Local Government Energy Audit: Energy Audit Report

Facilities Management

Building #66

1 College Drive

Toms River, New Jersey 08754

Ocean County College

October 18, 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 savings 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 Facilities Management Building #66.

The goal of a LGEA is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and put you in a position to implement the ECMs. The LGEA also sets you on the path to receive financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing the ECMs.

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey local government in controlling energy costs and protecting our environment by offering a full spectrum of energy management options.

1.1 Facility Summary

Facilities Management Building (#66) is an 18,952 square foot facility comprised of various space types such as offices, kitchenettes, a warehouse, storage areas, and restrooms. This building is located separate from the main campus. The building operates year-round from 6:00 AM to 8:00 PM. The building is heated and cooled via rooftop packaged units.

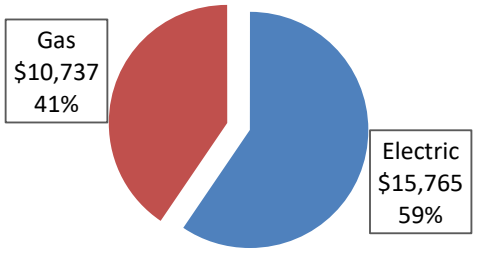
Facilities Management Building #66 consists of a mixture of T8 and T5 linear tubes in the offices and warehouse, respectively. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

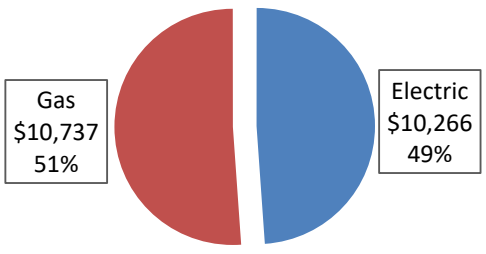
TRC evaluated three (3) projects that represent an opportunity for #66 to reduce annual energy costs by roughly $724 and annual greenhouse gas emissions by 9,811 lbs CO_2e. The measures would pay for themselves in roughly 4.37 years. The breakdown of existing and potential utility costs is illustrated in Figure 1 and Figure 2, respectively. These projects represent an opportunity to reduce Facilities Management Building #66's annual energy use by 2.3%.

Figure 1 – Previous 12 Month Utility Costs



$26,502

Figure 2 – Potential Post-Implementation Costs



$21,003

A detailed description of Facilities Management Building #66's existing energy use can be found in Section 3.

The evaluated measures have been listed and grouped into major categories as shown in Figure 3. Brief descriptions of the categories can be found below and descriptions of the individual opportunities can be found in Section 4.

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	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			8,816	2.1	0.0	$655.48	$4,414.14	$1,630.00	$2,784.14	4.25	8,878
ECM 1	Install LED Fixtures	Yes	6,754	1.5	0.0	$502.16	$2,559.84	$1,300.00	$1,259.84	2.51	6,801
ECM 2	Retrofit Fixtures with LED Lamps	Yes	2,062	0.6	0.0	$153.32	$1,854.30	$330.00	$1,524.30	9.94	2,077
Lighting Control Measures			926	0.1	0.0	$68.88	$464.00	$80.00	$384.00	5.58	933
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	926	0.1	0.0	$68.88	$464.00	$80.00	$384.00	5.58	933
TOTALS			9,742	2.2	0.0	$724.35	$4,878.14	$1,710.00	$3,168.14	4.37	9,811

* - 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 measures 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 conditions allow. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

Energy Efficient Practices

TRC also identified seven (7) low or (no-cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral and operational adjustments as well as performing routine maintenance on building systems. Through these practices equipment lifetime can be extended; occupant comfort, health and safety can be improved; and annual energy, operation, and maintenance costs can be reduced. Opportunities identified at Facilities Management Building #66 include:

- Reduce Air Leakage
- Close Doors and Windows
- Use Window Treatments/Coverings
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- 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 sources for Facilities Management Building #66. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures.

For details on our evaluation and the 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, the equipment changes outlined for each ECM need to be selected and installed through project implementation. One of the first considerations is if there is capital available for project implementation. Another consideration is whether to pursue individual ECMs, a group of ECMs, or a comprehensive approach wherein all ECMs are pursued, potentially in conjunction with other facility projects or improvements.

Rebates, incentives, and financing are available from the NJBPU, NJCEP, as well as some of the state's investor-owned utilities, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any project, please review the appropriate incentive program guidelines before proceeding. This is important because in most cases you will need to submit an application for the incentives before purchasing materials and beginning installation.

