Local Government Energy Audit:
Energy Audit Report

Community Center

5045 English Creek Avenue

Egg Harbor Township, NJ 08234

Egg Harbor Township

March 1, 2018

Final Report by:

TRC Energy Services

Disclaimer

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

The energy conservation measures and estimates of energy savings have been reviewed for technical accuracy. However, estimates of final energy savings are not guaranteed, because final savings may depend on behavioral factors and other uncontrollable variables. TRC Energy Services 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 Egg Harbor Township.

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, as part of a comprehensive effort to assist New Jersey local governments in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

Egg Harbor Township Community Center is a 56,616 square foot facility built in 2008 and comprised of three (3) different wings. The Parks & Recreation area includes activity rooms and office space, the Senior Center includes the multi-purpose room and gymnasiums, and the Performing Arts wing includes art and dance studios, office space and music rooms. The Parks & Recreation department provides yoga, basketball, wrestling and karate classes. The Senior Center provides space for the senior community and a kitchen for meal preparation. The Performing Arts wing is used by an outside organization that provides classes for music, arts and dance. Building occupancy may reach at least 300 people, day or night. The general building occupancy is between 6:00 AM and 10:00 PM during week days and Saturdays. The Performing Arts wing is also utilized on Sundays. The building is 100% heated and cooled.

The HVAC systems and their control are of major concern for the facility. A Honeywell Building Energy Management System (BEMS) was installed but according to staff, the system functionality does not meet the current operating requirements of the facility. This is a major issue relating to both excessive energy consumption and indoor air quality with impacts to both operations and maintenance. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC Energy Services evaluated 6 measures which together represent an opportunity for Egg Harbor Township to reduce annual energy costs by roughly $29,142 and annual greenhouse gas emissions by 220,924 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 5.9 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 Egg Harbor Township's annual energy use by 20%.

Figure 1 – Previous 12 Month Utility Costs

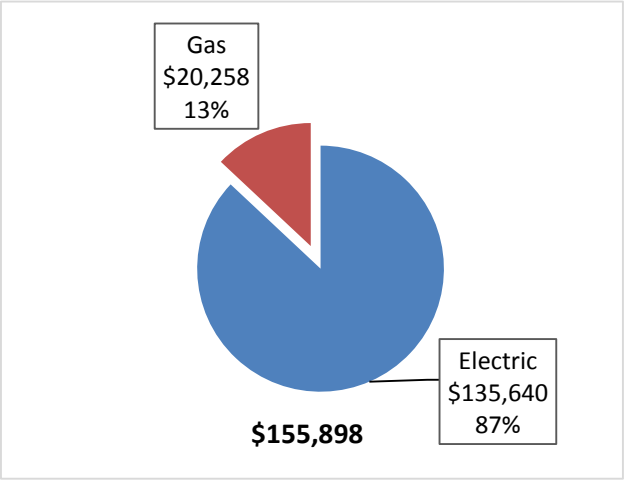
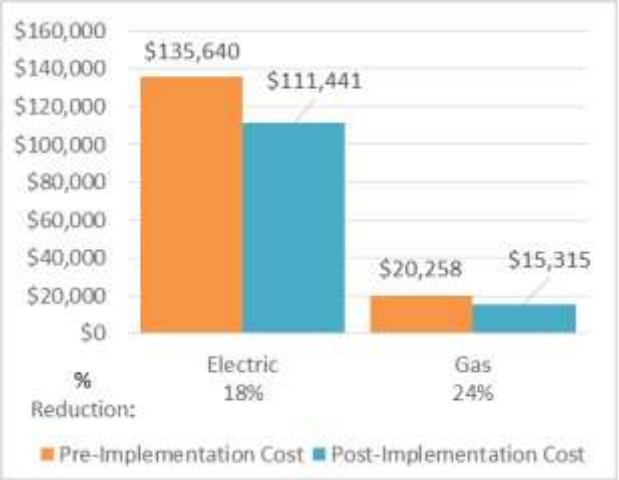


Figure 2 – Potential Post-Implementation Costs



A detailed description of Egg Harbor Township's existing energy use can be found in Section 3 "Site Energy Use and Costs".

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, "Energy Conservation Measures".

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**88,258**	**17.5**	**0.0**	**$12,245.57**	**$63,906.05**	**$10,455.00**	**$53,451.05**	**4.4**	**88,875**
ECM 1	Install LED Fixtures	11,407	2.3	0.0	$1,582.63	$16,799.11	$4,300.00	$12,499.11	7.9	11,486
ECM 2	Retrofit Fixtures with LED Lamps	76,851	15.2	0.0	$10,662.94	$47,106.94	$6,155.00	$40,951.94	3.8	77,389
Lighting Control Measures		**16,576**	**3.5**	**0.0**	**$2,299.90**	**$18,820.00**	**$1,920.00**	**$16,900.00**	**7.3**	**16,692**
ECM 3	Install Occupancy Sensor Lighting Controls	12,652	3.0	0.0	$1,755.50	$14,620.00	$1,920.00	$12,700.00	7.2	12,741
ECM 4	Install High/Low Lighitng Controls	3,924	0.5	0.0	$544.41	$4,200.00	$0.00	$4,200.00	7.7	3,951
Custom Measures		**69,578**	**0.0**	**386.8**	**$14,596.63**	**$101,908.80**	**$0.00**	**$101,908.80**	**7.0**	**115,357**
ECM 5	Retro-Commissioning Study & HVAC Improvements	23,193	0.0	128.9	$4,865.54	$16,984.80	$0.00	$16,984.80	3.5	38,452
ECM 6	Installation of an Energy Management System	46,385	0.0	257.9	$9,731.08	$84,924.00	$0.00	$84,924.00	8.7	76,905
TOTALS		**174,412**	**21.0**	**386.8**	**$29,142.10**	**$184,634.85**	**$12,375.00**	**$172,259.85**	**5.9**	**220,924**

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

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

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

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

Energy Efficient Practices

TRC Energy Services also identified 12 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 Egg Harbor Township include:

- Reduce Air Leakage
- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Install Destratification Fans
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Perform Proper Furnace Maintenance
- Perform Proper Water Heater Maintenance
- Water Conservation

For details on these Energy Efficient Practices, please refer to Section 5.

