ENERGY SAVINGS PLAN

SUBMITTED BY:
DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648
Rev 1
10/7/2021

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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 the City of Wildwood'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 the City of Wildwood 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 $5,852,053 project
2. Generate $282,291 in annual energy savings – 59% of current utility spend
3. Eligible for $151,513 in rebates and incentives
4. Reduce utility related annual CO2 emissions by 517 metric tons – a 45% reduction

NOTE: This submitted ESP doesn't constitute any contractual obligation between the City of Wildwood 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*
- *A description of the energy conservation measures that will comprise the program; (Section 3)*
- *An estimate of greenhouse gas reductions resulting from those energy savings (Section 3);*
- *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 5)*
- *Identify the eligibility for, and costs and revenues associated with the PJM Independent System Operator for demand response and curtailable service activities; (Section 3)*
- *Schedules showing calculations of all costs of implementing the proposed energy conservation measures and the projected energy savings; (Section 3)*
- *Maintenance requirements necessary to ensure continued energy savings, and describe how they will be provided; and (Section 6)*

- *If developed by an ESCO, a description of, and cost estimates of a proposed energy savings guarantee. (Section 7)*

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 3)*
- *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 7)*
- *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 the City of Wildwood's approval of the Energy Savings Plan to implement via the requirements of the ESIP legislation. Your time, effort, and support is appreciated.

Municipal Complex

The Municipal Building is 40,000 square feet and consists of city hall, police station and fire station departments. The building is occupied 8 AM to 4 PM on weekdays but portions, such as the fire and police, remain open 24/7.

Description of Building HVAC

The building is heated and cooled by 2-pipe fan coil units, air handling units, rooftop units, split system heat pumps and unit heaters. The airside unit are supplied by a gas-fired hot water boiler, water cooled chiller and cooling tower. The existing controls are programmable thermostats throughout the building. The hot water is supplied by an electric water heater.

Description of Building Lighting

The building lighting systems are primarily T8 fluorescent fixtures in the office areas. The screw in fixtures have CFL's installed.

Court Building

The Court is 9,000 square feet and contains a courtroom and several offices. The building is occupied 8AM to 4PM, Monday to Friday.

Description of Building HVAC

The Court building is heated by two (4) gas constant volume rooftop units, one (1) gas fired unit heaters and one (1) split system heat pump. The existing controls for the building are individual programmable thermostats.

Description of Building Lighting

The Court Building lighting system has primarily T8 fluorescents and CFL fixtures.

Byrne Recreation Center

The Byrne Recreation Center is approximately 19,500 square feet and contains a dance hall, gymnasium locker rooms and a few offices. The Byrne Recreation Center has regular hours of 8AM to 9PM, Monday to Friday, and 8AM to 3 PM Saturday and Sunday.

Description of Building HVAC

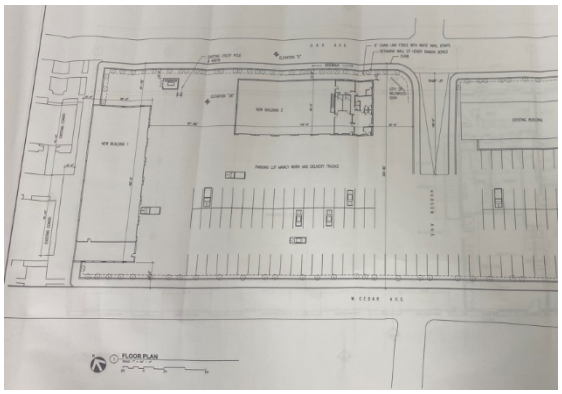
The building is heated and cooled by constant volume gas fired/ DX packaged rooftop units, with a gas fired water heater with a storage tank.

Description of Building Lighting

The Byrne Recreation Center lighting system has primarily T8 fluorescents and CFL fixtures.

Public Works Building (New)

The New Public Works Buildings are under construction. The buildings will be approximately 7,000 square feet and will contain garages, storage spaces, and a few office spaces. The facility has been included in the ESIP because of the potential for roof mounted solar.



Public Works Building (Existing)

The existing Public Works storage buildings are approximately 6,400 square feet and contain garages, storage spaces and offices.

Description of Building HVAC

The units are heated and cooled by gas fired unit heaters and split system ACs with a gas fired water heater with a storage tank.

Description of Building Lighting

The lighting systems are primarily LED and T12 fluorescent fixtures.

Boardwalk Info Center

The Boardwalk Info Center is approximately 5,250 square feet and contains offices, a meeting room and some storage space.

Description of Building HVAC

The building is heated and cooled by gas fired unit heaters and split system with a gas fired water heater with storage tank.

Description of Building Lighting

The Boardwalk Info Center lighting system has primarily T12 fluorescent and CFL fixtures.

Beach Patrol

The Beach Patrol building is approximately 3,800 square feet. The building is open during regular business hours in the summer and is unoccupied the remainder of the year.

Description of Building HVAC

The building is heated and cooled by electric split systems and window AC units and has an electric storage tank domestic water heater.

Description of Building Lighting

The lighting system has primarily linear fluorescent tubes and CFL bulbs.

Fox Park and Doo Wop Shop

The Fox Park and Doo Wop Shop is approximately 2,800 square feet and contains a restaurant sitting area, kitchen area, and storage. The building is open from 7AM to 10PM, everyday.

Description of Building HVAC

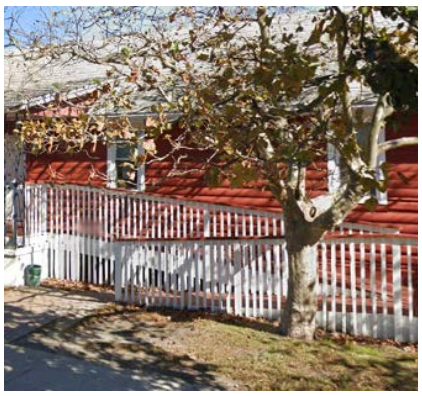
The building is heated and cooled by gas fired unit heaters and split system with a gas fired water heater with storage tank.

Description of Building Lighting

The Fox Park and Doo Wop Shop interior lighting system has primarily T8 fluorescent and CFL fixtures, while the exterior lighting system has primarily Metal Halide floodlights.

Hut

The Hut is approximately 1,100 square feet and contains a meeting room, kitchen and restroom.



Description of Building HVAC

The building is heated and cooled by a furnace and several window ACs with a gas fired water heater with storage tank.

Description of Building Lighting

The Hut lighting system has primarily T12 fluorescent fixtures.

Maxwell Field

Description of Lighting

The Maxwell Field lighting system has primarily Metal Halide Flood lights. Maxwell Field is adjacent to the Byrne Recreation Center.

Streetlights – City of Wildwood

Description of Lighting

The (206) city owned streetlights along Ocean and Pacific Ave will be demolished by the city. The savings are included in the ESIP.

Streetlights – Atlantic City Electric

Description of Lighting

The Atlantic City Street lighting system has (990) High Pressure Sodium fixtures in Wildwood – (957) of which are located throughout the city and (33) are located on the boardwalk. The (957) ACE city streetlights will be converted to LED.

ENERGY SAVINGS PLAN

SECTION 2 – ENERGY BASELINE

Total Utility Consumption and Site EUI

The City of Wildwood Energy Savings Plan includes 9 buildings, city athletic fields, 990 utility owned streetlights, and 206 city owned streetlights. To develop the ESP, DCO Energy was provided with all available utility data (electric, natural gas, fuel oil). DCO Energy tracked and documented this utility data from August 2019 thru July 2020. A listing of the buildings, the total utility consumption, and Energy Usage Index for the 12 sites are detailed below.

BUILDINGS & FACILITIES		
BUILDING #	BUILDING/FACILITY NAME	SQFT
1	**Municipal Building (City Hall, Fire, Police)**	**40,000**
2	**Court**	**9,000**
3	**Byrne Recreation Center**	**19,400**
4	**Public Works Buildings (New)**	**7,000**
5	**Public Works Buildings (Existing)**	**6,400**
6	**Boardwalk Info Center**	**5,250**
7	**Beach Patrol**	**3,800**
8	**Fox Park & Doo Wop Shop**	**2,800**
9	**Hut**	**1,100**
10	**Maxwell Field**	**0**
11	**Streetlights - City of Wildwood**	**0**
12	**Streetlights - Atlantic City Electric**	**0**

City of Wildwood - Electric Use Summary

CITY OF WILDWOOD BUILDINGS/FACILITIES		ELECTRIC			
BUILDING/FACILITY NAME	SQFT	USAGE kWh	DEMAND kW	USAGE BTU / SQFT	TOTAL COST $$
Municipal Building (City Hall, Fire, Police)	40,000	556,656	152	47,483	$75,695
Court	9,000	107,920	41	40,914	$17,750
Byrne Recreation Center	19,400	177,360	66	31,193	$26,042
Public Works Buildings (New)	7,000	29,154	13	14,210	$4,864
Public Works Buildings (Existing)	6,400	24,901	20	13,275	$4,430
Boardwalk Info Center	5,250	38,769	23	25,196	$6,709
Beach Patrol	3,800	14,304	0	12,843	$2,605
Fox Park & Doo Wop Shop	2,800	28,277	38	34,458	$5,382
Hut	1,100	6,876	5	21,328	$1,302
Maxwell Field	0	9,117	138	-	$3,381
Streetlights - City of Wildwood	0	175,917	18	-	$27,910
Streetlights - Atlantic City Electric	0	721,145	0	-	$256,745
TOTALS	**94,750**	**1,890,396**	**513**	**68,074**	**$432,817**

City of Wildwood – Natural Gas Use Summary

CITY OF WILDWOOD BUILDINGS/FACILITIES		NATURAL GAS		
BUILDING/FACILITY NAME	SQFT	USAGE THERMS	USAGE BTU / SQFT	TOTAL COST $$
Municipal Building (City Hall, Fire, Police)	40,000	14,314	35,784	$17,280
Court	9,000	3,320	36,885	$4,309
Byrne Recreation Center	19,400	10,247	52,820	$12,454
Public Works Buildings (New)	7,000	2,713	38,762	$3,650
Public Works Buildings (Existing)	6,400	2,356	36,815	$3,161
Boardwalk Info Center	5,250	1,425	27,144	$2,069
Beach Patrol	3,800	0	0	$0
Fox Park & Doo Wop Shop	2,800	357	12,748	$807
Hut	1,100	609	55,340	$1,110
Maxwell Field	0	0	0	$0
Streetlights - City of Wildwood	0	0	0	$0
Streetlights - Atlantic City Electric	0	0	0	$0
TOTALS	**94,750**	**35,341**	**37,299**	**$44,841**

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City of Wildwood – Energy Use Summary

CITY OF WILDWOOD BUILDINGS/FACILITIES		SITE ENERGY	SOURCE ENERGY	TOTAL COST
BUILDING/FACILITY NAME	SQFT	USAGE BTUs	USAGE BTUs	$$
Municipal Building (City Hall, Fire, Police)	40,000	3,330,662,272	6,820,988,362	$92,976
Court	9,000	700,186,040	1,379,585,662	$22,059
Byrne Recreation Center	19,400	1,629,868,320	2,770,378,296	$38,496
Public Works Buildings (New)	7,000	370,808,448	563,427,404	$8,514
Public Works Buildings (Existing)	6,400	320,580,212	485,293,094	$7,591
Boardwalk Info Center	5,250	274,783,828	520,012,718	$8,778
Beach Patrol	3,800	48,805,248	136,654,694	$2,605
Fox Park & Doo Wop Shop	2,800	132,174,124	307,624,797	$6,189
Hut	1,100	84,334,912	129,608,254	$2,412
Maxwell Field	0	31,107,204	87,100,171	$3,381
Streetlights - City of Wildwood	0	600,228,940	1,680,641,033	$27,910
Streetlights - Atlantic City Electric	0	2,460,546,740	6,889,530,872	$256,745
TOTALS	**94,750**	**9,984,086,288**	**21,770,845,358**	**$477,658**

City of Wildwood – Energy Use & Cost Index

CITY OF WILDWOOD 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 +/- %
Municipal Building (City Hall, Fire, Police)	40,000	83,267	72,800	-14%	$2.32	$1.72	-35%
Court	9,000	77,798	92,200	16%	$2.45	$2.17	-13%
Byrne Recreation Center	19,400	84,014	77,600	-8%	$1.98	$1.83	-8%
Public Works Buildings (New)	7,000	52,973	48,800	-9%	$1.22	$1.15	-6%
Public Works Buildings (Existing)	6,400	50,091	48,800	-3%	$1.19	$1.15	-3%
Boardwalk Info Center	5,250	52,340	64,800	19%	$1.67	$1.53	-9%
Beach Patrol	3,800	12,843	64,800	80%	$0.69	$1.53	55%
Fox Park & Doo Wop Shop	2,800	47,205	61,100	23%	$2.21	$1.44	-53%
Hut	1,100	76,668	61,100	-25%	$2.19	$1.44	-52%
Maxwell Field	0	0	0	0%	$0.00	$0.00	0%
Streetlights - City of Wildwood	0	0	0	0%	$0.00	$0.00	0%
Streetlights - Atlantic City Electric	0	0	0	0%	$0.00	$0.00	0%
TOTALS	**94,750**	**129,966**	**70,986**	**-83%**	**$4.24**	**$1.67**	**-153%**

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

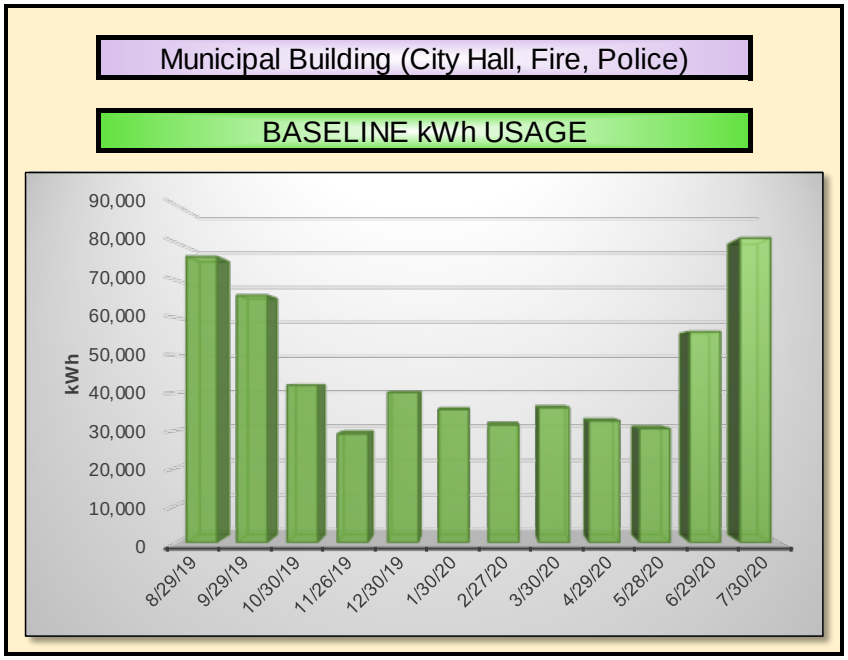
Atlantic City Electric

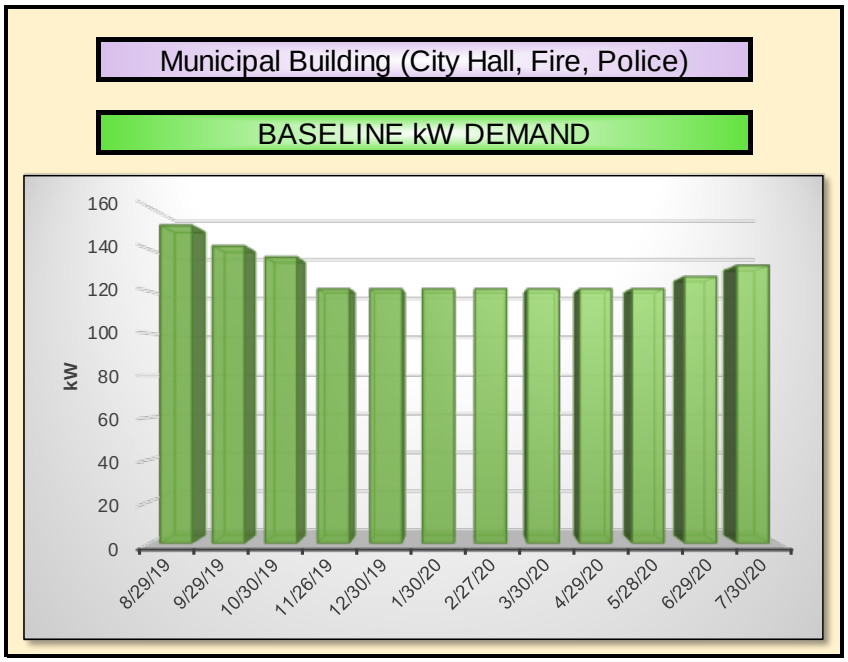
CITY OF WILDWOOD			
Account Address	**Account Number**	**Tariff**	**ESIP Building**
312 W Oak Ave Grg-7	50010751613	Monthly General Service Secondary	Public Works Buildings (Existing)
316 W Oak Ave Grg-9	50010751654	Monthly General Service Secondary	Public Works Buildings (Existing)
314 W Oak Ave Grg-8	50010751662	Monthly General Service Secondary	Public Works Buildings (Existing)
City Hall-St. Lites	55000496913	Street and Private Lighting	Streetlights - Atlantic City Electric
City Hall	55000497283	Contributed Street Lighting	Streetlights - Atlantic City Electric
Oak & Park Garage #6	55001348048	Monthly General Service Secondary	Public Works Buildings (Existing)
NJ Ave #12	55000348122	Monthly General Service Secondary	Streetlights - City Owned
328 E Oak Ave Apt 14	55003319658	Monthly General Service Secondary	Public Works Buildings (Existing)
4401 Atlantic Ave	55003320235	Monthly General Service Secondary	Fox Park
249 W. Oak #20 Garage	55003320698	Monthly General Service Secondary	Public Works Buildings (Existing)
250 W Oak #19	55003321241	Monthly General Service Secondary	Public Works Buildings (Existing)
250 W Oak #18	55003321506	Monthly General Service Secondary	Public Works Buildings (Existing)
Beach & Lincoln, Wildwood, NJ	55003713157	Monthly General Service Secondary	Beach Patrol
115 W Davis, Wildwood, NJ	55005433465	Annual General Service Secondary	Court
Ocean Ave.	55005546142	Direct Distribution Connection	Streetlights - City Owned
Garfield & Pacific	55005608868	Monthly General Service Secondary	Streetlights - City Owned
Wildwood & Pacific	55005607043	Monthly General Service Secondary	Streetlights - City Owned
4400 NJ Ave., Wildwood, NJ	55007751187	Annual General Service Secondary	Municipal Complex
Garfield w/o Susquehanna	55008983144	Street and Private Lighting	Streetlights - Atlantic City Electric
401 W Youngs Ave, Wildwood, NJ	55009561394	Monthly General Service Secondary	Byrne Community Center
Ocean Ave. lites	55005608272	Monthly General Service Secondary	Streetlights - City Owned
401 W Youngs Ave Temp 1	55009561576	Monthly General Service Secondary	Maxwell Field
401 W Youngs Ave	55009561949	Monthly General Service Secondary	Maxwell Field
Pacific/Glenwood/Magnolia	55009581285	Monthly General Service Secondary	Streetlights - City Owned
26th & Park	55008057402	Monthly General Service Secondary	Streetlights - City Owned
123 W Oak Ave, Wildwood, NJ	55009681309	Monthly General Service Secondary	Hut
199 E Leaming	55009806351	Monthly General Service Secondary	Streetlights - City Owned
4500 Atlantic Ave	55010015711	Monthly General Service Secondary	Fox Park
4500 Atlantic Ave Tennis Court	55010016107	Monthly General Service Secondary	Fox Park
Ocean at Fox Park	55010016735	Monthly General Service Secondary	Fox Park & Doo Wop Shop
4000 Park Blvd. Field House	55010411928	Monthly General Service Secondary	Maxwell Field
3601 Boardwalk, Wildwood, NJ	55012103622	Monthly General Service Secondary	Boardwalk Info Center

South Jersey Gas

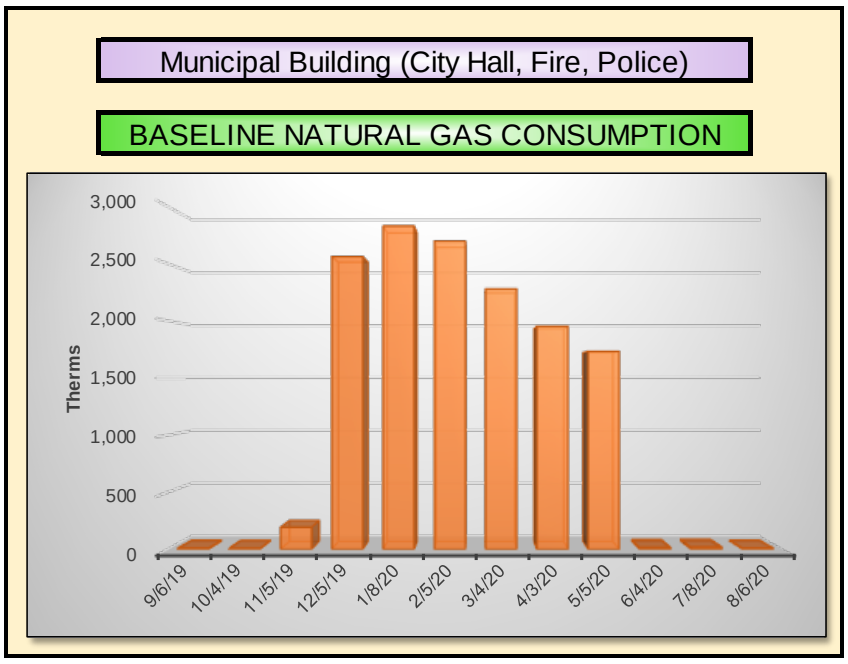
SJG Account Number	Bill Description	ESIP Building	UGI Account Number
1376140000	334 W Oak	Public Works Buildings (Existing) - Garages	1370130200
4376140000	3605 Bdwk	Boardwalk Info Center	4370130202
4968140000	4400 New Jersey	Municipal Complex	4960134105
5968140000	115 W Davis	Court	5960134106
6336140000	113 W Oak	Hut	6330141441
6821693327	316 W Oak Ave	Public Works Buildings (Existing) - Garages	6823284145
8211240000	401 W Youngs Ave	Byrne Community Center	8210131124
0417140000	4520 Ocean Ave	Fox Park/Doo Wop Shop	0416746018

Municipal Complex Baseline Energy Use



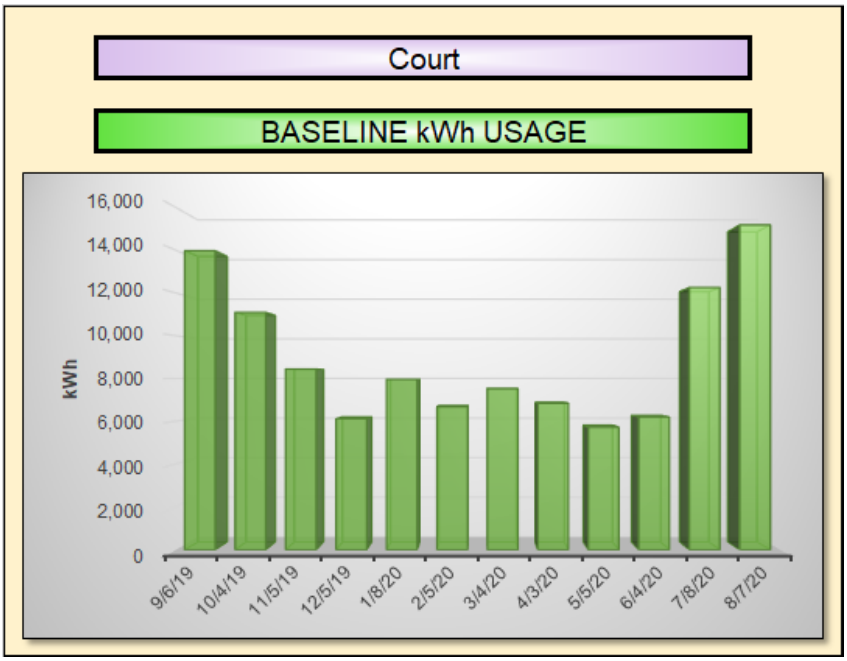


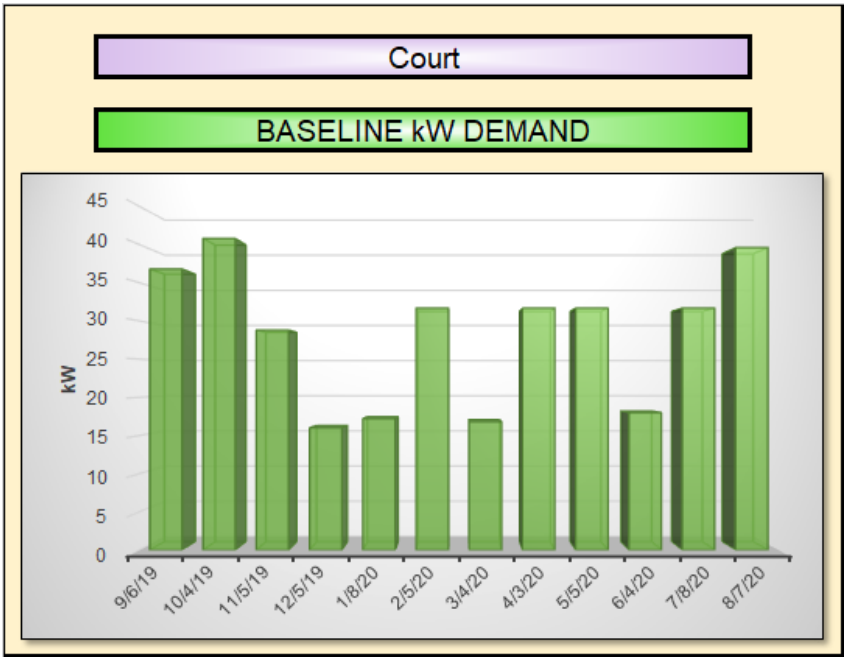
Municipal Complex (City Hall, Fire, Police)							ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #:	5500 7751 187				Meter #:	KZA017563348		
Commodity:	South Jersey Energy			Commodity:	4400 NJ Ave, Wildwood, NJ				Rate Tariff:	Annual General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
7/31/19	8/29/19	76,344	152	$1,695	$5,935	$193	$1,678	$9,502	$0.100	30	70%	260,485,728
8/30/19	9/29/19	66,007	142	$1,468	$5,132	$200	$1,621	$8,420	$0.100	31	63%	225,215,884
9/30/19	10/30/19	41,988	136	$992	$3,264	$200	$1,564	$6,019	$0.101	31	41%	143,263,056
10/31/19	11/26/19	28,989	121	$679	$2,262	$174	$1,210	$4,325	$0.101	27	37%	98,910,468
11/27/19	12/30/19	40,062	121	$938	$3,123	$219	$1,524	$5,804	$0.101	34	40%	136,691,544
12/31/19	1/30/20	35,480	121	$831	$2,776	$200	$1,389	$5,196	$0.102	31	39%	121,057,760
1/31/20	2/27/20	31,377	121	$735	$2,456	$180	$1,255	$4,626	$0.102	28	39%	107,058,324
2/28/20	3/30/20	36,008	121	$840	$2,818	$206	$1,434	$5,299	$0.102	32	39%	122,859,296
3/31/20	4/29/20	32,454	121	$757	$2,541	$193	$1,349	$4,841	$0.102	30	37%	110,733,048
4/30/20	5/28/20	30,394	121	$709	$2,381	$187	$1,304	$4,581	$0.102	29	36%	103,704,328
5/29/20	6/29/20	56,283	127	$1,327	$4,247	$206	$1,508	$7,288	$0.099	32	58%	192,037,596
6/30/20	7/30/20	81,270	132	$1,908	$6,165	$200	$1,523	$9,796	$0.099	31	83%	277,293,240
TOTALS		556,656	152	$12,878	$43,101	$2,357	$17,359	$75,695	$0.101	366	42%	1,899,310,272



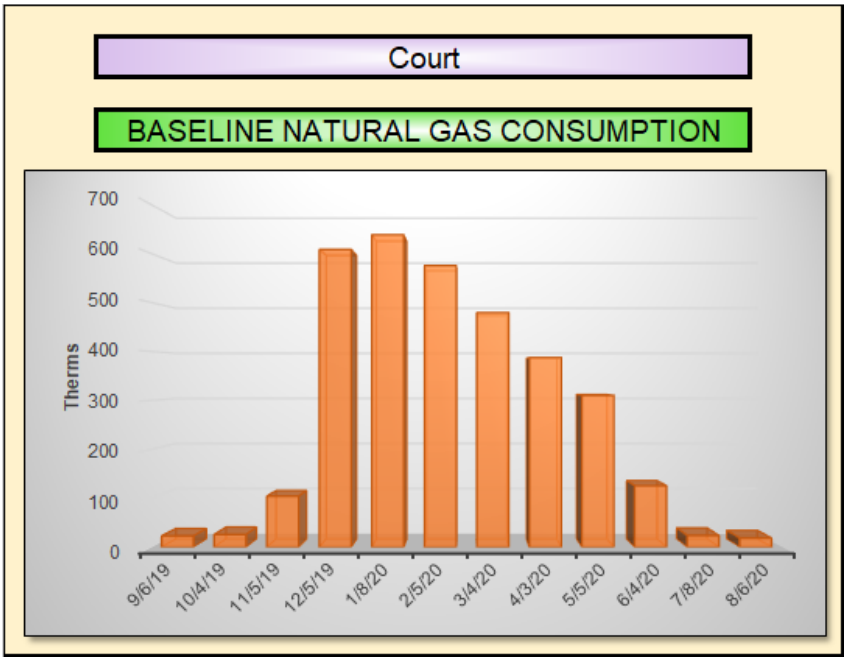
Municipal Complex (City Hall, Fire, Police)								Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	4968140000				Meter #	0341231
Commodity	UGI Utilities		Commodity	4960134105				Rate Tariff:	General Service FT
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
8/7/19	9/6/19	11	$8	$33		$5	$46	$1.12	1,139,000
9/7/19	10/4/19	9	$6	$30		$4	$40	$1.13	928,000
10/5/19	11/5/19	193	$144	$34		$88	$266	$1.20	19,280,000
11/6/19	12/5/19	2,562	$1,907	$36		$1,167	$3,110	$1.20	256,184,000
12/6/19	1/8/20	2,830	$2,111	$36		$1,289	$3,436	$1.20	282,969,000
1/9/20	2/5/20	2,698	$2,014	$30		$1,125	$3,168	$1.16	269,825,000
2/6/20	3/4/20	2,279	$1,705	$31		$950	$2,685	$1.16	227,907,000
3/5/20	4/3/20	1,951	$1,462	$32		$815	$2,308	$1.17	195,134,000
4/4/20	5/5/20	1,732	$1,308	$34		$723	$2,066	$1.17	173,246,000
5/6/20	6/4/20	16	$12	$32		$7	$51	$1.17	1,646,000
6/5/20	7/8/20	20	$15	$36		$8	$59	$1.16	1,959,000
7/9/20	8/6/20	11	$9	$31		$5	$44	$1.17	1,135,000
TOTALS		14,314	$10,700	$395	$0	$6,185	$17,280	$1.18	1,431,352,000

Court Baseline Energy Use



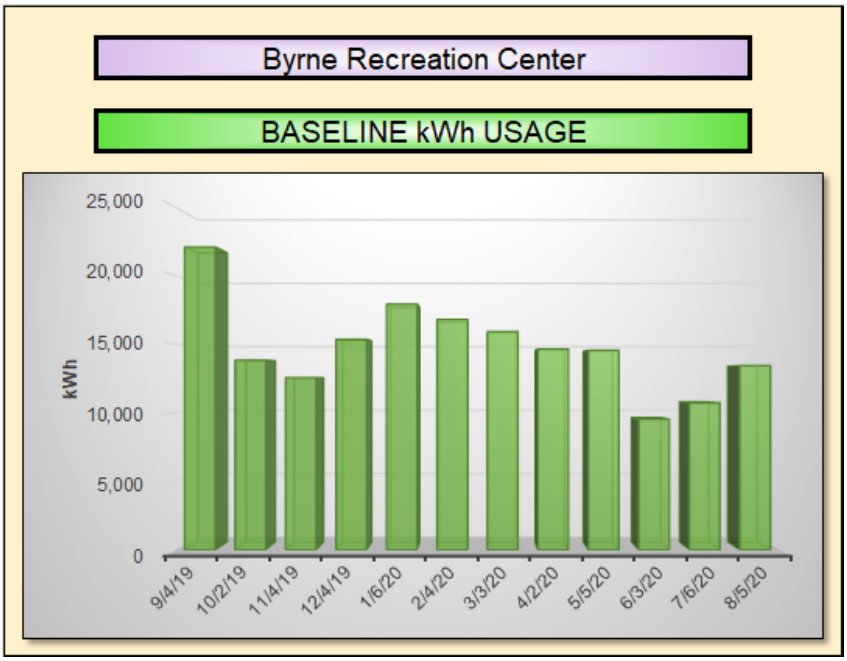


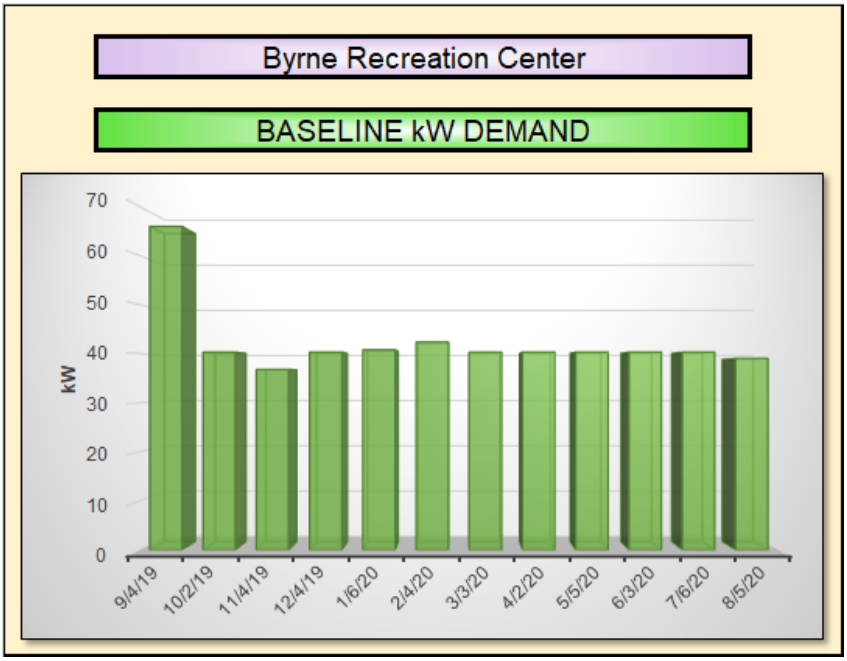
Court							ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	5500 5433 465				Meter #	KZG013132662		
Commodity:	South Jersey Energy			Commodity:	115 W. Davis Ave, Wildwood, NJ				Rate Tariff:	Annual General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/7/19	9/6/19	13,960	37	$308	$1,084	$200	$421	$2,013	$0.100	31	51%	47,631,520
9/7/19	10/4/19	11,080	41	$247	$861	$180	$422	$1,709	$0.100	28	40%	37,804,960
10/5/19	11/5/19	8,440	29	$198	$658	$206	$375	$1,436	$0.101	32	38%	28,797,280
11/6/19	12/5/19	6,120	16	$143	$479	$193	$351	$1,166	$0.102	30	53%	20,881,440
12/6/19	1/8/20	7,960	17	$186	$622	$219	$398	$1,425	$0.102	34	57%	27,159,520
1/9/20	2/5/20	6,680	32	$156	$523	$180	$328	$1,188	$0.102	28	31%	22,792,160
2/6/20	3/4/20	7,520	17	$177	$588	$180	$327	$1,272	$0.102	28	67%	25,658,240
3/5/20	4/3/20	6,840	32	$160	$536	$193	$351	$1,240	$0.102	30	30%	23,338,080
4/4/20	5/5/20	5,720	32	$133	$450	$206	$376	$1,165	$0.102	32	24%	19,516,640
5/6/20	6/4/20	6,200	18	$145	$482	$193	$353	$1,173	$0.101	30	48%	21,154,400
6/5/20	7/8/20	12,240	32	$286	$919	$219	$404	$1,827	$0.098	34	47%	41,762,880
7/9/20	8/7/20	15,160	40	$354	$1,147	$193	$441	$2,135	$0.099	30	53%	51,725,920
TOTALS		107,920	41	$2,492	$8,348	$2,363	$4,547	$17,750	$0.100	367	30%	368,223,040



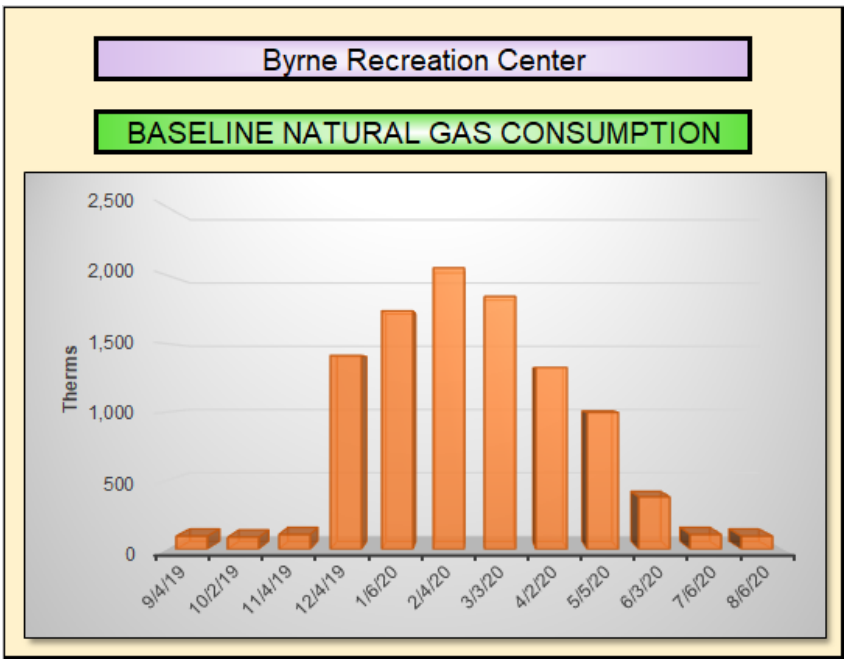
Court								Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	5968140000				Meter #	0572469
Commodity	UGI Utilities		Commodity	5960134106				Rate Tariff:	General Service FT
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
8/7/19	9/6/19	23	$16	$33		$10	$59	$1.14	2,277,000
9/7/19	10/4/19	26	$18	$30		$12	$60	$1.17	2,578,000
10/5/19	11/5/19	104	$78	$34		$48	$159	$1.20	10,413,000
11/6/19	12/5/19	608	$454	$32		$277	$763	$1.20	60,844,000
12/6/19	1/8/20	639	$476	$36		$291	$803	$1.20	63,860,000
1/9/20	2/5/20	575	$430	$30		$240	$699	$1.16	57,546,000
2/6/20	3/4/20	479	$359	$30		$200	$588	$1.17	47,921,000
3/5/20	4/3/20	387	$290	$32		$161	$484	$1.17	38,738,000
4/4/20	5/5/20	310	$234	$34		$129	$398	$1.17	31,003,000
5/6/20	6/4/20	126	$95	$32		$52	$179	$1.17	12,554,000
6/5/20	7/8/20	24	$18	$36		$10	$64	$1.17	2,371,000
7/9/20	8/6/20	19	$14	$31		$8	$53	$1.17	1,858,000
TOTALS		3,320	$2,480	$390	$0	$1,439	$4,309	$1.18	331,963,000

Byrne Recreation Center Baseline Energy Use



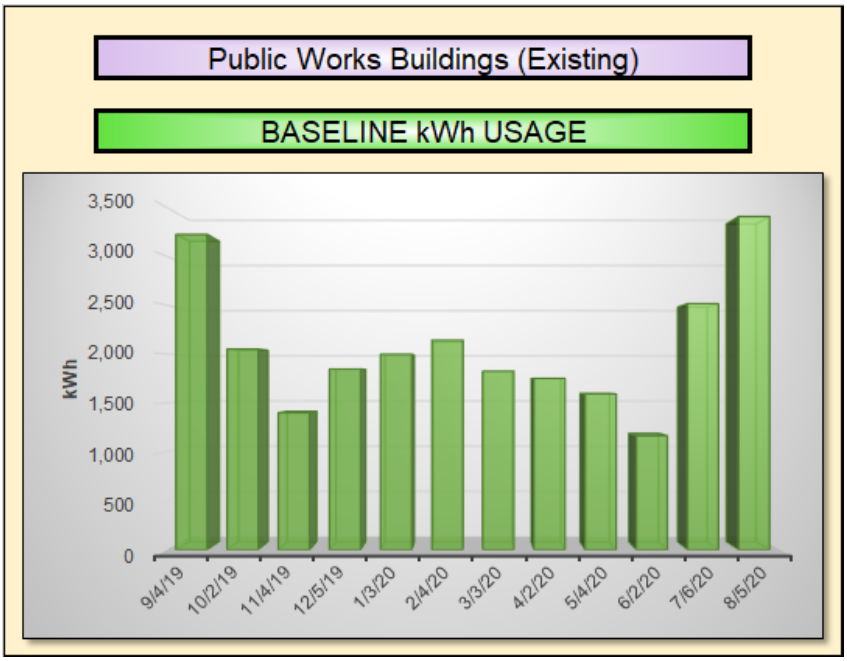


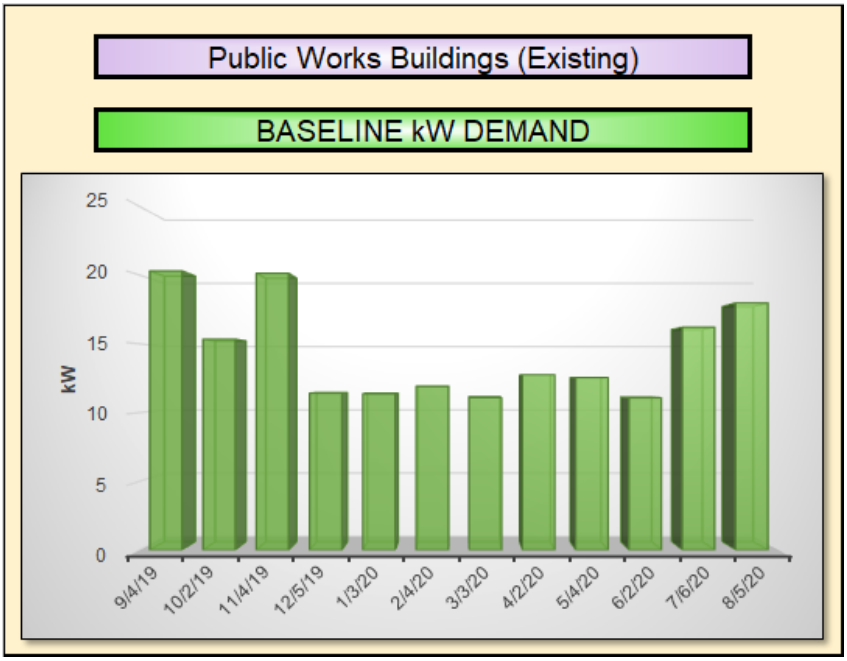
Byrne Recreation Center							ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	5500 9561 394				Meter #	99G006350767		
Commodity:	South Jersey Energy			Commodity:	401 W Youngs Ave, Wildwood, NJ				Rate Tariff:	Annual General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/3/19	9/4/19	22,080	66	$488	$1,722	$213	$803	$3,224	$0.100	33	42%	75,336,960
9/5/19	10/2/19	13,840	40	$307	$1,079	$180	$417	$1,983	$0.100	28	51%	47,222,080
10/3/19	11/4/19	12,560	37	$294	$983	$213	$492	$1,981	$0.102	33	43%	42,854,720
11/5/19	12/4/19	15,360	40	$360	$1,197	$193	$447	$2,197	$0.101	30	53%	52,408,320
12/5/19	1/6/20	17,920	41	$420	$1,397	$213	$498	$2,526	$0.101	33	55%	61,143,040
1/7/20	2/4/20	16,800	42	$393	$1,312	$187	$455	$2,347	$0.102	29	57%	57,321,600
2/5/20	3/3/20	15,920	40	$373	$1,244	$180	$417	$2,214	$0.102	28	59%	54,319,040
3/4/20	4/2/20	14,640	40	$342	$1,145	$193	$447	$2,128	$0.102	30	50%	49,951,680
4/3/20	5/5/20	14,560	40	$340	$1,140	$213	$494	$2,186	$0.102	33	46%	49,678,720
5/6/20	6/3/20	9,520	40	$222	$743	$187	$434	$1,585	$0.101	29	34%	32,482,240
6/4/20	7/6/20	10,720	40	$250	$779	$213	$494	$1,735	$0.096	33	34%	36,576,640
7/7/20	8/5/20	13,440	39	$314	$993	$193	$435	$1,935	$0.097	30	48%	45,857,280
TOTALS		177,360	66	$4,101	$13,734	$2,376	$5,831	$26,042	$0.101	369	30%	605,152,320



Byrne Recreation Center								Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	8211240000				Meter #	0411945
Commodity	UGI Utilities		Commodity	8210131124				Rate Tariff:	General Service FT
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
8/5/19	9/4/19	95	$66	$35		$43	$144	$1.14	9,522,000
9/5/19	10/2/19	88	$61	$30		$40	$131	$1.15	8,764,000
10/3/19	11/4/19	107	$80	$35		$49	$164	$1.20	10,722,000
11/5/19	12/4/19	1,413	$1,054	$32		$644	$1,730	$1.20	141,314,000
12/5/19	1/6/20	1,739	$1,296	$36		$792	$2,124	$1.20	173,880,000
1/7/20	2/4/20	2,052	$1,532	$31		$855	$2,418	$1.16	205,241,000
2/5/20	3/3/20	1,844	$1,380	$30		$769	$2,179	$1.17	184,437,000
3/4/20	4/2/20	1,326	$993	$32		$553	$1,578	$1.17	132,637,000
4/3/20	5/5/20	998	$754	$35		$417	$1,206	$1.17	99,807,000
5/6/20	6/3/20	382	$288	$31		$159	$478	$1.17	38,176,000
6/4/20	7/6/20	107	$80	$35		$45	$160	$1.17	10,722,000
7/7/20	8/6/20	95	$72	$31		$40	$143	$1.18	9,494,000
TOTALS		10,247	$7,656	$393	$0	$4,405	$12,454	$1.18	1,024,716,000

Public Works Buildings (Existing) Baseline Energy Use





Public Works Buildings (Existing)							ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	5001 0751 613				Meter #			
Commodity:	South Jersey Energy			Commodity:	312 W Oak Ave Grg-7				Rate Tariff:	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/3/19	9/4/19	0	0	$0	$0	$9	$0	$9	$0.00	33	0%	0
9/5/19	10/2/19	0	0	$0	$0	$9	$0	$9	$0.00	28	0%	0
10/3/19	11/4/19	0	0	$0	$0	$11	$0	$11	$0.00	33	0%	0
11/5/19	12/5/19	0	0	$0	$0	$10	$0	$10	$0.00	31	0%	0
12/6/19	1/3/20	0	0	$0	$0	$10	$0	$10	$0.00	29	0%	0
1/4/20	2/4/20	0	0	$0	$0	$11	$0	$11	$0.00	32	0%	0
2/5/20	3/3/20	0	0	$0	$0	$10	$0	$10	$0.00	28	0%	0
3/4/20	4/2/20	0	0	$0	$0	$10	$0	$10	$0.00	30	0%	0
4/3/20	5/4/20	0	0	$0	$0	$11	$0	$11	$0.00	32	0%	0
5/5/20	6/2/20	0	0	$0	$0	$10	$0	$10	$0.00	29	0%	0
6/3/20	7/6/20	0	0	$0	$0	$11	$0	$11	$0.00	34	0%	0
7/7/20	8/5/20	0	0	$0	$0	$10	$0	$10	$0.00	30	0%	0
TOTALS		0	0	$0	$0	$121	$0	$121	$0.00	369	0%	0

