Local Government Energy Audit:
Energy Audit Report

Larson Student Center (#8)

Ocean County College

1 College Drive
Toms River, NJ 08784

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.

Table of Contents

Table of Figures

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for Larson Student Center (#8).

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 Energy Services (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

Larson Student Center (#8) at Ocean County College is a 49,259 square foot building constructed in 2016. The two-story building, including the basement, was designed to be very energy efficient. Lighting at Larson Student Center (#8) already consists of energy efficient LED fixtures and lamps which are controlled by occupancy sensors.

The building is heated and cooled via a campus-wide hot and chilled water loop supplied by the CHP building. Five Carrier air handling units and three Greenheck make-up air units distribute conditioned air to the building spaces. The building receives electric power via the campus main account (with JCP&L). All electric and thermal energy used onsite is distributed from the CHP Building.

Due to this building's efficiency, we were not able to identify many ECMs within the scope of this audit program. However, a thorough description of the facility and our observations are in Section 2 and a description of the measure we were able to identify is found in Section 4.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated one measure which represents an opportunity for Larson Student Center (#8) to reduce annual energy costs by roughly $528 and annual greenhouse gas emissions by 3,246 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 1.3 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 Larson Student Center (#8)'s annual energy use by 0.14%.

Figure 1 – Previous 12 Month Utility Costs

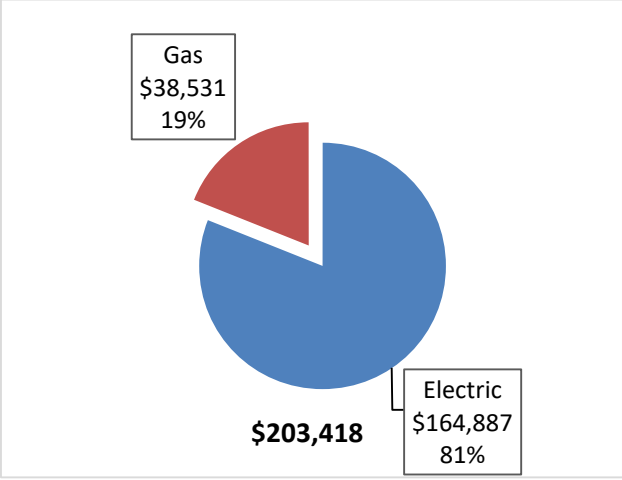
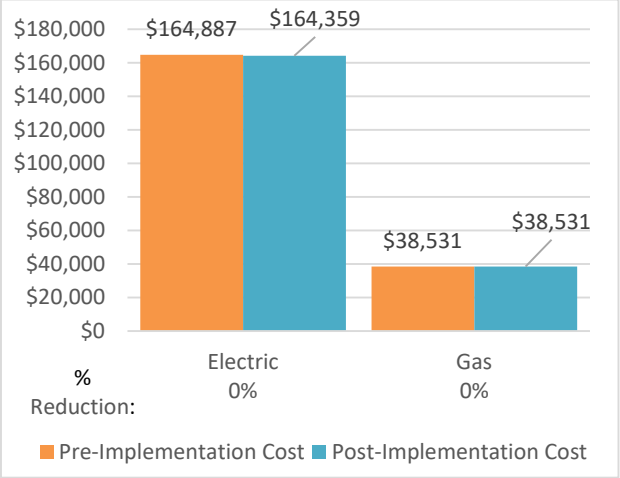


Figure 2 – Potential Post-Implementation Costs



A detailed description of Larson Student Center (#8)'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		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)
Plug Load Equipment Control - Vending Machine			3,224	0.0	0.0	$527.95	$690.00	$0.00	$690.00	1.3	3,246
ECM 1	Vending Machine Control	Yes	3,224	0.0	0.0	$527.95	$690.00	$0.00	$690.00	1.3	3,246
TOTALS			3,224	0.0	0.0	$527.95	$690.00	$0.00	$690.00	1.3	3,246

* - 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).

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 outlet when not in use.

Energy Efficient Practices

TRC also identified five 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 Larson Student Center (#8) include:

- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Perform Proper Water Heater Maintenance
- 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 Larson Student Center (#8). 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 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
- 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.

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 8.2 for additional information on the ESIP Program.