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

- SmartStart
- Pay for Performance (P4P)
- Direct Install
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- Energy Savings Improvement Program (ESIP)

For facilities with capital available for implementation of selected individual measures or phasing 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 design the ECM(s), select the equipment and apply for the incentive(s). Program pre-approval is required for some SmartStart incentives, so only after receiving approval may the ECM(s) be installed. The incentive values listed above in Figure 3 represent the SmartStart program and will be explained further in Section 8, as well as the other programs as mentioned below.

This facility also qualifies for the Direct Install program which, through an authorized network of participating contractors, can assist with the implementation of a group of measures versus installing individual measures or phasing implementation. This program is designed to be turnkey and will provide an incentive up to 70% of the cost of the project identified by the designated contractor.

For facilities without capital available 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 external project development, design, and implementation services as well as financing for implementing ECMs. This LGEA report is the first step for participating in ESIP and should help you determine next steps. Refer to Section 8.4 for additional information on the ESIP Program.

Additional descriptions of all relevant incentive programs are located in Section 8. You may also check the following website for further information on available rebates and incentives:www.njcleanenergy.com/ci.

To ensure projects are implemented such that maximum savings and incentives are achieved, bids and specifications should be reviewed by your procurement personnel and/or consultant(s) to ensure that

selected equipment coincides with LGEA recommendations, as well as applicable incentive program guidelines and requirements.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
James Calamia	Director of Facilities	jcalamia@ocean.edu	732-255-0400 x 2066
TRC Energy Services			
Smruti Srinivasan	Auditor	ssrinivasan@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On June 14, 2016, TRC performed an energy audit at Facilities Management Building #66 located in Toms River, New Jersey. TRC with Walter Lucas Jr to review the facility operations and focus the investigation on specific energy-using systems.

Facilities Management Building (#66) is an 18,952 square foot facility comprised of various space types such as offices, kitchenettes, warehouse, storage areas and restrooms. This building with some others is located away from the main campus. The building was constructed in 2000 and operates from 6:00 AM to 8:00 PM throughout the year. The building is heated and cooled using rooftop packaged units.

Facilities Management Building #66 consists of a mixture of T8 and T5 linear tubes in the offices and warehouse respectively.

2.3 Building Occupancy

The typical schedule is presented in the table below. During a typical day, the facility is occupied by approximately 19 full time staff.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Facilities management Building	Weekday	6.00AM - 8.00PM
Facilities management Building	Weekend	6:00AM - 8:00PM

2.4 Building Envelope

The building is constructed of concrete block with a standing seam metal façade. The roof of the building is pitched is also made of metal seam panels. The building has double-pane windows, which are in good condition. The exterior doors are constructed of aluminum and in good condition.

Figure 6: Building Envelope

2.5 On-site Generation

#66 does not have any on-site electric generation systems currently installed.

2.6 Energy-Using Systems

Please refer to Appendix A: Equipment Inventory & Recommendations for an inventory of your equipment.

Lighting System

Lighting is provided predominately by linear fluorescent T8 and T5 lamps and with electronic ballasts. Most of the building tenant spaces use 2-lamp 2-foot wide by 4-foot long troffers.

Lighting control in most spaces is provided by occupancy sensors. Smaller spaces such as the closets are controlled using manual wall switches. The occupancy sensors are either wall or ceiling mounted depending on the space layout. The T5 fixtures in many spaces are only at 50% brightness unless otherwise required. This is achieved using dimming controls. The building has exterior lighting, which consists of high pressure sodium fixtures (50-Watt, 250-Watt and 400-Watt) that are controlled with photocells. The EXIT signs in the building are all LED fixtures.

Figure 7: Lighting System

Air Conditioning (DX) and Heating

The building has various roof top packaged units providing the cooling and heating in the building. There are four (4) 6.5-ton units and two (2) 12.5-ton units (All made by Johnson Controls) equipped with DX coils and gas-fired furnaces. The 6.5-ton units have an output heating capacity of 96 MBh and the 12.5-ton units with 144 MBh. The warehouse section has warm air unit heaters in addition to the central heating. These have an output capacity of 48 MBh. All units have a heating efficiency of 80%.

The space temperatures are controlled using programmable thermostats in the respective spaces. The terminal units include ceiling ducts, vents in the walls, and unit heaters with hot water coils in the warehouses. All units were said to be original to the building (17 years).

Figure 8: HVAC Equipment

Domestic Hot Water

The domestic hot water system for the facility consists of one (1) gas fired water heater serving the restrooms and kitchenettes in the facility. The equipment has an input capacity of 40 MBh and a tank capacity of 40 gallons. The unit is 12 years old, in good condition, and well maintained.

Plug load & Vending Machines

There are roughly 25 computer work stations and 7 laptops throughout the facility. Offices also has other plug loads such as printers/copiers, a mailing machine, projectors, and other kitchenette equipment like microwaves, refrigerators, and coffee machines. There is no centralized PC power management software installed.