Public Works Buildings (Existing)							ELECTRIC METER #2					
Provider:	Atlantic City Electric			Account #	50010751654				Meter #			
Commodity:	South Jersey Energy			Commodity	316 W Oak Ave Grg-9				Rate Tariff	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/3/19	9/4/19	40	3	$3	$5	$11	$10	$18	$0.193	33	1%	136,480
9/5/19	10/2/19	42	0	$3	$5	$9	$0	$8	$0.187	28	69%	143,304
10/3/19	11/4/19	41	0	$3	$3	$11	$0	$7	$0.148	33	29%	139,892
11/5/19	12/3/19	45	0	$3	$3	$10	$0	$7	$0.149	29	129%	153,540
12/4/19	1/3/20	61	0	$4	$5	$10	$0	$9	$0.149	31	91%	208,132
1/4/20	2/4/20	36	0	$3	$3	$11	$0	$6	$0.150	32	47%	122,832
2/5/20	3/3/20	27	0	$2	$2	$10	$0	$4	$0.137	28	20%	92,124
3/4/20	4/2/20	56	0	$4	$4	$10	$0	$9	$0.149	30	78%	191,072
4/3/20	5/4/20	56	0	$4	$4	$11	$0	$9	$0.149	32	73%	191,072
5/5/20	6/2/20	34	0	$3	$3	$10	$0	$5	$0.150	29	54%	116,008
6/3/20	7/6/20	42	0	$3	$3	$11	$0	$7	$0.155	34	57%	143,304
7/7/20	8/5/20	52	0	$4	$4	$10	$0	$8	$0.156	30	80%	177,424
TOTALS		532	3	$39	$44	$123	$13	$96	$0.156	369	2%	1,815,184

Public Works Buildings (Existing)							ELECTRIC METER #3					
Provider:	Atlantic City Electric			Account #	50010751662				Meter #			
Commodity:	South Jersey Energy			Commodity	314 W Oak Ave Grg-8				Rate Tariff	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/3/19	9/4/19	9	0	$1	$1	$11	$0	$1	$0.16	33	-	30,708
9/5/19	10/2/19	9	0	$1	$1	$9	$0	$2	$0.15	28	13%	30,708
10/3/19	11/4/19	16	4	$1	$4	$11	$9	$13	$0.30	33	1%	54,592
11/5/19	12/3/19	21	0	$2	$2	$10	$0	$3	$0.15	29	23%	71,652
12/4/19	1/3/20	26	0	$2	$2	$10	$0	$4	$0.15	31	32%	88,712
1/4/20	2/4/20	30	0	$2	$2	$11	$0	$5	$0.15	32	20%	102,360
2/5/20	3/3/20	24	0	$1	$2	$10	$0	$3	$0.13	28	27%	81,888
3/4/20	4/2/20	21	0	$2	$2	$10	$0	$3	$0.15	30	24%	71,652
4/3/20	5/4/20	17	0	$1	$1	$11	$0	$3	$0.15	32	22%	58,004
5/5/20	6/2/20	13	0	$1	$1	$10	$0	$2	$0.15	29	23%	44,356
6/3/20	7/6/20	16	0	$1	$1	$11	$0	$3	$0.16	34	22%	54,592
7/7/20	8/5/20	15	0	$1	$1	$10	$0	$3	$0.16	30	23%	51,180
TOTALS		217	4	$16	$19	$123	$11	$46	$0.16	369	1%	740,404

Public Works Buildings (Existing)							ELECTRIC METER #4					
Provider:	Atlantic City Electric			Account #	55001348048				Meter #			
Commodity:	South Jersey Energy			Commodity	Oak & Park Garage #6				Rate Tariff	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/3/19	9/4/19	64	0	$5	$5	$11	$1	$11	$0.158	33	40%	218,368
9/5/19	10/2/19	58	0	$4	$5	$9	$0	$10	$0.158	28	43%	197,896
10/3/19	11/4/19	100	0	$7	$8	$11	$0	$16	$0.153	33	63%	341,200
11/5/19	12/3/19	45	0	$3	$4	$10	$1	$8	$0.154	29	22%	153,540
12/4/19	1/3/20	49	0	$4	$4	$10	$1	$8	$0.154	31	22%	167,188
1/4/20	2/4/20	55	0	$4	$4	$11	$1	$9	$0.153	32	24%	187,660
2/5/20	3/3/20	46	0	$3	$4	$10	$1	$8	$0.146	28	17%	156,952
3/4/20	4/2/20	54	0	$4	$4	$10	$1	$9	$0.154	30	25%	184,248
4/3/20	5/4/20	37	0	$3	$3	$11	$1	$7	$0.154	32	12%	126,244
5/5/20	6/2/20	43	0	$3	$3	$10	$0	$7	$0.154	29	309%	146,716
6/3/20	7/6/20	81	0	$6	$7	$11	$1	$14	$0.160	34	50%	276,372
7/7/20	8/5/20	69	0	$5	$6	$10	$1	$12	$0.160	30	48%	235,428
TOTALS		701	0	$52	$57	$123	$7	$116	$0.155	369	20%	2,391,812

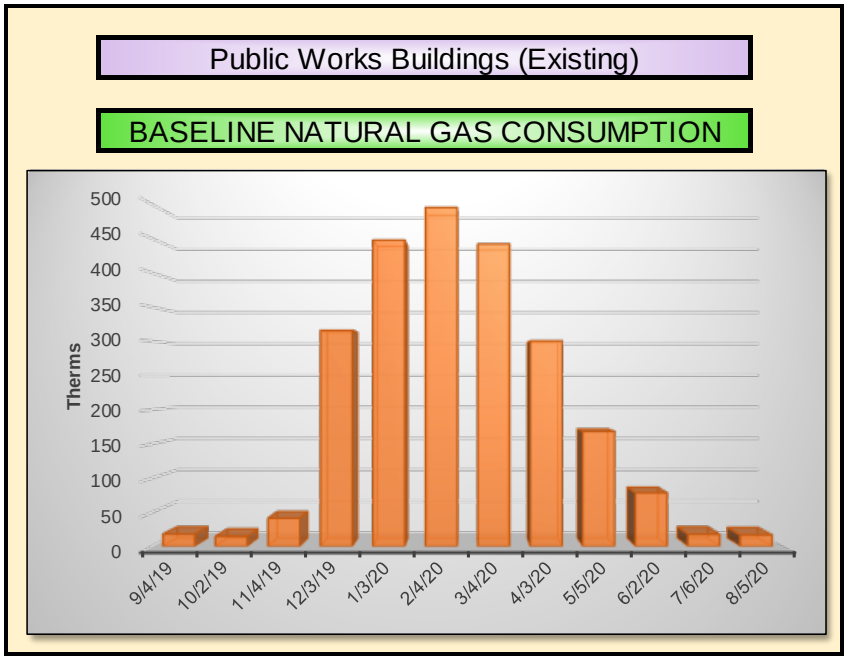
Public Works Buildings (Existing)							ELECTRIC METER #5					
Provider:	Atlantic City Electric			Account #	55003319658				Meter #			
Commodity:	South Jersey Energy			Commodity	328 E Oak Ave Apt 14				Rate Tariff	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/3/19	9/4/19	949	7	$74	$77	$11	$19	$170	$0.158	33	18%	3,237,988
9/5/19	10/2/19	707	6	$55	$57	$9	$14	$126	$0.158	28	19%	2,412,284
10/3/19	11/4/19	671	6	$49	$54	$11	$14	$117	$0.154	33	15%	2,289,452
11/5/19	12/3/19	755	4	$55	$61	$10	$8	$124	$0.154	29	29%	2,576,060
12/4/19	1/3/20	814	4	$59	$66	$10	$9	$134	$0.154	31	28%	2,777,368
1/4/20	2/4/20	863	4	$63	$70	$11	$9	$142	$0.154	32	28%	2,944,556
2/5/20	3/4/20	791	4	$57	$64	$10	$9	$130	$0.154	29	28%	2,698,892
3/5/20	4/3/20	834	4	$61	$67	$10	$9	$137	$0.153	30	27%	2,845,608
4/4/20	5/5/20	765	4	$56	$62	$11	$10	$127	$0.154	32	24%	2,610,180
5/6/20	6/2/20	570	4	$41	$46	$10	$9	$96	$0.154	28	20%	1,944,840
6/3/20	7/6/20	837	5	$66	$68	$11	$16	$150	$0.160	34	19%	2,855,844
7/7/20	8/5/20	995	6	$79	$80	$10	$15	$174	$0.160	30	24%	3,394,940
TOTALS		9,551	7	$714	$772	$123	$141	$1,627	$0.156	369	16%	32,588,012

Public Works Buildings (Existing)							ELECTRIC METER #6					
Provider:	Atlantic City Electric			Account #	55003320698				Meter #			
Commodity:	South Jersey Energy			Commodity	249 W. Oak #20 Garage				Rate Tariff	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/5/19	9/4/19	0				$11		$0	$0.00	31	$0.00	0
9/5/19	10/3/19	0				$9		$0	$0.00	29	$0.00	0
10/4/19	11/4/19	0				$11		$0	$0.00	32	$0.00	0
11/5/19	12/3/19	0				$10		$0	$0.00	29	$0.00	0
12/4/19	1/3/20	0				$10		$0	$0.00	31	$0.00	0
1/4/20	2/5/20	0				$11		$0	$0.00	33	$0.00	0
2/6/20	3/4/20	0				$10		$0	$0.00	28	$0.00	0
3/5/20	4/3/20	0				$10		$0	$0.00	30	$0.00	0
4/4/20	5/5/20	0				$11		$0	$0.00	32	$0.00	0
5/6/20	6/2/20	0				$10		$0	$0.00	28	$0.00	0
6/3/20	7/6/20	0				$11		$0	$0.00	34	$0.00	0
7/7/20	8/5/20	0				$10		$0	$0.00	30	$0.00	0
TOTALS		0	0	$0	$0	$123	$0	$0	$0.00	367	$0.00	0

Public Works Buildings (Existing)							ELECTRIC METER #7					
Provider:	Atlantic City Electric			Account #	55003321241				Meter #			
Commodity:	South Jersey Energy			Commodity	250 W Oak #19				Rate Tariff	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/3/19	9/4/19	635	5	$49	$51	$11	$15	$115	$0.158	33	16%	2,166,620
9/5/19	10/2/19	457	4	$35	$37	$9	$11	$83	$0.158	28	16%	1,559,284
10/3/19	11/4/19	450	6	$33	$36	$11	$14	$83	$0.154	33	10%	1,535,400
11/5/19	12/3/19	925	7	$67	$75	$10	$14	$156	$0.154	29	19%	3,156,100
12/4/19	1/3/20	979	6	$71	$79	$10	$14	$165	$0.154	31	21%	3,340,348
1/4/20	2/4/20	1,080	6	$79	$87	$11	$15	$181	$0.154	32	22%	3,684,960
2/5/20	3/4/20	867	6	$63	$70	$10	$13	$146	$0.154	29	21%	2,958,204
3/5/20	4/3/20	734	7	$53	$59	$10	$15	$127	$0.153	30	16%	2,504,408
4/4/20	5/5/20	681	7	$50	$55	$11	$15	$120	$0.154	32	14%	2,323,572
5/6/20	6/2/20	486	6	$35	$39	$10	$13	$87	$0.153	28	12%	1,658,232
6/3/20	7/6/20	621	5	$49	$50	$11	$16	$115	$0.160	34	14%	2,118,852
7/7/20	8/5/20	611	7	$48	$49	$10	$18	$116	$0.160	30	13%	2,084,732
TOTALS		8,526	7	$633	$689	$123	$172	$1,494	$0.155	369	14%	29,090,712

Public Works Buildings (Existing)						ELECTRIC METER #8						
Provider:	Atlantic City Electric			Account #	55003321506				Meter #			
Commodity:	South Jersey Energy			Commodity	250 W Oak #18				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	Customer Charge	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/3/19	9/4/19	1,523	5	$118	$123	$15	$11	$256	$0.16	33	38%	5,196,476
9/5/19	10/2/19	778	5	$60	$63	$12	$9	$135	$0.16	28	23%	2,654,536
10/3/19	11/4/19	121	5	$9	$10	$12	$11	$30	$0.15	33	3%	412,852
11/5/19	12/3/19	56	0	$4	$5	$1	$10	$9	$0.15	29	20%	191,072
12/4/19	1/3/20	69	1	$5	$6	$2	$10	$12	$0.15	31	13%	235,428
1/4/20	2/4/20	77	1	$6	$6	$2	$11	$14	$0.15	32	10%	262,724
2/5/20	3/4/20	69	0	$5	$6	$1	$10	$12	$0.15	29	22%	235,428
3/5/20	4/3/20	51	1	$4	$0	$3	$10	$7	$0.07	30	5%	174,012
4/4/20	5/5/20	35	1	$3	$3	$3	$11	$9	$0.15	32	3%	119,420
5/6/20	6/2/20	18	1	$1	$1	$1	$10	$4	$0.14	28	4%	61,416
6/3/20	7/6/20	916	5	$72	$74	$16	$11	$162	$0.16	34	21%	3,125,392
7/7/20	8/5/20	1,661	5	$131	$134	$14	$10	$279	$0.16	30	45%	5,667,332
TOTALS		5,374	5	$417	$430	$83	$123	$930	$0.16	369	12%	18,336,088

Public Works Buildings (Existing)											
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
3,220	20	$249	$262	$60	$580	$2.95	$0.159	$0.180	33	20%	10,986,640
2,051	15	$158	$167	$38	$372	$2.48	$0.159	$0.182	28	20%	6,998,012
1,399	20	$102	$115	$49	$277	$2.43	$0.155	$0.198	33	9%	4,773,388
1,847	11	$134	$149	$24	$317	$2.12	$0.153	$0.172	31	22%	6,301,964
1,998	11	$145	$161	$26	$343	$2.28	$0.153	$0.171	29	25%	6,817,176
2,141	12	$156	$173	$28	$367	$2.35	$0.153	$0.171	32	23%	7,305,092
1,824	11	$132	$147	$24	$312	$2.12	$0.153	$0.171	28	24%	6,223,488
1,750	13	$127	$137	$28	$302	$2.21	$0.151	$0.173	30	19%	5,971,000
1,591	13	$116	$128	$30	$285	$2.37	$0.153	$0.179	32	17%	5,428,492
1,164	11	$84	$94	$23	$211	$2.10	$0.153	$0.181	29	15%	3,971,568
2,513	16	$199	$203	$50	$462	$3.06	$0.160	$0.184	34	19%	8,574,356
3,403	18	$269	$275	$49	$602	$2.71	$0.160	$0.177	30	26%	11,611,036
24,901	20	$1,871	$2,010	$428	$4,430	$2.49	$0.156	$0.178	369	14%	84,962,212

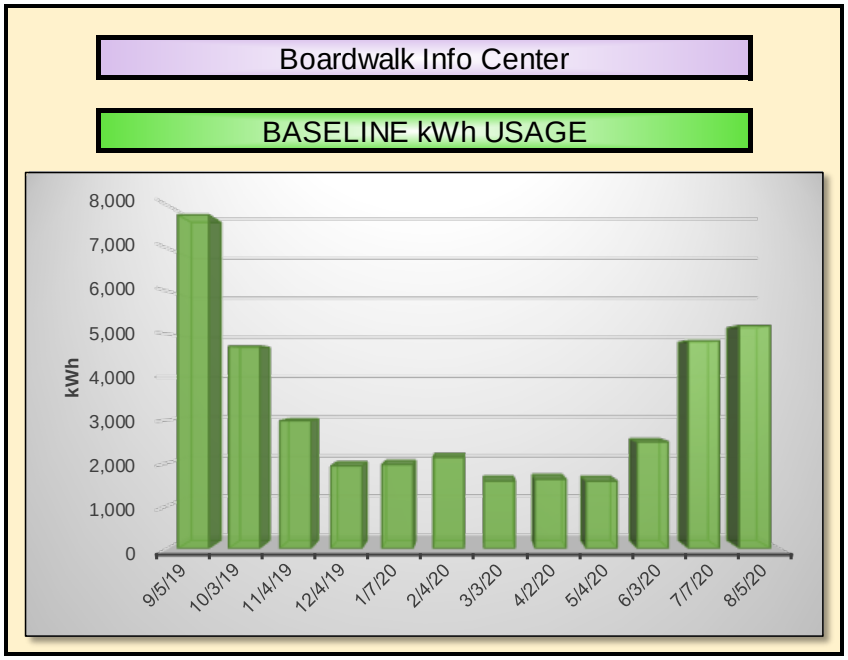


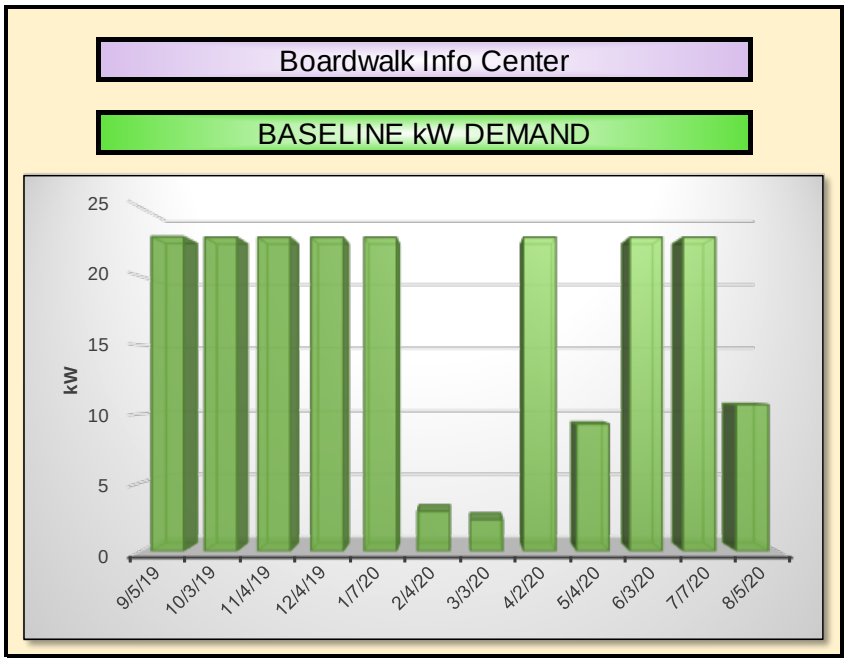
Public Works Buildings (Existing)							Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	1376140000			Meter #	0370476	
Commodity	UGI Utilities		Commodity	1370130200			Rate Tariff:	General Service FT	
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
8/2/19	9/4/19	18	$12	$35		$7	$54	$1.10	1,760,000
9/5/19	10/2/19	14	$10	$30		$7	$47	$1.16	1,443,000
10/3/19	11/4/19	40	$30	$35		$18	$84	$1.20	4,021,000
11/5/19	12/3/19	257	$192	$31		$117	$340	$1.20	25,722,000
12/4/19	1/3/20	327	$244	$33		$149	$426	$1.20	32,706,000
1/4/20	2/4/20	355	$265	$34		$148	$447	$1.16	35,501,000
2/5/20	3/4/20	316	$235	$31		$131	$398	$1.16	31,564,000
3/5/20	4/3/20	231	$173	$32		$97	$302	$1.17	23,139,000
4/4/20	5/5/20	146	$110	$34		$61	$206	$1.17	14,626,000
5/6/20	6/2/20	78	$59	$30		$33	$121	$1.17	7,820,000
6/3/20	7/6/20	18	$13	$36		$7	$57	$1.17	1,753,000
7/7/20	8/5/20	17	$12	$32		$7	$51	$1.17	1,651,000
TOTALS		1,817	$1,357	$393	$0	$782	$2,532	$1.18	181,706,000

Public Works Buildings (Existing)							Natural Gas Meter #2		
Provider	South Jersey Gas		Account #	6821693327			Meter #	0664005	
Commodity	UGI Utilities		Commodity	6823284145			Rate Tariff	General Service FT	
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
8/2/19	9/4/19	0	$0	$35		$0	$0	-	0
9/5/19	10/2/19	0	$0	$30		$0	$0	-	0
10/3/19	11/4/19	1	$1	$35		$0	$1	$1.00	76,000
11/5/19	12/3/19	59	$44	$31		$26	$70	$1.19	5,888,000
12/4/19	1/3/20	121	$90	$33		$50	$141	$1.16	12,110,000
1/4/20	2/4/20	141	$105	$34		$59	$164	$1.16	14,077,000
2/5/20	3/4/20	127	$95	$31		$53	$147	$1.16	12,677,000
3/5/20	4/3/20	69	$52	$32		$29	$81	$1.17	6,921,000
4/4/20	5/5/20	22	$16	$34		$9	$25	$1.17	2,163,000
5/6/20	6/2/20	0	$0	$30		$0	$0	-	0
6/3/20	7/6/20	0	$0	$36		$0	$0	-	0
7/7/20	8/5/20	0	$0	$32		$0	$0	-	0
TOTALS		539	$403	$393	$0	$226	$629	$1.17	53,912,000

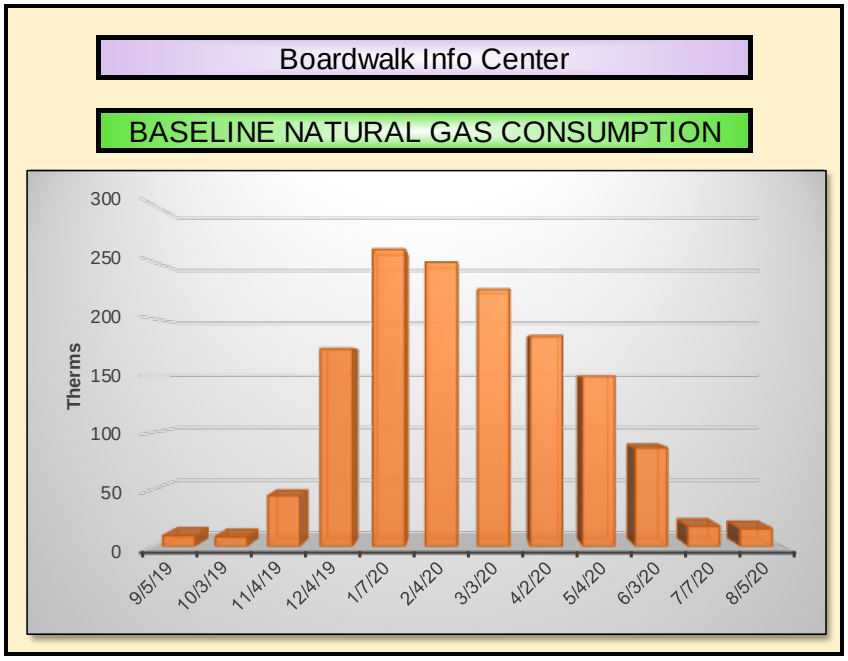
Public Works Buildings (Existing)							
TOTAL NATURAL GAS							
Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	Cost / Unit Checksum	BTU
18	$12	$70	$0	$7	$54	$1.10	1,760,000
14	$10	$60	$0	$7	$47	$1.16	1,443,000
41	$31	$70	$0	$18	$84	$1.20	4,097,000
316	$236	$62	$0	$144	$410	$1.20	31,610,000
448	$334	$66	$0	$199	$567	$1.19	44,816,000
496	$370	$68	$0	$207	$611	$1.16	49,578,000
442	$330	$62	$0	$184	$545	$1.16	44,241,000
301	$225	$64	$0	$126	$383	$1.17	30,060,000
168	$127	$68	$0	$70	$231	$1.17	16,789,000
78	$59	$60	$0	$33	$121	$1.17	7,820,000
18	$13	$72	$0	$7	$57	$1.17	1,753,000
17	$12	$64	$0	$7	$51	$1.17	1,651,000
2,356	$1,759	$786	$0	$1,008	$3,161	$1.17	235,618,000

Boardwalk Info Center Baseline Energy Use



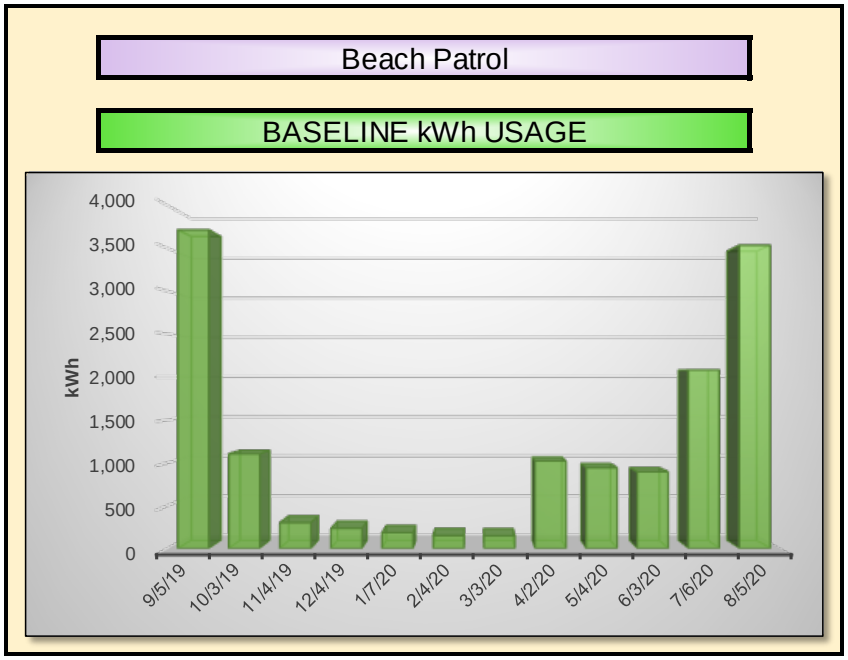


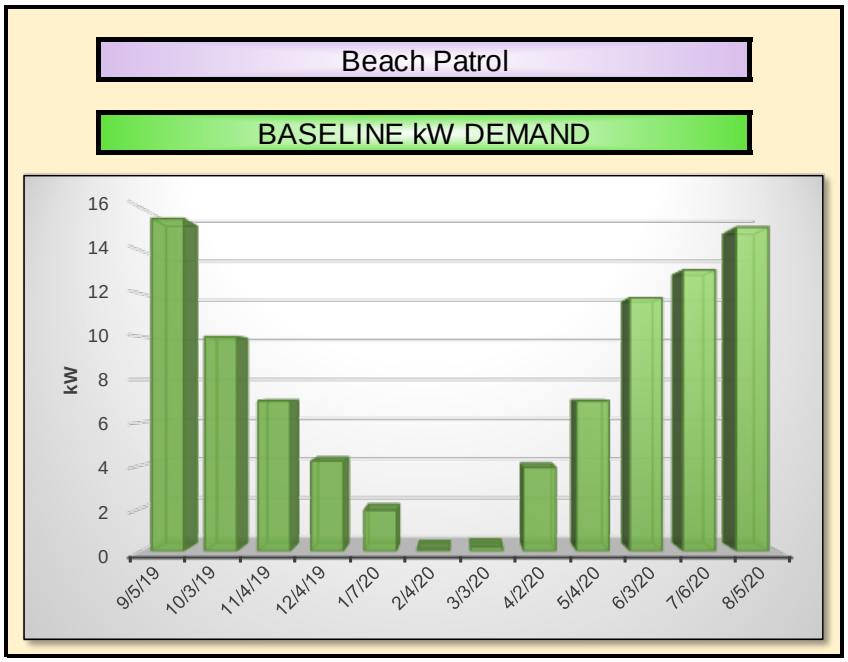
Boardwalk Info Center							ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	5501 2103 622				Meter #	99F105756706		
Commodity:	South Jersey Energy			Commodity:	3601 Boardwalk, Wildwood, NJ				Rate Tariff:	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/6/19	9/5/19	7,781	22.9	$603	$629	$10	$63	$1,305	$0.158	31	46%	26,548,772
9/6/19	10/3/19	4,720	22.9	$363	$381	$9	$56	$810	$0.158	28	31%	16,104,640
10/4/19	11/4/19	2,977	22.9	$216	$241	$11	$54	$521	$0.154	32	17%	10,157,524
11/5/19	12/4/19	1,924	22.9	$140	$156	$10	$50	$356	$0.154	30	12%	6,564,688
12/5/19	1/7/20	1,956	22.9	$142	$158	$11	$57	$369	$0.154	34	10%	6,673,872
1/8/20	2/4/20	2,127	2.9	$155	$172	$9	$6	$342	$0.154	28	109%	7,257,324
2/5/20	3/3/20	1,572	2.3	$114	$127	$9	$5	$255	$0.154	28	103%	5,363,664
3/4/20	4/2/20	1,614	22.9	$117	$130	$10	$50	$308	$0.153	30	10%	5,506,968
4/3/20	5/4/20	1,569	9.3	$114	$127	$11	$22	$274	$0.154	32	22%	5,353,428
5/5/20	6/3/20	2,485	22.9	$183	$201	$10	$52	$445	$0.154	30	15%	8,478,820
6/4/20	7/7/20	4,846	22.9	$383	$392	$11	$70	$856	$0.160	34	26%	16,534,552
7/8/20	8/5/20	5,198	10.7	$411	$420	$10	$28	$868	$0.160	29	70%	17,735,576
TOTALS		38,769	23	$2,941	$3,133	$122	$513	$6,709	$0.157	366	19%	132,279,828



Boardwalk Info Center								Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	4376140000				Meter #	
Commodity	UGI Utilities		Account #	4370130202				Meter #	
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
8/6/19	9/5/19	9	$6	$33		$4	$44	$1.12	932,000
9/6/19	10/3/19	8	$6	$30		$4	$40	$1.18	825,000
10/4/19	11/4/19	44	$33	$34		$20	$87	$1.20	4,433,000
11/5/19	12/4/19	174	$129	$32		$79	$240	$1.20	17,354,000
12/5/19	1/7/20	261	$195	$36		$119	$350	$1.20	26,082,000
1/8/20	2/4/20	249	$186	$30		$104	$320	$1.16	24,944,000
2/5/20	3/3/20	226	$168	$31		$94	$293	$1.16	22,563,000
3/4/20	4/2/20	185	$138	$32		$77	$248	$1.17	18,491,000
4/3/20	5/4/20	149	$113	$34		$62	$209	$1.17	14,935,000
5/5/20	6/3/20	86	$65	$32		$36	$133	$1.17	8,644,000
6/4/20	7/7/20	18	$13	$36		$7	$57	$1.17	1,753,000
7/8/20	8/5/20	15	$12	$31		$6	$49	$1.17	1,548,000
TOTALS		1,425	$1,065	$391	$0	$614	$2,069	$1.18	142,504,000

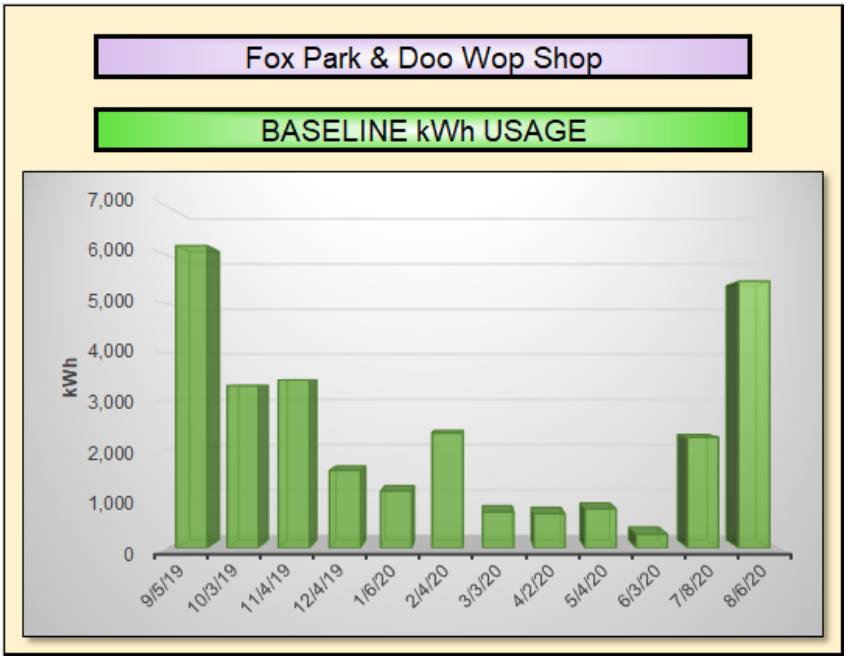
Beach Patrol Baseline Energy Use

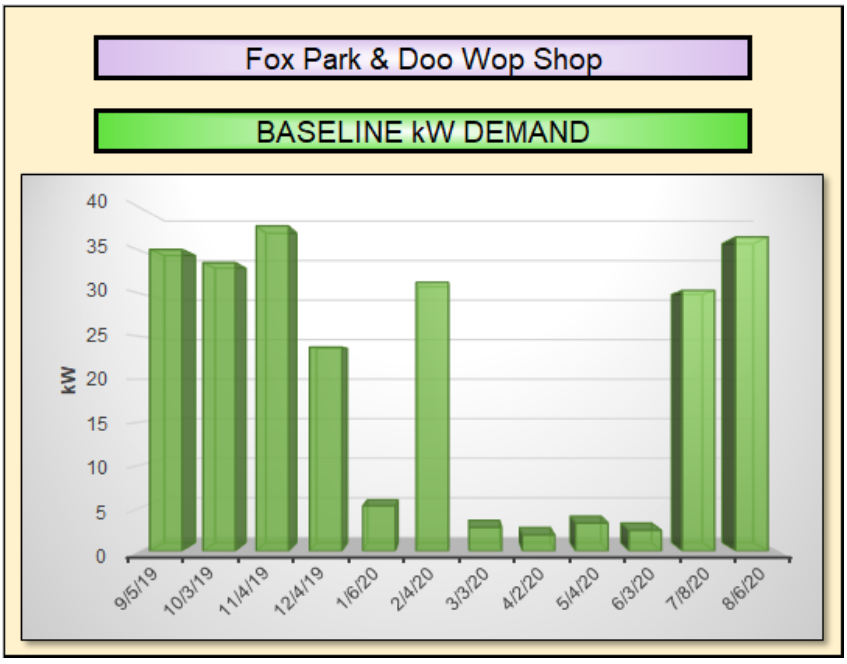




Beach Patrol						ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	5500 3713 157			Meter #	99F050214489		
Commodity:	South Jersey Energy			Commodity:	Beach & Lincoln, Wildwood, NJ			Rate Tariff:	Monthly General Service Secondary		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
8/6/19	9/5/19	3,717	15.50	$288	$300	$43	$642	$0.158	31	32%	12,682,404
9/6/19	10/3/19	1,103	10.00	$85	$89	$25	$208	$0.158	28	16%	3,763,436
10/4/19	11/4/19	300	7.00	$22	$24	$16	$73	$0.154	32	6%	1,023,600
11/5/19	12/4/19	235	4.20	$17	$19	$9	$55	$0.152	30	8%	801,820
12/5/19	1/7/20	184	1.90	$13	$15	$5	$44	$0.153	34	12%	627,808
1/8/20	2/4/20	148	0.10	$11	$12	$0	$32	$0.154	28	220%	504,976
2/5/20	3/3/20	145	0.20	$11	$12	$0	$32	$0.154	28	108%	494,740
3/4/20	4/2/20	1,019	3.90	$74	$82	$9	$175	$0.153	30	36%	3,476,828
4/3/20	5/4/20	941	7.00	$69	$76	$17	$172	$0.154	32	18%	3,210,692
5/5/20	6/3/20	892	11.80	$66	$72	$27	$174	$0.154	30	10%	3,043,504
6/4/20	7/6/20	2,083	13.10	$165	$168	$40	$384	$0.160	33	20%	7,107,196
7/7/20	8/5/20	3,537	15.10	$279	$286	$39	$614	$0.160	30	33%	12,068,244
TOTALS		14,304	16	$1,098	$1,156	$229	$2,605	$0.158	366	11%	48,805,248

Fox Park & Doo Wop Shop Baseline Energy Use





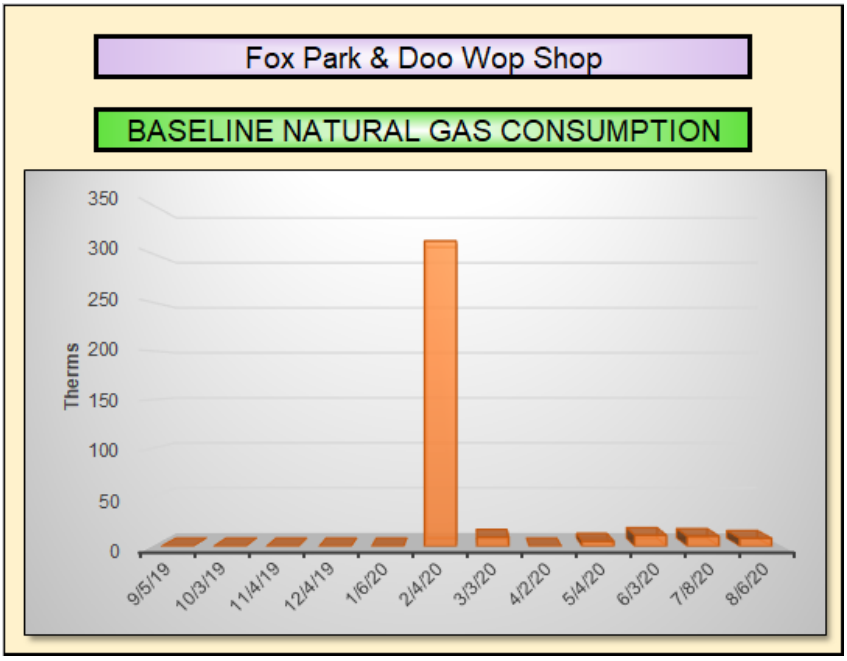
Fox Park & Doo Wop Shop							ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	55010016735				Meter #	TCA129833264		
Commodity:	South Jersey Energy			Commodity:	Ocean at Fox Park - Doo Wop Shop				Rate Tariff:	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/6/19	9/5/19	3,779	14.60	$293	$305	$10	$40	$649	$0.158	31	35%	12,893,948
9/6/19	10/3/19	2,116	13.46	$163	$171	$9	$33	$376	$0.158	28	23%	7,219,792
10/4/19	11/4/19	1,388	11.56	$101	$112	$11	$27	$251	$0.154	32	16%	4,735,856
11/5/19	12/4/19	647	3.31	$47	$52	$10	$7	$117	$0.154	30	27%	2,207,564
12/5/19	1/6/20	670	2.98	$49	$54	$11	$7	$121	$0.154	33	28%	2,286,040
1/7/20	2/4/20	1,270	9.80	$92	$103	$10	$21	$225	$0.154	29	19%	4,333,240
2/5/20	3/3/20	424	2.75	$31	$34	$9	$6	$80	$0.154	28	23%	1,446,688
3/4/20	4/2/20	396	0.67	$29	$32	$10	$2	$72	$0.153	30	82%	1,351,152
4/3/20	5/4/20	397	1.59	$29	$32	$11	$4	$75	$0.154	32	33%	1,354,564
5/5/20	6/3/20	25	0.74	$19	$20	$10	$2	$51	$1.562	30	5%	85,300
6/4/20	7/8/20	1,789	9.72	$141	$145	$12	$30	$328	$0.160	35	22%	6,104,068
7/9/20	8/6/20	3,612	12.72	$285	$292	$10	$33	$620	$0.160	29	41%	12,324,144
TOTALS		16,513	15	$1,279	$1,353	$122	$212	$2,966	$0.159	367	13%	56,342,356

Fox Park & Doo Wop Shop							ELECTRIC METER #2					
Provider:	Atlantic City Electric			Account #	55010016107				Meter #	TEG021009631		
Commodity:	South Jersey Energy			Commodity	4500 Atlantic Ave Tennis Court				Rate Tariff	General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/6/19	9/5/19	1,401	21	$109	$113	$12	$57	$279	$0.158	31	9%	4,780,212
9/6/19	10/3/19	286	20	$30	$23	$11	$40	$92	$0.184	28	2%	975,832
10/4/19	11/4/19	1,138	20	$83	$92	$12	$48	$222	$0.154	32	7%	3,882,856
11/5/19	12/4/19	244	20	$18	$20	$12	$45	$82	$0.154	30	2%	832,528
12/5/19	1/6/20	1	0	$0	$0	$13	$0	$0	$0.150	33	13%	3,412
1/7/20	2/4/20	758	20	$55	$61	$11	$43	$160	$0.154	29	5%	2,586,296
2/5/20	3/3/20	1	0	$0	$0	$11	$0	$0	$0.150	28	15%	3,412
3/4/20	4/2/20	1	0	$0	$0	$12	$0	$0	$0.150	30	14%	3,412
4/3/20	5/4/20	1	0	$0	$0	$12	$0	$0	$0.150	32	13%	3,412
5/5/20	6/3/20	1	0	$0	$0	$12	$0	$0	$0.150	30	14%	3,412
6/4/20	7/8/20	477	21	$38	$39	$14	$65	$141	$0.160	35	3%	1,627,524
7/9/20	8/6/20	926	20	$73	$75	$11	$53	$201	$0.160	29	7%	3,159,512
TOTALS		5,235	21	$405	$423	$142	$350	$1,178	$0.158	367	3%	17,861,820

Fox Park & Doo Wop Shop							ELECTRIC METER #3					
Provider:	Atlantic City Electric		Account #	55010015711			Meter #	1NF105788968				
Commodity:	South Jersey Energy		Account #	4500 Atlantic Ave			Meter #	General Service Secondary				
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
7/4/19	8/5/19	932		$93	$75			$168	$0.180	33	$0.00	3,179,984
8/6/19	9/5/19	854		$86	$69			$155	$0.182	31	$0.00	2,913,848
9/6/19	10/3/19	895	6	$78	$72		$15	$165	$0.168	28	22%	3,053,740
10/4/19	11/5/19	695		$67	$56			$123	$0.177	33	$0.00	2,371,340
11/6/19	12/4/19	495	2	$46	$40		$5	$91	$0.174	29	31%	1,688,940
12/5/19	1/6/20	322	1	$34	$26		$3	$63	$0.188	33	34%	1,098,664
1/7/20	2/4/20	312		$25	$35			$60	$0.193	29	$0.00	1,064,544
2/5/20	3/3/20	302	1	$31	$24		$2	$58	$0.184	28	38%	1,030,424
3/4/20	4/2/20	400	2	$39	$32		$4	$75	$0.178	30	33%	1,364,800
4/3/20	5/4/20	254	2	$29	$21		$4	$54	$0.195	32	20%	866,648
5/5/20	6/3/20	0	0	$10	$0			$10	$0.00	30	$0.00	0
6/4/20	7/8/20	916	3	$84	$74		$11	$169	$0.173	35	32%	3,125,392
TOTALS		6,377	6	$623	$525	$0	$44	$1,191	$0.180	371	12%	21,758,324

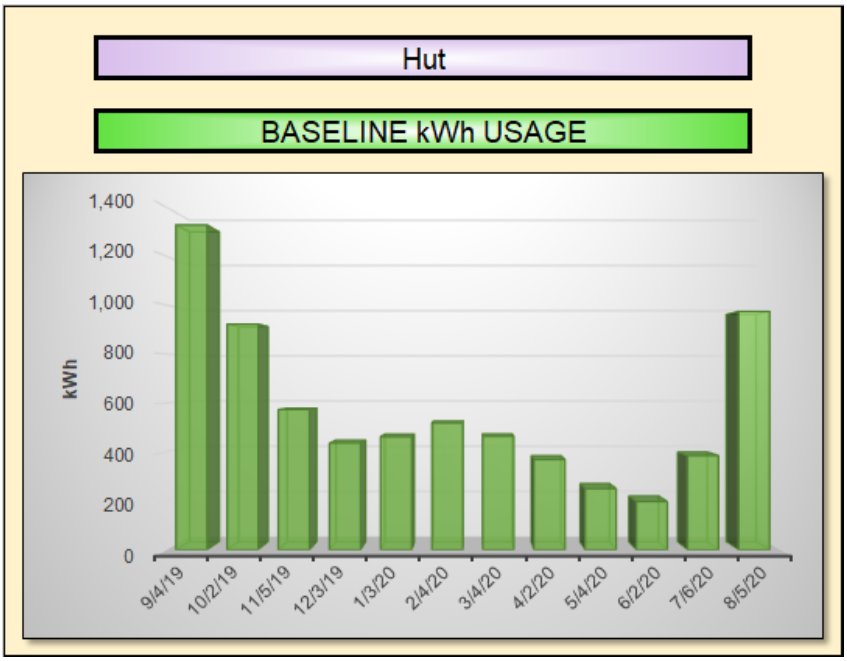
Fox Park & Doo Wop Shop							ELECTRIC METER #4					
Provider:	Atlantic City Electric		Account #	55003320235			Meter #	99F105701224				
Commodity:	South Jersey Energy		Account #	4401 Atlantic Ave			Meter #	General Service Secondary				
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/7/19	9/6/19	72	0	$15	$14	$10	$0	$29	$0.402	31	$0.00	245,664
9/7/19	10/4/19	65	0	$5	$11	$9	$0	$16	$0.247	28	$0.00	221,780
10/5/19	11/5/19	14	0	$1	$1	$11	$0	$2	$0.153	32	$0.00	47,768
11/6/19	12/5/19	1	0	$0	$0	$10	$0	$0	$0.150	30	$0.00	3,412
12/6/19	1/8/20	0	0	$0	$0	$11	$0	$0	$0.00	34	$0.00	0
1/9/20	2/5/20	0	0	$0	$0	$0	$0	$0	$0.00	28	$0.00	0
2/6/20	3/4/20	0	0	$0	$0	$9	$0	$0	$0.00	28	$0.00	0
3/5/20	4/3/20	0	0	$0	$0	$10	$0	$0	$0.00	30	$0.00	0
4/4/20	5/5/20	0	0	$0	$0	$11	$0	$0	$0.00	32	$0.00	0
5/6/20	6/4/20	0	0	$0	$0	$10	$0	$0	$0.00	30	$0.00	0
6/5/20	7/8/20	0	0	$0	$0	$11	$0	$0	$0.00	34	$0.00	0
7/9/20	8/6/20	0	0	$0	$0	$10	$0	$0	$0.00	29	$0.00	0
TOTALS		152	0	$21	$26	$112	$0	$47	$0.311	366	$0.00	518,624

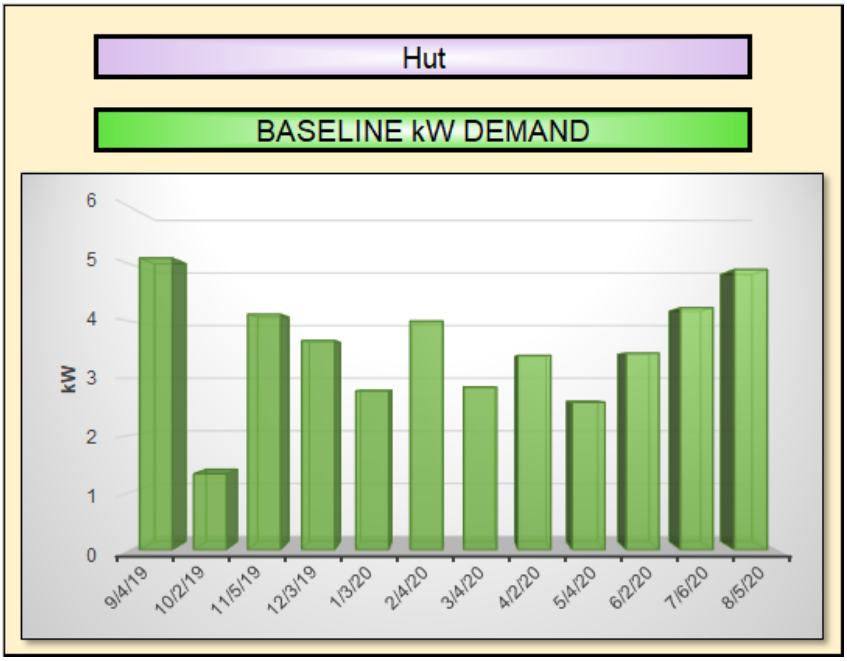
Fox Park & Doo Wop Shop											
TOTAL ELECTRIC											
Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kW Checksum	Cost / kWh Checksum	Total Cost / kWh Checksum	Days	Load Factor	BTU
6,184	35	$509	$508	$97	$1,124	$2.77	$0.164	$0.182	31	24%	21,099,808
3,321	34	$284	$274	$73	$640	$2.17	$0.168	$0.193	28	15%	11,331,252
3,435	38	$263	$278	$90	$641	$2.37	$0.157	$0.187	32	12%	11,720,220
1,587	24	$132	$128	$52	$322	$2.20	$0.164	$0.203	30	9%	5,414,844
1,166	5	$95	$94	$12	$212	$2.34	$0.162	$0.182	33	28%	3,978,392
2,350	31	$182	$190	$67	$448	$2.14	$0.158	$0.191	29	11%	8,018,200
737	3	$56	$69	$6	$140	$2.08	$0.170	$0.191	28	40%	2,514,644
699	2	$60	$57	$4	$131	$2.14	$0.167	$0.187	30	52%	2,384,988
798	3	$68	$65	$8	$151	$2.30	$0.166	$0.189	32	32%	2,722,776
280	2	$48	$41	$6	$104	$2.31	$0.317	$0.373	30	16%	955,360
2,266	30	$189	$183	$95	$479	$3.13	$0.164	$0.211	35	9%	7,731,592
5,454	37	$443	$441	$97	$990	$2.65	$0.162	$0.181	29	21%	18,609,048
28,277	38	$2,328	$2,327	$606	$5,382	$2.48	$0.165	$0.190	367	8%	96,481,124



