

Comprehensive Annual Maintenance

1. Clean the starter and cabinet.
2. Inspect wiring and connections for tightness and signs of overheating and discoloration.
3. Check the tightness of the motor terminal connections.
4. Verify the operation of the cooling loop.
5. Verify proper operation of the frequency drive.

Rooftop Units

Comprehensive Annual Maintenance

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Inspect for leaks and report results.
   b) Calculate refrigerant loss rate and report to the customer.
   c) Repair minor leaks as required (e.g. valve packing, flare nuts).
   d) Visually inspect condenser tubes for cleanliness.
4. Controls and Safeties
   a) Inspect the control panel for cleanliness.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Verify the working condition of all indicator/alarm lights, if applicable.
   d) Test the low water temperature control device. Calibrate and record setting.
   e) Test the low evaporator pressure safety device. Calibrate and record setting.
   f) Test the oil pressure safety device. Calibrate and record setting, if applicable.
   g) Check programmed parameters of RCM control, if applicable.
5. Lubrication System
   a) Check oil level in the compressor.
   b) Test oil for acid content and discoloration. Make recommendations to the customer based on the results of the test.
   c) Verify the operation of the oil heater. Measure amps and compare reading with the watt rating of the heater.

6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Check condition of the contacts for wear and pitting.
   d) Check the contactors for free and smooth operation.
   e) Check the tightness of the motor terminal connections.
   f) Meg the motor and record readings.
   g) Verify the operation of the electrical interlocks.
   h) Measure voltage and record. Voltage should be nominal voltage ± 10%.

Comprehensive Maintenance Inspection (RTU Heating Cycle)

1. Perform heating inspection/maintenance applicable to the unit (steam/hot water, gas, electric).
2. Verify smooth operation of the fans.

3. Check the belts for tension, wear, cracks, and glazing.
4. Verify clean air filters.
5. Gas Heat Option
   a) Visually inspect the heat exchanger.
   b) Inspect the combustion air blower fan, and clean, if required.
   c) Lubricate the combustion air blower fan motor, if applicable.
   d) Verify the operation of the combustion air flow-proving device.
   e) Test the operation of the high gas pressure safety device, if applicable. Calibrate, if necessary.
   f) Test the operation of the low gas pressure safety device, if applicable. Calibrate, if necessary.
   g) Verify the operation of the flame detection device.
   h) Test the operation of the high temperature limit switch. i.. Verify the integrity of the flue system.
   i) Verify the operation of the operating controls.
   j) Verify the burner sequence of operation.
   k) Verify proper gas pressure to the unit and/or at the manifold, if applicable.
   l) Perform combustion test. Make adjustments as necessary.
6. Electric Heat Option
   a) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   b) Check and calibrate operating and safety controls, if applicable.
   c) Verify the operation of the heating elements.
   d) Check voltage and amperage and compare readings with the watt rating on the heater.

7. Hot Water / Steam Heat Option
   a) Inspect control valves and traps.
   b) Check and calibrate all operating and safety controls.
   c) Verify the operation of the heating coils.
   d) Verify the operation of the unit low temperature safety device.

Mid-Season Cooling Inspection (RTU)

1. Check the general condition of the unit.
2. Log the operating condition after system has stabilized.
3. Verify the operation of the control circuits.
4. Analyze the recorded data. Compare the data to the original design conditions.
5. Review operating procedures with operating personnel.

6. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

Comprehensive Maintenance Inspection (RTU - Cooling Cycle)

1. Record and report abnormal conditions, measurements taken, etc.
2. Review logs for operational problems and trends.
3. General Assembly
   a) Inspect for leaks and report results.
   b) Calculate refrigerant loss rate and report to the customer.
   c) Repair minor leaks as required (e.g. valve packing, flare nuts).
   d) Check pulleys and sheaves for wear and alignment.
   e) Check belts for tension, wear, cracks, and glazing.
   f) Verify clean evaporator coil, blower wheel, and condensate pan.
   g) Verify clean air filters.
   h) Verify proper operation of the condensate drain.
   i) Verify proper operation of the dampers and/or inlet guide vanes, if applicable.
4. Controls and Safeties
   a) Inspect the control panel for cleanliness.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Verify the working condition of all indicator/alarm lights, if applicable.
   d) Test the low evaporator pressure safety device. Calibrate and record setting, if applicable.
   e) Test the high condenser pressure safety device. Calibrate and record setting, applicable.
   f) Test the oil pressure safety device, if applicable. Calibrate and record setting.
   g) Test the high static pressure safety device, if applicable. Calibrate and record setting.
   h) Verify the operation of the static pressure control device, if applicable.
5. Lubrication
   a) Verify the operation of the oil heater, if applicable.
   b) Lubricate the fan bearings as required.
   c) Lubricate the fan motor bearings as required.
   d) Lubricate the damper bearings, if applicable.
6. Motor and Starter
   a) Clean the starter and cabinet.
   b) Inspect wiring and connections for tightness and signs of overheating and discoloration.
   c) Check the condition of the contacts for wear and pitting.

d) Check the contactors for free and smooth operation.