2.7 Water-Using Systems

A sampling of restrooms found that all of the faucets are rated for 2.2 gallons per minute (gpm) or higher. The toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2 gpf.

3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost/ft^2 and energy use/ft^2. These energy use indices are indicative of the relative energy effectiveness of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy use for other facilities identified as: Higher Education - Private. Specific local climate conditions, daily occupancy hours of the facility, seasonal fluctuations in occupancy, daily operating hours of energy use systems, and the behavior of the occupants with regard to operating systems that impact energy use such as turning off appliances and leaving windows open. Please refer to the Benchmarking section within Section 3.4 for additional information.

3.1 Total Cost of Energy

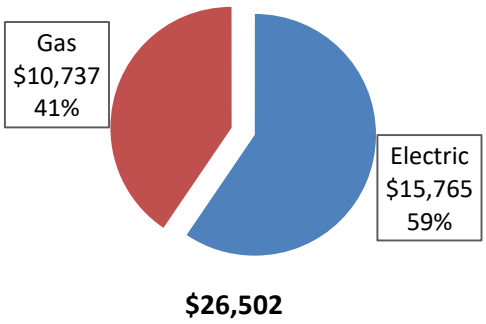
The following energy consumption and cost data is based on the last 12-month period of utility usage data that was provided for each utility. The annual consumption and cost was developed from this information.

Figure 9 - Utility Summary

Utility Summary for Facilities Management Building #66		
Fuel	Usage	Cost
Electricity	139,219 kWh	$15,765
Natural Gas	9,715 Therms	$10,737
Total		$26,502

The current utility cost for this site is $26,502 as shown in the chart below.

Figure 10 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost (combined for commodity, transmission, and distribution) for the past 12 months is $0.074/kWh, which is the blended rate used throughout the analyses in this report. The monthly electricity consumption and peak demand is represented graphically in the chart below.

Figure 11 - Electric Usage & Demand

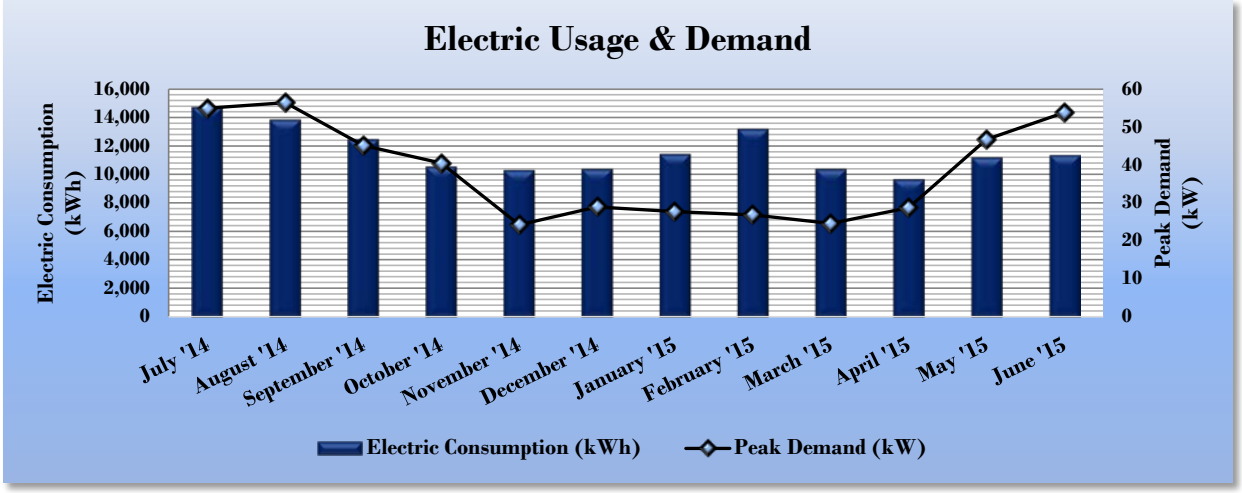


Figure 12 - Electric Usage & Demand

Electric Billing Data for Facilities Management Building #66					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
8/6/14	30	14,720	55	$604	$1,699
9/5/14	30	13,840	56	$602	$1,631
10/6/14	31	12,480	45	$489	$1,417
11/4/14	29	10,560	41	$425	$1,210
12/5/14	31	10,320	24	$371	$1,138
1/6/15	32	10,400	29	$372	$1,145
2/4/15	29	11,440	28	$389	$1,240
3/9/15	33	13,200	27	$428	$1,410
4/8/15	30	10,400	25	$379	$1,152
5/7/15	29	9,680	29	$358	$1,077
6/9/15	33	11,200	47	$483	$1,316
7/8/15	29	11,360	54	$529	$1,373
Totals	366	139,600	56.4	$5,429	$15,808
Annual	365	139,219	56.4	$5,414	$15,765

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $1.105/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is represented graphically in the chart below.