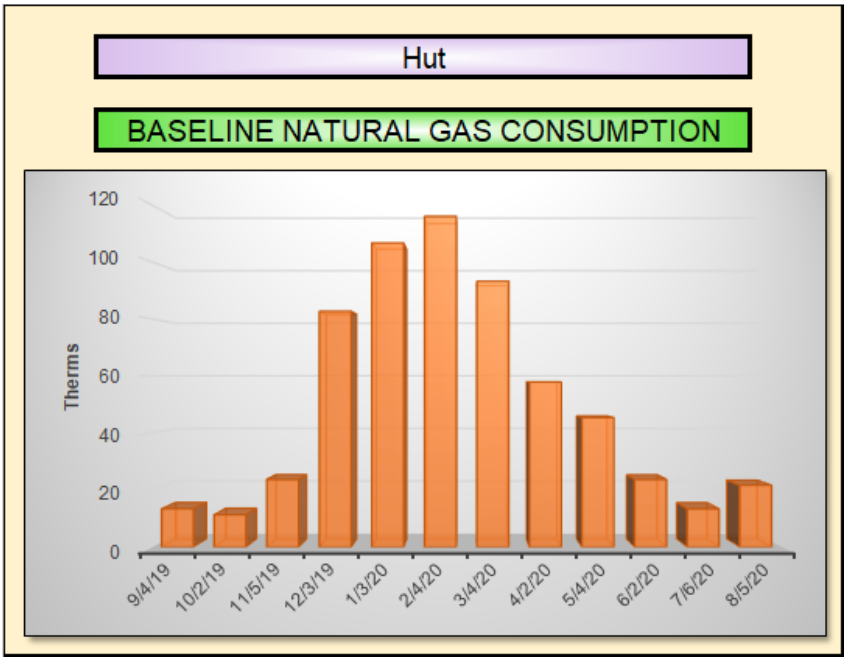
Fox Park & Doo Wop Shop								Natural Gas Meter #1	
Provider	South Jersey Gas		Account #	0417140000				Meter #	0639091
Commodity	UGI Utilities		Commodity	0416746018				Rate Tariff:	General Service FT
Billing Period Start Date	Actual Reading	Therms	Gas Delivery Charges	Gas Customer Charge	Gas Demand Charge	Gas Commodity Charges	Gas Total Charges	$/Therm Marginal Rate	BTU
8/6/19	9/5/19	0	$0	$33		$0	$33	-	0
9/6/19	10/3/19	0	$0	$30		$0	$30	-	0
10/4/19	11/4/19	0	$0	$34		$0	$34	-	0
11/5/19	12/4/19	0	$0	$32		$0	$32	-	0
12/5/19	1/6/20	0	$0	$35		$0	$35	-	0
1/7/20	2/4/20	313	$233	$31		$130	$394	$1.16	31,257,000
2/5/20	3/3/20	9	$7	$30		$4	$41	$1.17	932,000
3/4/20	4/2/20	0	$0	$32		$0	$32	-	0
4/3/20	5/4/20	5	$4	$34		$2	$40	$1.18	515,000
5/5/20	6/3/20	11	$9	$32		$5	$45	$1.17	1,132,000
6/4/20	7/8/20	10	$8	$37		$4	$49	$1.16	1,031,000
7/9/20	8/6/20	8	$6	$31		$4	$41	$1.27	826,000
TOTALS		357	$267	$391	$0	$150	$807	$1.17	35,693,000

Hut Baseline Energy Use



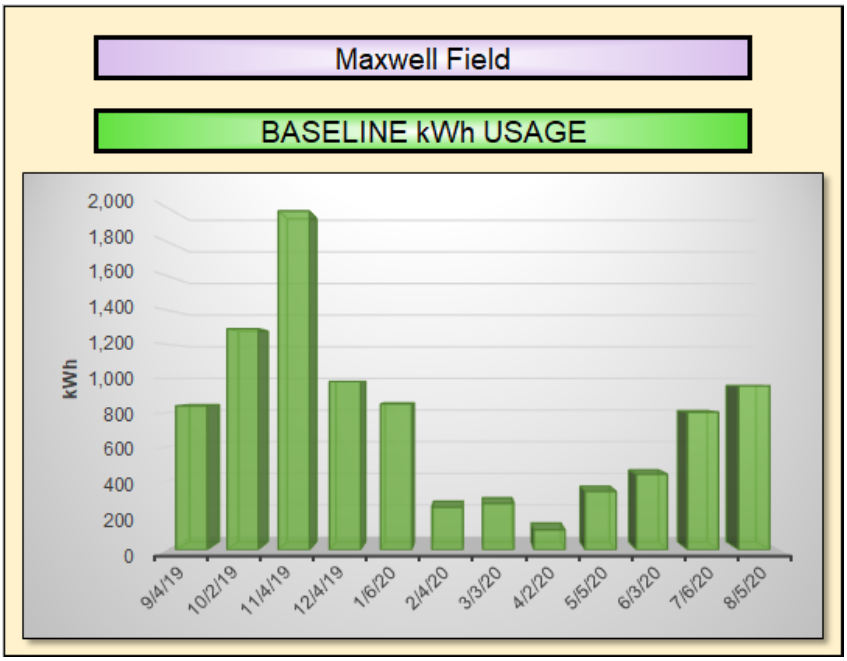


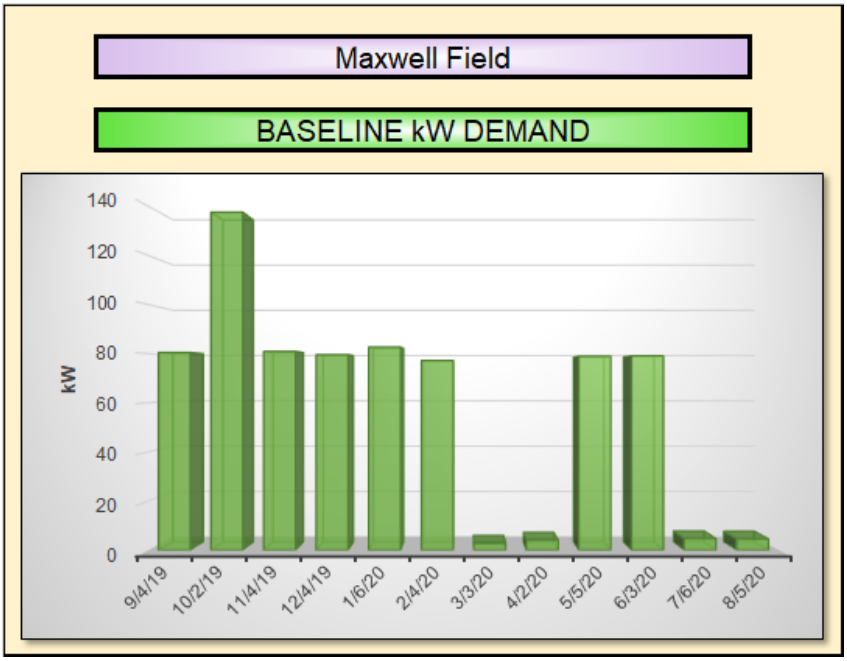
Hut							ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	55009681309				Meter #	99F105731553		
Commodity:	South Jersey Energy			Commodity:	123 W Oak Ave, Wildwood, NJ				Rate Tariff:	Monthly General Service Secondary		
Billing Period Start Date	**Actual Reading**	**Usage kWh**	**Demand kW**	**Electric Delivery Charges**	**Electric Commodity Charges**	**Customer Charge**	**Electric Demand Charges**	**Total Electric Charges**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
8/3/19	9/4/19	1,327	5.1	$103	$107	$11	$15	$236	$0.159	33	33%	4,527,724
9/5/19	10/2/19	922	1.3	$71	$75	$9	$3	$158	$0.158	28	103%	3,145,864
10/3/19	11/5/19	573	4.1	$42	$46	$11	$10	$109	$0.154	34	17%	1,955,076
11/6/19	12/3/19	436	3.7	$32	$35	$9	$8	$84	$0.154	28	18%	1,487,632
12/4/19	1/3/20	462	2.8	$34	$37	$10	$6	$88	$0.154	31	22%	1,576,344
1/4/20	2/4/20	518	4.0	$38	$42	$11	$9	$100	$0.154	32	17%	1,767,416
2/5/20	3/4/20	463	2.8	$34	$37	$10	$6	$87	$0.153	29	23%	1,579,756
3/5/20	4/2/20	369	3.4	$27	$30	$10	$7	$73	$0.153	29	16%	1,259,028
4/3/20	5/4/20	250	2.6	$18	$20	$11	$6	$55	$0.154	32	13%	853,000
5/5/20	6/2/20	197	3.4	$14	$16	$10	$7	$47	$0.154	29	8%	672,164
6/3/20	7/6/20	385	4.2	$30	$31	$11	$13	$86	$0.160	34	11%	1,313,620
7/7/20	8/5/20	974	4.9	$77	$79	$10	$13	$179	$0.160	30	28%	3,323,288
TOTALS		6,876	5	$519	$556	$122	$104	$1,302	$0.156	369	15%	23,460,912



Hut							Natural Gas Meter #1		
Provider	South Jersey Gas		Account #	6336140000				Meter #	0653803
Commodity	UGI Utilities		Commodity	6330141441				Rate Tariff:	General Service FT
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**
8/2/19	9/4/19	13	$9	$35		$6	$51	$1.16	1,346,000
9/5/19	10/2/19	11	$8	$30		$5	$43	$1.17	1,134,000
10/3/19	11/5/19	24	$18	$36		$11	$65	$1.20	2,371,000
11/6/19	12/3/19	83	$62	$30		$38	$129	$1.20	8,264,000
12/4/19	1/3/20	107	$80	$33		$49	$161	$1.20	10,661,000
1/4/20	2/4/20	116	$87	$34		$48	$169	$1.16	11,592,000
2/5/20	3/4/20	93	$70	$31		$39	$139	$1.16	9,315,000
3/5/20	4/2/20	58	$40	$34		$24	$98	$1.11	5,785,000
4/3/20	5/4/20	45	$37	$31		$19	$87	$1.24	4,532,000
5/5/20	6/2/20	24	$13	$36		$10	$59	$0.95	2,367,000
6/3/20	7/6/20	13	$14	$32		$6	$52	$1.48	1,340,000
7/7/20	8/5/20	22	$16	$32		$9	$57	$1.16	2,167,000
TOTALS		609	$453	$394	$0	$263	$1,110	$1.18	60,874,000

Maxwell Field Baseline Energy Use





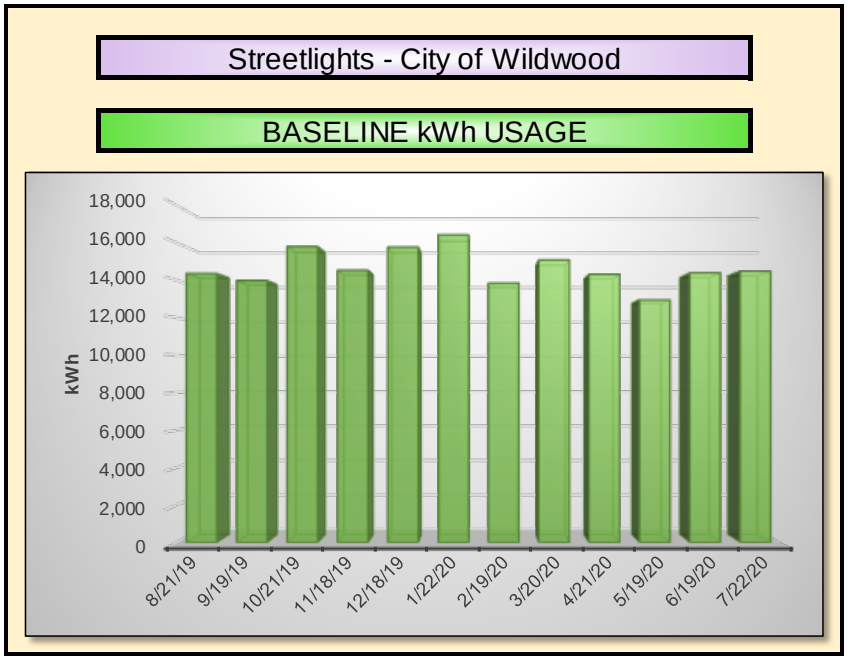
Maxwell Field							ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	55009561949				Meter #	99A094910876		
Commodity:	South Jersey Energy			Commodity:	401 W Youngs Ave				Rate Tariff:	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/2/19	9/4/19	497	78.00	$39	$40	$11	$230	$320	$0.158	34	1%	1,695,764
9/5/19	10/2/19	758	80.25	$70	$61	$9	$187	$327	$0.173	28	1%	2,586,296
10/3/19	11/4/19	1,553	78.08	$113	$126	$11	$189	$438	$0.154	33	3%	5,298,836
11/5/19	12/4/19	896	77.00	$65	$72	$10	$169	$317	$0.154	30	2%	3,057,152
12/5/19	1/6/20	96	2.10	$7	$8	$11	$6	$32	$0.154	33	6%	327,552
1/7/20	2/4/20	176	77.16	$13	$14	$10	$164	$201	$0.153	29	0%	600,512
2/5/20	3/3/20	80	2.29	$6	$6	$9	$5	$26	$0.153	28	5%	272,960
3/4/20	4/2/20	91	4.12	$7	$7	$10	$9	$33	$0.154	30	3%	310,492
4/3/20	5/5/20	115	76.63	$8	$9	$11	$186	$215	$0.154	33	0%	392,380
5/6/20	6/3/20	86	76.63	$6	$7	$10	$167	$190	$0.154	29	0%	293,432
6/4/20	7/6/20	230	2.18	$18	$19	$11	$7	$54	$0.160	33	13%	784,760
7/7/20	8/5/20	313	2.20	$25	$25	$10	$6	$66	$0.160	30	20%	1,067,956
TOTALS		4,891	80	$377	$395	$123	$1,325	$2,219	$0.158	370	1%	16,688,092

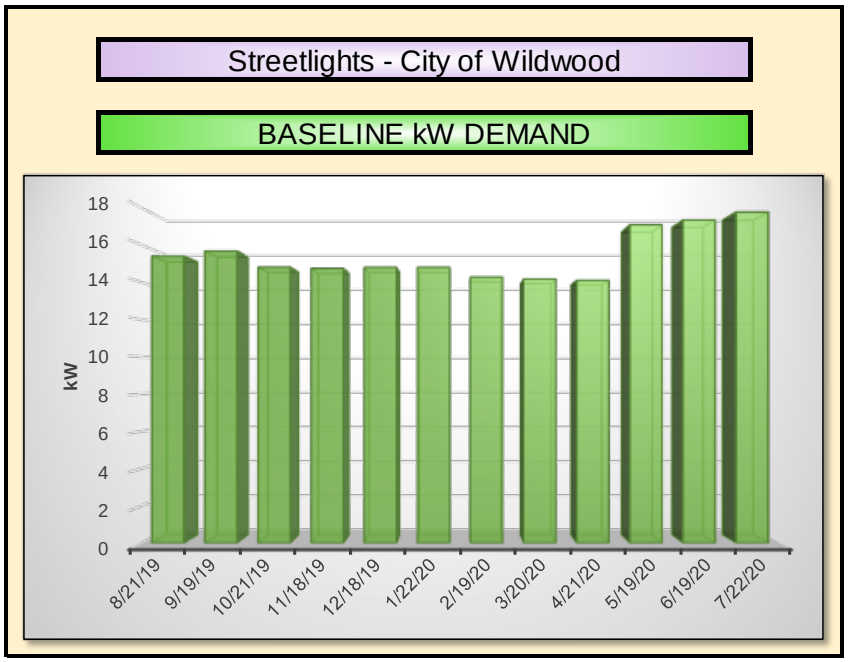
Maxwell Field							ELECTRIC METER #2					
Provider:	Atlantic City Electric			Account #	55009561576				Meter #			
Commodity:	South Jersey Energy			Commodity	401 W Youngs Ave Temp 1				Rate Tariff	General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges		Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
6/7/19	7/5/19			$0				$0	$0.00	29	0%	0
7/6/19	8/6/19	80	55	$21	$13		$155	$188	$0.419	32	0%	272,960
8/7/19	9/6/19	80	0	$18	$29		$1	$48	$0.591	31	27%	272,960
9/7/19	10/3/19	40	0	$13			$1	$14	$0.334	27	15%	136,480
10/4/19	11/5/19	640	80	$59	$52		$195	$306	$0.173	33	1%	2,183,680
11/6/19	12/4/19	0	0	$11				$11	$0.00	29	0%	0
12/5/19	1/7/20	120	0	$22	$10		$1	$33	$0.263	34	37%	409,440
1/8/20								$0	$0.00	0	0%	0
1/1/00								$0	$0.00	0	0%	0
1/1/00								$0	$0.00	0	0%	0
1/1/00								$0	$0.00	0	0%	0
1/1/00								$0	$0.00	0	0%	0
TOTALS		960	80	$144	$103		$352	$600	$0.258	215	0%	3,275,520

Maxwell Field							ELECTRIC METER #3					
Provider:	Atlantic City Electric			Account #	55010411928				Meter #			
Commodity:	South Jersey Energy			Account #	4000 Park Blvd. Field House				Meter #			
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Customer Charge	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/6/19	9/5/19	343	3	$28	$28	$11	$7	$62	$0.162	31	18%	1,170,316
9/6/19	10/3/19	452	3	$33	$37	$12	$6	$76	$0.154	28	26%	1,542,224
10/4/19	11/4/19	344	2	$25	$28	$12	$6	$59	$0.155	32	18%	1,173,728
11/5/19	12/5/19	46	2	$3	$4	$12	$5	$12	$0.153	31	3%	156,952
12/6/19	1/7/20	115	0	$8	$9	$13	$0	$18	$0.154	33	69%	392,380
1/8/20	2/5/20	73	0	$5	$6	$11	$0	$11	$0.154	29	105%	249,076
2/6/20	3/4/20	70	0	$5	$6	$11	$0	$11	$0.154	28	80%	238,840
3/5/20	4/6/20	25	0	$1	$2	$13	$1	$4	$0.103	33	316%	85,300
4/7/20	5/6/20	226	2	$16	$18	$12	$5	$40	$0.154	30	13%	771,112
5/7/20	6/3/20	355	2	$26	$29	$11	$5	$60	$0.154	28	21%	1,211,260
6/4/20	7/6/20	573	3	$45	$46	$13	$8	$99	$0.160	33	28%	1,955,076
7/7/20	8/6/20	644	2	$50	$52	$12	$7	$109	$0.158	31	36%	2,197,328
TOTALS		3,266	3	$247	$264	$142	$51	$562	$0.156	367	15%	11,143,592

Maxwell Field											
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
840	81	$66	$68	$237	$382	$2.94	$0.160	$0.455	34	1%	2,866,080
1,290	138	$124	$111	$348	$592	$2.53	$0.182	$0.459	28	1%	4,401,480
1,977	81	$156	$182	$196	$546	$2.42	$0.171	$0.276	33	3%	6,745,524
982	80	$82	$76	$176	$344	$2.20	$0.161	$0.350	30	2%	3,350,584
851	83	$75	$69	$201	$355	$2.43	$0.169	$0.417	33	1%	2,903,612
249	77	$29	$20	$164	$223	$2.13	$0.199	$0.897	29	0%	849,588
270	3	$33	$22	$6	$70	$2.10	$0.202	$0.259	28	14%	921,240
116	4	$7	$9	$10	$37	$2.50	$0.143	$0.317	30	4%	395,792
341	79	$25	$28	$191	$255	$2.42	$0.154	$0.747	33	1%	1,163,492
441	79	$32	$36	$173	$250	$2.18	$0.154	$0.568	29	1%	1,504,692
803	5	$63	$65	$14	$154	$3.00	$0.160	$0.191	33	21%	2,739,836
957	5	$75	$77	$13	$175	$2.74	$0.159	$0.182	30	29%	3,265,284
9,117	138	$768	$763	$1,728	$3,381	$2.42	$0.168	$0.371	370	1%	31,107,204

Streetlights – City of Wildwood Baseline Energy Use





Streetlights - City of Wildwood						ELECTRIC METER #1					
Provider:	Atlantic City Electric			Account #	55005546142			Meter #			
Commodity:	South Jersey Energy			Commodity:	Ocean Ave.			Rate Tariff:	Direct Distribution Connection		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
7/23/19	8/21/19	3,528	4.9	$256	$256	$114	$626	$0.145	30	100%	12,037,536
8/22/19	9/19/19	3,410	4.9	$110	$248	$110	$469	$0.105	29	100%	11,634,920
9/20/19	10/21/19	3,763	4.9	$125	$274	$122	$521	$0.106	32	100%	12,839,356
10/22/19	11/18/19	3,293	4.9	$111	$240	$107	$457	$0.107	28	100%	11,235,716
11/19/19	12/18/19	3,528	4.9	$119	$256	$114	$489	$0.106	30	100%	12,037,536
12/19/19	1/22/20	4,116	4.9	$139	$300	$133	$572	$0.107	35	100%	14,043,792
1/23/20	2/19/20	3,216	4.8	$109	$234	$104	$448	$0.107	28	100%	10,972,992
2/20/20	3/20/20	3,487	4.8	$118	$254	$113	$485	$0.107	30	100%	11,897,644
3/21/20	4/21/20	3,763	4.9	$126	$274	$122	$523	$0.106	32	100%	12,839,356
4/22/20	5/19/20	3,293	4.9	$111	$240	$107	$458	$0.106	28	100%	11,235,716
5/20/20	6/19/20	3,646	4.9	$123	$262	$119	$503	$0.106	31	100%	12,440,152
6/20/20	7/22/20	3,881	4.9	$130	$277	$126	$533	$0.105	33	100%	13,241,972
TOTALS		42,924	5	$1,576	$3,116	$1,391	$6,083	$0.109	366	100%	146,456,688

Streetlights - City of Wildwood						ELECTRIC METER #2					
Provider:	Atlantic City Electric			Account #	55009806351			Meter #			
Commodity:	South Jersey Energy			Commodity	199 E Leaming			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	Marginal Rate $/kWh	Days	Load Factor	BTU
8/7/19	9/6/19	1,033	3	$90	$83	$8	$182	$0.168	31	48%	3,524,596
9/7/19	10/4/19	1,040	3	$89	$84	$7	$181	$0.167	28	52%	3,548,480
10/5/19	11/5/19	1,327	3	$107	$107	$7	$221	$0.162	32	58%	4,527,724
11/6/19	12/6/19	1,326	3	$106	$107	$7	$220	$0.161	31	63%	4,524,312
12/7/19	1/8/20	1,494	3	$120	$121	$7	$247	$0.161	33	66%	5,097,528
1/9/20	2/6/20	1,264	3	$102	$102	$6	$210	$0.161	29	63%	4,312,768
2/7/20	3/5/20	1,133	3	$92	$92	$6	$189	$0.162	28	59%	3,865,796
3/6/20	4/6/20	1,272	3	$103	$103	$7	$213	$0.162	32	58%	4,340,064
4/7/20	5/6/20	733	3	$63	$59	$6	$129	$0.167	30	37%	2,500,996
5/7/20	6/8/20	614	2	$57	$50	$4	$110	$0.173	33	48%	2,094,968
6/9/20	7/9/20	604	2	$58	$49	$6	$113	$0.177	31	37%	2,060,848
7/10/20	8/7/20	812	2	$74	$66	$6	$145	$0.172	29	54%	2,770,544
TOTALS		12,652	3	$1,061	$1,023	$77	$2,160	$0.165	367	48%	43,168,624

Streetlights - City of Wildwood								ELECTRIC METER #3			
Provider:	Atlantic City Electric			Account #	55009581285			Meter #			
Commodity:	South Jersey Energy			Account #	Pacific/Glenwood/Magnolia			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
8/13/19	9/12/19	820	0	$74	$66	$0	$140	$0.17	31	$0.00	2,799,512
9/13/19	10/10/19	741	0	$60	$65	$0	$125	$0.17	28	$0.00	2,528,292
10/11/19	11/9/19	794	0	$64	$68	$0	$132	$0.17	30	$0.00	2,709,128
11/10/19	12/10/19	820	0	$66	$70	$0	$136	$0.17	31	$0.00	2,797,840
12/11/19	1/13/20	900	0	$73	$77	$0	$149	$0.17	34	$0.00	3,070,800
1/14/20	2/11/20	768	0	$65	$62	$0	$128	$0.17	29	$0.00	2,618,881
2/12/20	3/11/20	768	0	$62	$65	$0	$128	$0.17	29	$0.00	2,620,416
3/12/20	4/13/20	873	0	$71	$74	$0	$145	$0.17	33	$0.00	2,978,676
4/14/20	5/12/20	768	0	$62	$66	$0	$128	$0.17	29	$0.00	2,620,416
5/13/20	6/10/20	768	0	$62	$67	$0	$129	$0.17	29	$0.00	2,620,416
6/11/20	7/13/20	873	0	$71	$80	$0	$150	$0.17	33	$0.00	2,978,676
7/14/20	8/12/20	794	0	$64	$73	$0	$137	$0.17	30	$0.00	2,709,128
TOTALS		9,687	0	$794	$834	$0	$1,627	$0.17	366	$0.00	33,052,180

Streetlights - City of Wildwood								ELECTRIC METER #4			
Provider:	Atlantic City Electric			Account #	55005607043			Meter #			
Commodity:	South Jersey Energy			Account #	Wildwood & Pacific			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
8/3/19	9/4/19	655	2	$62	$53	$6	$121	$0.184	33	39%	2,234,860
9/5/19	10/2/19	627	2	$58	$51	$5	$114	$0.181	28	45%	2,139,324
10/3/19	11/4/19	657	2	$59	$53	$4	$116	$0.177	33	46%	2,241,684
11/5/19	12/3/19	630	2	$55	$51	$4	$110	$0.175	29	49%	2,149,560
12/4/19	1/3/20	682	2	$60	$55	$4	$119	$0.175	31	50%	2,326,984
1/4/20	2/19/20	629	2	$56	$51	$4	$112	$0.178	47	29%	2,146,148
2/20/20	3/3/20	668	2	$58	$62	$4	$123	$0.184	13	117%	2,279,216
3/4/20	4/2/20	683	2	$60	$64	$4	$127	$0.186	30	54%	2,330,396
4/3/20	5/4/20	757	2	$66	$61	$4	$131	$0.174	32	53%	2,582,884
5/5/20	6/2/20	596	2	$53	$48	$4	$106	$0.177	29	46%	2,033,552
6/3/20	7/6/20	702	2	$67	$57	$6	$129	$0.184	34	47%	2,395,224
7/7/20	8/5/20	682	2	$64	$55	$5	$124	$0.182	30	50%	2,326,984
TOTALS		7,968	2	$717	$660	$55	$1,432	$0.180	369	43%	27,186,816

Streetlights - City of Wildwood						ELECTRIC METER #5					
Provider:	Atlantic City Electric		Account #	5500 0348 122				Meter #			
Commodity:	South Jersey Energy		Account #	NEW JERSEY AVE #12				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
7/24/19	8/22/19	6,090		$482	$493		$975	$0.160	30	$0.00	20,779,080
8/23/19	9/20/19	5,893		$466	$476		$942	$0.160	29	$0.00	20,106,916
9/21/19	10/22/19	6,502		$493	$526		$1,019	$0.157	32	$0.00	22,184,824
10/23/19	11/19/19	5,690		$423	$460		$883	$0.155	28	$0.00	19,414,280
11/20/19	12/19/19	6,090		$482	$493		$975	$0.160	30	$0.00	20,779,080
12/20/19	1/23/20	7,112		$529	$575		$1,104	$0.155	35	$0.00	24,266,144
1/24/20	2/19/20	5,690		$423	$460		$883	$0.155	27	$0.00	19,414,280
2/20/20	3/23/20	6,502		$483	$526		$1,009	$0.155	33	$0.00	22,184,824
3/24/20	4/22/20	6,096		$454	$493		$946	$0.155	30	$0.00	20,799,552
4/23/20	5/20/20	5,690		$424	$460		$884	$0.155	28	$0.00	19,414,280
5/21/20	6/22/20	6,706		$527	$542		$1,069	$0.159	33	$0.00	22,880,872
6/23/20	7/23/20	6,299		$508	$509		$1,017	$0.161	31	$0.00	21,492,188
TOTALS		74,360	0	$5,694	$6,011	$0	$11,705	$0.157	366	$0.00	253,716,320

Streetlights - City of Wildwood						ELECTRIC METER #6					
Provider:	Atlantic City Electric		Account #	5500 5608 868				Meter #			
Commodity:	South Jersey Energy		Account #	GARFIELD & PACIFIC A				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
8/7/19	9/5/19	958	4	$85	$77	$9	$171	$0.179	30	38%	3,268,696
9/6/19	10/2/19	1,087	4	$93	$88	$9	$189	$0.174	27	47%	3,708,844
10/3/19	11/4/19	1,332	3	$108	$108	$7	$223	$0.167	33	56%	4,544,784
11/5/19	12/4/19	1,301	3	$105	$105	$7	$217	$0.166	30	58%	4,439,012
12/5/19	1/3/20	1,363	3	$109	$110	$7	$226	$0.166	30	63%	4,650,556
1/4/20	2/4/20	1,338	3	$108	$108	$7	$223	$0.166	32	58%	4,565,256
2/5/20	3/4/20	1,121	3	$91	$91	$6	$188	$0.168	29	56%	3,824,852
3/5/20	4/3/20	1,031	3	$85	$83	$6	$174	$0.169	30	51%	3,517,772
4/4/20	5/4/20	974	3	$81	$79	$6	$166	$0.171	31	48%	3,323,288
5/5/20	6/3/20	846	3	$72	$68	$6	$147	$0.173	30	44%	2,886,552
6/4/20	7/6/20	767	3	$72	$62	$8	$142	$0.185	33	35%	2,617,004
7/7/20	8/5/20	887	3	$80	$72	$8	$160	$0.180	30	41%	3,026,444
TOTALS		13,005	4	$1,088	$1,051	$86	$2,225	$0.171	365	37%	44,373,060

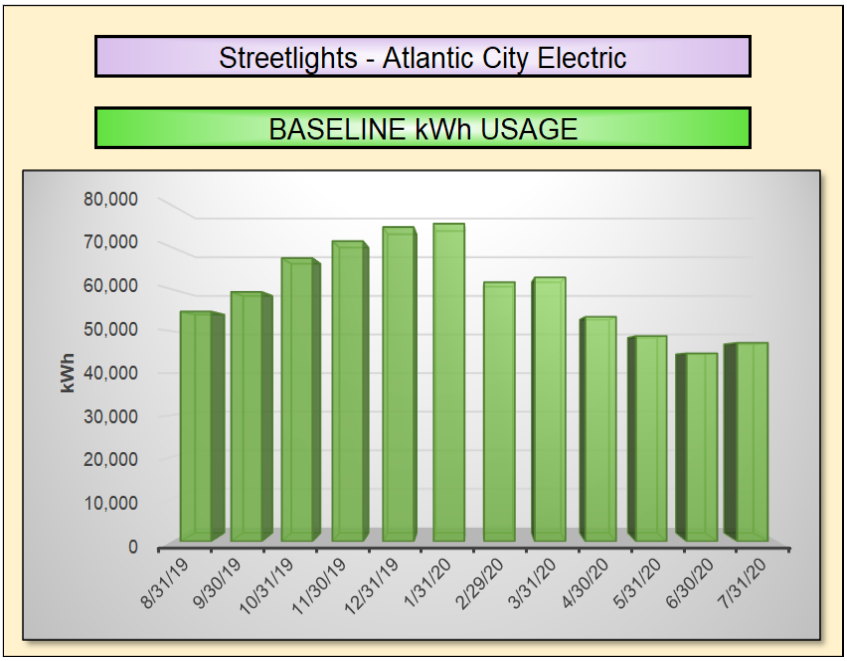
Streetlights - City of Wildwood						ELECTRIC METER #7					
Provider:	Atlantic City Electric			Account #	5500 5608 272			Meter #			
Commodity:	South Jersey Energy			Account #	OCEAN AVE LITE			Meter #	Monthly General Service Secondary		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Electric Demand Charges	Total Electric Charges	Cost / kWh Checksum	Days	Load Factor	BTU
8/9/19	9/5/19	651	2	$62	$53	$5	$119	$0.183	28	48%	2,221,212
9/6/19	10/2/19	631	2	$58	$51	$5	$114	$0.180	27	46%	2,152,972
10/3/19	11/4/19	843	2	$72	$68	$5	$145	$0.173	33	51%	2,876,316
11/5/19	12/4/19	826	2	$70	$67	$5	$141	$0.171	30	55%	2,818,312
12/5/19	1/7/20	1,046	2	$88	$85	$5	$177	$0.170	34	58%	3,568,952
1/8/20	2/4/20	648	2	$55	$52	$5	$113	$0.174	28	46%	2,210,976
2/5/20	3/4/20	699	2	$60	$57	$5	$121	$0.173	29	53%	2,384,988
3/5/20	4/2/20	645	2	$56	$52	$4	$113	$0.175	29	49%	2,200,740
4/3/20	5/4/20	633	2	$57	$51	$4	$112	$0.178	32	43%	2,159,796
5/5/20	6/3/20	524	2	$48	$42	$4	$95	$0.182	30	38%	1,787,888
6/4/20	7/6/20	535	2	$55	$43	$4	$102	$0.191	33	36%	1,825,420
7/7/20	8/5/20	554	2	$54	$45	$5	$104	$0.188	30	38%	1,890,248
TOTALS		8,235	2	$734	$666	$57	$1,457	$0.177	363	43%	28,097,820

Streetlights - City of Wildwood						ELECTRIC METER #8					
Provider:	Atlantic City Electric			Account #	5500 8057 402			Meter #			
Commodity:	South Jersey Energy			Commodity	26TH& PARK BLV			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
8/3/19	9/4/19	621		$71	$50		$121	$0.20	33	$0.00	2,118,852
9/5/19	10/2/19	548		$52	$44		$96	$0.17	28	$0.00	1,869,776
10/3/19	11/1/19	582		$52	$47		$99	$0.17	30	$0.00	1,985,784
11/2/19	12/3/19	643		$57	$52		$109	$0.17	32	$0.00	2,193,916
12/4/19	1/6/20	670		$60	$54		$114	$0.17	34	$0.00	2,286,040
1/7/20	2/3/20	551		$49	$45		$94	$0.17	28	$0.00	1,880,012
2/4/20	3/2/20	553		$50	$45		$94	$0.17	28	$0.00	1,886,836
3/3/20	4/1/20	587		$53	$47		$100	$0.17	30	$0.00	2,002,844
4/2/20	5/1/20	588		$53	$48		$100	$0.17	30	$0.00	2,006,256
5/2/20	6/2/20	616	4	$56	$50	$10	$115	$0.19	32	20%	2,101,792
6/3/20	7/6/20	554	4	$55	$45	$11	$111	$0.20	34	18%	1,890,248
7/7/20	8/5/20	573	4	$55	$0	$10	$65	$0.11	30	21%	1,955,076
TOTALS		7,086	4	$663	$526	$31	$1,220	$0.17	369	20%	24,177,432

Streetlights - City of Wildwood											
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
14,356	15	$1,182	$1,132	$142	$2,456	$9.24	$0.161	$0.171	30	129%	48,984,344
13,977	16	$985	$1,108	$136	$2,230	$8.70	$0.150	$0.160	29	128%	47,689,524
15,800	15	$1,080	$1,251	$145	$2,477	$9.82	$0.148	$0.157	32	139%	53,909,600
14,529	15	$993	$1,152	$129	$2,274	$8.76	$0.148	$0.157	28	147%	49,572,948
15,773	15	$1,111	$1,250	$137	$2,497	$9.23	$0.150	$0.158	30	148%	53,817,476
16,426	15	$1,103	$1,295	$156	$2,554	$10.57	$0.146	$0.155	35	132%	56,043,977
13,848	14	$944	$1,105	$125	$2,173	$8.73	$0.148	$0.157	28	144%	47,249,376
15,080	14	$1,028	$1,203	$134	$2,365	$9.44	$0.148	$0.157	30	148%	51,452,960
14,312	14	$963	$1,130	$143	$2,236	$10.13	$0.146	$0.156	32	132%	48,832,544
12,947	17	$883	$1,025	$136	$2,044	$7.94	$0.147	$0.158	28	113%	44,175,164
14,387	17	$1,026	$1,140	$154	$2,320	$8.90	$0.151	$0.161	31	112%	49,088,444
14,482	18	$1,029	$1,096	$161	$2,286	$9.05	$0.147	$0.158	33	103%	49,412,584
175,917	18	$12,326	$13,886	$1,698	$27,910	$9.18	$0.149	$0.159	366	113%	600,228,940

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Streetlights – Atlantic City Electric Baseline Energy Use



Streetlights - Atlantic City Electric								ELECTRIC METER #1			
Provider:	Atlantic City Electric			Account #	5500 0496 913			Meter #			
Commodity:	South Jersey Energy			Commodity:	City Hall-St. Lites (924 lights)			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**	**Marginal Rate $/kWh**	**Days**	**Load Factor**	**BTU**
8/1/19	8/31/19	50,510		$256	$2,276	$18,306	$20,837	$0.050	31	-	172,340,120
9/1/19	9/30/19	54,820		$278	$2,470	$17,670	$20,418	$0.050	30	-	187,045,840
10/1/19	10/31/19	62,156		$398	$2,800	$18,284	$21,481	$0.051	31	-	212,076,272
11/1/19	11/30/19	66,025		$422	$2,975	$17,694	$21,091	$0.051	30	-	225,277,300
12/1/19	12/31/19	68,834		$640	$3,058	$15,004	$18,702	$0.054	31	-	234,861,608
1/1/20	1/31/20	70,251		$449	$3,187	$18,284	$21,920	$0.052	31	-	239,696,412
2/1/20	2/29/20	56,700		$363	$2,573	$16,684	$19,620	$0.052	29	-	193,460,400
3/1/20	3/31/20	57,752		$365	$2,620	$17,835	$20,820	$0.052	31	-	197,049,824
4/1/20	4/30/20	48,977		$309	$2,222	$17,325	$19,856	$0.052	30	-	167,109,524
5/1/20	5/31/20	44,999		$284	$2,042	$17,902	$20,228	$0.052	31	-	153,536,588
6/1/20	6/30/20	41,081		$300	$1,855	$17,284	$19,439	$0.052	30	-	140,168,372
7/1/20	7/31/20	43,366		$274	$1,958	$17,902	$20,134	$0.051	31	-	147,964,792
TOTALS		**665,471**	**0**	**$4,339**	**$30,035**	**$210,174**	**$244,547**	**$0.052**	**366**	**-**	**2,270,587,052**

Streetlights - Atlantic City Electric						ELECTRIC METER #2					
Provider:	Atlantic City Electric			Account #	55000497283			Meter #			
Commodity:	South Jersey Energy			Account #	City Hall (59 lights)			Meter #	Contributed Street Lighting		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Tariff Charges	Total Electric Charges	Marginal Rate $/kWh	Days	Load Factor	BTU
8/1/19	8/31/19	2,858		$74	$129	$476	$679	$0.071	31	0%	9,751,496
9/1/19	9/30/19	3,109		$16	$140	$518	$674	$0.050	30	0%	10,607,908
10/1/19	10/31/19	3,526		$23	$159	$536	$718	$0.051	31	0%	12,030,712
11/1/19	11/30/19	3,744		$24	$169	$519	$711	$0.051	30	0%	12,774,528
12/1/19	12/31/19	4,065		$26	$183	$536	$745	$0.051	31	0%	13,869,780
1/1/20	1/31/20	3,985		$27	$181	$535	$742	$0.052	31	0%	13,596,820
2/1/20	2/29/20	3,349		$21	$152	$502	$675	$0.052	29	0%	11,426,788
3/1/20	3/31/20	3,412		$22	$155	$536	$712	$0.052	31	0%	11,641,744
4/1/20	4/30/20	2,894		$18	$131	$521	$670	$0.052	30	0%	9,874,328
5/1/20	5/31/20	2,658		$17	$121	$538	$676	$0.052	31	0%	9,069,096
6/1/20	6/30/20	2,427		$15	$110	$521	$646	$0.051	30	0%	8,280,924
7/1/20	7/31/20	2,560		$16	$116	$538	$670	$0.051	31	0%	8,734,720
TOTALS		38,587	0	$298	$1,744	$6,277	$8,319	$0.053	366	0%	131,658,844

Streetlights - Atlantic City Electric						ELECTRIC METER #3					
Provider:	Atlantic City Electric			Account #	5500 8983 144			Meter #			
Commodity:	South Jersey Energy			Account #	Garfield w/o Susquehanna (7 lights)			Meter #	Street and Private Lighting		
Billing Period Start Date	Actual Reading	Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Tariff Charges	Marginal Rate $/kWh	Marginal Rate $/kWh	Days	Load Factor	BTU
7/23/19	8/21/19	1,246		$6	$56	$247	$310	$0.050	30	$0.00	4,251,352
8/22/19	9/19/19	1,344		$7	$61	$239	$306	$0.050	29	$0.00	4,585,728
9/20/19	10/21/19	1,639		$10	$74	$264	$347	$0.051	32	$0.00	5,592,268
10/22/19	11/18/19	1,572		$10	$71	$231	$312	$0.051	28	$0.00	5,363,664
11/19/19	12/18/19	1,794		$12	$81	$247	$340	$0.052	30	$0.00	6,121,128
12/19/19	1/22/20	1,259		$8	$57	$273	$337	$0.051	35	$0.00	4,295,708
1/23/20	2/19/20	1,557		$10	$71	$231	$311	$0.052	28	$0.00	5,312,484
2/20/20	3/20/20	1,559		$10	$71	$247	$328	$0.052	30	$0.00	5,319,308
3/21/20	4/21/20	1,504		$10	$68	$264	$342	$0.052	32	$0.00	5,131,648
4/22/20	5/19/20	1,160		$7	$53	$231	$291	$0.052	28	$0.00	3,957,920
5/20/20	6/19/20	1,194		$8	$54	$256	$318	$0.052	31	$0.00	4,073,928
6/20/20	7/22/20	1,259		$8	$57	$273	$337	$0.051	33	$0.00	4,295,708
TOTALS		17,087	0	$105	$772	$3,002	$3,879	$0.051	366	$0.00	58,300,844

Streetlights - Atlantic City Electric											
TOTAL ELECTRIC											
Usage kWh	Demand kW	Electric Delivery Charges	Electric Commodity Charges	Tariff Charges	Total Electric Charges	Cost / kW Checksum	Cost / kWh Checksum	Total Cost / kWh Checksum	Days	Load Factor	BTU
54,614	0	$336	$2,460	$19,029	$21,826	$0.00	$0.051	$0.400	31	$0.00	186,342,968
59,273	0	$301	$2,670	$18,428	$21,398	$0.00	$0.050	$0.361	30	$0.00	202,239,476
67,321	0	$430	$3,033	$19,083	$22,546	$0.00	$0.051	$0.335	31	$0.00	229,699,252
71,341	0	$456	$3,214	$18,443	$22,114	$0.00	$0.051	$0.310	30	$0.00	243,415,492
74,693	0	$678	$3,322	$15,787	$19,787	$0.00	$0.054	$0.265	31	$0.00	254,852,516
75,495	0	$484	$3,425	$19,091	$23,000	$0.00	$0.052	$0.305	31	$0.00	257,588,940
61,606	0	$394	$2,795	$17,417	$20,606	$0.00	$0.052	$0.334	29	$0.00	210,199,672
62,723	0	$396	$2,846	$18,618	$21,860	$0.00	$0.052	$0.349	31	$0.00	214,010,876
53,375	0	$337	$2,422	$18,110	$20,869	$0.00	$0.052	$0.391	30	$0.00	182,115,500
48,817	0	$308	$2,215	$18,672	$21,195	$0.00	$0.052	$0.434	31	$0.00	166,563,604
44,702	0	$323	$2,018	$18,061	$20,402	$0.00	$0.052	$0.456	30	$0.00	152,523,224
47,185	0	$298	$2,130	$18,713	$21,141	$0.00	$0.051	$0.448	31	$0.00	160,995,220
721,145	0	$4,741	$32,551	$219,453	$256,745	$0.00	$0.052	$0.356	366	$0.00	2,460,546,740

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	$ / Therm Marginal Rate
Municipal Building (City Hall, Fire, Police)	$11.288	$0.101	$1.180
Court	$13.344	$0.100	$1.181
Byrne Recreation Center	$11.496	$0.101	$1.177
Public Works Buildings (New)	$2.409	$0.152	$1.200
Public Works Buildings (Existing)	$2.486	$0.156	$1.175
Boardwalk Info Center	$2.468	$0.157	$1.178
Beach Patrol	$2.555	$0.158	$0.000
Fox Park & Doo Wop Shop	$2.482	$0.165	$1.166
Hut	$2.465	$0.156	$1.176
Maxwell Field	$2.424	$0.168	$0.000
Streetlights - City of Wildwood	$9.181	$0.149	$0.000
Streetlights - Atlantic City Electric	$0.000	$0.052	$0.000

ENERGY SAVINGS PLAN

SECTION 3 – ENERGY CONSERVATION MEASURES

Energy Conservation Measure Breakdown by Building

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

CITY OF WILDWOOD

✔ ECM evaluated but not included
✔ ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
1a	LED Interior and Exterior Lighting	✔	✔	✔		✔	✔	✔	✔	✔		✔	
1b	LED Athletic Field Lighting								✔		✔		
2	Atlantic City Electric LED Street Lights												✔
3	Energy Management System	✔	✔	✔									
4	Boiler Replacement	✔											
5	Chiller Replacement	✔											
6	Cooling Tower Replacement	✔											
7	Premium Efficiency Pump Motors and VFDs	✔											
8	Rooftop Unit Replacement		✔	✔									
9	Dual Temperature Fan Coil Unit Replacement	✔											
10	Electronic Fuel-Use Economizer		✔	✔									
11	Destratification Fans			✔									
12	Domestic Water Heater Replacement	✔						✔					
13	Pipe and Valve Insulation	✔	✔										
14	Building Envelope Weatherization	✔	✔	✔					✔	✔			
15	Water Conservation	✔											
16a	Solar Owned by City	✔		✔	✔								
16b	Solar PPA	✔		✔	✔								
17	Combined Heat & Power Unit	✔											
18	Electrical Vehicle Charging Station	✔											
19	Roof Upgrades	✔	✔	✔									
20	Window Replacement	✔											
21	Parking Lot Paving for Carport Solar	✔											
22	Asbestos Abatement	✔											

ECM Breakdown by Cost & Savings

CITY OF WILDWOOD		INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	SIMPLE PAYBACK WITHOUT INCENTIVES
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$	$	$	$	$	$	YEARS
1a	LED Interior and Exterior Lighting	Y	$71,373	$36,462	($1,456)	$35,006	$8,820	$43,826	1.6
1b	LED Athletic Field Lighting	Y	$51,638	$3,723	$0	$3,723	$0	$3,723	13.9
2	Atlantic City Electric LED Street Lights	Y	$971,529	$200,241	$0	$200,241	$0	$200,241	4.9
3	Energy Management System	Y	$137,813	$958	$2,291	$3,249	$0	$3,249	42.4
4	Boiler Replacement	Y	$428,873	$0	$1,667	$1,667	$2,150	$3,817	112.4
5	Chiller Replacement	Y	$416,525	$8,675	$0	$8,675	$2,000	$10,675	39.0
6	Cooling Tower Replacement	Y	$375,953	$2,970	$0	$2,970	$7,200	$10,170	37.0
7	Premium Efficiency Pump Motors and VFDs	Y	$51,156	$4,055	$0	$4,055	$1,991	$6,047	8.5
8	Rooftop Unit Replacement	Y	$107,939	$2,974	$642	$3,615	$421	$4,036	26.7
9	Dual Temperature Fan Coil Unit Replacement	Y	$491,191	$2,609	$0	$2,609	$0	$2,609	188.3
10	Electronic Fuel-Use Economizer	Y	$2,702	$0	$2,000	$2,000	$0	$2,000	1.4
11	Destratification Fans	N	$0	$0	$0	$0	$0	$0	0.0
12	Domestic Water Heater Replacement	Y	$40,192	$5,493	($1,166)	$4,327	$0	$4,327	9.3
13	Pipe and Valve Insulation	Y	$34,782	$164	$1,491	$1,655	$0	$1,655	21.0
14	Building Envelope Weatherization	Y	$20,446	$710	$1,045	$1,755	$0	$1,755	11.7
15	Water Conservation	Y	$21	$0	$268	$268	$0	$268	0.1
16a	Solar Owned by City	N	$0	$0	$0	$0	$0	$0	0.0
16b	Solar PPA	N	$0	$0	$0	$0	$0	$0	0.0
17	Combined Heat & Power Unit	Y	$353,813	$11,858	($7,223)	$4,635	$0	$4,635	76.3
18	Electrical Vehicle Charging Station	N	$0	$0	$0	$0	$0	$0	0.0
19	Roof Upgrades	Y	$348,852	$52	$501	$553	$0	$553	630.3
20	Window Replacement	Y	$183,000	$83	$1,203	$1,286	$0	$1,286	142.3
21	Parking Lot Paving for Carport Solar	N	$0	$0	$0	$0	$0	$0	0.0
22	Asbestos Abatement	Y	$100,000	$0	$0	$0	$0	$0	0.0
TOTALS			$4,187,796	$281,028	$1,263	$282,291	$22,582	$304,874	13.7

ECM Breakdown by Greenhouse Gas Reduction

CITY OF WILDWOOD		INCLUDED IN PROJECT	Reduction of CO_2	Reduction of NO_x	Reduction of SO_2	Reduction of Hg
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	LBS	LBS	LBS	LBS
1a	LED Interior and Exterior Lighting	Y	255,677	222	543	1,142
1b	LED Athletic Field Lighting	Y	22,354	19	45	94
2	Atlantic City Electric LED Street Lights	Y	485,281	419	975	2,051.4
3	Energy Management System	Y	33,152	27	21	44.1
4	Boiler Replacement	Y	16,527	13	0	0
5	Chiller Replacement	Y	58,670	51	118	248
6	Cooling Tower Replacement	Y	28,416	25	57	120.1
7	Premium Efficiency Pump Motors and VFDs	Y	41,383	36	83	175
8	Rooftop Unit Replacement	Y	31,015	26	50	104
9	Dual Temperature Fan Coil Unit Replacement	Y	23,601	20	47	100
10	Electronic Fuel-Use Economizer	Y	19,862	16	0	0.0
11	Destratification Fans	N	0	0	0	0
12	Domestic Water Heater Replacement	Y	19,546	18	62	131.5
13	Pipe and Valve Insulation	Y	16,570	13	4	7.5
14	Building Envelope Weatherization	Y	17,288	14	14	29
15	Water Conservation	Y	2,656	2	0	0.0
16a	Solar Owned by City	N	0	0	0	0
16b	Solar PPA	N	0	0	0	0
17	Combined Heat & Power Unit	Y	49,749	22	63	0
18	Electrical Vehicle Charging Station	N	0	0	0	0.0
19	Roof Upgrades	Y	5,547	4	1	2
20	Window Replacement	Y	12,831	10	2	4
21	Parking Lot Paving for Carport Solar	N	0	0	0	0
22	Asbestos Abatement	Y	0	0	0	0
TOTALS			1,140,126	957	2,084	4,253

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)***

See Combined Heat and Power ECM for emission calculation per NJ BPU Protocols.

