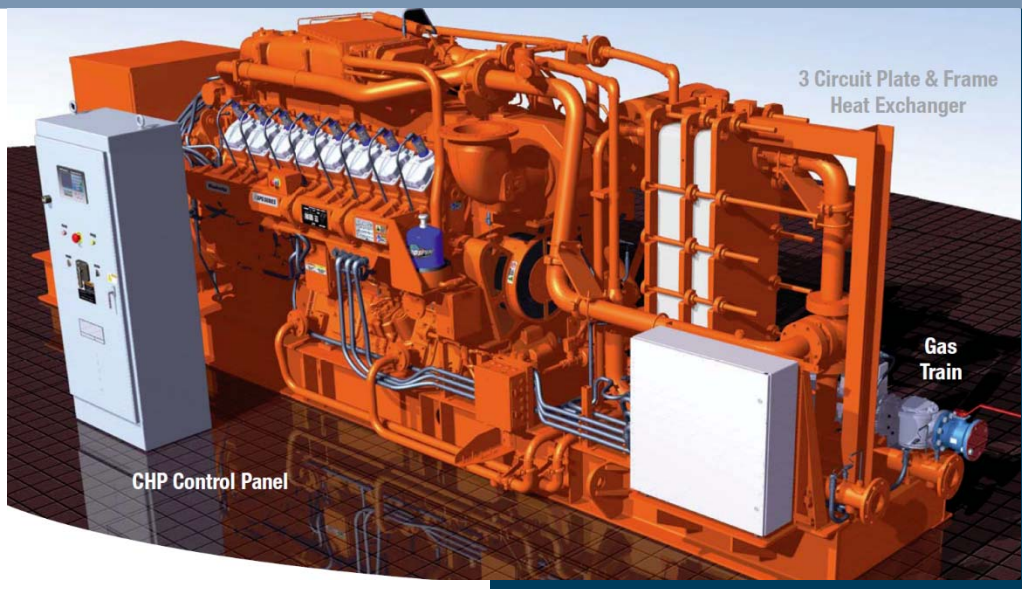
Local Government Energy Audit:
Combined Heat and Power Plant Evaluation



Ocean County College

One College Drive

Toms River, New Jersey

March 14, 2017

Report by:

TRC Energy Services

Disclaimer

The intent of this report is to identify energy savings opportunities and operational enhancement associated with the facility's combined heat and power plant. Approximate savings are included in this report to make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. It should be noted that detailed design efforts are required in order to implement several of the improvements evaluated as part of this analysis.

The energy savings opportunities and estimates of energy consumption contained in this report have been reviewed for technical accuracy. However, all estimates contained herein of energy consumption at the site are not guaranteed, because energy consumption ultimately depends on behavioral factors, the weather, and many other uncontrollable variables. The energy assessor and New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy consumption vary from the estimated consumption shown herein.

Estimated installation costs are based on a variety of sources, including our own experience at similar facilities, our own pricing research using local contractors and vendors, and cost estimating handbooks such as those provided by RS Means. The cost estimates represent our best judgment for the proposed action. The Owner is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for a particular installation, and for conditions which cannot be known prior to in-depth investigation and design, the energy assessor does not guarantee installed cost estimates and shall in no event be liable should actual installed costs vary from the estimated costs herein.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates and are based on program information available at the time this report is written. The NJBPU reserves the right to extend, modify, or terminate programs without prior or further notice, including incentive levels and eligibility requirements. The Owner should review available program incentives and requirements prior to selecting and/or installing any recommended measures.

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INTRODUCTION

The New Jersey Board of Public Utilities (NJBPU) has sponsored a Local Government Energy Audit (LGEA) Report for Ocean County College (OCC). As part of the LGEA, TRC was enlisted to review the operation of the campus's new combined heat and power (CHP) plant. The CHP plant has had a history of operational issues that limited the benefit it could provide to campus. OCC requested that TRC provides an economic analysis of the CHP plant and central plant to help determine the optimal mode of operation.

The CHP plant is comprised of a Waukesha APG1000 reciprocating engine-generator and a Broad BHE85 single-stage absorption chiller. The central plant is comprised of three York YMC2 magnetic bearing variable speed chillers and four Aerco BMK 6000 condensing boilers.

EVALUATED MODES OF OPERATION

TRC developed a model that simulates typical OCC demand for electricity, hot water, and chilled water throughout the day and the year. The performance of the CHP plant and central plant were overlaid atop the campus load profiles to simulate how the campus loads could be served. We evaluated the economics of seven modes of operation.

Utility – No Cogeneration

This mode of operation establishes a baseline model where all electricity is provided by the utility, all hot water is provided by the condensing boiler plant, and all chilled water is provided by the electric centrifugal chillers. The energy consumption and cost of the model was tuned to align with historical utility bills.

Existing Cogeneration Plant Configuration and Operation

This mode of operation mirrors the current plant configuration, equipment performance, and sequence of operations. As such:

- The absorption chiller and electric chillers are not allowed to operate simultaneously.
- The absorption chiller has a bias to produce chilled water whenever possible.
- The absorption chiller is limited to 43% of design capacity based on actual supplied exhaust and jacket water temperatures.
- The generator's electric output is restricted to maintain a 250 kW minimum import from the utility.

Existing Cogeneration with Full Absorption Chiller Capacity

This the same as the existing cogeneration model, except, the plant performance limitations have been corrected and the equipment is capable of operating at full-load design conditions. All other models that use the absorption chiller assume it is capable of meeting design performance.

Simultaneous Chiller Operation

Due to condenser water flow limitations, the absorption chiller and electric chillers cannot currently operate simultaneously. This model evaluates plant economics if both the CHP plant and central plant could produce chilled water simultaneously.

Existing Cogeneration Plant Configuration Heating Only

This mode of operation evaluates if the CHP plant only produces hot water with the single-stage absorption chiller and all chilled water is produced by the electric chillers. It should be noted that the variable-speed magnetic-bearing electric chillers are very efficient at producing chilled water (0.582 kW/ton) and have excellent part load performance, while a single-stage absorption chiller is not very efficient at producing chilled water (2.32 kW/ton equivalent) and performs worse at part load.

Heating Only Cogeneration Plant with New Heat Recovery

The existing absorption chiller is capable of taking exhaust and jacket water from the engine to produce hot water, however, since this is not its primary function, it is not very efficient at the process. Based on design drawings for the plant, the absorption chiller has an effective efficiency of 41.5% when converting engine waste heat into heating hot water. Task specific exhaust heat recovery systems are extremely effective at producing hot water with very little exhaust pressure drop.

This mode evaluates modifying the CHP plant to include a high-efficiency heat recovery system. We conservatively assume the new system would recover 80% (nearly double) of the same heat provided to the absorption chiller.

Existing Cogeneration Plant Configuration with Additional Generation

This mode evaluates installing additional generation capacity, effectively increasing the electric output of the plant. The model assumes a new 200 kW peaking engine-generator is added to the plant and it has the same performance characteristics of the existing Waukesha.

Additional Generation Cogeneration Plant Configuration with New Heat Recovery

This model evaluates installing the peaking engine-generator and the new high-efficiency heat recovery system, effectively increasing the electric and hot water output of the plant.

RESULTS

Due to the high cost of electricity and low cost of natural gas, OCC saves significant money using the CHP plant. The table below summarizes the economics associated with optimizing the CHP plant.

CHP Economic Analysis - Summary

	Utility (no cogen)	Existing Cogen (cooling bias)	Full ABS Cap (cooling bias)	Simultaneous Chillers	Heating only w/ ABS	Heating only w/ New HR	Existing Cogen Additional Gen	Add Gen w/ New HR
Annual Electricity (kWh/yr)	10,902,000	10,823,000	10,795,000	10,652,000	10,902,000	10,902,000	10,795,000	10,902,000
Utility Electricity (kWh/yr)	10,902,000	4,330,000	4,302,000	4,159,000	4,409,000	4,409,000	3,909,000	4,017,000
Annual Natural Gas (Th/yr)	217,000	755,000	722,000	732,000	696,000	662,000	767,000	706,000
	-	-	-	-	-	-	-	-
Electric Energy Cost	$1,059,000	420,000	$418,000	$404,000	$428,000	$428,000	$380,000	$390,000
Demand Cost	$126,000	$66,000	$66,000	$66,000	$66,000	$66,000	$66,000	$66,000
Natural Gas Cost	$168,000	$585,000	$559,000	$567,000	$538,000	$512,000	$593,000	$547,000
Total Utility Cost	$1,353,000	$1,071,000	$1,043,000	$1,037,000	$1,032,000	$1,006,000	$1,039,000	$1,003,000
Savings (compared to existing)			$28,000	$34,000	$39,000	$65,000	$32,000	$68,000
Implementation Cost			$50,000	$50,000	$0	$300,000	$200,000	$500,000
Simple Payback (yrs)			1.8	1.5	0.0	4.6	6.3	7.4

The campus hot water load profile indicates there is a continuous demand for hot water. Using engine exhaust and jacket water to satisfy the campus heating load is the most efficient way to use the engine waste heat. Our analysis shows that using the existing magnetic bearing chillers to produce chilled water and installing a dedicated high-efficiency exhaust heat recovery system is the most expeditious way to optimize CHP plant performance. Ideally, the exhaust system could be modified to allow the absorption chiller to be used as a backup device. This recommendation is driven by the low efficiency of a single stage absorption chiller.

Note that that exhaust system back pressure is a critical system design element and further analysis should be performed to ensure modifications to the exhaust system will not negatively affect engine performance.

The campus electric load profile indicates there are times when the campus could make use of additional generation capacity. There are also times when a smaller generator could operate and provide benefit. Installing a smaller engine generator or microturbine adds versatility to plant operations. Just installing additional generation capacity provides some additional savings, but paring additional generation with a dedicated high-efficiency exhaust heat recovery system provides the best opportunity to maximize CHP plant performance.

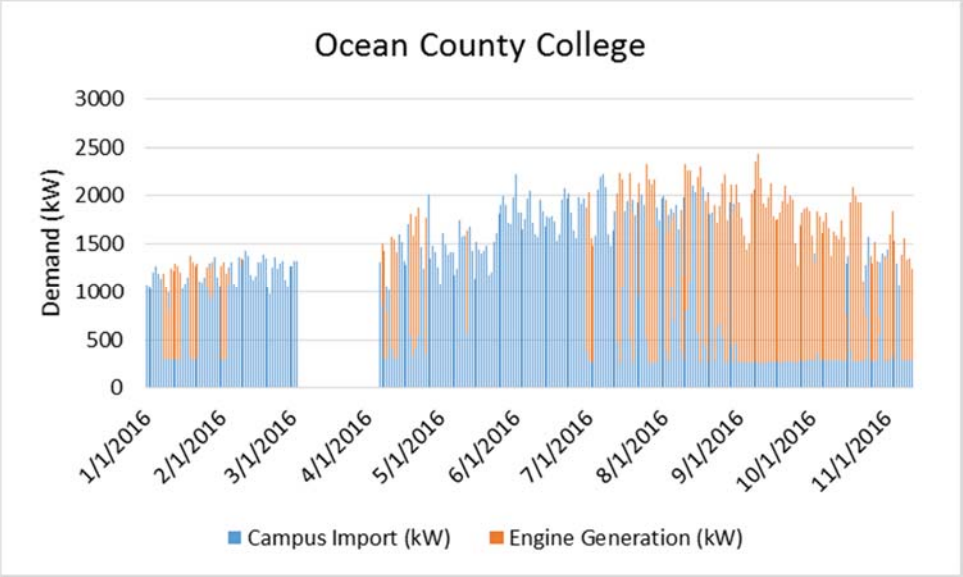
ANALYSIS METHODOLOGY

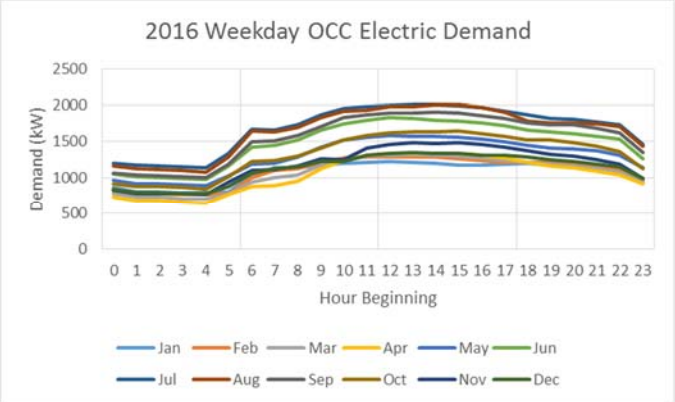
Existing load profiles

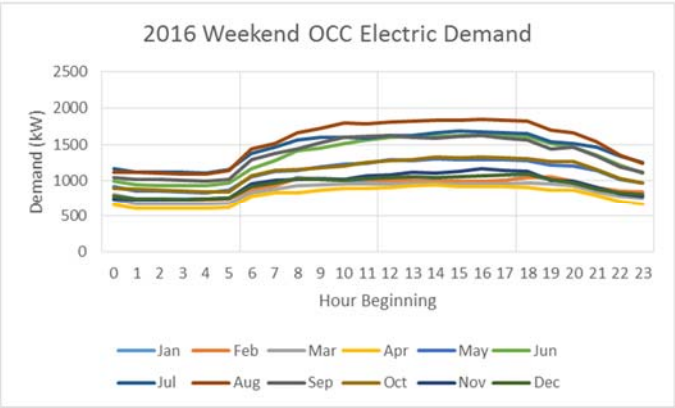
Existing campus load profiles were developed for electricity, hot water, and chilled water. The load profiles are based extensively on hourly trend data and sequence of operations provided by the campus, equipment capacities, and historical weather data.

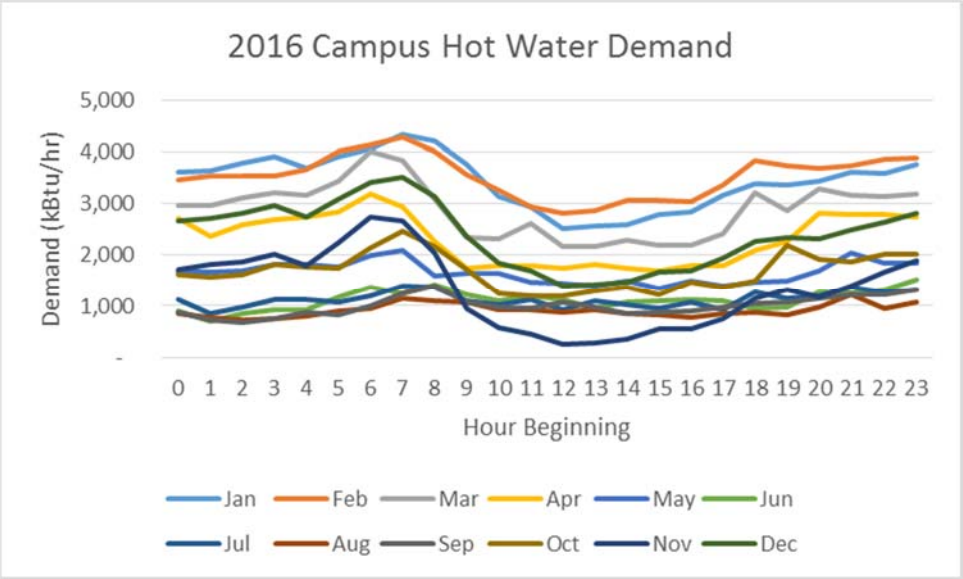
- The electrical load profile is based on the site's JCP&L meter, Enernoc's revenue meter, and the engine's generation meter. The energy associated with the creation of chilled water was removed to facilitate the comparison of different modes of CHP operation.
- The hot water load profile is based on boiler plant trend data.
- The chilled water load profile is based on equipment capacity, site operational data, and 30-year average weather data. Chilled water trends were not available.

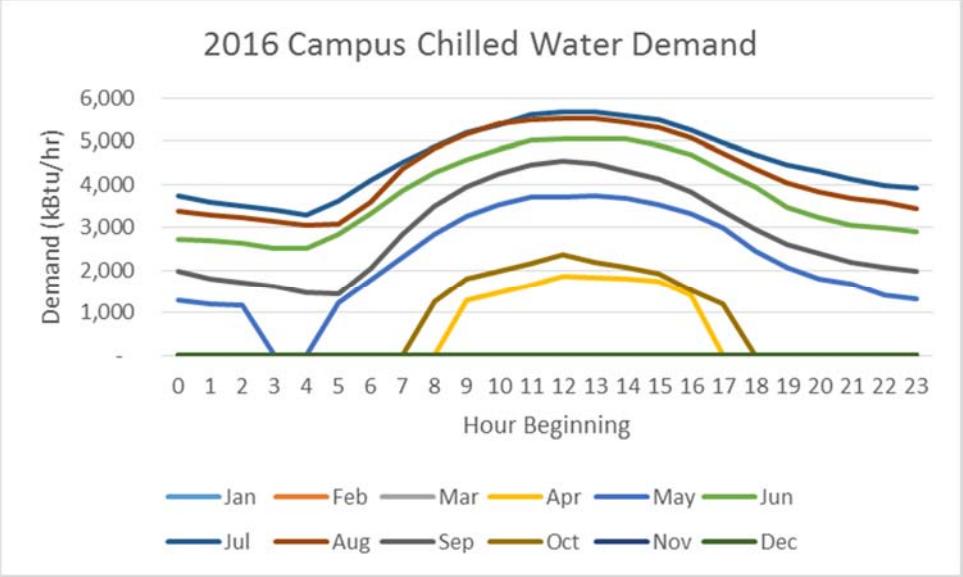
The data was compiled to create average daily load profiles for each month. Annual totals were compared against utility data to ensure reasonability.











Combined Heat and Power Model

We created a model that compares the cost of operating the CHP in different modes of operation. The model is based primarily on the campus load profiles, equipment performance data, and sequences of operation. Each mode of operation follows an identical analysis process where we determine the operational and energy state of the campus for each *typical* hour of a *typical* day each month.

The following order of analysis is considered for each hour:

1) Cogen Operation – Based on the mode of operation, the engine is on or off.
2) Cogen Electric Output (kW) – We maximize generator output while accounting for the minimum engine load, maximum engine load, and minimum utility import.

3) Electric Utility Import (kW) – The difference between campus load and generator output. This does not include the energy required to operate the centrifugal chillers.
4) Cogen Fuel Purchase (kBtu/hr) – A generic engine performance curve was scaled to the full load performance of the campus's Waukesha AGP1000.
5) ABS Operation – Based on the mode of operation, the absorption chiller is heating, cooling, or off.
6) ABS Heat Output (kBtu/hr) – The full load heat output of the absorption chiller is scaled based on the engine the fuel flow.
7) Boiler Fuel Purchase (kBtu/hr) – The difference between campus load and absorption chiller hot water output. The efficiency of the boiler is used to convert from heat to fuel.
8) ABS Cooling Output (kBtu/hr) – The full load cooling output of the absorption chiller is scaled based on the engine the fuel flow.
9) Centrifugal Chiller Energy (tons) – The difference between campus load and absorption chiller chilled water output. This was converted to tons to make the next step easier.
10) Centrifugal Chiller Electricity (kW) – A performance curve for generic magnetic bearing chiller was scaled to the full load performance of the campus chillers (York YMC2). The load on the chiller plant is split amongst the fewest number of chillers.
11) Total Utility Electric Purchase (kW) – The sum of the utility import and chiller plant energy. This is a conservative approach that underestimates CHP generation potential.
12) Total Utility Natural Gas Purchase (kW) – The sum of natural gas used for the engine and the boiler plant.
13) Utility Cost – utility rates are applied based on rate schedules and historical rates.
14) Daily averages are extrapolated to monthly and yearly totals.

Assumptions

The following is a list of key assumptions used in our analysis:

Electric Load Profile

- Electric data was missing for March and December so average values from adjacent months were used.

Chilled Water Load Profile

- The chilled water system is drained November through March.
- Below 55°F outside air temperature, chilled water is not required.
- The campus maximum chilled water demand is 475 tons.

Utility Rates

- JCP&L General Service Primary for Transmission and Distribution
  - $0.164143 per kWh (year round)
  - $5.65 per maximum KW during June through September
  - $5.23 per maximum KW during October through May
  - Included a $0.07/kWh fee to tune rate schedule to historic bills
- Direct Energy for commodity: flat fee of $0.07435 per kWh
- New Jersey Natural Gas Company General Service Large: 12-month ave. $0.7446 /th

Reciprocating Engine-generator: Waukesha AGP1000

- Full load performance matches manufacturer's data sheet.
- The engine's part load performance follows a curved derived from multiple IC engines of similar sizes.
- The engine-generator has a minimum load of 750 kW.
- The campus has a 250 kW minimum import requirement.