Figure 13 - Natural Gas Usage

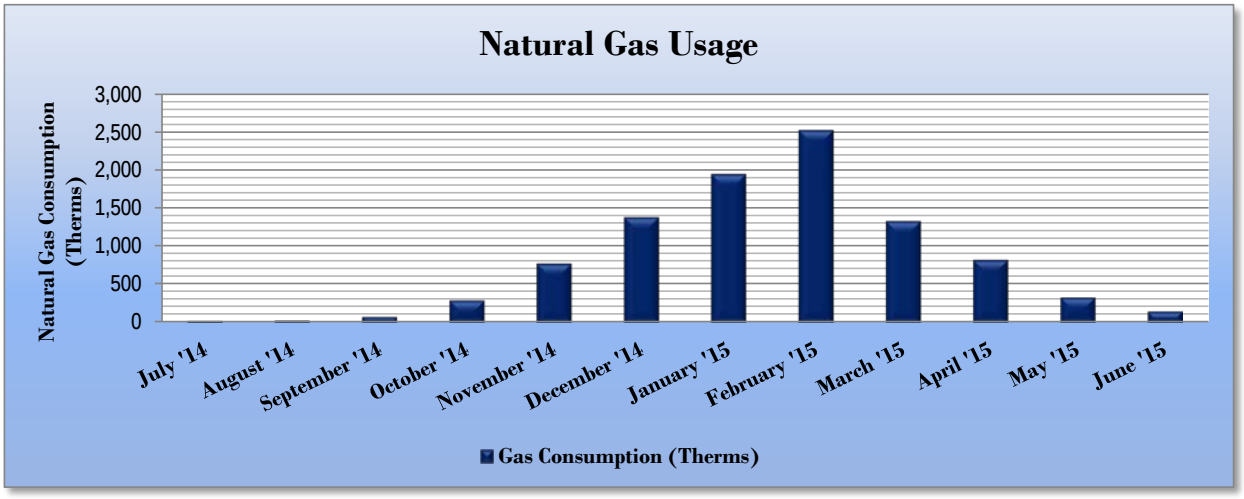


Figure 14 - Natural Gas Usage

Gas Billing Data for Facilities Management Building #66			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
7/23/14	28	17	$164
8/20/14	28	26	$168
9/19/14	30	75	$191
10/22/14	33	292	$286
11/18/14	27	778	$496
12/23/14	35	1,384	$1,536
1/26/15	34	1,952	$2,058
2/26/15	31	2,528	$2,619
3/23/15	25	1,335	$1,457
4/22/15	30	823	$958
5/26/15	34	331	$478
6/24/15	29	147	$296
Totals	364	9,689	$10,708
Annual	365	9,715	$10,737

3.4 Benchmarking

This facility was benchmarked through 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 compares its performance against a yearly baseline, national medians, or similar buildings in your portfolio. Metrics used in this comparison are the energy use intensity (EUI) and ENERGY STAR® score.

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 energy than similar buildings on a square foot basis or if that building performs better than the median. EUI is presented in both 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 is the raw fuel consumed to generate the energy consumed at the site, factoring in energy production and distribution losses.

Figure 15 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Facilities Management Building #66	National Median Building Type: Higher Education - Private
Source Energy Use Intensity (kBtu/ft^2)	132.5	262.6
Site Energy Use Intensity (kBtu/ft^2)	76.3	130.7

By implementing all recommended measures covered in this reporting, the Project's estimated post-implementation EUI improves as shown in the table below:

Figure 16 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Facilities Management Building #66	National Median Building Type: Higher Education - Private
Source Energy Use Intensity (kBtu/ft^2)	127.0	262.6
Site Energy Use Intensity (kBtu/ft^2)	74.6	130.7

Many buildings can also receive a 1 – 100 ENERGY STAR® score. This score 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 has an energy star score of 78. The Portfolio Manager®, Statement of Energy Performance can be found in Appendix B: ENERGY STAR® Statement of Energy Performance.