7. Startup /Checkout Procedure
   a) Verify the operation of the oil heater.
   b) Verify full water system, including the cooling tower and the condenser.
   c) Verify clean cooling tower and strainers.
   d) Test all flow-proving devices on the condenser water circuit.
   e) Start the condenser water pump and the cooling tower fan(s).
   f) Verify flow rate through the condenser.
   g) Start the unit.
   h) Verify smooth operation of the compressor(s) and fan(s).
   i) Check the setpoint and sensitivity of the temperature control device.
   j) Verify the operation of the condenser water temperature control device.
   k) Verify clean condenser using pressure and temperature.
   l) Check operation and setup of the Unit Control Module.
   m) Check the superheat and subcooling on the refrigeration circuit(s).
   n) Log the operating conditions after the system has stabilized.
   o) Review operating procedures with operating personnel.
   p) Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

ENERGY SAVINGS PLAN

SECTION 8 – OPTIONAL ENERGY GUARANTEE

OPTIONAL ENERGY GUARANTEE OVERVIEW

NOTE: *The following is meant only to serve as a description of an optional energy guarantee and does not constitute any contractual obligations between the Ventnor and DCO. If Ventnor chooses to implement an energy guarantee contract, a separate document will be used based on mutual agreement and acceptance of all parties of its terms and conditions.*

A successful energy project consists of a partnership between an ESCO and Owner. Both parties have defined roles and accept their individual responsibilities as well as support any joint initiatives of the program as defined in the RFP and this document. Both DCO and the Ventnor will have a role in ongoing maintenance and operations as defined in the agreed-upon energy guarantee contractual documents. Both parties will be required to meet their obligations for the guaranteed energy units savings (referred to as “guarantee or savings”) to be achieved and to ensure the guarantee stays intact.

DCO will guarantee Ventnor will achieve 100% of the total energy units savings per the provisions of the agreed-upon energy guarantee contractual documents based on the final selection of ECMs and their associated energy savings as measured and verified by the Owner’s third-party, independent firm. The energy savings will be in energy units, not dollars as DCO has no control over the costs of utilities. The energy units guarantee contract shall commence thirty (30) days after the start-up and commissioning of the last Energy Conservation Measure (ECM) and be enforced for a period of one (1) year or until terminated by Ventnor. The one (1) Year Guarantee is provided by DCO for a cost of $0. The Measurement & Verification required by ESIP Legislation in association with the acceptance of an Energy Savings Guarantee will be provided by DCO Energy at a cost of 0.72% of the Hard Costs of the ECMs as outlined in Form V of the RFP Response (also shown Section 5 of this document).

SAVINGS VERIFICATION

There are events that cause energy savings to change. Ventnor and DCO will agree to baseline energy consumption that represents the facility’s energy use and cost prior to the date of any Agreement (the “Base Year”) and parameters, which affect the energy usage and cost of the facility, including but not limited to, utility rates, local weather profile, facility square footage, environmental conditions, schedules (e.g., lighting, HVAC) and an inventory of

equipment in the facility. Energy savings are determined by comparing measured energy use or demand before and after implementation of an energy savings program.

ECM ENERGY SAVINGS = BASELINE ENERGY USE – POST INSTALLATION ENERGY USE +/- ADJUSTMENTS

Changes in estimated energy savings fall into two categories. These categories are Routine Adjustments and Non-Routine Adjustments. Routine Adjustments are expected changes during the savings reporting period to energy governing factors (e.g. weather). DCO uses IPMVP approved mathematical techniques to determine adjustments. Non-Routine Adjustments include energy-governing factors which are not usually expected to change, such as the facility size, the design and operation of installed equipment, occupancy and the type of occupants or any physical changes to the building or equipment that impact the facilities' utility use. These factors will be monitored for change throughout the reporting period.

DCO will perform monthly utility bill analysis and audit reports which compare the current year with base year energy consumption and costs. DCO will perform periodic on-site analysis to determine whether mechanical and electrical systems are operating at optimal efficiency and to assess the occupancy and operational schedules of the buildings.

As part of the optional energy guarantee, DCO uses weather normalization procedures to correct for the effect of weather variance on energy savings in subsequent years. Baseline energy and weather data are used to establish an algorithm to predict how the baseline building uses energy as a function of weather. The algorithm is then applied to subsequent years to correct for the impact weather may have on future building energy use. The weather normalization procedure and algorithms will be covered in detail as part of the optional energy guarantee contract provided to Ventnor.

