Local Government Energy Audit:
Energy Audit Report

Gorman Hall

Brookdale Community College

765 Newman Springs Road

Lincroft, NJ 07738

March 27, 2018

Final Report by:

TRC Energy Services

Disclaimer

The intent of this energy analysis report is to identify energy savings opportunities and recommend upgrades to the facility's energy using equipment and systems. Approximate saving are included in this report to help make decisions about reducing energy use at the facility. This report, however, is not intended to serve as a detailed engineering design document. Further design and analysis may be necessary in order to implement some of the measures recommended in this report.

The energy conservation measures and estimates of energy savings have been reviewed for technical accuracy. However, estimates of final energy savings are not guaranteed, because final savings may depend on behavioral factors and other uncontrollable variables. TRC Energy Services (TRC)and New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility 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 certain measures and conditions, TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

New Jersey's Clean Energy Program (NJCEP) incentive values provided in this report are estimates based on program information available at the time of the report. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. The owner of the facility should review available program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

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1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Gorman Hall.

The goal of an LGEA report is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and provide information and assistance to help facilities implement ECMs. The LGEA report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

This study was conducted by TRC, as part of a comprehensive effort to assist New Jersey higher education institutions in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Gorman Hall at Brookdale Community College is an 18,043 square-foot facility comprised of two buildings connected by an enclosed walkway. The first building is two stories and houses the campus information technology services and other offices. The second building is one-story and portions of it were unoccupied during the site visit. Interior lighting consists mainly of fluorescent fixtures with linear T8 and T12 lamps. The cooling and heating systems consist of packaged units and split system air conditioners. The building receives electric power via the campus main account with JCP&L and has no separate utility meters or submeters.

A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated four measures which together represent an opportunity for Gorman Hall to reduce annual energy costs by $2,731 and annual greenhouse gas emissions by 24,479 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 4.3 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce Gorman Hall's annual energy use by 4%.

Figure 1 – Previous 12 Month Utility Costs

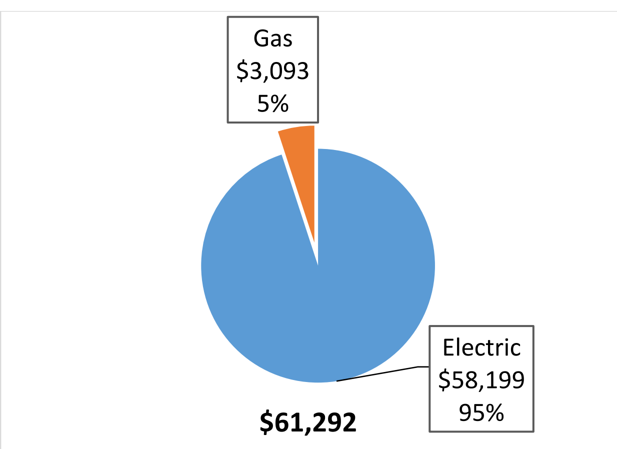
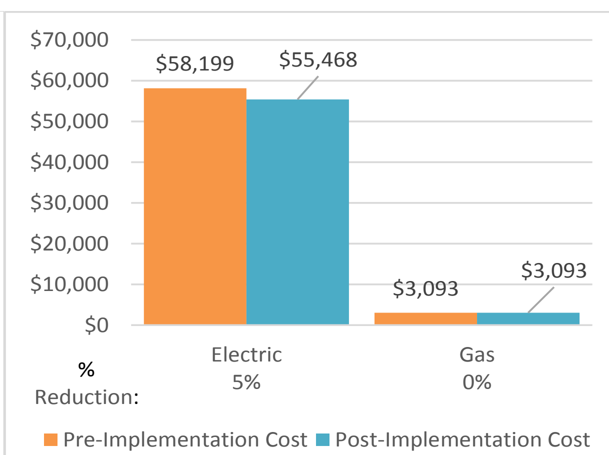


Figure 2 – Potential Post-Implementation Costs



A detailed description of Gorman Hall's existing energy use can be found in Section 3.

Estimates of the total cost, energy savings, and financial incentives for the proposed energy efficient upgrades are summarized below in Figure 3. A brief description of each category can be found below and a description of savings opportunities can be found in Section 4.

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**19,044**	**3.2**	**0.0**	**$2,139.08**	**$9,456.62**	**$785.00**	**$8,671.62**	**4.1**	**19,177**
ECM 1	Retrofit Fixtures with LED Lamps	19,044	3.2	0.0	$2,139.08	$9,456.62	$785.00	$8,671.62	4.1	19,177
Lighting Control Measures		**3,714**	**0.6**	**0.0**	**$417.21**	**$2,668.00**	**$80.00**	**$2,588.00**	**6.2**	**3,740**
ECM 2	Install Occupancy Sensor Lighting Controls	1,930	0.3	0.0	$216.75	$1,972.00	$80.00	$1,892.00	8.7	1,943
ECM 3	Install High/Low Lighitng Controls	1,785	0.3	0.0	$200.46	$696.00	$0.00	$696.00	3.5	1,797
Plug Load Equipment Control - Vending Machine		**1,551**	**0.0**	**0.0**	**$174.26**	**$460.00**	**$0.00**	**$460.00**	**2.6**	**1,562**
ECM 4	Vending Machine Control	1,551	0.0	0.0	$174.26	$460.00	$0.00	$460.00	2.6	1,562
TOTALS		**24,309**	**3.8**	**0.0**	**$2,730.55**	**$12,584.62**	**$865.00**	**$11,719.62**	**4.3**	**24,479**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

Lighting Upgrades generally involve the replacement of existing lighting components such as lamps and ballasts (or the entire fixture) with higher efficiency lighting components. These measure save energy by reducing the power used by the lighting components due to improved electrical efficiency.

Lighting Controls measures generally involve the installation of automated controls to turn off lights or reduce light output when not needed. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

Plug Load Equipment control measures generally involve installing automated devices that limit the power usage or operation of equipment that is plugged into an electric outlets when not in use.

Energy Efficient Practices

TRC also identified 16 low cost or no cost energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at Gorman Hall include:

- Reduce Air Leakage
- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Turn Off Unneeded Motors
- Reduce Motor Short Cycling
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Ensure Economizers are Functioning Properly
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Check for and Seal Duct Leakage

- Perform Proper Furnace Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

For details on these energy efficient practices, please refer to Section 5.

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Gorman Hall. Based on the configuration of the site and its loads there is a high potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	High	
System Potential	112	kW DC STC
Electric Generation	133,433	kWh/yr
Displaced Cost	$11,610	/yr
Installed Cost	$291,200	

For details on our evaluation and on-site generation potential, please refer to Section 6.

1.3 Implementation Planning

To realize the energy savings from the ECMs listed in this report, a project implementation plan must be developed. Available capital must be considered and decisions need to be made whether it is best to pursue individual ECMs separately, groups of ECMs, or a comprehensive approach where all ECMs are implemented together, possibly in conjunction with other facility upgrades or improvements.

Rebates, incentives, and financing are available from NJCEP, as well as other sources, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any measure, please review the relevant incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives prior to purchasing materials or commencing with installation.

The ECMs outlined in this report may qualify under the following program(s):

- SmartStart
- Direct Install
- Energy Savings Improvement Program (ESIP)

For facilities wanting to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years, incentives are available through the SmartStart program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 8.

This facility may also qualify for the Direct Install program which can provide turnkey installation of multiple measures, through an authorized network of participating contractors. This program can provide substantially higher incentives that SmartStart, up to 70% of the cost of selected measures, although measure eligibility will have to be assessed and be verified by the designated Direct Install contractor and, in most cases, they will perform the installation work.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.3 for additional information on the ESIP Program.