Absorption Chiller: Broad BHE85

- Full load performance matches the Equipment Schedule drawing from Concord Engineering Group dated 9/29/10.
- Output is linear with engine fuel flow.
- Actual operation is based on the following conditions:

Design Exhaust In	776	°F
Actual Exhaust In	750	°F
Design Exhaust Out	320	°F
Actual Exhaust Heat	94%	
Design JW In	210	°F
Actual JW In	177	°F
Design JW Out	198	°F
Actual JW Heat	0%	
Actual ABS Capacity	43%	

Chillers: York YMC2

- Full load performance matches the Equipment Schedule drawing from Concord Engineering.
- The chillers part load performance follows a curved derived from similar magnetic bearing variable speed chillers.
- The chillers have a minimum speed of 20%.

Boilers: Aerco BMK 6000

- Full load performance matches the Equipment Schedule drawing from Concord Engineering.

Appendix A: CHP Model

Ocean County College
CHP Economic Analysis - Summary

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Ocean County College
Existing Campus Load Profiles

Electricity - w/o Chillers																									
kW		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Month	1 Jan	840	786	783	774	771	781	975	1,073	1,104	1,125	1,137	1,139	1,147	1,144	1,134	1,116	1,113	1,129	1,153	1,124	1,080	1,042	1,021	929
	2 Feb	812	762	760	751	749	771	970	1,057	1,102	1,156	1,202	1,210	1,209	1,210	1,202	1,184	1,169	1,154	1,166	1,167	1,134	1,080	1,039	929
	3 Mar	760	708	705	695	689	748	909	964	1,009	1,102	1,169	1,197	1,206	1,212	1,209	1,197	1,180	1,159	1,144	1,119	1,095	1,042	989	883
	4 Apr	708	653	649	638	629	724	847	871	916	1,023	1,106	1,150	1,164	1,176	1,178	1,173	1,163	1,164	1,121	1,071	1,055	1,003	939	836
	5 May	926	875	868	881	868	955	1,110	1,128	1,170	1,269	1,333	1,355	1,385	1,374	1,385	1,382	1,380	1,367	1,340	1,308	1,306	1,273	1,198	1,059
	6 Jun	967	932	923	912	904	1,042	1,267	1,279	1,345	1,440	1,498	1,529	1,555	1,558	1,535	1,546	1,547	1,546	1,522	1,503	1,484	1,441	1,372	1,149
	7 Jul	1,074	1,055	1,052	1,046	1,041	1,173	1,441	1,435	1,484	1,558	1,596	1,583	1,591	1,601	1,630	1,636	1,647	1,634	1,618	1,572	1,561	1,535	1,481	1,269
	8 Aug	1,056	1,031	1,020	1,011	1,001	1,168	1,490	1,451	1,492	1,580	1,635	1,641	1,676	1,674	1,706	1,726	1,724	1,702	1,638	1,612	1,625	1,587	1,513	1,287
	9 Sep	1,017	999	988	979	970	1,108	1,394	1,410	1,448	1,538	1,627	1,642	1,660	1,660	1,672	1,689	1,677	1,667	1,636	1,599	1,612	1,544	1,459	1,240
	10 Oct	909	880	871	857	841	958	1,169	1,206	1,226	1,301	1,383	1,435	1,459	1,475	1,493	1,498	1,490	1,464	1,449	1,436	1,417	1,343	1,251	1,071
	11 Nov	811	767	771	764	762	909	1,072	1,091	1,137	1,222	1,206	1,345	1,387	1,409	1,399	1,411	1,398	1,368	1,328	1,260	1,238	1,179	1,114	947
	12 Dec	826	777	777	769	767	845	1,024	1,082	1,121	1,174	1,172	1,242	1,267	1,277	1,267	1,264	1,256	1,249	1,241	1,192	1,159	1,111	1,068	938

HHW		Hour																							
kBtu/hr		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Month	1 Jan	3,626	3,650	3,791	3,905	3,693	3,918	4,068	4,341	4,223	3,771	3,134	2,948	2,520	2,569	2,587	2,803	2,854	3,165	3,397	3,369	3,449	3,622	3,598	3,756
	2 Feb	3,461	3,552	3,553	3,543	3,675	4,021	4,143	4,293	4,019	3,574	3,266	2,935	2,823	2,857	3,062	3,070	3,050	3,370	3,833	3,747	3,703	3,744	3,857	3,896
	3 Mar	2,956	2,974	3,113	3,208	3,156	3,435	4,023	3,852	3,103	2,344	2,325	2,609	2,168	2,168	2,301	2,184	2,199	2,422	3,221	2,872	3,298	3,162	3,137	3,205
	4 Apr	2,722	2,368	2,604	2,687	2,742	2,846	3,193	2,952	2,268	1,756	1,797	1,788	1,757	1,814	1,744	1,695	1,789	1,788	2,094	2,273	2,808	2,785	2,782	2,755
	5 May	1,673	1,669	1,689	1,825	1,827	1,778	2,007	2,091	1,601	1,637	1,647	1,468	1,440	1,391	1,500	1,355	1,488	1,406	1,470	1,490	1,688	2,044	1,844	1,855
	6 Jun	908	707	840	927	912	1,178	1,378	1,250	1,421	1,218	1,110	1,192	1,119	946	1,079	1,091	1,133	1,093	941	985	1,270	1,246	1,331	1,530
	7 Jul	1,116	855	963	1,120	1,131	1,071	1,193	1,403	1,383	1,103	1,033	1,131	931	1,095	1,028	959	1,071	935	1,274	1,150	1,192	1,361	1,272	1,326
	8 Aug	849	763	725	752	807	890	958	1,157	1,090	1,071	920	918	879	930	855	827	774	845	879	824	971	1,213	958	1,068
	9 Sep	873	713	685	745	871	828	995	1,251	1,408	1,075	966	947	1,067	965	842	864	888	967	1,047	1,062	1,146	1,212	1,229	1,318
	10 Oct	1,610	1,569	1,620	1,813	1,762	1,747	2,142	2,468	2,165	1,725	1,255	1,194	1,193	1,306	1,384	1,234	1,466	1,361	1,498	2,190	1,920	1,881	2,014	2,031
	11 Nov	1,719	1,810	1,867	2,016	1,808	2,255	2,747	2,675	2,045	948	575	458	257	264	351	552	540	748	1,143	1,325	1,171	1,388	1,684	1,901
	12 Dec	2,673	2,730	2,829	2,961	2,751	3,087	3,408	3,508	3,134	2,360	1,855	1,703	1,389	1,417	1,469	1,678	1,697	1,957	2,270	2,347	2,310	2,505	2,641	2,829

Ocean County College
Existing Campus Load Profiles

OAT		Hour																							
°F		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Month	1 Jan	29.2	28.8	28.5	28.1	27.7	27.3	26.9	28.4	29.8	31.3	32.4	33.4	34.4	34.2	34	33.9	32.7	31.5	30.4	29.9	29.5	29.1	29	28.9
	2 Feb	30.5	30.1	30.1	30	29.8	29.3	28.7	31.3	34.6	37.5	39.2	40.6	41.7	42	42	41.3	39.6	37.2	35.2	34.2	33.3	32.6	32	31
	3 Mar	36.1	36	35.5	35.5	34.8	34.7	35.6	40.3	44.4	46.8	48.7	50.5	51.1	51.7	51.5	50.3	48.9	45.9	42.4	40.3	39.6	38.5	37.6	36.8
	4 Apr	46.2	45.6	45.1	44.5	45.7	46.8	48	50.7	53.3	55.9	57	58.1	59.3	59.1	58.9	58.6	56.7	54.7	52.7	51.4	50	48.7	48.2	47.6
	5 May	55.9	55.5	55.2	54.6	54.3	55.7	58.8	62	65.1	67.5	69.2	70.2	70.2	70.3	70	69.1	67.8	65.9	62.8	60.5	58.9	58.2	56.7	56.2
	6 Jun	64.3	64.2	63.9	63.2	63.1	65.1	67.9	71.1	73.5	75.2	76.7	77.9	78.1	78	78.1	77.2	76	73.7	71.6	68.7	67.3	66.3	65.9	65.4
	7 Jul	70.3	69.4	68.9	68.5	67.7	69.6	72.4	74.9	77	78.9	80	81.3	81.8	81.7	81.2	80.7	79.3	77.6	75.9	74.5	73.7	72.7	71.8	71.4
	8 Aug	68.2	67.7	67.3	66.9	66.3	66.5	69.5	74	76.9	78.7	80.2	80.7	80.8	80.9	80.4	79.6	78.3	76.2	74.1	72.1	70.8	70	69.4	68.6
	9 Sep	60	59	58.4	57.9	57	56.9	60.4	65.1	68.9	71.6	73.4	74.6	75	74.7	73.7	72.6	70.8	68.2	65.8	63.7	62.4	61.2	60.5	60
	10 Oct	49.7	49.5	49.4	49.2	49.3	49.4	49.5	52.7	55.8	58.9	60	61.1	62.2	61.3	60.5	59.6	57.4	55.4	53.2	52.4	51.6	50.8	50.2	49.7
	11 Nov	43.7	43.3	43.1	42.5	42.2	42.3	42.3	44.9	49.5	52.2	53.9	55.5	55.8	55.4	54.8	53.4	50.6	48.4	47.2	46.4	45.9	45.1	44.7	44
	12 Dec	33.4	32.9	32.5	32.6	32.3	31.7	31.2	31.9	34.5	37.6	39.3	40.7	41.5	41.8	41.2	40	38.1	36.5	35.8	35.5	35.2	34.8	34.5	33.9

Electricity		Hour																							
kW		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Month	1 Jan	840	786	783	774	771	781	975	1,073	1,104	1,125	1,137	1,139	1,147	1,144	1,134	1,116	1,113	1,129	1,153	1,124	1,080	1,042	1,021	929
	2 Feb	812	762	760	751	749	771	970	1,057	1,102	1,156	1,202	1,210	1,209	1,210	1,202	1,184	1,169	1,154	1,166	1,167	1,134	1,080	1,039	929
	3 Mar	*760*	*708*	*705*	*695*	*689*	*748*	*909*	*964*	*1,009*	*1,102*	*1,169*	*1,197*	*1,206*	*1,212*	*1,209*	*1,197*	*1,180*	*1,159*	*1,144*	*1,119*	*1,095*	*1,042*	*989*	*883*
	4 Apr	708	653	649	638	629	724	847	871	916	1,048	1,135	1,184	1,203	1,214	1,215	1,209	1,191	1,164	1,121	1,071	1,055	1,003	939	836
	5 May	951	899	891	881	868	980	1,146	1,179	1,239	1,356	1,434	1,466	1,496	1,486	1,494	1,482	1,469	1,442	1,395	1,352	1,343	1,307	1,226	1,085
	6 Jun	1,031	996	985	970	961	1,111	1,357	1,399	1,492	1,609	1,689	1,740	1,769	1,770	1,749	1,745	1,728	1,696	1,647	1,600	1,569	1,519	1,447	1,220
	7 Jul	1,186	1,158	1,150	1,141	1,129	1,278	1,575	1,600	1,680	1,786	1,844	1,857	1,875	1,883	1,901	1,898	1,882	1,840	1,797	1,732	1,711	1,672	1,608	1,392
	8 Aug	1,148	1,119	1,105	1,093	1,079	1,247	1,594	1,604	1,687	1,804	1,887	1,903	1,939	1,939	1,962	1,966	1,941	1,886	1,793	1,742	1,741	1,696	1,616	1,383
	9 Sep	1,059	1,036	1,023	1,012	999	1,137	1,437	1,479	1,546	1,663	1,773	1,803	1,827	1,823	1,822	1,825	1,793	1,759	1,710	1,660	1,665	1,591	1,503	1,282
	10 Oct	909	880	871	857	841	958	1,169	1,206	1,251	1,338	1,425	1,482	1,511	1,523	1,537	1,538	1,521	1,488	1,449	1,436	1,417	1,343	1,251	1,071
	11 Nov	811	767	771	764	762	909	1,072	1,091	1,137	1,222	1,206	1,345	1,387	1,409	1,399	1,411	1,398	1,368	1,328	1,260	1,238	1,179	1,114	947
	12 Dec	*826*	*777*	*777*	*769*	*767*	*845*	*1,024*	*1,082*	*1,121*	*1,174*	*1,172*	*1,242*	*1,267*	*1,277*	*1,267*	*1,264*	*1,256*	*1,249*	*1,241*	*1,192*	*1,159*	*1,111*	*1,068*	*938*

CHW		Hour																							
kBtu/hr		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Month	1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4 Apr	-	-	-	-	-	-	-	-	-	1,275	1,463	1,650	1,856	1,821	1,787	1,736	1,411	-	-	-	-	-	-	-
	5 May	1,275	1,206	1,155	-	-	1,240	1,770	2,317	2,847	3,257	3,547	3,718	3,718	3,735	3,684	3,530	3,308	2,983	2,454	2,061	1,787	1,668	1,411	1,326
	6 Jun	2,710	2,693	2,642	2,522	2,505	2,847	3,325	3,872	4,282	4,572	4,829	5,034	5,068	5,051	5,068	4,914	4,709	4,316	3,957	3,462	3,222	3,052	2,983	2,898
	7 Jul	3,735	3,581	3,496	3,427	3,291	3,615	4,094	4,521	4,880	5,204	5,392	5,615	5,700	5,683	5,597	5,512	5,273	4,982	4,692	4,453	4,316	4,145	3,991	3,923
	8 Aug	3,376	3,291	3,222	3,154	3,052	3,086	3,598	4,367	4,863	5,170	5,427	5,512	5,529	5,546	5,461	5,324	5,102	4,743	4,384	4,043	3,820	3,684	3,581	3,445
	9 Sep	1,975	1,804	1,702	1,616	1,463	1,445	2,043	2,847	3,496	3,957	4,265	4,470	4,538	4,487	4,316	4,128	3,820	3,376	2,966	2,607	2,385	2,180	2,061	1,975
	10 Oct	-	-	-	-	-	-	-	-	1,257	1,787	1,975	2,163	2,351	2,197	2,061	1,907	1,531	1,189	-	-	-	-	-	-
	11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ocean County College
CHP Economic Analysis - No CHP Operation

All electric purchased from the utility. All hot water from boilers. All chilled water from centrifugal chillers

Cogen Operation

on/off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Cogen Electric Output

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day	per month
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 31	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 28	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 31	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 30	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 31	-
6 Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 30	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 31	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 31	-
9 Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 30	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 31	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 30	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	- 31	-
																											-

Electric Utility Import - does not include centrifugal chiller plant load

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	840	786	783	774	771	781	975	1,073	1,104	1,125	1,137	1,139	1,147	1,144	1,134	1,116	1,113	1,129	1,153	1,124	1,080	1,042	1,021	929
2 Feb	812	762	760	751	749	771	970	1,057	1,102	1,156	1,202	1,210	1,209	1,210	1,202	1,184	1,169	1,154	1,166	1,167	1,134	1,080	1,039	929
3 Mar	760	708	705	695	689	748	909	964	1,009	1,102	1,169	1,197	1,206	1,212	1,209	1,197	1,180	1,159	1,144	1,119	1,095	1,042	989	883
4 Apr	708	653	649	638	629	724	847	871	916	1,023	1,106	1,150	1,164	1,176	1,178	1,173	1,163	1,164	1,121	1,071	1,055	1,003	939	836
5 May	926	875	868	881	868	955	1,110	1,128	1,170	1,269	1,333	1,355	1,385	1,374	1,385	1,382	1,380	1,367	1,340	1,308	1,306	1,273	1,198	1,059
6 Jun	967	932	923	912	904	1,042	1,267	1,279	1,345	1,440	1,498	1,529	1,555	1,558	1,535	1,546	1,547	1,546	1,522	1,503	1,484	1,441	1,372	1,149
7 Jul	1,074	1,055	1,052	1,046	1,041	1,173	1,441	1,435	1,484	1,558	1,596	1,583	1,591	1,601	1,630	1,636	1,647	1,634	1,618	1,572	1,561	1,535	1,481	1,269
8 Aug	1,056	1,031	1,020	1,011	1,001	1,168	1,490	1,451	1,492	1,580	1,635	1,641	1,676	1,674	1,706	1,726	1,724	1,702	1,638	1,612	1,625	1,587	1,513	1,287
9 Sep	1,017	999	988	979	970	1,108	1,394	1,410	1,448	1,538	1,627	1,642	1,660	1,660	1,672	1,689	1,677	1,667	1,636	1,599	1,612	1,544	1,459	1,240
10 Oct	909	880	871	857	841	958	1,169	1,206	1,226	1,301	1,383	1,435	1,459	1,475	1,493	1,498	1,490	1,464	1,449	1,436	1,417	1,343	1,251	1,071
11 Nov	811	767	771	764	762	909	1,072	1,091	1,137	1,222	1,206	1,345	1,387	1,409	1,399	1,411	1,398	1,368	1,328	1,260	1,238	1,179	1,114	947
12 Dec	826	777	777	769	767	845	1,024	1,082	1,121	1,174	1,172	1,242	1,267	1,277	1,267	1,264	1,256	1,249	1,241	1,192	1,159	1,111	1,068	938

Cogen Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ocean County College
CHP Economic Analysis - No CHP Operation

ABS Operation

Cool/Heat/Off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ABS Heat Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Boiler Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	4,693	4,565	4,077	3,388	3,187	2,724	2,777	2,797	3,030	3,085	3,422	3,672	3,642	3,729	3,916	3,890	4,061
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	4,641	4,345	3,864	3,531	3,173	3,052	3,089	3,310	3,319	3,297	3,643	4,144	4,051	4,003	4,048	4,170	4,212
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	3,355	2,534	2,514	2,821	2,344	2,344	2,488	2,361	2,377	2,618	3,482	3,105	3,565	3,418	3,391	3,465
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	1,898	1,943	1,933	1,899	1,961	1,885	1,832	1,934	1,933	2,264	2,457	3,036	3,011	3,008	2,978
5 May	1,809	1,804	1,826	1,973	1,975	1,922	2,170	2,261	1,731	1,770	1,781	1,587	1,557	1,504	1,622	1,465	1,609	1,520	1,589	1,611	1,825	2,210	1,994	2,005
6 Jun	982	764	908	1,002	986	1,274	1,490	1,351	1,536	1,317	1,200	1,289	1,210	1,023	1,166	1,179	1,225	1,182	1,017	1,065	1,373	1,347	1,439	1,654
7 Jul	1,206	924	1,041	1,211	1,223	1,158	1,290	1,517	1,495	1,192	1,117	1,223	1,006	1,184	1,111	1,037	1,158	1,011	1,377	1,243	1,289	1,471	1,375	1,434
8 Aug	918	825	784	813	872	962	1,036	1,251	1,178	1,158	995	992	950	1,005	924	894	837	914	950	891	1,050	1,311	1,036	1,155
9 Sep	944	771	741	805	942	895	1,076	1,352	1,522	1,162	1,044	1,024	1,154	1,043	910	934	960	1,045	1,132	1,148	1,239	1,310	1,329	1,425
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	2,316	2,668	2,341	1,865	1,357	1,291	1,290	1,412	1,496	1,334	1,585	1,471	1,619	2,368	2,076	2,034	2,177	2,196
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	2,970	2,892	2,211	1,025	622	495	278	285	379	597	584	809	1,236	1,432	1,266	1,501	1,821	2,055
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	3,684	3,792	3,388	2,551	2,005	1,841	1,502	1,532	1,588	1,814	1,835	2,116	2,454	2,537	2,497	2,708	2,855	3,058

ABS Cooling Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ocean County College
CHP Economic Analysis - No CHP Operation