ENERGY SAVINGS PLAN

APPENDICIES

APPENDIX LIST	
APPENDIX A	Construction Contingency Allowance
APPENDIX B	Design Bid Build Procedures
APPENDIX C	Operations & Maintenance Savings
APPENDIX D	Project Changes in Financing
APPENDIX E	Incentives in Debt Service
APPENDIX F	ECM Breakdown by Building
APPENDIX G	Lighting Line-by-Line
APPENDIX H	Building Equipment Lists
APPENDIX I	Local Government Energy Audits

ENERGY SAVINGS PLAN

APPENDIX A – CONSTRUCTION CONTINGENCY ALLOWANCE

Appendix A – Construction Contingency Allowance

Experience shows that during the construction phase there are four major categories of potential change of scope issues that benefit from having an appropriate Construction Contingency Allowance (CCA).

- Unknown conditions
- Building inspector's modifications
- Project owner requested changes
- Design clarifications or modifications

Unknown Conditions

Renovations to older facilities have greater potential for revealing unknown. Missing or inaccurate Blueprints, deviations from the original blue prints by the original builder and unknown or undocumented modifications during the life of the facility.

Areas such as behind a wall/roof/equipment or under the slab can bring unforeseen conditions which can delay the new construction and change the anticipated scope of the work. Therefore, it is advisable to dedicate a CCA that is higher than that for new construction.

Building Inspection Modifications

A plan review for the local building jurisdiction reviews the construction documents prior to issuing a building permit. However, there remains the likelihood that the building inspector will request modifications to the plans based upon experience and their interpretation of the applicable building code.

While we can ask for code review and documentation, if you hope to get a Certificate of Occupancy under a tight schedule from this same inspector requested modifications will need to be implemented as successfully appeals take time.

Whether it is adding an extra exit sign, smoke detector or fire extinguisher, or whether it is something more significant, it may require more work from the contractor, thus added expense. The CCA is intended to be the source of funds necessary for these requested modifications.

Project Owner Requested Changes

It is nearly impossible to express your every desire during the design phase. You will always see something during construction that you would like to change.

There is nothing necessarily wrong with that.

The CCA is intended to be the source of funds necessary for these requested changes.

Design Clarifications or Modifications

No designer has ever developed the perfect set of construction documents.

There are always items that can be detailed better or more clearly. The design intent should be adequately reflected in the drawings and specifications so that the contractor can bid and build the ECM to meet the design intent.

However, there will be times during construction when the builder will not be readily able to identify the exact intent of particular details or systems. At that time the builder will submit a Request for Information (RFI) to the designer for clarification or more information. The designer will issue clarifications or directives so that the builder can continue to meet the design intent.

On occasion, the RFI will reveal that something more than was shown in the construction documents is necessary to fulfill the design intent. The clarification or modification may impact the scope of the work to a degree that additional construction costs become necessary.

As long as the design omission is not negligent, the CCA is intended to be the source of funds necessary for these design clarifications or modifications.

Allowance Method

Detailed plans, schematics and specifications for Ventnor were not available to deliver a cost estimate for each ECM. The budgetary costs carried in the project are based on good faith estimates, contractor supplied budgets for similar ECMs on other recent projects and a database of actual installed costs for various ECMs.

a. Allowance Amount (10% of Hard Costs)

BID PACKAGE ALLOWANCE SCHEDULE	
ECM	**CONTINGENCY AMOUNT**
LED Street Lights	$156,860
LED Lighting Replacement with Controls	$81,035
Solar PPA	$0
Roof Replacement	$79,880
Energy Management System	$77,473
Combined Heat & Power Unit	$30,388
High Efficiency Transformers	$8,564
Building Envelope Weatherization	$11,579
Pipe and Valve Insulation	$151
Forced-Air Heating Fuel Economizer	$67
Water Conservation	$22
Boiler Replacement	$15,488
Premium Efficiency Pump Motors and VFDs	$2,478
Destratification Fans	$7,072
Electrical Vehicle Charging Stations	$3,061
Rooftop Unit Replacement	$13,662
AHU / Split System Replacement	$14,918
Domestic Water Heater Replacement	$372
Streetscape	$100,000
TOTAL	**$603,069**

Project total construction contingency allowance amount is 10% of estimated hard costs and is agreed upon.

DCO

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Ventnor

- Ventnor

ENERGY SAVINGS PLAN

APPENDIX B – DESIGN BID BUILD

Appendix B – Design Bid Build Procedures

Design–bid–build (or **design/bid/build**, and abbreviated **D–B–B** or **D/B/B** accordingly), also known as **Design–tender** (or "design/tender") **traditional method** or **hard bid** is the method of delivery for this project.