Additional information on relevant incentive programs is located in Section 8 or: [www.njcleanenergy.com/ci.](http://www.njcleanenergy.com/ci)

2 Facility Information and Existing Conditions

2.1 Project Contacts

Figure 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Timothy Drury	Director of Facilities Management and Construction	tdrury@brookdalecc.edu	(732) 224-2217
Designated Representative			
Christopher Otis	Manager,Fire Safety & Environmental Compliance	cotis@brookdalecc.edu	(732) 224-2217
TRC Energy Services			
Moussa Traore	Auditor	mtraore@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On December 9, 2016, TRC performed an energy audit at Gorman Hall located in Lincroft, New Jersey. TRC's auditor met with Christopher Otis to review the facility operations and help focus our investigation on specific energy-using systems.

Gorman Hall is an 18,043 square-foot facility constructed in 1967 comprised of two buildings which are connected by an enclosed walkway. The first building is a two-story facility and was renovated recently. The second building is one-story and portions of it were also recently renovated while the remaining section of this building was unoccupied during the site visit. Gorman Hall houses the Brookdale Community College information technology services and the college main data center which includes some of the most sensitive and vital computer services needed to run the college.

The building receives electric power via the campus main account with JCP&L. The building has no separate utility meters or submeters. The breakdown of energy usage is based on both our estimates of Gorman Hall's share of the total electric and gas loads as well as number and sizes of the energy-using equipment on site.

TRC recommends installing electric submeters for all buildings to better sharpen the view of relative energy demand between one campus building and another.

2.3 Building Occupancy

The facility is used year around. The typical schedule is presented in the table below.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Gorman Hall	Weekday	7:00 AM - 11:00 PM
Gorman Hall	Weekend	N/A

2.4 Building Envelope

The building has a conventional, reinforced concrete foundation. The two buildings have a hip roofs covered with asphalt shingles which are in good condition. Exterior walls of the two-story building is constructed of concrete block with vinyl siding. Exterior walls of the second building are also constructed of concrete block and portions of the walls are accented with decorative stone.

The windows are single pane with aluminum frames and appear in good condition. Exterior doors are glass and metal.

2.5 On-Site Generation

Gorman Hall has a 550 kW diesel fuel backup generator located at the rear of the building.

2.6 Energy-Using Systems

Please see Appendix A: Equipment Inventory & Recommendations for an inventory of the facility's equipment.

Lighting System

Lighting at the facility is provided by a combination of linear fluorescent fixtures with T8 and T12 lamps with both electronic and magnetic ballasts. Most of the fixtures are 1-lamp or 2-lamp, 4-foot long troffers with diffusers. The fixtures with T12 lamps are all in the unoccupied portion of the building. There are also fixtures with compact fluorescent lamps (CFL). The main lobby, stairwells, storage rooms and restrooms of the renovated portions of the facility are primarily lit with recessed fixtures with CFLs. Interior lighting control is provided by a combination of occupancy sensors and manual walls switches. Occupancy sensors are used in the two-story building. exit signs throughout the building use fluorescent lamps.

Direct Expansion Air Conditioning System (DX)

Four 9-ton Heatcraft air-cooled split-systems cool the data center. The units used integrated variable speed technology to optimize the operation. The units are two years old and are located in the rear of the two-story building.

Three 7.5-ton Trane package units located on the ground floor are used to condition various spaces of the facility. The units are constant air volume with direct-expansion (DX) cooling and a gas fired furnace with an output capacity of 96 MBh each. They are three years old and appear in good condition.

Three ductless mini-split heat pumps and one Trane air handler unit are also used to condition and ventilate various spaces of the facility. They are six and three years old respectively and are located on the ground floor. The air handler is variable air volume with a single 15 hp supply fan and one 7.5 return fan. The units are controlled by individual thermostats.

Domestic Hot Water Heating System

Domestic hot water is provided by two electric water heaters. One Bradford White and one A.O Smith unit are located in the closets of the two-story building and unoccupied portion of the second building respectively. They have an input rating of 4.5 kW and 40 gallon storage tank each. They are used to serve the renovated areas and an unoccupied portions of the facility respectively. The A.O. Smith hot water heater was not operational as its service area was unoccupied. They are 12 and 15 years old respectively and appear in fair condition.

Building Plug Load

The data center equipment is the primary plug load in the building. The building also has approximately 35 computers with LCD monitors and typical office equipment that are used daily.

The facility has two vending machines located in the break room

2.7 Water-Using Systems

There are several restrooms at this facility. A sampling of restrooms found that faucets in the renovated portions of the facility are low flow. The restrooms of the unoccupied area are not functional.

3 SITE ENERGY USE AND COSTS

Nearly the entire campus receives electricity through a master electric meter. The main meter was prorated for individual buildings based on building size and function. Utility data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.4 for additional information.

3.1 Total Cost of Energy

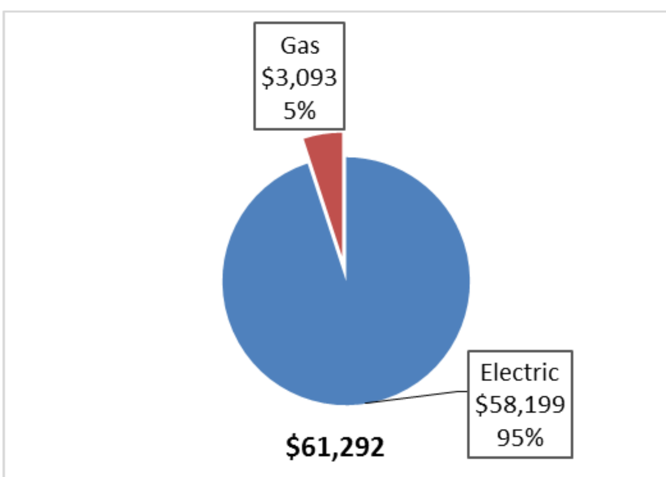
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Gorman Hall		
Fuel	**Usage**	**Cost**
Electricity	518,129 kWh	$58,199
Natural Gas	1,732 Therms	$3,093
Total		**$61,292**

The current annual energy cost for this facility is $61,292 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. It is supplied via the main electric account for the campus and distributed from the Central Utility Plant to Gorman Hall. The average electric cost over the past 12 months on the main account was $0.112/kWh. This is a blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly estimated electricity consumption and peak demand are shown in the chart below.