ECM Breakdown by Building

Please see Appendix F for ECM Breakdown by Building.

ECM Budgeting Narrative

Detailed plans, schematics and specifications for City of Wildwood 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.

CITY OF WILDWOOD		INCLUDED IN PROJECT	INSTALLED COST
ECM #	ENERGY CONSERVATION MEASURE	"Y" OR "N"	$
1a	LED Interior and Exterior Lighting	Y	$71,373
1b	LED Athletic Field Lighting	Y	$51,638
2	Atlantic City Electric LED Street Lights	Y	$971,529
3	Energy Management System	Y	$137,813
4	Boiler Replacement	Y	$428,873
5	Chiller Replacement	Y	$416,525
6	Cooling Tower Replacement	Y	$375,953
7	Premium Efficiency Pump Motors and VFDs	Y	$51,156
8	Rooftop Unit Replacement	Y	$107,939
9	Dual Temperature Fan Coil Unit Replacement	Y	$491,191
10	Electronic Fuel-Use Economizer	Y	$2,702
11	Destratification Fans	N	$0
12	Domestic Water Heater Replacement	Y	$40,192
13	Pipe and Valve Insulation	Y	$34,782
14	Building Envelope Weatherization	Y	$20,446
15	Water Conservation	Y	$21
16a	Solar Owned by City	N	$0
16b	Solar PPA	N	$0
17	Combined Heat & Power Unit	Y	$353,813
18	Electrical Vehicle Charging Station	N	$0
19	Roof Upgrades	Y	$348,852
20	Window Replacement	Y	$183,000
21	Parking Lot Paving for Carport Solar	N	$0
22	Asbestos Abatement	Y	$100,000
TOTALS			$4,187,796

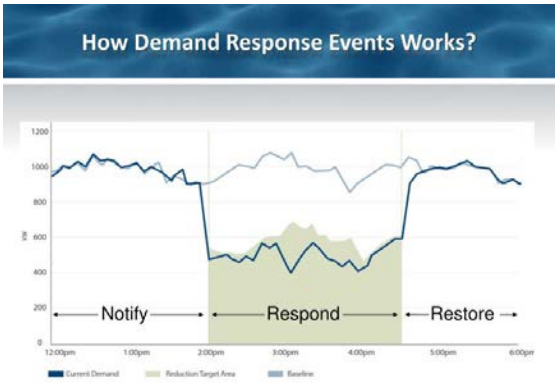
Demand Response & Project Incentives Analysis

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

Atlantic City Electric - Prescriptive

The Prescriptive and Custom Program makes it easy for C&I customers to install high-efficiency electric equipment across a wide range of technologies and receive quick one-for-one incentives.

LED Exterior Luminaires *based on* DLC *primary use category*.	**Incentive (per fixture)**
LED Luminaire - Wall Packs, Flood Lights, Canopy, Landscape	$50 - up to 4,999 lumens $125 - 5,000 - 9,999 lumens $175 - 10,000 - 19,999 lumens $225 - 20,000 - 29,999 lumens $275 - 30,000 - 39,000 lumens $350 - > 40,000 lumens
LED Architectural Flood and Spot Luminaries	
LED Bollard Fixtures	
LED Fuel Pump Canopy	
LED Landscape/Accent Flood and Spot Luminaires	
LED Large Outdoor Pole/Arm-Mounted Area and Roadway Retrofit	
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaires	
LED Outdoor Pole/Arm-Mounted Decorative Luminaires	
LED Outdoor Wall-Mounted Area Luminaires	
LED Parking Garage Luminaires	

City of Wildwood – ACE City Street Lights

Existing Conditions				Proposed			Rebate	
LIGHT STYLE	LAMP TYPE	LAMP (W)	WILDWOOD QTY	LIGHT STYLE	LED FIXTURE (W)	LUMENS	REBATE ($/FIXT)	WILDWOOD REBATE
Cobra Head	High Pressure Sodium	50	520	Cobra Head	19	2,514	$50	$26,000
Cobra Head	High Pressure Sodium	70	21	Cobra Head	31	3,784	$50	$1,050
Cobra Head	High Pressure Sodium	100	133	Cobra Head	47	5,392	$125	$16,625
Cobra Head	High Pressure Sodium	150	28	Cobra Head	76	8,653	$125	$3,500
Cobra Head	High Pressure Sodium	170	0	Cobra Head	76	8,653	$125	$0
Cobra Head	High Pressure Sodium	175	0	Cobra Head	76	8,653	$125	$0
Cobra Head	High Pressure Sodium	250	87	Cobra Head	164	17,930	$175	$15,225
Cobra Head	High Pressure Sodium	400	143	Cobra Head	164	17,930	$175	$25,025
Cobra Head	Mercury Vapor	50	0	Cobra Head	31	3,784	$50	$0
Cobra Head	Mercury Vapor	70	0	Cobra Head	31	3,784	$50	$0
Cobra Head	Mercury Vapor	100	0	Cobra Head	47	5,392	$125	$0
Flood	High Pressure Sodium	250	3	Flood	177	21,622	$225	$675
Flood	High Pressure Sodium	400	0	Flood	261	32,002	$275	$0
Flood	Metal Halide	400	11	Flood	261	32,002	$275	$3,025
Flood	Metal Halide	1000	5	Flood	391	48,004	$350	$1,750
Flood	Metal Halide (Pulse Start)	400	0	Flood	261	32,002	$275	$0
Granville III	High Pressure Sodium	100	0	Granville III	60	7,440	$125	$0
Traditionaire	High Pressure Sodium	100	0	Traditionaire	72	6,027	$125	$0
TOTAL			**957**					**$92,875**

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)

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 $151,513 in rebates and incentives. 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
CITY OF WILDWOOD	Custom Electric	Atlantic City Electric	53,336	kWh	$0.160	$0	$4,267	$4,267	$8,534	$151,513
	Custom Gas	South Jersey Gas	0	therms	$1.60	$0	$0	$0	$0	
	Prescriptive	ACE or SJG	Various	Various	Various	$0	$107,165	$0	$107,165	
	Direct Install	ACE or SJG	$69,109	$	52%	$35,814	$0	$0	$35,814	
					TOTALS	$35,814	$111,432	$4,267	$151,513	

Incentive Data

BUILDING	INCENTIVE TYPE	SOURCE	QUANTITY	UNITS	INCENTIVE $/UNIT	INSTALL INCENTIVE	YEAR 1 INCENTIVE	YEAR 2 INCENTIVE	SUBTOTAL	TOTAL
Municipal Building (City Hall, Fire, Police)	Custom Electric	Atlantic City Electric	53,336	kWh	$0.160		$4,267	$4,267	$8,534	
Municipal Building (City Hall, Fire, Police)	Prescriptive	ACE or SJG	Various	Various	Various		$11,350		$11,350	$37,286
Municipal Building (City Hall, Fire, Police)	Direct Install	ACE or SJG	$21,752	$	80%	$17,402			$17,402	
Court	Direct Install	ACE or SJG	$37,829	$	30%	$11,466			$11,466	$11,466
Byrne Recreation Center	Direct Install	ACE or SJG	$9,527	$	73%	$6,946			$6,946	$6,946
Public Works Buildings (Existing)	Prescriptive	ACE or SJG	Various	Various	Various		$865		$865	$865
Boardwalk Info Center	Prescriptive	ACE or SJG	Various	Various	Various		$270		$270	$270
Fox Park & Doo Wop Shop	Prescriptive	ACE or SJG	Various	Various	Various		$1,720		$1,720	$1,720
Hut	Prescriptive	ACE or SJG	Various	Various	Various		$85		$85	$85
Streetlights - Atlantic City Electric	Prescriptive	ACE or SJG	Various	Various	Various		$92,875		$92,875	$92,875

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, City of Wildwood 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

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
1a	LED Interior and Exterior Lighting	✔	✔	✔		✔	✔	✔	✔	✔		✔	
1b	LED Athletic Field Lighting								✔		✔		

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.

Existing Conditions

Existing interior lighting at the Municipal Building (Fire)

Scope of Work

Retrofit or replace existing interior and exterior 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.

The (206) city owned streetlights along Ocean and Pacific Ave will be demolished by the city. The savings are included in the ESIP.

Athletic field lighting replacement has been evaluated at Maxwell Field and Fox Park. Maxwell Field LED replacement is not included in the project because it was not financially viable.

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 is 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)
Municipal Building (City Hall, Fire, Police)	INTERIOR	21.58	8.65	12.92	0.66	4,573	0.34	0.08	-0.001075	11.43	63,832	-635
Municipal Building (City Hall, Fire, Police)	EXTERIOR	0.80	0.24	0.56	0.66	4,380				0.37	2,453	0
Municipal Building (City Hall, Fire, Police)	SPECIAL			0.00						0.00	0	0
Court	INTERIOR	4.63	1.95	2.68	0.66	4,573	0.34	0.08	-0.001075	2.37	13,241	-132
Court	EXTERIOR			0.00						0.00	0	0
Court	SPECIAL			0.00						0.00	0	0
Byrne Recreation Center	INTERIOR	9.43	3.98	5.46	0.66	4,573	0.34	0.08	-0.001075	4.82	26,944	-268
Byrne Recreation Center	EXTERIOR			0.00						0.00	0	0
Byrne Recreation Center	GYM	3.89	4.67	0.00	0.66	4,573	0.34	0.08	-0.001075	0.00	0	0
Public Works Buildings (Existing)	INTERIOR	3.85	1.70	2.15	0.67	2,950	0.35	0.10	-0.001075	1.94	6,967	-68
Public Works Buildings (Existing)	EXTERIOR			0.00						0.00	0	0
Public Works Buildings (Existing)	SPECIAL			0.00						0.00	0	0
Boardwalk Info Center	INTERIOR	4.32	1.42	2.90	0.67	2,950	0.35	0.10	-0.001075	2.62	9,411	-92
Boardwalk Info Center	EXTERIOR	0.16	0.11	0.05	0.66	4,380				0.03	219	0
Boardwalk Info Center	SPECIAL			0.00						0.00	0	0
Beach Patrol	INTERIOR	3.13	1.03	2.10	0.67	974	0.35	-0.06		1.90	1,921	0
Beach Patrol	EXTERIOR	0.16	0.11	0.05	0.66	4,380				0.03	219	0
Beach Patrol	SPECIAL			0.00						0.00	0	0
Fox Park & Doo Wop Shop	INTERIOR (Doo Wop)	1.15	0.53	0.62	0.67	2,950	0.35	0.10	-0.001075	0.56	2,012	-20
Fox Park & Doo Wop Shop	EXTERIOR (Doo Wop)	0.26	0.24	0.02	0.66	4,380				0.01	88	0
Fox Park & Doo Wop Shop	EXTERIOR (Fox Park)	30.24	11.42	18.82	0.66	1,080				12.42	20,322	0
Hut	INTERIOR	0.81	0.18	0.63	0.67	2,950	0.35	0.10	-0.001075	0.57	2,044	-20
Hut	EXTERIOR			0.00						0.00	0	0
Hut	SPECIAL			0.00						0.00	0	0
Maxwell Field	INTERIOR			0.00						0.00	0	0
Maxwell Field	EXTERIOR	198.00	106.90	91.10	0.66	71				60.13	6,468	0
Maxwell Field	SPECIAL			0.00						0.00	0	0
Streetlights - City of Wildwood	Ocean Ave St Lights	10.48		10.48	0.66	4,380				6.92	45,900	0
Streetlights - City of Wildwood	Pacific Ave St Lights	16.06		16.06	0.66	4,380				10.60	70,321	0
Streetlights - City of Wildwood	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

- Typical exterior lighting fixtures should be modeled as lit twelve (12) hours per day on average.

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 (HVACg) 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

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 2 – Atlantic City Electric LED Street Lights

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
2	Atlantic City Electric LED Street Lights												✔

With 990 Street and Parking Lot Lights throughout the city, the City of Wildwood will benefit by the installation of upgraded high efficiency LED lighting. The lights are owned by the City of Wildwood's utility, Atlantic City Electric. The City of Wildwood 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 streetlights with LEDs. By doing so, the City of Wildwood will be switched to the LED Contributed Street Lighting tariff and save an average of $14,775 each month. In addition, the City of Wildwood will be charged for less energy use associated with the LED lights - an additional average savings of $1,901 per month.

Existing Conditions

Existing Atlantic City Electric streetlighting

Scope of Work

- Atlantic City Owned Street Lighting – the LED streetlights through the city will be installed by Atlantic City Electric or one of their subcontractors. Refer to ECM calculations for fixture counts. The Boardwalk lights are not included in the proposed scope.

Street Lighting ECM Calculations

Street and Private Lighting tariff charges were calculated using 12 months of utility invoices (see Section 2). The annual sum of 957 city streetlight tariff charges was $213,935. The LED Contributed Street Lighting tariff charge is $3.19 per fixture totaling to $36,634 – a $177,301 annual savings. Energy savings are calculated using 441,164 kWh reduction at the marginal rate of $0.052 per kWh – which equals $22,941 per year. A sample utility bill for 924 of the 957 streetlights is shown below.

LED Street Lighting Replacement Savings Summary							
BUILDING	TYPE	QTY	Annual kWh	Avg. Tariff Charge per Fixture ($	Annual Tariff Charges ($)	Annual kWh Charges	Total Annual Charge
Streetlights - Atlantic City Electric - City	EXISTING - SPL Tariff	957	711,725	$18.63	$213,935	$36,802	$250,737
	PROPOSED - LED CSL Tariff	957	270,560	$3.19	$36,634	$13,862	$50,496
	SAVINGS		**441,164**	$15.44	$177,301	$22,941	**$200,241**

Existing Conditions								Proposed Conditions		
LIGHT STYLE	LAMP TYPE	LAMP (W)	FIXTURE (W)	ANNUAL HOURS	WILDWOOD QTY	WILDWOOD (kW)	WILDWOOD (kWh)	LED FIXTURE (W)	WILDWOOD (kW)	WILDWOOD (kWh)
Cobra Head	High Pressure Sodium	50	66	4,325	520	34.3	148,449	19	9.9	42,735
Cobra Head	High Pressure Sodium	70	95	4,325	21	2.0	8,629	31	0.7	2,816
Cobra Head	High Pressure Sodium	100	138	4,325	133	18.4	79,389	47	6.3	27,038
Cobra Head	High Pressure Sodium	150	188	4,325	28	5.3	22,769	76	2.1	9,205
Cobra Head	High Pressure Sodium	250	295	4,325	87	25.7	111,012	164	14.3	61,715
Cobra Head	High Pressure Sodium	400	465	4,325	143	66.5	287,620	164	23.5	101,440
Flood	High Pressure Sodium	250	295	4,325	3	0.9	3,828	177	0.5	2,297
Flood	Metal Halide	400	458	4,325	11	5.0	21,792	261	2.9	12,418
Flood	Metal Halide	1000	1,080	4,325	5	5.4	23,357	391	2.0	8,456
TOTAL					**957**	**164.5**	**711,725**		**62.6**	**270,560**

Details of your Electric Charges

Street and Private Lighting - service number 0550 0049 6913 7001 0139 91
Electricity you used this period

Lamp size	Quantity	Total use
250S FH	2	215
400S FH	4	671
150S FH2	6	735
250S FH2	1	215
400S FH2	2	671
1000S FM	1	395
1000S FM2	4	3161
50W S	548	12389
70W S	9	276
100W S	96	4094
100W SO	2	85
100W SODS	4	342
150W S	21	1286
250W S	34	3656
250W SO	46	4946
250W SODS	0	0
400W S	139	23305
400W SO	1	168
50W SL	4	90
Total	**924**	**56,700**

Type of charge	How we calculate this charge	Amount($)
Distribution Charge	4 X $13.4275000	53.71
Distribution Charge	1 X $35.8800000	35.88
Distribution Charge	139 X $28.3716547	3,943.66
Distribution Charge	46 X $31.3682609	1,442.94
Distribution Charge	34 X $23.8379412	810.49
Distribution Charge	21 X $16.5495238	347.54
Distribution Charge	4 X $37.4400000	149.76
Distribution Charge	2 X $22.4950000	44.99
Distribution Charge	96 X $14.9543750	1,435.62
Distribution Charge	9 X $14.0355556	126.32
Distribution Charge	548 X $13.4270073	7,358.00
Distribution Charge	4 X $104.9025000	419.61
Distribution Charge	1 X $52.4500000	52.45
Distribution Charge	2 X $49.9750000	99.95
Distribution Charge	1 X $39.0700000	39.07
Distribution Charge	6 X $30.8950000	185.37
Distribution Charge	4 X $24.9875000	99.95
Distribution Charge	2 X $19.5350000	39.07
Market Transition Tax	56700 kWh X $0.0010280 per kWh	58.29
Transition Bond Charge	56700 kWh X $0.0024000 per kWh	136.08
Non-Utility Generation Charge	56700 kWh X $0.0122540 per kWh	694.80
Societal Benefits Charge	56700 kWh X $0.0058319 per kWh	330.67
RGGI Energy Efficiency	56700 kWh X $0.0004169 per kWh	23.64
EDIT Credit 5 Yr - kWh	56700 kWh X $0.0197981- per kWh	1,122.55–
Zero Emission Certif (ZEC) Charge	56700 kWh X $0.0042651 per kWh	241.83
Total Electric Delivery Charges		**17,047.14**

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 5.38 cents per kWh.

Total Electric Charges - Street and Private Lighting **17,047.14**

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 3 – Energy Management System

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
3	Energy Management System	✔	✔	✔									

Background & Existing Conditions

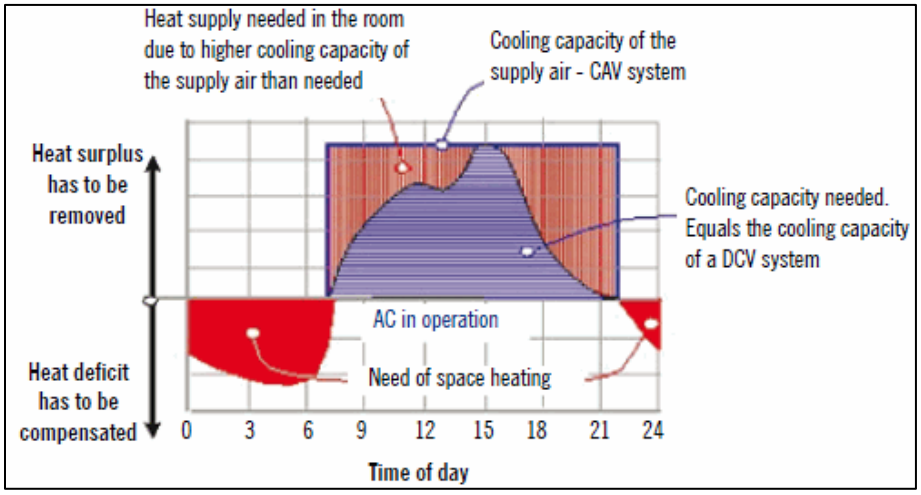
A direct digital controls (DDC) building automation systems (BAS) is an intelligent network of sensors, operators, processors, and a web-based user interface that controls and monitors electrical and mechanical building systems. Such systems provide automated control and monitoring of the heating, ventilation, 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 at Byrne Recreation Center and the Municipal Building

Existing conditions at the Municipal Building, the Court, and the Byrne Recreation Center are standalone programmable 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.

Municipal Building - Base Scope of Work

- The systems listed below will all be installed as new equipment and included the field installation of a new BACnet controls system.
- Furnish and install CM3 Niagara-based network controllers, sized to fit the controller for the Municipal Building. Will interface all new BACnet controllers to these controllers.
- Furnish, wire, and control all the dual temp valves.

- Furnish and install a central operator BAS server, located at the Maintenance Office. Server will coordinate activity between the network controllers and provide long-term database storage. This includes cost for dashboard software.
- The existing programmable thermostats in the City Hall wing will modulate heating/cooling load

	System	Qty	Comments
a.	Water Cooled Chiller	1	New Equipment
b.	Cooling Tower	1	New Equipment
c.	Hot Water Boilers	2	New Equipment
d.	Dual HW/CHW Pump	1	New Equipment
e.	Jail/Fire House HW Pump	1	New Equipment
f.	Domestic HW Pump	1	New Equipment
g.	Main CHW Loop Pump	1	New Equipment
h.	Main CW Loop Pump	1	New Equipment
i.	Combined Heat & Power (CHP)	1	New Equipment
j.	CHP HX Pumps	2	New Equipment
k.	Dual Temp Control Valves	18	New Equipment

Municipal Building - Alternate Scope of Work (evaluated but not included)

- Includes upgrading the existing controls with a new CM3 BACnet Building Automation System, as noted below:

MUNICIPAL BLDG- City Hall Wing

	System	Qty	Comments
a.	Fan Coil Units- (2- Pipe)	40	BACnet Thermostats
b.	Ex. Air Handling Unit	1	CV, 2-Pipe (HW/CHW)

MUNICIPAL BLDG- Police Dept Wing

	System	Qty	Comments
a.	Ex. Fan Coil Units- (2- Pipe)	40	BACnet Thermostats
b.	Ex. Rooftop Unit – Gas/DX	1	
c.	Split System Heat Pumps	3	BACnet Thermostats
d.	Ex. Air Handling Unit	1	CV, 2-Pipe (HW/CHW)

MUNICIPAL BLDG- Fire House Wing

	System	Qty	Comments
a.	Ex. Rooftop Unit – Gas/DX	1	
b.	Ex. Split System AC Units	2	BACnet Thermostats
c.	Ex. HW Unit Heater	2	BACnet Thermostats

Court - Scope of Work (evaluated by not included)

- Furnish new BACnet controllers for all (4) Rooftop Units.
- For all units. We will furnish new controls as needed, to provide demand control ventilation for each unit. This includes space CO2 sensors and space humidity sensors.
- Furnish and install CM3 Niagara-based network controllers, sized to fit the controller for the Municipal Building. Will interface all new BACnet controllers to these controllers.

	System	Qty	Comments
a.	Ex. Rooftop Units – Gas/DX	2	Constant Volume, Single Zone
b.	New Rooftop Units – Gas/DX	2	Constant Volume, Single Zone
c.	Gas-Fired Unit Heater	1	
d.	Ex. Split System Heat Pump	1	

Byrne Recreation Center - Scope of Work (evaluated but not included)

- Furnish new BACnet controllers for all (8) Rooftop Units.
- For all units. We will furnish new controls as needed, to provide demand control ventilation for each unit. This includes space CO2 sensors and space humidity sensors.
- Furnish and install CM3 Niagara-based network controllers, sized to fit the controller for the Municipal Building. Will interface all new BACnet controllers to these controllers.

	System	Qty	Comments
a.	New Gym Rooftop Units	8	Constant Volume, Single Zone

ECM Calculations

Energy Savings from the installation of a Municipality Wide Energy Management System were calculated using the BPU protocols. The calculations are shown below.

EMS Savings					
BUILDING	Weekly Occupied Hours [H]	RTU Cooling (tons) [CAPrtu]	RTU Cooling Efficiency (EER) [EERrtu]	Chiller Cooling (tons) [CAPchiller]	Chiller Cooling Efficiency (EER) [EERchiller]
Municipal Building (City Hall, Fire, Police)	40	14.5	11.68	79.6	21.8
Court	40	29.8	11.00		
Byrne Recreation Center	86	65.1	11.00		

EMS Savings						
BUILDING	RTU Heating (Btu/hr) [CAPrtu]	RTU Heating Efficiency (%) [AFUEh]	Boiler Heating (Btu/hr) [CAPboiler]	Boiler Heating Efficiency (%) [AFUEh]	ELFHc	ELFHh
Municipal Building (City Hall, Fire, Police)	200,000	78.4%	1,990,000	85.0%	736	681
Court	645,000	80.0%			736	681
Byrne Recreation Center	1,455,000	80.0%			736	681

EMS Savings						
BUILDING	RTU Cooling Energy Savings (kWh)	Chiller Cooling Energy Savings (kWh)	RTU Heating Energy Savings (therms)	Boiler Heating Energy Savings (therms)	Total Electric Savings (kWh)	Total Gas Savings (therms)
Municipal Building (City Hall, Fire, Police)	2,408	7,077	191	1,751	9,486	1,942
Court	5,247	0	603	0	5,247	603
Byrne Recreation Center	7,191	0	852	0	7,191	852

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)	Varies
EFLHh (hrs per year)	Varies
Ph (%)	3%
Pc (%)	6%

NJ BPU FY 2020 Protocols - Occupancy Controlled Thermostats

Algorithms

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

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

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

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.

7 = Assumed weekly hours for setback/setup adjustment period (based on 1 setback/setup per day, 7 days per week).

Summary of Inputs

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 84 hrs/week
Cap_{hp}	Variable		Application
Cap_h	Variable		Application
$EFLH_{c,h}$	Variable	See Table Below	1
P_h	Fixed	3%	2
P_c	Fixed	6%	2
$AFUE_h$	Variable		Application
EER_{hp}	Variable		Application

EFLH Table

Facility Type	Heating $EFLH_h$	Cooling $EFLH_c$
Assembly	603	669
Auto repair	1910	426
Dormitory	465	800
Hospital	3366	1424
Light industrial	714	549
Lodging – Hotel	1077	2918
Lodging – Motel	619	1233
Office – large	2034	720
Office – small	431	955
Other	681	736
Religious worship	722	279
Restaurant – fast food	813	645
Restaurant – full service	821	574

Facility Type	Heating $EFLH_h$	Cooling $EFLH_c$
Retail – big box	191	1279
Retail – Grocery	191	1279
Retail – small	545	882
Retail – large	2101	1068
School – Community college	1431	846
School – postsecondary	1191	1208
School – primary	840	394
School – secondary	901	466
Warehouse	452	400

Multi-family EFLH by Vintage

Facility Type	Prior to 1979	From 1979 to 2006	From 2007 through Present
Low-rise, Cooling	507	550	562
Low-rise, Heating	757	723	503
High-rise, Cooling	793	843	954
High-rise, Heating	526	395	219

Demand Control Ventilation Savings											
BUILDING	Building SQFT	Ventilation SQFT	Componet	HVAC Unit #	People Outdoor Air Rate (cfm/person)	Area Outdoor Air Rate (cfm/sqft)	Occupant Density (#/1000 sqft)	Combined Outdoor Air Rate (cfm/person)	Total Occupants	Calculated OA (cfm)	Existing Design OA (cfm)
Court	9,000	3,103	Office	RTU-1	5	0.06	5	17	16	266	N/A
	9,000	2,017	Office	RTU-2	5	0.06	5	17	11	176	N/A
	9,000	2,328	Office	RTU-3	5	0.06	5	17	12	200	N/A
	9,000	1,552	Office	RTU-4	5	0.06	5	17	8	133	N/A
Byrne Recreation Center	19,400	1,500	Community Center	RTU-1	N/A	N/A	N/A	N/A	N/A	N/A	600.0
	19,400	1,159	Community Center	RTU-2	N/A	N/A	N/A	N/A	N/A	N/A	370.0
	19,400	900	Community Center	RTU-3	N/A	N/A	N/A	N/A	N/A	N/A	165.0
	19,400	4,320	Gymnasium	RTU-4	N/A	N/A	N/A	N/A	N/A	N/A	1,305.0
	19,400	4,320	Gymnasium	RTU-5	N/A	N/A	N/A	N/A	N/A	N/A	1,305.0
	19,400	1,725	Community Center	RTU-6	N/A	N/A	N/A	N/A	N/A	N/A	530.0
	19,400	1,425	Community Center	RTU-7	N/A	N/A	N/A	N/A	N/A	N/A	270.0
	19,400	1,500	Community Center	RTU-8	N/A	N/A	N/A	N/A	N/A	N/A	600.0

Demand Control Ventilation Savings									
BUILDING	CESF	CDSF	HSF	DCV Electric Savings (kWh)	DCV Demand Savings (kW)	DCV Gas Savings (Th)	Total Electric Savings (kWh)	Total Demand Savings (kW)	Total Gas Savings (Th)
Court	2.544	0.0013	0.0680	677	0	181	1,972	1	527
	2.544	0.0013	0.0680	448	0	120			
	2.544	0.0013	0.0680	508	0	136			
	2.544	0.0013	0.0680	339	0	91			
Byrne Recreation Center	1.500	0.0015	0.0430	900	1	258	10,479	7	2,891
	1.500	0.0015	0.0430	555	1	159			
	1.500	0.0015	0.0430	248	0	71			
	2.558	0.0013	0.0690	3,338	2	900			
	2.558	0.0013	0.0690	3,338	2	900			
	1.500	0.0015	0.0430	795	1	228			
	1.500	0.0015	0.0430	405	0	116			
	1.500	0.0015	0.0430	900	1	258			

NJ BPU FY 2020 Protocols - Demand-Controlled Ventilation Using CO2 Sensors

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

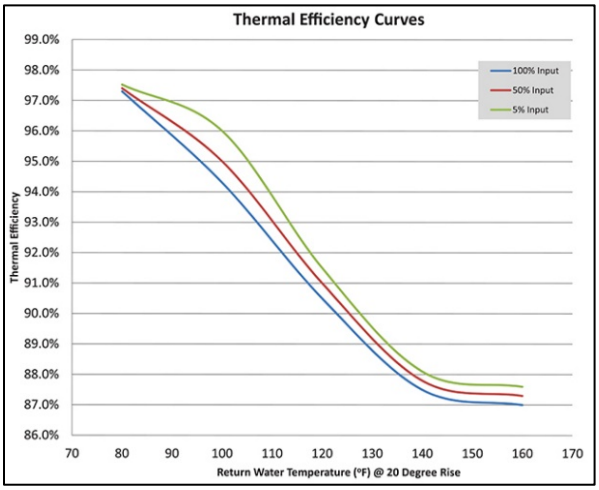
ECM 4 – Boiler Replacement

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
4	Boiler Replacement	✔											

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

The City of Wildwood Municipal Building has (1) 4,000 MBH Cleaver Brooks hot water boiler. Existing equipment to be replaced with (2) 2,000 MBH high efficiency hot water condensing boilers. These boilers condition a dual temperature hot water / chilled water loop which serve terminal fan coil units and two air handlers throughout the complex.

Scope of Work

- Demolish existing 4,000 MBH hot water boiler
- Install (2) 2,000 MBH hot water condensing boilers
- Re-pipe boiler room

Boiler Replacement Estimate				
BUILDING	**SQFT**	**CATEGORY**	**NOTES**	**QUANTITY**
Municipal Building (City Hall, Fire, Police)	40,000	Demo	Remove (1) 4000 MBH Existing Boiler	1
		Boiler	Install (2) 2000 MBH Boilers	1
		Re-Pipe	HHW Mains/Connections - ALLOW 600LF	1
		Electrical	Tie in	1
		ATC		1
		Remediation	Associated with re-piping HW/Dual Temp Piping	1

ECM Calculations

Energy Savings from the installation of a high efficiency condensing boiler were calculated using the BPU protocols. Existing boiler is from 2003 and estimated to be 76.5% efficient. The proposed boilers a minimum of 85% efficient at 160F return water temperature.

Boiler Replacement Savings					
BUILDING	Existing Qty	Input Capacity (mbh) [CAPin]	Equivalent Full Load Hours [EFLHh]	Boiler Baseline Efficiency [EFFb]	Baseline Plant Rated Output MBH
Municipal Building (City Hall, Fire, Police)	1	4,000	681	76.8%	3,072

Boiler Replacement Savings							
BUILDING	Baseline Plant Rated Output MBH	Baseline Output Btuh/sq ft	Proposed Qty	Boiler Proposed Efficiency [EFFq]	Proposed Plant Rated Input MBH (CAPYbi)	Qualifying Boiler Efficiency (EFFq)	Proposed Plant Rated Output MBH
Municipal Building (City Hall, Fire, Police)	3,072	76.8	2	85%	4,000	85%	3,400

Boiler Replacement Savings			
BUILDING	Calculated Annual Fuel Savings (Th)	CHP REDUCTION OF HOT WATER	Calculated Annual Fuel Savings (Th) with CHP
Municipal Building (City Hall, Fire, Police)	2,908	51.4%	1,412.6

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 5 – Chiller Replacement

CITY OF WILDWOOD

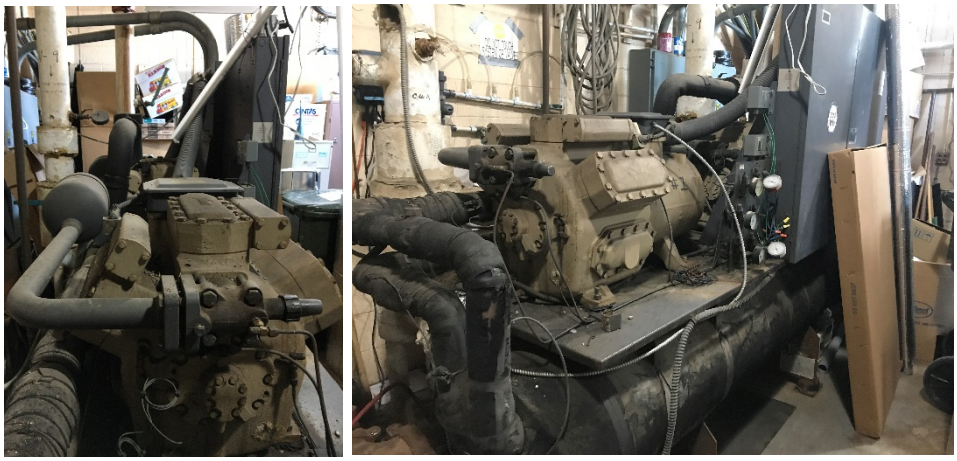
✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
5	Chiller Replacement	✔											

A chiller is one of the most energy-intensive units in any facility. Technology has made leaps and bounds in the past several years in making these machines more efficient. Chiller efficiency is rated by how much electrical energy is used to produce an amount of cooling. This is expressed in kilo-watts per ton of cooling (kW/ton). An older machine may be as high as 1.5 kW/ton, whereas a new chiller may be as low as 1 kW/ton or even less. A new machine uses less electrical power to produce the same amount of cooling. The efficiency of the chiller can vary widely depending on whether the model is air-cooled, or water cooled.

Existing Conditions

The City of Wildwood Municipal Complex has (1) 120-ton Trane water-cooled reciprocating chiller. Existing equipment to be replaced with (1) 120-ton high efficiency water cooled chiller. This chiller conditions a dual temperature hot water / chilled water loop which serves terminal fan coil units and two air handlers throughout the building.



Existing chiller at Municipal Building

Scope of Work

- Install 120 ton water-cooled helical rotary chiller
- Install refrigerant monitor
- Re-pipe chiller room

ECM Calculations

Energy Savings from the installation of a high efficiency helical rotary chiller were calculated using the BPU protocols. Existing chiller is from 1986 and estimated to have a full load kW/ton of 1.13 and a part load kW/ton of 0.80.

Chiller Replacement Savings								
BUILDING	Qty	Baseline Tons	Proposed Tons	EFLH	FLVb (kW/ton)	FLVq (kW/ton)	IPLVb (kW/ton)	IPLVq (kW/ton)
Municipal Building (City Hall, Fire, Police)	1	120.0	120.0	736	1.017	0.620	0.687	0.480

Chiller Replacement Savings							
BUILDING	PDC	FLV Demand Savings (kW)	FLV Energy Savings (kWh)	IPLV Demand Savings (kW)	IPLV Energy Savings (kWh)	Peak Demand Savings (kW)	Total Energy Savings (kWh)
Municipal Building (City Hall, Fire, Police)	67%	31.9	35,059	16.6	18,278	48.6	53,336

Electric Chillers

The measurement of energy and demand savings for C&I chillers is based on algorithms with key variables.

This measure applies to new construction, replacement of failed equipment, or end of useful life. The baseline unit is a code compliant unit with an efficiency as required by ASHRAE Std. 90.1 – 2016, which is the current code adopted by the state of New Jersey.

Algorithms

For IPLV:

Energy Savings (kWh/yr) = N * Tons * EFLH * ($IPLV_b$ – $IPLV_q$)

Peak Demand Savings (kW) = N * Tons * PDC * ($IPLV_b$ – $IPLV_q$)

For FLV:

Energy Savings (kWh/yr) = N * Tons * EFLH * (FLV_b – FLV_q)

Peak Demand Savings (kW) = N * Tons * PDC * (FLV_b – FLV_q)

Definition of Variables

N = Number of units

Tons = Rated capacity of coolling equipment.

EFLH = Equivalent Full Load Hours – This represents a measure of energy use by season during the on-peak and off peak periods.

PDC = Peak Duty Cycle: fraction of time the compressor runs during peak hours

$IPLV_b$ = Integrated Part Load Value of baseline equipment, kW/Ton. The efficiency of the chiller under partial-load conditions.

$IPLV_q$ = Integrated Part Load Value of qualifying equipment, kW/ efficiency of the chiller under partial-load conditions.

FLV_b = Full Load Value of baseline equipment, kW/Ton. The eff chiller under full-load conditions.

FLV_q = Full Load Value of qualifying equipment, kW/Ton. The the chiller under full-load conditions.

Summary of Inputs

Electric Chiller Assumptions

Electric Chillers Component	Type	Situation
Tons	Rated Capacity, Tons	All
$IPLV_b$ (kW/ton)	Variable	See table below

Electric Chillers Component	Type	Situation
$IPLV_q$ (kW/ton)	Variable	All
FLV_b (kW/ton)	Variable	See table below
FLV_q (kW/ton)	Variable	All
PDC	Fixed	All
EFLH	Variable	All

Electric Chillers – New Construction

Type	Capacity	ASHRAE 90.1 2016 Table 6.8.1-3) Path A Full Load kW/ton	Path A IPLV kW/ton	Path B Full Load kW/ton	Path B IPLV kW/ton
Air Cooled	tons < 150	*10.1* 1.188	*13.7* 0.876	*9.7* 1.237	*15.8* 0.759
	tons ≥ 150	*10.1* 1.188	*14.0* 0.857	*9.7* 1.237	*16.1* 0.745
Water Cooled Positive Displacement (rotary screw and scroll)	tons < 75	0.750	0.600	0.780	0.500
	75 ≤ tons < 150	0.720	0.560	0.750	0.490
	150 ≤ tons < 300	0.660	0.540	0.680	0.440
	300 ≤ tons < 600	0.610	0.520	0.625	0.410
	tons ≥ 600	0.560	0.500	0.585	0.380
Water Cooled Centrifugal	tons < 150	0.610	0.550	0.695	0.440
	150 ≤ tons < 300	0.610	0.550	0.635	0.400
	300 ≤ tons < 400	0.560	0.520	0.595	0.390
	400 ≤ tons < 600	0.560	0.500	0.585	0.380
	tons ≥ 600	0.560	0.500	0.585	0.380

a – Values in italics are EERs.

EFLH Table

Facility Type	Cooling EFLH
Assembly	669
Auto repair	426
Dormitory	800
Hospital	1424
Light industrial	549
Lodging – Hotel	2918
Lodging – Motel	1233
Office – large	720
Office – small	955
Other	736
Religious worship	279
Restaurant – fast food	645
Restaurant – full service	574
Retail – big box	1279
Retail – Grocery	1279
Retail – small	882
Retail – large	1068
School – Community college	846
School – postsecondary	1208
School – primary	394
School – secondary	466
Warehouse	400

ECM 6 – Cooling Tower Replacement

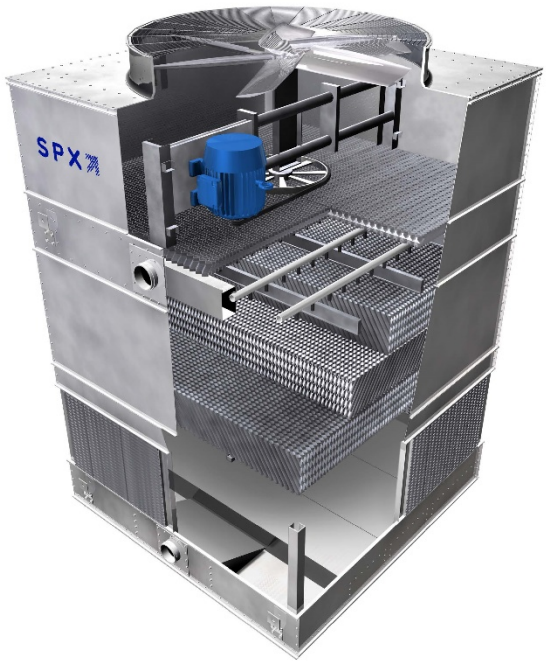
CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
6	Cooling Tower Replacement	✔											

Induced draft counterflow design requires less plan area than crossflow towers for many HVAC and light industrial duties. And because the tower's size results in less steel used, its reduced weight requires less support structure.

Induced draft counterflow equipment minimizes energy consumption by providing lower fan energy than centrifugal fan counterflow units. VFD fan provides the ultimate in temperature and sound control, energy management and mechanical equipment longevity.



Existing Conditions


Existing Cooling Tower at Municipal Building

Scope of Work

- Install stainless steel induced draft cooling tower with variable speed fan
- Replace condenser water piping
- Replace steel structural support on roof

ECM Calculations

Energy Savings from the installation of a high efficiency cooling tower were calculated using the BPU protocols. Existing cooling tower fan is downsized from 20 HP to 10 HP and now includes a VFD. The existing 20 HP fan motor was installed in 1986 and is assumed to be derated by 5%. Derated efficiency is 93% x 95% = 88.4%.

Cooling Tower Savings						
BUILDING	UNIT/FAN TAG	CAPACITY (TONS)	EXISTING FAN MOTOR HP	EXISTING MOTOR EFFICIENCY (Nbase)	REPLACEMENT FAN MOTOR HP	REPLACEMENT MOTOR EFFICIENCY (Nprem)
Municipal Building (City Hall, Fire, Police)	CT-1	150	20	88.4%	10	91.7%

Cooling Tower Savings							
BUILDING	LF	CF	IFvfd	HRS	ΔkW	MOTOR DEMAND SAVINGS (kW)	MOTOR ELECTRIC SAVINGS (kWh)
Municipal Building (City Hall, Fire, Police)	0.75	0.74	0.9	3391	7.88	5.83	20,033

Algorithms

From application form calculate ΔkW where:

$$\Delta kW = 0.746 * HP * IF_{VFD} * (1/\eta_{base} - 1/\eta_{prem})$$

Demand Savings = (ΔkW) * CF

Energy Savings = (ΔkW)*HRS * LF

Definition of Variables
ΔkW = kW Savings at full load
HP = Rated horsepower of qualifying motor, from nameplate/manufacturer specs.
LF = Load Factor, percent of full load at typical operating condition
IF_{VFD} = VFD Interaction Factor, 1.0 without VFD, 0.9 with VFD
η_{base} = Efficiency of the baseline motor
η_{prem} = Efficiency of the energy-efficient motor
HRS = Annual operating hours
CF = Coincidence Factor

Component	Type	Value	Source
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
LF	Fixed	0.75	1
η_{base}	Fixed	ASHRAE 90.1-2016 Baseline Efficiency Table	ASHRAE
η_{prem}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
IF_{VFD}	Fixed	1.0 or 0.9	3
Efficiency - η_{ee}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
CF	Fixed	0.74	1
HRS	Fixed	Annual Operating Hours Table	1

NEMA ASHRAE 90.1-2016 Motor Efficiency Table – General Purpose Subtype I (Adapted from Table 10.8-1)

Motor Horsepower	1200 RPM (6 pole)		1800 RPM (4 pole)		3600 RPM (2 pole)	
	ODP	TEFC	ODP	TEFC	ODP	TEFC
1	.825	.825	.855	.855	.77	.77
1.5	.865	.875	.865	.865	.84	.84
2	.875	.885	.865	.865	.855	.855
3	.885	.895	.895	.895	.855	.865
5	.895	.895	.895	.895	.865	.885
7.5	.902	.91	.91	.917	.885	.895
10	.917	.91	.917	.917	.895	.902
15	.917	.917	.93	.924	.902	.91
20	.924	.917	.93	.930	.91	.91
25	.93	.93	.936	.936	.917	.917
30	.936	.93	.941	.936	.917	.917
40	.941	.941	.941	.941	.924	.924
50	.941	.941	.945	.945	.93	.93
60	.945	.945	.95	.950	.936	.936
75	.945	.945	.95	.954	.936	.936
100	.95	.95	.954	.954	.936	.941
125	.95	.95	.954	.954	.941	.95
150	.954	.958	.958	.958	.941	.95
200	.954	.958	.958	.962	.95	.954

Annual Operating Hours Table

Motor Horsepower	Operating Hours, HRS
1 to 5 HP	2,745
6 to 20 HP	3,391
21 to 50 HP	4,067
51 to 100 HP	5,329
101 to 200 HP	5,200

Cooling Tower Savings						
BUILDING	ESF	DSF	VSD DEMAND SAVINGS (kW)	VSD ELECTRIC SAVINGS (kWh)	TOTAL DEMAND SAVINGS (kW)	TOTAL ELECTRIC SAVINGS (kWh)
Municipal Building (City Hall, Fire, Police)	290	(0.025)	(0.50)	5,800	5.33	25,833

Algorithms

Energy Savings (kWh/yr) = N * HP * ESF

Peak Demand Savings (kW) = N * HP * DSF

Definitions of Variables

N = Number of motors controlled by VFD(s) per application
HP = Nameplate motor horsepower or manufacturer specification sheet per application
ESF = Energy Savings Factor (kWh/year per HP)
DSF = Demand Savings Factor (kW per HP)

Summary of Inputs

Variable Frequency Drives

Component	Type	Value	Source
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
ESF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3
DSF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3

The ESF for the supply and return fans and circulating pumps are derived from a 2014 NEEP-funded study of 400 VFD installations in eight northeast states. The derived values are based on actual logged input power data and reflect average operating hours, load factors, and motor efficiencies for the sample. Savings factors representing cooling tower fans and boiler feed water pumps are not reflected in the NEEP report. Values representing these applications are taken from April 2018 New York TRM, Appendix K, and represent average values derived from DOE2.2 simulation of various building types

VFD Savings Factors

Application	ESF (kWh/Year-HP)	DSF (kW/HP)	Source
Supply Air Fan	2,033	0.286	1
Return Air Fan	1,788	0.297	1
CHW or CW Pump	1,633	0.185	1
HHW Pump	1,548	0.096	1
WSHP Pump	2,562	0.234	1
CT Fan	290	-0.025	2, 3
Boiler Feedwater Pump	1,588	0.498	2, 3

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 7 – Premium Efficiency Pump Motors and VFDs

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
7	Premium Efficiency Pump Motors and VFDs	✔											

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

City of Wildwood Municipal Building has (6) constant speed pumps. Existing equipment to be replaced with variable speed pumps.