Design–bid–build is the traditional method for project delivery and differs in several substantial aspects from design–build.

There are three main sequential phases to the design–bid–build delivery method:

- The design phase
- The bidding (or tender) phase
- The construction phase

Design Phase

In this phase DCO will design and produce bid documents, including construction drawings and technical specifications, on which various contractors will in turn bid to construct the project.

The Energy Savings Plan (ESP) is intended to document owner's project requirements and provide a conceptual and/or schematic design and good faith estimates.

With the ESP DCO will bring in other design professionals including mechanical, electrical, and plumbing engineers (MEP specifications engineers), a fire protection engineer, structural engineer, sometimes a civil engineer and a landscape architect to help complete the construction drawings and technical.

The design document should reflect the intent of the energy savings plan for scope, price, savings, operations & maintenance savings, incentive and schedule.

The finished bid documents are coordinated by the DCO and owner for issuance to contractors during the bid phase.

Bid (or tender) phase

Bidding is according to NJ Public Bid Law and is "open", in which any qualified bidder may participate.

The various contractors bidding obtain bid documents, and then put them out to multiple subcontractors for bids on sub-components of the project.

Questions may arise during the bid period, and DCO will issue clarifications or corrections to the bid documents in the form of addenda.

From these elements, the contractor compiles a complete bid for submission by the established closing date and time bid date.

Bids are to be based on a base bid lump sum plus alternates, bid requirements and alternates are elucidated within the bid documents.

Once bids are received, DCO reviews the bids, seeks any clarifications required of the bidders, investigates contractor qualifications, ensures all documentation is in order (including bonding if required), and advises the owner as to the ranking of the bids.

If the bids fall in a range acceptable to the owner, the project is awarded to the contractor with the lowest reasonable bid.

In the event that all of the bids do not satisfy the needs of the owner the following options become available to DCO:

- Re-bid the construction of the project on a future when monies become available and/or construction costs go down.
- Revise the design of that ECM (at no cost to the client) so as to make the project smaller or reduce features or elements of the project to bring the cost down. The revised bid documents can then be issued again for bid.
    - DCO will provide guidance on energy savings, operation and maintenance savings and incentives to ensure the project is self-funding.
- Revise the design of future ECM(s) (at no cost to the client) so as to make the project smaller or reduce features or elements of the project to bring the cost down. The current bid package can then be contracted
    - DCO will provide guidance on energy savings, operation and maintenance savings and incentives to ensure the project is self-funding.

Construction phase

Once the construction of the project has been awarded to the contractor, the bid documents (e.g., approved construction drawings and technical specifications) may not be altered.

The necessary permits (for example, a building permit) must be achieved from all jurisdictional authorities in order for the construction process to begin.

Should design changes be necessary during construction, whether initiated by the contractor, owner, or as discovered by the architect, DCO will issue sketches or written clarifications and handle the project through allowance (See Appendix A).

The contractor may be required to document "as built" conditions to the owner.

Bidding Method

1. To achieve energy savings and fund debt service payments as rapidly as possible the bid packages will be bid in the following order:

BID METHOD SCHEDULE		
ECM	COST + ALLOWANC	SAVINGS
LED Street Lights	$1,725,465	$232,530
LED Lighting Replacement with Controls	$891,383	$75,857
Solar PPA	$0	$18,202
Roof Replacement	$878,685	$0
Energy Management System	$852,205	$48,527
Combined Heat & Power Unit	$334,263	$8,754
High Efficiency Transformers	$94,202	$6,096
Building Envelope Weatherization	$127,370	$7,422
Pipe and Valve Insulation	$1,666	$17
Forced-Air Heating Fuel Economizer	$737	$323
Water Conservation	$243	$121
Boiler Replacement	$170,363	$689
Premium Efficiency Pump Motors and VFDs	$27,258	$114
Destratification Fans	$77,792	$8,391
Electrical Vehicle Charging Stations	$33,667	$0
Rooftop Unit Replacement	$150,282	$2,769
AHU / Split System Replacement	$164,093	$149
Domestic Water Heater Replacement	$4,089	$8
Streetscape	$1,100,000	$0
TOTAL	**$6,633,763**	**$409,970**

2. Bids in group 1 (Green) are within 15% of budget value they will be awarded.
3. Bids in group 2 (Yellow) may be value engineered from the project to meet budget
    a. DCO will provide the impact of ECMs value engineered:
        i. Energy Savings
        ii. Operations and Maintenance Savings
        iii. Incentive
4. Bids in group 3 (Red) may be value engineered **or removed** from the project to meet budget
    a. DCO will provide the impact of ECMs value engineered or removed:
        i. Energy Savings
        ii. Operations and Maintenance Savings
        iii. Incentive
5. As per ESIP law DCO fee will be applied to the ECM hard cost.
    a. DCO will receive no compensation for bids that are under budget
    b. DCO will receive no penalty for bids that are over budget
6. If the budget overruns make savings unachievable at the current budget, DCO will provide additional ECMs above the budget to meet the required energy savings

Project bidding strategy is agreed upon.