Centrifugal Chiller Energy

tons

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	106	122	138	155	152	149	145	118	-	-	-	-	-	-	-
5 May	106	101	96	-	-	103	148	193	237	271	296	310	310	311	307	294	276	249	205	172	149	139	118	111
6 Jun	226	224	220	210	209	237	277	323	357	381	402	420	422	421	422	410	392	360	330	289	269	254	249	242
7 Jul	311	298	291	286	274	301	341	377	407	434	449	468	475	474	466	459	439	415	391	371	360	345	333	327
8 Aug	281	274	269	263	254	257	300	364	405	431	452	459	461	462	455	444	425	395	365	337	318	307	298	287
9 Sep	165	150	142	135	122	120	170	237	291	330	355	373	378	374	360	344	318	281	247	217	199	182	172	165
10 Oct	-	-	-	-	-	-	-	-	105	149	165	180	196	183	172	159	128	99	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Centrifugal Chiller Electricity Minimum chiller load = 20%

kW

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	25	29	34	39	38	37	36	28	-	-	-	-	-	-	-
5 May	25	24	23	-	-	25	36	51	69	87	101	111	111	112	109	100	89	75	55	44	37	34	28	26
6 Jun	64	64	62	58	57	69	90	120	147	169	191	211	214	212	214	199	181	150	125	97	85	78	75	71
7 Jul	112	103	98	95	88	105	134	165	196	228	248	136	139	138	271	262	235	206	179	160	150	137	127	123
8 Aug	92	88	85	82	78	79	104	153	195	224	252	262	263	265	256	240	217	184	155	130	116	109	103	96
9 Sep	42	37	35	33	29	29	43	69	98	125	146	161	167	163	150	136	116	92	74	61	53	47	44	42
10 Oct	-	-	-	-	-	-	-	-	25	37	42	47	52	48	44	40	31	24	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total Utility Electric Purchase

kW

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	840	786	783	774	771	781	975	1,073	1,104	1,125	1,137	1,139	1,147	1,144	1,134	1,116	1,113	1,129	1,153	1,124	1,080	1,042	1,021	929	1153	24,420	31	757,020
2 Feb	812	762	760	751	749	771	970	1,057	1,102	1,156	1,202	1,210	1,209	1,210	1,202	1,184	1,169	1,154	1,166	1,167	1,134	1,080	1,039	929	1210	24,945	28	698,460
3 Mar	760	708	705	695	689	748	909	964	1,009	1,102	1,169	1,197	1,206	1,212	1,209	1,197	1,180	1,159	1,144	1,119	1,095	1,042	989	883	1212	24,090	31	746,790
4 Apr	708	653	649	638	629	724	847	871	916	1,048	1,135	1,184	1,203	1,214	1,215	1,209	1,191	1,164	1,121	1,071	1,055	1,003	939	836	1215	23,223	30	696,690
5 May	951	899	891	881	868	980	1,146	1,179	1,239	1,356	1,434	1,466	1,496	1,486	1,494	1,482	1,469	1,442	1,395	1,352	1,343	1,307	1,226	1,085	1496	29,867	31	925,877
6 Jun	1,031	996	985	970	961	1,111	1,357	1,399	1,492	1,609	1,689	1,740	1,769	1,770	1,749	1,745	1,728	1,696	1,647	1,600	1,569	1,519	1,447	1,220	1770	34,799	30	1,043,970
7 Jul	1,186	1,158	1,150	1,141	1,129	1,278	1,575	1,600	1,680	1,786	1,844	1,719	1,730	1,739	1,901	1,898	1,882	1,840	1,797	1,732	1,711	1,672	1,608	1,392	1901	38,148	31	1,182,588
8 Aug	1,148	1,119	1,105	1,093	1,079	1,247	1,594	1,604	1,687	1,804	1,887	1,903	1,939	1,939	1,962	1,966	1,941	1,886	1,793	1,742	1,741	1,696	1,616	1,383	1966	38,874	31	1,205,094
9 Sep	1,059	1,036	1,023	1,012	999	1,137	1,437	1,479	1,546	1,663	1,773	1,803	1,827	1,823	1,822	1,825	1,793	1,759	1,710	1,660	1,665	1,591	1,503	1,282	1827	36,227	30	1,086,810
10 Oct	909	880	871	857	841	958	1,169	1,206	1,251	1,338	1,425	1,482	1,511	1,523	1,537	1,538	1,521	1,488	1,449	1,436	1,417	1,343	1,251	1,071	1538	30,272	31	938,432
11 Nov	811	767	771	764	762	909	1,072	1,091	1,137	1,222	1,206	1,345	1,387	1,409	1,399	1,411	1,398	1,368	1,328	1,260	1,238	1,179	1,114	947	1411	27,295	30	818,850
12 Dec	826	777	777	769	767	845	1,024	1,082	1,121	1,174	1,172	1,242	1,267	1,277	1,267	1,264	1,256	1,249	1,241	1,192	1,159	1,111	1,068	938	1277	25,865	31	801,815
																												10,902,396

Total Utility Natural Gas Purchase

kBtu/hr

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	per day		per month
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	4,693	4,565	4,077	3,388	3,187	2,724	2,777	2,797	3,030	3,085	3,422	3,672	3,642	3,729	3,916	3,890	4,061	89,467	31	2,773,478
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	4,641	4,345	3,864	3,531	3,173	3,052	3,089	3,310	3,319	3,297	3,643	4,144	4,051	4,003	4,048	4,170	4,212	91,943	28	2,574,396
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	3,355	2,534	2,514	2,821	2,344	2,344	2,488	2,361	2,377	2,618	3,482	3,105	3,565	3,418	3,391	3,465	75,065	31	2,327,011
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	1,898	1,943	1,933	1,899	1,961	1,885	1,832	1,934	1,933	2,264	2,457	3,036	3,011	3,008	2,978	60,332	30	1,809,957
5 May	1,809	1,804	1,826	1,973	1,975	1,922	2,170	2,261	1,731	1,770	1,781	1,587	1,557	1,504	1,622	1,465	1,609	1,520	1,589	1,611	1,825	2,210	1,994	2,005	43,117	31	1,336,619
6 Jun	982	764	908	1,002	986	1,274	1,490	1,351	1,536	1,317	1,200	1,289	1,210	1,023	1,166	1,179	1,225	1,182	1,017	1,065	1,373	1,347	1,439	1,654	28,978	30	869,351
7 Jul	1,206	924	1,041	1,211	1,223	1,158	1,290	1,517	1,495	1,192	1,117	1,223	1,006	1,184	1,111	1,037	1,158	1,011	1,377	1,243	1,289	1,471	1,375	1,434	29,293	31	908,082
8 Aug	918	825	784	813	872	962	1,036	1,251	1,178	1,158	995	992	950	1,005	924	894	837	914	950	891	1,050	1,311	1,036	1,155	23,701	31	734,717
9 Sep	944	771	741	805	942	895	1,076	1,352	1,522	1,162	1,044	1,024	1,154	1,043	910	934	960	1,045	1,132	1,148	1,239	1,310	1,329	1,425	25,907	30	777,211
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	2,316	2,668	2,341	1,865	1,357	1,291	1,290	1,412	1,496	1,334	1,585	1,471	1,619	2,368	2,076	2,034	2,177	2,196	43,836	31	1,358,906
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	2,970	2,892	2,211	1,025	622	495	278	285	379	597	584	809	1,236	1,432	1,266	1,501	1,821	2,055	34,862	30	1,045,849
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	3,684	3,792	3,388	2,551	2,005	1,841	1,502	1,532	1,588	1,814	1,835	2,116	2,454	2,537	2,497	2,708	2,855	3,058	62,171	31	1,927,295
																											18,442,871

Ocean County College
CHP Economic Analysis - No CHP Operation

Annual Electricity	10,902,396	kWh/yr	$0.1758 / kWh
Utility Electricity	10,902,396	kWh/yr	$0.1758 /kWh
Annual Natural Gas	184,428.71	Th/yr	$0.7446 / Th

Electric Energy Cost	$ 1,789,551.99	/yr
Demand Cost (Jun-Sep)	$ 44,431.60	/yr
Demand Cost (Oct- May)	$ 82,257.44	/yr
Natural Gas Cost	$ 137,324.08	/yr
Total Utiilty Cost	$ 2,053,565.11	/yr

Ocean County College
CHP Economic Analysis - Existing Cogen with ABS Cooling Bias (ABS limited capacity, can not run ABS and Centrif)

Electric primarily from CHP. Absorption chillers produces chilled water when ever possible. ABS and Centrif chillers can NOT run together. Hot water from boilers as needed.

Cogen Operation

on/off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
2 Feb	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
3 Mar	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
5 May	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 Jun	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9 Sep	1	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 Oct	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11 Nov	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
12 Dec	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-

Cogen Electric Output

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	-	-	-	-	-	-	-	823	854	875	887	889	897	894	884	866	863	879	903	874	830	792	771	-	903	13,781	31	427,211
2 Feb	-	-	-	-	-	-	-	807	852	906	952	960	959	960	952	934	919	904	916	917	884	830	789	-	960	14,441	28	404,348
3 Mar	-	-	-	-	-	-	-	-	759	852	919	947	956	962	959	947	930	909	894	869	845	792	-	-	962	12,540	31	388,740
4 Apr	-	-	-	-	-	-	-	-	-	773	856	900	914	926	928	923	913	914	871	821	805	753	-	-	928	11,297	30	338,910
5 May	-	-	-	-	-	-	860	878	920	1,019	1,083	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,090	1,058	1,056	1,023	948	809	1100	18,444	31	571,764
6 Jun	-	-	-	-	-	792	1,017	1,029	1,095	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	899	1100	20,232	30	606,960
7 Jul	824	805	802	796	791	923	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,019	1100	24,660	31	764,460
8 Aug	806	781	770	761	751	918	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,037	1100	24,524	31	760,244
9 Sep	767	-	-	-	-	858	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	990	1100	21,315	30	639,450
10 Oct	-	-	-	-	-	-	919	956	976	1,051	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,093	1,001	821	1100	18,917	31	586,427
11 Nov	-	-	-	-	-	-	822	841	887	972	956	1,095	1,100	1,100	1,100	1,100	1,100	1,100	1,078	1,010	988	929	864	-	1100	17,042	30	511,260
12 Dec	-	-	-	-	-	-	774	832	871	924	922	992	1,017	1,027	1,017	1,014	1,006	999	991	942	909	861	818	-	1027	15,916	31	493,396
																												6,493,170

Electric Utility Import - does not include centrifugal chiller plant load

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836
5 May	926	875	868	881	868	955	250	250	250	250	250	255	285	274	285	282	280	267	250	250	250	250	250	250
6 Jun	967	932	923	912	904	250	250	250	250	340	398	429	455	458	435	446	447	446	422	403	384	341	272	250
7 Jul	250	250	250	250	250	250	341	335	384	458	496	483	491	501	530	536	547	534	518	472	461	435	381	250
8 Aug	250	250	250	250	250	250	390	351	392	480	535	541	576	574	606	626	624	602	538	512	525	487	413	250
9 Sep	250	999	988	979	970	250	294	310	348	438	527	542	560	560	572	589	577	567	536	499	512	444	359	250
10 Oct	909	880	871	857	841	958	250	250	250	250	283	335	359	375	393	398	390	364	349	336	317	250	250	250
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	287	309	299	311	298	268	250	250	250	250	250	947
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938

Cogen Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	7,453	7,687	7,844	7,933	7,948	8,007	7,985	7,911	7,776	7,754	7,873	8,052	7,836	7,506	7,218	7,057	-
2 Feb	-	-	-	-	-	-	-	7,332	7,672	8,074	8,412	8,471	8,464	8,471	8,412	8,280	8,170	8,059	8,148	8,155	7,911	7,506	7,195	-
3 Mar	-	-	-	-	-	-	-	-	6,964	7,672	8,170	8,376	8,442	8,485	8,464	8,376	8,251	8,096	7,985	7,799	7,619	7,218	-	-
4 Apr	-	-	-	-	-	-	-	-	-	7,072	7,702	8,029	8,133	8,221	8,236	8,199	8,126	8,133	7,814	7,438	7,317	6,918	-	-
5 May	-	-	-	-	-	-	7,732	7,866	8,177	8,899	9,359	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,409	9,180	9,166	8,928	8,383	7,347
6 Jun	-	-	-	-	-	7,218	8,885	8,972	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,022
7 Jul	7,461	7,317	7,294	7,248	7,210	8,199	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,899
8 Aug	7,324	7,133	7,049	6,980	6,902	8,163	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,029
9 Sep	7,026	-	-	-	-	7,717	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,689
10 Oct	-	-	-	-	-	-	8,170	8,442	8,588	9,130	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,431	8,769	7,438
11 Nov	-	-	-	-	-	-	7,446	7,589	7,933	8,558	8,442	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,324	8,834	8,675	8,244	7,762	-
12 Dec	-	-	-	-	-	-	7,080	7,521	7,814	8,207	8,192	8,704	8,885	8,957	8,885	8,863	8,805	8,755	8,697	8,339	8,096	7,739	7,415	-

Ocean County College
CHP Economic Analysis - Existing Cogen with ABS Cooling Bias (ABS limited capacity, can not run ABS and Centrif)

ABS Operation

Cool/Heat/Off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
2 Feb	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
3 Mar	-	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-	-
4 Apr	-	-	-	-	-	-	-	-	-	C	C	C	C	C	C	C	C	H	H	H	H	H	-	-
5 May	-	-	-	-	-	-	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6 Jun	-	-	-	-	-	H	C	H	H	H	H	H	H	H	H	H	H	H	H	C	C	C	C	C
7 Jul	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
8 Aug	H	H	H	H	H	C	C	H	H	H	H	H	H	H	H	H	H	H	H	H	H	C	C	C
9 Sep	C	-	-	-	-	C	C	C	H	H	H	H	H	H	H	H	H	C	C	C	C	C	C	C
10 Oct	-	-	-	-	-	-	H	H	C	C	C	C	C	C	C	C	C	C	H	H	H	H	H	H
11 Nov	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
12 Dec	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-

ABS Heat Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	502	518	529	535	536	540	538	533	524	522	531	543	528	505	486	475	-
2 Feb	-	-	-	-	-	-	-	494	517	544	568	572	571	572	568	559	551	543	549	550	533	505	485	-
3 Mar	-	-	-	-	-	-	-	-	469	517	551	565	570	573	571	565	557	546	538	525	513	486	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	548	526	501	493	466	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	486	-	607	641	644	644	644	644	644	644	644	644	644	644	-	-	-	-	-
7 Jul	502	493	491	488	486	553	644	644	644	644	644	644	644	644	644	644	644	644	644	644	644	644	644	602
8 Aug	493	480	475	470	465	-	-	644	644	644	644	644	644	644	644	644	644	644	644	644	644	-	-	-
9 Sep	-	-	-	-	-	-	-	-	644	644	644	644	644	644	644	644	644	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	551	570	-	-	-	-	-	-	-	-	-	-	644	644	644	640	593	501
11 Nov	-	-	-	-	-	-	501	511	535	578	570	513	288	296	393	618	605	644	632	598	586	556	523	-
12 Dec	-	-	-	-	-	-	477	507	526	554	553	588	601	606	601	600	596	592	588	563	546	521	499	-

Boiler Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	4,615	4,645	4,825	4,970	4,700	4,987	5,177	4,954	4,786	4,198	3,381	3,143	2,594	2,658	2,687	2,972	3,039	3,425	3,706	3,688	3,816	4,058	4,040	4,780
2 Feb	4,405	4,521	4,522	4,509	4,677	5,118	5,273	4,902	4,528	3,931	3,511	3,085	2,944	2,986	3,252	3,272	3,256	3,672	4,255	4,144	4,107	4,191	4,358	4,959
3 Mar	3,762	3,785	3,962	4,083	4,017	4,372	5,120	4,903	3,416	2,396	2,333	2,679	2,112	2,108	2,280	2,138	2,166	2,462	3,488	3,059	3,615	3,472	3,993	4,079
4 Apr	3,464	3,014	3,314	3,420	3,490	3,622	4,064	3,757	2,887	2,235	2,287	2,276	2,236	2,309	2,220	2,157	2,277	1,653	2,067	2,324	3,014	3,015	3,541	3,506
5 May	2,129	2,124	2,150	2,323	2,325	2,263	2,554	2,661	2,038	2,083	2,096	1,868	1,833	1,770	1,909	1,725	1,894	1,789	1,871	1,896	2,148	2,601	2,347	2,361
6 Jun	1,156	900	1,069	1,180	1,161	947	1,754	901	1,080	818	681	785	692	472	641	657	710	659	466	1,254	1,616	1,586	1,694	1,947
7 Jul	850	528	668	871	887	735	787	1,054	1,028	672	583	708	453	662	577	489	631	458	890	732	785	1,000	887	1,004
8 Aug	520	426	383	423	499	1,133	1,219	741	655	631	439	437	387	452	356	321	253	344	387	317	504	1,544	1,219	1,359
9 Sep	1,111	907	872	948	1,109	1,054	1,266	1,592	1,060	636	498	473	626	496	340	368	398	1,231	1,333	1,352	1,459	1,543	1,564	1,677
10 Oct	2,049	1,997	2,062	2,307	2,243	2,223	2,100	2,493	2,755	2,195	1,597	1,520	1,518	1,662	1,761	1,571	1,866	1,732	1,175	2,055	1,712	1,667	1,889	2,016
11 Nov	2,188	2,304	2,376	2,566	2,301	2,870	2,927	2,824	1,995	550	84	(0)	(0)	(0)	0	0	(0)	220	737	1,007	824	1,135	1,549	2,419
12 Dec	3,401	3,475	3,600	3,768	3,501	3,928	3,794	3,889	3,391	2,374	1,732	1,499	1,084	1,114	1,186	1,453	1,483	1,817	2,220	2,348	2,319	2,597	2,794	3,600

ABS Cooling Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1,144	1,245	1,299	1,317	1,331	1,334	1,328	1,315	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	1,250	1,272	1,324	1,446	1,524	1,545	1,545	1,545	1,545	1,545	1,545	1,545	1,533	1,494	1,491	1,451	1,358	1,188
6 Jun	-	-	-	-	-	-	1,443	-	-	-	-	-	-	-	-	-	-	-	-	1,545	1,545	1,545	1,545	1,298
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	1,322	1,545	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,545	1,545	1,468
9 Sep	1,136	-	-	-	-	1,248	1,545	1,545	-	-	-	-	-	-	-	-	-	1,545	1,545	1,545	1,545	1,545	1,545	1,410
10 Oct	-	-	-	-	-	-	-	-	1,257	1,485	1,545	1,545	1,545	1,545	1,545	1,545	1,531	1,189	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ocean County College
CHP Economic Analysis - Existing Cogen with ABS Cooling Bias (ABS limited capacity, can not run ABS and Centrif)

Centrifugal Chiller Energy

tons	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	11	18	29	45	41	38	34	8	-	-	-	-	-	-	-
5 May	106	101	96	-	-	103	43	87	127	151	169	181	181	183	178	165	147	120	77	47	25	18	4	12
6 Jun	226	224	220	210	209	237	157	323	357	381	402	420	422	421	422	410	392	360	330	160	140	126	120	133
7 Jul	311	298	291	286	274	301	341	377	407	434	449	468	475	474	466	459	439	415	391	371	360	345	333	327
8 Aug	281	274	269	263	254	147	171	364	405	431	452	459	461	462	455	444	425	395	365	337	318	178	170	165
9 Sep	70	150	142	135	122	16	42	109	291	330	355	373	378	374	360	344	318	153	118	89	70	53	43	47
10 Oct	-	-	-	-	-	-	-	-	-	25	36	52	67	54	43	30	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Centrifugal Chiller Electricity Minimum chiller load = 20%

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	25	24	23	-	-	25	-	-	31	37	43	47	47	47	46	42	36	29	-	-	-	-	-	-
6 Jun	64	64	62	58	57	69	39	120	147	169	191	211	214	212	214	199	181	150	125	40	34	30	29	32
7 Jul	112	103	98	95	88	105	134	165	196	228	248	136	139	138	271	262	235	206	179	160	150	137	127	123
8 Aug	92	88	85	82	78	36	44	153	195	224	252	262	263	265	256	240	217	184	155	130	116	46	43	42
9 Sep	-	37	35	33	29	-	-	26	98	125	146	161	167	163	150	136	116	38	28	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total Utility Electric Purchase

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	975	10,639	31	329,809
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	970	10,504	28	294,112
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883	989	11,550	31	358,050
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836	939	11,660	30	349,800
5 May	951	899	891	881	868	980	250	250	281	287	293	302	332	321	331	324	316	296	250	250	250	250	250	250	980	10,553	31	327,143
6 Jun	1,031	996	985	970	961	319	289	370	397	509	589	640	669	670	649	645	628	596	547	443	418	371	301	282	1031	14,275	30	428,250
7 Jul	362	353	348	345	338	355	475	500	580	686	744	619	630	639	801	798	782	740	697	632	611	572	508	373	801	13,488	31	418,128
8 Aug	342	338	335	332	328	286	434	504	587	704	787	803	839	839	862	866	841	786	693	642	641	533	456	292	866	14,070	31	436,170
9 Sep	250	1,036	1,023	1,012	999	250	294	336	446	563	673	703	727	723	722	725	693	605	564	499	512	444	359	250	1036	14,408	30	432,240
10 Oct	909	880	871	857	841	958	250	250	250	250	283	335	359	375	393	398	390	364	349	336	317	250	250	250	958	10,965	31	339,915
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	287	309	299	311	298	268	250	250	250	250	250	947	947	10,253	30	307,590
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938	938	9,949	31	308,419
																												4,329,626