Figure 9 -Electric Usage & Demand

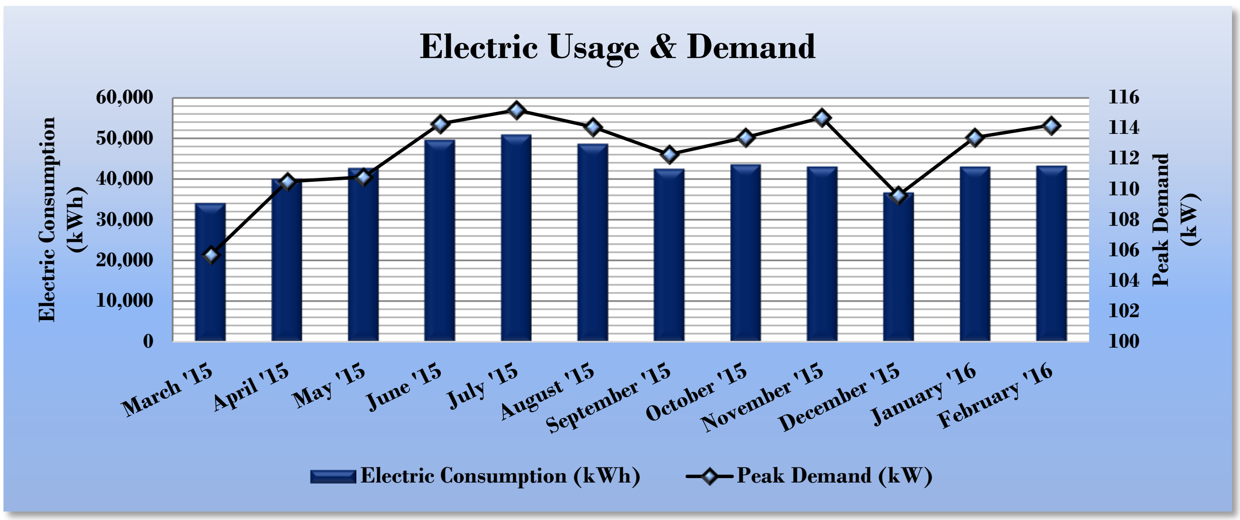


Figure 10 -Electric Usage & Demand

Electric Billing Data for Gorman Hall						
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost	TRC Estimated Usage?
4/13/15	31	34,094	106		$3,830	Yes
5/12/15	30	40,029	111		$4,496	Yes
6/11/15	31	42,680	111		$4,794	Yes
7/13/15	30	49,580	114		$5,569	Yes
8/12/15	31	50,933	115		$5,721	Yes
9/11/15	31	48,618	114		$5,461	Yes
10/13/15	30	42,514	112		$4,775	Yes
11/12/15	31	43,612	113		$4,899	Yes
12/14/15	30	43,052	115		$4,836	Yes
1/13/16	31	36,710	110		$4,123	Yes
2/11/16	31	43,029	113		$4,833	Yes
3/11/16	28	43,279	114		$4,861	Yes
Totals	**365**	**518,129**	**115.2**	**$0**	**$58,199**	12
Annual	**365**	**518,129**	**115.2**	**$0**	**$58,199**	

3.3 Natural Gas Usage

Natural gas is provided by New Jersey Natural Gas. The average gas cost for the most recent 12-month billing period is $1.786/therm. This is the blended rate used throughout the analyses in this report. Estimated monthly gas consumption for the building is shown in the chart below. This is a typical profile for a building with high internal loads.

Figure 11 -Natural Gas Usage

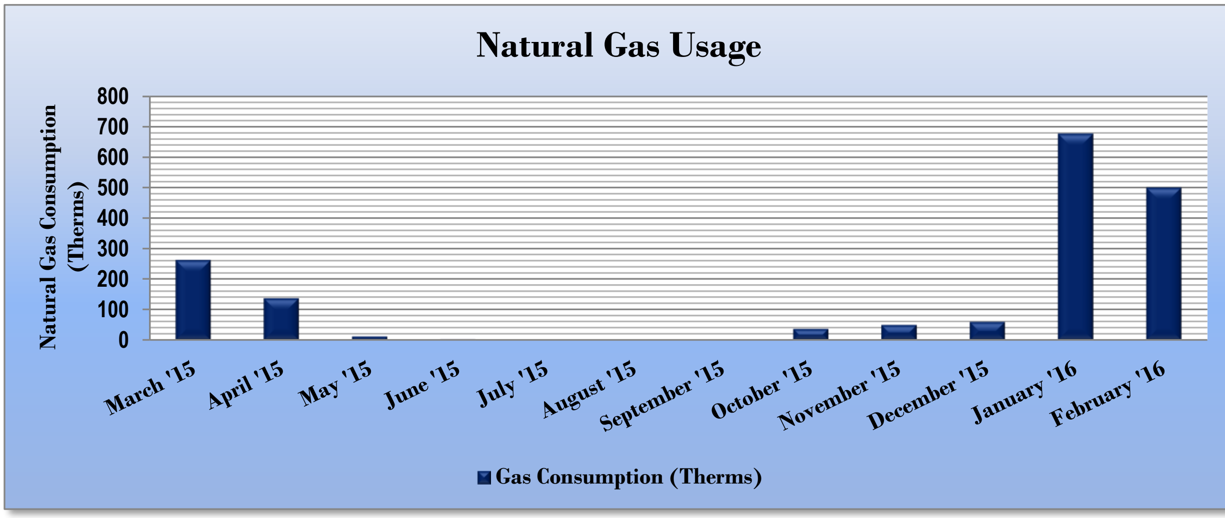


Figure 12 -Natural Gas Usage

Gas Billing Data for Gorman Hall				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
4/1/15	31	262	$486	Yes
5/1/15	30	137	$254	Yes
6/1/15	31	12	$91	Yes
7/1/15	30	1	$16	Yes
8/1/15	31	0	$19	Yes
9/1/15	31	0	$19	Yes
10/1/15	30	0	$19	Yes
11/1/15	31	37	$55	Yes
12/1/15	30	49	$267	Yes
1/1/16	31	59	$277	Yes
2/1/16	31	676	$883	Yes
3/1/16	28	499	$709	Yes
Totals	**365**	**1,732**	**$3,093**	12
Annual	**365**	**1,732**	**$3,093**	

3.4 Benchmarking

This facility was benchmarked using Portfolio Manager, an online tool created and managed by the United States Environmental Protection Agency (EPA) through the ENERGY STAR® program. Portfolio Manager analyzes your building's consumption data, cost information, and operational use details and then compares its performance against a national median for similar buildings of its type. Metrics provided by this analysis are Energy Use Intensity (EUI) and an ENERGY STAR® Score for select building types.

The EUI is a measure of a facility's energy consumption per square foot, and it is the standard metric for comparing buildings' energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more or less energy than similar buildings of its type on a square foot basis. EUI is presented in terms of "site energy" and "source energy." Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy includes fuel consumed to generate electricity consumed at the site, factoring in electric production and distribution losses for the region.

Figure 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Gorman Hall	National Median Building Type: Office
Source Energy Use Intensity (kBtu/ft^2)	317.7	148.1
Site Energy Use Intensity (kBtu/ft^2)	107.6	67.3

Implementation of all recommended measures in this report would improve the building's estimated EUI significantly, as shown in the table below:

Figure 14 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Gorman Hall	National Median Building Type: Office
Source Energy Use Intensity (kBtu/ft^2)	303.3	148.1
Site Energy Use Intensity (kBtu/ft^2)	103.0	67.3

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification. This building is not eligible to receive a score because final end-usage of energy could not be precisely apportioned for each building. We have provided a combined benchmarking score for the whole campus. While the building is not eligible for an ENERGY STAR® score, it may be useful to compare this average campus score to EUI scores available for similar college campuses.

A Portfolio Manager Statement of Energy Performance (SEP) was generated for the campus, see Appendix B: ENERGY STAR® Statement of Energy Performance.

For more information on ENERGY STAR® certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

A Portfolio Manager account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager regularly, so that you can keep track of your building's performance. Free online training is available to help you use ENERGY STAR® Portfolio Manager to track your building's performance at: https://www.energystar.gov/buildings/training.