Additional information on relevant incentive programs is in Section 8. You may also check the following website for more details: www.njcleanenergy.com/ci.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
James Calamia	Director of Facility	jcalamia@ocean.edu	732-255-0400 Ext 2066
Designated Representative			
John Jack	Maintenance Technician		732-255-0400
TRC Energy Services			
Moussa Traore	Auditor	mtraore@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On June 13, 2016, TRC performed an energy audit at Larson Student Center (#8) located in Toms River, New Jersey. TRC's auditor met with John Jack to review the facility operations and help focus our investigation on specific energy-using systems.

Larson Student Center (#8) is a 49,259 square foot, two-story, designed to be energy efficient. The first floor houses a cafeteria with seating for approximately 380 people along with a coffee shop. The second-floor houses activity and club rooms, conference rooms, the student lounge along with the admissions, student affairs and student life offices.

2.3 Building Occupancy

The school building is open six days a week. The typical schedule is presented in the table below. The entire facility is used year-round.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Larson Student Center	Weekday	7:00 AM - 8:00 PM
Larson Student Center	Weekend	7:00 AM - 5:00 PM

2.4 Building Envelope

The building is constructed of concrete masonry block with brick façade and glass framed walls. The roof was covered with a thermoplastic white membrane that is in good shape. The building has aluminum framed, double paned windows and glass doors throughout. All door and window seals appeared to be tight. No outside air infiltration was noted.

2.5 On-Site Generation

The campus has a 1.1 MW Waukesha reciprocating engines combined heat and power (CHP) power plant at the Central Plant. The CHP plant generates a significant portion of the power used by the Larson Student Center (#8) and other central campus buildings.

2.6 Energy-Using Systems

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

Lighting System

The entire building is outfitted with an energy efficient LED lighting system. The basement mechanical spaces are illuminated with 29-Watt LED linear tubes while the first and second floors are lit with a combination of 40-Watt LED panels and recessed LED fixtures. Exit signs throughout the facility are also LED. Lighting control is also provided by battery powered occupancy sensors. The building has minimal exterior lighting which consists of outdoor LED wall packs and are controlled by photocells.

Hot and Chilled Water HVAC System

The building receives chilled water via the campus-wide central heating/cooling loop. Chilled water is generated at the Central Plant by a new 1400-ton York chiller system and a 300-ton Broad™ absorption chiller system. The operation and scheduling of all chillers is controlled from the Central Plant.

The heating is provided to the Larson Student Center from the Central Plant too. Hot water is generated by an AERCO BMK-6000 boiler system.

Air is distributed throughout the building by five Carrier air handling units (AHUs) equipped with hot and chilled water coils. The heating hot water is distributed to the building's AHUs by two 10 hp water pumps equipped with variable speed drives (VFDs) while the chilled water is distributed to the AHUs by two 15 hp pumps also equipped with variable speed drives (VFDs).

In addition to Carrier AHUs, three Greenheck make-up air with 100% outdoor air operation are used to condition the building.

Direct Expansion Air Conditioning System (DX)

One 2-ton and one 2.5-ton Mitsubishi split system air conditioners are to condition the server room and room 210 respectively. The units utilize a scroll compressor and are controlled by programmable thermostats.

Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of two A.O. Smith gas-fired condensing hot water heaters with an input rating of 200 MBH each and a nominal efficiency of 95%. Each water heater has a 119-gallon storage tank. They are well maintained.

Food Service & Refrigeration

The facility has a food service and coffee bar located in the first floor. The ovens, range tops and griddle are all gas fired. The facility also has walk in freezers and coolers all energy efficient located in the first floor and the basement.

2.7 Water-Using Systems

There are several restrooms at this facility. A sampling of restrooms found that all of the faucets are already rated as low flow.

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 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. Sub-meter data was not available for a full 12-month period. So, we had to use our best estimate of consumption for each building to divide up the energy purchases through the master electric and gas accounts.

Annual electric usage for each building on the main account was estimated from the partial year submeter data that was available. Thermal load for each building on the central heating and cooling loops was apportioned according to building square footage. These estimates were complicated by the fact that the amount of electricity produced by the Central Plant's CHP system could not be determined precisely for the billing period for which we had utility bills. So, our usage estimates may vary from current actual energy usage for some buildings that are supplied by master metered electric and gas accounts.