Total Utility Natural Gas Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	per day		per month
1 Jan	4,615	4,645	4,825	4,970	4,700	4,987	5,177	12,407	12,473	12,042	11,314	11,091	10,601	10,643	10,598	10,748	10,793	11,298	11,758	11,524	11,322	11,276	11,097	4,780	219,684	31	6,810,208
2 Feb	4,405	4,521	4,522	4,509	4,677	5,118	5,273	12,234	12,200	12,005	11,923	11,556	11,408	11,457	11,664	11,552	11,426	11,731	12,403	12,299	12,018	11,697	11,553	4,959	227,109	28	6,359,048
3 Mar	3,762	3,785	3,962	4,083	4,017	4,372	5,120	4,903	10,380	10,068	10,503	11,055	10,554	10,593	10,744	10,514	10,417	10,558	11,473	10,858	11,234	10,690	3,993	4,079	191,714	31	5,943,128
4 Apr	3,464	3,014	3,314	3,420	3,490	3,622	4,064	3,757	2,887	9,307	9,989	10,305	10,369	10,530	10,456	10,356	10,403	9,786	9,881	9,762	10,331	9,933	3,541	3,506	169,486	30	5,084,566
5 May	2,129	2,124	2,150	2,323	2,325	2,263	10,286	10,527	10,215	10,982	11,455	11,349	11,314	11,251	11,390	11,206	11,375	11,270	11,280	11,076	11,314	11,529	10,730	9,708	211,573	31	6,558,769
6 Jun	1,156	900	1,069	1,180	1,161	8,165	10,639	9,873	10,525	10,299	10,162	10,266	10,173	9,953	10,122	10,138	10,191	10,140	9,947	10,735	11,097	11,067	11,175	9,969	200,103	30	6,003,085
7 Jul	8,311	7,845	7,962	8,119	8,097	8,934	10,268	10,535	10,509	10,153	10,064	10,189	9,934	10,143	10,058	9,970	10,112	9,939	10,371	10,213	10,266	10,481	10,368	9,903	232,742	31	7,215,001
8 Aug	7,844	7,559	7,432	7,403	7,401	9,296	10,700	10,222	10,136	10,112	9,920	9,918	9,868	9,933	9,837	9,802	9,734	9,825	9,868	9,798	9,985	11,025	10,700	10,388	228,706	31	7,089,873
9 Sep	8,137	907	872	948	1,109	8,771	10,747	11,073	10,541	10,117	9,979	9,954	10,107	9,977	9,821	9,849	9,879	10,712	10,814	10,833	10,940	11,024	11,045	10,366	208,522	30	6,255,668
10 Oct	2,049	1,997	2,062	2,307	2,243	2,223	10,270	10,935	11,343	11,325	11,078	11,001	10,999	11,143	11,242	11,052	11,347	11,213	10,656	11,536	11,193	11,098	10,658	9,454	210,426	31	6,523,199
11 Nov	2,188	2,304	2,376	2,566	2,301	2,870	10,373	10,413	9,928	9,108	8,526	9,445	9,481	9,481	9,481	9,481	9,481	9,701	10,061	9,841	9,499	9,379	9,311	2,419	180,013	30	5,400,378
12 Dec	3,401	3,475	3,600	3,768	3,501	3,928	10,874	11,410	11,205	10,581	9,924	10,203	9,969	10,071	10,071	10,316	10,288	10,572	10,917	10,687	10,415	10,336	10,209	3,600	203,322	31	6,302,988
																											75,545,911

Ocean County College
CHP Economic Analysis - Existing Cogen with ABS Cooling Bias (ABS limited capacity, can not run ABS and Centrif)

Annual Electricity	10,822,796	kWh/yr	$0.0450 / kWh
Utility Electricity	4,329,626	kWh/yr	$0.1125 /kWh
Annual Natural Gas	755,459.11	Th/yr	$0.7740 / Th

Electric Energy Cost	$ 420,419.67	/yr
Demand Cost (Jun-Sep)	$ 23,413.60	/yr
Demand Cost (Oct- May)	$ 43,346.24	/yr
Natural Gas Cost	$ 584,725.35	/yr
Total Utiilty Cost	$ 1,071,904.86	/yr

Ocean County College
CHP Economic Analysis - Existing Cogen with Full ABS Capacity (ABS Cooling Bias and can not run ABS and Centrif)

Electric primarily from CHP. Absorption chillers produces chilled water when ever possible. ABS and Centrif chillers can NOT run together. Hot water from boilers as needed.

Cogen Operation

on/off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
2 Feb	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
3 Mar	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
5 May	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 Jun	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9 Sep	1	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 Oct	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11 Nov	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
12 Dec	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-

Cogen Electric Output

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	-	-	-	-	-	-	-	823	854	875	887	889	897	894	884	866	863	879	903	874	830	792	771	-	903	13,781	31	427,211
2 Feb	-	-	-	-	-	-	-	807	852	906	952	960	959	960	952	934	919	904	916	917	884	830	789	-	960	14,441	28	404,348
3 Mar	-	-	-	-	-	-	-	-	759	852	919	947	956	962	959	947	930	909	894	869	845	792	-	-	962	12,540	31	388,740
4 Apr	-	-	-	-	-	-	-	-	-	773	856	900	914	926	928	923	913	914	871	821	805	753	-	-	928	11,297	30	338,910
5 May	-	-	-	-	-	-	860	878	920	1,019	1,083	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,090	1,058	1,056	1,023	948	809	1100	18,444	31	571,764
6 Jun	-	-	-	-	-	792	1,017	1,029	1,095	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	899	1100	20,232	30	606,960
7 Jul	824	805	802	796	791	923	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,019	1100	24,660	31	764,460
8 Aug	806	781	770	761	751	918	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,037	1100	24,524	31	760,244
9 Sep	767	-	-	-	-	858	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	990	1100	21,315	30	639,450
10 Oct	-	-	-	-	-	-	919	956	976	1,051	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,093	1,001	821	1100	18,917	31	586,427
11 Nov	-	-	-	-	-	-	822	841	887	972	956	1,095	1,100	1,100	1,100	1,100	1,100	1,100	1,078	1,010	988	929	864	-	1100	17,042	30	511,260
12 Dec	-	-	-	-	-	-	774	832	871	924	922	992	1,017	1,027	1,017	1,014	1,006	999	991	942	909	861	818	-	1027	15,916	31	493,396
																												6,493,170

Electric Utility Import - does not include centrifugal chiller plant load

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836
5 May	926	875	868	881	868	955	250	250	250	250	250	255	285	274	285	282	280	267	250	250	250	250	250	250
6 Jun	967	932	923	912	904	250	250	250	250	340	398	429	455	458	435	446	447	446	422	403	384	341	272	250
7 Jul	250	250	250	250	250	250	341	335	384	458	496	483	491	501	530	536	547	534	518	472	461	435	381	250
8 Aug	250	250	250	250	250	250	390	351	392	480	535	541	576	574	606	626	624	602	538	512	525	487	413	250
9 Sep	250	999	988	979	970	250	294	310	348	438	527	542	560	560	572	589	577	567	536	499	512	444	359	250
10 Oct	909	880	871	857	841	958	250	250	250	250	283	335	359	375	393	398	390	364	349	336	317	250	250	250
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	287	309	299	311	298	268	250	250	250	250	250	947
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938

Cogen Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	7,453	7,687	7,844	7,933	7,948	8,007	7,985	7,911	7,776	7,754	7,873	8,052	7,836	7,506	7,218	7,057	-
2 Feb	-	-	-	-	-	-	-	7,332	7,672	8,074	8,412	8,471	8,464	8,471	8,412	8,280	8,170	8,059	8,148	8,155	7,911	7,506	7,195	-
3 Mar	-	-	-	-	-	-	-	-	6,964	7,672	8,170	8,376	8,442	8,485	8,464	8,376	8,251	8,096	7,985	7,799	7,619	7,218	-	-
4 Apr	-	-	-	-	-	-	-	-	-	7,072	7,702	8,029	8,133	8,221	8,236	8,199	8,126	8,133	7,814	7,438	7,317	6,918	-	-
5 May	-	-	-	-	-	-	7,732	7,866	8,177	8,899	9,359	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,409	9,180	9,166	8,928	8,383	7,347
6 Jun	-	-	-	-	-	7,218	8,885	8,972	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,022
7 Jul	7,461	7,317	7,294	7,248	7,210	8,199	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,899
8 Aug	7,324	7,133	7,049	6,980	6,902	8,163	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,029
9 Sep	7,026	-	-	-	-	7,717	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,689
10 Oct	-	-	-	-	-	-	8,170	8,442	8,588	9,130	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,431	8,769	7,438
11 Nov	-	-	-	-	-	-	7,446	7,589	7,933	8,558	8,442	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,324	8,834	8,675	8,244	7,762	-
12 Dec	-	-	-	-	-	-	7,080	7,521	7,814	8,207	8,192	8,704	8,885	8,957	8,885	8,863	8,805	8,755	8,697	8,339	8,096	7,739	7,415	-

Ocean County College
CHP Economic Analysis - Existing Cogen with Full ABS Capacity (ABS Cooling Bias and can not run ABS and Centrif)

ABS Operation

Cool/Heat/Off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
2 Feb	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
3 Mar	-	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-	-
4 Apr	-	-	-	-	-	-	-	-	-	C	C	C	C	C	C	C	C	H	H	H	H	H	-	-
5 May	-	-	-	-	-	-	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6 Jun	-	-	-	-	-	H	C	H	H	H	H	H	H	H	H	H	H	H	H	C	C	C	C	C
7 Jul	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
8 Aug	H	H	H	H	H	C	C	H	H	H	H	H	H	H	H	H	H	H	H	H	H	C	C	C
9 Sep	C	-	-	-	-	C	C	C	H	H	H	H	H	H	H	H	H	C	C	C	C	C	C	C
10 Oct	-	-	-	-	-	-	H	H	C	C	C	C	C	C	C	C	C	C	H	H	H	H	H	H
11 Nov	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
12 Dec	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-

ABS Heat Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1,166	1,203	1,228	1,242	1,244	1,254	1,250	1,238	1,217	1,213	1,232	1,261	1,226	1,174	1,129	1,104	-
2 Feb	-	-	-	-	-	-	-	1,147	1,200	1,265	1,319	1,329	1,328	1,329	1,319	1,298	1,280	1,262	1,276	1,278	1,238	1,174	1,125	-
3 Mar	-	-	-	-	-	-	-	-	1,090	1,200	1,280	1,313	1,324	1,331	1,328	1,313	1,293	1,268	1,250	1,221	1,192	1,129	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,274	1,223	1,164	1,144	1,083	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	1,129	-	1,400	1,489	1,364	1,243	1,335	1,253	1,060	1,208	1,222	1,269	1,224	1,054	-	-	-	-	-
7 Jul	1,167	958	1,079	1,134	1,128	1,200	1,336	1,495	1,495	1,235	1,157	1,267	1,043	1,226	1,151	1,074	1,200	1,047	1,427	1,288	1,335	1,495	1,425	1,399
8 Aug	951	855	812	842	904	-	-	1,296	1,221	1,200	1,030	1,028	984	1,042	958	926	867	946	984	923	1,088	-	-	-
9 Sep	-	-	-	-	-	-	-	-	1,495	1,204	1,082	1,061	1,195	1,081	943	968	995	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	1,280	1,324	-	-	-	-	-	-	-	-	-	-	1,495	1,495	1,495	1,487	1,377	1,164
11 Nov	-	-	-	-	-	-	1,165	1,187	1,242	1,062	644	513	288	296	393	618	605	838	1,280	1,388	1,312	1,292	1,215	-
12 Dec	-	-	-	-	-	-	1,108	1,177	1,223	1,286	1,284	1,367	1,396	1,408	1,396	1,393	1,383	1,375	1,366	1,307	1,268	1,211	1,160	-

Boiler Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	4,615	4,645	4,825	4,970	4,700	4,987	5,177	4,200	4,008	3,404	2,577	2,338	1,782	1,849	1,886	2,185	2,254	2,628	2,891	2,895	3,056	3,327	3,325	4,780
2 Feb	4,405	4,521	4,522	4,509	4,677	5,118	5,273	4,160	3,751	3,111	2,658	2,225	2,084	2,126	2,398	2,432	2,427	2,855	3,428	3,317	3,306	3,431	3,631	4,959
3 Mar	3,762	3,785	3,962	4,083	4,017	4,372	5,120	4,903	2,711	1,620	1,505	1,829	1,255	1,247	1,419	1,288	1,329	1,642	2,679	2,268	2,843	2,741	3,993	4,079
4 Apr	3,464	3,014	3,314	3,420	3,490	3,622	4,064	3,757	2,887	2,235	2,287	2,276	2,236	2,309	2,220	2,157	2,277	828	1,275	1,570	2,274	2,314	3,541	3,506
5 May	2,129	2,124	2,150	2,323	2,325	2,263	2,554	2,661	2,038	2,083	2,096	1,868	1,833	1,770	1,909	1,725	1,894	1,789	1,871	1,896	2,148	2,601	2,347	2,361
6 Jun	1,156	900	1,069	1,180	1,161	216	1,754	0	117	0	0	0	0	(1)	1	(0)	(0)	0	(0)	1,254	1,616	1,586	1,694	1,947
7 Jul	94	(0)	(0)	137	158	(1)	0	87	61	0	(0)	(0)	(0)	0	0	0	(1)	0	(0)	0	0	33	(0)	98
8 Aug	(0)	(0)	0	0	(0)	1,133	1,219	(0)	(0)	(1)	0	0	1	(0)	(0)	0	(0)	0	1	(0)	(1)	1,544	1,219	1,359
9 Sep	1,111	907	872	948	1,109	1,054	1,266	1,592	93	0	(0)	(0)	0	(0)	0	(0)	(0)	1,231	1,333	1,352	1,459	1,543	1,564	1,677
10 Oct	2,049	1,997	2,062	2,307	2,243	2,223	1,272	1,637	2,755	2,195	1,597	1,520	1,518	1,662	1,761	1,571	1,866	1,732	208	1,088	745	704	999	1,262
11 Nov	2,188	2,304	2,376	2,566	2,301	2,870	2,172	2,056	1,191	(0)	0	(0)	(0)	(0)	0	0	(0)	(0)	0	109	(1)	298	763	2,419
12 Dec	3,401	3,475	3,600	3,768	3,501	3,928	3,077	3,127	2,599	1,542	901	614	181	202	283	552	589	927	1,336	1,502	1,499	1,813	2,043	3,600

ABS Cooling Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1,275	1,463	1,650	1,856	1,821	1,787	1,736	1,411	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	1,770	2,317	2,847	3,257	3,541	3,589	3,589	3,589	3,589	3,530	3,308	2,983	2,454	2,061	1,787	1,668	1,411	1,326
6 Jun	-	-	-	-	-	-	3,325	-	-	-	-	-	-	-	-	-	-	-	-	3,462	3,222	3,052	2,983	2,898
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	3,070	3,589	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,589	3,581	3,409
9 Sep	1,975	-	-	-	-	1,445	2,043	2,847	-	-	-	-	-	-	-	-	-	3,376	2,966	2,607	2,385	2,180	2,061	1,975
10 Oct	-	-	-	-	-	-	-	-	1,257	1,787	1,975	2,163	2,351	2,197	2,061	1,907	1,531	1,189	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ocean County College
CHP Economic Analysis - Existing Cogen with Full ABS Capacity (ABS Cooling Bias and can not run ABS and Centrif)

Centrifugal Chiller Energy

tons	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	106	101	96	-	-	103	-	-	-	-	1	11	11	12	8	-	-	-	-	-	-	-	-	-
6 Jun	226	224	220	210	209	237	-	323	357	381	402	420	422	421	422	410	392	360	330	-	-	-	-	-
7 Jul	311	298	291	286	274	301	341	377	407	434	449	468	475	474	466	459	439	415	391	371	360	345	333	327
8 Aug	281	274	269	263	254	1	1	364	405	431	452	459	461	462	455	444	425	395	365	337	318	8	-	3
9 Sep	-	150	142	135	122	-	-	-	291	330	355	373	378	374	360	344	318	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Centrifugal Chiller Electricity Minimum chiller load = 20%

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	25	24	23	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	64	64	62	58	57	69	-	120	147	169	191	211	214	212	214	199	181	150	125	-	-	-	-	-
7 Jul	112	103	98	95	88	105	134	165	196	228	248	136	139	138	271	262	235	206	179	160	150	137	127	123
8 Aug	92	88	85	82	78	-	-	153	195	224	252	262	263	265	256	240	217	184	155	130	116	-	-	-
9 Sep	-	37	35	33	29	-	-	-	98	125	146	161	167	163	150	136	116	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total Utility Electric Purchase

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	975	10,639	31	329,809
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	970	10,504	28	294,112
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883	989	11,550	31	358,050
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836	939	11,660	30	349,800
5 May	951	899	891	881	868	980	250	250	250	250	250	255	285	274	285	282	280	267	250	250	250	250	250	250	980	10,148	31	314,588
6 Jun	1,031	996	985	970	961	319	250	370	397	509	589	640	669	670	649	645	628	596	547	403	384	341	272	250	1031	14,071	30	422,130
7 Jul	362	353	348	345	338	355	475	500	580	686	744	619	630	639	801	798	782	740	697	632	611	572	508	373	801	13,488	31	418,128
8 Aug	342	338	335	332	328	250	390	504	587	704	787	803	839	839	862	866	841	786	693	642	641	487	413	250	866	13,859	31	429,629
9 Sep	250	1,036	1,023	1,012	999	250	294	310	446	563	673	703	727	723	722	725	693	567	536	499	512	444	359	250	1036	14,316	30	429,480
10 Oct	909	880	871	857	841	958	250	250	250	250	283	335	359	375	393	398	390	364	349	336	317	250	250	250	958	10,965	31	339,915
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	287	309	299	311	298	268	250	250	250	250	250	947	947	10,253	30	307,590
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938	938	9,949	31	308,419
																												4,301,650

Total Utility Natural Gas Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	per day		per month
1 Jan	4,615	4,645	4,825	4,970	4,700	4,987	5,177	11,653	11,695	11,248	10,510	10,286	9,789	9,834	9,797	9,961	10,008	10,501	10,943	10,731	10,562	10,545	10,382	4,780	207,143	31	6,421,440
2 Feb	4,405	4,521	4,522	4,509	4,677	5,118	5,273	11,492	11,423	11,185	11,070	10,696	10,548	10,597	10,810	10,712	10,597	10,914	11,576	11,472	11,217	10,937	10,826	4,959	214,057	28	5,993,585
3 Mar	3,762	3,785	3,962	4,083	4,017	4,372	5,120	4,903	9,675	9,292	9,675	10,205	9,697	9,732	9,883	9,664	9,580	9,738	10,664	10,067	10,462	9,959	3,993	4,079	180,366	31	5,591,349
4 Apr	3,464	3,014	3,314	3,420	3,490	3,622	4,064	3,757	2,887	9,307	9,989	10,305	10,369	10,530	10,456	10,356	10,403	8,961	9,089	9,008	9,591	9,232	3,541	3,506	165,674	30	4,970,225
5 May	2,129	2,124	2,150	2,323	2,325	2,263	10,286	10,527	10,215	10,982	11,455	11,349	11,314	11,251	11,390	11,206	11,375	11,270	11,280	11,076	11,314	11,529	10,730	9,708	211,573	31	6,558,769
6 Jun	1,156	900	1,069	1,180	1,161	7,434	10,639	8,972	9,562	9,481	9,481	9,481	9,481	9,480	9,482	9,481	9,481	9,481	9,481	10,735	11,097	11,067	11,175	9,969	190,926	30	5,727,766
7 Jul	7,555	7,317	7,294	7,385	7,368	8,198	9,481	9,568	9,542	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,480	9,481	9,481	9,481	9,481	9,514	9,481	8,997	215,472	31	6,679,617
8 Aug	7,324	7,133	7,049	6,980	6,902	9,296	10,700	9,481	9,481	9,480	9,481	9,481	9,482	9,481	9,481	9,481	9,481	9,481	9,482	9,481	9,480	11,025	10,700	10,388	220,231	31	6,827,148
9 Sep	8,137	907	872	948	1,109	8,771	10,747	11,073	9,574	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	10,712	10,814	10,833	10,940	11,024	11,045	10,366	203,718	30	6,111,532
10 Oct	2,049	1,997	2,062	2,307	2,243	2,223	9,442	10,079	11,343	11,325	11,078	11,001	10,999	11,143	11,242	11,052	11,347	11,213	9,689	10,569	10,226	10,135	9,768	8,700	203,233	31	6,300,210
11 Nov	2,188	2,304	2,376	2,566	2,301	2,870	9,618	9,645	9,124	8,558	8,442	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,324	8,943	8,674	8,542	8,525	2,419	172,750	30	5,182,503
12 Dec	3,401	3,475	3,600	3,768	3,501	3,928	10,157	10,648	10,413	9,749	9,093	9,318	9,066	9,159	9,168	9,415	9,394	9,682	10,033	9,841	9,595	9,552	9,458	3,600	189,015	31	5,859,476
																											72,223,620

Ocean County College
CHP Economic Analysis - Existing Cogen with Full ABS Capacity (ABS Cooling Bias and can not run ABS and Centrif)

Annual Electricity	10,794,820	kWh/yr	$0.0449 / kWh
Utility Electricity	4,301,650	kWh/yr	$0.1126 /kWh
Annual Natural Gas	722,236.20	Th/yr	$0.7740 / Th

Electric Energy Cost	$ 417,703.12	/yr
Demand Cost (Jun-Sep)	$ 23,413.60	/yr
Demand Cost (Oct- May)	$ 43,346.24	/yr
Natural Gas Cost	$ 559,010.82	/yr
Total Utiilty Cost	$ 1,043,473.78	/yr

Ocean County College
CHP Economic Analysis - Simultaneous Chiller operation (ABS Cooling Bias)

Electric primarily from CHP. Absorption chillers produces chilled water when ever possible. ABS and Centrif chillers CAN run together. Hot water from boilers as needed.