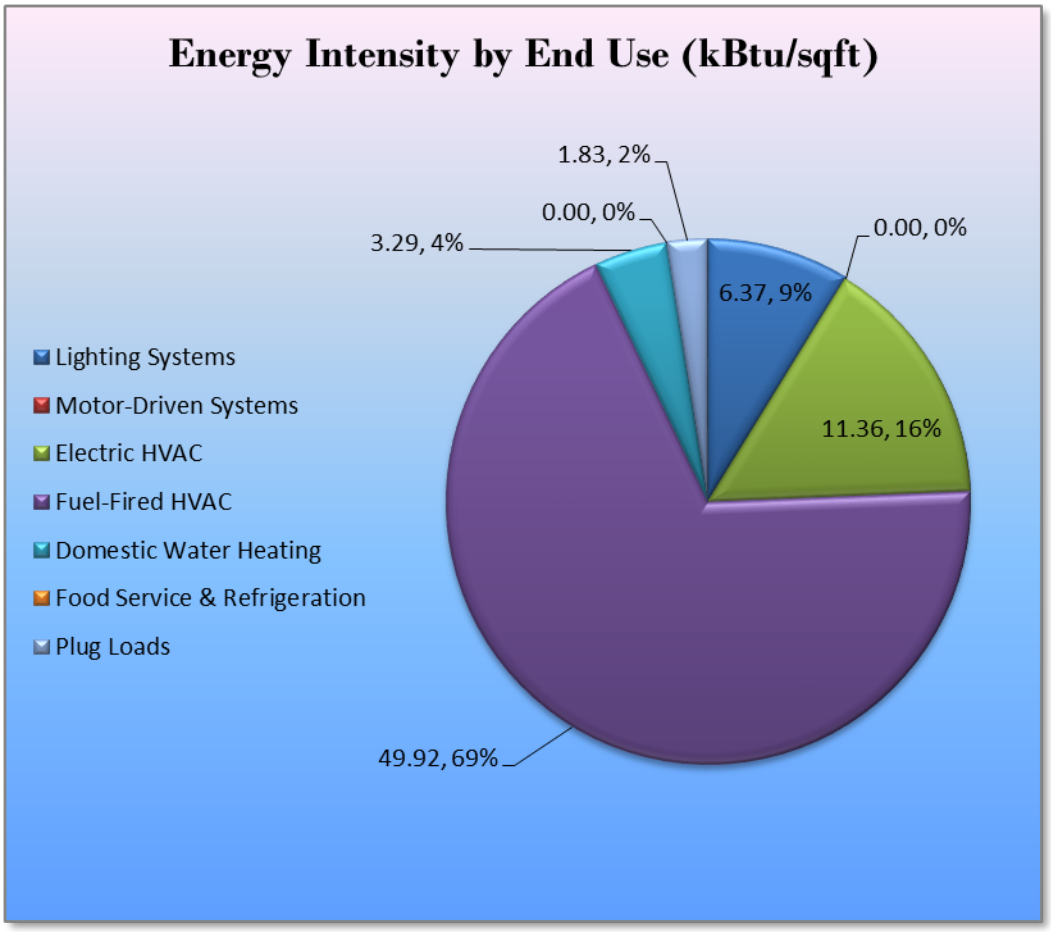
For more information on ENERGY STAR® certification go to:
https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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. 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. This visual representation of energy end uses highlights systems that may benefit most from energy efficiency projects.

Figure 17 - 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 Facilities Management Building #66 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 18 – 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		8,816	2.1	0.0	$655.48	$4,414.14	$1,630.00	$2,784.14	4.25	8,878
ECM 1	Install LED Fixtures	6,754	1.5	0.0	$502.16	$2,559.84	$1,300.00	$1,259.84	2.51	6,801
ECM 2	Retrofit Fixtures with LED Lamps	2,062	0.6	0.0	$153.32	$1,854.30	$330.00	$1,524.30	9.94	2,077
Lighting Control Measures		926	0.1	0.0	$68.88	$464.00	$80.00	$384.00	5.58	933
ECM 3	Install Occupancy Sensor Lighting Controls	926	0.1	0.0	$68.88	$464.00	$80.00	$384.00	5.58	933
TOTALS		9,742	2.2	0.0	$724.35	$4,878.14	$1,710.00	$3,168.14	4.37	9,811

* - 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).

4.2 Lighting Upgrades

Our recommendations to existing lighting fixtures are summarized in Figure 19 below.

Figure 19 – 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		8,816	2.1	0.0	$655.48	$4,414.14	$1,630.00	$2,784.14	4.25	8,878
ECM 1	Install LED Fixtures	6,754	1.5	0.0	$502.16	$2,559.84	$1,300.00	$1,259.84	2.51	6,801
ECM 2	Retrofit Fixtures with LED Lamps	2,062	0.6	0.0	$153.32	$1,854.30	$330.00	$1,524.30	9.94	2,077

ECM 1: Install LED Fixtures

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	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0
Exterior	6,754	1.5	0.0	$502.16	$2,559.84	$1,300.00	$1,259.84	2.51	6,801

Measure Description

This measure evaluates replacing existing exterior fixtures containing HID lamps with new high-performance LED light fixtures. This measure saves energy by installing LED sources, which use less power than other technologies with a comparable light output.

Maintenance savings are anticipated since LED sources have burn hours that are generally more than twice that of a fluorescent source and more than 10 times incandescent sources. Maintenance savings may be partially offset by the higher material costs associated with LED sources.