DCO

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ENERGY SAVINGS PLAN

APPENDIX C – OPERATIONS AND MAINTENANCE SAVINGS

Appendix C – Operation & Maintenance Savings

Operations and Maintenance and other non-energy-related cost savings are allowable in NJ ESIPs, and are defined as reduction in expenses (other than energy cost savings) related to energy and water consuming equipment:

Energy-related cost savings can result from avoided expenditures for operations, maintenance, equipment repair, or equipment replacement due to the ESIP project.

Sources of O&M savings include:

- Termination of service personnel
- Lower maintenance service contract costs
- Decrease in repair costs
    - Avoided repair and replacement costs as a result of replacing old and unreliable equipment
    - Material savings due to new equipment warranties
    - Material savings due to the longer life items not needing replacement
        - In particular, reduction in florescent bulbs due to LED

Termination of service personnel

As a result of the ESIP, a number of the client's maintenance staff members may no longer be required. If there will be a reduction in the government's maintenance staff, O&M savings can be claimed.

A problem could arise if the maintenance staff is not reduced. Then it would be necessary to determine what new O&M responsibilities the facility has taken on, or savings should not be claimed. For example, it could be that a new building was constructed. During the performance period, it is important to establish that any increased maintenance was not due to the equipment installed under the ESIP

Lower maintenance service contract costs

Prior to the implementation of the ESIP mechanical and electrical equipment was maintained by a third party under a maintenance contract. The ESIP replaces the aging equipment with newer, more efficient equipment, which can reduce the service costs to the client.

Decrease in repair costs

The client is responsible for maintenance both before and after the equipment installation. Although there is no reduction in staff for which to claim labor savings, there will be cost savings on replacement materials.

Material-related savings frequently result from lighting and lighting controls projects.

For this project, lighting maintenance savings will result from the following:

1. Reduced material requirements (e.g., lamps)
2. Reduced operating time — Control measures increase equipment life by reducing the burn time of lamps and ballasts
3. Warranty-related savings — newly installed lamps, and fixtures come with a manufacturer warranty of 10 years.

O&M Savings

Project total O&M savings to fund debt service amount: $0

Project O&M Savings strategy is agreed upon.

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Ventnor

- Ventnor

ENERGY SAVINGS PLAN

APPENDIX D – PROJECT CHANGES IN FINANCING

Appendix D – Project Changes in Financing

The Energy savings plan has been approved using:

Interest rate of: 2.0%
Term: ..... 20 Years
Construction Term ..... 18 Months
Construction Interest Only Payment of ..... TBD by Ventnor financial advisor
Annual Surplus of no less than $4,438

During financing DCO will provide assistance but does not guarantee the timing of savings or incentives.

While beneficial to the client financing changes are the responsibility of the client, bond counsel and/or financial advisor. DCO represents in no way advice on these financial items

Financial items may include but are not limited to:

- Timing of payments
- Splitting payments into bi-annual, tri-annual, etc.
- Coordination with the client's fiscal year
- Local finance board material, forms and presentations
- Multiple tiered interest rates

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ENERGY SAVINGS PLAN

APPENDIX E – INCENTIVES IN DEBT SERVICE

Appendix E – Incentives in Debt Service

Estimated incentive values were calculated in accordance with the New Jersey Clean Energy Program Guidelines. The total incentive amount was calculated to be $536,121 in rebates and incentives - 50%, $268,061, has been applied to the project financial analysis (See Section 4). Please see below and Appendix F for building-by-building details.