Cogen Operation

on/off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
2 Feb	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
3 Mar	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
5 May	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 Jun	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9 Sep	1	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 Oct	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11 Nov	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
12 Dec	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-

Cogen Electric Output

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	-	-	-	-	-	-	-	823	854	875	887	889	897	894	884	866	863	879	903	874	830	792	771	-	903	13,781	31	427,211
2 Feb	-	-	-	-	-	-	-	807	852	906	952	960	959	960	952	934	919	904	916	917	884	830	789	-	960	14,441	28	404,348
3 Mar	-	-	-	-	-	-	-	-	759	852	919	947	956	962	959	947	930	909	894	869	845	792	-	-	962	12,540	31	388,740
4 Apr	-	-	-	-	-	-	-	-	-	773	856	900	914	926	928	923	913	914	871	821	805	753	-	-	928	11,297	30	338,910
5 May	-	-	-	-	-	-	860	878	920	1,019	1,083	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,090	1,058	1,056	1,023	948	809	1100	18,444	31	571,764
6 Jun	-	-	-	-	-	792	1,017	1,029	1,095	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	899	1100	20,232	30	606,960
7 Jul	824	805	802	796	791	923	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,019	1100	24,660	31	764,460
8 Aug	806	781	770	761	751	918	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,037	1100	24,524	31	760,244
9 Sep	767	-	-	-	-	858	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	990	1100	21,315	30	639,450
10 Oct	-	-	-	-	-	-	919	956	976	1,051	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,093	1,001	821	1100	18,917	31	586,427
11 Nov	-	-	-	-	-	-	822	841	887	972	956	1,095	1,100	1,100	1,100	1,100	1,100	1,100	1,078	1,010	988	929	864	-	1100	17,042	30	511,260
12 Dec	-	-	-	-	-	-	774	832	871	924	922	992	1,017	1,027	1,017	1,014	1,006	999	991	942	909	861	818	-	1027	15,916	31	493,396
																												6,493,170

Electric Utility Import - does not include centrifugal chiller plant load

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836
5 May	926	875	868	881	868	955	250	250	250	250	250	255	285	274	285	282	280	267	250	250	250	250	250	250
6 Jun	967	932	923	912	904	250	250	250	250	340	398	429	455	458	435	446	447	446	422	403	384	341	272	250
7 Jul	250	250	250	250	250	250	341	335	384	458	496	483	491	501	530	536	547	534	518	472	461	435	381	250
8 Aug	250	250	250	250	250	250	390	351	392	480	535	541	576	574	606	626	624	602	538	512	525	487	413	250
9 Sep	250	999	988	979	970	250	294	310	348	438	527	542	560	560	572	589	577	567	536	499	512	444	359	250
10 Oct	909	880	871	857	841	958	250	250	250	250	283	335	359	375	393	398	390	364	349	336	317	250	250	250
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	287	309	299	311	298	268	250	250	250	250	250	947
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938

Cogen Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	7,453	7,687	7,844	7,933	7,948	8,007	7,985	7,911	7,776	7,754	7,873	8,052	7,836	7,506	7,218	7,057	-
2 Feb	-	-	-	-	-	-	-	7,332	7,672	8,074	8,412	8,471	8,464	8,471	8,412	8,280	8,170	8,059	8,148	8,155	7,911	7,506	7,195	-
3 Mar	-	-	-	-	-	-	-	-	6,964	7,672	8,170	8,376	8,442	8,485	8,464	8,376	8,251	8,096	7,985	7,799	7,619	7,218	-	-
4 Apr	-	-	-	-	-	-	-	-	-	7,072	7,702	8,029	8,133	8,221	8,236	8,199	8,126	8,133	7,814	7,438	7,317	6,918	-	-
5 May	-	-	-	-	-	-	7,732	7,866	8,177	8,899	9,359	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,409	9,180	9,166	8,928	8,383	7,347
6 Jun	-	-	-	-	-	7,218	8,885	8,972	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,022
7 Jul	7,461	7,317	7,294	7,248	7,210	8,199	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,899
8 Aug	7,324	7,133	7,049	6,980	6,902	8,163	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,029
9 Sep	7,026	-	-	-	-	7,717	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,689
10 Oct	-	-	-	-	-	-	8,170	8,442	8,588	9,130	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,431	8,769	7,438
11 Nov	-	-	-	-	-	-	7,446	7,589	7,933	8,558	8,442	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,324	8,834	8,675	8,244	7,762	-
12 Dec	-	-	-	-	-	-	7,080	7,521	7,814	8,207	8,192	8,704	8,885	8,957	8,885	8,863	8,805	8,755	8,697	8,339	8,096	7,739	7,415	-

Ocean County College
CHP Economic Analysis - Simultaneous Chiller operation (ABS Cooling Bias)

ABS Operation

Cool/Heat/Off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
2 Feb	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
3 Mar	-	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-	-
4 Apr	-	-	-	-	-	-	-	-	-	C	C	C	C	C	C	C	C	H	H	H	H	H	-	-
5 May	-	-	-	-	-	-	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6 Jun	-	-	-	-	-	H	C	H	H	H	C	C	C	C	C	C	H	H	H	C	C	C	C	C
7 Jul	H	H	H	H	H	H	H	H	C	C	C	C	C	C	C	C	C	C	H	H	H	H	H	H
8 Aug	H	H	H	H	H	H	C	H	C	C	C	C	C	C	C	C	C	H	H	H	H	C	C	C
9 Sep	C	-	-	-	-	C	C	C	C	H	H	H	H	H	H	H	H	C	C	C	C	C	C	C
10 Oct	-	-	-	-	-	-	H	H	C	C	C	C	C	C	C	C	C	C	H	H	H	H	H	H
11 Nov	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
12 Dec	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-

ABS Heat Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1,166	1,203	1,228	1,242	1,244	1,254	1,250	1,238	1,217	1,213	1,232	1,261	1,226	1,174	1,129	1,104	-
2 Feb	-	-	-	-	-	-	-	1,147	1,200	1,265	1,319	1,329	1,328	1,329	1,319	1,298	1,280	1,262	1,276	1,278	1,238	1,174	1,125	-
3 Mar	-	-	-	-	-	-	-	-	1,090	1,200	1,280	1,313	1,324	1,331	1,328	1,313	1,293	1,268	1,250	1,221	1,192	1,129	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,274	1,223	1,164	1,144	1,083	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	1,129	-	1,250	1,421	1,218	-	-	-	-	-	-	1,133	1,093	941	-	-	-	-	-
7 Jul	1,116	855	963	1,120	1,128	1,071	1,193	1,403	-	-	-	-	-	-	-	-	-	-	1,274	1,150	1,192	1,361	1,272	1,326
8 Aug	849	763	725	752	807	890	-	1,157	-	-	-	-	-	-	-	-	-	845	879	824	971	-	-	-
9 Sep	-	-	-	-	-	-	-	-	-	1,075	966	947	1,067	965	842	864	888	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	1,280	1,324	-	-	-	-	-	-	-	-	-	-	1,495	1,495	1,495	1,487	1,377	1,164
11 Nov	-	-	-	-	-	-	1,165	1,187	1,242	948	575	458	257	264	351	552	540	748	1,143	1,325	1,171	1,292	1,215	-
12 Dec	-	-	-	-	-	-	1,108	1,177	1,223	1,286	1,284	1,367	1,389	1,408	1,396	1,393	1,383	1,375	1,366	1,307	1,268	1,211	1,160	-

Boiler Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	3,432	3,265	2,749	2,045	1,842	1,369	1,426	1,458	1,715	1,774	2,090	2,309	2,317	2,459	2,695	2,696	4,061
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	3,401	3,048	2,496	2,105	1,736	1,616	1,652	1,884	1,916	1,914	2,279	2,764	2,669	2,665	2,778	2,954	4,212
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	2,176	1,237	1,130	1,401	912	905	1,052	942	979	1,248	2,131	1,785	2,277	2,198	3,391	3,465
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	1,898	1,943	1,933	1,899	1,961	1,885	1,832	1,934	556	942	1,199	1,799	1,840	3,008	2,978
5 May	1,809	1,804	1,826	1,973	1,975	1,922	2,170	2,261	1,731	1,770	1,781	1,587	1,557	1,504	1,622	1,465	1,609	1,520	1,589	1,611	1,825	2,210	1,994	2,005
6 Jun	982	764	908	1,002	986	53	1,490	-	-	-	1,200	1,289	1,210	1,023	1,166	1,179	-	-	-	1,065	1,373	1,347	1,439	1,654
7 Jul	-	-	-	-	3	-	-	-	1,495	1,192	1,117	1,223	1,006	1,184	1,111	1,037	1,158	1,011	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	1,036	-	1,178	1,158	995	992	950	1,005	924	894	837	-	-	-	-	1,311	1,036	1,155
9 Sep	944	771	741	805	942	895	1,076	1,352	1,522	-	-	-	-	-	-	-	-	1,045	1,132	1,148	1,239	1,310	1,329	1,425
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	932	1,237	2,341	1,865	1,357	1,291	1,290	1,412	1,496	1,334	1,585	1,471	3	751	459	426	689	937
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	1,710	1,609	868	-	-	-	-	-	-	-	-	-	-	-	-	104	507	2,055
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	2,486	2,520	2,066	1,161	617	363	-	10	79	308	339	629	977	1,124	1,126	1,399	1,601	3,058

ABS Cooling Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1,275	1,463	1,650	1,856	1,821	1,787	1,736	1,411	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	1,770	2,317	2,847	3,257	3,541	3,589	3,589	3,589	3,589	3,530	3,308	2,983	2,454	2,061	1,787	1,668	1,411	1,326
6 Jun	-	-	-	-	-	-	3,325	-	-	-	3,589	3,589	3,589	3,589	3,589	3,589	-	-	-	3,462	3,222	3,052	2,983	2,898
7 Jul	-	-	-	-	-	-	-	-	3,589	3,589	3,589	3,589	3,589	3,589	3,589	3,589	3,589	3,589	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	3,589	-	3,589	3,589	3,589	3,589	3,589	3,589	3,589	3,589	3,589	-	-	-	-	3,589	3,581	3,409
9 Sep	1,975	-	-	-	-	1,445	2,043	2,847	3,496	-	-	-	-	-	-	-	-	3,376	2,966	2,607	2,385	2,180	2,061	1,975
10 Oct	-	-	-	-	-	-	-	-	1,257	1,787	1,975	2,163	2,351	2,197	2,061	1,907	1,531	1,189	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ocean County College
CHP Economic Analysis - Simultaneous Chiller operation (ABS Cooling Bias)

Centrifugal Chiller Energy

tons

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	106	101	96	-	-	103	-	-	-	-	1	11	11	12	8	-	-	-	-	-	-	-	-	-
6 Jun	226	224	220	210	209	237	-	323	357	381	103	120	123	122	123	110	392	360	330	-	-	-	-	-
7 Jul	311	298	291	286	274	301	341	377	108	135	150	169	176	175	167	160	140	116	391	371	360	345	333	327
8 Aug	281	274	269	263	254	257	1	364	106	132	153	160	162	163	156	145	126	395	365	337	318	8	-	3
9 Sep	-	150	142	135	122	-	-	-	-	330	355	373	378	374	360	344	318	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Centrifugal Chiller Electricity Minimum chiller load = 20%

kW

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	25	24	23	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	64	64	62	58	57	69	-	120	147	169	25	29	30	29	30	26	181	150	125	-	-	-	-	-
7 Jul	112	103	98	95	88	105	134	165	26	33	37	43	45	45	42	40	34	28	179	160	150	137	127	123
8 Aug	92	88	85	82	78	79	-	153	25	32	38	40	41	41	39	36	30	184	155	130	116	-	-	-
9 Sep	-	37	35	33	29	-	-	-	-	125	146	161	167	163	150	136	116	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total Utility Electric Purchase

kW

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	975	10,639	31	329,809
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	970	10,504	28	294,112
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883	989	11,550	31	358,050
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836	939	11,660	30	349,800
5 May	951	899	891	881	868	980	250	250	250	250	250	255	285	274	285	282	280	267	250	250	250	250	250	250	980	10,148	31	314,588
6 Jun	1,031	996	985	970	961	319	250	370	397	509	423	458	485	487	465	472	628	596	547	403	384	341	272	250	1031	12,999	30	389,970
7 Jul	362	353	348	345	338	355	475	500	410	491	533	526	536	546	572	576	581	562	697	632	611	572	508	373	697	11,802	31	365,862
8 Aug	342	338	335	332	328	329	390	504	417	512	573	581	617	615	645	662	654	786	693	642	641	487	413	250	786	12,086	31	374,666
9 Sep	250	1,036	1,023	1,012	999	250	294	310	348	563	673	703	727	723	722	725	693	567	536	499	512	444	359	250	1036	14,218	30	426,540
10 Oct	909	880	871	857	841	958	250	250	250	250	283	335	359	375	393	398	390	364	349	336	317	250	250	250	958	10,965	31	339,915
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	287	309	299	311	298	268	250	250	250	250	250	947	947	10,253	30	307,590
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938	938	9,949	31	308,419
																												4,159,321

Total Utility Natural Gas Purchase

kBtu/hr

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	per day		per month
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	10,885	10,952	10,593	9,978	9,790	9,376	9,411	9,369	9,491	9,528	9,963	10,361	10,153	9,965	9,913	9,753	4,061	192,355	31	5,962,992
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	10,733	10,720	10,570	10,517	10,207	10,080	10,123	10,296	10,196	10,084	10,338	10,912	10,824	10,576	10,284	10,149	4,212	198,873	28	5,568,431
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	9,140	8,909	9,300	9,777	9,354	9,390	9,516	9,318	9,230	9,344	10,116	9,584	9,896	9,416	3,391	3,465	168,028	31	5,208,879
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	8,970	9,645	9,962	10,032	10,182	10,121	10,031	10,060	8,689	8,756	8,637	9,116	8,758	3,008	2,978	155,304	30	4,659,135
5 May	1,809	1,804	1,826	1,973	1,975	1,922	9,902	10,127	9,908	10,669	11,140	11,068	11,038	10,985	11,103	10,946	11,090	11,001	10,998	10,791	10,991	11,138	10,377	9,352	203,930	31	6,321,822
6 Jun	982	764	908	1,002	986	7,271	10,375	8,972	9,445	9,481	10,681	10,770	10,691	10,504	10,647	10,660	9,481	9,481	9,481	10,546	10,854	10,828	10,920	9,676	195,406	30	5,862,172
7 Jul	7,461	7,317	7,294	7,248	7,213	8,199	9,481	9,481	10,976	10,673	10,598	10,704	10,487	10,665	10,592	10,518	10,639	10,492	9,481	9,481	9,481	9,481	9,481	8,899	226,342	31	7,016,611
8 Aug	7,324	7,133	7,049	6,980	6,902	8,163	10,517	9,481	10,659	10,639	10,476	10,473	10,431	10,486	10,405	10,375	10,318	9,481	9,481	9,481	9,481	10,792	10,517	10,184	227,228	31	7,044,079
9 Sep	7,970	771	741	805	942	8,612	10,557	10,833	11,003	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	10,526	10,613	10,629	10,720	10,791	10,810	10,114	202,285	30	6,068,540
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	9,102	9,679	10,929	10,995	10,838	10,772	10,771	10,893	10,977	10,815	11,066	10,952	9,484	10,232	9,940	9,857	9,458	8,375	196,076	31	6,078,365
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	9,156	9,198	8,801	8,558	8,442	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,324	8,834	8,675	8,348	8,269	2,055	168,396	30	5,051,891
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	9,566	10,041	9,880	9,368	8,809	9,067	8,885	8,967	8,964	9,171	9,144	9,384	9,674	9,463	9,222	9,138	9,016	3,058	179,232	31	5,556,187
																											70,399,105

Ocean County College
CHP Economic Analysis - Simultaneous Chiller operation (ABS Cooling Bias)

Annual Electricity	10,652,491	kWh/yr	$0.0704 / kWh
Utility Electricity	4,159,321	kWh/yr	$0.1802 /kWh
Annual Natural Gas	703,991.05	Th/yr	$0.7446 / Th

Electric Energy Cost	$ 682,723.43	/yr
Demand Cost (Jun-Sep)	$ 23,413.60	/yr
Demand Cost (Oct- May)	$ 43,346.24	/yr
Natural Gas Cost	$ 524,185.87	/yr
Total Utiilty Cost	$ 1,273,669.14	/yr

Ocean County College
CHP Economic Analysis - ABS Heating

Electric primarily from CHP. Absorption chillers produces hot water when ever possible. Hot water from boilers as needed. All chilled water from centrif chiller.

Cogen Operation

on/off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
2 Feb	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
3 Mar	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
5 May	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 Jun	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9 Sep	1	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 Oct	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11 Nov	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
12 Dec	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-

Cogen Electric Output

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	-	-	-	-	-	-	-	823	854	875	887	889	897	894	884	866	863	879	903	874	830	792	771	-	903	13,781	31	427,211
2 Feb	-	-	-	-	-	-	-	807	852	906	952	960	959	960	952	934	919	904	916	917	884	830	789	-	960	14,441	28	404,348
3 Mar	-	-	-	-	-	-	-	-	759	852	919	947	956	962	959	947	930	909	894	869	845	792	-	-	962	12,540	31	388,740
4 Apr	-	-	-	-	-	-	-	-	-	773	856	900	914	926	928	923	913	914	871	821	805	753	-	-	928	11,297	30	338,910
5 May	-	-	-	-	-	-	860	878	920	1,019	1,083	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,090	1,058	1,056	1,023	948	809	1100	18,444	31	571,764
6 Jun	-	-	-	-	-	792	1,017	1,029	1,095	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	899	1100	20,232	30	606,960
7 Jul	824	805	802	796	791	923	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,019	1100	24,660	31	764,460
8 Aug	806	781	770	761	751	918	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,037	1100	24,524	31	760,244
9 Sep	767	-	-	-	-	858	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	990	1100	21,315	30	639,450
10 Oct	-	-	-	-	-	-	919	956	976	1,051	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,093	1,001	821	1100	18,917	31	586,427
11 Nov	-	-	-	-	-	-	822	841	887	972	956	1,095	1,100	1,100	1,100	1,100	1,100	1,100	1,078	1,010	988	929	864	-	1100	17,042	30	511,260
12 Dec	-	-	-	-	-	-	774	832	871	924	922	992	1,017	1,027	1,017	1,014	1,006	999	991	942	909	861	818	-	1027	15,916	31	493,396
																												6,493,170

Electric Utility Import - does not include centrifugal chiller plant load

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836
5 May	926	875	868	881	868	955	250	250	250	250	250	255	285	274	285	282	280	267	250	250	250	250	250	250
6 Jun	967	932	923	912	904	250	250	250	250	340	398	429	455	458	435	446	447	446	422	403	384	341	272	250
7 Jul	250	250	250	250	250	250	341	335	384	458	496	483	491	501	530	536	547	534	518	472	461	435	381	250
8 Aug	250	250	250	250	250	250	390	351	392	480	535	541	576	574	606	626	624	602	538	512	525	487	413	250
9 Sep	250	999	988	979	970	250	294	310	348	438	527	542	560	560	572	589	577	567	536	499	512	444	359	250
10 Oct	909	880	871	857	841	958	250	250	250	250	283	335	359	375	393	398	390	364	349	336	317	250	250	250
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	287	309	299	311	298	268	250	250	250	250	250	947
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938

Cogen Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	7,453	7,687	7,844	7,933	7,948	8,007	7,985	7,911	7,776	7,754	7,873	8,052	7,836	7,506	7,218	7,057	-
2 Feb	-	-	-	-	-	-	-	7,332	7,672	8,074	8,412	8,471	8,464	8,471	8,412	8,280	8,170	8,059	8,148	8,155	7,911	7,506	7,195	-
3 Mar	-	-	-	-	-	-	-	-	6,964	7,672	8,170	8,376	8,442	8,485	8,464	8,376	8,251	8,096	7,985	7,799	7,619	7,218	-	-
4 Apr	-	-	-	-	-	-	-	-	-	7,072	7,702	8,029	8,133	8,221	8,236	8,199	8,126	8,133	7,814	7,438	7,317	6,918	-	-
5 May	-	-	-	-	-	-	7,732	7,866	8,177	8,899	9,359	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,409	9,180	9,166	8,928	8,383	7,347
6 Jun	-	-	-	-	-	7,218	8,885	8,972	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,022
7 Jul	7,461	7,317	7,294	7,248	7,210	8,199	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,899
8 Aug	7,324	7,133	7,049	6,980	6,902	8,163	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,029
9 Sep	7,026	-	-	-	-	7,717	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,689
10 Oct	-	-	-	-	-	-	8,170	8,442	8,588	9,130	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,431	8,769	7,438
11 Nov	-	-	-	-	-	-	7,446	7,589	7,933	8,558	8,442	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,324	8,834	8,675	8,244	7,762	-
12 Dec	-	-	-	-	-	-	7,080	7,521	7,814	8,207	8,192	8,704	8,885	8,957	8,885	8,863	8,805	8,755	8,697	8,339	8,096	7,739	7,415	-