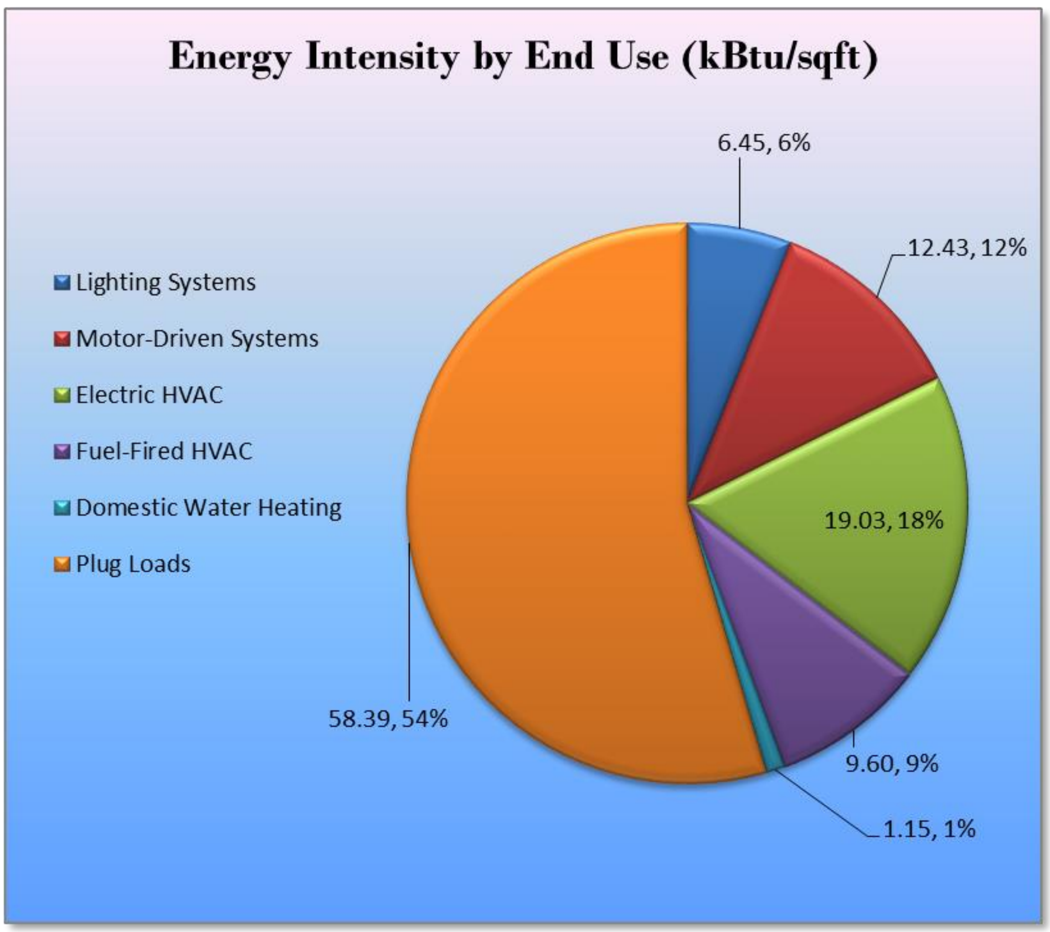
3.5 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building and determine their proportional contribution to overall building energy usage.

The breakdown of energy usage is based on both our estimates of the Gorman Hall's share of the total electric load as well as number and sizes of energy-using equipment on site.

TRC recommends installing electric submeters for all buildings to better sharpen the view of relative energy demand between one campus building and another.

Figure 15 - Energy Balance (kBtu/SF,%)



4 Energy Conservation Measures

Level of Analysis

The goal of this audit report is to identify potential energy efficiency opportunities, help prioritize specific measures for implementation, and provide information to the Gorman Hall regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016 approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

The measures below have been evaluated by the auditor and are recommended for implementation at the facility.

Figure 16 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**19,044**	**3.2**	**0.0**	**$2,139.08**	**$9,456.62**	**$785.00**	**$8,671.62**	**4.1**	**19,177**
ECM 1	Retrofit Fixtures with LED Lamps	19,044	3.2	0.0	$2,139.08	$9,456.62	$785.00	$8,671.62	4.1	19,177
Lighting Control Measures		**3,714**	**0.6**	**0.0**	**$417.21**	**$2,668.00**	**$80.00**	**$2,588.00**	**6.2**	**3,740**
ECM 2	Install Occupancy Sensor Lighting Controls	1,930	0.3	0.0	$216.75	$1,972.00	$80.00	$1,892.00	8.7	1,943
ECM 3	Install High/Low Lighitng Controls	1,785	0.3	0.0	$200.46	$696.00	$0.00	$696.00	3.5	1,797
Plug Load Equipment Control - Vending Machine		**1,551**	**0.0**	**0.0**	**$174.26**	**$460.00**	**$0.00**	**$460.00**	**2.6**	**1,562**
ECM 4	Vending Machine Control	1,551	0.0	0.0	$174.26	$460.00	$0.00	$460.00	2.6	1,562
TOTALS		**24,309**	**3.8**	**0.0**	**$2,730.55**	**$12,584.62**	**$865.00**	**$11,719.62**	**4.3**	**24,479**

* - All incentives presented in this table are based on NJ Smart Start Building equipment incentives and assume proposed equipment meets minimum performance criteria for that program.

** - Simple Payback Period is based on net measure costs (i.e. after incentives).

4.1.1 Lighting Upgrades

Recommended upgrades to existing lighting fixtures are summarized in Figure 17 below.

Figure 17 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**19,044**	**3.2**	**0.0**	**$2,139.08**	**$9,456.62**	**$785.00**	**$8,671.62**	**4.1**	**19,177**
ECM 1	Retrofit Fixtures with LED Lamps	19,044	3.2	0.0	$2,139.08	$9,456.62	$785.00	$8,671.62	4.1	19,177

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

ECM 1: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	18,424	3.0	0.0	$2,069.50	$9,241.60	$765.00	$8,476.60	4.1	18,553
Exterior	620	0.2	0.0	$69.59	$215.01	$20.00	$195.01	2.8	624

Measure Description

We recommend retrofitting existing linear fluorescent lamps, incandescent and compact fluorescent lamps with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tube and more than 10 times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Figure 18 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		3,714	0.6	0.0	$417.21	$2,668.00	$80.00	$2,588.00	6.2	3,740
ECM 2	Install Occupancy Sensor Lighting Controls	1,930	0.3	0.0	$216.75	$1,972.00	$80.00	$1,892.00	8.7	1,943
ECM 3	Install High/Low Lightng Controls	1,785	0.3	0.0	$200.46	$696.00	$0.00	$696.00	3.5	1,797

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

ECM 2: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,930	0.3	0.0	$216.75	$1,972.00	$80.00	$1,892.00	8.7	1,943

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in all restrooms, training room and offices. Lighting sensors detect occupancy using ultrasonic and/or infrared sensors. For most spaces, we recommend lighting controls use dual technology sensors, which can eliminate the possibility of any lights turning off unexpectedly. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Some controls also provide dimming options and all modern occupancy controls can be easily over-ridden by room occupants to allow them to manually turn fixtures on or off, as desired. Energy savings results from only operating lighting systems when they are required.

Occupancy sensors may be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are recommended for single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in locations without local switching or where wall switches are not in the line-of-sight of the main work area and in large spaces. We recommend a comprehensive approach to lighting design that upgrades both the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 3: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,785	0.3	0.0	$200.46	$696.00	$0.00	$696.00	3.5	1,797

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Typical areas for such lighting control are interior corridors. Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. Energy savings results from only providing full lighting levels when it is required.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches.

Additional savings from reduced lighting maintenance may also result from this measure, due to reduced lamp operation.

4.1.3 Plug Load Equipment Control - Vending Machines

ECM 4: Vending Machine Control

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,551	0.0	0.0	$174.26	$460.00	$0.00	$460.00	2.6	1,562

Measure Description

Vending machines operate continuously, even during non-business hours. It is recommended to install occupancy sensor controls to reduce the energy use. These controls power down vending machines when the vending machine area has been vacant for some time, then power up at regular intervals, as needed, to turn machine lights on or keep the product cool. Energy savings are a dependent on vending machine and activity level in the area surrounding the machines.

5 Energy Efficient Practices

In addition to the quantifiable savings estimated in Section 4, a facility's energy performance can also be improved through application of many low cost or no-cost energy efficiency strategies. By employing certain behavioral and operational changes and performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and energy and O&M costs can be reduced. The recommendations below are provided as a framework for developing a whole building maintenance plan that is customized to your facility. Consult with qualified equipment specialists for details on proper maintenance and system operation.

Reduce Air Leakage

Air leakage, or infiltration, occurs when outside air enters a building uncontrollably through cracks and openings. Properly sealing such cracks and openings can significantly reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. This includes caulking or installing weather stripping around leaky doors and windows allowing for better control of indoor air quality through controlled ventilation.

Close Doors and Windows

Ensure doors and windows are closed in conditioned spaces. Leaving doors and windows open leads to a significant increase in heat transfer between conditioned spaces and the outside air. Reducing a facility's air changes per hour (ACH) can lead to increased occupant comfort as well as significant heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

Perform Proper Lighting Maintenance

In order to sustain optimal lighting levels, lighting fixtures should undergo routine maintenance. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust on lamps, fixtures and reflective surfaces. Together, these factors can reduce total illumination by 20%-60% or more, while operating fixtures continue drawing full power. To limit this reduction, lamps, reflectors and diffusers should be thoroughly cleaned of dirt, dust, oil, and smoke film buildup approximately every 6–12 months.