On-Site Generation Measures

TRC Energy Services evaluated the potential for installing on-site generation for Egg Harbor Township. Based on the configuration of the site and its loads there is a moderate potential for installing a photovoltaic (PV) array.

Figure 4 – Photovoltaic Potential

Potential	Medium	
System Potential	97	kW DC STC
Electric Generation	115,563	kWh/yr
Displaced Cost	$10,050	/yr
Installed Cost	$252,200	

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

1.3 Implementation Planning

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

Rebates, incentives, and financing are available from NJCEP, as well as other sources, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any measure, please review the relevant incentive program guidelines before proceeding. This is important

because in most cases you will need to submit applications for the incentives prior to purchasing materials or commencing with installation.

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

- SmartStart (SS)

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 SS 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 SS 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 8.3 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a (non-NJCEP) program designed to reduce electric loads at commercial facilities, when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. Demand Response (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. By enabling grid operators to call upon commercial facilities to reduce their 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 facilities receive payments whether or not they are called upon to curtail their load during times of peak demand. Refer to Section 7 for additional information on this program.

Additional information on relevant incentive programs is located 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 5 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Matthew von der Hayden	Deputy Administrator	MVonDerHayden@ehtgov.org	609-926-4044
Sam Gioconda	Division Manager, Buildings & Grounds	sgioconda@ehtgov.org	609-926-3838
TRC Energy Services			
Aimee Lalonde	Auditor	Alalonde@trcsolutions.com	732-855-0033

2.2 General Site Information

On September 29, 2017, TRC Energy Services performed an energy audit at the Community Center for Egg Harbor Township located in Egg Harbor Township, NJ. TRC Energy Services' team met with Matt & Sam to review the facility operations and help focus our investigation on specific energy-using systems.

Egg Harbor Township Community Center is a 56,616 square foot facility built in 2008 and comprised of three (3) different wings. The Parks & Recreation area includes activity rooms and office space, the Senior Center includes the multi-purpose room and gymnasiums, and the Performing Arts wing includes art and dance studios, office space and music rooms. The Parks & Recreation department provides yoga, basketball, wrestling and karate classes. The Senior Center provides space for the senior community and a kitchen for meal preparation. The Performing Arts wing is used by an outside organization that provides classes for music, arts and dance. The building is 100% heated and cooled.

The HVAC systems and their control are of major concern for the facility. A Honeywell Building Energy Management System (BEMS) was installed but according to staff, the system functionality does not meet the current operating requirements of the facility. This is a major issue relating to both excessive energy consumption and indoor air quality with impacts to both operations and maintenance.

Specific issues related to lack of control include: Lack of ability to set back space temperatures, lack of ability to regulate outdoor air intake, simultaneous heating and cooling, and short cycling of HVAC equipment. Additionally, system compressors and motors require frequent replacement. HVAC system break downs have led to events and programs being cancelled, impacting the community.

2.3 Building Occupancy

Building occupancy may reach at least 300 people, day or night. The general building occupancy is between 6:00 AM and 10:00 PM during week days and Saturdays. The Performing Arts wing is also utilized on Sundays. The typical schedule is presented in the table below.

Figure 6 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Community Center	Weekday	6 AM to 10 PM
Community Center	Saturday	6 AM to 6 PM
Community Center	Sunday	12 PM to 4 PM

2.4 Building Envelope

The building envelope is in fair condition and includes exterior aluminum clad siding and brick finish. The building has a pitched rooftop that is in fair condition. The building mostly includes double pane fixed pane windows with metal frames with internal shading which are in good condition and show little sign of excessive infiltration. The exterior doors are constructed of aluminum and in good condition.

2.5 On-Site Generation

Egg Harbor Township Community Center does not have any on-site electric generation capacity.

2.6 Energy-Using Systems

Lighting System

Lighting at the facility is provided mostly by linear fluorescent T8 lamps with electronic ballasts. There are also compact fluorescent lamp (CFL) fixtures and halogen incandescent lamp track light fixtures. The multipurpose rooms and gymnasiums are lit by linear fluorescent T5HO lamp high bay fixtures. Fixtures are in good condition and therefore provide a great opportunity for retrofitting or relamping to upgrade to LED technology. Lighting fixtures are manually controlled via wall switches. There is an opportunity for energy savings by installing occupancy based sensors.

Image 1 – Lighting Systems

The building's exterior lighting includes compact fluorescent fixtures at the entrances and canopies. There are also building mounted high pressure sodium lamp fixtures. The parking lot areas include pole mounted metal halide lamp fixtures. There are compact fluorescent fixtures at the entrance that are on during the day. There is an opportunity for energy savings by upgrading to LED technology and by installing lighting controls to limit operation of the CFL fixtures to operate from dusk to dawn.

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

Air Conditioning Systems

The building is conditioned primarily by packaged forced air handling units with gas fired furnaces and DX coils, supplemented by energy recovery units. The majority of the units are of high efficiency but their operation is not optimized based on the current lack of HVAC controls.

Image 2 – Package Air Conditioning Systems

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

The units are likely to have outside air economizers designed to utilize free cooling when the outside air temperature is lower than the return air temperature, however their function is unknown. The energy recovery units have enthalpy wheels but some are not currently operational. These are issues we recommend for investigation through the implementation of a Retro-Commissioning Study and corrected and optimized through the installation of an Energy Management System.

Image 3 – Air Handling Equipment - Economizers

A number of outdoor condensing units exhaust heat from the refrigerant loop that serves cooling coils located in the air handling units. These are in good condition and high efficiency.