Existing Pump at Municipal Building

Scope of Work

- Replace existing constant speed pumps with premium efficiency pumps with VFDs

Pump + VFD Estimate				
BUILDING	**SQFT**	**CATEGORY**	**QUANTITY**	**HP**
Municipal Building (City Hall, Fire, Police)	40,000	Jail/Fire House HWLP	1	2.0
		Main Two-Pipe HWLP/CHWLP	1	5.0
		DHWLP	1	1.0
		CHWLP/CWLP	2	7.5

ECM Calculations

Energy Savings from the installation of variable speed pumps were calculated using BPU protocols. Existing motor efficiencies were found on site using motor nameplate data. The proposed motor efficiencies will meet or exceed ASHRAE 90.1 2016 standard efficiency values. The calculations are shown below.

Pump + VFD Savings					
BUILDING	SYSTEM AND SERVICE	QTY	MOTOR HP	EXISTING MOTOR EFFICIENCY (Nbase)	REPLACEMENT MOTOR EFFICIENCY (Nprem)
Municipal Building (City Hall, Fire, Police)	Jail/Fire House HWLP	1	2	81.5%	86.5%
	Main Two-Pipe HWLP/CHWLP	1	5	89.5%	89.5%
	DHWLP	1	1	85.5%	85.5%
	Main CHWLP	1	7.5	89.5%	91.0%
	Main CWLP	1	7.5	89.5%	91.0%

Pump + VFD Savings							
BUILDING	LF	CF	IFvfd	HRS	ΔkW	PREM. MOTOR DEMAND SAVINGS (kW)	PREM. MOTOR ELECTRIC SAVINGS (kWh)
Municipal Building (City Hall, Fire, Police)	0.75	0.74	1.0	2745	0.11	0.08	218
	0.75	0.74	1.0	2745	0.00	0.00	0
	0.75	0.74	1.0	2745	0.00	0.00	0
	0.75	0.74	1.0	3391	0.10	0.08	262
	0.75	0.74	1.0	3391	0.10	0.08	262

Algorithms

From application form calculate ΔkW where:

$$\Delta kW = 0.746 * HP * IF_{VFD} * (1/\eta_{base} - 1/\eta_{prem})$$

Demand Savings = (ΔkW) * CF

Energy Savings = (ΔkW)*HRS * LF

Definition of Variables

ΔkW = kW Savings at full load
HP = Rated horsepower of qualifying motor, from nameplate/manufacturer specs.
LF = Load Factor, percent of full load at typical operating condition
IF_{VFD} = VFD Interaction Factor, 1.0 without VFD, 0.9 with VFD
η_{base} = Efficiency of the baseline motor
η_{prem} = Efficiency of the energy-efficient motor
HRS = Annual operating hours
CF = Coincidence Factor

Table

NEMA ASHRAE 90.1-2016 Motor Efficiency Table – General Purpose Subtype I (Adapted from Table 10.8-1)

Motor Horsepower	1200 RPM (6 pole)		1800 RPM (4 pole)		3600 RPM (2 pole)	
	ODP	TEFC	ODP	TEFC	ODP	TEFC
1	.825	.825	.855	.855	.77	.77
1.5	.865	.875	.865	.865	.84	.84
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3	.885	.895	.895	.895	.855	.865
5	.895	.895	.895	.895	.865	.885
7.5	.902	.91	.91	.917	.885	.895
10	.917	.91	.917	.917	.895	.902
15	.917	.917	.93	.924	.902	.91
20	.924	.917	.93	.930	.91	.91
25	.93	.93	.936	.936	.917	.917
30	.936	.93	.941	.936	.917	.917
40	.941	.941	.941	.941	.924	.924
50	.941	.941	.945	.945	.93	.93
60	.945	.945	.95	.950	.936	.936
75	.945	.945	.95	.954	.936	.936
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Annual Operating Hours Table

Motor Horsepower	Operating Hours, HRS
1 to 5 HP	2,745
6 to 20 HP	3,391
21 to 50 HP	4,067
51 to 100 HP	5,329
101 to 200 HP	5,200

Pump + 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)	TOTAL ELECTRIC SAVINGS (kWh)
Municipal Building (City Hall, Fire, Police)	1,548	0.096	0.19	3,096	0.27	3.77	3,314	37,621
	1,548	0.096	0.48	7,740	0.48		7,740	
	1,548	0.096	0.10	1,548	0.10		1,548	
	1,633	0.185	1.39	12,248	1.46		12,510	
	1,633	0.185	1.39	12,248	1.46		12,510	

Algorithms

Energy Savings (kWh/yr) = N * HP * ESF

Peak Demand Savings (kW) = N * HP * DSF

Definitions of Variables

N = Number of motors controlled by VFD(s) per application
HP = Nameplate motor horsepower or manufacturer specification sheet per application
ESF = Energy Savings Factor (kWh/year per HP)
DSF = Demand Savings Factor (kW per HP)

Summary of Inputs

Variable Frequency Drives

Component	Type	Value	Source
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
ESF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3
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The ESF for the supply and return fans and circulating pumps are derived from a 2014 NEEP-funded study of 400 VFD installations in eight northeast states. The derived values are based on actual logged input power data and reflect average operating hours, load factors, and motor efficiencies for the sample. Savings factors representing cooling tower fans and boiler feed water pumps are not reflected in the NEEP report. Values representing these applications are taken from April 2018 New York TRM, Appendix K, and represent average values derived from DOE2.2 simulation of various building types

VFD Savings Factors

Application	ESF (kWh/Year-HP)	DSF (kW/HP)	Source
Supply Air Fan	2,033	0.286	1
Return Air Fan	1,788	0.297	1
CHW or CW Pump	1,633	0.185	1
HHW Pump	1,548	0.096	1
WSHP Pump	2,562	0.234	1
CT Fan	290	-0.025	2, 3
Boiler Feedwater Pump	1,588	0.498	2, 3

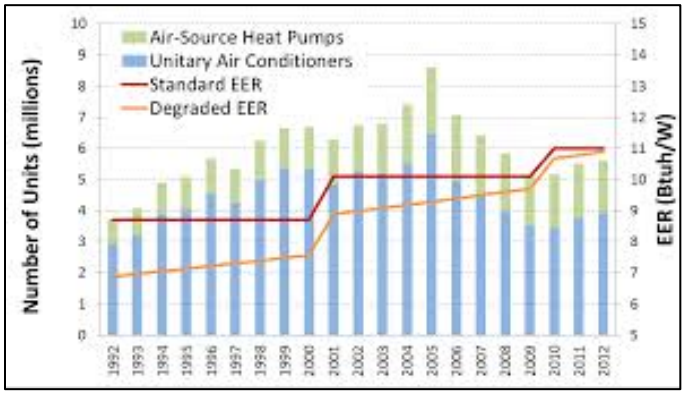
DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 8 – Roof Top Unit Replacement

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
8	Rooftop Unit Replacement		✔	✔									



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.

Existing Conditions

Existing roof top units at the Court and Byrne Recreation Center

Scope of Work

The following RTUs will be replaced with high efficiency constant volume units:

RTU Replacement Estimate						
BUILDING	SQFT	INSTALL? (Y/N)	CATEGORY	AREA SERVED	Tons	QUANTITY
Court	9,000	Y	Packaged RTU (Gas Heating): 10-Tons / Roof- 6098	Court	10	1
		Y	Packaged RTU (Gas Heating): 6-Tons / Roof- 4836	Court	6	1
		Y	New Direct Install program escalation			50%
Byrne Recreation Center	19,400	Y	DX/Gas-Fired	BRC	5	1
		Y	DX/Gas-Fired	BRC	4	1
		Y	DX/Gas-Fired	BRC	3	1
		Y	DX/Gas-Fired	Gym	20	2
		Y	DX/Gas-Fired	BRC	7.5	1
		Y	DX/Gas-Fired	BRC	5	1
		Y	DX/Gas-Fired	BRC	5	1

Note: The RTUs at the Byrne Recreation Center are being replaced by the City outside of ESIP. The cost and savings are included in the ESIP so City of Wildwood can reimburse themselves.

ECM Calculations

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

RTU Replacement - VFD Fan Savings							
BUILDING	SYSTEM	Areas Served	QTY	EXISTING FAN HP	PROPOSED FAN HP	EXISTING MOTOR EFFICIENCY (Nbase)	REPLACEMENT MOTOR EFFICIENCY (Nprem)
Court	Packaged RTU (Gas Heating): 10-Tons / Roof- 6098	Court	1	3.0	3.0	80.0%	89.5%
	Packaged RTU (Gas Heating): 6-Tons / Roof- 4836	Court	1	2.0	2.0	80.0%	86.5%
Byrne Recreation Center	RTU-1 - DX/Gas-Fired	BRC	1	1.5	1.50	81.5%	86.5%
	RTU-2 - DX/Gas-Fired	BRC	1	1.5	1.5	81.5%	86.5%
	RTU-3 - DX/Gas-Fired	BRC	1	1.5	1.5	81.5%	86.5%
	RTU-4/5 - DX/Gas-Fired	Gym	2	10.0	10.0	86.5%	91.7%
	RTU-6 - DX/Gas-Fired	BRC	1	2.0	2.0	81.5%	86.5%
	RTU-7 - DX/Gas-Fired	BRC	1	1.5	1.5	81.5%	86.5%
	RTU-8 - DX/Gas-Fired	BRC	1	2	2	81.5%	86.5%

RTU Replacement - VFD Fan Savings									
BUILDING	LF	CF	IFvfd	HRS	ΔkW	PREM. MOTOR DEMAND SAVINGS (kW)	PREM. MOTOR ELECTRIC SAVINGS (kWh)	TOTAL DEMAND SAVINGS (kW)	TOTAL ELECTRIC SAVINGS (kWh)
Court	0.75	0.74	1.0	2,745	0.30	0.22	611	0.2	611
	0.75	0.74	1.0	2,745	0.14	0.10	289	0.1	289
Byrne Recreation Center	0.75	0.74	1.0	2,745	0.08	0.06	163	0.1	163
	0.75	0.74	1.0	2,745	0.08	0.06	163	0.1	163
	0.75	0.74	1.0	2,745	0.08	0.06	163	0.1	163
	0.75	0.74	1.0	3,391	0.98	0.72	2,488	0.7	2,488
	0.75	0.74	1.0	2,745	0.11	0.08	218	0.1	218
	0.75	0.74	1.0	2,745	0.08	0.06	163	0.1	163
	0.75	0.74	1.0	2,745	0.08	0.06	163	0.1	163

Algorithms

From application form calculate ΔkW where:

$$\Delta kW = 0.746 * HP * IF_{VFD} * (1/\eta_{base} - 1/\eta_{prem})$$

Demand Savings = (ΔkW) * CF

Energy Savings = (ΔkW)*HRS * LF

Definition of Variables

ΔkW = kW Savings at full load
HP = Rated horsepower of qualifying motor, from nameplate/manufacturer specs.
LF = Load Factor, percent of full load at typical operating condition
IF_{VFD} = VFD Interaction Factor, 1.0 without VFD, 0.9 with VFD
η_{base} = Efficiency of the baseline motor
η_{prem} = Efficiency of the energy-efficient motor
HRS = Annual operating hours
CF = Coincidence Factor

		Spec. Sheet	
LF	Fixed	0.75	1
η_{base}	Fixed	ASHRAE 90.1-2016 Baseline Efficiency Table	ASHRAE
η_{prem}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
IF_{VFD}	Fixed	1.0 or 0.9	3
Efficiency - η_{ee}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
CF	Fixed	0.74	1
HRS	Fixed	Annual Operating Hours Table	1

NEMA ASHRAE 90.1-2016 Motor Efficiency Table – General Purpose Subtype I (Adapted from Table 10.8-1)

Motor Horsepower	1200 RPM (6 pole)		1800 RPM (4 pole)		3600 RPM (2 pole)	
	ODP	TEFC	ODP	TEFC	ODP	TEFC
1	.825	.825	.855	.855	.77	.77
1.5	.865	.875	.865	.865	.84	.84
2	.875	.885	.865	.865	.855	.855
3	.885	.895	.895	.895	.855	.865
5	.895	.895	.895	.895	.865	.885
7.5	.902	.91	.91	.917	.885	.895
10	.917	.91	.917	.917	.895	.902
15	.917	.917	.93	.924	.902	.91
20	.924	.917	.93	.930	.91	.91
25	.93	.93	.936	.936	.917	.917
30	.936	.93	.941	.936	.917	.917
40	.941	.941	.941	.941	.924	.924
50	.941	.941	.945	.945	.93	.93
60	.945	.945	.95	.950	.936	.936
75	.945	.945	.95	.954	.936	.936
100	.95	.95	.954	.954	.936	.941
125	.95	.95	.954	.954	.941	.95
150	.954	.958	.958	.958	.941	.95
200	.954	.958	.958	.962	.95	.954

Annual Operating Hours Table

Motor Horsepower	Operating Hours, HRS
1 to 5 HP	2,745
6 to 20 HP	3,391
21 to 50 HP	4,067
51 to 100 HP	5,329
101 to 200 HP	5,200

RTU Replacement - Cooling Savings						
BUILDING	SYSTEM	Areas Served	Existing Qty	Tons Per Unit	Total Existing Tons	EERb / SEERb
Court	Packaged RTU (Gas Heating): 10-Tons / Roof- 6098	Court	1	6.5	6.5	9.5
	Packaged RTU (Gas Heating): 6-Tons / Roof· 4836	Court	1	10	10.0	9.3
Byrne Recreation Center	RTU-1 - DX/Gas-Fired	BRC	1	5	5.0	11.6
	RTU-2 - DX/Gas-Fired	BRC	1	4	4.0	11.6
	RTU-3 - DX/Gas-Fired	BRC	1	3	3.0	11.6
	RTU-4/5 - DX/Gas-Fired	Gym	2	20	40.0	9.1
	RTU-6 - DX/Gas-Fired	BRC	1	7.5	7.5	10.0
	RTU-7 - DX/Gas-Fired	BRC	1	5	5.0	11.6
	RTU-8 - DX/Gas-Fired	BRC	1	5	5.0	11.6

RTU Replacement - Cooling Savings								
BUILDING	Proposed Qty	Tons Per Unit	Total Proposed Tons	EERq / SEERq	CF	EFLH Cooling	Demand Savings (kW)	Energy Savings (kWh)
Court	1	6.5	6.5	11.0	0.5	736	0.56	824
	1	10	10.0	11.0	0.5	736	1.00	1,468
Byrne Recreation Center	1	5	5.0	14.0	0.5	736	0.44	653
	1	4	4.0	14.0	0.5	736	0.35	522
	1	3	3.0	14.0	0.5	736	0.27	392
	2	20	40.0	11.0	0.5	736	4.56	6,706
	1	8	7.5	11.5	0.5	736	0.59	864
	1	5	5.0	14.0	0.5	736	0.44	653
	1	5	5.0	14.0	0.5	736	0.44	653

Algorithms

Air Conditioning Algorithms:

Energy Savings (kWh/yr) = N * Tons * 12 kBtuh/Ton * $(1/EER_b - 1/EER_q) * EFLH_c$

Peak Demand Savings (kW) = N * Tons * 12 kBtuh/Ton * $(1/EER_b - 1/EER_q) * CF$

Definition of Variables

N = Number of units

Tons = Rated cooling capacity of unit.This value comes from ARI/AHRI or AHAM rating or manufacturer data.

EER_b = Energy Efficiency Ratio of the baseline unit. This data is found in the HVAC and Heat Pumps table below. For units < 65,000 BtuH (5.4 tons), SEER should be used in place of EER.

COP_b = Coefficient of Performance of the baseline unit. This data is found in the HVAC and Heat Pumps table below. For units < 65,000 BtuH (5.4 tons), SEER and HSPF/3.412 should be used in place of COP * 3.412 for cooling and heating savings, respectively.

EER_q = Energy Efficiency Ratio of the high efficiency unit. This value comes from the ARI/AHRI or AHAM directories or manufacturer data. For units < 65,000 (5.4 tons) BtuH, SEER should be used in place of EER.

COP_q = Coefficient of Performance of the high efficiency unit. This value comes from the ARI/AHRI or AHAM directories or manufacturer data. For units < 65,000 BtuH

(5.4 tons), SEER and HSPF/3.412 should be used in place of COP * 3.412 for cooling and heating savings, respectively.

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

$EFLH_{c\ or\ h}$ = Equivalent Full Load Hours – This represents a measure of energy use by season during the on-peak and off-peak periods.

Summary of Inputs

HVAC and Heat Pumps

Component	Type	Value	Source
Tons	Variable	Rated Capacity, Tons	Application
EER_b	Variable	See Table below	1
EER_q	Variable	ARI/AHRI or AHAM Values	Application
CF	Fixed	50%	2
$EFLH_{(c\ or\ h)}$	Variable	See Tables below	3

HVAC Baseline Efficiencies Table – New Construction/EUL/RoF

Equipment Type	Baseline = ASHRAE Std. 90.1 – 2016
Unitary HVAC/Split Systems and Single Package, Air Cooled	
<=5.4 tons, split	14 SEER
<=5.4 tons, single	14 SEER
>5.4 to 11.25 tons	11.0 EER, 12.7 IEER
>11.25 to 20 tons	10.8 EER, 12.2 IEER
> 21 to 63 tons	9.8 EER, 11.4 IEER
>63 Tons	9.5 EER, 11.0 IEER
Air Cooled Heat Pump Systems, Split System and Single Package	
<=5.4 tons, split	14 SEER, 8.2 HSPF
<=5.4 tons, single	14 SEER, 8.0 HSPF
>5.4 to 11.25 tons	10.8 EER, 12 IEER, 3.3 heating COP
>11.25 to 20 tons	10.4 EER, 11.4 IEER, 3.2 heating COP
>= 21	9.3 EER, 10.4 IEER, 3.2 heating COP

Equipment Type	Baseline = ASHRAE Std. 90.1 – 2016
Water Source Heat Pumps (water to air, water loop)	
<=1.4 tons	12.2 EER, 4.3 heating COP
>1.4 to 5.4 tons	13.0 EER, 4.3 heating COP
>5.4 to 11.25 tons	13.0 EER, 4.3 heating COP
Ground Water Source Heat Pumps <=11.25 tons	18.0 EER, 3.7 heating COP
Ground Source Heat Pumps (brine to air, ground loop) <=11.25 tons	14.1 EER, 3.2 heating COP
Package Terminal Air Conditioners[57]	14.0 – (0.300 * Cap/1,000), EER
Package Terminal Heat Pumps	14.0 – (0.300 * Cap/1,000), EER 3.7 – (0.052 * Cap/1,000), heating COP
Single Package Vertical Air Conditioners	
<=5.4 tons	10.0 EER
>5.4 to 11.25 tons	10.0 EER
>11.25 to 20 tons	10.0 EER
Single Package Vertical Heat Pumps	
<=5.4 tons	10.0 EER, 3.0 heating COP
>5.4 to 11.25 tons	10.0 EER, 3.0 heating COP
>11.25 to 20 tons	10.0 EER, 3.0 heating COP

EFLH Table

Facility Type	Heating $EFLH_h$	Cooling $EFLH_c$
Assembly	603	669
Auto repair	1910	426
Dormitory	465	800
Hospital	3366	1424
Light industrial	714	549
Lodging – Hotel	1077	2918
Lodging – Motel	619	1233
Office – large	2034	720
Office – small	431	955
Other	681	736
Religious worship	722	279
Restaurant – fast food	813	645
Restaurant – full service	821	574
Retail – big box	191	1279
Retail – Grocery	191	1279
Retail – small	545	882
Retail – large	2101	1068
School – Community college	1431	846
School – postsecondary	1191	1208
School – primary	840	394
School – secondary	901	466
Warehouse	452	400

RTU Replacement - Economizer Savings							
BUILDING	SYSTEM	Areas Served	QUANTITY	Cap (Tons)	D^kwh/ton	Demand Savings (kW)	Energy Savings (kWh)
Court	ackaged RTU (Gas Heating): 10-Tons / Roof- 60	Court	1	6.5	61	0.0	397
	ackaged RTU (Gas Heating): 6-Tons / Roof- 483	Court	1	10	61	0.0	610
Byrne Recreation Center	RTU-1 - DX/Gas-Fired	BRC	1	5	61	0.0	305
	RTU-2 - DX/Gas-Fired	BRC	1	4	61	0.0	244
	RTU-3 - DX/Gas-Fired	BRC	1	3	61	0.0	183
	RTU-4/5 - DX/Gas-Fired	Gym	2	20	61	0.0	2,440
	RTU-6 - DX/Gas-Fired	BRC	1	7.5	61	0.0	458
	RTU-7 - DX/Gas-Fired	BRC	1	5	61	0.0	305
	RTU-8 - DX/Gas-Fired	BRC	1	5	61	0.0	305

Dual Enthalpy Economizers

The following algorithm details savings for dual enthalpy economizers. They are to be used to determine electric energy savings between baseline standard units and the high efficiency units promoted in the program. The baseline condition is assumed to be a rooftop unit with fixed outside air (no economizer). The high efficiency units are equipped with sensors that monitor the enthalpy of outside air and return air and modulate the outside air damper to optimize energy performance.

Algorithms

Electric energy savings (kWh/yr) = N * Tons * (ΔkWh/ton)

Peak Demand Savings (kW) = 0^{38} kW

Definition of Variables

N = Number of units

Tons = Rated capacity of the cooling system retrofitted with an economizer

ΔkWh/ton = Stipulated per building type electricity energy savings per ton of cooling system retrofitted with an economizer

Summary of Inputs

Dual Enthalpy Economizers

Component	Type	Value	Source
N	Variable		Application
Tons	Variable	Rated Capacity, Tons	Application
ΔkWh/ton	Fixed	See Table Below	1

Savings per Ton of Cooling System

Building Type	Savings (ΔkWh/ton)
Assembly	27
Big Box Retail	152
Fast Food Restaurant	39
Full Service Restaurant	31
Light Industrial	25
Primary School	42
Small Office	186
Small Retail	95
Religious	6
Warehouse	2
Other	61

RTU Replacement - Heating Savings							
BUILDING NAME	SYSTEM	Areas Served	Qty	Estimated Existing Efficiency (COPb)	Efficiency Units	Baseline RTU Rated Input MBH	Baseline Plant Rated Input MBH (CAPYbi)
Court	Packaged RTU (Gas Heating): 10-Tons / Roof- 6098	Court	1	76.5%	%AFUE	120	120
	Packaged RTU (Gas Heating): 6-Tons / Roof- 4836	Court	1	76.5%	Et	240	240
Byrne Recreation Center	RTU-1 - DX/Gas-Fired	BRC	1	77.7%	Et	125	125
	RTU-2 - DX/Gas-Fired	BRC	1	78.3%	Et	75	75
	RTU-3 - DX/Gas-Fired	BRC	1	78.3%	Et	50	50
	RTU-4/5 - DX/Gas-Fired	Gym	2	77.4%	Et	400	800
	RTU-6 - DX/Gas-Fired	BRC	1	77.4%	Et	180	180
	RTU-7 - DX/Gas-Fired	BRC	1	77.9%	Et	100	100
	RTU-8 - DX/Gas-Fired	BRC	1	78.3%	Et	125	125

RTU Replacement - Heating Savings											
BUILDING NAME	Qualifying RTU Capacity MBH	Qualifying Plant Capacity (CAPYqi)	Qualifying RTU Efficiency (COPq)	Efficiency Units	EFLH	Conversion of BTU to kWh	Conversion of BTU to therms	Annual Electric Savings (kWh)	Baseline Gas Use (Therms)	Proposed Gas Use (Therms)	Annual Gas Savings (Therms)
Court	120	120	78%	%AFUE	681	3,412	100,000	-	1,068	1,048	21
	240	240	80%	Et	681	3,412	100,000	-	2,136	2,043	93
Byrne Recreation Center	125	125	81%	Et	681	3,412	100,000	-	1,096	1,051	45
	75	75	81%	Et	681	3,412	100,000	-	652	631	22
	50	50	81%	Et	681	3,412	100,000	-	435	420	14
	400	800	80%	Et	681	3,412	100,000	-	7,039	6,810	229
	180	180	80%	Et	681	3,412	100,000	-	1,584	1,532	51
	100	100	81%	Et	681	3,412	100,000	-	874	841	33
	125	125	81%	Et	681	3,412	100,000	-	1,087	1,051	36

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 = Furnace Baseline Efficiency

Eff_q = Furnace Proposed Efficiency

1000 = Conversion from kBtu to MMBtu

Summary of Inputs

Prescriptive Furnaces

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

$EFLH_h$ 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 Furnace Efficiencies (Eff_b)

Furnace Type	Size Category (kBtu input)	Standard 90.1-2016
Gas Fired	< 225 ≥ 225	78% AFUE or 80% Et 80% Et
Oil Fired	< 225 ≥ 225	78% AFUE 81% Et

RTU 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)
Court	RTU (Gas Heating): 10-Tons /	Court	1,832	4,198	1	2	21	114
	RTU (Gas Heating): 6-Tons /	Court	2,366		1		93	
Byrne Recreation Center	RTU-1 - DX/Gas-Fired	BRC	1,121	18,203	1	8	45	431
	RTU-2 - DX/Gas-Fired	BRC	929		0		22	
	RTU-3 - DX/Gas-Fired	BRC	738		0		14	
	RTU-4/5 - DX/Gas-Fired	Gym	11,633		5		229	
	RTU-6 - DX/Gas-Fired	BRC	1,539		1		51	
	RTU-7 - DX/Gas-Fired	BRC	1,121		1		33	
	RTU-8 - DX/Gas-Fired	BRC	1,121		1		36	

ECM 9 – Dual Temperature Fan Coil Unit Replacement

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
9	Dual Temperature Fan Coil Unit Replacement	✔											

Electronically Commutated (EC) motors are designed to offer greater efficiency than the traditional Permanent Split Capacitor (PSC) motors. EC motors maintain 60-80% efficiency throughout their operating range where PSC motors maximum efficiency at high speed is typically only 65% and as low as 25-40% at lower speeds.

The EC motor used is specifically designed with fan coil horsepower requirements in mind (less than or equal to 1/4 HP). The new fan coil EC motors operate in a constant RPM mode compared to a constant airflow mode often associated with EC motor technology applied in Variable Air Volume boxes. Constant airflow applied in a fan coil application reduces efficiency.

Scope of Work

Fan coils to be replaced in-kind by new units with electrically commutated fan motors. Existing AHU to be replaced in-kind by a new unit with a variable speed fan.

Municipal Building Police Wing - existing (40) HW/CHW 2-pipe fan coils

Municipal Building City Hall Wing - equivalent HW/CHW AHU to be replaced in Police Wing

ECM Calculations

Energy Savings from the installation of fan coils with electrically commutated motors and a variable volume AHU were calculated using BPU protocols. The calculations are shown below.

Dual Temp Fan Coil Replacement Savings					
BUILDING	UNIT TAG	NUMBER OF UNITS	FAN MOTOR HP	EXISTING MOTOR EFFICIENCY (Nbase)	REPLACEMENT MOTOR EFFICIENCY (Nprem)
Municipal Building (City Hall, Fire, Police)	DTFCU-1-40	40	0.125	80.0%	85.5%
Municipal Building (City Hall, Fire, Police)	AHU-1	1	5	84.5%	89.5%

Dual Temp Fan Coil Replacement Savings				
BUILDING	LF	CF	IFvfd	HRS
Municipal Building (City Hall, Fire, Police)	0.75	0.74	1.0	2745
Municipal Building (City Hall, Fire, Police)	0.75	0.74	1.0	2745

Dual Temp Fan Coil Replacement Savings			
BUILDING	ΔkW	DEMAND SAVINGS (Kw)	ELECTRIC SAVINGS (kWh)
Municipal Building (City Hall, Fire, Police)	0.01	0.22	617
Municipal Building (City Hall, Fire, Police)	0.25	0.18	508

Algorithms

From application form calculate ΔkW where:

$$\Delta kW = 0.746 * HP * IF_{VFD} * (1/\eta_{base} - 1/\eta_{prem})$$

Demand Savings = (ΔkW) * CF

Energy Savings = (ΔkW)*HRS * LF

Definition of Variables
ΔkW = kW Savings at full load
HP = Rated horsepower of qualifying motor, from nameplate/manufacturer specs.
LF = Load Factor, percent of full load at typical operating condition
IF_{VFD} = VFD Interaction Factor, 1.0 without VFD, 0.9 with VFD
η_{base} = Efficiency of the baseline motor
η_{prem} = Efficiency of the energy-efficient motor
HRS = Annual operating hours
CF = Coincidence Factor

Component	Type	Value	Source
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
LF	Fixed	0.75	1
η_{base}	Fixed	ASHRAE 90.1-2016 Baseline Efficiency Table	ASHRAE
η_{prem}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
IF_{VFD}	Fixed	1.0 or 0.9	3
Efficiency - η_{ee}	Variable	Nameplate/Manufacturer Spec. Sheet	Application
CF	Fixed	0.74	1
HRS	Fixed	Annual Operating Hours Table	1

NEMA ASHRAE 90.1-2016 Motor Efficiency Table – General Purpose Subtype I (Adapted from Table 10.8-1)

Motor Horsepower	1200 RPM (6 pole)		1800 RPM (4 pole)		3600 RPM (2 pole)	
	ODP	TEFC	ODP	TEFC	ODP	TEFC
1	.825	.825	.855	.855	.77	.77
1.5	.865	.875	.865	.865	.84	.84
2	.875	.885	.865	.865	.855	.855
3	.885	.895	.895	.895	.855	.865
5	.895	.895	.895	.895	.865	.885
7.5	.902	.91	.91	.917	.885	.895
10	.917	.91	.917	.917	.895	.902
15	.917	.917	.93	.924	.902	.91
20	.924	.917	.93	.930	.91	.91
25	.93	.93	.936	.936	.917	.917
30	.936	.93	.941	.936	.917	.917
40	.941	.941	.941	.941	.924	.924
50	.941	.941	.945	.945	.93	.93
60	.945	.945	.95	.950	.936	.936
75	.945	.945	.95	.954	.936	.936
100	.95	.95	.954	.954	.936	.941
125	.95	.95	.954	.954	.941	.95
150	.954	.958	.958	.958	.941	.95
200	.954	.958	.958	.962	.95	.954

Annual Operating Hours Table

Motor Horsepower	Operating Hours, HRS
1 to 5 HP	2,745
6 to 20 HP	3,391
21 to 50 HP	4,067
51 to 100 HP	5,329
101 to 200 HP	5,200

Dual Temp Fan Coil Replacement Savings						
BUILDING	VFD ESF	VFD DSF	VFD DEMAND SAVINGS (kW)	VFD ELECTRIC SAVINGS (kWh)	TOTAL DEMAND SAVINGS (kW)	TOTAL ELECTRIC SAVINGS (kWh)
Municipal Building (City Hall, Fire, Police)	2,033	0.286	1.4	10,165	1.7	10,782
Municipal Building (City Hall, Fire, Police)	2,033	0.286	1.4	10,165	1.6	10,673

Algorithms

Energy Savings (kWh/yr) = N * HP * ESF

Peak Demand Savings (kW) = N * HP * DSF

Definitions of Variables

N = Number of motors controlled by VFD(s) per application
HP = Nameplate motor horsepower or manufacturer specification sheet per application
ESF = Energy Savings Factor (kWh/year per HP)
DSF = Demand Savings Factor (kW per HP)

Summary of Inputs

Variable Frequency Drives

Component	Type	Value	Source
HP	Variable	Nameplate/Manufacturer Spec. Sheet	Application
ESF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3
DSF	Variable	See Table Below	Derived value based on the following sources: 1, 2, 3

The ESF for the supply and return fans and circulating pumps are derived from a 2014 NEEP-funded study of 400 VFD installations in eight northeast states. The derived values are based on actual logged input power data and reflect average operating hours, load factors, and motor efficiencies for the sample. Savings factors representing cooling tower fans and boiler feed water pumps are not reflected in the NEEP report. Values representing these applications are taken from April 2018 New York TRM, Appendix K, and represent average values derived from DOE2.2 simulation of various building types

VFD Savings Factors

Application	ESF (kWh/Year-HP)	DSF (kW/HP)	Source
Supply Air Fan	2,033	0.286	1
Return Air Fan	1,788	0.297	1
CHW or CW Pump	1,633	0.185	1
HHW Pump	1,548	0.096	1
WSHP Pump	2,562	0.234	1
CT Fan	290	-0.025	2, 3
Boiler Feedwater Pump	1,588	0.498	2, 3

ECM 10 – Electronic Fuel-Use Economizer

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

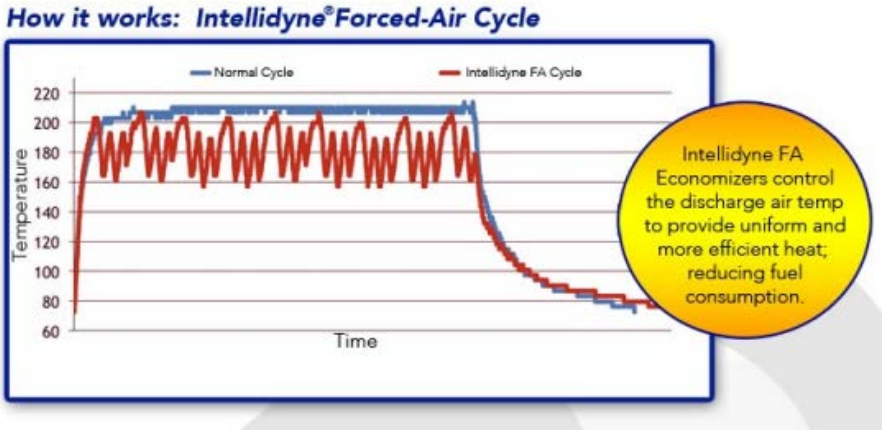
ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
10	Electronic Fuel-Use 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.

Existing gas fired RTU at the Court

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



Scope of Work

Electronic Fuel Use Economizer Estimate				
BUILDING	**SQFT**	**CATEGORY**	**NOTES**	**QUANTITY**
Court	9,000	Gas-Fired RTU	Electronic Fuel-Use Economizers (for Forced Air Heat) / Roof	4
			Escalation to new DI program	50%
Byrne Recreation Center	19,400	Gas-Fired RTU	Electronic Fuel-Use Economizers (for Forced Air Heat) / Roof	2
			Escalation to new DI program	50%
Holly Beach Volunteer Fire Company	7,400	Gas-Fired RTU	Electronic Fuel-Use Economizers (for Forced Air Heat) / Roof	2
			Escalation to new DI program	50%

ECM Calculations

Heating energy use is reduced by 13% by using an electronic fuel use 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 at design conditions and heating degree day base temperature (65F-13F). Heating degree days were modified to align with actual site gas use identified in energy baseline.

Electronic Fuel Use Economizer															
BUILDING	**System**	**Qty**	**CAPb (Btu/hr)**	**CAPq (Btu/hr)**	**Total CAPb (Btu/hr)**	**Total CAPq (Btu/hr)**	**AFUEb**	**AFUEq**	**OF**	**ICF**	**ΔT**	**HDD (modified)**	**Annual Fuel Usage**	**Gas Savings %**	**Gas Savings (therms)**
Court	RTU-1	1	150,000	0	150,000	0	81%	81%	0.80	1.00	52	726	497	13%	532
Court	RTU-2	1	135,000	0	135,000	0	82%	82%	0.80	1.00	52	726	981	13%	
Court	RTU-3	1	120,000	0	120,000	0	80%	80%	0.80	1.00	52	726	872	13%	
Court	RTU-4	1	240,000	0	240,000	0	80%	80%	0.80	1.00	52	726	1,743	13%	
Byrne Recreation Center	RTU-4	1	400,000	0	400,000	0	80%	80%	0.80	1.00	52	1,121	4,483	13%	1,166
Byrne Recreation Center	RTU-5	1	400,000	0	400,000	0	80%	80%	0.80	1.00	52	1,121	4,483	13%	

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

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

Algorithms

Electric Savings (kWh) = (AEU * 0.13)

Fuel Savings (MMBtu) = (AFU * 0.13)

Definition of Variables

AEU = Annual Electric Usage for an uncontrolled AC or refrigeration unit (kWh)

AFU = Annual Fuel Usage for an uncontrolled (gas, oil, propane) HVAC unit (MMBtu or gallons)

Notes:

(1) Some examples of the different types of fuel-use economizer controls available on the market can be found at: http://www.intellidynellc.com/02_prods.htm

ECM 11 – Destratification Fans

Evaluated but not included.

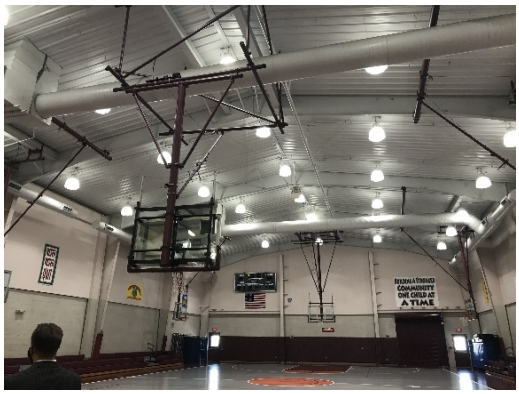
CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
11	Destratification Fans			✔									

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



Byrne Recreation Center gymnasium

Scope of Work

Install destratification fans in the following gyms:

Destratification Fan Estimate				
BUILDING	SQFT	CATEGORY	NOTES	QUANTITY
Byrne Recreation Center	19,400	Air Pear 45-EC	Main Gym	6

ECM Calculations

De-strat fans are estimated to save 19.8% to 26.3% of gym HVAC energy. Gym HVAC heating energy was estimated to be 54.4% of total building gas use. De-strat fans will run during heating season.

Destratification Fan Savings					
BUILDING	Area	Space SQFT	HVAC % of Building Gas Use	Large Space Heating / Cooling Multiplier	Estimated Space Heating (Therm)
Byrne Recreation Center	Main Gym	8,400	54.4%	1	2,986
Byrne Recreation Center					
Byrne Recreation Center					

Destratification Fan Savings					
BUILDING	Fan Data for Energy Use Calc.	Estimated Space Fan Use (kWh)	Ceiling Height (ft)	Floor to Ceiling deltaT (F)	HVAC Energy Savings (%)
Byrne Recreation Center	(2) 10 HP Fans	31,710	30	12.6	23.6%
Byrne Recreation Center					
Byrne Recreation Center					

Destratification Fan Savings								
BUILDING	Total DeStrat Fans (#)	DeStrat Fan Power (W)	DeStrat Fan Run Hours (hrs)	DeStrat Fan Energy (kWh)	Energy Savings (kWh)	Total Energy Savings (kWh)	Energy Savings (Therms)	Total Energy Savings (Therms)
Byrne Recreation Center	6	154	3,391	3,133	4,364	4,364	706	706
Byrne Recreation Center				0	0		0	
Byrne Recreation Center				0	0		0	

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 12 – Domestic Water Heater Replacement

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
12	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 domestic water heater at the Municipal Building

Scope of Work

BUILDING	CATEGORY	NOTES
Municipal Building (City Hall, Fire, Police)	Replace electric DWH with gas	RHEEM GHE80SS-130A
	Install high efficiency tank water heater	(or similar)
	Flue + gas piping	
Beach Patrol	Replace electric DWH with new electric	40 gallon tank DWH

ECM Calculations

Energy Savings from the installation of new domestic water heaters were calculated using BPU protocols. The calculations are shown below.

BUILDING	TANK CAPACITY (GALLONS)	HEATER CAPACITY				EFFICIENCY			
		BASELINE	UNITS	PROPOSED	UNITS	BASELINE	UNITS	PROPOSED	UNITS
Municipal Building (City Hall, Fire, Police)	80	30.0	KW	130	MBH	97%	Et	94%	Et
Beach Patrol	40	9.0	kW	9	kW	97%	Et	99%	Et

ENERGY USE DENSITY	SLb	SLq	STAND-BY LOSS FACTOR	Annual DHW Load (Btu)	ENERGY USE (BTU)	
					BASELINE	PROPOSED
2.3	1.09	1.12	(0.0002)	92,000,000	96,299,493	98,779,436
2.3	0.73	0.70	0.0025	8,740,000	9,235,838	9,037,809

BUILDING	ELECTRIC DEMAND COINCIDENCE FACTOR	FUEL CONVERSION SAVINGS (Electric to Gas)		
		ELECTRIC SAVINGS (kWh)	ELECTRIC DEMAND SAVINGS (kW)	NATURAL GAS SAVINGS (THERMS)
Municipal Building (City Hall, Fire, Police)	67%	28,224	19.4	(988)

BUILDING	ELECTRIC DEMAND COINCIDENCE FACTOR	Total BTU/hr Savings	NON- FUEL CONVERSION SAVINGS		
			ELECTRIC SAVINGS (kWh)	ELECTRIC DEMAND SAVINGS (kW)	NATURAL GAS SAVINGS (THERMS)
Beach Patrol	67%	176,566	52	0.1	0

Algorithms

Fuel Savings (MMBtu/yr) = $((1 - (EFF_b / EFF_q) + SLF^{59}) * \text{Energy Use Density} * \text{Area} / 1000 \text{ kBtu/MMBtu}$

where,

$SLF = (SL_b - SL_q) / Cap_q$

Fuel Savings (Therms) = $((GPD \times 365 \times 8.33 \times deltaT_{main})/1000) \times (1/UEF_b - 1/UEF_q)$

Definition of Variables

EFF_q = Efficiency of the qualifying water heater.

EFF_b = Efficiency of the baseline water heater, commercial grade.

EF_b = Energy Factor of the baseline water heater, commercial grade.

UEF_b = Uniform Energy Factor of baseline water heater

UEF_q = Uniform Energy Factor of proposed efficient water heater

Energy Use Density = Annual baseline water heater energy use per square foot of commercial space served (MMBtu/sq.ft./yr)

Area = Square feet of building area served by the water heater

SLF = Standby loss factor for savings of qualifying water heater over baseline

$SL_{b \text{ or } q}$ = Standby losses in kBtu/hr of the baseline and qualifying storage water heater respectively. The baseline standby losses is calculated assuming the baseline water heater has the same input capacity rating as the qualifying unit's input capacity using ASHRAE equipment performance standards. The qualifying unit's standby losses are available on the AHRI certificate provided with the application.

Cap_q = Rated input capacity of the qualifying water heater

GPD = Gallons per day

$deltaT_{main}$ = Average temperature difference between water heater set point temperature and the supply water temperature in water main (°F)

Summary of Inputs

Stand Alone Storage Water Heater Assumptions

Component	Type	Value	Source
EFF_q	Variable		Application
EFF_b	Variable	See Table Below	1, 2
EF_b	Variable	See Table Below	1, 2
Energy Use Density	Variable	See Table Below	3
Area	Variable		Application
Cap_q	Variable		Application
SL_b	Variable	See Table Below	1 & Application
SL_q	Variable		Application
GPD	Variable	46	4
UEF_b	Variable	See Table Below	3
UEF_q	Variable		Application
$deltaT_{main}$		64.1	5

Efficiency of Baseline Stand Alone Storage Water Heaters

ASHRAE 90.1-2007 and 2016[a]			
Equipment Type	**Size Category (Input)**	**Existing Building Baseline Efficiency (ASHRAE 90.1-2007)**	**New Building Baseline Efficiency (ASHRAE 90.1-2016)**
Gas Storage Water Heaters	≤ 75 kBtu/hr	EF = 0.62 – 0.0019 × V	EF = 0.67 – 0.0005 × V
Gas Storage Water Heaters	> 75 - <= 105kBtu/hr	TE = 0.80 SL = (Cap_q / 0.8 + 110 × √V) / 1000	Very Small DP: UEF=0.2674 – (0.0009 x Vr

[a] Cap_q is the rated input of the proposed storage water heater

Energy Use Density Look-up Table

Building Type	Energy Use Density (kBtu/SF/yr)
Education	7.0
Food sales	4.4
Food service	39.2
Health care	23.7
Inpatient	34.3
Outpatient	3.9
Lodging	26.5
Retail (other than mall)	2.5
Enclosed and strip malls	14.1
Office	4.8
Public assembly	2.1
Public order and safety	21.4
Religious worship	0.9
Service	15
Warehouse and storage	2.9
Other	2.3

Example: If a water heater of 150 kBtu/hr input capacity and 100 gallons storage capacity is installed in an existing building, the baseline standby losses would be calculated as SL = (150 kBtu/hr / 0.8 + 110 × √100) / 1000 = 1.29 kBtu/hr. If the proposed equipment's standby losses were rated for 1.0 kBtu/hr, the standby loss factor for savings would be SLF = (1.29 – 1.0) / 150 = 0.0019.

In the above example, if the unit was rated for 96% thermal efficiency, and installed in an office building space of 10,000 ft^2, the annual energy savings would be ((1 – 0.8/0.96) + 0.0019) × 4.8 × 10000 / 1000 = 8.1 MMBtus/yr

ECM 13 – Pipe and Valve Insulation

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
13	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

Damaged pipe and valve insulation at the Municipal Building

Scope of Work

Pipe and Valve Insulation Estimate			
BUILDING	**CATEGORY**	**NOTES**	**Linear feet**
Municipal Building (City Hall, Fire, Police)	Heating Hot Water/ Chilled Water Pipe Fitting Insulation (Units)	BE Retrofit - City Hall only	10
	Heating Hot Water / Chilled Water Straight Pipe Insulation (LF)	BE Retrofit - City Hall only	280
	Heating Hot Water / Chilled Water Pipe Fitting Insulation (Units)	BE Retrofit - City Hall only	6
	Heating Hot Water / Chilled Water Straight Pipe Insulation (LF)	BE Retrofit - City Hall only	128
	Domestic Hot Water Straight Pipe Insulation (LF)	Direct Install	10
	Escalation to new DI program	Direct Install	
Court	Domestic Hot Water Straight Pipe Insulation (LF)	Direct Install	9.5
	Escalation to new DI program	Direct Install	

Insulation will be installed on exposed pipes and valves. Failed insulation will be replaced. Poorly insulated pipes in the dual temperature heating and cooling distribution system is leading to unnecessary distribution losses and wasted energy. The scope of work will include

- Installation of pipe insulation to meet the insulation requirements of the fluid temperature in the pipe
- Utilize and install pipe wrap covering and jackets to protect the insulation material as required in the work area
- Materials will vary by the application and work space
    - Fiberglass
    - Mineral wool
    - Foamglass
    - Styrofoam
    - Urethane
    - Closed cell rubber

ECM Calculations

Hot water pipe insulation is calculated using NJ BPU Protocols. Existing hot water piping insulation is estimated to be at 50% of original efficiency. Domestic hot water piping was observed to be uninsulated. Chilled water pipe insulation savings are calculated using ASHRAE guidelines. Existing chilled water pipe insulation efficiency is estimated to be 50% of original efficiency. Calculations are shown below.