Incentive Totals

BUILDING	INCENTIVE TYPE	SOURCE	QUANTITY	UNITS	INCENTIVE $/UNIT	INSTALL INCENTIVE	YEAR 1 INCENTIVE	YEAR 2 INCENTIVE	SUBTOTAL	TOTAL
VENTNOR	P4P 2&3 (electric)	NJ Clean Energy Program	627,544	kWh	$0.36	$0	$112,958	$112,958	$225,916	$536,121
	P4P 2&3 (natural gas)	NJ Clean Energy Program	8,779	therms	$3.60	$0	$15,802	$15,802	$31,604	
	Direct Install	NJ Clean Energy Program	$73,722	$		$73,722	$0	$0	$73,722	
	SmartStart	NJ Clean Energy Program	Various	Various	Various	$0	$111,380	$0	$111,380	
	Combined Heat & Power	NJ Clean Energy Program	35	kW	$2,500	$26,250	$43,750	$17,500	$87,500	
	EV Charging Station	NJ DEP	1	each	$6,000	$0	$6,000	$0	$6,000	
					TOTALS	$99,972	$289,890	$146,260	$536,121	

Incentive Data

BUILDING	INCENTIVE TYPE	SOURCE	QUANTITY	UNITS	INCENTIVE $/UNIT	INSTALL INCENTIV	YEAR 1 INCENTIV	YEAR 2 INCENTIV	SUBTOTAL	TOTAL
Ventnor City Hall	Direct Install	NJ Clean Energy Program	$21,269	Various	80%	$21,269			$21,269	$21,269
Ventnor Public / Water Works	Direct Install	NJ Clean Energy Program	$34,293	Various	80%	$34,293			$34,293	$34,293
Ventnor Cultural Arts / Senior Center	Direct Install	NJ Clean Energy Program	$6,232	Various	80%	$6,232			$6,232	$12,232
Ventnor Cultural Arts / Senior Center	EV Charging Station	NJ DEP	1	each	$6,000		$6,000		$6,000	
Ventnor Firehouse 1	Direct Install	NJ Clean Energy Program	$11,929	Various	80%	$11,929			$11,929	$11,929
Ventnor City Park	SmartStart	NJ Clean Energy Program	Various	Various	Various		$4,730		$4,730	$4,730
Ventnor Street Lights	SmartStart	NJ Clean Energy Program	Various	Various	Various		$106,650		$106,650	$106,650
Ventnor Educational Community Complex	P4P 2&3 (electric)	NJ Clean Energy Program	627,544	kWh	$0.36		$112,958	$112,958	$225,916	$345,020
Ventnor Educational Community Complex	P4P 2&3 (natural gas)	NJ Clean Energy Program	8,779	therms	$3.60		$15,802	$15,802	$31,604	
Ventnor Educational Community Complex	Combined Heat & Power	NJ Clean Energy Program	35	kW	$2,500	$26,250	$43,750	$17,500	$87,500	

No implied and/or written guarantee is being made with respective to the receipt of incentives. All incentives estimates carry inherent risks that may jeopardize the receipt of them. Therefore, Ventnor acknowledges and accepts that any project proposed should not rely on the receipt of incentives as a reason to implement it.

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ENERGY SAVINGS PLAN

APPENDIX F – ECM BREAKDOWN BY BUILDING

VENTNOR % SAVINGS BY BUILDING (T.O.R.)

VENTNOR BUILDINGS/FACILITIES		UTILITY ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	ONSITE ELECTRIC SAVINGS	NATURAL GAS SAVINGS	ONSITE NATURAL GAS SAVINGS
BUILDING/FACILITY NAME	SQFT	kWh	kW	kWh	THERMS	THERMS
Ventnor City Hall	29,376	13.6%	11.7%	13.6%	31.5%	31.5%
Ventnor Public / Water Works	25,000	51.5%	3.6%	8.7%	19.0%	19.0%
Ventnor Cultural Arts / Senior Center	24,464	37.1%	23.6%	37.1%	-	-
Ventnor Firehouse 1	10,775	23.7%	13.8%	23.7%	25.1%	25.1%
Ventnor City Park	2,500	47.8%	2.5%	47.8%	-	-
Ventnor Fishing Pier	780	0.0%	0.0%	0.0%	-	-
Ventnor Street Lights	0	63.0%	-	63.0%	-	-
Ventnor Educational Community Complex	152,357	48.5%	19.2%	40.1%	8.0%	23.8%
TOTALS	**245,252**	**47.5%**	**13.6%**	**37.4%**	**22.0%**	**30.8%**

VENTNOR SAVINGS BY BUILDING BY UTILITY FROM SMART SELECT

VENTNOR BUILDINGS/FACILITIES		ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	ONSITE ELECTRIC SAVINGS	NATURAL GAS SAVINGS	ONSITE NATURAL GAS SAVINGS
BUILDING/FACILITY NAME	SQFT	kWh	kW	kWh	THERMS	THERMS
Ventnor City Hall	29,376	55,209	10	55,209	3,130	3,130
Ventnor Public / Water Works	25,000	365,070	9	61,672	4,513	4,513
Ventnor Cultural Arts / Senior Center	24,464	144,841	37	144,841	6,382	6,382
Ventnor Firehouse 1	10,775	23,771	4	23,771	1,096	1,096
Ventnor City Park	2,500	28,261	4	28,261	0	0
Ventnor Fishing Pier	780	0	0	0	0	0
Ventnor Street Lights	0	645,543	0	645,543	0	0
Ventnor Educational Community Complex	152,357	888,295	104	734,022	3,862	11,471
TOTALS	**245,252**	**2,150,990**	**167**	**1,693,319**	**18,983**	**26,592**