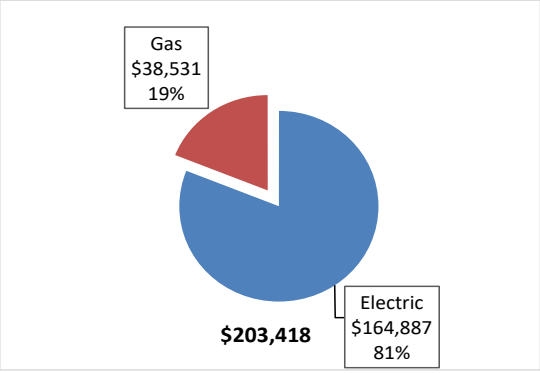
The Larson Student Center receives all electric and thermal energy from the campus' mater electric and gas accounts. Below is our estimate of the portion of energy consumptions and costs that can be attributed to the Student Center building.

Figure 6 - Utility Summary

Utility Summary for Larson Student Center		
Fuel	Usage	Cost
Electricity	1,006,806 kWh	$164,887
Natural Gas	43,663 Therms	$38,531
Total		$203,418

The current annual energy cost for this facility is $203,418 as shown in the chart below.

Figure 7 - 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 Plant to the Student Center. The average electric cost over the past 12 months on the main account was $0.164/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 electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

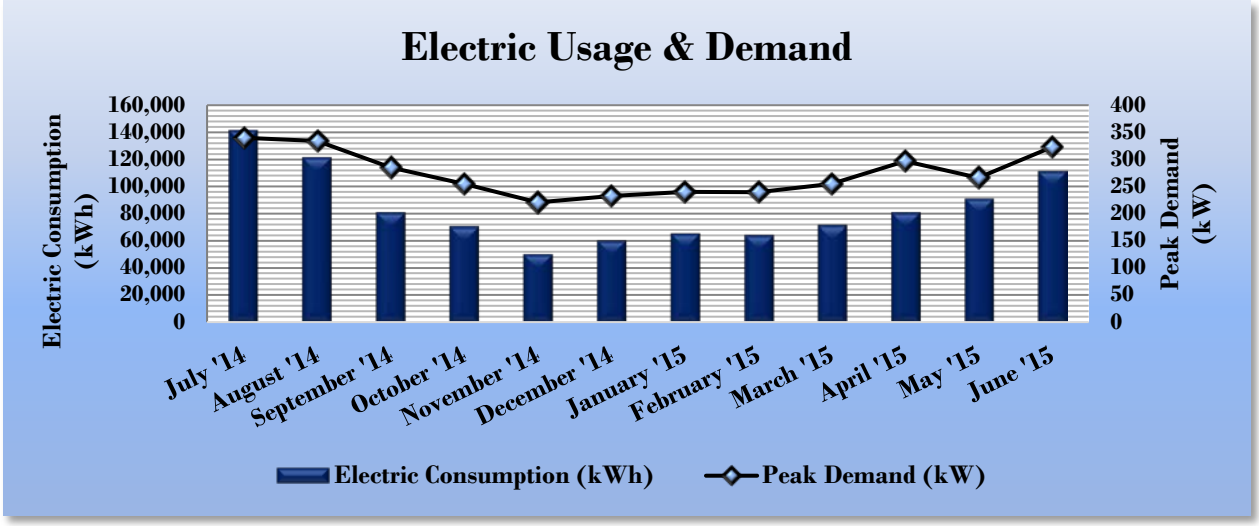


Figure 9 - Electric Usage & Demand

Electric Billing Data for Larson Student Center					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost	TRC Estimated Usage?
8/6/14	31	141,725	440	$23,211	Yes
9/5/14	29	121,479	434	$19,895	Yes
10/3/14	29	80,986	397	$13,263	Yes
11/4/14	32	70,863	395	$11,605	Yes
12/5/14	31	50,616	361	$8,290	Yes
1/6/15	32	60,739	382	$9,947	Yes
2/5/15	30	65,801	380	$10,776	Yes
3/6/15	29	64,789	379	$10,611	Yes
4/7/15	32	71,875	395	$11,771	Yes
5/7/15	30	80,986	397	$13,263	Yes
6/8/15	32	91,109	406	$14,921	Yes
7/8/15	30	111,355	433	$18,237	Yes
Totals	367	1,012,322	439.92	$165,790	12
Annual	365	1,006,806	439.92	$164,887	

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. It is supplied to the boilers at the Central Plant. The gas fires the main boilers there and distributes hot water to 10 campus buildings, including the Larson Student Center. The gas is also used to generate a portion of the campus' electric and chilled water demand via the Plant's CHP and absorption chiller equipment. This makes it difficult to assign a final end-use gas consumption for each building. From the main gas account, we determined the average gas cost for the most recent 12-month billing period to be $0.882/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.