Image 4 – Condensing Units

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

Building Energy Management System (BEMS)

The majority of the facility is controlled with a Honeywell building energy management system (BEMS). According to staff, the system functionality does not meet the current operating requirements of the facility. Therefore, staff is limited to HVAC equipment by manual controls. There are no temperature setbacks and there is simultaneous heating and cooling. There are temperature sensors throughout the building and manual dial thermostats located in almost every individual room. There is great potential for optimization of HVAC systems in the building, however this must be implemented. The BEMS aggregates the direct digital control (DDC) points from throughout the building. We recommend having an HVAC contractor identify that all building zones are subject to DDC, are properly tied into the BEMS, and that the system is programmed properly. The system may be capable of providing trends for individual DDC points for up to one year.

Image 5 – HVAC Controls

Domestic Water Heating System

The domestic hot water heating system consists of a gas fired storage tank water heater with an input rating of 150 MBH and a nominal efficiency of 80%. The water heater has an 80 gallon storage tank. This system provides the majority of the facility's domestic hot water needs. There are also instantaneous electric tankless water heaters that supply sinks in the kitchen and art classrooms. These units are of high efficiency and in good condition. The hand washing sinks throughout the building are already fit with low flow aerators.

Image 6 – Domestic Water Heating

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

Food Service & Laundry Equipment

The building has a kitchen that includes food prep equipment. There is also a washer and dryer on site. Equipment includes a gas fired oven and an electric under the counter dishwasher. The washer and dryer are only used sparingly. All equipment is in good condition.

Image 7 – Food Service and Laundry

Please see **Appendix A: Equipment Inventory & Recommendations** for an inventory of the facility's food service and laundry equipment.

Refrigeration

There are a number of stand up solid door refrigerators in the building. These are all in good condition and high efficiency.

Image 8 – Refrigeration

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

Building Plug Load

Plug loads in the building include general office and café equipment as well as entertainment equipment.

Image 9 – Building Plug Load

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

2.7 Water-Using Systems

There are restrooms throughout the facility and the sinks within them are all currently fit with low flow aerators.

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

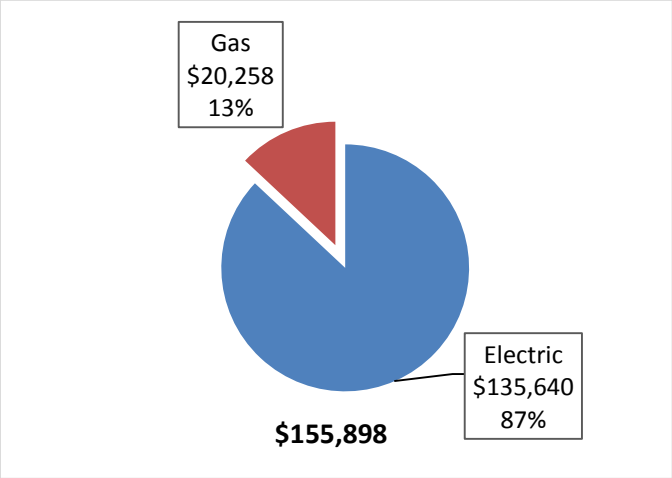
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 7 - Utility Summary

Utility Summary for Egg Harbor Township		
Fuel	**Usage**	**Cost**
Electricity	977,603 kWh	$135,640
Natural Gas	15,854 Therms	$20,258
Total		**$155,898**

The current annual energy cost for this facility is $155,898 as shown in the chart below.

Figure 8 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by Atlantic City Electric. The average electric cost over the past 12 months was $0.139/kWh, which is the 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 facility pays electrical demand charges. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 9 - Graph of 12 Months Electric Usage & Demand