VENTNOR			INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL Solar PPA (kWh) COST SAVINGS	ANNUAL ENERGY COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Solar PPA (kWh) SAVINGS	TOTAL SITE ENERGY SAVINGS	TOTAL SOURCE ENERGY SAVINGS	Reduction of CO_2	Reduction of NO_x	Reduction of SO_2	Reduction of Hg	TYPE OF INCENTIVE	ESTIMATED INCENTIVE AMOUNT	SIMPLE PAYBACK WITH INCENTIVES
ECM #	BUILDING/FACILITY	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$	$	$	YEARS	kWh	kW	THERMS	Solar PPA (kWh)	MMBTU	MMBTU	LBS	LBS	LBS	LBS	SELECT	$$	YEARS
1	Ventnor City Hall	LED Lighting Replacement with Controls	Y	$90,992	$5,253	($388)	$0	$4,865	$4,865	18.7	41,470	6.4	-356	0	106	359	41,451	36	92	193	NJ BPU DI	$21,126	14.4
2	Ventnor City Hall	Energy Management System	Y	$164,415	$1,628	$2,681	$0	$4,309	$4,309	38.2	11,236	3.2	2,460	0	284	366	41,144	33	25	52		$0	38.2
11	Ventnor City Hall	Building Envelope Weatherization	Y	$8,425	$265	$997	$0	$1,262	$1,262	6.7	2,504	0.0	915	0	100	120	13,455	11	6	12		$0	6.7
12	Ventnor City Hall	Water Conservation	Y	$221	$0	$121	$0	$121	$121	1.8	0	0.0	111	0	11	12	1,302	1	0	0	NJ BPU DI	$143	0.6
1	Ventnor Public / Water Works	LED Lighting Replacement with Controls	Y	$77,438	$5,729	$0	$0	$5,729	$5,729	13.5	45,519	8.3	0	0	155	435	50,070	43	101	212	NJ BPU DI	$33,860	7.6
2	Ventnor Public / Water Works	Energy Management System	Y	$45,224	$0	$675	$0	$675	$675	67.0	0	0.0	621	0	62	65	7,263	6	0	0		$0	67.0
3	Ventnor Public / Water Works	Boiler Replacement	Y	$154,875	$0	$689	$0	$689	$689	224.6	0	0.0	634	0	63	67	7,422	6	0	0		$0	224.6
4	Ventnor Public / Water Works	Premium Efficiency Pump Motors and VFDs	Y	$24,780	$114	$0	$0	$114	$114	217.1	782	0.3	0	0	3	7	860	1	2	4		$0	217.1
7	Ventnor Public / Water Works	Forced-Air Heating Fuel Economizer	Y	$670	$0	$323	$0	$323	$323	2.1	0	0.0	297	0	30	31	3,473	3	0	0	NJ BPU DI	$433	0.7
9	Ventnor Public / Water Works	Domestic Water Heater Replacement	Y	$3,717	$0	$8	$0	$8	$8	465.5	0	0.0	7	0	1	1	86	0	0	0		$0	465.5
11	Ventnor Public / Water Works	Building Envelope Weatherization	Y	$34,444	$535	$3,211	$0	$3,745	$3,745	9.2	5,242	0.0	2,954	0	313	360	40,328	32	12	24		$0	9.2
13	Ventnor Public / Water Works	High Efficiency Transformers	Y	$20,444	$1,122	$0	$0	$1,122	$1,122	18.2	10,129	0.7	0	0	35	97	11,142	10	22	47		$0	18.2
14	Ventnor Public / Water Works	Solar PPA	Y	$0	$30,945	$0	($12,743)	$18,202	$18,202	0.0	303,398	0.0	0	-303,398	0	1,863	333,738	288	671	1,411		$0	0.0
17	Ventnor Public / Water Works	Roof Replacement	Y	$798,805	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0		$0	0.0
1	Ventnor Cultural Arts / Senior Center	LED Lighting Replacement with Controls	Y	$75,777	$17,555	$0	$0	$17,555	$17,555	4.3	110,459	24.7	0	0	377	1,055	121,504	105	244	514	NJ BPU DI	$5,802	4.0
2	Ventnor Cultural Arts / Senior Center	Energy Management System	Y	$183,868	$3,253	$0	$0	$3,253	$3,253	56.5	20,238	5.8	4,239	0	493	638	71,860	58	45	94		$0	56.5