Figure 10 - Natural Gas Usage

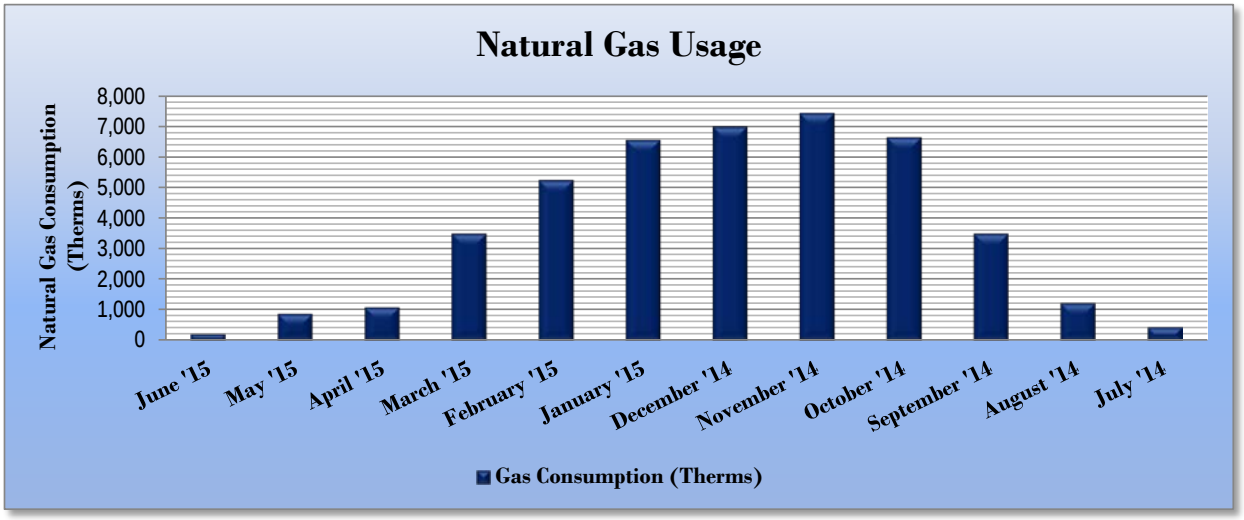


Figure 11 - Natural Gas Usage

Gas Billing Data for Larson Student Center				
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost	TRC Estimated Usage?
7/8/15	30	219	$193	Yes
6/9/15	32	876	$773	Yes
5/7/15	29	1,095	$966	Yes
4/8/15	30	3,503	$3,091	Yes
3/9/15	33	5,254	$4,636	Yes
2/4/15	29	6,567	$5,795	Yes
1/6/15	32	7,005	$6,182	Yes
12/5/14	31	7,443	$6,568	Yes
11/4/14	29	6,655	$5,873	Yes
10/6/14	31	3,503	$3,091	Yes
9/5/14	30	1,226	$1,082	Yes
8/6/14	30	438	$386	Yes
Totals	366	43,783	$38,636	12
Annual	365	43,663	$38,531	

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.

Due to the many uncertainties regarding electric and gas end-usage for buildings on master metered accounts (as discussed in Sections 3.2 and 3.3 above), we have provided a combined benchmarking (in kBTU/sq-ft) for all campus buildings that are served by master electric and gas accounts.

Figure 12 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Larson Student Center	National Median Building Type: Higher Education - Public
Source Energy Use Intensity (kBtu/ft^2)	312.0	262.6
Site Energy Use Intensity (kBtu/ft^2)	158.4	130.7

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

Figure 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Larson Student Center	National Median Building Type: Higher Education - Public
Source Energy Use Intensity (kBtu/ft^2)	311.3	262.6
Site Energy Use Intensity (kBtu/ft^2)	158.2	130.7

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 being one of the building types that are eligible to receive an ENERGY STAR® 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 this does not qualify 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.