Develop a Lighting Maintenance Schedule

In addition to routine fixture cleaning, development of a maintenance schedule can both ensure maintenance is performed regularly and can reduce the overall cost of fixture re-lamping and re-ballasting. By re-lamping and re-ballasting fixtures in groups, lighting levels are better maintained and the number of site visits by a lighting technician or contractor can be minimized, decreasing the overall cost of maintenance.

Ensure Lighting Controls Are Operating Properly

Lighting controls are very cost effective energy efficient devices, when installed and operating correctly. As part of a lighting maintenance schedule, lighting controls should be tested annually to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight sensors, maintenance involves cleaning of sensor lenses and confirming setpoints and sensitivity are appropriately configured.

Turn Off Unneeded Motors

Electric motors often run unnecessarily, and this is an overlooked opportunity to save energy. These motors should be identified and turned off when appropriate. For example, exhaust fans often run unnecessarily when ventilation requirements are already met. Reducing run hours for these motors can result in significant energy savings. Whenever possible, use automatic devices such as twist timers or occupancy sensors to ensure that motors are turned off when not needed.

Reduce Motor Short Cycling

Frequent stopping and starting of motors subjects rotors and other parts to substantial stress. This can result in component wear, reducing efficiency, and increasing maintenance costs. Adjust the load on the motor to limit the amount of unnecessary stopping and starting to improve motor performance.

Practice Proper Use of Thermostat Schedules and Temperature Resets

Ensure thermostats are correctly set back. By employing proper set back temperatures and schedules, facility heating and cooling costs can be reduced dramatically during periods of low or no occupancy. As such, thermostats should be programmed for a setback of 5-10°F during low occupancy hours (reduce heating setpoints and increase cooling setpoints). Cooling load can be reduced further by increasing the facility's occupied setpoint temperature. In general, during the cooling season, thermostats should be set as high as possible without sacrificing occupant comfort.

Ensure Economizers are Functioning Properly

Economizers, when properly configured, can be used to significantly reduce mechanical cooling. However, if the outdoor thermostat or enthalpy control is malfunctioning or the damper is stuck or improperly adjusted, benefits from the economizer may not be fully realized. As such, periodic inspection and maintenance is required to ensure proper operation. This maintenance should be scheduled with maintenance of the facility's air conditioning system and should include proper setting of the outdoor thermostat/enthalpy control, inspection of control and damper operation, lubrication of damper connections, and adjustment of minimum damper position. A malfunctioning economizer can significantly increase the amount of heating and mechanical cooling required by introducing excess amounts of cold or hot outside air.

Clean Evaporator/Condenser Coils on AC Systems

Dirty evaporators and condensers coils cause a restriction to air flow and restrict heat transfer. This results in increased evaporator and condenser fan load and a decrease in cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

Clean and/or Replace HVAC Filters

Air filters work to reduce the amount of indoor air pollution and increase occupant comfort. Over time, filters become less and less effective as particulate buildup increases. In addition to health concerns related to clogged filters, filters that have reached saturation also restrict air flow through the facility's air conditioning or heat pump system, increasing the load on the distribution fans and decreasing occupant comfort levels. Filters should be checked monthly and cleaned or replaced when appropriate.

Check for and Seal Duct Leakage

Duct leakage in commercial buildings typically accounts for 5% to 25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building, significantly increasing cooling and heating costs. By sealing sources of leakage, cooling, heating, and ventilation energy use can be reduced significantly, depending on the severity of air leakage.

Perform Proper Furnace Maintenance

Preventative furnace maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. Following the manufacturer's instructions, a yearly tune-up should include tasks such as checking for gas / carbon monoxide leaks; changing the air and fuel filters; checking components for cracks, corrosion, dirt, or debris build-up; ensuring the ignition system is working properly; testing and adjusting operation and safety controls; inspecting the electrical connections; and ensuring proper lubrication for motors and bearings.

Perform Proper Water Heater Maintenance

At least once a year, drain a few gallons out of the water heater using the drain valve. If there is a lot of sediment or debris, then a full flush is recommended. Turn the temperature down and then completely drain the tank. Once a year check for any leaks or heavy corrosion on the pipes and valves. For gas water heaters, check the draft hood and make sure it is placed properly, with a few inches of air space between the tank and where it connects to the vent. Look for any corrosion or wear on the gas line and on the piping. If you noticed any black residue, soot or charred metal, this is a sign you may be having combustion issues and you should have the unit serviced by a professional. For electric water heaters, look for any signs of leaking such as rust streaks or residue around the upper and lower panels covering the electrical components on the tank. For water heaters over three (3) to four (4) years old have a technician inspect the sacrificial anode annually.

Plug Load Controls

There are a variety of ways to limit the energy use of plug loads including increasing occupant awareness, removing under-utilized equipment, installing hardware controls, and using software controls. Some control steps to take are to enable the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips. For additional information refer to "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

Water Conservation

Installing low-flow faucets or faucet aerators, low-flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and water. These devices save energy by reducing the overall amount of hot water used hence reducing the energy used to heat the water. The flow ratings for EPA WaterSense™ (http://www3.epa.gov/watersense/products) labeled devices are 1.5 gallons per minute (gpm) for bathroom faucets, 2.0 gpm for showerheads, and 1.28 gpm for pre-rinse spray valves.

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 gallons per flush (gpf) and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

6 ON-SITE GENERATION MEASURES

On-site generation measure options include both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) on-site technologies that generate power to meet all or a portion of the electric energy needs of a facility, often repurposing any waste heat where applicable. Also referred to as distributed generation, these systems contribute to Greenhouse Gas (GHG) emission reductions, demand reductions and reduced customer electricity purchases, resulting in the electric system reliability through improved transmission and distribution system utilization.

The State of New Jersey's Energy Master Plan (EMP) encourages new distributed generation of all forms and specifically focuses on expanding use of combined heat and power (CHP) by reducing financial, regulatory and technical barriers and identifying opportunities for new entries. The EMP also outlines a goal of 70% of the State's electrical needs to be met by renewable sources by 2050.

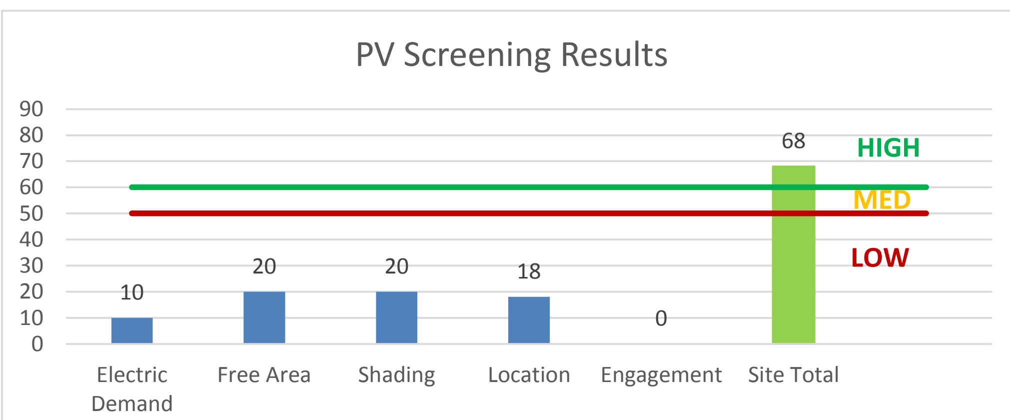
Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection, and the costs associated with the generation project including interconnection costs, departing load charges, and any additional special facilities charges.

6.1 Photovoltaic

Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility's electrical distribution system. The amount of unobstructed area available determines how large of a solar array can be installed. The size of the array combined with the orientation, tilt, and shading elements determines the energy produced.

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has a High potential for installing a PV array.