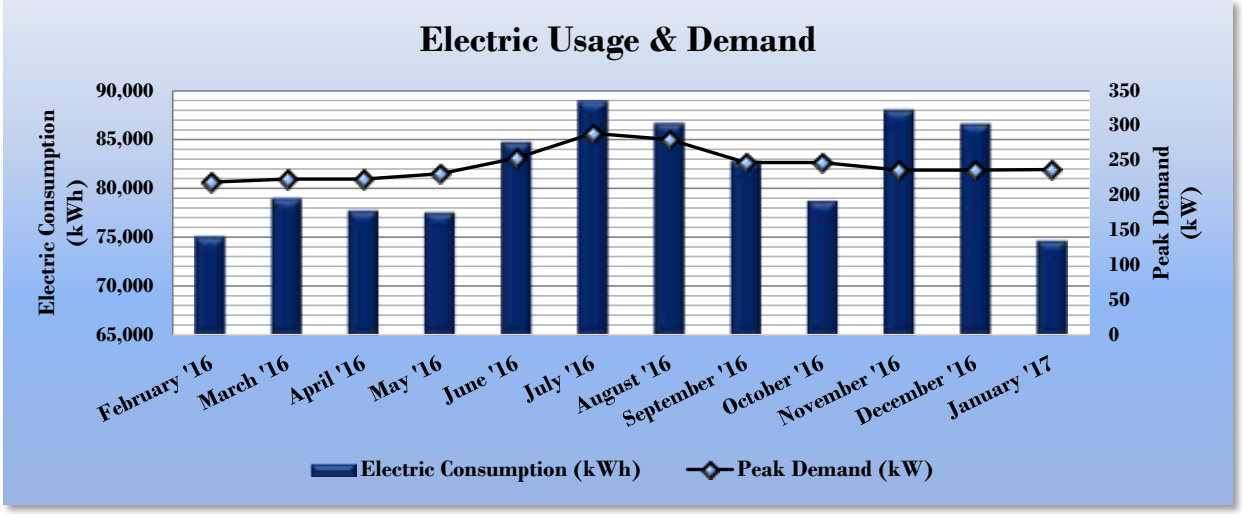


Figure 10 - Table of 12 Months Electric Usage & Demand

Electric Billing Data for Egg Harbor Township					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
3/14/16	34	75,080	219	$1,490	$10,180
4/12/16	29	78,960	223	$1,656	$10,846
5/10/16	28	77,720	223	$1,498	$10,438
6/10/16	31	77,520	231	$1,616	$10,585
7/13/16	33	84,720	254	$1,964	$11,902
8/12/16	30	88,920	289	$2,056	$12,426
9/12/16	31	86,640	280	$2,104	$12,267
10/12/16	30	82,760	247	$2,133	$11,562
11/9/16	28	78,721	247	$1,865	$10,807
12/9/16	30	88,000	236	$1,903	$12,060
1/10/17	32	86,600	236	$2,084	$12,265
2/9/17	30	74,640	237	$1,835	$10,673
Totals	**366**	**980,281**	**288.8**	**$22,204**	**$136,012**
Annual	**365**	**977,603**	**288.8**	**$22,144**	**$135,640**

3.3 Natural Gas Usage

Natural gas is provided by South Jersey Gas. The average gas cost for the past 12 months is $1.278/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below.

Figure 11 - Graph of 12 Months Natural Gas Usage

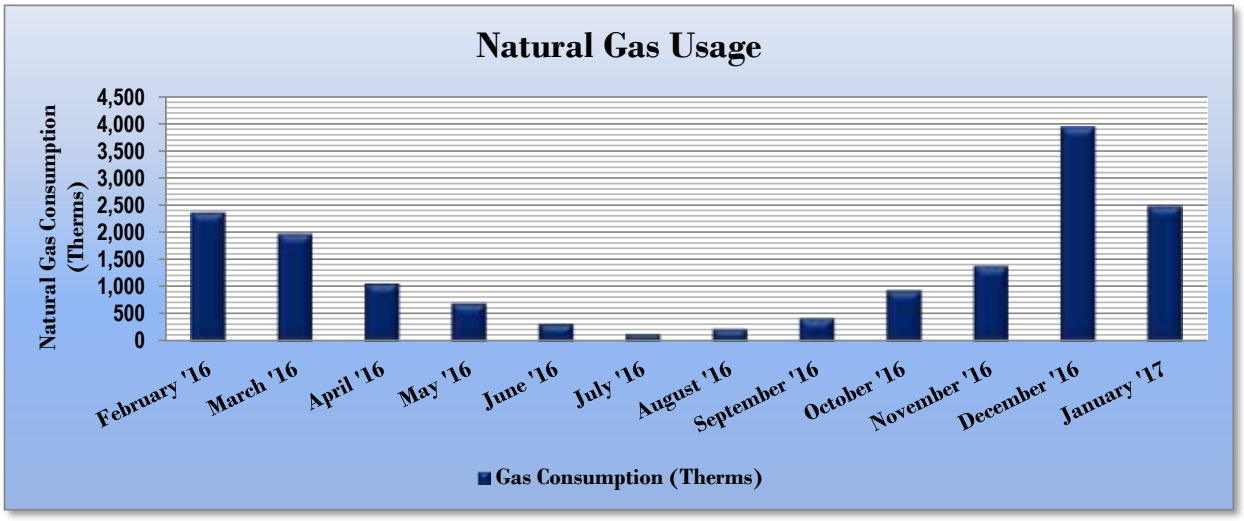


Figure 12 - Table of 12 Months Natural Gas Usage

Gas Billing Data for Egg Harbor Township			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
3/14/16	34	2,364	$2,692
4/12/16	29	1,970	$2,242
5/10/16	28	1,058	$1,192
6/10/16	31	695	$798
7/13/16	33	321	$388
8/12/16	30	126	$168
9/12/16	31	219	$271
10/12/16	30	415	$505
11/9/16	28	934	$1,155
12/9/16	30	1,378	$2,903
1/13/17	35	3,932	$4,446
2/9/17	27	2,486	$3,553
Totals	**366**	**15,898**	**$20,314**
Annual	**365**	**15,854**	**$20,258**

3.4 Benchmarking

This facility was benchmarked using *Portfolio Manager*, an online tool created and managed by the U.S. 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.

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

Figure 13 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Egg Harbor Township	National Median Building Type: Higher Education - Public
Source Energy Use Intensity (kBtu/ft^2)	214.4	262.6
Site Energy Use Intensity (kBtu/ft^2)	86.9	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 14 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