During planning and design for the installation of new fixtures, we recommend a holistic approach that considers both the technology of the lighting sources and how they are controlled.

ECM 2: 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	2,062	0.6	0.0	$153.32	$1,854.30	$330.00	$1,524.30	9.94	2,077
Exterior	0	0.0	0.0	$0.00	$0.00	$0.00	$0.00	0.00	0

Measure Description

This measure evaluates replacing linear T8 fluorescent lamps with LED tubes. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed although there is a fluorescent fixture ballast in place. Other tube lamps require that fluorescent fixture ballasts be removed or replaced with LED drivers. Screw-in/plug-in LED lamps can be used as a direct replacement for most other screw-in/plug-in lamps. This measure saves energy by installing LED sources, which use less power than other technologies with a comparable light output.

Maintenance savings are anticipated since LED sources have burn hours that are more than twice that of a fluorescent source and more than 10 times incandescent sources. LED lamps that use the existing fluorescent fixture ballast will be constrained by the remaining hours of the ballast. Maintenance savings may be partially offset by the higher material costs associated with LED sources.

During retrofit planning and design, we recommend a holistic approach that considers both the technology of the lighting sources and how they are controlled.

4.3 Lighting Control Measures

Our recommendations for lighting control measures are summarized in Figure 20 below.

Figure 20 – 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		926	0.1	0.0	$68.88	$464.00	$80.00	$384.00	5.58	933
ECM 3	Install Occupancy Sensor Lighting Controls	926	0.1	0.0	$68.88	$464.00	$80.00	$384.00	5.58	933

ECM 3: 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)
926	0.1	0.0	$68.88	$464.00	$80.00	$384.00	5.58	933

Measure Description

This measure evaluates installing occupancy sensors to control light fixtures that are currently manually controlled in some offices that are still controlled using wall switches. Sensors detect occupancy using ultrasonic and/or infrared wave technologies. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Occupants will also be able to manually turn off fixtures. Energy savings result 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. Ceiling-mounted or remote-mounted sensors require the use of low voltage switching relays or a wireless signal to the switch. In general, use wall switch replacement sensors for single occupant offices and other small rooms. Install ceiling-mounted or remote mounted sensors in locations without local switching, in situations where the existing wall switches are not in the line-of-sight of the main work area, and in large spaces. We recommend a holistic design approach that considers both the technology of the lighting sources and how they are controlled.

Maintenance savings are anticipated due to reduced lamp operation; however, additional maintenance costs may be incurred because the occupancy sensors may require periodic adjustment; it is anticipated that the net effect on maintenance costs will be negligible.

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 low or no-cost efficiency strategies. By employing certain behavioral and operational adjustments as well as performing routine maintenance on building systems, equipment lifetime can be extended; occupant comfort, health and safety can be improved; and annual energy, operation, and maintenance 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.

Use Window Treatments/Coverings

A substantial amount of heat gain can occur through uncovered or untreated windows, especially older single pane windows and east or west-facing windows. Treatments such as high-reflectivity films or covering windows with shades or shutters can reduce solar heat gain and, consequently, cooling load and can reduce internal heat loss and the associated heating load.

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.

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 to four 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 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 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.

TRC analyzed the potentially available rooftop areas for each of the central campus buildings, in order to determine the potential cost and energy savings for installing a campus-wide solar PV array at Ocean County College. Based on our analysis, we estimate that Ocean County College has about 106,687 square feet of available unshaded roof space for all buildings combined. We estimate that the Library has approximately 7,854 square feet of unshaded roof space available, representing about 7.3% of the total array. We estimate that the available rooftop space could support up to 1,487 kW of solar generating capacity (~4,956 PV panels @300-WDC each)[1].

The combined PV array could generate nearly 2 million kWh on an annual basis. This could potentially offset $326,719 of annual electric purchases from the grid. In addition, Ocean County College could receive during the first 15 years of the solar project's lifetime, up to $795,309 per year in Solar Renewable Energy Certificate (SREC) income (@ $235/MWh). We estimate that the installed cost of such an array would be about $5.2 million. Based on these numbers, we estimate that such an investment would have a simple payback period of about 6.5 years.

Rebates are not available for solar projects, but owners of solar projects MUST register their projects in the SREC Registration Program (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. Refer to Section 8.4 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

[1] Our estimate was based on the National Renewable Energy Lab's *PVWatts*® Online Calculator (http://pvwatts.nrel.gov/), plus TRC's analysis of current market conditions for commercial solar power development in New Jersey.

7 DEMAND RESPONSE

Demand Response (DR) is a program designed to reduce consumer electric load when electric wholesale prices are high or when the reliability of the electric grid is threatened due to peak demand. DR 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 locally.

By enabling grid operators to call upon Curtailment Service Providers and energy consumers 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 will receive payments whether or not their facility is called upon to curtail their load.