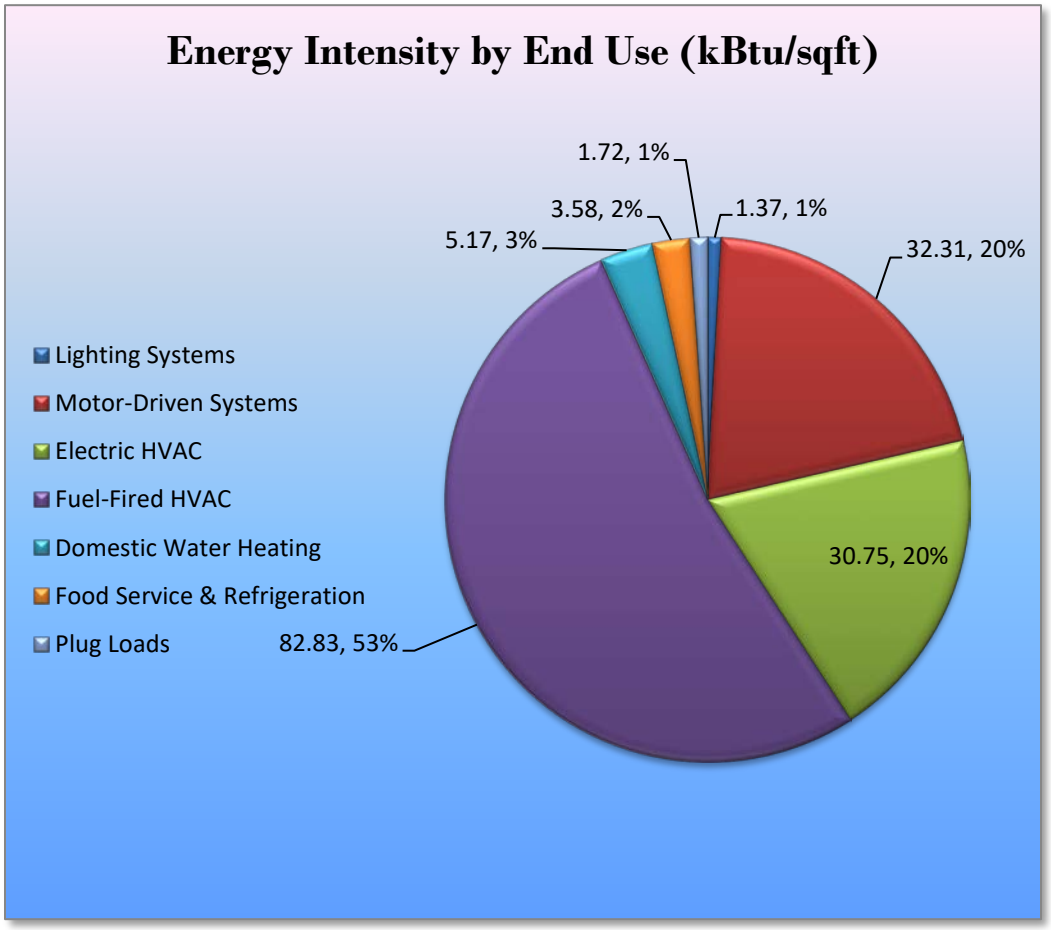
3.5 Energy End-Use Breakdown

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 to determine their proportional contribution to overall building energy usage. This chart of energy end uses highlights the relative contribution of each equipment category to total energy usage. This can help determine where the greatest benefits might be found from energy efficiency measures.

This breakdown of energy usage is based on both our estimates of the Larson Student Center's shares of the total electric and gas loads as well as number and sizes of energy-using equipment on site. The relative share of gas usage appears to be a bit high in the pie chart below, but that result is uncertain. The relatively higher share for gas usage might be partly due to assumptions that we made when dividing up energy usage by building for the mater electric and gas accounts.

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

Figure 14 - Energy Balance (% and 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 Larson Student Center 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 15 – 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)
Plug Load Equipment Control - Vending Machine		3,224	0.0	0.0	$527.95	$690.00	$0.00	$690.00	1.3	3,246
ECM 1	Vending Machine Control	3,224	0.0	0.0	$527.95	$690.00	$0.00	$690.00	1.3	3,246
TOTALS		3,224	0.0	0.0	$527.95	$690.00	$0.00	$690.00	1.3	3,246

* - 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 Plug Load Equipment Control - Vending Machines

Our recommendations for plug load equipment controls are summarized in Figure16 below.

Figure 16-Summary of Plug Load Equipment Controls

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)
Plug Load Equipment Control - Vending Machine		3,224	0.0	0.0	$527.95	$690.00	$0.00	$690.00	1.3	3,246
ECM 1	Vending Machine Control	3,224	0.0	0.0	$527.95	$690.00	$0.00	$690.00	1.3	3,246

ECM 1: 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)
3,224	0.0	0.0	$527.95	$690.00	$0.00	$690.00	1.3	3,246

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.