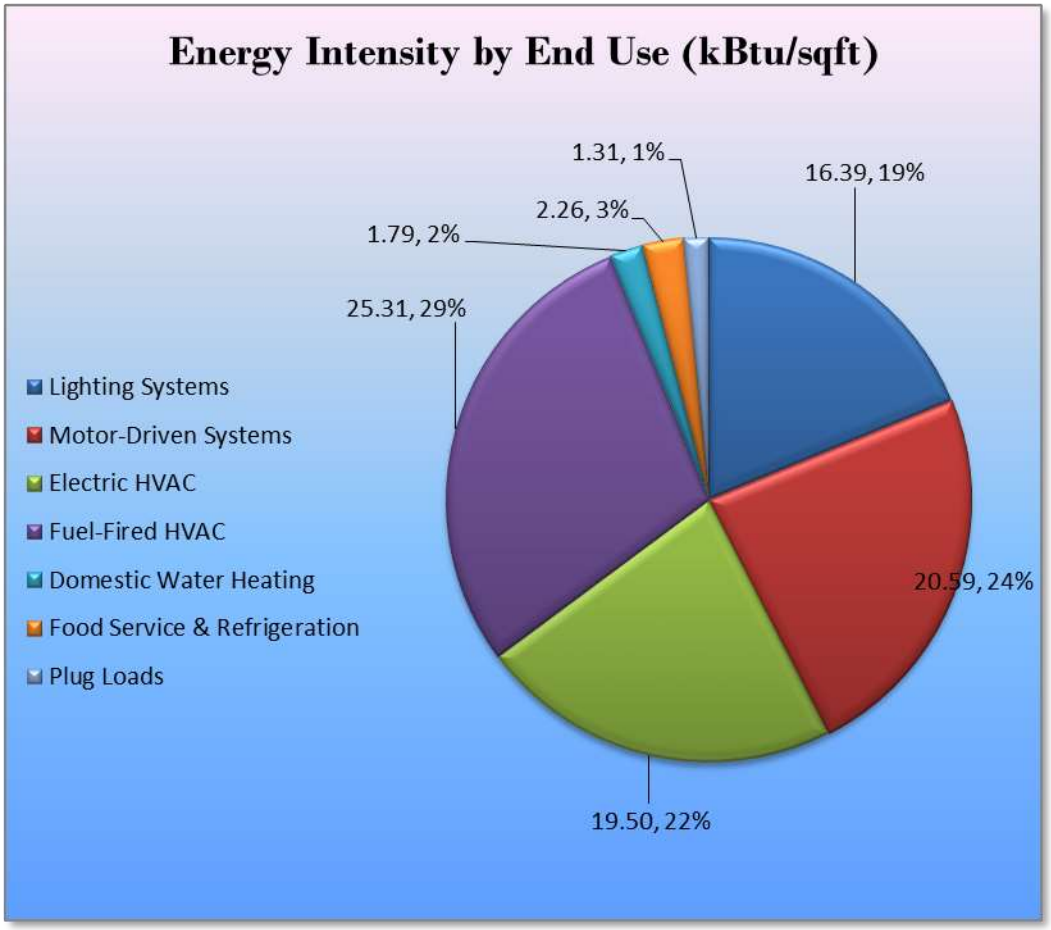
Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Egg Harbor Township	National Median Building Type: Higher Education - Public
Source Energy Use Intensity (kBtu/ft^2)	174.2	262.6
Site Energy Use Intensity (kBtu/ft^2)	69.6	130.7

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. Your building is not is one of the building categories that are eligible to receive a score.

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.

Figure 15 - 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 Egg Harbor Township regarding financial incentives for which they may qualify to implement the recommended measures. For this audit report, most measures have received only a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to demonstrate project cost-effectiveness and help prioritize energy measures. Savings are based on the New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016, approved by the New Jersey Board of Public Utilities. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances. A higher level of investigation may be necessary to support any custom SmartStart or Pay for Performance, or Direct Install incentive applications. Financial incentives for the ECMs identified in this report have been calculated based the NJCEP prescriptive SmartStart program. Some measures and proposed upgrade projects may be eligible for higher incentives than those shown below through other NJCEP programs as described in Section 8.

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 16 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**88,258**	**17.5**	**0.0**	**$12,245.57**	**$63,906.05**	**$10,455.00**	**$53,451.05**	**4.4**	**88,875**
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ECM 2	Retrofit Fixtures with LED Lamps	76,851	15.2	0.0	$10,662.94	$47,106.94	$6,155.00	$40,951.94	3.8	77,389
Lighting Control Measures		**16,576**	**3.5**	**0.0**	**$2,299.90**	**$18,820.00**	**$1,920.00**	**$16,900.00**	**7.3**	**16,692**
ECM 3	Install Occupancy Sensor Lighting Controls	12,652	3.0	0.0	$1,755.50	$14,620.00	$1,920.00	$12,700.00	7.2	12,741
ECM 4	Install High/Low Lighitng Controls	3,924	0.5	0.0	$544.41	$4,200.00	$0.00	$4,200.00	7.7	3,951
Custom Measures		**69,578**	**0.0**	**386.8**	**$14,596.63**	**$101,908.80**	**$0.00**	**$101,908.80**	**7.0**	**115,357**
ECM 5	Retro-Commissioning Study & HVAC Improvements	23,193	0.0	128.9	$4,865.54	$16,984.80	$0.00	$16,984.80	3.5	38,452
ECM 6	Installation of an Energy Management System	46,385	0.0	257.9	$9,731.08	$84,924.00	$0.00	$84,924.00	8.7	76,905
TOTALS		**174,412**	**21.0**	**386.8**	**$29,142.10**	**$184,634.85**	**$12,375.00**	**$172,259.85**	**5.9**	**220,924**

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

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

4.1.1 Lighting Upgrades

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

Figure 17 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**88,258**	**17.5**	**0.0**	**$12,245.57**	**$63,906.05**	**$10,455.00**	**$53,451.05**	**4.4**	**88,875**
ECM 1	Install LED Fixtures	11,407	2.3	0.0	$1,582.63	$16,799.11	$4,300.00	$12,499.11	7.9	11,486
ECM 2	Retrofit Fixtures with LED Lamps	76,851	15.2	0.0	$10,662.94	$47,106.94	$6,155.00	$40,951.94	3.8	77,389

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled. Please see **Appendix A: Equipment Inventory & Recommendations** for a detailed list of the locations and recommended upgrades for each lighting measure.

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	0.0	0
Exterior	11,407	2.6	0.0	$1,582.63	$16,799.11	$4,300.00	$12,499.11	7.9	11,486

Measure Description

We recommend replacing existing fixtures containing high pressure sodium and metal halide lamps with new high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output.

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	74,865	15.0	0.0	$10,387.37	$46,031.88	$6,155.00	$39,876.88	3.8	75,389
Exterior	1,986	0.2	0.0	$275.57	$1,075.06	$0.00	$1,075.06	3.9	2,000

Measure Description

We recommend retrofitting existing compact fluorescent, halogen incandescent and linear fluorescent T8 lamp fixtures with LED lamps. Many LED tube lamps are direct replacements for existing fluorescent lamps and can be installed while leaving the fluorescent fixture ballast in place. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

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

4.1.2 Lighting Control Measures

Figure 18 – Summary of Lighting Control ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**16,576**	**3.5**	**0.0**	**$2,299.90**	**$18,820.00**	**$1,920.00**	**$16,900.00**	**7.3**	**16,692**
ECM 3	Install Occupancy Sensor Lighting Controls	12,652	3.0	0.0	$1,755.50	$14,620.00	$1,920.00	$12,700.00	7.2	12,741
ECM 4	Install High/Low Lighitng Controls	3,924	0.5	0.0	$544.41	$4,200.00	$0.00	$4,200.00	7.7	3,951

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled. Please see **Appendix A: Equipment Inventory & Recommendations** for a detailed list of the locations and recommended lighting controls upgrades for each lighting measure.