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 program often find it to be a valuable source of revenue for their facility(ies) because the payments can significantly offset annual utility 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 event cycle. DR program participants often have to install smart meters and 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 the program rules and requirements for metering and controls, a facility's ability to temporarily reduce electric load, as well as the payments involved in participating in the program. Also, these providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment to help ensure compliance of all terms and conditions of a DR contract.

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	Install LED Fixtures	x		x
ECM 2	Retrofit Fixtures with LED Lamps	x		x
ECM 3	Install Occupancy Sensor Lighting Controls	x		x

SmartStart is generally well suited for implementation of individual or small sets of measures, with the flexibility to install projects at your own pace using in-house staff or a preferred contractor. Direct Install caters to small to mid-size facilities to bundle measures and simplify participation, 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 and 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; applicants can use in-house staff or preferred contractor.

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent comparison of available incentives.

Brief descriptions of all relevant alternative financing and incentive programs are located in the sections below. You may also check the following website for further information, including most current program availability, requirements, and incentive levels: 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.

Prescriptive Equipment Incentives 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 Direct Install

Overview

Direct Install is a turnkey program available to existing small to mid-sized facilities with a peak electric demand that did not exceed 200 kW in any of the preceding 12 months. You will work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and install those measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives and controls.

Incentives

The program pays up to 70% of the total installed cost of eligible measures, up to $125,000 per project. Direct Install participants will also be held to a fiscal year cap of $250,000 per entity.

How to Participate

To participate in the Direct Install program you will need to contact the participating contractor assigned to the county where your facility is located; a complete list is provided on the Direct Install website identified below. The contractor will be paid the program incentive directly which will pass on to you in the form of reduced material and implementation costs. This means up to 70% of eligible costs are covered by the program, subject to program caps mentioned above, and the remaining 30% of the cost is your responsibility to the contractor.

Since Direct Install offers a free assessment, LGEA applicants that do not meet the audit program eligibility requirements, but do meet the Direct Install requirements, may be moved directly into this program.

Detailed program descriptions and applications can be found at: www.njcleanenergy.com/DI.

8.3 SREC Registration Program

The SREC (Solar Renewable Energy Certificate) 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.

8.4 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.

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 the incentive programs to help further reduce costs when compiling 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
Entrance	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Entrance	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	5,096	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,096	0.02	182	0.0	$13.51	$58.50	$10.00	3.59
Front desk area	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	5,096	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	5,096	0.09	727	0.0	$54.03	$234.00	$40.00	3.59
Front desk area	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 115	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway Lights	7	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	5,096	None	Yes	7	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.09	738	0.0	$54.90	$116.00	$20.00	1.75
Hallway Lights	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Conference Room	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Closet in the conference room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.15	$58.50	$10.00	330.56
Room 102 - office	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 103 - office	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 113 - custodial closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.15	$58.50	$10.00	330.56
Men's Room	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	62	728	Relamp	No	1	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	728	0.02	23	0.0	$1.74	$76.53	$20.00	32.44
Men's Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	728	Relamp	No	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	728	0.07	83	0.0	$6.16	$175.50	$30.00	23.61
Room 104- Office	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 105 - office	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 106 - Break room	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	728	Relamp	No	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	728	0.10	111	0.0	$8.22	$234.00	$40.00	23.61
Room 106 - Break room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	728	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	728	0.05	55	0.0	$4.11	$117.00	$20.00	23.61
Women's room	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Occupancy Sensor	62	728	Relamp	No	1	LED - Linear Tubes: (4) 2' Lamps	Occupancy Sensor	34	728	0.02	23	0.0	$1.74	$76.53	$20.00	32.44
Women's room	3	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	728	Relamp	No	3	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	728	0.04	44	0.0	$3.27	$107.70	$15.00	28.37
Room 107 - Server Room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.02	2	0.0	$0.15	$58.50	$10.00	330.56
Room 8 - Mechanical Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	52	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	52	0.05	4	0.0	$0.29	$117.00	$20.00	330.56
Warehouse	1	Exit Signs: LED - 2 W Lamp	None	6	728	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	728	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Warehouse entrance	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,567	Relamp	Yes	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,497	0.03	171	0.0	$12.72	$174.50	$30.00	11.36
Warehouse entrance	1	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Wall Switch	32	3,567	Relamp	No	1	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	15	3,567	0.01	72	0.0	$5.34	$35.90	$5.00	5.79