Ocean County College
CHP Economic Analysis - ABS Heating

ABS Operation

Cool/Heat/Off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
2 Feb	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
3 Mar	-	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-	-
4 Apr	-	-	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	-	-
5 May	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
6 Jun	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
7 Jul	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
8 Aug	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
9 Sep	H	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
10 Oct	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
11 Nov	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
12 Dec	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-

ABS Heat Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1,166	1,203	1,228	1,242	1,244	1,254	1,250	1,238	1,217	1,213	1,232	1,261	1,226	1,174	1,129	1,104	-
2 Feb	-	-	-	-	-	-	-	1,147	1,200	1,265	1,319	1,329	1,328	1,329	1,319	1,298	1,280	1,262	1,276	1,278	1,238	1,174	1,125	-
3 Mar	-	-	-	-	-	-	-	-	1,090	1,200	1,280	1,313	1,324	1,331	1,328	1,313	1,293	1,268	1,250	1,221	1,192	1,129	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1,106	1,205	1,257	1,274	1,288	1,291	1,285	1,273	1,274	1,223	1,164	1,144	1,083	-	-
5 May	-	-	-	-	-	-	1,210	1,231	1,281	1,399	1,475	1,468	1,440	1,391	1,495	1,355	1,488	1,406	1,470	1,445	1,443	1,404	1,314	1,149
6 Jun	-	-	-	-	-	1,129	1,378	1,250	1,421	1,218	1,110	1,192	1,119	946	1,079	1,091	1,133	1,093	941	985	1,270	1,246	1,331	1,256
7 Jul	1,116	855	963	1,120	1,128	1,071	1,193	1,403	1,383	1,103	1,033	1,131	931	1,095	1,028	959	1,071	935	1,274	1,150	1,192	1,361	1,272	1,326
8 Aug	849	763	725	752	807	890	958	1,157	1,090	1,071	920	918	879	930	855	827	774	845	879	824	971	1,213	958	1,068
9 Sep	873	-	-	-	-	828	995	1,251	1,408	1,075	966	947	1,067	965	842	864	888	967	1,047	1,062	1,146	1,212	1,229	1,318
10 Oct	-	-	-	-	-	-	1,280	1,324	1,348	1,437	1,255	1,194	1,193	1,306	1,384	1,234	1,466	1,361	1,495	1,495	1,495	1,487	1,377	1,164
11 Nov	-	-	-	-	-	-	1,165	1,187	1,242	948	575	458	257	264	351	552	540	748	1,143	1,325	1,171	1,292	1,215	-
12 Dec	-	-	-	-	-	-	1,108	1,177	1,223	1,286	1,284	1,367	1,389	1,408	1,396	1,393	1,383	1,375	1,366	1,307	1,268	1,211	1,160	-

Boiler Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	3,432	3,265	2,749	2,045	1,842	1,369	1,426	1,458	1,715	1,774	2,090	2,309	2,317	2,459	2,695	2,696	4,061
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	3,401	3,048	2,496	2,105	1,736	1,616	1,652	1,884	1,916	1,914	2,279	2,764	2,669	2,665	2,778	2,954	4,212
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	2,176	1,237	1,130	1,401	912	905	1,052	942	979	1,248	2,131	1,785	2,277	2,198	3,391	3,465
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	703	640	574	522	569	490	443	558	556	942	1,199	1,799	1,840	3,008	2,978
5 May	1,809	1,804	1,826	1,973	1,975	1,922	862	930	346	257	186	-	-	-	5	-	-	-	-	49	265	692	573	763
6 Jun	982	764	908	1,002	986	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	296
7 Jul	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	771	741	805	942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	932	1,237	883	311	-	-	-	-	-	-	-	-	3	751	459	426	689	937
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	1,710	1,609	868	-	-	-	-	-	-	-	-	-	-	-	-	104	507	2,055
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	2,486	2,520	2,066	1,161	617	363	-	10	79	308	339	629	977	1,124	1,126	1,399	1,601	3,058

ABS Cooling Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ocean County College
CHP Economic Analysis - ABS Heating

Centrifugal Chiller Energy

tons

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	106	122	138	155	152	149	145	118	-	-	-	-	-	-	-
5 May	106	101	96	-	-	103	148	193	237	271	296	310	310	311	307	294	276	249	205	172	149	139	118	111
6 Jun	226	224	220	210	209	237	277	323	357	381	402	420	422	421	422	410	392	360	330	289	269	254	249	242
7 Jul	311	298	291	286	274	301	341	377	407	434	449	468	475	474	466	459	439	415	391	371	360	345	333	327
8 Aug	281	274	269	263	254	257	300	364	405	431	452	459	461	462	455	444	425	395	365	337	318	307	298	287
9 Sep	165	150	142	135	122	120	170	237	291	330	355	373	378	374	360	344	318	281	247	217	199	182	172	165
10 Oct	-	-	-	-	-	-	-	-	105	149	165	180	196	183	172	159	128	99	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Centrifugal Chiller Electricity Minimum chiller load = 20%

kW

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	25	29	34	39	38	37	36	28	-	-	-	-	-	-	-
5 May	25	24	23	-	-	25	36	51	69	87	101	111	111	112	109	100	89	75	55	44	37	34	28	26
6 Jun	64	64	62	58	57	69	90	120	147	169	191	211	214	212	214	199	181	150	125	97	85	78	75	71
7 Jul	112	103	98	95	88	105	134	165	196	228	248	136	139	138	271	262	235	206	179	160	150	137	127	123
8 Aug	92	88	85	82	78	79	104	153	195	224	252	262	263	265	256	240	217	184	155	130	116	109	103	96
9 Sep	42	37	35	33	29	29	43	69	98	125	146	161	167	163	150	136	116	92	74	61	53	47	44	42
10 Oct	-	-	-	-	-	-	-	-	25	37	42	47	52	48	44	40	31	24	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total Utility Electric Purchase

kW

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	975	10,639	31	329,809
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	970	10,504	28	294,112
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883	989	11,550	31	358,050
4 Apr	708	653	649	638	629	724	847	871	916	275	279	284	289	288	287	286	278	250	250	250	250	250	939	836	939	11,926	30	357,780
5 May	951	899	891	881	868	980	286	301	319	337	351	366	396	386	394	382	369	342	305	294	287	284	278	276	980	11,423	31	354,113
6 Jun	1,031	996	985	970	961	319	340	370	397	509	589	640	669	670	649	645	628	596	547	500	469	419	347	321	1031	14,567	30	437,010
7 Jul	362	353	348	345	338	355	475	500	580	686	744	619	630	639	801	798	782	740	697	632	611	572	508	373	801	13,488	31	418,128
8 Aug	342	338	335	332	328	329	494	504	587	704	787	803	839	839	862	866	841	786	693	642	641	596	516	346	866	14,350	31	444,850
9 Sep	292	1,036	1,023	1,012	999	279	337	379	446	563	673	703	727	723	722	725	693	659	610	560	565	491	403	292	1036	14,912	30	447,360
10 Oct	909	880	871	857	841	958	250	250	275	287	325	382	411	423	437	438	421	388	349	336	317	250	250	250	958	11,355	31	352,005
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	287	309	299	311	298	268	250	250	250	250	250	947	947	10,253	30	307,590
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938	938	9,949	31	308,419
																												4,409,226

Total Utility Natural Gas Purchase

kBtu/hr

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	per day		per month
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	10,885	10,952	10,593	9,978	9,790	9,376	9,411	9,369	9,491	9,528	9,963	10,361	10,153	9,965	9,913	9,753	4,061	192,355	31	5,962,992
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	10,733	10,720	10,570	10,517	10,207	10,080	10,123	10,296	10,196	10,084	10,338	10,912	10,824	10,576	10,284	10,149	4,212	198,873	28	5,568,431
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	9,140	8,909	9,300	9,777	9,354	9,390	9,516	9,318	9,230	9,344	10,116	9,584	9,896	9,416	3,391	3,465	168,028	31	5,208,879
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	7,775	8,342	8,603	8,655	8,790	8,726	8,642	8,684	8,689	8,756	8,637	9,116	8,758	3,008	2,978	144,516	30	4,335,491
5 May	1,809	1,804	1,826	1,973	1,975	1,922	8,594	8,796	8,523	9,156	9,545	9,481	9,481	9,481	9,486	9,481	9,481	9,481	9,409	9,229	9,431	9,620	8,956	8,110	177,050	31	5,488,542
6 Jun	982	764	908	1,002	986	7,271	8,885	8,972	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,318	180,267	30	5,408,021
7 Jul	7,461	7,317	7,294	7,248	7,213	8,199	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,899	214,808	31	6,659,056
8 Aug	7,324	7,133	7,049	6,980	6,902	8,163	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,029	213,757	31	6,626,467
9 Sep	7,026	771	741	805	942	7,717	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,689	187,867	30	5,636,021
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	9,102	9,679	9,471	9,441	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,484	10,232	9,940	9,857	9,458	8,375	181,830	31	5,636,724
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	9,156	9,198	8,801	8,558	8,442	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,324	8,834	8,675	8,348	8,269	2,055	168,396	30	5,051,891
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	9,566	10,041	9,880	9,368	8,809	9,067	8,885	8,967	8,964	9,171	9,144	9,384	9,674	9,463	9,222	9,138	9,016	3,058	179,232	31	5,556,187
																											67,138,703

Ocean County College
CHP Economic Analysis - ABS Heating

Annual Electricity	10,902,396	kWh/yr	$0.0725 / kWh
Utility Electricity	4,409,226	kWh/yr	$0.1793 /kWh
Annual Natural Gas	671,387.03	Th/yr	$0.7446 / Th

Electric Energy Cost	$ 723,743.58	/yr
Demand Cost (Jun-Sep)	$ 23,413.60	/yr
Demand Cost (Oct- May)	$ 43,346.24	/yr
Natural Gas Cost	$ 499,909.19	/yr
Total Utiilty Cost	$ 1,290,412.61	/yr

Ocean County College
CHP Economic Analysis - Add High Efficiency Exhaust Heat Recovery

Electric primarily from CHP. High efficiency exhaust heat recovery produces hot water when ever possible. Hot water from boilers as needed. All chilled water from centrif chiller.

Cogen Operation

on/off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
2 Feb	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
3 Mar	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
5 May	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 Jun	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9 Sep	1	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 Oct	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11 Nov	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
12 Dec	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-

Cogen Electric Output

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	-	-	-	-	-	-	-	823	854	875	887	889	897	894	884	866	863	879	903	874	830	792	771	-	903	13,781	31	427,211
2 Feb	-	-	-	-	-	-	-	807	852	906	952	960	959	960	952	934	919	904	916	917	884	830	789	-	960	14,441	28	404,348
3 Mar	-	-	-	-	-	-	-	-	759	852	919	947	956	962	959	947	930	909	894	869	845	792	-	-	962	12,540	31	388,740
4 Apr	-	-	-	-	-	-	-	-	-	773	856	900	914	926	928	923	913	914	871	821	805	753	-	-	928	11,297	30	338,910
5 May	-	-	-	-	-	-	860	878	920	1,019	1,083	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,090	1,058	1,056	1,023	948	809	1100	18,444	31	571,764
6 Jun	-	-	-	-	-	792	1,017	1,029	1,095	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	899	1100	20,232	30	606,960
7 Jul	824	805	802	796	791	923	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,019	1100	24,660	31	764,460
8 Aug	806	781	770	761	751	918	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,037	1100	24,524	31	760,244
9 Sep	767	-	-	-	-	858	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	990	1100	21,315	30	639,450
10 Oct	-	-	-	-	-	-	919	956	976	1,051	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,093	1,001	821	1100	18,917	31	586,427
11 Nov	-	-	-	-	-	-	822	841	887	972	956	1,095	1,100	1,100	1,100	1,100	1,100	1,100	1,078	1,010	988	929	864	-	1100	17,042	30	511,260
12 Dec	-	-	-	-	-	-	774	832	871	924	922	992	1,017	1,027	1,017	1,014	1,006	999	991	942	909	861	818	-	1027	15,916	31	493,396
																												6,493,170

Electric Utility Import - does not include centrifugal chiller plant load

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836
5 May	926	875	868	881	868	955	250	250	250	250	250	255	285	274	285	282	280	267	250	250	250	250	250	250
6 Jun	967	932	923	912	904	250	250	250	250	340	398	429	455	458	435	446	447	446	422	403	384	341	272	250
7 Jul	250	250	250	250	250	250	341	335	384	458	496	483	491	501	530	536	547	534	518	472	461	435	381	250
8 Aug	250	250	250	250	250	250	390	351	392	480	535	541	576	574	606	626	624	602	538	512	525	487	413	250
9 Sep	250	999	988	979	970	250	294	310	348	438	527	542	560	560	572	589	577	567	536	499	512	444	359	250
10 Oct	909	880	871	857	841	958	250	250	250	250	283	335	359	375	393	398	390	364	349	336	317	250	250	250
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	287	309	299	311	298	268	250	250	250	250	250	947
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938

Cogen Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	7,453	7,687	7,844	7,933	7,948	8,007	7,985	7,911	7,776	7,754	7,873	8,052	7,836	7,506	7,218	7,057	-
2 Feb	-	-	-	-	-	-	-	7,332	7,672	8,074	8,412	8,471	8,464	8,471	8,412	8,280	8,170	8,059	8,148	8,155	7,911	7,506	7,195	-
3 Mar	-	-	-	-	-	-	-	-	6,964	7,672	8,170	8,376	8,442	8,485	8,464	8,376	8,251	8,096	7,985	7,799	7,619	7,218	-	-
4 Apr	-	-	-	-	-	-	-	-	-	7,072	7,702	8,029	8,133	8,221	8,236	8,199	8,126	8,133	7,814	7,438	7,317	6,918	-	-
5 May	-	-	-	-	-	-	7,732	7,866	8,177	8,899	9,359	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,409	9,180	9,166	8,928	8,383	7,347
6 Jun	-	-	-	-	-	7,218	8,885	8,972	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,022
7 Jul	7,461	7,317	7,294	7,248	7,210	8,199	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,899
8 Aug	7,324	7,133	7,049	6,980	6,902	8,163	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,029
9 Sep	7,026	-	-	-	-	7,717	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,689
10 Oct	-	-	-	-	-	-	8,170	8,442	8,588	9,130	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,431	8,769	7,438
11 Nov	-	-	-	-	-	-	7,446	7,589	7,933	8,558	8,442	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,324	8,834	8,675	8,244	7,762	-
12 Dec	-	-	-	-	-	-	7,080	7,521	7,814	8,207	8,192	8,704	8,885	8,957	8,885	8,863	8,805	8,755	8,697	8,339	8,096	7,739	7,415	-

Ocean County College
CHP Economic Analysis - Add High Efficiency Exhaust Heat Recovery

Heat Recovery Operation

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
2 Feb	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
3 Mar	-	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-	-
4 Apr	-	-	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	-	-
5 May	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
6 Jun	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
7 Jul	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
8 Aug	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
9 Sep	H	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
10 Oct	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
11 Nov	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
12 Dec	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-

Heat Recovery Heat exchanger efficiency = 80%

kBtu/hr

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	2,234	2,305	2,353	2,380	2,384	2,403	2,396	2,373	2,332	2,325	2,362	2,416	2,350	2,250	2,164	2,116	-
2 Feb	-	-	-	-	-	-	-	2,198	2,300	2,423	2,528	2,546	2,544	2,546	2,528	2,487	2,453	2,419	2,446	2,448	2,373	2,250	2,157	-
3 Mar	-	-	-	-	-	-	-	-	2,088	2,300	2,325	2,517	2,168	2,168	2,301	2,184	2,199	2,422	2,396	2,339	2,284	2,164	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1,756	1,797	1,788	1,757	1,814	1,744	1,695	1,789	1,788	2,094	2,230	2,193	2,075	-	-
5 May	-	-	-	-	-	-	2,007	2,091	1,601	1,637	1,647	1,468	1,440	1,391	1,500	1,355	1,488	1,406	1,470	1,490	1,688	2,044	1,844	1,855
6 Jun	-	-	-	-	-	1,178	1,378	1,250	1,421	1,218	1,110	1,192	1,119	946	1,079	1,091	1,133	1,093	941	985	1,270	1,246	1,331	1,530
7 Jul	1,116	855	963	1,120	1,131	1,071	1,193	1,403	1,383	1,103	1,033	1,131	931	1,095	1,028	959	1,071	935	1,274	1,150	1,192	1,361	1,272	1,326
8 Aug	849	763	725	752	807	890	958	1,157	1,090	1,071	920	918	879	930	855	827	774	845	879	824	971	1,213	958	1,068
9 Sep	873	-	-	-	-	828	995	1,251	1,408	1,075	966	947	1,067	965	842	864	888	967	1,047	1,062	1,146	1,212	1,229	1,318
10 Oct	-	-	-	-	-	-	2,142	2,468	2,165	1,725	1,255	1,194	1,193	1,306	1,384	1,234	1,466	1,361	1,498	2,190	1,920	1,881	2,014	2,031
11 Nov	-	-	-	-	-	-	2,232	2,275	2,045	948	575	458	257	264	351	552	540	748	1,143	1,325	1,171	1,388	1,684	-
12 Dec	-	-	-	-	-	-	2,123	2,255	2,343	2,360	1,855	1,703	1,389	1,417	1,469	1,678	1,697	1,957	2,270	2,347	2,310	2,321	2,223	-

Boiler Fuel Purchase

kBtu/hr

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	2,278	2,074	1,533	815	610	126	187	231	509	572	868	1,061	1,102	1,296	1,576	1,602	4,061
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	2,265	1,858	1,244	798	421	302	336	577	630	645	1,028	1,499	1,404	1,438	1,615	1,838	4,212
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	1,097	48	-	99	-	-	-	-	-	-	892	576	1,096	1,079	3,391	3,465
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	-	-	-	-	-	-	-	-	-	-	46	665	768	3,008	2,978
5 May	1,809	1,804	1,826	1,973	1,975	1,922	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	982	764	908	1,002	986	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	771	741	805	942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	557	432	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,055
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	1,389	1,355	855	-	-	-	-	-	-	-	-	-	-	-	-	199	452	3,058

ABS Cooling Out

kBtu/hr

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ocean County College
CHP Economic Analysis - Add High Efficiency Exhaust Heat Recovery

Centrifugal Chiller Energy

tons

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	106	122	138	155	152	149	145	118	-	-	-	-	-	-	-
5 May	106	101	96	-	-	103	148	193	237	271	296	310	310	311	307	294	276	249	205	172	149	139	118	111
6 Jun	226	224	220	210	209	237	277	323	357	381	402	420	422	421	422	410	392	360	330	289	269	254	249	242
7 Jul	311	298	291	286	274	301	341	377	407	434	449	468	475	474	466	459	439	415	391	371	360	345	333	327
8 Aug	281	274	269	263	254	257	300	364	405	431	452	459	461	462	455	444	425	395	365	337	318	307	298	287
9 Sep	165	150	142	135	122	120	170	237	291	330	355	373	378	374	360	344	318	281	247	217	199	182	172	165
10 Oct	-	-	-	-	-	-	-	-	105	149	165	180	196	183	172	159	128	99	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Centrifugal Chiller Electricity Minimum chiller load = 20%

kW

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	25	29	34	39	38	37	36	28	-	-	-	-	-	-	-
5 May	25	24	23	-	-	25	36	51	69	87	101	111	111	112	109	100	89	75	55	44	37	34	28	26
6 Jun	64	64	62	58	57	69	90	120	147	169	191	211	214	212	214	199	181	150	125	97	85	78	75	71
7 Jul	112	103	98	95	88	105	134	165	196	228	248	136	139	138	271	262	235	206	179	160	150	137	127	123
8 Aug	92	88	85	82	78	79	104	153	195	224	252	262	263	265	256	240	217	184	155	130	116	109	103	96
9 Sep	42	37	35	33	29	29	43	69	98	125	146	161	167	163	150	136	116	92	74	61	53	47	44	42
10 Oct	-	-	-	-	-	-	-	-	25	37	42	47	52	48	44	40	31	24	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total Utility Electric Purchase

kW

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	975	10,639	31	329,809
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	970	10,504	28	294,112
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883	989	11,550	31	358,050
4 Apr	708	653	649	638	629	724	847	871	916	275	279	284	289	288	287	286	278	250	250	250	250	250	939	836	939	11,926	30	357,780
5 May	951	899	891	881	868	980	286	301	319	337	351	366	396	386	394	382	369	342	305	294	287	284	278	276	980	11,423	31	354,113
6 Jun	1,031	996	985	970	961	319	340	370	397	509	589	640	669	670	649	645	628	596	547	500	469	419	347	321	1031	14,567	30	437,010
7 Jul	362	353	348	345	338	355	475	500	580	686	744	619	630	639	801	798	782	740	697	632	611	572	508	373	801	13,488	31	418,128
8 Aug	342	338	335	332	328	329	494	504	587	704	787	803	839	839	862	866	841	786	693	642	641	596	516	346	866	14,350	31	444,850
9 Sep	292	1,036	1,023	1,012	999	279	337	379	446	563	673	703	727	723	722	725	693	659	610	560	565	491	403	292	1036	14,912	30	447,360
10 Oct	909	880	871	857	841	958	250	250	275	287	325	382	411	423	437	438	421	388	349	336	317	250	250	250	958	11,355	31	352,005
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	287	309	299	311	298	268	250	250	250	250	250	947	947	10,253	30	307,590
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938	938	9,949	31	308,419
																												4,409,226