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)
12,755	3.3	0.0	$1,769.66	$14,620.00	$1,920.00	$12,700.00	7.2	12,844

Measure Description

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

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

ECM 4: Install High/Low Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
3,924	0.5	0.0	$544.41	$4,200.00	$0.00	$4,200.00	7.7	3,951

Measure Description

We recommend installing occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons. Typical areas for such lighting control are hallways.

Lighting fixtures with these controls operate at default low levels when the area is not occupied to provide minimal lighting to meet security or safety requirements. Sensors detect occupancy using ultrasonic and/or infrared sensors. The lighting systems are switched to full lighting levels whenever an occupant is detected. Fixtures are automatically switched back to low level after an area has been vacant for a preset period of time. Energy savings results from only providing full lighting levels when it is required.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage needs to be provided to ensure that lights turn on in each area as an occupant approaches. Additional savings from reduced lighting maintenance may also result from this measure, due to reduced lamp operation.

4.1.3 Custom Measures

Additional custom measure energy saving opportunities are addressed in this section. Recommended custom measures are summarized in Figure 19 below.

Figure 19 - Summary of Custom 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)
Custom Measures		**69,578**	**0.0**	**386.8**	**$14,596.63**	**$101,908.80**	**$0.00**	**$101,908.80**	**7.0**	**115,357**
ECM 5	Retro-Commissioning Study & HVAC Improvements	23,193	0.0	128.9	$4,865.54	$16,984.80	$0.00	$16,984.80	3.5	38,452
ECM 6	Installation of an Energy Management System	46,385	0.0	257.9	$9,731.08	$84,924.00	$0.00	$84,924.00	8.7	76,905

ECM 5: Retro-Commissioning Study & HVAC Improvements

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)
23,193	0.0	128.9	$4,865.54	$16,984.80	$0.00	$16,984.80	3.5	38,452

Measure Description

Due to the complexity of today's HVAC systems and controls, it is likely for systems to be operating incorrectly or not as efficiently as they could be. Retro-commissioning studies reveal hidden deficiencies and highlights operational & maintenance (O&M) issues that could have been avoided as well as exposes hidden control system problems. Examples of areas to investigate include the following: areas with steam heating should be evaluated for the opportunity for steam trap replacements, and hot water heating systems should be evaluated for the opportunity of installing thermostatic radiator valves.

Some site specific examples are the following:

- The large HVAC units are currently not subject to automatic control, therefore, there are no temperature setbacks or regulation of outdoor air intake
- There are safety concerns and humidity issues that need to be addressed
- Compressors and motors require frequent replacement, which needs to be investigated
- Due to the lack of adequate control, there is simultaneous heating and cooling and a majority of the HVAC equipment cycles on and off continuously throughout the year
- The exhaust of the ERU-1 air handling unit is near the intake of that unit
- The ERU-5 exhaust fan variable frequency drive is not currently operational
- The heat wheel in one of the energy recovery units is not currently operational
- There are sensor problems associated with ERU-2. The exhaust fan motors reportedly burn out every winter due to the cycling.
- There are compressors which are not currently operational in one of the outdoor condensing units.

There are valuable benefits to retro-commissioning in existing buildings. It is a detailed and specialized process that reviews how an HVAC system is controlled and designed to operate. Applying retro-commissioning to existing facilities includes planning, discovering root causes of inefficiencies, development of a cost-effective project delivery and a focus on optimizing value to the building owner. The study includes functional system testing under various modes, such as heating or cooling, occupied and unoccupied modes, and variance in outside air and space temperatures. This is a systematic process to ensure that the building energy systems perform interactively according to the original design intent and the current operational needs of the facility.

Retro-commissioning is a common practice recommended by the American Society of Heating Refrigeration and Energy (ASHRAE) to be revisited every couple of years. We recommend that an engineering firm who specializes in energy control systems and retro-commissioning be contacted for a detailed evaluation and implementation costs. Facility operations personnel would work with the engineers to develop goals and objectives. During on site testing, the qualified personnel conducting the

study would immediately make any no/low-cost improvements as identified. Furthermore, any suggested corrective actions which require the purchase of material, a contractor who specializes in that scope of work would be contacted to implement the remaining improvements. For the purposes of this report, the potential energy savings and measure costs were estimated to demonstrate the cost effectiveness of this measure and promote moving forward.

Please see **Appendix A: Equipment Inventory & Recommendations** for more details on existing equipment and proposed measures.

ECM 6: Troubleshooting, Upgrading, and Programming a Building Energy Management System

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)
46,385	0.0	257.9	$9,731.08	$84,924.00	$0.00	$84,924.00	8.7	76,905

Measure Description

The HVAC systems and equipment are of major concern for the facility. A Honeywell Building Energy Management System (BEMS) was installed but according to staff, the system functionality does not meet the current operating requirements of the facility. This is a major issue relating to both excessive energy consumption and indoor air quality with impacts to both operations and maintenance.

The installation or upgrade of a Building Energy Management System (BEMS) increases the efficiency of the building HVAC system operation. Upgrade of controls to optimize the start/stop of all key HVAC equipment, tying in all space temperature controls will minimize the amount of waste energy. Schedules may be put in place to limit system operation when the building is closed. Temperature set back controls may be applied to operate systems only to the point necessary. Ventilation and economizer controls and programming would allow air handling units to operate according to room schedules, occupancy and availability for “free cooling” or “free heating”. We recommend that an HVAC contractor who specializes in energy management systems be contacted for a detailed evaluation and implementation costs.