Figure 19 - Photovoltaic Screening



Potential	High	
System Potential	112	kW DC STC
Electric Generation	133,433	kWh/yr
Displaced Cost	$11,610	/yr
Installed Cost	$291,200	

Solar projects must register their projects in the SREC Registration Program prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about developed new solar projects and insight into future SREC pricing. Refer to Section 8.2 for additional information.

For more information on solar PV technology and commercial solar markets in New Jersey, or to find a qualified solar installer, who can provide a more detailed assessment of the specific costs and benefits of solar develop of the site, please visit the following links below:

- **Basic Info on Solar PV in NJ**: http://www.njcleanenergy.com/whysolar
- **NJ Solar Market FAQs**: http://www.njcleanenergy.com/renewable-energy/program-updates-and-background-information/solar-transition/solar-market-faqs
- **Approved Solar Installers in the NJ Market**: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/?id=60&start=1

6.2 Combined Heat and Power

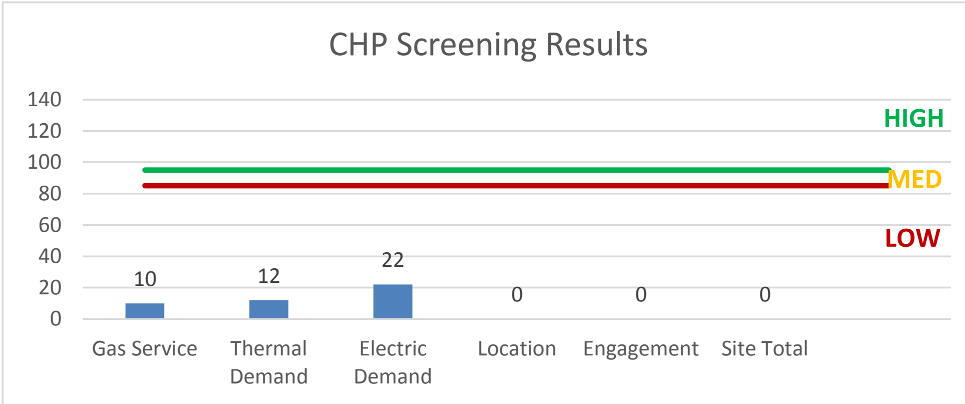
Combined heat and power (CHP) is the on-site generation of electricity along with the recovery of heat energy, which is put to beneficial use. Common technologies for CHP include reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines. Electric generation from a CHP system is typically interconnected to local power distribution systems. Heat is recovered from exhaust and ancillary cooling systems and interconnected to the existing hot water (or steam) distribution systems.

CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for the purpose of space cooling. The key criteria used for screening, however, is the amount of time the system operates at full load and the facility's ability to use the recovered heat. Facilities with continuous use for large quantities of waste heat are the best candidates for CHP.

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has a Low potential for installing a cost-effective CHP system.

Low or infrequent thermal load is the most significant factor contributing to the low potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

Figure 20 - Combined Heat and Power Screening



7 Demand Response

Demand Response (DR) is a program designed to reduce the electric load of commercial facilities when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. Demand Response service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability.

By enabling grid operators to call upon Curtailment Service Providers and commercial facilities to reduce electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and participants receive payments whether or not their facility is called upon to curtail their electric usage.

Typically an electric customer needs to be capable of reducing their electric demand, within minutes, by at least 100 kW or more in order to participate in a DR program. Customers with a greater capability to quickly curtail their demand during peak hours will receive higher payments. Customers with back-up generators onsite may also receive additional DR payments for their generating capacity if they agree to run the generators for grid support when called upon. Eligible customers who have chosen to participate in a DR programs often find it to be a valuable source of revenue for their facility because the payments can significantly offset annual electric costs.

Participating customers can often quickly reduce their peak load through simple measures, such as temporarily raising temperature set points on thermostats, so that air conditioning units run less frequently, or agreeing to dim or shut off less critical lighting. This usually requires some level of building automation and controls capability to ensure rapid load reduction during a DR curtailment event. DR program participants may need to install smart meters or may need to also sub-meter larger energy-using equipment, such as chillers, in order to demonstrate compliance with DR program requirements.

DR does not include the reduction of electricity consumption based on normal operating practice or behavior. For example, if a company's normal schedule is to close for a holiday, the reduction of electricity due to this closure or scaled-back operation is not considered a demand response activity in most situations.

The first step toward participation in a DR program is to contact a Curtailment Service Provider. A list of these providers is available on PJM's website and it includes contact information for each company, as well as the states where they have active business (http://www.pjm.com/markets-and-operations/demand-response/csps.aspx). PJM also posts training materials that are developed for program members interested in specific rules and requirements regarding DR activity (http://www.pjm.com/training/training%20material.aspx), along with a variety of other DR program information.

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding program rules and requirements for metering and controls, assess a facility's ability to temporarily reduce electric load, and provide details on payments to be expected for participation in the program. Providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment of their own to help ensure compliance with all terms and conditions of a DR contract.

In our opinion Gorman Hall is not a good candidate for DR.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 21 for a list of the eligible programs identified for each recommended ECM.

Figure 21 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install
ECM 1	Retrofit Fixtures with LED Lamps	x		x
ECM 2	Install Occupancy Sensor Lighting Controls	x		x
ECM 3	Install High/Low Lighitng Controls			x
ECM 4	Vending Machine Control			x

SmartStart is generally well-suited for implementation of individual measures or small group of measures. It provides flexibility to install measures at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities that can bundle multiple ECMs together. This can greatly simplify participation and may lead to higher incentive amounts, but requires the use of pre-approved contractors. The Pay for Performance (P4P) program is a "whole-building" energy improvement program designed for larger facilities. It requires implementation of multiple measures meeting minimum savings thresholds, as well as use of pre-approved consultants. The Large Energy Users Program (LEUP) is available to New Jersey's largest energy users giving them flexibility to install as little or as many measures, in a single facility or several facilities, with incentives capped based on the entity's annual energy consumption. LEUP applicants can use in-house staff or a preferred contractor.

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent basis for comparison of available incentives for various measures, though in many cases incentive amounts may be higher through participation in other programs.

Brief descriptions of all relevant financing and incentive programs are located in the sections below. Further information, including most current program availability, requirements, and incentive levels can be found at: www.njcleanenergy.com/ci.

8.1 SmartStart

Overview

The SmartStart program offers incentives for installing prescriptive and custom energy efficiency measures at your facility. Routinely the program adds, removes or modifies incentives from year to year for various energy efficiency equipment based on market trends and new technologies.

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers
Electric Unitary HVAC
Gas Cooling
Gas Heating
Gas Water Heating
Ground Source Heat Pumps
Lighting
Lighting Controls
Refrigeration Doors
Refrigeration Controls
Refrigerator/Freezer Motors
Food Service Equipment
Variable Frequency Drives

Most equipment sizes and types are served by this program. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades.

Incentives

The SmartStart prescriptive incentive program provides fixed incentives for specific energy efficiency measures, whereas the custom SmartStart program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentive offerings for specific devices.

Since your facility is an existing building, only the retrofit incentives have been applied in this report. Custom Measure incentives are calculated at $0.16/kWh and $1.60/therm based on estimated annual savings, capped at 50% of the total installed incremental project cost, or a project cost buy down to a one-year payback (whichever is less). Program incentives are capped at $500,000 per electric account and $500,000 per natural gas account, per fiscal year.

How to Participate

To participate in the SmartStart program you will need to submit an application for the specific equipment to be installed. Many applications are designed as rebates, although others require application approval prior to installation. Applicants may work with a contractor of their choosing and can also utilize internal personnel, which provides added flexibility to the program. Using internal personnel also helps improve the economics of the ECM by reducing the labor cost that is included in the tables in this report.

Detailed program descriptions, instructions for applying and applications can be found at: www.njcleanenergy.com/SSB.

8.2 SREC Registration Program

The SREC Registration Program (SRP) is used to register the intent to install solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SRP prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing.