Total Utility Natural Gas Purchase

kBtu/hr

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	per day		per month
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	9,731	9,761	9,377	8,748	8,558	8,133	8,172	8,142	8,285	8,326	8,741	9,113	8,938	8,802	8,794	8,659	4,061	173,152	31	5,367,725
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	9,597	9,530	9,318	9,210	8,892	8,766	8,807	8,989	8,910	8,815	9,087	9,647	9,559	9,349	9,121	9,033	4,212	178,895	28	5,009,067
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	8,061	7,720	8,170	8,475	8,442	8,485	8,464	8,376	8,251	8,096	8,877	8,375	8,715	8,297	3,391	3,465	152,544	31	4,728,865
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	7,072	7,702	8,029	8,133	8,221	8,236	8,199	8,126	8,133	7,814	7,484	7,982	7,686	3,008	2,978	135,162	30	4,054,854
5 May	1,809	1,804	1,826	1,973	1,975	1,922	7,732	7,866	8,177	8,899	9,359	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,409	9,180	9,166	8,928	8,383	7,347	172,122	31	5,335,788
6 Jun	982	764	908	1,002	986	7,218	8,885	8,972	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,022	179,918	30	5,397,545
7 Jul	7,461	7,317	7,294	7,248	7,210	8,199	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,899	214,805	31	6,658,955
8 Aug	7,324	7,133	7,049	6,980	6,902	8,163	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,029	213,757	31	6,626,467
9 Sep	7,026	771	741	805	942	7,717	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	8,689	187,867	30	5,636,021
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	8,170	8,442	8,588	9,130	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,481	9,431	8,769	7,438	175,201	31	5,431,219
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	8,003	8,021	7,933	8,558	8,442	9,445	9,481	9,481	9,481	9,481	9,481	9,481	9,324	8,834	8,675	8,244	7,762	2,055	164,588	30	4,937,632
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	8,469	8,876	8,669	8,207	8,192	8,704	8,885	8,957	8,885	8,863	8,805	8,755	8,697	8,339	8,096	7,938	7,867	3,058	166,674	31	5,166,894
																											64,351,032

Ocean County College
CHP Economic Analysis - Add High Efficiency Exhaust Heat Recovery

Annual Electricity	10,902,396	kWh/yr	$0.0725 / kWh
Utility Electricity	4,409,226	kWh/yr	$0.1793 /kWh
Annual Natural Gas	643,510.32	Th/yr	$0.7446 / Th

Electric Energy Cost	$ 723,743.58	/yr
Demand Cost (Jun-Sep)	$ 23,413.60	/yr
Demand Cost (Oct- May)	$ 43,346.24	/yr
Natural Gas Cost	$ 479,152.42	/yr
Total Utiilty Cost	$ 1,269,655.84	/yr

Ocean County College
CHP Economic Analysis - Additional Generation Capacity

Electric primarily from expanded CHP. Absorption chillers produces chilled water when ever possible. ABS and Centrif chillers can NOT run together. Hot water from boilers as needed.

Cogen Operation

on/off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
2 Feb	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
3 Mar	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
5 May	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 Jun	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9 Sep	1	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 Oct	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11 Nov	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
12 Dec	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-

Cogen Electric Output Added Generation Capacity = 200 kW

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	-	-	-	-	-	-	-	823	854	875	887	889	897	894	884	866	863	879	903	874	830	792	771	-	903	13,781	31	427,211
2 Feb	-	-	-	-	-	-	-	807	852	906	952	960	959	960	952	934	919	904	916	917	884	830	789	-	960	14,441	28	404,348
3 Mar	-	-	-	-	-	-	-	-	759	852	919	947	956	962	959	947	930	909	894	869	845	792	-	-	962	12,540	31	388,740
4 Apr	-	-	-	-	-	-	-	-	-	773	856	900	914	926	928	923	913	914	871	821	805	753	-	-	928	11,297	30	338,910
5 May	-	-	-	-	-	-	860	878	920	1,019	1,083	1,105	1,135	1,124	1,135	1,132	1,130	1,117	1,090	1,058	1,056	1,023	948	809	1135	18,622	31	577,282
6 Jun	-	-	-	-	-	792	1,017	1,029	1,095	1,190	1,248	1,279	1,300	1,300	1,285	1,296	1,297	1,296	1,272	1,253	1,234	1,191	1,122	899	1300	22,395	30	671,850
7 Jul	824	805	802	796	791	923	1,191	1,185	1,234	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,285	1,231	1,019	1300	27,686	31	858,266
8 Aug	806	781	770	761	751	918	1,240	1,201	1,242	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,263	1,037	1300	27,670	31	857,770
9 Sep	767	-	-	-	-	858	1,144	1,160	1,198	1,288	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,294	1,209	990	1300	24,208	30	726,240
10 Oct	-	-	-	-	-	-	919	956	976	1,051	1,133	1,185	1,209	1,225	1,243	1,248	1,240	1,214	1,199	1,186	1,167	1,093	1,001	821	1248	20,066	31	622,046
11 Nov	-	-	-	-	-	-	822	841	887	972	956	1,095	1,137	1,159	1,149	1,161	1,148	1,118	1,078	1,010	988	929	864	-	1161	17,314	30	519,420
12 Dec	-	-	-	-	-	-	774	832	871	924	922	992	1,017	1,027	1,017	1,014	1,006	999	991	942	909	861	818	-	1027	15,916	31	493,396
																												6,885,479

Electric Utility Import - does not include centrifugal chiller plant load

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836
5 May	926	875	868	881	868	955	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
6 Jun	967	932	923	912	904	250	250	250	250	250	250	250	255	258	250	250	250	250	250	250	250	250	250	250
7 Jul	250	250	250	250	250	250	250	250	250	258	296	283	291	301	330	336	347	334	318	272	261	250	250	250
8 Aug	250	250	250	250	250	250	250	250	250	280	335	341	376	374	406	426	424	402	338	312	325	287	250	250
9 Sep	250	999	988	979	970	250	250	250	250	250	327	342	360	360	372	389	377	367	336	299	312	250	250	250
10 Oct	909	880	871	857	841	958	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	947
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938

Cogen Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	7,653	7,896	8,060	8,153	8,169	8,230	8,207	8,130	7,990	7,967	8,091	8,277	8,052	7,708	7,407	7,239	-
2 Feb	-	-	-	-	-	-	-	7,527	7,881	8,300	8,652	8,713	8,705	8,713	8,652	8,515	8,400	8,284	8,377	8,384	8,130	7,708	7,383	-
3 Mar	-	-	-	-	-	-	-	-	7,143	7,881	8,400	8,614	8,682	8,728	8,705	8,614	8,484	8,323	8,207	8,013	7,826	7,407	-	-
4 Apr	-	-	-	-	-	-	-	-	-	7,256	7,912	8,254	8,361	8,453	8,469	8,430	8,354	8,361	8,029	7,637	7,511	7,095	-	-
5 May	-	-	-	-	-	-	7,943	8,083	8,407	9,157	9,633	9,794	10,014	9,934	10,014	9,992	9,978	9,883	9,684	9,448	9,433	9,187	8,621	7,542
6 Jun	-	-	-	-	-	7,407	9,142	9,232	9,721	10,414	10,832	11,055	11,205	11,205	11,098	11,176	11,183	11,176	11,004	10,868	10,732	10,421	9,919	8,246
7 Jul	7,661	7,511	7,487	7,439	7,399	8,430	10,421	10,378	10,732	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,098	10,710	9,157
8 Aug	7,519	7,320	7,231	7,159	7,079	8,392	10,775	10,494	10,789	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	10,940	9,291
9 Sep	7,207	-	-	-	-	7,928	10,080	10,197	10,472	11,119	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,162	10,552	8,939
10 Oct	-	-	-	-	-	-	8,400	8,682	8,834	9,396	10,000	10,378	10,552	10,667	10,796	10,832	10,775	10,588	10,479	10,385	10,247	9,706	9,022	7,637
11 Nov	-	-	-	-	-	-	7,645	7,795	8,153	8,803	8,682	9,721	10,029	10,189	10,116	10,204	10,109	9,890	9,596	9,090	8,924	8,476	7,975	-
12 Dec	-	-	-	-	-	-	7,264	7,724	8,029	8,438	8,423	8,954	9,142	9,217	9,142	9,120	9,060	9,007	8,947	8,576	8,323	7,951	7,614	-

Ocean County College
CHP Economic Analysis - Additional Generation Capacity

ABS Operation

Cool/Heat/Off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
2 Feb	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
3 Mar	-	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-	-
4 Apr	-	-	-	-	-	-	-	-	-	C	C	C	C	C	C	C	C	H	H	H	H	H	-	-
5 May	-	-	-	-	-	-	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6 Jun	-	-	-	-	-	H	C	H	H	H	H	H	H	H	H	H	H	H	H	C	C	C	C	C
7 Jul	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
8 Aug	H	H	H	H	H	C	C	H	H	H	H	H	H	H	H	H	H	H	H	H	H	C	C	C
9 Sep	C	-	-	-	-	C	C	C	H	H	H	H	H	H	H	H	H	C	C	C	C	C	C	C
10 Oct	-	-	-	-	-	-	H	H	C	C	C	C	C	C	C	C	C	C	H	H	H	H	H	H
11 Nov	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
12 Dec	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-

ABS Heat Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1,166	1,203	1,228	1,242	1,244	1,254	1,250	1,238	1,217	1,213	1,232	1,261	1,226	1,174	1,129	1,104	-
2 Feb	-	-	-	-	-	-	-	1,147	1,200	1,265	1,319	1,329	1,328	1,329	1,319	1,298	1,280	1,262	1,276	1,278	1,238	1,174	1,125	-
3 Mar	-	-	-	-	-	-	-	-	1,090	1,200	1,280	1,313	1,324	1,331	1,328	1,313	1,293	1,268	1,250	1,221	1,192	1,129	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,274	1,223	1,164	1,144	1,083	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	1,129	-	1,250	1,421	1,218	1,110	1,192	1,119	946	1,079	1,091	1,133	1,093	941	-	-	-	-	-
7 Jul	1,116	855	963	1,120	1,128	1,071	1,193	1,403	1,383	1,103	1,033	1,131	931	1,095	1,028	959	1,071	935	1,274	1,150	1,192	1,361	1,272	1,326
8 Aug	849	763	725	752	807	-	-	1,157	1,090	1,071	920	918	879	930	855	827	774	845	879	824	971	-	-	-
9 Sep	-	-	-	-	-	-	-	-	1,408	1,075	966	947	1,067	965	842	864	888	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	1,280	1,324	-	-	-	-	-	-	-	-	-	-	1,498	1,597	1,575	1,487	1,377	1,164
11 Nov	-	-	-	-	-	-	1,165	1,187	1,242	948	575	458	257	264	351	552	540	748	1,143	1,325	1,171	1,292	1,215	-
12 Dec	-	-	-	-	-	-	1,108	1,177	1,223	1,286	1,284	1,367	1,389	1,408	1,396	1,393	1,383	1,375	1,366	1,307	1,268	1,211	1,160	-

Boiler Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	3,432	3,265	2,749	2,045	1,842	1,369	1,426	1,458	1,715	1,774	2,090	2,309	2,317	2,459	2,695	2,696	4,061
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	3,401	3,048	2,496	2,105	1,736	1,616	1,652	1,884	1,916	1,914	2,279	2,764	2,669	2,665	2,778	2,954	4,212
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	2,176	1,237	1,130	1,401	912	905	1,052	942	979	1,248	2,131	1,785	2,277	2,198	3,391	3,465
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	1,898	1,943	1,933	1,899	1,961	1,885	1,832	1,934	556	942	1,199	1,799	1,840	3,008	2,978
5 May	1,809	1,804	1,826	1,973	1,975	1,922	2,170	2,261	1,731	1,770	1,781	1,587	1,557	1,504	1,622	1,465	1,609	1,520	1,589	1,611	1,825	2,210	1,994	2,005
6 Jun	982	764	908	1,002	986	53	1,490	-	-	-	-	-	-	-	-	-	-	-	-	1,065	1,373	1,347	1,439	1,654
7 Jul	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	962	1,036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,311	1,036	1,155
9 Sep	944	771	741	805	942	895	1,076	1,352	-	-	-	-	-	-	-	-	-	1,045	1,132	1,148	1,239	1,310	1,329	1,425
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	932	1,237	2,341	1,865	1,357	1,291	1,290	1,412	1,496	1,334	1,585	1,471	-	641	373	426	689	937
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	1,710	1,609	868	-	-	-	-	-	-	-	-	-	-	-	-	104	507	2,055
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	2,486	2,520	2,066	1,161	617	363	-	10	79	308	339	629	977	1,124	1,126	1,399	1,601	3,058

ABS Cooling Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1,275	1,463	1,650	1,856	1,821	1,787	1,736	1,411	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	1,770	2,317	2,847	3,257	3,541	3,603	3,689	3,658	3,684	3,530	3,308	2,983	2,454	2,061	1,787	1,668	1,411	1,326
6 Jun	-	-	-	-	-	-	3,325	-	-	-	-	-	-	-	-	-	-	-	-	3,462	3,222	3,052	2,983	2,898
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	3,070	3,598	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,684	3,581	3,409
9 Sep	1,975	-	-	-	-	1,445	2,043	2,847	-	-	-	-	-	-	-	-	-	3,376	2,966	2,607	2,385	2,180	2,061	1,975
10 Oct	-	-	-	-	-	-	-	-	1,257	1,787	1,975	2,163	2,351	2,197	2,061	1,907	1,531	1,189	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ocean County College
CHP Economic Analysis - Additional Generation Capacity

Centrifugal Chiller Energy

tons

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	106	101	96	-	-	103	-	-	-	-	1	10	2	6	-	-	-	-	-	-	-	-	-	-
6 Jun	226	224	220	210	209	237	-	323	357	381	402	420	422	421	422	410	392	360	330	-	-	-	-	-
7 Jul	311	298	291	286	274	301	341	377	407	434	449	468	475	474	466	459	439	415	391	371	360	345	333	327
8 Aug	281	274	269	263	254	1	-	364	405	431	452	459	461	462	455	444	425	395	365	337	318	-	-	3
9 Sep	-	150	142	135	122	-	-	-	291	330	355	373	378	374	360	344	318	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Centrifugal Chiller Electricity Minimum chiller load = 20%

kW

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	25	24	23	-	-	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	64	64	62	58	57	69	-	120	147	169	191	211	214	212	214	199	181	150	125	-	-	-	-	-
7 Jul	112	103	98	95	88	105	134	165	196	228	248	136	139	138	271	262	235	206	179	160	150	137	127	123
8 Aug	92	88	85	82	78	-	-	153	195	224	252	262	263	265	256	240	217	184	155	130	116	-	-	-
9 Sep	-	37	35	33	29	-	-	-	98	125	146	161	167	163	150	136	116	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total Utility Electric Purchase

kW

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	975	10,639	31	329,809
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	970	10,504	28	294,112
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883	989	11,550	31	358,050
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836	939	11,660	30	349,800
5 May	951	899	891	881	868	980	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	980	9,970	31	309,070
6 Jun	1,031	996	985	970	961	319	250	370	397	419	441	461	469	470	464	449	431	400	375	250	250	250	250	250	1031	11,908	30	357,240
7 Jul	362	353	348	345	338	355	384	415	446	486	544	419	430	439	601	598	582	540	497	432	411	387	377	373	601	10,462	31	324,322
8 Aug	342	338	335	332	328	250	250	403	445	504	587	603	639	639	662	666	641	586	493	442	441	287	250	250	666	10,713	31	332,103
9 Sep	250	1,036	1,023	1,012	999	250	250	250	348	375	473	503	527	523	522	525	493	367	336	299	312	250	250	250	1036	11,423	30	342,690
10 Oct	909	880	871	857	841	958	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	958	9,816	31	304,296
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	947	947	9,981	30	299,430
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938	938	9,949	31	308,419
																												3,909,341

Total Utility Natural Gas Purchase

kBtu/hr

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	per day		per month
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	11,085	11,161	10,809	10,198	10,011	9,599	9,633	9,588	9,705	9,741	10,181	10,586	10,369	10,167	10,102	9,935	4,061	195,744	31	6,068,051
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	10,928	10,929	10,796	10,757	10,449	10,321	10,365	10,536	10,431	10,314	10,563	11,141	11,053	10,795	10,486	10,337	4,212	202,465	28	5,669,007
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	9,319	9,118	9,530	10,015	9,594	9,633	9,757	9,556	9,463	9,571	10,338	9,798	10,103	9,605	3,391	3,465	171,138	31	5,305,289
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	9,154	9,855	10,187	10,260	10,414	10,354	10,262	10,288	8,917	8,971	8,836	9,310	8,935	3,008	2,978	158,088	30	4,742,655
5 May	1,809	1,804	1,826	1,973	1,975	1,922	10,113	10,344	10,138	10,927	11,414	11,381	11,571	11,438	11,636	11,457	11,587	11,403	11,273	11,059	11,258	11,397	10,615	9,547	209,864	31	6,505,776
6 Jun	982	764	908	1,002	986	7,460	10,632	9,232	9,721	10,414	10,832	11,055	11,205	11,205	11,098	11,176	11,183	11,176	11,004	11,933	12,105	11,768	11,358	9,900	209,099	30	6,272,961
7 Jul	7,661	7,511	7,487	7,439	7,402	8,430	10,421	10,378	10,732	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,098	10,710	9,157	242,886	31	7,529,474
8 Aug	7,519	7,320	7,231	7,159	7,079	9,354	11,811	10,494	10,789	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	12,516	11,976	10,446	248,153	31	7,692,757
9 Sep	8,151	771	741	805	942	8,823	11,156	11,549	10,472	11,119	11,205	11,205	11,205	11,205	11,205	11,205	11,205	12,250	12,337	12,353	12,444	12,472	11,881	10,364	227,065	30	6,811,935
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	9,332	9,919	11,175	11,261	11,357	11,669	11,842	12,079	12,292	12,166	12,360	12,059	10,479	11,026	10,620	10,132	9,711	8,574	208,993	31	6,478,792
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	9,355	9,404	9,021	8,803	8,682	9,721	10,029	10,189	10,116	10,204	10,109	9,890	9,596	9,090	8,924	8,580	8,482	2,055	174,655	30	5,239,661
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	9,750	10,244	10,095	9,599	9,040	9,317	9,142	9,227	9,221	9,428	9,399	9,636	9,924	9,700	9,449	9,350	9,215	3,058	183,209	31	5,679,474
																											73,995,833

Ocean County College
CHP Economic Analysis - Additional Generation Capacity

Annual Electricity	10,794,820	kWh/yr	$0.0656 / kWh
Utility Electricity	3,909,341	kWh/yr	$0.1812 /kWh
Annual Natural Gas	739,958.33	Th/yr	$0.7446 / Th

Electric Energy Cost	$ 641,690.96	/yr
Demand Cost (Jun-Sep)	$ 23,413.60	/yr
Demand Cost (Oct- May)	$ 43,346.24	/yr
Natural Gas Cost	$ 550,966.81	/yr
Total Utiilty Cost	$ 1,259,417.61	/yr

Ocean County College
CHP Economic Analysis - Additional Generation Capacity and High Efficiency Exhaust Heat Recovery

Electric primarily from expanded CHP. High efficiency exhaust heat recovery produces hot water when ever possible. Hot water from boilers as needed. All chilled water from centrif chiller.