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.

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.

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.

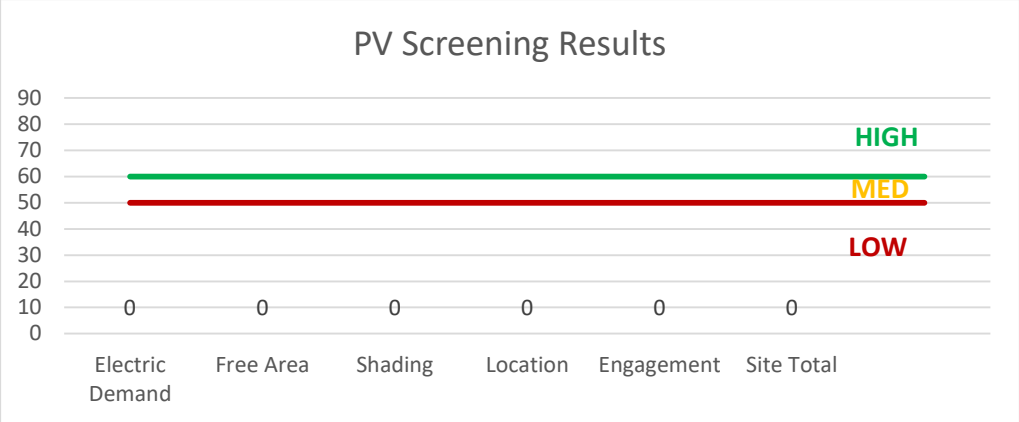
6.1 Photovoltaic

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 **Low** potential for installing a PV array.

In order to be cost-effective, a solar PV array needs certain minimum criteria, such as flat or south-facing rooftop or other unshaded space on which to place the PV panels. In our opinion, the facility does appear not meet these minimum criteria for cost-effective PV installation.

Figure 17 - Photovoltaic Screening



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

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.

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 18 for a list of the eligible programs identified for each recommended ECM.

Figure 18 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Vending Machine Control						

Although the only ECM recommended for this building does not currently qualify for a NJCEP incentive, the information about the incentive programs is still relevant to the college as a whole and therefore the information is also included in this building report. As mentioned in the other reports, 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 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 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
Food Service and Coffee Bar	23	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	None	No	23	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Food Service and Coffee Bar	35	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	None	No	35	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 200 Admission Office	6	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	None	No	6	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 200 Admission Office	3	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	None	No	3	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 211 - Club & Activity Room	12	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	None	No	12	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 211 - Club & Activity Room	9	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	None	No	9	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 220 - Collab Learning Lounge	18	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	None	No	18	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 220 - Collab Learning Lounge	12	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	None	No	12	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 220 - Collab Learning Lounge	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 201 Conference Room	14	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	None	No	14	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 201 Conference Room	10	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	None	No	10	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 201 Conference Room	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
Room 203 Conference Room	14	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	None	No	14	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 203 Conference Room	10	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	None	No	10	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 203 Conference Room	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
Room 217 - Multumedia Lounge	9	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	None	No	9	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 217 - Multumedia Lounge	5	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	None	No	5	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 217 - Multumedia Lounge	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
Room 205 - Student Life Office	8	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	None	No	8	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 205 - Student Life Office	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	None	No	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 104 - Student Life Box Office	8	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	None	No	8	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 104 - Student Life Box Office	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	None	No	4	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 104 - Student Life Box Office	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 104 - Welcome Kiosk	12	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	None	No	12	LED - Fixtures: Ambient 2x2 Fixture - Flat Panel	Occupancy Sensor	40	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Room 104 - Welcome Kiosk	6	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	None	No	6	LED - Fixtures: Downlight Recessed	Occupancy Sensor	11	2,748	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
Room 104 - Welcome Kiosk	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
Basement Mechanical Space	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,748	None	No	16	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Basement Mechanical Space	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	3	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Basement Walk in Freezer Area	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,748	None	No	12	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,748	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Basement Walk in Freezer 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