Please see **Appendix A: Equipment Inventory & Recommendations** for more details on existing equipment and proposed measures.

5 ENERGY EFFICIENT PRACTICES

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

Reduce Air Leakage

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

Close Doors and Windows

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

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Perform Routine Motor Maintenance

Motors consist of many moving parts whose collective degradation can contribute to a significant loss of motor efficiency. In order to prevent damage to motor components, routine maintenance should be performed. This maintenance consists of cleaning surfaces and ventilation openings on motors to prevent overheating, lubricating moving parts to reduce friction, inspecting belts and pulleys for wear and to ensure they are at proper alignment and tension, and cleaning and lubricating bearings. Consult a licensed technician to assess these and other motor maintenance strategies.

Use Fans to Reduce Cooling Load

Utilizing ceiling fans to supplement cooling is a low cost strategy to reduce cooling load considerably. Thermostat settings can be increased by 4°F with no change in overall occupant comfort when the wind chill effect of moving air is employed for cooling.

Install Destratification Fans

Allowing air to thermally stratify in spaces with high ceilings results in additional energy consumption by requiring the heating system to heat a volume of space much larger than the actual occupied space. Additional inefficiencies also occur because there are higher temperatures at the ceiling level than at the floor level. Higher temperatures at the ceiling accelerate heat loss through the roof, requiring additional energy consumption by the heating equipment in order to compensate for the accelerated heat transfer.

Destratification fans are specially designed to deliver a columnar, laminar flow of air balancing the air temperature from floor to ceiling. In addition to fuel savings, the use of destratification fans will reduce the recovery time necessary to warm the space after nightly temperature setbacks and will increase the comfort level of the occupants.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Perform Proper Furnace Maintenance

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

Perform Proper Water Heater Maintenance

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

components on the tank. For water heaters over three 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 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.

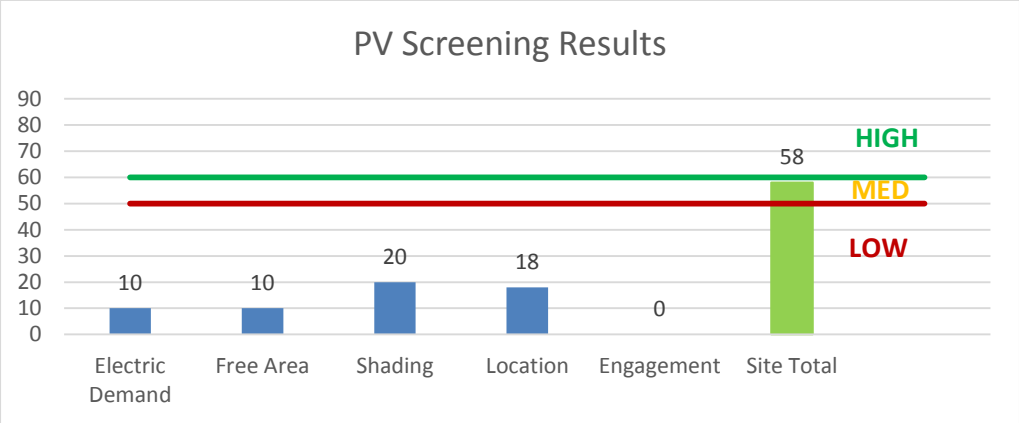
6.1 Photovoltaic

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

The amount of free area, ease of installation (location), and the lack of shading elements contribute to the Medium potential for PV at the site. A PV array located on the roof of the main building/ground next to the building/over the main parking lot may be feasible. If Egg Harbor Township is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 20 - Photovoltaic Screening



Potential	Medium	
System Potential	97	kW DC STC
Electric Generation	115,563	kWh/yr
Displaced Cost	$10,050	/yr
Installed Cost	$252,200	

Solar projects must register their projects in the SREC Registration Program prior to the start of construction in order to establish the project's eligibility to earn SRECs. Registration of the intent to participate in New Jersey's solar marketplace provides market participants with information about developed new solar projects and insight into future SREC pricing. Refer to Section 8.6 for additional information.

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

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

6.2 Combined Heat and Power

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

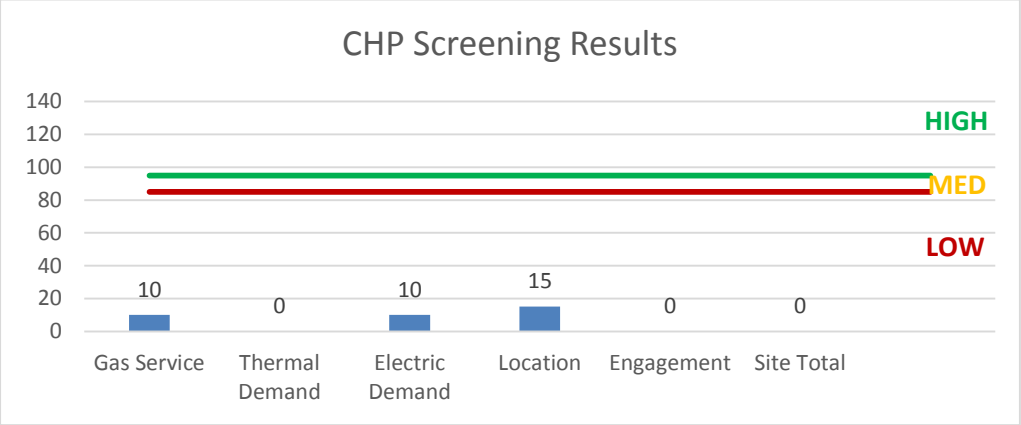
CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste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

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

Lack of gas service, low or infrequent thermal load, and lack of space near the existing boilers are the most significant factors contributing to the **Low** potential for CHP at the site. In our opinion, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation.