	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
Warehouse library	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,567	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,497	0.12	684	0.0	$50.87	$350.00	$60.00	5.70
Warehouse aisles	5	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	728	None	No	5	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	728	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Warehouse aisles	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	728	None	No	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	728	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Warehouse aisles	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	728	None	No	3	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	728	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Warehouse aisles	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Warehouse aisles	9	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	728	None	No	9	Linear Fluorescent - T5HO: 4' T5HO (54W) - 2L	Occupancy Sensor	117	728	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Warehouse aisles	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Warehouse aisles - with offices	6	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	6	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Warehouse aisles - with offices	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	114	3,567	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	3,567	0.04	230	0.0	$17.08	$95.13	$20.00	4.40
Warehouse aisles - with offices	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Occupancy Sensor	62	3,567	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	3,567	0.02	135	0.0	$10.07	$58.50	$10.00	4.82
Other side offices - common area	30	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	30	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Other side offices - common area	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Other side offices - common area	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	3,587	None	Yes	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	2,511	0.03	149	0.0	$11.04	$116.00	$20.00	8.69
Other side offices - common area	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 120 - office	3	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	3	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 121 - office	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 122 - office	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 123 - office	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	4	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 125 - office	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 126 - office	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 127 - office	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	None	No	2	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	3,567	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Men's Room	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	728	None	No	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	728	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
women's room	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	728	None	No	1	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Occupancy Sensor	60	728	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Other side offices - common area	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Over window next to door A	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	40	5,096	None	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	40	5,096	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
Over doors A,B,C and F	4	High-Pressure Sodium: (1) 50W Lamp	None	66	2,920	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	13	2,920	0.16	712	0.0	$52.93	$205.04	$400.00	-3.68
Sidewall facing cell tower	1	High-Pressure Sodium: (1) 250W Lamp	None	295	2,920	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	86	2,920	0.15	702	0.0	$52.18	$251.92	$100.00	2.91
Back wall between doors E and F	2	High-Pressure Sodium: (1) 250W Lamp	None	295	2,920	Fixture Replacement	No	2	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	86	2,920	0.31	1,404	0.0	$104.36	$503.84	$200.00	2.91
Over bay door next to door C	1	High-Pressure Sodium: (1) 250W Lamp	None	295	2,920	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	86	2,920	0.15	702	0.0	$52.18	$251.92	$100.00	2.91
Over door E	1	High-Pressure Sodium: (1) 250W Lamp	None	295	2,920	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	86	2,920	0.15	702	0.0	$52.18	$251.92	$100.00	2.91
Side wall facing woods and picnic table	1	High-Pressure Sodium: (1) 250W Lamp	None	295	2,920	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	86	2,920	0.15	702	0.0	$52.18	$251.92	$100.00	2.91
Next to door D	1	High-Pressure Sodium: (1) 250W Lamp	None	295	2,920	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	86	2,920	0.15	702	0.0	$52.18	$251.92	$100.00	2.91
Between doors C and B	1	High-Pressure Sodium: (1) 400W Lamp	None	465	2,920	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	146	2,920	0.23	1,071	0.0	$79.64	$295.68	$100.00	2.46
Over bay door next to door B	1	High-Pressure Sodium: (1) 400W Lamp	None	465	2,920	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	146	2,920	0.23	1,071	0.0	$79.64	$295.68	$100.00	2.46

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
Roof	Building #66	1	Packaged AC	12.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Building #66	1	Packaged AC	6.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Building #66	1	Packaged AC	6.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Building #66	1	Packaged AC	6.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Building #66	1	Packaged AC	6.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof	Building #66	1	Packaged AC	12.50		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
Roof top Unit	Facilities management building	1	Furnace	144.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof top Unit	Facilities management building	4	Furnace	96.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Roof top Unit	Facilities management building	1	Furnace	144.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Ware house ceiling	Warehouse	2	Warm Air Unit Heater	48.00	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
Room 108	Buiding #66 - facilities management building	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?
Building #66	7	Laptops	25.0	No
Building #66	25	Computers	75.0	No
Building #66	8	Printer/copier	515.0	No
Building #66	1	Mailing machine	200.0	No
Building #66	2	Small Fridge	11.0	No
Building #66	2	Microwave	1,000.0	No
Building #66	1	Big Fridge	300.0	No
Building #66	1	Projector	211.0	No

APPENDIX B: ENERGY STAR® STATEMENT OF ENERGY PERFORMANCE

ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Facilities Management Building (#66)

Primary Property Type: Office
Gross Floor Area (ft²): 18,952
Built: 2000

For Year Ending: June 30, 2015
Date Generated: April 17, 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
Facilities Management Building (#66) 1 College Drive Toms River, New Jersey 08754	_____ , (___)___-_____	___ _____ , (___)___-_____ _____

Property ID: 5093702

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
76.3 kBtu/ft²

Source EUI
132.6 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	476,315 (33%)
Natural Gas (kBtu)	969,852 (67%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	108.9
National Median Source EUI (kBtu/ft²)	189.3
% Diff from National Median Source EUI	-30%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	106

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)