Pipe and Valve Insulation Savings (Hot Water Piping)							
BUILDING	DESCRIPTION	QTY	UNITS	NOMINAL PIPE SIZE (IN)	EQUIVALENT LINEAR FEET	INSULATION (IN)	EXISTING % INSULATED (0% for bare piping)
Municipal Building (City Hall, Fire, Police)	Dual Temp HW Piping	128.0	LF	2.00	128.0	2.00	50%
Municipal Building (City Hall, Fire, Police)	Dual Temp HW Piping	6.0	90 deg elbow	2.00	10.8	2.00	50%
Municipal Building (City Hall, Fire, Police)	Dual Temp HW Piping	280.0	LF	1.50	280.0	2.00	50%
Municipal Building (City Hall, Fire, Police)	Dual Temp HW Piping	10.0	90 deg elbow	1.50	18.0	2.00	50%
Municipal Building (City Hall, Fire, Police)	DHW Piping	5.0	LF	1.00	5.0	1.00	0%
Court	DHW Piping	9.5	LF	1.00	9.5	1.00	0%

Pipe and Valve Insulation Savings (Hot Water Piping)								
BUILDING	SAVINGS FACTOR (BTU/HR-FT)	ADJUSTED SAVINGS FACTOR (BTU/HR-FT)	HEATING EFFICIENCY (%)	HEATING HOURS PER YEAR	PIPING SPACE TEMP (F)	FLUID TEMP (F)	SCALING FACTOR	ENERGY SAVINGS (THERMS)
Municipal Building (City Hall, Fire, Police)	153.00	76.50	85%	4,282	67.5	180	0.865	426.9
Municipal Building (City Hall, Fire, Police)	153.00	76.50	85%	4,282	67.5	180	0.865	20.0
Municipal Building (City Hall, Fire, Police)	125.00	62.50	85%	4,282	67.5	180	0.865	762.9
Municipal Building (City Hall, Fire, Police)	125.00	62.50	85%	4,282	67.5	180	0.865	27.2
Municipal Building (City Hall, Fire, Police)	82.00	82.00	94%	4,282	67.5	125	0.442	8
Court	82.00	82.00	80%	4,282	67.5	125	0.442	18

Algorithms

Fossil Fuel Source:

Fuel Savings (MMBtu/yr) = SF * L * Oper Hrs / EFF

Electric Source:

Energy Savings (kWh/yr) = SF * L * Oper Hrs / EFF / C

Scaling: Only applicable if differential between the fluid temperature and space temperature is significantly different than 130°F. If this is the case, the fuel or electric savings calculated with the above formulas should be multiplied by the resulting scaling factor deroived as:

Scaling Factor (unitless) = (FT – ST)/130

Fuel or electric savinsg calculated using the derived savings factors should be multiplied by the acaling factor.

Scaled Savings (MMBtu/year or kWh/yr) = Calculated Savings * Savings Factor

Definition of Variables

SF = Savings factor derived from #E Plus Version 4.1 tool, Btu/hr-ft see table below

L = Length of pipe from water heating source to hot water application, ft

Oper Hrs = hours per year fluid flows in pipe, hours

EFF = Efficiency of equipment providing heat to the fluid

C (kWh) = Conversion factor from Btu to kWh = 3,413 for electric water heating

FT = Fluid Temperature (°F)

ST = Space temperature (°F)

Summary of Inputs

Pipe Insulation

Component	Type	Value	Source
SF	Fixed	See Table Below	1
L	Variable		Application
Oper Hrs	Fixed	4,282 hrs/year (default value reflects average heating season hours)	2
EFF	Fixed	98% electric 80% natural gas	3
FT	Variable		Application
ST	Variable		Application

Savings Factor

	Savings, Btu/hr-ft			
Nominal Pipe Size, Inches	0.5" Insulation	1.0" Insulation	1.5" Insulation	2.0" Insulation
0.50	47	53	56	57
0.75	58	64	68	70
1.00	72	82	85	87
1.25	89	100	107	108
1.50	100	115	120	125
2.00	128	143	148	153
2.50	153	171	182	185
3.00	195	221	230	236
3.50	224	241	248	253
4.00	232	263	274	281

Pipe and Valve Insulation Savings (Chilled Water)									
BUILDING	DESCRIPTION	QTY	UNITS	NOMINAL PIPE SIZE (IN)	EQUIVALENT LINEAR FEET	INSULATION (IN)	BARE EMITTANCE	INSULATION EMITTANCE	EXISTING % INSULATED (0% for bare piping)
Municipal Building (City Hall, Fire, Police)	Dual Temp CHW Piping	128	LF	2.00	128.0	2.00	0.8	0.9	50%
Municipal Building (City Hall, Fire, Police)	Dual Temp CHW Piping	6	90 deg elbow	2.00	10.8	2.00	0.8	0.9	50%
Municipal Building (City Hall, Fire, Police)	Dual Temp CHW Piping	280	LF	1.50	280.0	2.00	0.8	0.9	50%
Municipal Building (City Hall, Fire, Police)	Dual Temp CHW Piping	10	90 deg elbow	1.50	18.0	2.00	0.8	0.9	50%

Pipe and Valve Insulation Savings (Chilled Water)						
BUILDING	EXISTING % INSULATED (0% for bare piping)	HOURS PER YEAR	COOLING EFFICIENCY (kW/ton)	SPACE TEMP (F)	FLUID TEMP (F)	Natural Convection Heat Transfer Coefficient (BTU/hr-ft2-F)
Municipal Building (City Hall, Fire, Police)	50%	3,391	0.55	85.0	44.0	1.20
Municipal Building (City Hall, Fire, Police)	50%	3,391	0.55	85.0	44.0	1.20
Municipal Building (City Hall, Fire, Police)	50%	3,391	0.55	85.0	44.0	1.20
Municipal Building (City Hall, Fire, Police)	50%	3,391	0.55	85.0	44.0	1.20

Pipe and Valve Insulation Savings (Chilled Water)						
BUILDING	BARE PIPE OUTSIDE DIAMETER (in)	BARE THERMAL COND. (Btu*in/hr *F*ft^2)	BARE SURFACE TEMPERTURE (F)	Bare Convection h_c (BTU/hr-ft2-F)	Bare Radiation h_r (BTU/hr-ft2-F)	Bare Heat Transfer Coefficient (BTU/hr-ft2-F)
Municipal Building (City Hall, Fire, Police)	2.375	0.54	44.0	0.808	0.793	1.601
Municipal Building (City Hall, Fire, Police)	2.375	0.54	44.0	0.808	0.793	1.601
Municipal Building (City Hall, Fire, Police)	1.900	0.54	44.0	0.854	0.793	1.647
Municipal Building (City Hall, Fire, Police)	1.900	0.54	44.0	0.854	0.793	1.647

Pipe and Valve Insulation Savings (Chilled Water)						
BUILDING	PROPOSED PIPE OUTSIDE DIAMETER (in)	PROPOSED INSULATION THERMAL COND. (Btu*in/hr *F*ft^2)	PROPOSED INSULATION SURFACE TEMPERTURE (F)	Proposed Convection h_c (BTU/hr-ft2-F)	Proposed Radiation h_r (BTU/hr-ft2-F)	Proposed Total Heat Transfer Coefficient (BTU/hr-ft2-F)
Municipal Building (City Hall, Fire, Police)	6.375	0.27	80.9	0.356	0.100	0.456
Municipal Building (City Hall, Fire, Police)	6.375	0.27	80.9	0.356	0.100	0.456
Municipal Building (City Hall, Fire, Police)	5.900	0.27	80.9	0.363	0.100	0.463
Municipal Building (City Hall, Fire, Police)	5.900	0.27	80.9	0.363	0.100	0.463

Pipe and Valve Insulation Savings (Chilled Water)							
BUILDING	BARE HEAT GAIN (btu/h/ln.ft)	EXISTING HEAT GAIN (btu/hr)	EXISTING ELECTRIC LOSS (kWh/year)	INSULATED HEAT GAIN (btu/h/ln.ft)	PROPOSED HEAT LOSS (btu/hr)	INSULATED ELECTRIC LOSS (kWh/year)	ENERGY SAVINGS (kWh)
Municipal Building (City Hall, Fire, Police)	59.3	3,795	590	0.5	64	10	580
Municipal Building (City Hall, Fire, Police)	59.3	320	50	0.5	5	1	49
Municipal Building (City Hall, Fire, Police)	43.7	6,121	951	0.4	118	18	933
Municipal Building (City Hall, Fire, Police)	43.7	393	61	0.4	8	1	60

Mechanical Insulation Savings Calculations

This section describes our methodology for calculating energy savings. We use standard heat transfer methods to compute heat loss from bare and insulated mechanical systems (piping, valves, fittings, tanks, and ductwork). The difference in heat loss is the energy savings, as follows:

Energy Savings = [Existing Heat Loss] – [Insulated Heat Loss]

Methodology

We use standard heat transfer methods to compute radiation, convection, and conduction heat loss from (or gain to, for cold systems) bare and insulated systems. Key parameters that affect the heat transfer rate include: temperature of fluid (e.g. steam, hot water, chilled water, etc.); surface temperature of the component (e.g. pipe, fitting, tank, ductwork); temperature of environment; emissivity of surface; average wind speed where applicable; percentage of existing component covered with insulation; and condition of existing insulation, where applicable.

Energy Use

Existing and proposed energy use are computed as follows:

Pipes & Fittings

Heat Loss (Btu/h) = (Heat Loss / lin.ft. bare pipe) * (lin.ft. of pipe) * [1 – (%insulated)] +
(Heat Loss / lin.ft. insulated pipe) * (lin.ft. of pipe) * (%insulated)

Fuel Loss (MMBTU/yr) = (Heat Loss Btu/h) * (heating hrs/year) ÷ (efficiency)
Electric Loss (kWh/yr) = (Heat Loss Btu/h) * (cooling hrs/year) ÷ (12,000 Btu/ton-hr) x (cooling kW/ton)

Energy Savings

Energy savings are the difference between existing and proposed heat loss:

Fuel Savings (MMBTU/yr) = (Existing Fuel Loss) – (Proposed Fuel Loss)
Electric Savings (MMBTU/yr) = (Existing Electric Loss) – (Proposed Electric Loss)
Cost Savings ($/yr) = (Fuel Savings MMBTU/yr) * (Fuel Rate $/MMBTU) + (Electric Savings kWh/yr) * (Electric Rate $/kWh)

Heat Transfer: Bare Systems

Bare systems are subject to convection and radiation heat transfer. We ignore conductive heat transfer through the pipe/fitting material (e.g. steel, copper, PVC etc.) as this is negligible as compared to heat transfer through insulation and air convection.

Pipes & Fittings

This section describes the heat transfer calculations for pipes and fittings for indoor systems subject to natural convection (no wind). The calculations for outdoor systems subject to forced convection (wind) are similar except that the formulas are more complicated. These methods are presented following this section.

For fittings (valves, elbows, strainers, etc.), we estimate heat loss based on equivalent length of straight pipe, which is the ratio of the area of the fitting to the area of 1 linear foot of pipe of the same size (fitting equivalent length = Area of fitting, ft^2 / Area of pipe of equivalent diameter, ft^2).

$$q_{pipe} = \frac{2 * \pi * \Delta T}{\frac{1}{h * \left(D_{outer}/_2\right)}}$$

Where:

q_{pipe} = *heat loss per linear foot = Btu/h/lin.ft.*

$h = total\ convective\ heat\ transfer\ factor = h_{convection} + h_{radiation}$

$$h_{convection} = 0.213 * \left(\frac{\Delta T}{D}\right)^{\left(\frac{1}{4}\right)}$$ [ASHRAE 2005, Ch. 3, Eq. T10.16]

$\Delta T = T_{surface} - T_{air}$

$\Delta T = T_{surface} - T_{air}$

D = Outer diameter

$$h_{radiation} = \varepsilon * \sigma * \left(T_{surface}^4 - T_{air}^4\right) / \left(T_{surface} - T_{air}\right)$$

e = emissivity of surface

s = Stefan-Boltzmann constant = 0.1714 x 10-8 Btu / (hr-ft^2-°R^4)

$T_{surface}$ = *Temperature of surface*

T_{air} = *Average ambient air temperature*

Heat Transfer: Insulated Systems

Insulated systems are subject to convection, radiation, and conductive heat transfer. We ignore conductive heat transfer through the pipe/fitting material (e.g. steel, copper, PVC etc.) as this is negligible when compared to heat transfer through insulation and air convection.

$$q_{pipe} = \frac{2 * \pi * \Delta T}{\frac{ln\left(D_{outer}/D_{inner}\right)}{k} + \frac{1}{h * \left(D_{outer}/2\right)}}$$

Where:

q_{pipe} = *heat loss per linear foot = Btu/h/lin.ft.*

$$h_{convection} = 0.213 * \left(\frac{\Delta T}{D}\right)^{\left(\frac{1}{4}\right)}$$ [ASHRAE 2005, Ch. 3, Eq. T10.16]

$\Delta T = T_{surface} - T_{air}$

$\Delta T = T_{surface} - T_{air}$

D = Outer diameter

$$h_{radiation} = \varepsilon * \sigma * \left(T_{surface}^4 - T_{air}^4\right) / \left(T_{surface} - T_{air}\right)$$

e = emissivity of surface

s = Stefan-Boltzmann constant = 0.1714 x 10-8 Btu / (hr-ft^2-°R^4)

$T_{surface}$ = *Temperature of surface*

T_{air} = *Average ambient air temperature*

L = Pipe length or fitting equivalent length

The temperature at any interface location "x" can be calculated from:

$$\frac{R_x}{R_{total}} = \frac{\left(T_{inside} - T_x\right)}{T_{inside} - T_{outside}}$$

$$T_x = T_{inside} - \frac{R_x}{R_{total}}\left(T_{inside} - T_{outside}\right)$$

ECM 14 – Building Envelope Improvements

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
14	Building Envelope Weatherization	✔	✔	✔					✔	✔			

An on-site survey of the existing air barrier continuity was conducted at all five City of Wildwood 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.

Existing Conditions at the Hut

Scope of Work

Building Envelope Estimate						
BUILDING	SQFT	Type	CATEGORY	UNITS	NOTES	QUANTITY
Municipal Building (City Hall, Fire, Police)	40,000	Door Weather Stripping	Double Door - Sweep, Center	UT	BE Retrofit	7
Court	9,000	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center	UT	BE Retrofit	1
			Single Door - Sides, Top, Sweep	UT		5
		Roof-Wall Intersection Air Sealing	Block, Seal	LF		100
			Block, Seal Paint	LF		70
			Seal	LF		120
			Seal Paint	LF		30
Byrne Recreation Center	19,400	Door Weather Stripping	Double Door - Sweep, Center□	UT	BE Retrofit	1
			Single Door - Sides, Top, Sweep	UT		1
Holly Beach Volunteer Fire Company	7,400	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center□	UT	BE Retrofit	1
			Single Door - Sides, Top, Sweep	UT		2
		Garage Door Weather Stripping	Overhead Door Weather Strip - Sides, Top	UT		2
Fox Park & Doo Wop Shop	2,800	Door Weather Stripping	Double Door - Sweep, Center□	UT	BE Retrofit	1
			Single Door - Sides, Top, Sweep	UT		3
Hut	1,100	Attic Bypass Air Sealing	Attic Air Barrier Retrofit	UT	BE Retrofit	4
			Install Soffit Baffles	UT		72
			Retrofit Existing Attic Hatch	UT		1
			Seal	SF		1152
		Attic Insulation	12" Open Blow Cellulose	SF		1152

- Attic Air Barrier Retrofit
- Attic Bypass Sealing
    - Weather strip and insulate the attic hatch to provide an air tight seal with permanently fixed insulation to prevent thermal heat gain and loss consistent with the surrounding attic recommendations.
- Attic Flat Insulation
    - Install 12 inches of cellulose across the attic flat
- Door Weather Stripping
- Overhead Door Weather Stripping/Roll-up Door Weather Stripping
    - Install heavy-duty aluminum carrier with oversized vinyl insert gasket at the sides and top.
- Roof Air Barrier Retrofit
    - Install Thermax and appropriate sheathing tapes and/or air sealing foam to ensure an air tight seal.
    - Install Hatch – weather strip and insulate consistent with the Roof Air Barrier Retrofit to ensure a removable but air tight roof hatch assembly.
- Roof Insulation

- Roof Wall Intersection Air Sealing

ECM Calculations

Energy Savings from the installation of building envelope improvements are calculated on the following pages:

Building Envelope - Heating Savings

BUILDING	TYPE	SUBTYPE	INFILTRATION REDUCTION (CFM)	HEATING FUEL	HEATING EFFICIENCY (%)
Municipal Building (City Hall, Fire, Police)	Door Weather Stripping	Double Door - Sweep, Center (UT)	90	Natural Gas	85%
Municipal Building (City Hall, Fire, Police)	Window Sealing	Window Sealing	49	Natural Gas	85%
Court	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	30	Natural Gas	80%
Court	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	92	Natural Gas	80%
Court	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	61	Natural Gas	80%
Court	Roof-Wall Intersection Air Sealing	Block, Seal Paint (LF)	43	Natural Gas	80%
Court	Roof-Wall Intersection Air Sealing	Seal (LF)	74	Natural Gas	80%
Court	Roof-Wall Intersection Air Sealing	Seal Paint (LF)	18	Natural Gas	80%
Byrne Recreation Center	Door Weather Stripping	Double Door - Sweep, Center (UT)	13	Natural Gas	81%
Byrne Recreation Center	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	20	Natural Gas	81%
Fox Park & Doo Wop Shop	Door Weather Stripping	Double Door - Sweep, Center (UT)	13	Natural Gas	80%
Fox Park & Doo Wop Shop	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	59	Natural Gas	80%
Hut	Attic Bypass Air Sealing	Attic Air Barrier Retrofit (UT)	33	Natural Gas	80%
Hut	Attic Bypass Air Sealing	Retrofit Existing Attic Hatch (UT)	9	Natural Gas	80%
Hut	Attic Bypass Air Sealing	Seal (SF)	94	Natural Gas	80%
Hut	Attic Insulation	12" Open Blow Cellulose (SF)	0	Natural Gas	80%

Building Envelope - Heating Savings

BUILDING	SENSIABLE HEAT CONSTANT	HOURS (HR/DAY)	HEAT EFFICIENCY FACTOR	HEATING DEGREE DAYS
Municipal Building (City Hall, Fire, Police)	1.08	24.00	3279	4615
Municipal Building (City Hall, Fire, Police)	1.08	24.00	3279	4615
Court	1.08	24.00	3086	4615
Court	1.08	24.00	3086	4615
Court	1.08	24.00	3086	4615
Court	1.08	24.00	3086	4615
Court	1.08	24.00	3086	4615
Court	1.08	24.00	3086	4615
Byrne Recreation Center	1.08	24.00	3125	4615
Byrne Recreation Center	1.08	24.00	3125	4615
Fox Park & Doo Wop Shop	1.08	24.00	3086	1145
Fox Park & Doo Wop Shop	1.08	24.00	3086	1145
Hut	1.08	24.00	3086	1145
Hut	1.08	24.00	3086	1145
Hut	1.08	24.00	3086	1145
Hut	1.08	24.00	3086	1145

Building Envelope - Heating Savings					
BUILDING	EXISTING U-VALUE	PROPOSED U-VALUE	SURFACE AREA (SQFT)	EXISTING HEAT LOSS (THERM)	POST-RETRO FIT HEAT LOSS (THERM)
Municipal Building (City Hall, Fire, Police)	0	0	0	0	0
Municipal Building (City Hall, Fire, Police)	0	0	0	0	0
Court	0	0	0	0	0
Court	0	0	0	0	0
Court	0	0	0	0	0
Court	0	0	0	0	0
Court	0	0	0	0	0
Court	0	0	0	0	0
Byrne Recreation Center	0	0	0	0	0
Byrne Recreation Center	0	0	0	0	0
Fox Park & Doo Wop Shop	0	0	0	0	0
Fox Park & Doo Wop Shop	0	0	0	0	0
Hut	0	0	0	0	0
Hut	0	0	0	0	0
Hut	0	0	0	0	0
Hut	0.250	0.022	1,152	99	9

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Building Envelope - Heating Savings					
BUILDING	INFILTRATION HEATING SAVINGS (THERM)	THERMAL INSULATION SAVINGS (THERM)	TOTAL HEATING SAVINGS (THERM)	TOTAL HEATING SAVINGS (FUEL OIL)	TOTAL HEATING SAVINGS (kWh)
Municipal Building (City Hall, Fire, Police)	127	0	127	0	0
Municipal Building (City Hall, Fire, Police)	69	0	69	0	0
Court	45	0	45	0	0
Court	138	0	138	0	0
Court	91	0	91	0	0
Court	64	0	64	0	0
Court	110	0	110	0	0
Court	26	0	26	0	0
Byrne Recreation Center	19	0	19	0	0
Byrne Recreation Center	29	0	29	0	0
Fox Park & Doo Wop Shop	5	0	5	0	0
Fox Park & Doo Wop Shop	22	0	22	0	0
Hut	12	0	12	0	0
Hut	3	0	3	0	0
Hut	35	0	35	0	0
Hut	0	90	90	0	0

Heat Efficiency Factor

The derivation of the Efficiency Factor is based on sensible heat constant (1.08 * 24 Hours per Day) and an assumed efficiency percentage for the heating plant in the building. The efficiency of the heating plant is captured as a percentage of the total energy output of the heating system.

Calculation is = 1.08 * 24 hours per day = 25.92; in order to get the Efficiency Factor in the denominator and account for system efficiency = 1/ (25.92 / (1,000,000 Btus * **Heating** Plant Efficiency Percent).

Infiltration Heating Savings (therm) = Infiltration Reduction (CFM) * Heating Degree Days (HDD) / Heat Efficiency Factor

Thermal Insulation Savings (therm) = Existing Heat Loss (therm) - Proposed Heat Loss (therm)

Existing Heat Loss (therm) = (Existing U-Value * (Hours/Day * Heating Degree Days (HDD)) * Surface Area (Sqft)) / Heating Efficiency (%) / 100,000 Btu/Therm

Proposed Heat Loss (therm) = (Proposed U-Value * (Hours/Day * Heating Degree Days (HDD)) * Surface Area (Sqft)) / Heating Efficiency (%) / 100,000 Btu/Therm

Building Envelope Savings - Cooling Savings

BUILDING	TYPE	SUBTYPE	INFILTRATION REDUCTION (CFM)	TOTAL HEAT CONSTANT	INTERIOR DRY BULB TEMP (F)	EXTERIOR DRY BULB TEMP (F)
Municipal Building (City Hall, Fire, Police)	Door Weather Stripping	Double Door - Sweep, Center (UT)	90	4.5	72.0	75.0
Municipal Building (City Hall, Fire, Police)	Window Sealing	Window Sealing	49	4.5	72.0	75.0
Court	Door Weather Stripping	Double Door - Sides, Top, Sweep, Center (UT)	30	4.5	72.0	75.0
Court	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	92	4.5	72.0	75.0
Court	Roof-Wall Intersection Air Sealing	Block, Seal (LF)	61	4.5	72.0	75.0
Court	Roof-Wall Intersection Air Sealing	Block, Seal Paint (LF)	43	4.5	72.0	75.0
Court	Roof-Wall Intersection Air Sealing	Seal (LF)	74	4.5	72.0	75.0
Court	Roof-Wall Intersection Air Sealing	Seal Paint (LF)	18	4.5	72.0	75.0
Byrne Recreation Center	Door Weather Stripping	Double Door - Sweep, Center (UT)	13	4.5	72.0	75.0
Byrne Recreation Center	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	20	4.5	72.0	75.0
Fox Park & Doo Wop Shop	Door Weather Stripping	Double Door - Sweep, Center (UT)	13	4.5	72.0	75.0
Fox Park & Doo Wop Shop	Door Weather Stripping	Single Door - Sides, Top, Sweep (UT)	59	4.5	72.0	75.0
Hut	Attic Bypass Air Sealing	Attic Air Barrier Retrofit (UT)	33	4.5	72.0	75.0
Hut	Attic Bypass Air Sealing	Retrofit Existing Attic Hatch (UT)	9	4.5	72.0	75.0
Hut	Attic Bypass Air Sealing	Seal (SF)	94	4.5	72.0	75.0
Hut	Attic Insulation	12" Open Blow Cellulose (SF)	0	4.5	72.0	75.0

Building Envelope Savings - Cooling Savings

BUILDING	INTERIOR DRY BULB TEMP (F)	EXTERIOR DRY BULB TEMP (F)	INTERIOR DRY RELATIVE HUMIDITY (%)	EXTERIOR RELATIVE HUMIDITY (%)	INTERIOR ENTHALPY (SUMMER)	EXTERIOR ENTHALPY (SUMMER)	ENTHALPY	TONS	EFFICIENCY (kW/TON)	COOLING HOURS (CDD)
Municipal Building (City Hall, Fire, Police)	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.29	0.550	954
Municipal Building (City Hall, Fire, Police)	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.16	0.550	954
Court	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.10	1.091	954
Court	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.30	1.091	954
Court	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.20	1.091	954
Court	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.14	1.091	954
Court	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.24	1.091	954
Court	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.06	1.091	954
Byrne Recreation Center	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.04	1.043	954
Byrne Recreation Center	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.06	1.043	954
Fox Park & Doo Wop Shop	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.04	1.000	954
Fox Park & Doo Wop Shop	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.19	1.000	954
Hut	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.11	1.000	237
Hut	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.03	1.000	237
Hut	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.31	1.000	237
Hut	72.0	75.0	40.0	75.0	24.55	33.27	8.72	0.00	1.000	237

Building Envelope Savings - Cooling Savings								
BUILDING	EXISTING U-VALUE	PROPOSED U-VALUE	SURFACE AREA (SQFT)	EXISTING COOLING LOSS (kWh)	POST-RETROFIT COOLING LOSS (kWh)	INFILTRATION ELECTRIC SAVINGS (kWh)	THERMAL INSULATION SAVINGS (kWh)	TOTAL COOLING SAVINGS (kWh)
Municipal Building (City Hall, Fire, Police)	0	0	0	0	0	544	0	544
Municipal Building (City Hall, Fire, Police)	0	0	0	0	0	296	0	296
Court	0	0	0	0	0	357	0	357
Court	0	0	0	0	0	1103	0	1,103
Court	0	0	0	0	0	732	0	732
Court	0	0	0	0	0	509	0	509
Court	0	0	0	0	0	880	0	880
Court	0	0	0	0	0	212	0	212
Byrne Recreation Center	0	0	0	0	0	147	0	147
Byrne Recreation Center	0	0	0	0	0	227	0	227
Fox Park & Doo Wop Shop	0	0	0	0	0	141	0	141
Fox Park & Doo Wop Shop	0	0	0	0	0	652	0	652
Hut	0	0	0	0	0	91	0	91
Hut	0	0	0	0	0	24	0	24
Hut	0	0	0	0	0	256	0	256
Hut	0.250	0.022	1152	136	12	0	124	124

Enthalpy
Based on Interior Relative Humidity of 40% and temperature of 75 degrees F = 26.1 btu/lb. Exterior Enthalpy based on outside relative humidity estimate of 75% and the below NOAA summer temperature

Infiltration Cooling Savings (kWh) = Tons * Efficiency (kW/ton) *Cooling Degree Days (CDD)*12000 btu/hr *0.000293071

Tons = Inflitration Reduction (CFM) * Total Heat Constant * Enthalpy / 12,0000 Btu/hr

Insulation Savings (kWh) = Existing Cooling Loss (kWh) - Proposed Cooling Loss (kWh)

Existing Cooling Loss (kWh) = (Existing U-Value) * (Hours/Day) * (Cooling Degree Days (CDD)) * (Surface Area (Sqft)) * (Cooling Efficiency (kWh/ton-hr)) * (1 Ton-hr/12,000 Btu)

Proposed Cooling Loss (kWh) = (Proposed U-Value) * (Hours/Day) * (Cooling Degree Days (CDD)) * (Surface Area (Sqft)) * (Cooling Efficiency (kWh/ton-hr)) * (1 Ton-hr/12,000 Btu)

ECM 15 – Water Conservation

CITY OF WILDWOOD		Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
✔	ECM evaluated but not included												
✔	ECM included in the project												
ECM #	ECM DESCRIPTION												
15	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.

Fixture with aerator

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

Scope of Work

Existing faucets within the facilities will retrofit with high efficiency aerators through the Direct Install rebate program.

Low Flow Aerator Scope		
BUILDING	**CATEGORY**	**QUANTITY**
Municipal Building (City Hall, Fire, Police)	Low Flow Faucet Aerators	6

ECM Calculations

Fuel savings associated with water conservation from faucet aerators is calculated using NJ BPU Protocols:

Water Conservation Fuel Savings									
BUILDING NAME		Public Restroom Faucets							
	DHW Type	Number of Fixtures	Existing (GPM)	Proposed (GPM)	Duration (Min)	Days per year	dT (F)	EFF	Fuel Savings (Therms)
Municipal Building (City Hall, Fire, Police)	Natural Gas	6	2.2	0.5	30.0	260	27.40	80%	227

2021 NJ BPU Protocols:

Low Flow Faucet Aerators and Showerheads

Algorithm

Therm or kWh Fuel Savings/yr = $N * M * D * (F_b - F_q) * (8.33 * DT / EFF) / C$

Definition of Variables

N = Number of fixtures

M = Minutes per day of device usage

D = Days per year of device usage

F_b = Baseline device flow rate (gal/m)

F_q = Low flow device flow rate (gal/m)

8.33 = Heat content of water (Btu/gal/°F)

DT = Difference in temperature (°F) between cold intake and output

EFF = Efficiency of water heating equipment

C = Conversion factor from Btu to therms or kWh = (100,000 for gas water heating (Therms), 3,413 for electric water heating (kWh)

Summary of Inputs

Low Flow Faucet Aerators and Showerheads

Component	Type	Value	Source
N	Variable		Application
M	Fixed	Aerators 30 minutes	1
		Shower heads 20 minutes	
D	Fixed	Aerators 260 days	1
		Shower heads 365 days	
F_b	Fixed	Aerators 2.2 gpm	
		Showerhead 2.5 gpm	
F_q	Fixed	Aerators <=1.5 gpm (kitchen) <=0.5 gpm (public restroom) <=1.5 gpm (private restroom)	2,3,4
		Showerheads <=2 gpm	4
DT	Fixed	Aerators 27.4°F	5
		Showerheads 44.4°F	6
EFF	Fixed	98% electric 80% natural gas	7,8

ECM 16 – Solar

Evaluated but not included.

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
16a	Solar Owned by City	✔		✔	✔								
16b	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.

Photovoltaic (PV) solar array

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.

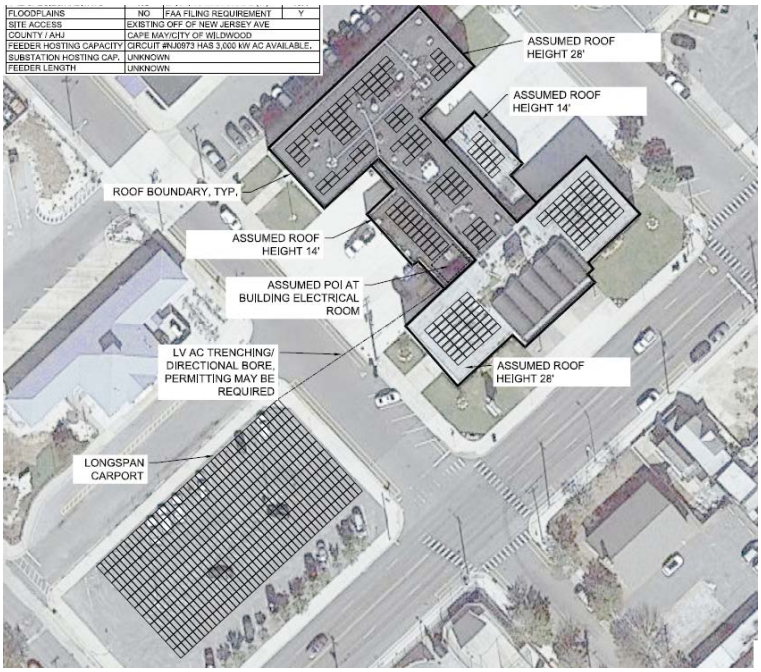
Assessment
A preliminary assessment of your facilities will allow for the design of a system that meets your energy needs and environmental goals.

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.

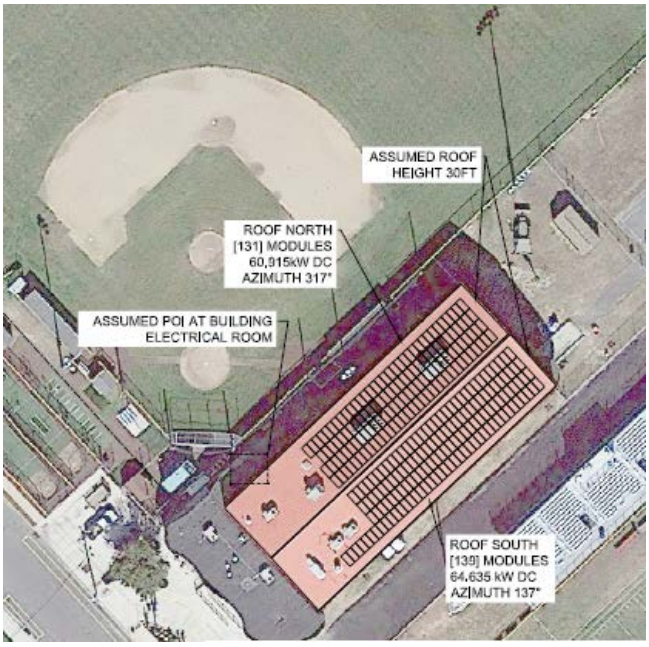
Installation
A turnkey system includes the design, construction, commissioning, and interconnection with local utilities.

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.

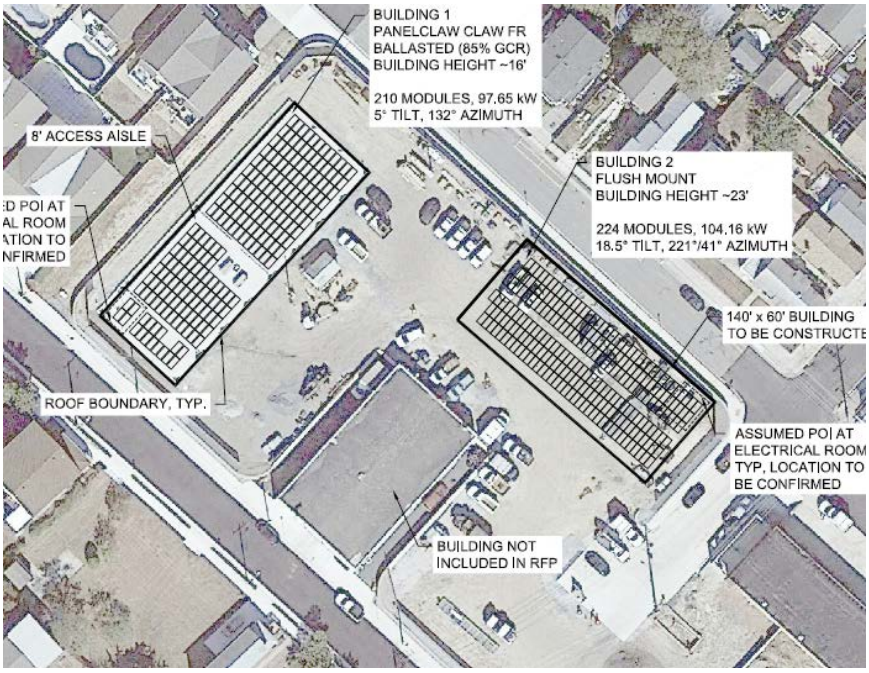
Management
The solar provider handles all compliance and reporting requirements for the client. They will file documentation with federal and state agencies and participate in state and utility REC markets.



Proposed arrays at Municipal Complex



Proposed array at Byrne Rec Center



Proposed arrays at New Public Works

Solar Owned by City - Scope of Work

- Generation estimates are calculated from proposals received during the City of Wildwood Solar PPA RFP process
- Arrays will be designed, and the installation will be bid
- Installation of the Solar PV System shall be in accordance with NFPA 70. NEC 2011. ARTICLE 690.Solar Photovoltaic (PV) Systems.
- City will receive any incentives available

Solar Owned by City - ECM Calculations

The energy savings shown below are a result of the reduced electrical cost from installing solar panels owned by the City. Solar generation estimates were taken from the proposals received during the City of Wildwood Solar PPA RFP process. SREC II revenue is not included in project financing per ESIP regulations.

SOLAR RATE ($/kWh)	ANNUAL PANEL DERATING
$0.0000	0.50%

INSTALLED CAPACITY (kWdc)	TOTAL ECM YEAR 1 SAVINGS
268	$37,135

Solar Owned by City - Rates & Savings

BUILDING	MOUNTING CATEGORY	INSTALLED ARRAY (kW)	EFLH	INSTALLED kWh GENERATION	$$/kWh RATES		SAVINGS
					UTILITY	SOLAR	
Municipal Building (City Hall, Fire, Police)	Canopy	166.7	1,396	232,610	$0.101	$0.0000	$23,392
Byrne Recreation Center	Roof	81.6	1,196	97,565	$0.101	$0.0000	$9,811
Public Works Buildings (New)	Roof	20.2	1,282	25,870	$0.152	$0.0000	$3,932

Municipal Building (City Hall, Fire, Police)

YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	SREC II VALUE ($120/MWh)	SAVINGS
	UTILITY	SOLAR				
1	$0.101	$0.0000	232,610	$23,392	$27,840	$51,232
2	$0.103	$0.0000	231,447	$23,787	$27,720	$51,507
3	$0.105	$0.0000	230,290	$24,189	$27,600	$51,789
4	$0.107	$0.0000	229,138	$24,597	$27,480	$52,077
5	$0.110	$0.0000	227,993	$25,013	$27,240	$52,253
6	$0.112	$0.0000	226,853	$25,435	$27,120	$52,555
7	$0.115	$0.0000	225,718	$25,865	$27,000	$52,865
8	$0.117	$0.0000	224,590	$26,302	$26,880	$53,182
9	$0.120	$0.0000	223,467	$26,746	$26,760	$53,506
10	$0.122	$0.0000	222,349	$27,198	$26,640	$53,838
11	$0.125	$0.0000	221,238	$27,657	$26,520	$54,177
12	$0.128	$0.0000	220,132	$28,124	$26,400	$54,524
13	$0.131	$0.0000	219,031	$28,599	$26,280	$54,879
14	$0.133	$0.0000	217,936	$29,082	$26,040	$55,122
15	$0.136	$0.0000	216,846	$29,574	$25,920	$55,494
16	$0.139	$0.0000	215,762	$30,073		$30,073
17	$0.142	$0.0000	214,683	$30,581		$30,581
18	$0.146	$0.0000	213,610	$31,098		$31,098
19	$0.149	$0.0000	212,542	$31,623		$31,623
20	$0.152	$0.0000	211,479	$32,157		$32,157
Total			**4,437,711**	**$551,092**	**$403,440**	**$954,532**

Byrne Recreation Center						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	SREC II VALUE ($120/MWh)	SAVINGS
	UTILITY	SOLAR				
1	$0.101	$0.0000	97,565	$9,811	$11,640	$21,451
2	$0.103	$0.0000	97,077	$9,977	$11,640	$21,617
3	$0.105	$0.0000	96,592	$10,145	$11,520	$21,665
4	$0.107	$0.0000	96,109	$10,316	$11,520	$21,836
5	$0.110	$0.0000	95,628	$10,491	$11,400	$21,891
6	$0.112	$0.0000	95,150	$10,668	$11,400	$22,068
7	$0.115	$0.0000	94,674	$10,848	$11,280	$22,128
8	$0.117	$0.0000	94,201	$11,031	$11,280	$22,311
9	$0.120	$0.0000	93,730	$11,218	$11,160	$22,378
10	$0.122	$0.0000	93,261	$11,407	$11,160	$22,567
11	$0.125	$0.0000	92,795	$11,600	$11,040	$22,640
12	$0.128	$0.0000	92,331	$11,796	$11,040	$22,836
13	$0.131	$0.0000	91,869	$11,995	$10,920	$22,915
14	$0.133	$0.0000	91,410	$12,198	$10,920	$23,118
15	$0.136	$0.0000	90,953	$12,404	$10,800	$23,204
16	$0.139	$0.0000	90,498	$12,613		$12,613
17	$0.142	$0.0000	90,046	$12,826		$12,826
18	$0.146	$0.0000	89,596	$13,043		$13,043
19	$0.149	$0.0000	89,148	$13,263		$13,263
20	$0.152	$0.0000	88,702	$13,487		$13,487
Total			**1,861,336**	**$231,135**	**$168,720**	**$399,855**

Public Works Buildings (New)						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	SREC II VALUE ($120/MWh)	SAVINGS
	UTILITY	SOLAR				
1	$0.152	$0.0000	25,870	$3,932	$3,000	$6,932
2	$0.155	$0.0000	25,741	$3,999	$3,000	$6,999
3	$0.159	$0.0000	25,612	$4,066	$3,000	$7,066
4	$0.162	$0.0000	25,484	$4,135	$3,000	$7,135
5	$0.166	$0.0000	25,356	$4,205	$3,000	$7,205
6	$0.169	$0.0000	25,230	$4,276	$3,000	$7,276
7	$0.173	$0.0000	25,104	$4,348	$3,000	$7,348
8	$0.177	$0.0000	24,978	$4,422	$2,880	$7,302
9	$0.181	$0.0000	24,853	$4,496	$2,880	$7,376
10	$0.185	$0.0000	24,729	$4,572	$2,880	$7,452
11	$0.189	$0.0000	24,605	$4,649	$2,880	$7,529
12	$0.193	$0.0000	24,482	$4,728	$2,880	$7,608
13	$0.197	$0.0000	24,360	$4,808	$2,880	$7,688
14	$0.202	$0.0000	24,238	$4,889	$2,880	$7,769
15	$0.206	$0.0000	24,117	$4,972	$2,880	$7,852
16	$0.211	$0.0000	23,996	$5,056		$5,056
17	$0.215	$0.0000	23,876	$5,141		$5,141
18	$0.220	$0.0000	23,757	$5,228		$5,228
19	$0.225	$0.0000	23,638	$5,316		$5,316
20	$0.230	$0.0000	23,520	$5,406		$5,406
Total			**493,545**	**$92,643**	**$44,040**	**$136,683**

Solar Owned by City – Savings Summary

YEAR	PPA kWh PRODUCTION	UTILITY SAVINGS	SREC II VALUE ($120/MWh)	NET SOLAR SAVINGS
1	356,045	$36,825	$42,720	$79,545
2	354,265	$37,447	$42,480	$79,927
3	352,493	$38,079	$42,240	$80,319
4	350,731	$38,722	$42,000	$80,722
5	348,977	$39,377	$41,760	$81,137
6	347,232	$40,042	$41,640	$81,682
7	345,496	$40,718	$41,400	$82,118
8	343,769	$41,406	$41,160	$82,566
9	342,050	$42,105	$41,040	$83,145
10	340,340	$42,816	$40,800	$83,616
11	338,638	$43,539	$40,560	$84,099
12	336,945	$44,275	$40,320	$84,595
13	335,260	$45,022	$40,200	$85,222
14	333,584	$45,783	$39,960	$85,743
15	331,916	$46,556	$39,720	$86,276
16	330,256	$47,342		$47,342
17	328,605	$48,142		$48,142
18	326,962	$48,955		$48,955
19	325,327	$49,782		$49,782
20	323,701	$50,623		$50,623
Total	**6,792,592**	**$867,556**	**$618,000**	**$1,485,556**

Note: SREC II revenue is not included in project financing per ESIP regulations.

Power Purchase Agreement - Scope of Work

- Savings estimates are calculated from proposals received during the City of Wildwood 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

Power Purchase Agreement - 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 City of Wildwood Solar PPA RFP process. The PPA term is 15 years.

PPA RATE ($/kWh)	ANNUAL ESCALATION RATE	ANNUAL PANEL DERATING
$0.0751	1.90%	0.50%

INSTALLED CAPACITY (kWdc)	TOTAL ECM YEAR 1 SAVINGS
268	$10,396

Solar PPA - Rates & Savings

BUILDING	SQFT	MOUNTING CATEGORY	INSTALLED ARRAY (kW)	EFLH	INSTALLED kWh GENERATION	$$/kWh RATES		SAVINGS
						UTILITY	SOLAR PPA	
Municipal Building (City Hall, Fire, Police)	40,000	Carport	166.7	1,396	232,610	$0.101	$0.0751	$5,923
Byrne Recreation Center	19,400	Roof	81.6	1,196	97,565	$0.101	$0.0751	$2,484
Public Works Buildings (New)	7,000	Roof	20.2	1,282	25,870	$0.152	$0.0751	$1,990

Municipal Building (City Hall, Fire, Police)						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	PPA COST	SAVINGS
	UTILITY	SOLAR PPA				
1	$0.101	$0.0751	232,610	$23,392	($17,469)	$5,923
2	$0.103	$0.0765	231,447	$23,787	($17,712)	$6,075
3	$0.105	$0.0780	230,290	$24,189	($17,958)	$6,231
4	$0.107	$0.0795	229,138	$24,597	($18,208)	$6,390
5	$0.110	$0.0810	227,993	$25,013	($18,461)	$6,552
6	$0.112	$0.0825	226,853	$25,435	($18,718)	$6,718
7	$0.115	$0.0841	225,718	$25,865	($18,978)	$6,887
8	$0.117	$0.0857	224,590	$26,302	($19,242)	$7,060
9	$0.120	$0.0873	223,467	$26,746	($19,510)	$7,237
10	$0.122	$0.0890	222,349	$27,198	($19,781)	$7,417
11	$0.125	$0.0907	221,238	$27,657	($20,056)	$7,601
12	$0.128	$0.0924	220,132	$28,124	($20,335)	$7,790
13	$0.131	$0.0941	219,031	$28,599	($20,617)	$7,982
14	$0.133	$0.0959	217,936	$29,082	($20,904)	$8,178
15	$0.136	$0.0977	216,846	$29,574	($21,195)	$8,379
Total			**3,369,636**	**$395,561**	**($289,143)**	**$106,418**

Byrne Recreation Center						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	PPA COST	SAVINGS
	UTILITY	SOLAR PPA				
1	$0.101	$0.0751	97,565	$9,811	($7,327)	$2,484
2	$0.103	$0.0765	97,077	$9,977	($7,429)	$2,548
3	$0.105	$0.0780	96,592	$10,145	($7,532)	$2,613
4	$0.107	$0.0795	96,109	$10,316	($7,637)	$2,679
5	$0.110	$0.0810	95,628	$10,491	($7,743)	$2,747
6	$0.112	$0.0825	95,150	$10,668	($7,851)	$2,817
7	$0.115	$0.0841	94,674	$10,848	($7,960)	$2,888
8	$0.117	$0.0857	94,201	$11,031	($8,071)	$2,961
9	$0.120	$0.0873	93,730	$11,218	($8,183)	$3,035
10	$0.122	$0.0890	93,261	$11,407	($8,297)	$3,110
11	$0.125	$0.0907	92,795	$11,600	($8,412)	$3,188
12	$0.128	$0.0924	92,331	$11,796	($8,529)	$3,267
13	$0.131	$0.0941	91,869	$11,995	($8,648)	$3,347
14	$0.133	$0.0959	91,410	$12,198	($8,768)	$3,430
15	$0.136	$0.0977	90,953	$12,404	($8,890)	$3,514
Total			**1,413,347**	**$165,903**	**($121,277)**	**$44,626**

Public Works Buildings (New)						
YEAR	$$/kWh RATES		SOLAR kWh	UTILITY SAVINGS	PPA COST	SAVINGS
	UTILITY	SOLAR PPA				
1	$0.152	$0.0751	25,870	$3,932	($1,943)	$1,990
2	$0.155	$0.0765	25,741	$3,999	($1,970)	$2,029
3	$0.159	$0.0780	25,612	$4,066	($1,997)	$2,069
4	$0.162	$0.0795	25,484	$4,135	($2,025)	$2,110
5	$0.166	$0.0810	25,356	$4,205	($2,053)	$2,152
6	$0.169	$0.0825	25,230	$4,276	($2,082)	$2,194
7	$0.173	$0.0841	25,104	$4,348	($2,111)	$2,237
8	$0.177	$0.0857	24,978	$4,422	($2,140)	$2,282
9	$0.181	$0.0873	24,853	$4,496	($2,170)	$2,326
10	$0.185	$0.0890	24,729	$4,572	($2,200)	$2,372
11	$0.189	$0.0907	24,605	$4,649	($2,231)	$2,419
12	$0.193	$0.0924	24,482	$4,728	($2,262)	$2,466
13	$0.197	$0.0941	24,360	$4,808	($2,293)	$2,515
14	$0.202	$0.0959	24,238	$4,889	($2,325)	$2,564
15	$0.206	$0.0977	24,117	$4,972	($2,357)	$2,614
Total			**374,758**	**$66,497**	**($32,157)**	**$34,339**

Solar PPA – Savings Summary

YEAR	PPA kWh PRODUCTION	UTILITY SAVINGS	PPA COST	NET SOLAR SAVINGS
1	356,045	$36,825	($26,739)	$10,086
2	354,265	$37,447	($27,111)	$10,336
3	352,493	$38,079	($27,488)	$10,592
4	350,731	$38,722	($27,870)	$10,853
5	348,977	$39,377	($28,258)	$11,119
6	347,232	$40,042	($28,650)	$11,391
7	345,496	$40,718	($29,049)	$11,669
8	343,769	$41,406	($29,453)	$11,953
9	342,050	$42,105	($29,862)	$12,243
10	340,340	$42,816	($30,278)	$12,539
11	338,638	$43,539	($30,699)	$12,841
12	336,945	$44,275	($31,125)	$13,149
13	335,260	$45,022	($31,558)	$13,464
14	333,584	$45,783	($31,997)	$13,786
15	331,916	$46,556	($32,442)	$14,114
Total	**5,157,741**	**$622,711**	**($442,578)**	**$180,134**

ECM 17 – Combined Heat & Power

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
17	Combined Heat & Power Unit	✔											

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.