5	Ventnor Cultural Arts / Senior Center	Rooftop Unit Replacement	Y	$37,170	$1,884	$0	$0	$1,884	$1,884	19.7	11,215	6.1	880	0	126	200	22,637	19	25	52		$0	19.7
10	Ventnor Cultural Arts / Senior Center	Pipe and Valve Insulation	Y	$666	$0	$0	$0	$0	$0	0.0	0	0.0	23	0	2	2	268	0	0	0	NJ BPU DI	$430	0.0
11	Ventnor Cultural Arts / Senior Center	Building Envelope Weatherization	Y	$15,488	$447	$0	$0	$447	$447	34.6	2,929	0.0	1,240	0	134	158	17,725	14	6	14		$0	34.6
16	Ventnor Cultural Arts / Senior Center	Electrical Vehicle Charging Stations	Y	$30,606	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0	NJ DEP Grant	$6,000	0.0
1	Ventnor Firehouse 1	LED Lighting Replacement with Controls	Y	$33,376	$3,248	$0	$0	$3,248	$3,248	10.3	20,545	3.7	0	0	70	196	22,599	20	45	96	NJ BPU DI	$11,381	6.8
10	Ventnor Firehouse 1	Pipe and Valve Insulation	Y	$849	$0	$17	$0	$17	$17	50.8	0	0.0	15	0	2	2	179	0	0	0	NJ BPU DI	$548	18.0
11	Ventnor Firehouse 1	Building Envelope Weatherization	Y	$17,714	$494	$1,178	$0	$1,672	$1,672	10.6	3,227	0.0	1,080	0	119	144	16,190	13	7	15		$0	10.6
1	Ventnor City Park	LED Lighting Replacement with Controls	Y	$61,311	$4,429	$0	$0	$4,429	$4,429	13.8	28,261	4.2	0	0	96	270	31,087	27	62	131	NJ SmartStart	$4,730	12.8
1a	Ventnor Street Lights	LED Street Lights	Y	$1,568,605	$232,530	$0	$0	$232,530	$232,530	6.7	645,543	0.0	0	0	2,203	6,167	710,098	613	1,427	3,003	NJ SmartStart	$106,650	6.3
18	Ventnor Street Lights	Streetscape	Y	$1,000,000	$0	$0	$0	$0	$0	0.0	0	0.0	0	0	0	0	0	0	0	0		$0	0.0
1	Ventnor Educational Community Complex	LED Lighting Replacement with Controls	Y	$471,455	$43,063	($3,031)	$0	$40,031	$40,031	11.8	360,114	58.3	-2,533	0	975	3,174	366,489	319	796	1,675	NJ P4P	$120,522	8.8
2	Ventnor Educational Community Complex	Energy Management System	Y	$381,225	$26,753	$13,537	$0	$40,291	$40,291	9.5	267,430	3.0	11,312	0	2,044	3,743	426,522	358	591	1,244	NJ P4P	$136,998	6.1
5	Ventnor Educational Community Complex	Rooftop Unit Replacement	Y	$99,450	$661	$225	$0	$885	$885	112.3	2,070	3.5	188	0	26	39	4,474	4	5	10		$0	112.3
6	Ventnor Educational Community Complex	AHU / Split System Replacement	Y	$149,175	$149	$0	$0	$149	$149	1,003.5	368	0.9	0	0	1	4	405	0	1	2		$0	1003.5
8	Ventnor Educational Community Complex	Destratification Fans	Y	$70,720	$5,680	$2,712	$0	$8,391	$8,391	8.4	57,605	0.0	2,266	0	423	788	89,877	76	127	268		$0	8.4
11	Ventnor Educational Community Complex	Building Envelope Weatherization	Y	$39,720	$11	$285	$0	$296	$296	134.1	110	0.0	238	0	24	26	2,910	2	0	1		$0	134.1
13	Ventnor Educational Community Complex	High Efficiency Transformers	Y	$65,195	$4,974	$0	$0	$4,974	$4,974	13.1	46,325	3.1	0	0	158	443	50,958	44	102	215		$0	13.1
15	Ventnor Educational Community Complex	Combined Heat & Power Unit	Y	$303,875	$17,859	($9,105)	$0	$8,754	$8,754	34.7	154,273	35.0	-7,609	0	-234	675	80,680	77	341	718	NJ BPU CHP	$87,500	24.7
		TOTALS		$6,030,694	$408,579	$14,133	($12,743)	$409,970	$409,970	14.7	2,150,990	167.1	18,983	-303,398	8,202	21,508	2,588,196	2,218	4,754	10,006		$536,121	13.4