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number which enables it to generate New Jersey SRECs. SREC's are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

Each time a solar installation generates 1,000 kilowatt-hours (kWh) of electricity, an SREC is earned. Solar project owners report the energy production to the SREC Tracking System. This reporting allows SREC's to be placed in the customer's electronic account. SRECs can then be sold on the SREC Tracking System, providing revenue for the first 15 years of the project's life.

Electricity suppliers, the primary purchasers of SRECs, are required to pay a Solar Alternative Compliance Payment (SACP) if they do not meet the requirements of New Jersey's Solar RPS. One way they can meet the RPS requirements is by purchasing SRECs. As SRECs are traded in a competitive market, the price may vary significantly. The actual price of an SREC during a trading period can and will fluctuate depending on supply and demand.

Information about the SRP can be found at: www.njcleanenergy.com/srec.

8.3 Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) is an alternate method for New Jersey's government agencies to finance the implementation of energy conservation measures. An ESIP is a type of "performance contract," whereby school districts, counties, municipalities, housing authorities and other public and state entities enter in to contracts to help finance building energy upgrades. This is done in a manner that ensures that annual payments are lower than the savings projected from the ECMs, ensuring that ESIP projects are cash flow positive in year one, and every year thereafter. ESIP provides government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources. NJCEP incentive programs can be leveraged to help further reduce the total project cost of eligible measures.

This LGEA report is the first step to participating in ESIP. Next, you will need to select an approach for implementing the desired ECMs:

(1) Use an Energy Services Company or "ESCO."
(2) Use independent engineers and other specialists, or your own qualified staff, to provide and manage the requirements of the program through bonds or lease obligations.
(3) Use a hybrid approach of the two options described above where the ESCO is utilized for some services and independent engineers, or other specialists or qualified staff, are used to deliver other requirements of the program.

After adopting a resolution with a chosen implementation approach, the development of the Energy Savings Plan (ESP) can begin. The ESP demonstrates that the total project costs of the ECMs are offset by the energy savings over the financing term, not to exceed 15 years. The verified savings will then be used to pay for the financing.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Entities should carefully consider all alternatives to develop an approach that best meets their needs. A detailed program descriptions and application can be found at: [www.njcleanenergy.com/ESIP.](www.njcleanenergy.com/ESIP)

Please note that ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you may utilize NJCEP incentive programs to help further reduce costs when developing the ESP. You should refer to the ESIP guidelines at the link above for further information and guidance on next steps.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

In 1999, New Jersey State Legislature passed the Electric Discount & Energy Competition Act (EDECA) to restructure the electric power industry in New Jersey. This law deregulated the retail electric markets, allowing all consumers to shop for service from competitive electric suppliers. The intent was to create a more competitive market for electric power supply in New Jersey. As a result, utilities were allowed to charge Cost of Service and customers were given the ability to choose a third party (i.e. non-utility) energy supplier.

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. So, though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third party supplier, consider shopping for a reduced rate from third party electric suppliers. If your facility is purchasing electricity from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party electric suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

9.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey has also been deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate on a monthly basis. The utility provides basic gas supply service (BGSS) to customers who choose not to buy from a third party supplier for natural gas commodity.

A customer's decision about whether to buy natural gas from a retail supplier is typically dependent upon whether a customer seeks budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by signing up for service through a third party retail natural gas supplier. Many larger natural gas customers may seek the assistance of a professional consultant to assist in their procurement process.

If your facility is not purchasing natural gas from a third party supplier, consider shopping for a reduced rate from third party natural gas suppliers. If your facility is purchasing natural gas from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party natural gas suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: www.state.nj.us/bpu/commercial/shopping.html.

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	**Fixture Quantity**	**Fixture Description**	**Control System**	**Watts per Fixture**	**Annual Operating Hours**	**Fixture Recommendation**	**Add Controls?**	**Fixture Quantity**	**Fixture Description**	**Control System**	**Watts per Fixture**	**Annual Operating Hours**	**Total Peak kW Savings**	**Total Annual kWh Savings**	**Total Annual MMBtu Savings**	**Total Annual Energy Cost Savings**	**Total Installation Cost**	**Total Incentives**	**Simple Payback w/ Incentives in Years**
Front Entrance	8	Compact Fluorescent: Recessed 26W 4-pin	Wall Switch	26	4,160	Relamp	Yes	8	LED - Fixtures: Downlight Solid State Retrofit	High/Low Control	13	2,912	0.10	647	0.0	$72.65	$625.20	$0.00	8.61
Front Entrance	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,160	0.02	158	0.0	$17.73	$58.50	$10.00	2.74
Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	4,160	0.01	84	0.0	$9.40	$35.90	$5.00	3.29
Front Entrance Exeterior	3	Halogen Incandescent: Flood Light 65W	Daylight Dimming	65	2,080	Relamp	No	3	LED Screw-In Lamps: Downlight Solid State Retrofit	Daylight Dimming	13	2,080	0.11	373	0.0	$41.91	$161.26	$15.00	3.49
Main Hallway	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	2,912	0.19	1,254	0.0	$140.90	$546.80	$60.00	3.46
Main Hallway	4	Compact Fluorescent: Recessed 26W 4-pin	Wall Switch	26	4,160	Relamp	No	4	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	13	4,160	0.04	249	0.0	$27.94	$254.60	$0.00	9.11
Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.06	418	0.0	$46.97	$259.60	$20.00	5.10
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.06	418	0.0	$46.97	$259.60	$20.00	5.10
Storage	2	Compact Fluorescent: Recessed 26W 4-pin	Wall Switch	26	4,160	Relamp	No	2	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	13	4,160	0.02	124	0.0	$13.97	$127.30	$0.00	9.11
Office2	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.06	418	0.0	$46.97	$259.60	$20.00	5.10
Office3	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.06	418	0.0	$46.97	$259.60	$20.00	5.10
Office4	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.08	523	0.0	$58.71	$295.50	$25.00	4.61
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.06	418	0.0	$46.97	$259.60	$20.00	5.10
Electrical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,160	0.05	316	0.0	$35.47	$117.00	$20.00	2.74
Mechanical Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,160	0.02	158	0.0	$17.73	$58.50	$10.00	2.74
Elevator Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	4,160	0.01	84	0.0	$9.40	$35.90	$5.00	3.29
Women Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,912	0.06	399	0.0	$44.82	$233.00	$20.00	4.75
Women Restroom	5	Compact Fluorescent: Recessed 26W 4-pin	Wall Switch	26	4,160	Relamp	Yes	5	LED - Fixtures: Downlight Solid State Retrofit	Occupancy Sensor	13	2,912	0.06	404	0.0	$45.41	$434.25	$0.00	9.56
Closet	1	Incandescent: 100W A Lamp	Occupancy Sensor	100	2,912	Relamp	No	1	LED Screw-In Lamps: Downlight Solid State Retrofit	Occupancy Sensor	15	2,912	0.06	285	0.0	$31.97	$53.75	$5.00	1.52
Cafeteria	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.06	418	0.0	$46.97	$259.60	$20.00	5.10
Training Room	12	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	12	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.19	1,254	0.0	$140.90	$546.80	$80.00	3.31
Men Restroom	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,912	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,912	0.07	332	0.0	$37.24	$175.50	$30.00	3.91
Men Restroom	2	Compact Fluorescent: Recessed 26W 4-pin	Occupancy Sensor	26	2,912	Relamp	No	2	LED - Fixtures: Downlight Solid State Retrofit	Occupancy Sensor	13	2,912	0.02	87	0.0	$9.78	$127.30	$0.00	13.02
Hallway	23	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	23	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	2,912	0.37	2,404	0.0	$270.05	$1,057.70	$115.00	3.49
Storage	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	2,912	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,912	0.05	221	0.0	$24.83	$117.00	$20.00	3.91