The following CHP will be installed at the Municipal Building.

Combined Heat & Power Estimate

BUILDING	SQFT	CATEGORY	QUANTITY
Municipal Building (City Hall, Fire, Police)	40,000	Yanmar CP35D1-TNUG – Non-Black Start Capable - 35kW	1
		Electrical	1
		ATC	1

Location of proposed CHP

ECM Calculations

The CHP will act as the first stage of heating for the hot water heating loop. The CHP is estimated to run at full load for over 2,600 hours per year. Run hours were estimated using eQuest simulations where a 35 kW CHP was proposed at a similar building. eQuest conservatively estimates run hours because it accounts for heating and electric loads on an hourly basis, which limits the run hours. There are certain hours during colder months where the CHP will not meet the entire heating load. eQuest accounts for this and requires the boilers to fire to meet the remaining load. Non-displaceable gas use is estimated to be 5% (kitchen appliances, gas-fired RTUs, etc.) during the heating season. The remaining load is available for the CHP. For a more conservative energy savings calculation, the CHP is allowed to run during the main heating season only (November thru April). 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	2,684
Full load heat and electric hours	2,684
% Boiler load displaced by CHP	51%

		Fuel Usage Without CHP				
Month	Days	Total Gas - Post ECMs (Baseline reduced by 30%)	Proposed Boiler Efficiency	Non-Displaceable Gas Therms (5%), Boilers OFF May-Oct	Displaceable Gas Therms	Displaceable Heat Therms
Jan	31	1,889	85%	94	1,794	1,525
Feb	28	1,595	85%	80	1,516	1,288
Mar	31	1,366	85%	68	1,298	1,103
Apr	30	1,213	85%	61	1,152	979
May	31	12	85%	12	0	0
Jun	30	8	85%	8	0	0
Jul	31	8	85%	8	0	0
Aug	31	8	85%	8	0	0
Sep	30	6	85%	6	0	0
Oct	31	135	85%	135	0	0
Nov	30	1,793	85%	90	1,704	1,448
Dec	31	1,981	85%	99	1,882	1,599
Total:	**365**	**10,014**		**669**	**9,345**	**7,943**

		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
Jan	31	606	973	1,145	606	69%
Feb	28	517	816	960	517	68%
Mar	31	430	640	753	430	66%
Apr	30	265	339	399	265	61%
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	0	0	0	0	-
Nov	30	332	498	586	332	66%
Dec	31	534	819	963	534	67%
Total:	**365**	**2,684**	**4,085**	**4,806**	**2,684**	**67%**

		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
Jan	31	649	2,467	3,211	606	35	35	21,210
Feb	28	556	2,105	2,740	517	35	35	18,095
Mar	31	545	1,751	2,364	430	35	35	15,050
Apr	30	753	1,079	1,892	265	35	35	9,275
May	31	0	0	12	0	0	0	0
Jun	30	0	0	8	0	0	0	0
Jul	31	0	0	8	0	0	0	0
Aug	31	0	0	8	0	0	0	0
Sep	30	0	0	6	0	0	0	0
Oct	31	0	0	135	0	0	0	0
Nov	30	1,118	1,352	2,559	332	35	35	11,620
Dec	31	918	2,174	3,192	534	35	35	18,690
Total:	**365**	**4,539**	**10,928**	**16,135**	**2,684**		**35**	**93,940**

The NJ Protocol is to follow the National Renewable Energy Laboratory's Combined Heat and Power, The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures [1]. The product should be all of the below outputs, as applicable:

a. Annual energy input to the generator, HHV basis (MMBtu/yr)
b. Annual electricity generated, net of all parasitic loads (kWh/yr)
c. Annual fossil fuel energy savings from heat recovery (MMBtu/yr)
d. Annual electric energy savings from heat recovery, including absorption chiller sourced savings if chiller installation is included as part of the system installation (kWh/yr)
e. Annual overall CHP fuel conversion efficiency, HHV basis (%)
f. Annual electric conversion efficiency, net of parasitics, HHV basis (%)

CHP Emissions Reduction Associated with PJM Grid

(Assuming that the useful thermal output will displace natural gas)

Algorithms

CO_2 ER (lbs) = (CO_2 EF_{elec} – CO_2 EF_{CHP}) * Net Electricity Generation (MWh) + CO_2 EF_{elec} * Electric Energy Savings (MWh) + CO_2 EF_{NG} * Gas Energy Savings (MMBtu) * 10

NO_x ER (tons) = (NO_x EF_{elec} – NO_x EF_{CHP}) * Net Electricity Generation (MWh) + NO_x EF_{elec} * Electric Energy Savings (MWh) + NO_x EF_{NG} * Gas Energy Savings (MMBtu) * 10

SO_2 ER (lbs) = (SO_2 EF_{elec} – SO_2 EF_{CHP}) * Net Electricity Generation (MWh) + SO_2 EF_{elec} * Electric Energy Savings (MWh)

Hg (grams) = (Electric Energy Savings (MWh) * Hg EF_{elec})/1,000

Definition of Variables

CO_2 EF_{elec} = CO_2 Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

NO_x EF_{elec} = NO_x Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

SO_2 EF_{elec} = SO_2 Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

Hg EF_{elec} = Hg Electric Emissions Factor – see emissions tables summarized in Introduction section of Protocols

CO_2 EF_{CHP} = CO_2 Emissions Factor of the CHP system (in lbs/MWh), which will vary with different projects based on the types of prime movers and emission control devices used

NO_x EF_{CHP} = NO_x Emissions Factor of the CHP system (in lbs/MWh), which will vary with different projects based on the types of prime movers and emission control devices used

SO_2 EF_{CHP} = SO_2 Emissions Factor of the CHP system (in lbs/MWh), which will vary with different projects based on the types of prime movers and emission control devices used

CO_2 EF_{NG} = CO_2 Natural Gas Emissions Factor associated with boiler fuel displacement – see emissions tables summarized in Introduction section of Protocols

NO_x EF_{NG} = NO_x Natural Gas Emissions Factor associated with boiler fuel displacement – see emissions tables summarized in Introduction section of Protocols

10 = Conversion from MMBtu to therms (1 MMBtu = 10 therms)

Calculation of Clean Air Impacts

The amount of air emission reductions resulting from the energy savings is calculated using the energy savings at the system level and multiplying them by factors provided by the New Jersey Department of Environmental Protection, Office of Air and Energy Advisor, on June 25, 2019.

Using Weighted Average of 2018 PJM On-Peak and Off-Peak annual data:

Electric Emission Factors

Emissions Product	Pounds per MWh[7]
CO_2	1,292
NOx	0.83
SO_2	0.67
Hg	1.1 mg/MWh[8]

Natural Gas Emission Factors

Emissions Product	Current
CO_2	11.7 lbs per therm saved
NOx	0.0092 lbs per therm saved

Combined Heat & Power Emission Reduction

BUILDING	kW	Equivalent Full Load Electric Hours	NET GENERATION MWh	FUEL INPUT MMBTU	ELECTRIC SAVINGS FROM HEAT RECOVERY MWh	FOSSIL FUEL SAVINGS FROM HEAT RECOVERY MMBTU
Municipal Building (City Hall, Fire, Police)	35	2,684	93.9	1,092.8	0	480.6

BUILDING	CO2 EF ELECTRIC	CO2 EF CHP	CO2 EF GAS	CO2 EMISSION REDUCTION LBS
Municipal Building (City Hall, Fire, Police)	1,292.0	1,361.0	117.0	49,748.5

BUILDING	NOx EF ELECTRIC	NOx EF CHP	NOx EF GAS	NOx EMISSION REDUCTION LBS
Municipal Building (City Hall, Fire, Police)	0.83	1.07	0.092	21.7

BUILDING	SO2 EF ELECTRIC	SO2 EF CHP	SO2 EMISSION REDUCTION LBS	Hg EF ELECTRIC	Hg EMISSION REDUCTION LBS
Municipal Building (City Hall, Fire, Police)	0.67	0.00	62.9	0.67	0.0

Note: CHP emission factors for CO2 and NOx were calculated using nameplate electric generation and natural gas input capacity as seen in the ECM calculation. Per BPU Protocols, natural gas does not require SO2 or Hg emission factors.

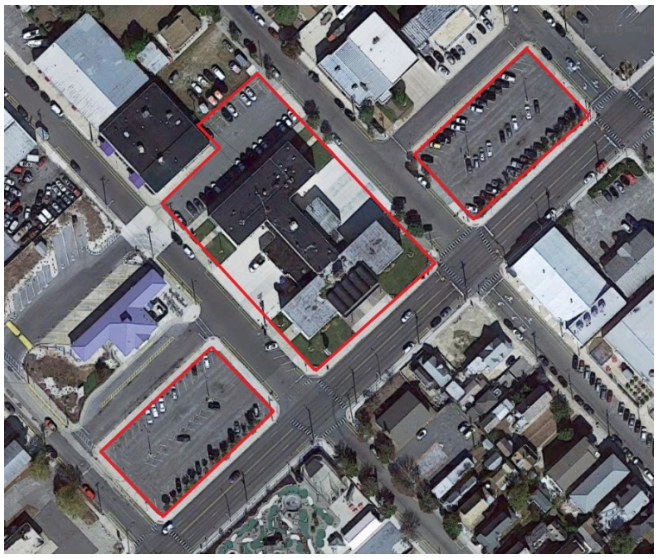
Capital Improvement Measure 18 – Electric Vehicle Charging Stations

Evaluated but not included.

CITY OF WILDWOOD	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
✔ ECM evaluated but not included												
✔ ECM included in the project												
ECM # / **ECM DESCRIPTION**												
18 Electrical Vehicle Charging Station	✔											

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 lots at City of Wildwood Municipal Building

The EV Charging Station was identified as a capital improvement by City of Wildwood to be included in the ESIP.

Scope of Work

- Location to be approved by City of Wildwood 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.

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

ECM 19 – Roof Upgrades

CITY OF WILDWOOD

✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
19	Roof Upgrades	✔	✔	✔									

Year after year, reflective elastomeric coatings continue to be used as a viable option for many roofing substrates, and single-ply membranes are no different. This system addresses all seams and penetrations that could potentially be a leak point while protective elastomeric coating maintains and restores the membrane. Single ply membrane restorations include the following benefits:

Single Ply Membrane Roof Restoration

Performance

Watertight	Addresses all sources of roof leaks by sealing all seams and fasteners.
Durable	Resistant to damage from roof traffic and storm damage.
UV Resistant	Designed for the harshest UV conditions.
Light Weight	Very low impact on your overall roof weight-load.
High Reflectivity	Nearly 85% of all UV light is reflected and the High Emissivity gives the coating and Emissivity the ability to release any heat that is absorbed which keeps the roof surface +/- 10 degrees from ambient temperature.
Disruption Free	Installation is completed without bothering building occupants.

Extends Building Life	Cool roof surface will reduce expansion and contraction stresses on the building.

Value

Energy Savings	Reduced solar heat gain will cut summer energy costs by up to 30%.
No Tear Off	Typically no costly tear off required.
Low Cost	Keeps more money in your pocket compared to replacement systems.
Low Life Cycle Cost	With no tear-off and by simply maintaining the protective surface coating on your roof every 10-15 years, your roof can last indefinitely.
Rebates	Many local and federal rebates are available.
Tax Benefits	Can often be fully expensed in the year of installation.

Environment

No Tear Off	Typically no need to remove roof and fill our land-fills with roof waste.
Water-based	Non-hazardous, non-flammable and easy cleanup.
Low VOC	Meets the most stringent VOC requirements in the U.S.
Low Odor	Can be installed in situations where rooftop air handlers cannot be turned off.
Sustainable	Simply maintaining the protective surface coating on your roof every 10-15 years, your roof will last indefinitely.

Sample Installation Process (EPDM/BUR style roof restoration)

- Identify the coating system to be used. Adhesion test most likely necessary.
- Identify wet insulation to be replaced using infrared scans.
- Address all deficient seams and penetrations. Repair with “like” materials. Probe and inspect all seams.
- Power wash the roof to wash away all contaminants including dirt and loose particulates.
- Apply wash primer. Allow to sit for 10 minutes and begin washing off with high pressure power wash. (Only prime what you plan to coat that day)
- Apply thick bead of sealant to seam and feather out with a chip brush to a width of 3”.
- Apply desired basecoat.
- Apply desired topcoat.

Sample Installation Process (Metal roof coating)

- Identify the coating system to be used. Adhesion test most likely necessary.
- Address all deficient seams and penetrations. Repair with “like” materials. Probe and inspect all seams.
- Power wash the roof to wash away all contaminants including dirt and loose particulates.
- Apply metal wash primer. Allow to sit for 10 minutes and begin washing off with high pressure power wash. (Only prime what you plan to coat that day)
- Apply thick bead of sealant to seam and feather out with a chip brush to a width of 3”.
- Apply desired basecoat.
- Apply desired topcoat.

Scope of Work

Roof Refurbishment Scope of Work		
BUILDING	**CATEGORY**	**QUANTITY (SF)**
Municipal Building (City Hall, Fire, Police)	BUR / Mod Bit - Replacement	9,508
Court	EPDM - Restoration	9,948
Byrne Recreation Center	Metal Roofing - Coating	15,824

ECM Calculations

Energy savings for roof upgrades are calculated below.

Roof - Heating Savings						
BUILDING	ROOF SQFT	HEATING EFFICIENCY (%)	HOURS (HR/DAY)	HEATING DEGREE DAYS (°F-days)	EXISTING R-VALUE (ft2-°F-h/BTU)	EXISTING U-VALUE (BTU/ft2-°F-h)
Municipal Building (City Hall, Fire, Police)	9,508	85%	24.00	4615	16	0.0625
Court	9,948	80%	24.00	4615	16	0.0625
Byrne Recreation Center	15,824	81%	24.00	4615	16	0.0625

Roof - Heating Savings					
BUILDING	PROPOSED R-VALUE (ft2-°F-h/BTU)	PROPOSED U-VALUE (BTU/ft2-°F-h)	EXISTING HEAT LOSS (THERM)	POST-RETRO FIT HEAT LOSS (THERM)	ROOF SAVINGS (THERM)
Municipal Building (City Hall, Fire, Police)	20	0.0500	774	619	155
Court	20	0.0500	861	689	172
Byrne Recreation Center	20	0.0500	1352	1082	270

Roof Savings (therm) = Existing Heat Loss (therm) - Proposed Heat Loss (therm)

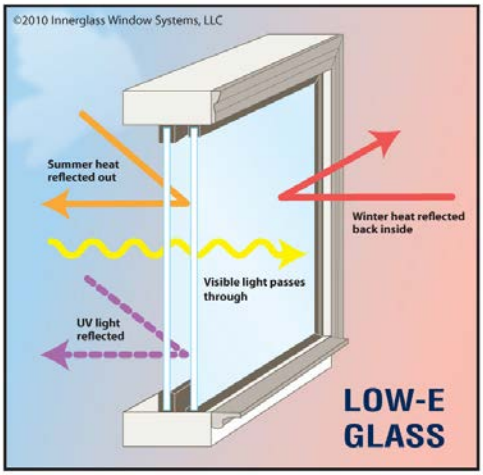
Existing Heat Loss (therm) = (Existing U-Value * (Hours/Day * Heating Degree Days (HDD)) * Surface Area (Sqft)) / Heating Efficiency (%) / 100,000 Btu/Therm

Proposed Heat Loss (therm) = (Proposed U-Value * (Hours/Day * Heating Degree Days (HDD)) * Surface Area (Sqft)) / Heating Efficiency (%) / 100,000 Btu/Therm

ECM 20 – Window Replacement

CITY OF WILDWOOD		Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
✔	ECM evaluated but not included												
✔	ECM included in the project												
ECM #	ECM DESCRIPTION												
20	Window Replacement	✔											

Background & Existing Conditions



To improve thermal efficiency (insulation properties) thin film coatings are applied to the raw soda-lime glass. Specially designed coatings are applied to one or more surfaces of insulated glass. These coatings reflect radiant infrared energy, thus tending to keep radiant heat on the side of the glass where it originated, while letting visible light pass. This results in more efficient windows because radiant heat originating from indoors in winter is reflected back inside, while infrared heat radiation from the sun during summer is reflected away, keeping it cooler inside.

Glass can be made with differing thermal emissivity, but this is not used for windows. Certain properties such as the iron content may be controlled, changing the thermal emissivity properties of glass. This "naturally" low thermal emissivity is found in some formulations of borosilicate or Pyrex. Naturally low-e glass does not have the property of reflecting near infrared (NIR)/thermal radiation; instead, this type of glass has higher NIR transmission, leading to undesirable heat loss (or gain) in a building window.


Existing windows at Municipal Building Commissioner's Meeting Room

Scope of Work

The existing single pane windows at the Municipal Building Commissioner's Meeting Room are being replaced by the City with double pane windows outside of ESIP. The cost and savings are included in the ESIP so City of Wildwood can reimburse themselves.

ECM Calculations

Energy savings for window replacement are calculated below.

Window Replacement - Heating Savings						
BUILDING	WINDOW SQFT	HEATING EFFICIENCY (%)	HOURS (HR/DAY)	HEATING DEGREE DAYS (°F-days)	EXISTING R-VALUE (ft2-°F-h/BTU)	EXISTING U-VALUE (BTU/ft2-°F-h)
Municipal Building (City Hall, Fire, Police)	978	85%	24.00	4615	0.77	1.3000

Window Replacement - Heating Savings					
BUILDING	PROPOSED R-VALUE (ft2-°F-h/BTU)	PROPOSED U-VALUE (BTU/ft2-°F-h)	EXISTING HEAT LOSS (THERM)	POST-RETRO FIT HEAT LOSS (THERM)	WINDOW SAVINGS (THERM)
Municipal Building (City Hall, Fire, Police)	2.00	0.5000	1657	637	1,020

Window Savings (therm) = Existing Heat Loss (therm) - Proposed Heat Loss (therm)

Existing Heat Loss (therm) = (Existing U-Value * (Hours/Day * Heating Degree Days (HDD)) * Surface Area (Sqft)) / Heating Efficiency (%) / 100,000 Btu/Therm

Proposed Heat Loss (therm) = (Proposed U-Value * (Hours/Day * Heating Degree Days (HDD)) * Surface Area (Sqft)) / Heating Efficiency (%) / 100,000 Btu/Therm

Window Replacement - Cooling Savings

BUILDING	WINDOW SQFT	EFFICIENCY (kWh/ton-hr)	HOURS (HR/DAY)	COOLING HOURS (CDD)	EXISTING R-VALUE (ft2-°F-h/BTU)	EXISTING U-VALUE (BTU/ft2-°F-h)
Municipal Building (City Hall, Fire, Police)	978	0.550	24.00	954	0.77	1.3000

Window Replacement - Cooling Savings

BUILDING	PROPOSED R-VALUE (ft2-°F-h/BTU)	PROPOSED U-VALUE (BTU/ft2-°F-h)	PRE-RETRO FIT COOLING LOSS (kWh)	POST-RETRO FIT COOLING LOSS (kWh)	WINDOW SAVINGS (kWh)
Municipal Building (City Hall, Fire, Police)	2.00	0.5000	1334	513	821

Window Savings (kWh) = Existing Cooling Loss (kWh) - Proposed Cooling Loss (kWh)

Existing Cooling Loss (kWh) = (Existing U-Value) * (Hours/Day) * (Cooling Degree Days (CDD)) * (Surface Area (Sqft)) * (Cooling Efficiency (kWh/ton-hr)) * (1 Ton-hr/12,000 Btu)

Proposed Cooling Loss (kWh) = (Proposed U-Value) * (Hours/Day) * (Cooling Degree Days (CDD)) * (Surface Area (Sqft)) * (Cooling Efficiency (kWh/ton-hr)) * (1 Ton-hr/12,000 Btu)

Capital Improvement Measure 21 – Parking Lot Paving for Carport Solar

Evaluated but not included.

CITY OF WILDWOOD		Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
✔	ECM evaluated but not included												
✔	ECM included in the project												
ECM #	ECM DESCRIPTION												
21	Parking Lot Paving for Carport Solar	✔											

Scope of Work

A paving upgrade was identified by the City of Wildwood for the northeast and southwest parking lots on either side of the municipal building. The scope includes milling and resurfacing the parking lots in coordination with potential carport solar and EV charging stations.

BUILDING	TYPE	CATEGORY	QUANTITY	UNITS
Municipal Building (City Hall, Fire, Police)	Northeast Parking Lot	Milling and resurfacing	2,778	Sq Yard
	Southwest Parking Lot	Milling and resurfacing	2,778	Sq Yard

Energy Savings Calculations

There are no energy savings associated with this measure.

Capital Improvement Measure 22 – Asbestos Abatement

CITY OF WILDWOOD

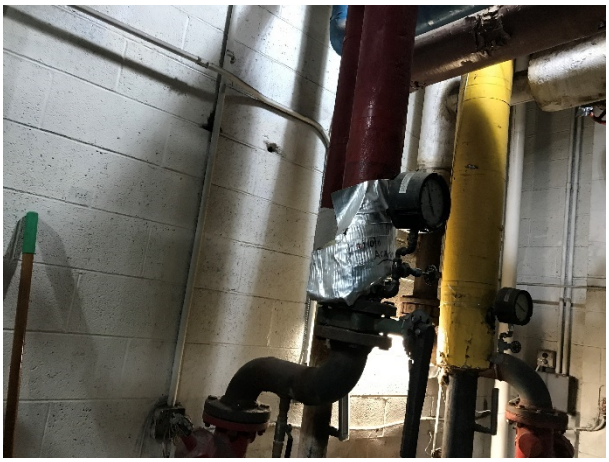
✔	ECM evaluated but not included
✔	ECM included in the project

ECM #	ECM DESCRIPTION	Municipal Building (City Hall, Fire, Police)	Court	Byrne Recreation Center	Public Works Buildings (New)	Public Works Buildings (Existing)	Boardwalk Info Center	Beach Patrol	Fox Park & Doo Wop Shop	Hut	Maxwell Field	Streetlights - City of Wildwood	Streetlights - Atlantic City Electric
22	Asbestos Abatement	✔											

Scope of Work

Asbestos abatement has been included given the age of the Municipal Building and scope of work proposed. The following locations have been identified for asbestos abatement testing:

- Boiler/Chiller rooms
- (2) AHUs – City Hall and Police wings
- Ceiling tiles – Police wing
- Fan coils piping – building wide
- Fan coils to be replaced – Police wing
- Floor tiles near fan coils to be replaced – Police wing



Energy Savings Calculations

There are no energy savings associated with this measure.

ENERGY SAVINGS PLAN

SECTION 4 – FINANCIAL ANALYSIS

Form V – ESCO Construction and Service Fees

FORM V		
ESCO's ENERGY SAVINGS PLAN (ESP): ESCOs PROPOSED FINAL PROJECT COST FORM CITY OF WILDWOOD 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]	$ 4,187,796	N/A
ECM Contingency	$ 418,780	
Total Value of Hard Costs	$ 4,606,575	
Project Service Fees		
Triad	$ 92,132	2.00%
DCO	$ 1,013,447	22.00%
TOTAL FINANCED PROJECT COSTS:	$ 5,712,153	24.00%

DCO Energy Efficiency Division
100 Lenox Drive
Lawrenceville, NJ 08648

Form VI – Project Cash Flow Analysis

FORM VI

ESCO's ENERGY SAVINGS PLAN (ESP):
ESCO's ANNUAL CASH FLOW ANALYSIS FORM
CITY OF WILDWOOD - 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**
2. Construction Period [2] (months): 12 Months
3. Cash Flow Analysis Format:

Miscellaneous Costs Financed:	
Cost of Issuance	$125,000
Third Party Review	$14,900
Total	$139,900

Project Cost[1]: **$5,712,153**
Miscellaneous Costs Financed: **$139,900**
Financed Amount: **$5,852,053**

Interest Rate: **2.00%**

Year	Annual Energy Savings	Annual Operational Savings	Energy Rebates / Incentives	Total Annual Savings	Annual Project Costs	Net Cash-Flow to Client	Cumulative Cash Flow
Installation	$ -	$ -	$ -	$ -		$ -	$ -
Year 1	$ 353,408	$ 22,582	$ 111,432	$ 487,423	$ (485,023)	$ 2,400	$ 2,400
Year 2	$ 288,504	$ 22,582	$ 4,267	$ 315,354	$ (312,954)	$ 2,400	$ 4,800
Year 3	$ 294,854	$ 8,820	$ -	$ 303,674	$ (301,274)	$ 2,400	$ 7,200
Year 4	$ 301,344	$ 8,820	$ -	$ 310,164	$ (307,764)	$ 2,400	$ 9,600
Year 5	$ 307,976	$ 8,820		$ 316,796	$ (314,396)	$ 2,400	$ 12,000
Year 6	$ 314,754			$ 314,754	$ (312,354)	$ 2,400	$ 14,400
Year 7	$ 321,681			$ 321,681	$ (319,281)	$ 2,400	$ 16,800
Year 8	$ 328,761			$ 328,761	$ (326,361)	$ 2,400	$ 19,200
Year 9	$ 335,997			$ 335,997	$ (333,597)	$ 2,400	$ 21,600
Year 10	$ 343,392			$ 343,392	$ (340,992)	$ 2,400	$ 24,000
Year 11	$ 350,950			$ 350,950	$ (348,550)	$ 2,400	$ 26,400
Year 12	$ 358,674			$ 358,674	$ (356,274)	$ 2,400	$ 28,800
Year 13	$ 366,568			$ 366,568	$ (364,168)	$ 2,400	$ 31,200
Year 14	$ 374,636			$ 374,636	$ (372,236)	$ 2,400	$ 33,600
Year 15	$ 382,881			$ 382,881	$ (380,481)	$ 2,400	$ 36,000
Year 16	$ 391,308			$ 391,308	$ (388,908)	$ 2,400	$ 38,400
Year 17	$ 399,921			$ 399,921	$ (397,521)	$ 2,400	$ 40,800
Year 18	$ 408,723			$ 408,723	$ (406,323)	$ 2,400	$ 43,200
Year 19	$ 417,718			$ 417,718	$ (415,318)	$ 2,400	$ 45,600
Year 20	$ 426,912			$ 426,912	$ (424,512)	$ 2,400	$ 48,000
Totals	$ 7,068,963	$ 71,625	$ 115,699	$ 7,256,286	$ (7,208,286)	$ 48,000	

NOTES:
(1) Includes: Hard costs and project service fees defined in ESCO's PROPOSED "FORM V"
(2) No payments are made by Wildwood during the construction period.

Utility Inflation Details

Per Form VI, the annual inflation rate is 2.2% for electric and 2.4% for natural gas.

Utility Inflation Worksheet			
Year	TOTAL ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	Total
2	$287,211.08	$1,293.32	$288,504.40
3	$293,529.72	$1,324.36	$294,854.09
4	$299,987.38	$1,356.15	$301,343.52
5	$306,587.10	$1,388.69	$307,975.79
6	$313,332.02	$1,422.02	$314,754.04
7	$320,225.32	$1,456.15	$321,681.47
8	$327,270.28	$1,491.10	$328,761.38
9	$334,470.22	$1,526.88	$335,997.11
10	$341,828.57	$1,563.53	$343,392.10
11	$349,348.80	$1,601.05	$350,949.85
12	$357,034.47	$1,639.48	$358,673.95
13	$364,889.23	$1,678.83	$366,568.06
14	$372,916.79	$1,719.12	$374,635.91
15	$381,120.96	$1,760.38	$382,881.34
16	$389,505.62	$1,802.63	$391,308.25
17	$398,074.75	$1,845.89	$399,920.64
18	$406,832.39	$1,890.19	$408,722.58
19	$415,782.70	$1,935.56	$417,718.26
20	$424,929.92	$1,982.01	$426,911.93

ENERGY SAVINGS PLAN

SECTION 5 – 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	City of Wildwood
Disposition of Abandoned Equipment (Steam Piping, Condensate Piping, Oil Tanks, etc.)	Risk	City of Wildwood
New Natural Gas Distribution	Risk	City of Wildwood
Integrity of re-used Infrastructure	Risk	City of Wildwood
Life Safety System Coordination	Risk	City of Wildwood
Coordination with City of Wildwood Information Technology Department	Risk	City of Wildwood
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. City of Wildwood
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 & City of Wildwood
Scope changes relating to requests by Authorities Having Jurisdiction.	Risk	City of Wildwood (via contingency)
Department of Environmental Protection Permitting	Risk	Consulting Engineer
Modifications of Energy Saving Control Sequences and Setpoints impacting Energy Savings and Incentives	Risk	City of Wildwood
Post Construction Calibration of Sensors, Meters, & Safety Devices	Risk	City of Wildwood
Adequate time and access for bidding contractor site surveys	Risk	City of Wildwood
Utility Interconnection approval for the CHP Unit	Risk	City of Wildwood

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 City of Wildwood, 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. City of Wildwood 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 City of Wildwood 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 City of Wildwood.

Maintenance Plan

Owner Tasks and Responsibilities:

As a general statement, City of Wildwood 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, City of Wildwood 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 City of Wildwood'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:

City of Wildwood will be given specific training on the changes and advancements in the environmental operations and energy savings strategies. City of Wildwood 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

City of Wildwood 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 City of Wildwood 's attention for correction.

ENERGY SAVINGS PLAN

SECTION 6 – OPERATION & MAINTENANCE

It is critical to the success of achieving continued energy savings that City of Wildwood 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 City of Wildwood 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)

Cooling Towers

Startup/Checkout Procedure

1. Fill the basin and verify the float level.
2. Verify the operation of the basin heaters
3. Verify the operation, setpoint, and sensitivity of the basin heater temperature control device.
4. Start the condenser water pumps.
5. Verify the balance of the return water through the distribution boxes.
6. Verify proper operation of the bypass valve(s), if applicable.
7. Operate fan and verify smooth operation.
8. Log operation after system has stabilized.
9. Review operating procedures
10. Provide a written report of completed work, operating log, and indicate uncorrected deficiencies detected.

Comprehensive Bi-Annual Inspection

1. Perform following inspection and cleaning before starting the tower for the cooling season and during shutdown at end of season.
2. Record and report abnormal conditions, measurements taken, etc.
3. Review logs for operational problems and trends.
4. General Assembly
   a) Structure
      1. Disassemble all screens and access panels for inspection.
      2. Inspect the conditions of the slats, if applicable.
      3. Inspect the condition of the tower fill.
      4. Inspect the condition of the support structure.
      5. Inspect the condition of the basins (upper and lower) and/or spray nozzles.
      6. Verify clean basins and strainer(s).
      7. Verify the condition and operation of the basin fill valve system.
   b) Mechanical
      1. Inspect belts for wear, cracks, and glazing.
      2. Verify correct belt tension. Adjust the tension as necessary.
      3. Inspect sheaves and pulleys for wear, condition, and alignment.

4. Inspect fan shaft and bearings for condition.
5. Inspect fan assembly for condition, security, and clearances. (e.g. blade tip clearance).

4. Lubrication System
   a) Lubricate motor bearings.
   b) Lubricate fan shaft bearings.
5. 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 contactor(s) for free and smooth operation.
   e) Meg the motor(s) and record readings.
   f) Check disconnect terminal block for wear, tightness and signs of overheating and discoloration.
   g) Check the condition and operation of the basin heater contactor(s).

Shut-Down Procedure

1. Check the general condition of the tower.
2. Turn off electrical power to basin heaters, tower fans, and pipe heaters as necessary.
3. Drain tower and condenser water piping.
4. Review operating procedures
5. Provide a written report of completed work, operating log, and indicate any uncorrected deficiencies detected.

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.

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 7 – 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 City of Wildwood and DCO. If City of Wildwood 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 this document. Both DCO and the City of Wildwood 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 City of Wildwood 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 City of Wildwood.

SAVINGS VERIFICATION

There are events that cause energy savings to change. City of Wildwood 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 City of Wildwood.

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

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 City of Wildwood 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**
Atlantic City Electric LED Street Lights	$97,153
LED Interior and Exterior Lighting	$7,137
Chiller Replacement	$41,652
Cooling Tower Replacement	$37,595
Combined Heat & Power Unit	$35,381
Boiler Replacement	$42,887
Dual Temperature Fan Coil Unit Replacement	$49,119
Energy Management System	$13,781
LED Athletic Field Lighting	$5,164
Premium Efficiency Pump Motors and VFDs	$5,116
Rooftop Unit Replacement	$10,794
Domestic Water Heater Replacement	$4,019
Building Envelope Weatherization	$2,045
Window Replacement	$18,300
Pipe and Valve Insulation	$3,478
Electronic Fuel-Use Economizer	$270
Roof Upgrades	$34,885
Water Conservation	$2
Asbestos Abatement	$10,000
TOTAL	**$418,780**

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

DCO

- Josh Costell
- Executive Vice President and General Manager
- DCO Energy Efficiency Division
- 100 Lenox Drive
- Lawrenceville, NJ 08648

Wildwood

- Wildwood

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
Atlantic City Electric LED Street Lights	$1,068,682	$200,241
LED Interior and Exterior Lighting	$78,510	$35,006
Chiller Replacement	$458,177	$8,675
Cooling Tower Replacement	$413,548	$2,970
Combined Heat & Power Unit	$389,195	$4,635
Boiler Replacement	$471,760	$1,667
Dual Temperature Fan Coil Unit Replacemer	$540,310	$2,609
Energy Management System	$151,594	$3,249
LED Athletic Field Lighting	$56,802	$3,723
Premium Efficiency Pump Motors and VFDs	$56,272	$4,055
Rooftop Unit Replacement	$118,733	$3,615
Domestic Water Heater Replacement	$44,211	$4,327
Building Envelope Weatherization	$22,490	$1,755
Window Replacement	$201,300	$1,286
Pipe and Valve Insulation	$38,261	$1,655
Electronic Fuel-Use Economizer	$2,972	$2,000
Roof Upgrades	$383,737	$553
Water Conservation	$24	$268
Asbestos Abatement	$110,000	$0
TOTAL	**$4,606,575**	**$282,291**

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

- Josh Costell
- Executive Vice President and General Manager
- DCO Energy Efficiency Division
- 100 Lenox Drive
- Lawrenceville, NJ 08648

Wildwood

- Wildwood

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.

Year 1 O&M Savings

CITY OF WILDWOOD		ANNUAL O&M COST SAVINGS
ECM #	ENERGY CONSERVATION MEASURE	$
1a	LED Interior and Exterior Lighting	$8,820
4	Boiler Replacement	$2,150
5	Chiller Replacement	$2,000
6	Cooling Tower Replacement	$7,200
7	Premium Efficiency Pump Motors and VFDs	$1,991
8	Rooftop Unit Replacement	$421
	TOTALS	$22,582

Project O&M Savings strategy is agreed upon.

DCO

- Josh Costell
- Executive Vice President and General Manager
- DCO Energy Efficiency Division
- 100 Lenox Drive
- Lawrenceville, NJ 08648

Wildwood

- Wildwood

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 ..... 12 Months
Construction Interest Only Payment of ..... TBD by City of Wildwood financial advisor
Annual Surplus of no less than $2,400

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

DCO

- Josh Costell
- Executive Vice President and General Manager
- DCO Energy Efficiency Division
- 100 Lenox Drive
- Lawrenceville, NJ 08648

Wildwood

- Wildwood

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 $151,513 in rebates and incentives. 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
CITY OF WILDWOOD	Custom Electric	Atlantic City Electric	53,336	kWh	$0.160	$0	$4,267	$4,267	$8,534	$151,513
	Custom Gas	South Jersey Gas	0	therms	$1.60	$0	$0	$0	$0	
	Prescriptive	ACE or SJG	Various	Various	Various	$0	$107,165	$0	$107,165	
	Direct Install	ACE or SJG	$69,109	$	52%	$35,814	$0	$0	$35,814	
					TOTALS	$35,814	$111,432	$4,267	$151,513	

Incentive Data

BUILDING	INCENTIVE TYPE	SOURCE	QUANTITY	UNITS	INCENTIVE $/UNIT	INSTALL INCENTIVE	YEAR 1 INCENTIVE	YEAR 2 INCENTIVE	SUBTOTAL	TOTAL
Municipal Building (City Hall, Fire, Police)	Custom Electric	Atlantic City Electric	53,336	kWh	$0.160		$4,267	$4,267	$8,534	$37,286
Municipal Building (City Hall, Fire, Police)	Prescriptive	ACE or SJG	Various	Various	Various		$11,350		$11,350	
Municipal Building (City Hall, Fire, Police)	Direct Install	ACE or SJG	$21,752	$	80%	$17,402			$17,402	
Court	Direct Install	ACE or SJG	$37,829	$	30%	$11,466			$11,466	$11,466
Byrne Recreation Center	Direct Install	ACE or SJG	$9,527	$	73%	$6,946			$6,946	$6,946
Public Works Buildings (Existing)	Prescriptive	ACE or SJG	Various	Various	Various		$865		$865	$865
Boardwalk Info Center	Prescriptive	ACE or SJG	Various	Various	Various		$270		$270	$270
Fox Park & Doo Wop Shop	Prescriptive	ACE or SJG	Various	Various	Various		$1,720		$1,720	$1,720
Hut	Prescriptive	ACE or SJG	Various	Various	Various		$85		$85	$85
Streetlights - Atlantic City Electric	Prescriptive	ACE or SJG	Various	Various	Various		$92,875		$92,875	$92,875

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, City of Wildwood acknowledges and accepts that any project proposed should not rely on the receipt of incentives as a reason to implement it.

New Jersey Office of Clean Energy
Direct Install Program
Energy Assessment Tool (V5.0A)

General Project Information

Participating Customer:	City of Wildwood	Facility Type:	Office - Small
Contractor / Project #:	Hutchinson	HVAC Type:	AC & Gas Heat
Facility Name:	Byrne Rec Center	Total Facility Square Footage:	5,000
Street Address:	401 W Youngs Ave	Avg Weekly Hrs of Operation:	60
City / Zip Code:	Wildwood 08260	# of Full-Time Employees:	10
Is this facility publicly owned?:	Y	Year Constructed:	1995
BOE, MUA or other public entity property?	Y	Tax Exempt?:	Y
		Project Permitting Costs:	

Enhanced Incentive Eligibility

Project in UEZ?	N	K-12 School?	N
Project in OZ?	N	Municipality?	Y
Affordable Housing Development?	N	County Facility?	N

Electric Utility Information

Electric Provider:	
Service Class:	
Account #:	
Billing Period Start Date:	
Billing Period End Date:	
Billing Period kWh Consumption:	100
Billing Period Total Cost:	$17.00
Total Taxes + Fees on Bill:	$1.00
Electric - Average Cost ($/kWh):	$0.160

Gas Utility Information

Gas Provider:	
Service Class:	
Account #:	
Billing Period Start Date:	
Billing Period End Date:	
Billing Period Therm Consumption:	1
Billing Period Total Cost:	$2.00
Total Taxes + Fees on Bill:	$1.00
Gas - Average Cost ($/Therm):	$1.000

Oil Information

Annual Consumption (Gallons):	
Annual Cost:	
Annual Taxes + Fees on Bill:	
Oil - Average Cost ($/Gallon):	$0.000

Propane Information

Annual Consumption (Gallons):	
Annual Cost:	
Annual Taxes + Fees on Bill:	
Propane - Average Cost ($/Gallon):	$0.000

Project Summary

	Annual Energy Savings	Energy Units	Annual Cost Savings	Total Measure Cost	Estimated Incentive Amount	Total Cost to Customer
Lighting Measures Total:	16,399	kWh	$2,623.78	$8,445.14	$6,157.31	$2,287.83
Motors & VFD Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
HVAC Electric Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
Refrigeration Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
ELECTRIC MEASURES:	16,399	kWh	$2,623.78	$8,445.14	$6,157.31	$2,287.83
GAS MEASURES:	(20)	Therms	-$20.18	$1,082.00	$788.88	$293.12
OIL MEASURES:	0	Gallons	$0.00	$0.00	$0.00	$0.00
TOTAL PROPANE MEASURES:	0	Gallons	$0.00	$0.00	$0.00	$0.00
CONVERSION MEASURES (OIL):	0	Gallons	$0.00	$0.00	$0.00	$0.00
CONVERSION MEASURES GAS:	0	Therms				
COMBINED PROJECT TOTALS:			$2,603.59	$9,527.14	$6,946.19	$2,580.95

SIMPLE PAYBACK (YEARS): 0.99

PROJECT TRC TEST: 1.16

Projected Dollar Savings Per Measure Category

DIRECT INSTALL PROGRAM

PARTICIPATION AGREEMENT

SCOPE OF WORK ATTACHMENT

"Parties":				
Participating Customer*:	City of Wildwood			
Participating Contractor*:	Hutchinson			
Facility Name*:	Byrne Rec Center			
Facility Address:	401 W Youngs Ave	Wildwood,	NJ	08260
	Street	City		Zip

*as listed on Application

When fully signed, this Scope of Work Attachment ("Attachment") shall become part of the Direct Install Program Participation Agreement ("Participation Agreement") previously executed by the Parties in connection with the installation of energy efficiency retrofit Measures to be performed by the Participating Contractor (or "Contractor") at the above listed Facility. This Attachment, together with the Participation Agreement shall constitute the full Agreement between the Parties. Terms capitalized herein are defined in the Participation Agreement.

The Participating Customer (or "Customer") agrees to have Contractor perform retrofit work in connection with the Measures listed on page 2 of this form (attached). In consideration of the Contractor's performance of such work, Customer agrees to pay Contractor based on the measure costs listed below under Customer Unit Cost for the number of completed units for each Measure upon receipt of invoice; provided the Contractor may collect a deposit from Customer prior to performing such work, in which case the final invoice shall be net of such deposit. Customer and Contractor understand that conditions discovered during installation may require that some measures identified in the energy assessment cannot be installed, or some areas may require additional measures/quantities to be installed. Should conditions in the field dictate that the Estimated Program Total Cost shown on page 2 increase by more than 10%, Contractor must obtain both Program Administrator and Customer written approval in the form of an amended Scope of Work Attachment before proceeding with such additional work.

By signing below, the Parties agree the above listed Measures shall be installed by the Contractor. The Customer shall pay the Contractor as described herein following Completion and Acceptance of Measures. Customer certifies that he/she has the authority to contract for retrofit work in the Facility in connection with the Measures listed and, if the Customer does not own the Facility, the Owner has granted permission to Customer for performance of such work.

Participating Customer _____ Date _____

Participating Contractor _____ Date _____

Page 2
Scope of Work

The work to be performed by the Participating Contractor in connection with the Project shall be comprised of the below listed Measures in the estimated quantities listed:

Measure Description / Location	Quantity To Be Installed	Total Measure Cost	Estimated Customer Total Cost	Estimated Incentive Amount
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Electric Room	2	$ 123.56	$ 33.47	$ 90.09
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Mens Locker Room	1	$ 77.15	$ 20.90	$ 56.25
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / Mens Locker Room	7	$ 590.03	$ 159.84	$ 430.19
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Mens Locker Room	2	$ 123.56	$ 33.47	$ 90.09
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Womens Locker Room	1	$ 77.15	$ 20.90	$ 56.25
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / Womens Locker Room	8	$ 674.32	$ 182.68	$ 491.64
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Womens Locker Room	2	$ 123.56	$ 33.47	$ 90.09
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / Hall	5	$ 421.45	$ 114.17	$ 307.28
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / Dance Room	15	$ 1,264.35	$ 342.52	$ 921.83
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Womens BR	1	$ 77.15	$ 20.90	$ 56.25
Relamp: LED - A-Lamp (3 - 25W): 15 W / Womens BR	2	$ 56.34	$ 15.26	$ 41.08
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Mens BR	1	$ 77.15	$ 20.90	$ 56.25
Relamp: LED - A-Lamp (3 - 25W): 15 W / Mens BR	2	$ 56.34	$ 15.26	$ 41.08
Relamp: Direct Line LED - 3-Lamp - 2-Foot T8 / Kitchen	1	$ 82.09	$ 22.24	$ 59.85
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Kitchen	9	$ 694.35	$ 188.10	$ 506.25
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Kitchen Hood	2	$ 123.56	$ 33.47	$ 90.09
Relamp: Direct Line LED - 2-Lamp - 2-Foot T8 / Stair Sconce	3	$ 195.21	$ 52.88	$ 142.33
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / 2nd FL Fitness Rm	25	$ 1,544.50	$ 418.41	$ 1,126.09
Relamp: Direct Line LED - 3-Lamp - 2-Foot T8 / 2nd FL Conf Rm	9	$ 738.81	$ 200.15	$ 538.66
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / 2nd FL Offices	8	$ 617.20	$ 167.20	$ 450.00
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / 2nd FL Storage	4	$ 308.60	$ 83.60	$ 225.00
Relamp: Direct Line LED - 2-Lamp - 2-Foot T8 / Back Stair Sconce	4	$ 260.28	$ 70.51	$ 189.77
Relamp: Direct Line LED - 3-Lamp - 2-Foot T8 / 2nd Floor Bathroom	1	$ 82.09	$ 22.24	$ 59.85
Relamp: LED - A-Lamp (3 - 25W): 15 W / 2nd Floor Bathroom	2	$ 56.34	$ 15.26	$ 41.08
Electronic Fuel-Use Economizers (for Forced Air Heat) / Roof	2	$ 1,082.00	$ 293.12	$ 788.88
TOTALS**		$ 9,527.14	$ 2,580.95	$ 6,946.19

**Maximum incentive amount per project is $125,000. Measures that would qualify the project for funding through the State Energy Program (SEP) are identified above with an 'S'. If any "SEP measures" are included then the total incentive amount for all measures will be paid with SEP funds, otherwise the total incentive amount will come from NJ Clean Energy funds.