Cogen Operation

on/off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
2 Feb	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
3 Mar	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
5 May	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6 Jun	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8 Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9 Sep	1	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10 Oct	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11 Nov	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
12 Dec	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-

Cogen Electric Output Added Generation Capacity = 200 kW

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	-	-	-	-	-	-	-	823	854	875	887	889	897	894	884	866	863	879	903	874	830	792	771	-	903	13,781	31	427,211
2 Feb	-	-	-	-	-	-	-	807	852	906	952	960	959	960	952	934	919	904	916	917	884	830	789	-	960	14,441	28	404,348
3 Mar	-	-	-	-	-	-	-	-	759	852	919	947	956	962	959	947	930	909	894	869	845	792	-	-	962	12,540	31	388,740
4 Apr	-	-	-	-	-	-	-	-	-	773	856	900	914	926	928	923	913	914	871	821	805	753	-	-	928	11,297	30	338,910
5 May	-	-	-	-	-	-	860	878	920	1,019	1,083	1,105	1,135	1,124	1,135	1,132	1,130	1,117	1,090	1,058	1,056	1,023	948	809	1135	18,622	31	577,282
6 Jun	-	-	-	-	-	792	1,017	1,029	1,095	1,190	1,248	1,279	1,300	1,300	1,285	1,296	1,297	1,296	1,272	1,253	1,234	1,191	1,122	899	1300	22,395	30	671,850
7 Jul	824	805	802	796	791	923	1,191	1,185	1,234	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,285	1,231	1,019	1300	27,686	31	858,266
8 Aug	806	781	770	761	751	918	1,240	1,201	1,242	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,263	1,037	1300	27,670	31	857,770
9 Sep	767	-	-	-	-	858	1,144	1,160	1,198	1,288	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,294	1,209	990	1300	24,208	30	726,240
10 Oct	-	-	-	-	-	-	919	956	976	1,051	1,133	1,185	1,209	1,225	1,243	1,248	1,240	1,214	1,199	1,186	1,167	1,093	1,001	821	1248	20,066	31	622,046
11 Nov	-	-	-	-	-	-	822	841	887	972	956	1,095	1,137	1,159	1,149	1,161	1,148	1,118	1,078	1,010	988	929	864	-	1161	17,314	30	519,420
12 Dec	-	-	-	-	-	-	774	832	871	924	922	992	1,017	1,027	1,017	1,014	1,006	999	991	942	909	861	818	-	1027	15,916	31	493,396
																												6,885,479

Electric Utility Import - does not include centrifugal chiller plant load

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883
4 Apr	708	653	649	638	629	724	847	871	916	250	250	250	250	250	250	250	250	250	250	250	250	250	939	836
5 May	926	875	868	881	868	955	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
6 Jun	967	932	923	912	904	250	250	250	250	250	250	250	255	258	250	250	250	250	250	250	250	250	250	250
7 Jul	250	250	250	250	250	250	250	250	250	258	296	283	291	301	330	336	347	334	318	272	261	250	250	250
8 Aug	250	250	250	250	250	250	250	250	250	280	335	341	376	374	406	426	424	402	338	312	325	287	250	250
9 Sep	250	999	988	979	970	250	250	250	250	250	327	342	360	360	372	389	377	367	336	299	312	250	250	250
10 Oct	909	880	871	857	841	958	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	947
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938

Cogen Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	7,653	7,896	8,060	8,153	8,169	8,230	8,207	8,130	7,990	7,967	8,091	8,277	8,052	7,708	7,407	7,239	-
2 Feb	-	-	-	-	-	-	-	7,527	7,881	8,300	8,652	8,713	8,705	8,713	8,652	8,515	8,400	8,284	8,377	8,384	8,130	7,708	7,383	-
3 Mar	-	-	-	-	-	-	-	-	7,143	7,881	8,400	8,614	8,682	8,728	8,705	8,614	8,484	8,323	8,207	8,013	7,826	7,407	-	-
4 Apr	-	-	-	-	-	-	-	-	-	7,256	7,912	8,254	8,361	8,453	8,469	8,430	8,354	8,361	8,029	7,637	7,511	7,095	-	-
5 May	-	-	-	-	-	-	7,943	8,083	8,407	9,157	9,633	9,794	10,014	9,934	10,014	9,992	9,978	9,883	9,684	9,448	9,433	9,187	8,621	7,542
6 Jun	-	-	-	-	-	7,407	9,142	9,232	9,721	10,414	10,832	11,055	11,205	11,205	11,098	11,176	11,183	11,176	11,004	10,868	10,732	10,421	9,919	8,246
7 Jul	7,661	7,511	7,487	7,439	7,399	8,430	10,421	10,378	10,732	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,098	10,710	9,157
8 Aug	7,519	7,320	7,231	7,159	7,079	8,392	10,775	10,494	10,789	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	10,940	9,291
9 Sep	7,207	-	-	-	-	7,928	10,080	10,197	10,472	11,119	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,162	10,552	8,939
10 Oct	-	-	-	-	-	-	8,400	8,682	8,834	9,396	10,000	10,378	10,552	10,667	10,796	10,832	10,775	10,588	10,479	10,385	10,247	9,706	9,022	7,637
11 Nov	-	-	-	-	-	-	7,645	7,795	8,153	8,803	8,682	9,721	10,029	10,189	10,116	10,204	10,109	9,890	9,596	9,090	8,924	8,476	7,975	-
12 Dec	-	-	-	-	-	-	7,264	7,724	8,029	8,438	8,423	8,954	9,142	9,217	9,142	9,120	9,060	9,007	8,947	8,576	8,323	7,951	7,614	-

Ocean County College
CHP Economic Analysis - Additional Generation Capacity and High Efficiency Exhaust Heat Recovery

Heat Recovery Operation

Cool/Heat/Off	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
2 Feb	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
3 Mar	-	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-	-
4 Apr	-	-	-	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	-	-
5 May	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
6 Jun	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
7 Jul	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
8 Aug	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
9 Sep	H	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
10 Oct	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
11 Nov	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
12 Dec	-	-	-	-	-	-	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-

Heat Recovery Heat exchanger efficiency = 80%

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	2,234	2,305	2,353	2,380	2,384	2,403	2,396	2,373	2,332	2,325	2,362	2,416	2,350	2,250	2,164	2,116	-
2 Feb	-	-	-	-	-	-	-	2,198	2,300	2,423	2,528	2,546	2,544	2,546	2,528	2,487	2,453	2,419	2,446	2,448	2,373	2,250	2,157	-
3 Mar	-	-	-	-	-	-	-	-	2,088	2,300	2,325	2,517	2,168	2,168	2,301	2,184	2,199	2,422	2,396	2,339	2,284	2,164	-	-
4 Apr	-	-	-	-	-	-	-	-	-	1,756	1,797	1,788	1,757	1,814	1,744	1,695	1,789	1,788	2,094	2,230	2,193	2,075	-	-
5 May	-	-	-	-	-	-	2,007	2,091	1,601	1,637	1,647	1,468	1,440	1,391	1,500	1,355	1,488	1,406	1,470	1,490	1,688	2,044	1,844	1,855
6 Jun	-	-	-	-	-	1,178	1,378	1,250	1,421	1,218	1,110	1,192	1,119	946	1,079	1,091	1,133	1,093	941	985	1,270	1,246	1,331	1,530
7 Jul	1,116	855	963	1,120	1,131	1,071	1,193	1,403	1,383	1,103	1,033	1,131	931	1,095	1,028	959	1,071	935	1,274	1,150	1,192	1,361	1,272	1,326
8 Aug	849	763	725	752	807	890	958	1,157	1,090	1,071	920	918	879	930	855	827	774	845	879	824	971	1,213	958	1,068
9 Sep	873	-	-	-	-	828	995	1,251	1,408	1,075	966	947	1,067	965	842	864	888	967	1,047	1,062	1,146	1,212	1,229	1,318
10 Oct	-	-	-	-	-	-	2,142	2,468	2,165	1,725	1,255	1,194	1,193	1,306	1,384	1,234	1,466	1,361	1,498	2,190	1,920	1,881	2,014	2,031
11 Nov	-	-	-	-	-	-	2,232	2,275	2,045	948	575	458	257	264	351	552	540	748	1,143	1,325	1,171	1,388	1,684	-
12 Dec	-	-	-	-	-	-	2,123	2,255	2,343	2,360	1,855	1,703	1,389	1,417	1,469	1,678	1,697	1,957	2,270	2,347	2,310	2,321	2,223	-

Boiler Fuel Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	2,278	2,074	1,533	815	610	126	187	231	509	572	868	1,061	1,102	1,296	1,576	1,602	4,061
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	2,265	1,858	1,244	798	421	302	336	577	630	645	1,028	1,499	1,404	1,438	1,615	1,838	4,212
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	1,097	48	-	99	-	-	-	-	-	-	892	576	1,096	1,079	3,391	3,465
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	-	-	-	-	-	-	-	-	-	-	46	665	768	3,008	2,978
5 May	1,809	1,804	1,826	1,973	1,975	1,922	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	982	764	908	1,002	986	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	771	741	805	942	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	557	432	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,055
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	1,389	1,355	855	-	-	-	-	-	-	-	-	-	-	-	-	199	452	3,058

ABS Cooling Out

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 May	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 Jun	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 Jul	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Aug	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9 Sep	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Oct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Ocean County College
CHP Economic Analysis - Additional Generation Capacity and High Efficiency Exhaust Heat Recovery

Centrifugal Chiller Energy

tons	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	106	122	138	155	152	149	145	118	-	-	-	-	-	-	-
5 May	106	101	96	-	-	103	148	193	237	271	296	310	310	311	307	294	276	249	205	172	149	139	118	111
6 Jun	226	224	220	210	209	237	277	323	357	381	402	420	422	421	422	410	392	360	330	289	269	254	249	242
7 Jul	311	298	291	286	274	301	341	377	407	434	449	468	475	474	466	459	439	415	391	371	360	345	333	327
8 Aug	281	274	269	263	254	257	300	364	405	431	452	459	461	462	455	444	425	395	365	337	318	307	298	287
9 Sep	165	150	142	135	122	120	170	237	291	330	355	373	378	374	360	344	318	281	247	217	199	182	172	165
10 Oct	-	-	-	-	-	-	-	-	105	149	165	180	196	183	172	159	128	99	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Centrifugal Chiller Electricity Minimum chiller load = 20%

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Jan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Feb	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3 Mar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 Apr	-	-	-	-	-	-	-	-	-	25	29	34	39	38	37	36	28	-	-	-	-	-	-	-
5 May	25	24	23	-	-	25	36	51	69	87	101	111	111	112	109	100	89	75	55	44	37	34	28	26
6 Jun	64	64	62	58	57	69	90	120	147	169	191	211	214	212	214	199	181	150	125	97	85	78	75	71
7 Jul	112	103	98	95	88	105	134	165	196	228	248	136	139	138	271	262	235	206	179	160	150	137	127	123
8 Aug	92	88	85	82	78	79	104	153	195	224	252	262	263	265	256	240	217	184	155	130	116	109	103	96
9 Sep	42	37	35	33	29	29	43	69	98	125	146	161	167	163	150	136	116	92	74	61	53	47	44	42
10 Oct	-	-	-	-	-	-	-	-	25	37	42	47	52	48	44	40	31	24	-	-	-	-	-	-
11 Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12 Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Total Utility Electric Purchase

kW	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max	per day		per month
1 Jan	840	786	783	774	771	781	975	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	975	10,639	31	329,809
2 Feb	812	762	760	751	749	771	970	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	929	970	10,504	28	294,112
3 Mar	760	708	705	695	689	748	909	964	250	250	250	250	250	250	250	250	250	250	250	250	250	250	989	883	989	11,550	31	358,050
4 Apr	708	653	649	638	629	724	847	871	916	275	279	284	289	288	287	286	278	250	250	250	250	250	939	836	939	11,926	30	357,780
5 May	951	899	891	881	868	980	286	301	319	337	351	361	361	362	359	350	339	325	305	294	287	284	278	276	980	11,245	31	348,595
6 Jun	1,031	996	985	970	961	319	340	370	397	419	441	461	469	470	464	449	431	400	375	347	335	328	325	321	1031	12,404	30	372,120
7 Jul	362	353	348	345	338	355	384	415	446	486	544	419	430	439	601	598	582	540	497	432	411	387	377	373	601	10,462	31	324,322
8 Aug	342	338	335	332	328	329	354	403	445	504	587	603	639	639	662	666	641	586	493	442	441	396	353	346	666	11,204	31	347,324
9 Sep	292	1,036	1,023	1,012	999	279	293	319	348	375	473	503	527	523	522	525	493	459	410	360	365	297	294	292	1036	12,019	30	360,570
10 Oct	909	880	871	857	841	958	250	250	275	287	292	297	302	298	294	290	281	274	250	250	250	250	250	250	958	10,206	31	316,386
11 Nov	811	767	771	764	762	909	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	947	947	9,981	30	299,430
12 Dec	826	777	777	769	767	845	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	938	938	9,949	31	308,419
																												4,016,917

Total Utility Natural Gas Purchase

kBtu/hr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	per day		per month
1 Jan	3,920	3,946	4,098	4,222	3,992	4,236	4,398	9,931	9,970	9,593	8,968	8,779	8,356	8,394	8,361	8,499	8,539	8,959	9,338	9,154	9,004	8,983	8,841	4,061	176,541	31	5,472,784
2 Feb	3,742	3,840	3,841	3,830	3,973	4,347	4,479	9,792	9,739	9,544	9,450	9,134	9,007	9,049	9,229	9,145	9,045	9,312	9,876	9,788	9,568	9,323	9,221	4,212	182,487	28	5,109,643
3 Mar	3,196	3,215	3,365	3,468	3,412	3,714	4,349	4,164	8,240	7,929	8,400	8,713	8,682	8,728	8,705	8,614	8,484	8,323	9,099	8,589	8,922	8,486	3,391	3,465	155,654	31	4,825,275
4 Apr	2,943	2,560	2,815	2,905	2,964	3,077	3,452	3,191	2,452	7,256	7,912	8,254	8,361	8,453	8,469	8,430	8,354	8,361	8,029	7,683	8,176	7,863	3,008	2,978	137,946	30	4,138,374
5 May	1,809	1,804	1,826	1,973	1,975	1,922	7,943	8,083	8,407	9,157	9,633	9,794	10,014	9,934	10,014	9,992	9,978	9,883	9,684	9,448	9,433	9,187	8,621	7,542	178,056	31	5,519,742
6 Jun	982	764	908	1,002	986	7,407	9,142	9,232	9,721	10,414	10,832	11,055	11,205	11,205	11,098	11,176	11,183	11,176	11,004	10,868	10,732	10,421	9,919	8,246	200,678	30	6,020,345
7 Jul	7,661	7,511	7,487	7,439	7,399	8,430	10,421	10,378	10,732	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,098	10,710	9,157	242,883	31	7,529,373
8 Aug	7,519	7,320	7,231	7,159	7,079	8,392	10,775	10,494	10,789	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	10,940	9,291	242,654	31	7,522,274
9 Sep	7,207	771	741	805	942	7,928	10,080	10,197	10,472	11,119	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,205	11,162	10,552	8,939	214,169	30	6,425,081
10 Oct	1,741	1,696	1,751	1,960	1,905	1,889	8,400	8,682	8,834	9,396	10,000	10,378	10,552	10,667	10,796	10,832	10,775	10,588	10,479	10,385	10,247	9,706	9,022	7,637	188,318	31	5,837,846
11 Nov	1,858	1,957	2,018	2,179	1,955	2,438	8,202	8,227	8,153	8,803	8,682	9,721	10,029	10,189	10,116	10,204	10,109	9,890	9,596	9,090	8,924	8,476	7,975	2,055	170,847	30	5,125,402
12 Dec	2,890	2,951	3,058	3,201	2,974	3,337	8,653	9,079	8,884	8,438	8,423	8,954	9,142	9,217	9,142	9,120	9,060	9,007	8,947	8,576	8,323	8,150	8,066	3,058	170,651	31	5,290,181
																											68,816,320

Ocean County College
CHP Economic Analysis - Additional Generation Capacity and High Efficiency Exhaust Heat Recovery

Annual Electricity	10,902,396	kWh/yr	$0.0666 / kWh
Utility Electricity	4,016,917	kWh/yr	$0.1808 /kWh
Annual Natural Gas	688,163.20	Th/yr	$0.7446 / Th

Electric Energy Cost	$ 659,348.81	/yr
Demand Cost (Jun-Sep)	$ 23,413.60	/yr
Demand Cost (Oct- May)	$ 43,346.24	/yr
Natural Gas Cost	$ 512,400.58	/yr
Total Utiilty Cost	$ 1,238,509.23	/yr

Ocean County College
CHP and Central Plant Performance Data

Engine: Waukesha AGP1000

Size	1100 kW		(from Manufacturers datasheet)
Fuel Consuption	9481 kBtu/h		(from Manufacturers datasheet)
Heat Rate (LHV)	8619 Btu/kWh		(from Manufacturers datasheet)

Generic 1 MW Recip Performace

Load	100%	75%	50%	
Heat Rate	9238	9671	10232	btu/kWh

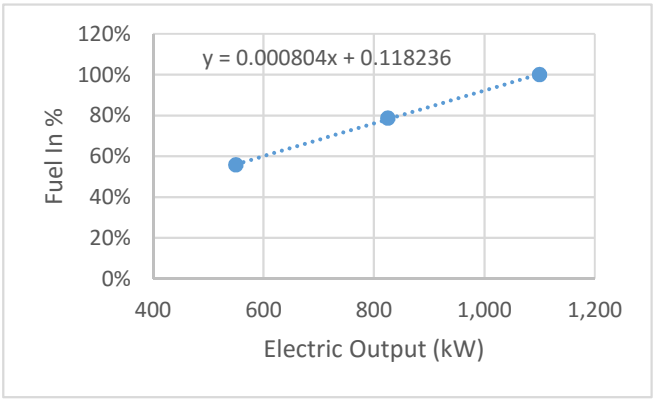
HR Curve based on the part load preformance of multplie 1 MW engines
HR Curve: y = 1020x2 - 3519x + 11737 (x is % engine load)

A	B	C
1020	-3519	11737

Heat Rate Adjustment (LHV) 619 Btu/kWh (tuning generic IC curve to AGP1000)

AGP1000 Recip Performance (based on Generic Recip Performance)

Load	100%	75%	50%	
Electric	1,100	825	550	kW
Heat Rate	8619	9052	9613	btu/kWh
Fuel In (LHV)	9481	7468	5287	kBtu/hr
Fuel %	100%	79%	56%	



Fuel % Curve (used to scale Cogen heat output and ABS output)

m	b
0.000787	0.124412

Minimum utility import	250	kW
Minimum engine load	750	kW

Ocean County College
CHP and Central Plant Performance Data

Absorption Chiller: Broad BHE85

Design Performance			**Actual Condition**			**Actual Performance**		
Exhust In	1637	kBtu/hr	Design Exhaust In	776	°F	Exhust In	1544	kBtu/hr
JW In	1980	kBtu/hr	Actual Exhaust In	750	°F	JW In	0	kBtu/hr
Elect In	6.8	kW	Design Exhaust Out	320	°F	Elect In	6.8	kW
Total In	3640	kBtu/hr	Actual Capacity	94%		Total In	1567	kBtu/hr
						Capacity	43%	
HHW Flow	151	gpm	Design JW In	210	°F			
HHW in	160	°F	Actual JW In	177	°F			
HHW out	180	°F	Design JW Out	198	°F	HHW Cap	650	kBtu/hr
HHW Cap	1510	kBtu/hr	Actual Capacity	0%				
						CHW Cap	1561	kBtu/hr
CHW Flow	725	gpm						
CHW in	54	°F						
CHW out	44	°F						
CHW Cap	3625	kBtu/hr						

HHW Eff	41.5%

CHW COP based on plant design data and performce data for a Broad BE chiller

Exh Temp	CHW Temp	CW Temp	ABS Load	COP	
932	44	85	100%	1.5	<<< does SCR design prevents higher Exh Temp ???
775	44	85	75%	1.48	
775	46	85	87%	1.47	
775	45	85	81%	1.475	<<< Ave Design Performance
				2.32	<<< Equivalent kW/ton

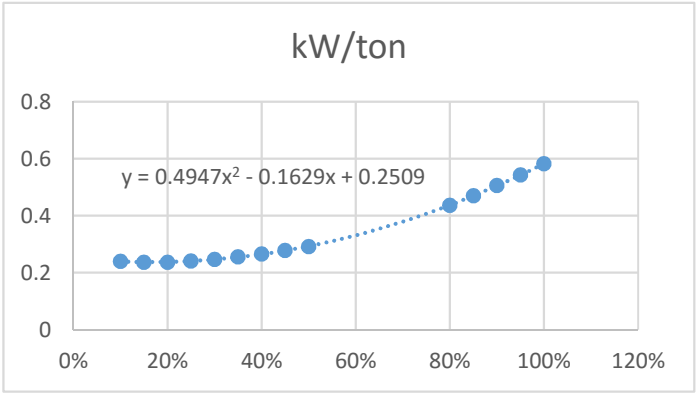
Ocean County College
CHP and Central Plant Performance Data

Chillers: York YMC2

Size	467	tons
Eff	0.582	kW/ton
Qnty	3	
CW Temp	85	°F
CHW Temp	44	°F

Curve based on plant design data and single compressor mag chillers
kW/ton Curve: y = 0.5212x2 - 0.1944x + 0.2563 (x is % chiller load)

A	B	C
0.5212	-0.1944	0.2563



Operation / Sequence

55	°F OSA Min load (full OSA econ)
20%	Min chiller load
93.40	Min chiller load (tons)
475	Peak load (tons)

Load	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%
kW/ton	0.24	0.237	0.237	0.241	0.247	0.256	0.266	0.278	0.291	0.306	0.321	0.343	0.373	0.404	0.436

Boilers: Aerco BMK 6000

Size	5445	kBtu/hr
Eff	92.5%	(@ 80 to 180)
Eff	88.0%	Boiler Eff @ 130°F
Qnty	4	