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
College Data Center Room	14	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	Yes	14	LED - Linear Tubes: (1) 4' Lamp	High/Low Control	15	2,912	0.23	1,463	0.0	$164.38	$618.60	$70.00	3.34
College Data Center Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,160	0.05	316	0.0	$35.47	$117.00	$20.00	2.74
Room 115	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	2,912	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.05	234	0.0	$26.33	$143.60	$20.00	4.69
Room 114	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	2,912	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.05	234	0.0	$26.33	$143.60	$20.00	4.69
Room 108	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	2,912	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.08	352	0.0	$39.50	$215.40	$30.00	4.69
Room 109	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	2,912	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.05	234	0.0	$26.33	$143.60	$20.00	4.69
Room 110	6	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	2,912	Relamp	No	6	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.08	352	0.0	$39.50	$215.40	$30.00	4.69
Room 107	4	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	2,912	Relamp	No	4	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,912	0.05	234	0.0	$26.33	$143.60	$20.00	4.69
Stairway	6	Compact Fluorescent: Recessed 26W 4-pin	Wall Switch	26	4,160	Relamp	No	6	LED - Fixtures: Downlight Solid State Retrofit	Wall Switch	13	4,160	0.06	373	0.0	$41.91	$381.90	$0.00	9.11
2nd Floor Hallway	13	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	Yes	13	LED - Linear Tubes: (2) U-Lamp	High/Low Control	33	2,912	0.37	2,419	0.0	$271.74	$937.60	$0.00	3.45
Office1	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,912	0.06	372	0.0	$41.81	$242.40	$0.00	5.80
Office2	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,912	0.11	744	0.0	$83.61	$368.80	$20.00	4.17
Conference Room	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,912	0.11	744	0.0	$83.61	$368.80	$20.00	4.17
Conference Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	4,160	Relamp	No	2	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	4,160	0.03	167	0.0	$18.81	$71.80	$10.00	3.29
Office3	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,912	0.06	372	0.0	$41.81	$242.40	$0.00	5.80
Office4	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,912	0.06	372	0.0	$41.81	$242.40	$0.00	5.80
Office5	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,160	0.02	158	0.0	$17.73	$58.50	$10.00	2.74
Office6	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	4,160	0.02	158	0.0	$17.73	$58.50	$10.00	2.74
Office7	2	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	Yes	2	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,912	0.06	372	0.0	$41.81	$242.40	$0.00	5.80
Office8	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	Yes	3	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,912	0.09	558	0.0	$62.71	$305.60	$20.00	4.55
Stairway2	3	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	4,160	Relamp	No	3	LED - Linear Tubes: (2) U-Lamp	Wall Switch	33	4,160	0.06	416	0.0	$46.75	$189.60	$0.00	4.06
Exterior Perimeter Light	1	Metal Halide: (1) 100W Lamp	Daylight Dimming	128	2,080	Relamp	No	1	LED Screw-In Lamps: Downlight Solid State Retrofit	Daylight Dimming	25	2,080	0.08	246	0.0	$27.67	$53.75	$5.00	1.76
Old section Empty Space	23	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	100	None	No	23	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Old section Empty Space	83	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	100	None	No	83	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Old section Empty Space	4	Halogen Incandescent: Reflecror 60W	Wall Switch	60	100	None	No	4	Halogen Incandescent: Reflecror 60W	Wall Switch	60	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Old section Empty Space	8	Exit Signs: Fluorescent	None	11	8,760	None	No	8	Exit Signs: Fluorescent	None	11	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Old section Empty Space	15	Incandescent: 300W Globe Light	Wall Switch	300	100	None	No	15	Incandescent: 300W Globe Light	Wall Switch	300	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Closet	1	Incandescent: 100W A Lamp	Wall Switch	100	100	None	No	1	Incandescent: 100W A Lamp	Wall Switch	100	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Men Restroom	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	100	None	No	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Women Restroom	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	100	None	No	1	Linear Fluorescent - T12: 4' T12 (40W) - 4L	Wall Switch	176	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Old section Empty Space	16	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	100	None	No	16	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Elevator Room	Elevator Room	1	Other	5.0	87.0%	No	520	No	87.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear Building	Air Handler Unit 2	1	Supply Fan	15.0	93.0%	Yes	4,160	No	93.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear Building	Air Handler Unit 2	1	Return Fan	7.5	92.0%	Yes	4,160	No	92.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear Building	Trane YHC092	1	Other	0.8	78.5%	No	2,745	No	78.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear Building	Trane YHC092	1	Supply Fan	3.0	85.0%	No	4,160	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear Building	Heatcraft LNES01A009	4	Supply Fan	3.0	85.0%	No	2,500	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 2nd Building	Carrier 48TCDA08	1	Supply Fan	5.0	82.0%	No	0	No	82.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 2nd Building	Carrier 48TCDA09	2	Other	0.8	78.7%	No	0	No	78.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 2nd Building	Carrier 48HH008	1	Supply Fan	7.5	84.0%	No	0	No	84.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 2nd Building	Carrier 48HH009	2	Other	0.8	78.7%	No	0	No	78.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rear 1st Building	Building	3	Ductless Mini-Split HP	3.00	38.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 1st Building	Building - AHU1	1	Packaged AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 1st Building	Building - AHU3	1	Packaged AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 1st Building	Building - AHU4	1	Packaged AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 1st Building	College Data Center	4	Split-System AC	9.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 2nd Building	Second buillding - Empty	1	Packaged AC	12.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 2nd Building	Second buillding - Empty	1	Packaged AC	7.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Rear Building	Building - AHU1	1	Furnace	96.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear Building	Building - AHU3	1	Furnace	96.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear Building	Building - AHU4	1	Furnace	96.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 2nd Building	Second buillding - Empty	1	Furnace	91.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rear 2nd Building	Second buillding - Empty	1	Furnace	98.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Closet	Building	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Closet	Old Building-No Occupy	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Facility	35	Desktop with LCD Monitor	191.0	Yes
Cafeteria	1	Microwave	1,000.0	No
Facility	3	Water Fountain	270.0	Yes
Cafeteria	1	Toaster	1,050.0	No
Cafeteria	1	Refrigerator	275.0	Yes
Hallway	1	Water Fountain	170.0	Yes
Hallway	2	Refrigerator	250.0	Yes
Hallway	1	Printer	560.0	Yes
Main Hallway	1	Copy Machine	1,000.0	Yes
Data Room	1	Power Protection	33,000.0	Yes

Vending Machine Inventory & Recommendations

	Existing Conditions		Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Vending Machine Type	Install Controls?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Cafeteria	1	Non-Refrigerated	Yes	0.00	343	0.0	$38.47	$230.00	$0.00	5.98
Cafeteria	1	Glass Fronted Refrigerated	Yes	0.00	1,209	0.0	$135.79	$230.00	$0.00	1.69

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

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N/A

ENERGY STAR® Score[1]

Brookdale Community College - Lincroft Campus

Primary Property Type: College/University
Gross Floor Area (ft²): 900,381
Built: 1967

For Year Ending: February 29, 2016
Date Generated: June 28, 2017

1. The ENERGY STAR score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity.

Property & Contact Information

Property Address	Property Owner	Primary Contact
Brookdale Community College - Lincroft Campus 765 Newman Springs Road Lincroft, New Jersey 07738	Brookdale Community College 765 Newman Springs Road Lincroft, NJ 07738 (732) 224-2217	Timothy Drury 765 Newman Springs Road Lincroft, NJ 07738 (732) 224-2217 tdrury@brookdalecc.edu

Property ID: 5733170

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
95.4 kBtu/ft²

Source EUI
211.9 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	48,132,581 (56%)
Natural Gas (kBtu)	37,799,044 (44%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	118.2
National Median Source EUI (kBtu/ft²)	262.6
% Diff from National Median Source EUI	-19%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	7,528

Signature & Stamp of Verifying Professional

I _________________ (Name) verify that the above information is true and correct to the best of my knowledge.

Signature: ______________________Date: ___________

Licensed Professional

____ ________
,
(____)____-______
____

Professional Engineer Stamp
(if applicable)