New Jersey Office of Clean Energy
Direct Install Program
Energy Assessment Tool (V5.0A)

General Project Information

Participating Customer:	City of Wildwood		Facility Type:	Office - Small
Contractor / Project #:	Hutchinson		HVAC Type:	AC & Gas Heat
Facility Name:	City Hall		Total Facility Square Footage:	30,000
Street Address:	4400 New Jersey Ave		Avg Weekly Hrs of Operation:	168
City / Zip Code:	Wildwood	08260	# of Full-Time Employees:	40
Is this facility publicly owned?:		Y	Year Constructed:	1960
BOE, MUA or other public entity property?		Y	Tax Exempt?:	Y
			Project Permitting Costs:	

Enhanced Incentive Eligibility

Project in UEZ?	N	K-12 School?	N
Project in OZ?	N	Municipality?	Y
Affordable Housing Development?	N	County Facility?	N

Electric Utility Information

Electric Provider:	
Service Class:	
Account #:	
Billing Period Start Date:	
Billing Period End Date:	
Billing Period kWh Consumption:	100
Billing Period Total Cost:	$17.00
Total Taxes + Fees on Bill:	$1.00
Electric - Average Cost ($/kWh):	$0.160

Gas Utility Information

Gas Provider:	
Service Class:	
Account #:	
Billing Period Start Date:	
Billing Period End Date:	
Billing Period Therm Consumption:	1
Billing Period Total Cost:	$2.00
Total Taxes + Fees on Bill:	$1.00
Gas - Average Cost ($/Therm):	$1.000

Oil Information

Annual Consumption (Gallons):	
Annual Cost:	
Annual Taxes + Fees on Bill:	
Oil - Average Cost ($/Gallon):	$0.000

Propane Information

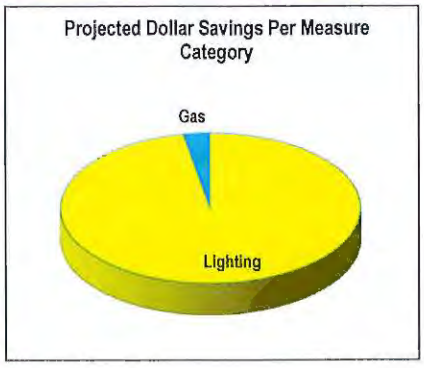
Annual Consumption (Gallons):	
Annual Cost:	
Annual Taxes + Fees on Bill:	
Propane - Average Cost ($/Gallon):	$0.000

Project Summary

	Annual Energy Savings	Energy Units	Annual Cost Savings	Total Measure Cost	Estimated Incentive Amount	Total Cost to Customer
Lighting Measures Total:	35,475	kWh	$5,676.02	$21,333.45	$17,066.76	$4,266.69
Motors & VFD Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
HVAC Electric Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
Refrigeration Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
ELECTRIC MEASURES:	35,475	kWh	$5,676.02	$21,333.45	$17,066.76	$4,266.69
GAS MEASURES:	166	Therms	$166.43	$418.90	$335.12	$83.78
OIL MEASURES:	0	Gallons	$0.00	$0.00	$0.00	$0.00
TOTAL PROPANE MEASURES:	0	Gallons	$0.00	$0.00	$0.00	$0.00
CONVERSION MEASURES (OIL):	0	Gallons	$0.00	$0.00	$0.00	$0.00
CONVERSION MEASURES GAS:	0	Therms				
COMBINED PROJECT TOTALS:			$5,842.45	$21,752.35	$17,401.88	$4,350.47

SIMPLE PAYBACK (YEARS): 0.74

PROJECT TRC TEST: 1.15



DIRECT INSTALL PROGRAM

PARTICIPATION AGREEMENT

SCOPE OF WORK ATTACHMENT

"Parties":				
Participating Customer*:	City of Wildwood			
Participating Contractor*:	Hutchinson			
Facility Name*:	City Hall			
Facility Address:	4400 New Jersey Ave	Wildwood,	NJ	08260
	Street	City		Zip

*as listed on Application

When fully signed, this Scope of Work Attachment ("Attachment") shall become part of the Direct Install Program Participation Agreement ("Participation Agreement") previously executed by the Parties in connection with the installation of energy efficiency retrofit Measures to be performed by the Participating Contractor (or "Contractor") at the above listed Facility. This Attachment, together with the Participation Agreement shall constitute the full Agreement between the Parties. Terms capitalized herein are defined in the Participation Agreement.

The Participating Customer (or "Customer") agrees to have Contractor perform retrofit work in connection with the Measures listed on page 2 of this form (attached). In consideration of the Contractor's performance of such work, Customer agrees to pay Contractor based on the measure costs listed below under Customer Unit Cost for the number of completed units for each Measure upon receipt of invoice; provided the Contractor may collect a deposit from Customer prior to performing such work, in which case the final invoice shall be net of such deposit. Customer and Contractor understand that conditions discovered during installation may require that some measures identified in the energy assessment cannot be installed, or some areas may require additional measures/quantities to be installed. Should conditions in the field dictate that the Estimated Program Total Cost shown on page 2 increase by more than 10%, Contractor must obtain both Program Administrator and Customer written approval in the form of an amended Scope of Work Attachment before proceeding with such additional work.

By signing below, the Parties agree the above listed Measures shall be installed by the Contractor. The Customer shall pay the Contractor as described herein following Completion and Acceptance of Measures. Customer certifies that he/she has the authority to contract for retrofit work in the Facility in connection with the Measures listed and, if the Customer does not own the Facility, the Owner has granted permission to Customer for performance of such work.

Participating Customer Date

Participating Contractor Date

Page 2
Scope of Work

The work to be performed by the Participating Contractor in connection with the Project shall be comprised of the below listed Measures in the estimated quantities listed:

Measure Description / Location	Quantity To Be Installed	Total Measure Cost	Estimated Customer Total Cost	Estimated Incentive Amount
Relamp: LED - A-Lamp (3 - 25W): 15 W / 2nd FL Meeting Room Pendants	36	$ 1,181.52	$ 236.30	$ 945.22
Relamp: LED - BR30 (6 - 17W): 12 W / Track Heads	4	$ 113.48	$ 22.70	$ 90.78
Relamp: Direct Line LED - 2-Lamp - 2-Foot T8 / 2nd Fl Womens BR	1	$ 65.07	$ 13.01	$ 52.06
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / 2nd Fl Server Room	4	$ 337.16	$ 67.43	$ 269.73
Relamp: LED - A-Lamp (3 - 25W): 15 W / 2nd Fl Storage Rm	1	$ 28.17	$ 5.63	$ 22.54
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / 2nd Fl Storage Rm	1	$ 61.78	$ 12.36	$ 49.42
Relamp: LED - A-Lamp (3 - 25W): 15 W / Fire Truck Garage	2	$ 65.64	$ 13.13	$ 52.51
Relamp: Direct Line LED - 8' Conversion Kit - (4) 4-Foot T8 Lamps (Stand. - 12.5W) / Fire Truck Garage	18	$ 2,269.80	$ 453.96	$ 1,815.84
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / weight area	3	$ 185.34	$ 37.07	$ 148.27
Relamp: Direct Line LED - 2-Lamp - 2-Foot T8 / fire 2nd Fl hall	5	$ 325.35	$ 65.07	$ 260.28
Relamp: Direct Line LED - 2-Lamp - 2-Foot T8 / fire 2nd fl office	14	$ 910.98	$ 182.20	$ 728.78
Relamp: Direct Line LED - 2-Lamp - 2-Foot T8 / fire 2nd fl closet	2	$ 130.14	$ 26.03	$ 104.11
Relamp: Direct Line LED - 2-Lamp - 2-Foot T8 / flag room	4	$ 260.28	$ 52.06	$ 208.22
Relamp: Direct Line LED - 2-Lamp - 2-Foot T8 / female bunk room	2	$ 130.14	$ 26.03	$ 104.11
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / locker room	2	$ 170.36	$ 34.07	$ 136.29
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / male bunk room	2	$ 170.36	$ 34.07	$ 136.29
Relamp: LED - BR30 (6 - 17W): 12 W / bunk room	5	$ 118.60	$ 23.72	$ 94.88
Relamp: LED - A-Lamp (3 - 25W): 15 W / shower	2	$ 56.34	$ 11.27	$ 45.07
Relamp: LED - A-Lamp (3 - 25W): 15 W / Police 2 FL stairs	4	$ 112.68	$ 22.54	$ 90.14
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / Police 2 FL stairs	3	$ 255.54	$ 51.11	$ 204.43
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / Police 2 FL Hall	18	$ 1,533.24	$ 306.65	$ 1,226.59
Relamp: LED - A-Lamp (3 - 25W): 15 W / mop closet	2	$ 56.34	$ 11.27	$ 45.07
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / server room	2	$ 123.56	$ 24.71	$ 98.85
Relamp: Direct Line LED - 8' Conversion Kit - (4) 4-Foot T8 Lamps (Stand. - 12.5W) / server room	1	$ 108.15	$ 21.63	$ 86.52
Relamp: LED - A-Lamp (3 - 25W): 15 W / server room	2	$ 56.34	$ 11.27	$ 45.07
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / room 259	2	$ 123.56	$ 24.71	$ 98.85
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / evidence room	2	$ 123.56	$ 24.71	$ 98.85
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / womens br	1	$ 85.18	$ 17.04	$ 68.14
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / mens br	1	$ 85.18	$ 17.04	$ 68.14
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / open office	2	$ 168.58	$ 33.72	$ 134.86
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / stairs	2	$ 170.36	$ 34.07	$ 136.29
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / comp room	2	$ 168.58	$ 33.72	$ 134.86
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / sean jordans office	2	$ 168.58	$ 33.72	$ 134.86
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / 2 rooms	6	$ 505.74	$ 101.15	$ 404.59
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / chiefs room	4	$ 337.16	$ 67.43	$ 269.73
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / break room	4	$ 340.72	$ 68.14	$ 272.58
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / deputy chief	4	$ 340.72	$ 68.14	$ 272.58
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / interrogation	4	$ 340.72	$ 68.14	$ 272.58
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / ops captain	4	$ 340.72	$ 68.14	$ 272.58
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / stairs	2	$ 170.36	$ 34.07	$ 136.29
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / locker room	10	$ 851.80	$ 170.36	$ 681.44
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / locker room	8	$ 494.24	$ 98.85	$ 395.39
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / bathroom	1	$ 84.29	$ 16.86	$ 67.43

Savings values are estimates. Actual savings will vary.
Incentives and participation subject to program rules and Participation Agreement.

Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / police 1st fl Hall	5	$ 425.90	$ 85.18	$ 340.72
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / 1st fl open room	2	$ 168.58	$ 33.72	$ 134.86
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / 1st floor evidence	3	$ 255.54	$ 51.11	$ 204.43
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / 1st floor evidence	2	$ 168.58	$ 33.72	$ 134.86
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / storage	2	$ 168.58	$ 33.72	$ 134.86
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / storage	1	$ 85.18	$ 17.04	$ 68.14
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / hall	2	$ 170.36	$ 34.07	$ 136.29
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / mens br	2	$ 170.36	$ 34.07	$ 136.29
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / womens br	1	$ 85.18	$ 17.04	$ 68.14
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Lt of Police	3	$ 185.34	$ 37.07	$ 148.27
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / evidence room	3	$ 185.34	$ 37.07	$ 148.27
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / Qtr Deck	4	$ 340.72	$ 68.14	$ 272.58
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / booking room	6	$ 505.74	$ 101.15	$ 404.59
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / hall	3	$ 252.87	$ 50.57	$ 202.30
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / cells	2	$ 168.58	$ 33.72	$ 134.86
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / hall	3	$ 255.54	$ 51.11	$ 204.43
Fixture Replacement: LED Outdoor Wall Mount (14 - 60W): 50 W / beezeway	4	$ 1,036.20	$ 207.24	$ 828.96
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / report room	5	$ 421.45	$ 84.29	$ 337.16
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / briefing room	15	$ 1,264.35	$ 252.87	$ 1,011.48
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / south hall	5	$ 308.90	$ 61.78	$ 247.12
Relamp: Direct Line LED - 4-Lamp - 4-Foot T8 (Stand. - 12.5W) / records	10	$ 842.90	$ 168.58	$ 674.32
Relamp: LED - A-Lamp (3 - 25W): 15 W / ext breezeway	1	$ 28.17	$ 5.63	$ 22.54
Relamp: LED - A-Lamp (3 - 25W): 15 W / ext police door	1	$ 28.17	$ 5.63	$ 22.54
Relamp: LED - A-Lamp (3 - 25W): 15 W / ext side	3	$ 84.51	$ 16.90	$ 67.61
Low-Flow Aerators (Lavatory) / Bathrooms	6	$ 71.40	$ 14.28	$ 57.12
Pipe Wrap Insulation / Boiler Room	1	$ 347.50	$ 69.50	$ 278.00
TOTALS**		$ 21,752.35	$ 4,350.47	$ 17,401.88

**Maximum incentive amount per project is $125,000. Measures that would qualify the project for funding through the State Energy Program (SEP) are identified above with an 'S'. If any "SEP measures" are included then the total incentive amount for all measures will be paid with SEP funds, otherwise the total incentive amount will come from NJ Clean Energy funds.

New Jersey Office of Clean Energy
Direct Install Program
Energy Assessment Tool (V5.0A)

General Project Information

Participating Customer:	City of Wildwood	Facility Type:	Office - Small
Contractor / Project #:	Hutchinson	HVAC Type:	AC & Gas Heat
Facility Name:	Wildwood Court House	Total Facility Square Footage:	10,000
Street Address:	115 W Davis Ave	Avg Weekly Hrs of Operation:	50
City / Zip Code:	Wildwood Court House	# of Full-Time Employees:	10
Is this facility publicly owned?:	Y	Year Constructed:	1990
BOE, MUA or other public entity property?	Y	Tax Exempt?:	Y
		Project Permitting Costs:	

Enhanced Incentive Eligibility

Project in UEZ?	N	K-12 School?	N
Project in OZ?	N	Municipality?	Y
Affordable Housing Development?	N	County Facility?	N

Electric Utility Information

Electric Provider:	
Service Class:	
Account #:	
Billing Period Start Date:	
Billing Period End Date:	
Billing Period kWh Consumption:	100
Billing Period Total Cost:	$17.00
Total Taxes + Fees on Bill:	$1.00
Electric - Average Cost ($/kWh):	$0.160

Gas Utility Information

Gas Provider:	
Service Class:	
Account #:	
Billing Period Start Date:	
Billing Period End Date:	
Billing Period Therm Consumption:	1
Billing Period Total Cost:	$2.00
Total Taxes + Fees on Bill:	$1.00
Gas - Average Cost ($/Therm):	$1.000

Oil Information

Annual Consumption (Gallons):	
Annual Cost:	
Annual Taxes + Fees on Bill:	
Oil - Average Cost ($/Gallon):	$0.000

Propane Information

Annual Consumption (Gallons):	
Annual Cost:	
Annual Taxes + Fees on Bill:	
Propane - Average Cost ($/Gallon):	$0.000

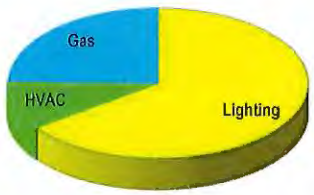
Project Summary

	Annual Energy Savings	Energy Units	Annual Cost Savings	Total Measure Cost	Estimated Incentive Amount	Total Cost to Customer
Lighting Measures Total:	8,564	kWh	$1,370.22	$4,537.82	$1,375.39	$3,162.43
Motors & VFD Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
HVAC Electric Measures Total:	1,389	kWh	$222.25	$30,790.00	$9,332.27	$21,457.73
Refrigeration Measures Total:	0	kWh	$0.00	$0.00	$0.00	$0.00
ELECTRIC MEASURES:	9,953	kWh	$1,592.47	$35,327.82	$10,707.66	$24,620.16
GAS MEASURES:	518	Therms	$517.61	$2,501.50	$758.19	$1,743.31
OIL MEASURES:	0	Gallons	$0.00	$0.00	$0.00	$0.00
TOTAL PROPANE MEASURES:	0	Gallons	$0.00	$0.00	$0.00	$0.00
CONVERSION MEASURES (OIL):	0	Gallons	$0.00	$0.00	$0.00	$0.00
CONVERSION MEASURES GAS:	0	Therms				
COMBINED PROJECT TOTALS:			$2,110.09	$37,829.32	$11,465.85	$26,363.47

SIMPLE PAYBACK (YEARS): 12.49

PROJECT TRC TEST: 1.10

Projected Dollar Savings Per Measure Category



DIRECT INSTALL PROGRAM

PARTICIPATION AGREEMENT

SCOPE OF WORK ATTACHMENT

"Parties":

Participating Customer*:	City of Wildwood		
Participating Contractor*:	Hutchinson		
Facility Name*:	Wildwood Court House		
Facility Address:	115 W Davis Ave	Wildwood Court Hc	NJ
	Street	City	Zip

*as listed on Application

When fully signed, this Scope of Work Attachment ("Attachment") shall become part of the Direct Install Program Participation Agreement ("Participation Agreement") previously executed by the Parties in connection with the installation of energy efficiency retrofit Measures to be performed by the Participating Contractor (or "Contractor") at the above listed Facility. This Attachment, together with the Participation Agreement shall constitute the full Agreement between the Parties. Terms capitalized herein are defined in the Participation Agreement.

The Participating Customer (or "Customer") agrees to have Contractor perform retrofit work in connection with the Measures listed on page 2 of this form (attached). In consideration of the Contractor's performance of such work, Customer agrees to pay Contractor based on the measure costs listed below under Customer Unit Cost for the number of completed units for each Measure upon receipt of invoice; provided the Contractor may collect a deposit from Customer prior to performing such work, in which case the final invoice shall be net of such deposit. Customer and Contractor understand that conditions discovered during installation may require that some measures identified in the energy assessment cannot be installed, or some areas may require additional measures/quantities to be installed. Should conditions in the field dictate that the Estimated Program Total Cost shown on page 2 increase by more than 10%, Contractor must obtain both Program Administrator and Customer written approval in the form of an amended Scope of Work Attachment before proceeding with such additional work.

By signing below, the Parties agree the above listed Measures shall be installed by the Contractor. The Customer shall pay the Contractor as described herein following Completion and Acceptance of Measures. Customer certifies that he/she has the authority to contract for retrofit work in the Facility in connection with the Measures listed and, if the Customer does not own the Facility, the Owner has granted permission to Customer for performance of such work.

Participating Customer _____ Date _____

Participating Contractor _____ Date _____

Page 2
Scope of Work

The work to be performed by the Participating Contractor in connection with the Project shall be comprised of the below listed Measures in the estimated quantities listed:

Measure Description / Location	Quantity To Be Installed	Total Measure Cost	Estimated Customer Total Cost	Estimated Incentive Amount
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Locker Room	2	$ 154.30	$ 107.53	$ 46.77
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Mens BR	1	$ 61.78	$ 43.05	$ 18.73
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Womens BR	1	$ 61.78	$ 43.05	$ 18.73
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Fire Cabinet	1	$ 77.15	$ 53.77	$ 23.38
Relamp: LED - A-Lamp (3 - 25W): 15 W / Canopy Ext	4	$ 112.68	$ 78.53	$ 34.15
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Main Office	14	$ 1,080.10	$ 752.73	$ 327.37
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Court Admin	2	$ 154.30	$ 107.53	$ 46.77
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Bathroom	1	$ 77.15	$ 53.77	$ 23.38
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Bathroom	1	$ 61.78	$ 43.05	$ 18.73
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Break Room	2	$ 154.30	$ 107.53	$ 46.77
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Records	4	$ 308.60	$ 215.07	$ 93.53
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Closet	1	$ 77.15	$ 53.77	$ 23.38
Fixture Replacement: LED Recessed Downlight - 6": 17 W / Judges Office	4	$ 535.40	$ 373.12	$ 162.28
Relamp/Reballast: Plug & Play LED - 2-Lamp - U-Bend (U6): 15W / Judges Office	1	$ 85.18	$ 59.36	$ 25.82
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Judges BR	1	$ 61.78	$ 43.05	$ 18.73
Relamp: Direct Line LED - 1-Lamp - 4-Foot T8 (Stand. - 12.5W) / Storage Closet	1	$ 54.65	$ 38.09	$ 16.56
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Conference Room	5	$ 385.75	$ 268.83	$ 116.92
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Hall	3	$ 231.45	$ 161.30	$ 70.15
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Public Defender Office	2	$ 154.30	$ 107.53	$ 46.77
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Sprinkler Room	1	$ 61.78	$ 43.05	$ 18.73
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Womens BR	2	$ 154.30	$ 107.53	$ 46.77
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Womens BR	1	$ 61.78	$ 43.05	$ 18.73
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Mens BR	2	$ 154.30	$ 107.53	$ 46.77
Relamp: Direct Line LED - 2-Lamp - 4-Foot T8 (Stand. - 12.5W) / Mens BR	1	$ 61.78	$ 43.05	$ 18.73
Relamp: Direct Line LED - 3-Lamp - 4-Foot T8 (Stand. - 12.5W) / Prosecutor Office	2	$ 154.30	$ 107.53	$ 46.77
Packaged RTU (Gas Heating): 10-Tons / Roof - 6098	1	$ 17,689.00	$ 12,327.57	$ 5,361.43
Packaged RTU (Gas Heating): 6-Tons / Roof - 4836	1	$ 13,101.00	$ 9,130.16	$ 3,970.84
Electronic Fuel-Use Economizers (for Forced Air Heat) / Roof - 0923	1	$ 541.00	$ 377.03	$ 163.97
Electronic Fuel-Use Economizers (for Forced Air Heat) / Roof - 1109	1	$ 541.00	$ 377.03	$ 163.97
Electronic Fuel-Use Economizers (for Forced Air Heat) / Roof - 6098	1	$ 541.00	$ 377.03	$ 163.97
Electronic Fuel-Use Economizers (for Forced Air Heat) / Roof - 4836	1	$ 541.00	$ 377.03	$ 163.97
Pipe Wrap Insulation / Mech. Romm	1	$ 337.50	$ 235.21	$ 102.29
TOTALS**		$ 37,829.32	$ 26,363.47	$ 11,465.85

**Maximum incentive amount per project is $125,000. Measures that would qualify the project for funding through the State Energy Program (SEP) are identified above with an 'S'. If any "SEP measures" are included then the total incentive amount for all measures will be paid with SEP funds, otherwise the total incentive amount will come from NJ Clean Energy funds.

DCO

- Josh Costell
- Executive Vice President and General Manager
- DCO Energy Efficiency Division
- 100 Lenox Drive
- Lawrenceville, NJ 08648

Wildwood

- Wildwood

ENERGY SAVINGS PLAN

APPENDIX F – ECM BREAKDOWN BY BUILDING

CITY OF WILDWOOD			INCLUDED IN PROJECT	INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS SAVINGS	Reduction of CO_2	Reduction of Nox	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"	$	$	$	$	$	$	kWh	kW	THERMS	LBS	LBS	LBS	LBS	SELECT	$$	YEARS
1a	Municipal Building (City Hall, Fire, Police)	LED Interior and Exterior Lighting	Y	$11,733	$8,293	($750)	$7,543	$8,820	$16,363	66,285	11.8	-635	65,480	57	146	308		$0	0.7
3	Municipal Building (City Hall, Fire, Police)	Energy Management System	Y	$137,813	$958	$2,291	$3,249	$0	$3,249	9,486	0.0	1,942	33,152	27	21	44		$0	42.4
4	Municipal Building (City Hall, Fire, Police)	Boiler Replacement	Y	$428,873	$0	$1,667	$1,667	$2,150	$3,817	0	0.0	1,413	16,527	13	0	0	PRESCRIPTIVE	$6,000	110.8
5	Municipal Building (City Hall, Fire, Police)	Chiller Replacement	Y	$416,525	$8,675	$0	$8,675	$2,000	$10,675	53,336	48.6	0	58,670	51	118	248	CUSTOM	$8,534	38.2
6	Municipal Building (City Hall, Fire, Police)	Cooling Tower Replacement	Y	$375,953	$2,970	$0	$2,970	$7,200	$10,170	25,833	5.3	0	28,416	25	57	120	PRESCRIPTIVE	$1,500	36.8
7	Municipal Building (City Hall, Fire, Police)	Premium Efficiency Pump Motors and VFDs	Y	$51,156	$4,055	$0	$4,055	$1,991	$6,047	37,621	3.8	0	41,383	36	83	175	PRESCRIPTIVE	$3,100	7.9
9	Municipal Building (City Hall, Fire, Police)	Dual Temperature Fan Coil Unit Replacement	Y	$491,191	$2,609	$0	$2,609	$0	$2,609	21,455	3.3	0	23,601	20	47	100		$0	188.3
12	Municipal Building (City Hall, Fire, Police)	Domestic Water Heater Replacement	Y	$34,679	$5,481	($1,166)	$4,315	$0	$4,315	28,224	19.4	-988	19,489	18	62	131	PRESCRIPTIVE	$750	7.9
13	Municipal Building (City Hall, Fire, Police)	Pipe and Valve Insulation	Y	$34,430	$164	$1,469	$1,633	$0	$1,633	1,622	0	1,245	16,354	13	4	8		$0	21.1
14	Municipal Building (City Hall, Fire, Police)	Building Envelope Weatherization	Y	$2,038	$85	$231	$316	$0	$316	840	0.0	196	3,215	3	2	4		$0	6.5
15	Municipal Building (City Hall, Fire, Police)	Water Conservation	Y	$21	$0	$268	$268	$0	$268	0	0.0	227	2,656	2	0	0		$0	0.1
16a	Municipal Building (City Hall, Fire, Police)	Solar Owned by City	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
16b	Municipal Building (City Hall, Fire, Police)	Solar PPA	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
17	Municipal Building (City Hall, Fire, Police)	Combined Heat & Power Unit	Y	$353,813	$11,858	($7,223)	$4,635	$0	$4,635	93,940	35.0	-6,122	49,749	22	63	0		$0	76.3
18	Municipal Building (City Hall, Fire, Police)	Electrical Vehicle Charging Station	N	$0	$0	$0	$0	$0	$0	0	0	0	0	0	0	0			0.0
19	Municipal Building (City Hall, Fire, Police)	Roof Upgrades	Y	$228,192	$13	$183	$195	$0	$195	125	0	155	1,949	2	0	1		$0	1168.2
20	Municipal Building (City Hall, Fire, Police)	Window Replacement	Y	$183,000	$83	$1,203	$1,286	$0	$1,286	821	0	1,020	12,831	10	2	4		$0	142.3
21	Municipal Building (City Hall, Fire, Police)	Parking Lot Paving for Carport Solar	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
22	Municipal Building (City Hall, Fire, Police)	Asbestos Abatement	Y	$100,000	$0	$0	$0	$0	$0	0	0	0	0	0	0	0		$0	0.0
1a	Court	LED Interior and Exterior Lighting	Y	$5,878	$1,704	($156)	$1,548	$0	$1,548	13,241	2.4	-132	13,023	11	29	62		$0	3.8
3	Court	Energy Management System	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
8	Court	Rooftop Unit Replacement	Y	$39,884	$570	$135	$705	$95	$800	4,198	1.9	114	5,952	5	9	20		$0	49.9
10	Court	Electronic Fuel-Use Economizer	Y	$2,262	$0	$628	$628	$0	$628	0	0.0	532	6,225	5	0	0		$0	3.6
13	Court	Pipe and Valve Insulation	Y	$353	$0	$22	$22	$0	$22	0	0.0	18	216	0	0	0		$0	16.2
14	Court	Building Envelope Weatherization	Y	$7,868	$379	$560	$939	$0	$939	3,792	0.0	474	9,716	8	8	18		$0	8.4
19	Court	Roof Upgrades	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
1a	Byrne Recreation Center	LED Interior and Exterior Lighting	Y	$5,543	$3,387	($316)	$3,071	$0	$3,071	26,944	4.8	-268	26,500	23	60	125		$0	1.8
3	Byrne Recreation Center	Energy Management System	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
8	Byrne Recreation Center	Rooftop Unit Replacement	Y	$68,055	$2,403	$507	$2,910	$326	$3,236	18,203	8.2	431	25,064	21	40	85		$0	21.0
10	Byrne Recreation Center	Electronic Fuel-Use Economizer	Y	$440	$0	$1,372	$1,372	$0	$1,372	0	0.0	1,166	13,638	11	0	0		$0	0.3
11	Byrne Recreation Center	Destratification Fans	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
14	Byrne Recreation Center	Building Envelope Weatherization	Y	$1,357	$38	$57	$95	$0	$95	374	0.0	48	977	1	1	2		$0	14.3
16a	Byrne Recreation Center	Solar Owned by City	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
16b	Byrne Recreation Center	Solar PPA	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
19	Byrne Recreation Center	Roof Upgrades	Y	$120,660	$40	$318	$358	$0	$358	394	0.0	270	3,598	3	1	2		$0	336.9
16a	Public Works Buildings (New)	Solar Owned by City	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
16b	Public Works Buildings (New)	Solar PPA	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
1a	Public Works Buildings (Existing)	LED Interior and Exterior Lighting	Y	$11,628	$1,145	($80)	$1,065	$0	$1,065	6,967	1.9	-68	6,867	6	15	32	PRESCRIPTIVE	$865	10.1
1a	Boardwalk Info Center	LED Interior and Exterior Lighting	Y	$15,498	$1,590	($108)	$1,482	$0	$1,482	9,630	2.7	-92	9,516	8	21	45	PRESCRIPTIVE	$270	10.3
1a	Beach Patrol	LED Interior and Exterior Lighting	Y	$11,218	$397	$0	$397	$0	$397	2,140	1.9	0	2,354	2	5	10		$0	28.2
12	Beach Patrol	Domestic Water Heater Replacement	Y	$5,513	$12	$0	$12	$0	$12	52	0.1	0	57	0	0	0		$0	458.4
1a	Fox Park & Doo Wop Shop	LED Interior and Exterior Lighting	Y	$8,613	$364	($23)	$341	$0	$341	2,100	0.6	-20	2,079	2	5	10	PRESCRIPTIVE	$120	24.9
1b	Fox Park & Doo Wop Shop	LED Athletic Field Lighting	Y	$51,638	$3,723	$0	$3,723	$0	$3,723	20,322	12.4	0	22,354	19	45	94	PRESCRIPTIVE	$1,600	13.4
14	Fox Park & Doo Wop Shop	Building Envelope Weatherization	Y	$1,666	$131	$31	$162	$0	$162	793	0.0	27	1,187	1	2	4		$0	10.3
1a	Hut	LED Interior and Exterior Lighting	Y	$1,262	$336	($23)	$312	$0	$312	2,044	0.6	-20	2,015	2	5	10	PRESCRIPTIVE	$85	3.8
14	Hut	Building Envelope Weatherization	Y	$7,518	$77	$166	$243	$0	$243	496	0.0	141	2,194	2	1	2		$0	30.9
1b	Maxwell Field	LED Athletic Field Lighting	N	$0	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0			0.0
1a	Streetlights - City of Wildwood	LED Interior and Exterior Lighting	Y	$0	$19,246	$0	$19,246	$0	$19,246	116,221	17.5	0	127,843	110	257	540		$0	0.0
2	Streetlights - Atlantic City Electric	Atlantic City Electric LED Street Lights	Y	$971,529	$200,241	$0	$200,241	$0	$200,241	441,164	0	0	485,281	419	975	2,051	PRESCRIPTIVE	$92,875	4.4
		TOTALS		$4,187,796	$281,028	$1,263	$282,291	$22,582	$304,874	1,008,660	182.1	1,074	1,140,126	957	2,084	4,253		$115,699	13.4

Optional ECMs evaluated but not included.

CITY OF WILDWOOD			INSTALLED COST	ANNUAL ELECTRIC COST SAVINGS	ANNUAL NATURAL GAS COST SAVINGS	ANNUAL ENERGY COST SAVINGS	ANNUAL O&M COST SAVINGS	TOTAL ANNUAL COST SAVINGS	ELECTRIC CONSUMPTION SAVINGS	ELECTRIC DEMAND SAVINGS	NATURAL GAS 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	$	$	$	$	$	$	kWh	kW	THERMS	LBS	LBS	LBS	LBS	SELECT	$$	YEARS
16a	Municipal Building (City Hall, Fire, Police)	Solar Owned by City	$541,632	$23,494	$0	$23,494	$0	$23,494	232,610	0.0	0	255,871	221	514	1,082		$0	23.1
16b	Municipal Building (City Hall, Fire, Police)	Solar PPA	$0	$23,494	$0	$6,025	$0	$6,025	232,610	0.0	0	255,871	221	514	1,082		$0	0.0
18	Municipal Building (City Hall, Fire, Police)	Electrical Vehicle Charging Station	$28,408	$0	$0	$0	$0	$0	0	0	0	0	0	0	0		$0	0.0
21	Municipal Building (City Hall, Fire, Police)	Parking Lot Paving for Carport Solar	$111,111	$0	$0	$0	$0	$0	0	0.0	0	0	0	0	0		$0	0.0
3	Court	Energy Management System	$83,790	$883	$1,335	$2,218	$0	$2,218	7,218	1.0	1,130	21,161	17	16	34		$0	37.8
19	Court	Roof Upgrades	$65,225	$26	$203	$229	$0	$229	259	0.0	172	2,299	2	1	1		$0	284.6
3	Byrne Recreation Center	Energy Management System	$143,325	$2,777	$4,405	$7,182	$0	$7,182	17,670	7.2	3,742	63,223	51	39	82		$0	20.0
11	Byrne Recreation Center	Destratification Fans	$45,000	$441	$831	$1,272	$0	$1,272	4,364	0.0	706	13,061	11	10	20		$0	35.4
16a	Byrne Recreation Center	Solar Owned by City	$265,224	$9,854	$0	$9,854	$0	$9,854	97,565	0.0	0	107,322	93	216	454		$0	26.9
16b	Byrne Recreation Center	Solar PPA	$0	$9,854	$0	$2,527	$0	$2,527	97,565	0.0	0	107,322	93	216	454		$0	0.0
16a	Public Works Buildings (New)	Solar Owned by City	$65,588	$3,932	$0	$3,932	$0	$3,932	25,870	0.0	0	28,457	25	57	120		$0	16.7
16b	Public Works Buildings (New)	Solar PPA	$0	$3,932	$0	$1,989	$0	$1,989	25,870	0.0	0	28,457	25	57	120		$0	0.0
1b	Maxwell Field	LED Athletic Field Lighting	$896,303	$2,836	$0	$2,836	$0	$2,836	6,468	60.1	0	7,115	6	14	30		$0	316.1
		TOTALS	$2,245,607	$81,522	$6,774	$61,557	$0	$61,557	748,068	68.3	5,751	939,906	785	1,716	3,479		$0	36.5

CITY OF WILDWOOD % SAVINGS BY BUILDING (T.O.R.)

CITY OF WILDWOOD 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
Municipal Building (City Hall, Fire, Police)	40,000	61.0%	83.9%	44.1%	-10.8%	32.0%
Court	9,000	19.7%	10.4%	19.7%	30.3%	30.3%
Byrne Recreation Center	19,400	25.9%	19.7%	25.9%	16.1%	16.1%
Public Works Buildings (New)	7,000	0.0%	0.0%	0.0%	0.0%	0.0%
Public Works Buildings (Existing)	6,400	28.0%	9.6%	28.0%	-2.9%	-2.9%
Boardwalk Info Center	5,250	24.8%	11.6%	24.8%	-6.5%	-6.5%
Beach Patrol	3,800	15.3%	-	15.3%	-	-
Fox Park & Doo Wop Shop	2,800	82.1%	34.3%	82.1%	2.0%	2.0%
Hut	1,100	36.9%	11.2%	36.9%	19.9%	19.9%
Maxwell Field	0	0.0%	0.0%	0.0%	-	-
Streetlights - City of Wildwood	0	66.1%	98.6%	66.1%	0	-
Streetlights - Atlantic City Electric	0	61.2%	0	61.2%	0	-
TOTALS	**94,750**	**53.4%**	**35.5%**	**48.4%**	**3.0%**	**20.4%**

CITY OF WILDWOOD SAVINGS BY BUILDING BY UTILITY FROM SMART SELECT

CITY OF WILDWOOD 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
Municipal Building (City Hall, Fire, Police)	40,000	339,587	127	245,647	(1,548)	4,574
Court	9,000	21,231	4	21,231	1,007	1,007
Byrne Recreation Center	19,400	45,915	13	45,915	1,647	1,647
Public Works Buildings (New)	7,000	0	0	0	0	0
Public Works Buildings (Existing)	6,400	6,967	2	6,967	(68)	(68)
Boardwalk Info Center	5,250	9,630	3	9,630	(92)	(92)
Beach Patrol	3,800	2,192	2	2,192	0	0
Fox Park & Doo Wop Shop	2,800	23,215	13	23,215	7	7
Hut	1,100	2,540	1	2,540	121	121
Maxwell Field	0	0	0	0	0	0
Streetlights - City of Wildwood	0	116,221	18	116,221	0	0
Streetlights - Atlantic City Electric	0	441,164	0	441,164	0	0
TOTALS	**94,750**	**1,008,660**	**182**	**914,720**	**1,074**	**7,195**

ENERGY SAVINGS PLAN

APPENDIX G – LIGHTING LINE BY LINE

	LOCATION:		EXISTING							PROPOSED			SAVINGS				
Line Ref	Building	Location	Existing Hrs. per Year	Existing QTY	Existing Fixture Description	Existing Lighting Description	Existing WATT / Fixture	Existing KWH Usage	Existing KW Usage	Proposed QTY	Proposed Lighting Description	Proposed WATT / Fixture	Proposed KWH Usage	Proposed Kw Usage	KWH Saved	Total KWH Saved	KW Saved
--	**Public Works Garages**	**316 W Oak Ave, Wildwood, N.**	-----	---	----------	----------	-----	-----	-----	---	-------	-----	-----	-----	--	----	--
1	Public Works Garages	Garage #6	1,200	4	1x8 Surface-Mounted Strip Fixture	8' 2L Existing LED	64	307	0.26	4	RETROFIT 8' 46W LED STRIP KIT	46	221	0.18	86	86	0.07
2	Public Works Garages	Garage #7	1,200	4	1x8 Surface-Mounted Strip Fixture	8' 2L Existing LED	64	307	0.26	4	RETROFIT 8' 46W LED STRIP KIT	46	221	0.18	86	86	0.07
3	Public Works Garages	Garage #8	1,200	1	1x8 Surface-Mounted Strip Fixture	8' 2L Existing LED	64	77	0.06	1	RETROFIT 8' 46W LED STRIP KIT	46	55	0.05	22	22	0.02
4	Public Works Garages	Garage #9	1,200	1	1x8 Surface-Mounted Strip Fixture	8' 2L Existing LED	64	77	0.06	1	RETROFIT 8' 46W LED STRIP KIT	46	55	0.05	22	22	0.02
5	Public Works Garages	Traffic Office	2,000	4	2x2 Recessed Lens Fixture	2L 4' F32 U TUBE T8 ELE N BALLAST	60	480	0.24	4	RETROFIT 4' 2L LED U-TUBE /SELF BALLAST	32	256	0.13	224	224	0.11
6	Public Works Garages	Shop Area	2,000	10	2x4 Recessed Lens Fixture	4L 4' F32 T8 ELE N BALLAST	112	2,240	1.12	10	RETROFIT 4' 4L LED TUBE /SELF BALLAST	42	840	0.42	1,400	1,400	0.70
7	Public Works Garages	Garage Area	1,200	2	1x8 Surface-Mounted Strip Fixture	2 LAMP 8FT F96 T12 EE / EE	123	295	0.25	2	RETROFIT 8' 46W LED STRIP KIT	46	110	0.09	185	185	0.15
8	Public Works Garages	Garage #2	1,200	2	1x8 Surface-Mounted Strip Fixture	2 LAMP 8FT F96 T12 EE / EE	123	295	0.25	2	RETROFIT 8' 46W LED STRIP KIT	46	110	0.09	185	185	0.15
9	Public Works Garages	Carpentry Shop	2,000	11	1x8 Surface-Mounted Strip Fixture	2 LAMP 8FT F96 T12 EE / EE	123	2,706	1.35	11	RETROFIT 8' 46W LED STRIP KIT	46	1,012	0.51	1,694	1,694	0.85
	Total: Public Works Garages			**39**				**6,784**	**3.85**	**39**			**2,881**	**1.70**	**3,904**	**3,904**	**2.15**

	LOCATION:		EXISTING							PROPOSED			SAVINGS				
Line Ref	Building	Location	Existing Hrs. per Year	Existing QTY	Existing Fixture Description	Existing Lighting Description	Existing WATT / Fixture	Existing KWH Usage	Existing KW Usage	Proposed QTY	Proposed Lighting Description	Proposed WATT / Fixture	Proposed KWH Usage	Proposed Kw Usage	KWH Saved	Total KWH Saved	KW Saved
	Fox Park	**4401 Atlantic Ave, Wildwood,**															
1	Fox Park	Playground Floods	4,380	8	Floodlight Fixture	1,000 WATT MH FLOOD	1,080	37,843	8.64	8	NEW LED PARK FLOOD 357 WATT	357	12,509	2.86	25,334	25,334	5.78
2	Fox Park	Tennis Courts - Pole #1	4,380	2	Floodlight Fixture	1,000 WATT MH FLOOD	1,080	9,461	2.16	2	NEW LED PARK FLOOD 357 WATT	357	3,127	0.71	6,333	6,333	1.45
3	Fox Park	Tennis Courts - Pole #2	4,380	2	Floodlight Fixture	1,000 WATT MH FLOOD	1,080	9,461	2.16	2	NEW LED PARK FLOOD 357 WATT	357	3,127	0.71	6,333	6,333	1.45
4	Fox Park	Tennis Courts - Pole #3	4,380	4	Floodlight Fixture	1,000 WATT MH FLOOD	1,080	18,922	4.32	4	NEW LED PARK FLOOD 357 WATT	357	6,255	1.43	12,667	12,667	2.89
5	Fox Park	Tennis Courts - Pole #4	4,380	4	Floodlight Fixture	1,000 WATT MH FLOOD	1,080	18,922	4.32	4	NEW LED PARK FLOOD 357 WATT	357	6,255	1.43	12,667	12,667	2.89
6	Fox Park	Tennis Courts - Pole #5	4,380	4	Floodlight Fixture	1,000 WATT MH FLOOD	1,080	18,922	4.32	4	NEW LED PARK FLOOD 357 WATT	357	6,255	1.43	12,667	12,667	2.89
7	Fox Park	Tennis Courts - Pole #6	4,380		Floodlight Fixture	1,000 WATT MH FLOOD	1,080			4	NEW LED PARK FLOOD 357 WATT	357	6,255	1.43	(6,255)	(6,255)	(1.43)
8	Fox Park	Tennis Courts - Pole #7	4,380	2	Floodlight Fixture	1,000 WATT MH FLOOD	1,080	9,461	2.16	2	NEW LED PARK FLOOD 357 WATT	357	3,127	0.71	6,333	6,333	1.45
9	Fox Park	Tennis Courts - Pole #8	4,380	2	Floodlight Fixture	1,000 WATT MH FLOOD	1,080	9,461	2.16	2	NEW LED PARK FLOOD 357 WATT	357	3,127	0.71	6,333	6,333	1.45
10	Fox Park	Tennis Courts - Pole #6 Mounting	4,380							1	REPLACEMENT 4-HEAD BULLHORN						
11	Fox Park	Baseball Field - Wooden Pole #1	4,380	2	Floodlight Fixture	1,000 WATT MH FLOOD	1,080			2	NO CHANGE						
12	Fox Park	Baseball Field - Wooden Pole #2	4,380	2	Floodlight Fixture	1,000 WATT MH FLOOD	1,080			2	NO CHANGE						
13	Fox Park	Baseball Field - Wooden Pole #3	4,380	2	Floodlight Fixture	1,000 WATT MH FLOOD	1,080			2	NO CHANGE						
14	Fox Park	Baseball Field - Wooden Pole #4	4,380	2	Floodlight Fixture	1,000 WATT MH FLOOD	1,080			2	NO CHANGE						
	Total: Fox Park			**36**				**132,451**	**30.24**	**41**			**50,037**	**11.42**	**82,414**	**82,414**	**18.82**
	Boardwalk Information Address																
1	Boardwalk Information Center	Main Office Areas	2,000	17		4 LAMP 2 FT F20 T12 STD / STD	112	3,808	1.90	17	NEW 2X2 LED FLAT PANEL FIXTURE 30W	30	1,020	0.51	2,788	2,788	1.39
2	Boardwalk Information Center	Police Office	2,000	8		4 LAMP 2 FT F20 T12 STD / STD	112	1,792	0.90	8	NEW 2X2 LED FLAT PANEL FIXTURE 30W	30	480	0.24	1,312	1,312	0.66
3	Boardwalk Information Center	(2) Bathrooms	2,000	2		2L 2' F17 ELE N BALLAST	34	136	0.07	2	NEW 2X2 LED FLAT PANEL FIXTURE 30W	30	120	0.06	16	16	0.01
4	Boardwalk Information Center	Hallway	2,000	1		4 LAMP 2 FT F20 T12 STD / STD	112	224	0.11	1	NEW 2X2 LED FLAT PANEL FIXTURE 30W	30	60	0.03	164	164	0.08
5	Boardwalk Information Center	Meeting Room	2,000	8		2 LAMP 8FT F96 T12 EE / EE	123	1,968	0.98	8	NEW LED 54W 8' STRIP FIXTURE CHAIN MOUNT	54	864	0.43	1,104	1,104	0.55
6	Boardwalk Information Center	Side Office	2,000	2		2 LAMP 8FT F96 T12 EE / EE	123	492	0.25	2	NEW LED 54W 8' STRIP FIXTURE CHAIN MOUNT	54	216	0.11	276	276	0.14
7	Boardwalk Information Center	Side Office - (4) LED A9's															
8	Boardwalk Information Center	Storage Room	1,200	1		4L 4' F32 T8 ELE N BALLAST	112	134	0.11	1	RETROFIT 4' 4L LED TUBE /SELF BALLAST	42	50	0.04	84	84	0.07
9	Boardwalk Information Center	Exterior Floods	4,380	12		COMPACT FLUORESCENT 13W S/I	13	683	0.16	12	RELAMP 9 WATT LED A LAMP S/I	9	473	0.11	210	210	
	Information Center			**51**				**9,238**	**4.48**	**51**			**3,283**	**1.53**	**5,954**	**5,954**	**2.90**
	Doo Wop Shop	**Address**															
1	Doo Wop Shop	Restaurant Area - LED Screw In Floods															
2	Doo Wop Shop	Pantry	2,000	5		3L 4' F32 T8 ELE N BALLAST	85	850	0.43	5	RETROFIT 4' 3L LED TUBE /SELF BALLAST	32	315	0.16	535	535	0.27
3	Doo Wop Shop	Pantry	2,000	1		2L 4' F32 U TUBE T8 ELE N BALLAST	60	120	0.06	1	RETROFIT 4' 2L LED U-TUBE /SELF BALLAST	32	64	0.03	56	56	0.03
4	Doo Wop Shop	Storage Room	1,200	1		2L 4' F32 T8 ELE N BALLAST	60	72	0.06	1	RETROFIT 4' 2L LED TUBE /SELF BALLAST	21	25	0.02	47	47	0.04
5	Doo Wop Shop	Exterior Bathrooms	2,000	10		2L 4' F32 U TUBE T8 ELE N BALLAST	60	1,200	0.60	10	RETROFIT 4' 2L LED U-TUBE /SELF BALLAST	32	640	0.32	560	560	0.28
6	Doo Wop Shop	Exterior Canopy	4,380	20		COMPACT FLUORESCENT 13W HW	13	1,139	0.26	20	RETROFIT HIGH HAT 12 W LED 6 INCH	12	1,051	0.24	88	88	
	Total: Doo Wop Shop			**37**				**3,381**	**1.41**	**37**			**2,095**	**0.77**	**1,285**	**1,285**	**0.61**
	Hut Building	**Address**															
1	Hut Building	Meeting Room	2,000	3		4 LAMP 8FT F96 T12 EE / EE	246	1,476	0.74	3	NEW LED 54W 8' STRIP FIXTURE CHAIN MOUNT	54	324	0.16	1,152	1,152	0.58
2	Hut Building	Kitchen	2,000	1		2 LAMP 4 FT F40 T12 EE / EE	73	146	0.07	1	RETROFIT 4' 2L LED TUBE /SELF BALLAST	21	42	0.02	104	104	0.05
3	Hut Building	Kitchen (2) A9 LED's															
4	Hut Building	Bathroom (5) A9 LED's															
	Total: Hut Building			**4**				**1,622**	**0.81**	**4**			**366**	**0.18**	**1,256**	**1,256**	**0.63**

DCO CITY OF WILDWOOD LIGHT POLE REMOVAL			
STREET	**FIXTURE LOCATION**	**QTY**	**Work Description**
Ocean Ave.	Northbound From Bennett Ave to Schellenger Ave	37	DEMO POLE AND BASE, FILL IN WITH CONCRETE
Ocean Ave.	Northbound From Bennett Ave to Schellenger Ave	37	LABOR TO DISCONNECT POWER TO POLES
Ocean Ave.	Southbound From Bennett Ave to Schellenger Ave	39	DEMO POLE AND BASE, FILL IN WITH CONCRETE
Ocean Ave.	Southbound From Bennett Ave to Schellenger Ave	39	LABOR TO DISCONNECT POWER TO POLES
Pacific Ave. North	Southbound From Cresse Ave to East 16th Ave	83	DEMO POLE AND BASE, FILL IN WITH CONCRETE
Pacific Ave. North	Southbound From Cresse Ave to East 16th Ave	83	LABOR TO DISCONNECT POWER TO POLES
Pacific Ave. North	Southbound From Cresse Ave to East 26th Ave	47	DEMO POLE AND BASE, FILL IN WITH CONCRETE
Pacific Ave. North	Southbound From Cresse Ave to East 26th Ave	47	LABOR TO DISCONNECT POWER TO POLES

Additional line-by-lines in Appendix E