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
Basement	Heating System	2	Heating Hot Water Pump	10.0	91.7%	Yes	2,184	No	91.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Basement	Chilled Water System	2	Chilled Water Pump	15.0	92.5%	Yes	2,016	No	92.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Student Center	Elevator	1	Other	15.0	75.5%	No	720	No	75.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Student Center	1	Exhaust Fan	0.8	71.0%	No	2,016	No	71.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Student Center	1	Exhaust Fan	0.5	71.0%	No	2,016	No	71.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Student Center	1	Kitchen Hood Exhaust Fan	7.5	88.5%	No	2,016	No	88.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Student Center	2	Exhaust Fan	0.5	71.0%	No	2,016	No	71.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Student Center	1	Exhaust Fan	0.3	71.0%	No	2,016	No	71.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Student Center	1	Exhaust Fan	0.3	71.0%	No	2,016	No	71.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Vestibule	Vestibule	2	Other	0.3	71.0%	No	2,016	No	71.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Stairwell	Stairwell	2	Other	0.3	71.0%	No	2,016	No	71.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Air handler	1	Supply Fan	7.5	88.5%	Yes	2,016	No	88.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Air handler	1	Return Fan	5.0	84.7%	No	2,016	No	84.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Air handler	1	Supply Fan	5.0	84.7%	Yes	2,016	No	84.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Air handler	1	Return Fan	5.0	84.7%	No	2,016	No	84.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Air handler	1	Supply Fan	20.0	91.5%	Yes	2,016	No	91.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Air handler	1	Return Fan	10.0	89.5%	No	2,016	No	89.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Air handler	1	Supply Fan	40.0	94.5%	Yes	2,016	No	94.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Air handler	1	Return Fan	15.0	90.5%	No	2,016	No	90.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Air handler	1	Supply Fan	7.5	88.5%	Yes	2,016	No	88.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

		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
Rooftop	Air handler	1	Return Fan	5.0	84.7%	No	2,016	No	84.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Kitchen Make Up Air	1	Supply Fan	7.5	88.7%	Yes	2,016	No	88.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Kitchen Make Up Air	1	Supply Fan	7.5	188.7%	Yes	2,016	No	188.7%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Kitchen Make Up Air	1	Supply Fan	7.5	288.7%	Yes	2,016	No	288.7%	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
Rooftop	Data Room	1	Split-System AC	2.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Rooftop	Student Center	1	Split-System AC	2.50		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric Chiller Inventory & Recommendations

		Existing Conditions			Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Chiller Quantity	System Type	Cooling Capacity per Unit (Tons)	Install High Efficiency Chillers?	Chiller Quantity	System Type	Constant/ Variable Speed	Cooling Capacity (Tons)	Full Load Efficiency (kW/Ton)	IPLV Efficiency (kW/Ton)	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
Chiller Plant	Central Campus	3	Water-Cooled Centrifugal Chiller	1,400.00	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
Central Plant	Student Center	4	Condensing Hot Water Boiler	5,580.00	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
Basement	Student Center	2	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Walk-In Cooler/Freezer Inventory & Recommendations

	Existing Conditions		Proposed Conditions			Energy Impact & Financial Analysis						
Location	Cooler/ Freezer Quantity	Case Type/Temperature	Install EC Evaporator Fan Motors?	Install Electric Defrost Control?	Install Evaporator Fan Control?	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
Student Center	2	Medium Temp Freezer (0F to 30F)	No	No	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Student Center	3	Cooler (35F to 55F)	No	No	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?
Cafeteria	4	Coffee Maker	1,200.0	No
Cafeteria	1	Small Refrigerator	175.0	Yes
Larson Student Center	53	Desktop With LCD Monitors	191.0	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 Lobby	2	Refrigerated	Yes	0.00	3,224	0.0	$527.95	$460.00	$0.00	0.87
Cafeteria Lobby	1	Non-Refrigerated	No	0.00	0	0.0	$0.00	$230.00	$0.00	0.00

Appendix B: ENERGY STAR® Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

Ocean County College

Primary Property Type: College/University
Gross Floor Area (ft²): 526,034
Built: 1966

For Year Ending: June 30, 2015
Date Generated: April 21, 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
Ocean County College 1 College Drive Toms River, New Jersey 08754	_____ , (___)___-_____	___ _____ , (___)___-_____ _____

Property ID: 5093695

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
164.7 kBtu/ft²

Source EUI
315.4 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	50,787,318 (59%)
Electric - Grid (kBtu)	35,847,151 (41%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	137.1
National Median Source EUI (kBtu/ft²)	262.6
% Diff from National Median Source EUI	20%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	6,808

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)