For a list of qualified firms in New Jersey specializing in commercial CHP cost assessment and installation, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/

Figure 21 - Combined Heat and Power Screening



Please see Section **Error! Reference source not found.** for additional information in the Combined Heat Power and Fuel Cell Program.

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 (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 (www.pjm.com/training/trainingmaterial.aspx), along with a variety of other DR program information.

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

In our opinion this building does not appear to be a good candidate for the demand response program.

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

Figure 22 - 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	Install LED Fixtures	x					
ECM 2	Retrofit Fixtures with LED Lamps	x					
ECM 3	Install Occupancy Sensor Lighting Controls	x					
ECM 4	Install High/Low Lighitng Controls						
ECM 5	Retro-Commissioning Study & HVAC Improvements						
ECM 6	Installation of an Energy Management System						

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

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

How to Participate

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

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

8.2 SREC Registration Program

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

After the registration is accepted, construction is complete, and final paperwork has been submitted and is deemed complete, the project is issued a New Jersey certification number which enables it to generate

New Jersey SRECs. SREC's are generated once the solar project has been authorized to be energized by the Electric Distribution Company (EDC).

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

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

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

8.3 Energy Savings Improvement Program

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

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

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

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

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

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
Activity Room 113	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,000	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,100	0.51	2,120	0.0	$294.21	$1,022.00	$185.00	2.84
Activity Room 113	6	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	3,000	Relamp	Yes	6	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,100	0.19	791	0.0	$109.78	$649.20	$35.00	5.59
Activity Room 113	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,100	0.10	424	0.0	$58.84	$445.50	$65.00	6.47
Vestibule/Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	5,616	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	3,931	0.41	3,176	0.0	$440.60	$801.60	$120.00	1.55
Activity Room 112	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,000	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,100	0.46	1,908	0.0	$264.79	$946.80	$170.00	2.93
Activity Room 112	3	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,000	Relamp	Yes	3	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,100	0.10	424	0.0	$58.84	$445.50	$65.00	6.47
Activity Room 111	4	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	3,000	Relamp	Yes	4	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,100	0.13	527	0.0	$73.19	$522.80	$35.00	6.67
Activity Room 111	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,000	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,100	0.51	2,120	0.0	$294.21	$1,022.00	$185.00	2.84
Activity Room 116	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,000	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,100	0.81	3,393	0.0	$470.73	$1,473.20	$275.00	2.55
Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	5,616	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	3,931	0.41	3,176	0.0	$440.60	$801.60	$120.00	1.55
Hallway	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	5,616	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	3,931	0.41	3,176	0.0	$440.60	$801.60	$120.00	1.55
Storage 115	12	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	500	Relamp	Yes	12	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	350	0.72	498	0.0	$69.05	$1,411.60	$275.00	16.46
Activity Room 109	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,000	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,100	0.41	1,696	0.0	$235.37	$871.60	$155.00	3.04
Activity Room 109	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,000	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,100	0.27	1,131	0.0	$156.91	$738.00	$115.00	3.97
Activity Room 117	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,000	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,100	0.15	636	0.0	$88.26	$495.60	$80.00	4.71
Activity Room 117	7	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	3,000	Relamp	Yes	7	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	2,100	0.09	384	0.0	$53.34	$868.54	$20.00	15.91
Activity Room 117	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,000	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,100	0.27	1,131	0.0	$156.91	$738.00	$115.00	3.97
Activity Room 108	6	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	3,000	Relamp	No	6	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	3,000	0.06	244	0.0	$33.87	$645.04	$0.00	19.05
Activity Room 108	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,000	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,100	0.27	1,131	0.0	$156.91	$738.00	$115.00	3.97
Activity Room 118	11	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,000	Relamp	Yes	11	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,100	0.56	2,332	0.0	$323.63	$1,097.20	$200.00	2.77
Activity Room 118	1	U-Bend Fluorescent - T8: U T8 (32W) - 2L	Wall Switch	62	3,000	Relamp	Yes	1	LED - Linear Tubes: (2) U-Lamp	Occupancy Sensor	33	2,100	0.03	132	0.0	$18.30	$63.20	$35.00	1.54
Storage 119	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	500	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	350	0.41	283	0.0	$39.23	$871.60	$155.00	18.27
Meeting Rooom 120	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.46	1,272	0.0	$176.52	$946.80	$170.00	4.40
Office 104	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,540	0.41	1,244	0.0	$172.60	$871.60	$155.00	4.15

	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
Office 105	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,540	0.20	622	0.0	$86.30	$570.80	$95.00	5.51
Office 106	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,540	0.20	622	0.0	$86.30	$570.80	$95.00	5.51
Storage	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	500	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	350	0.41	283	0.0	$39.23	$871.60	$155.00	18.27
Lobby	16	Compact Fluorescent: Pendant Mount	Wall Switch	42	5,616	Relamp	Yes	16	LED Screw-In Lamps: Plug in Lamps	High/Low Control	18	3,931	0.38	2,985	0.0	$414.19	$1,260.05	$0.00	3.04
Lobby	2	Compact Fluorescent: Wall Mount	Wall Switch	32	5,616	Relamp	No	2	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	5,616	0.03	228	0.0	$31.70	$107.51	$0.00	3.39
Lobby	10	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	5,616	Relamp	Yes	10	LED - Linear Tubes: (2) 4' Lamps	High/Low Control	29	3,931	0.34	2,646	0.0	$367.17	$985.00	$100.00	2.41
Women's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.05	247	0.0	$34.32	$75.20	$50.00	0.73
Women's Restroom	14	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	3,500	Relamp	Yes	14	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	2,450	0.18	897	0.0	$124.46	$1,621.08	$20.00	12.86
Men's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	1	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.05	247	0.0	$34.32	$75.20	$50.00	0.73
Men's Restroom	14	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	3,500	Relamp	Yes	14	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	2,450	0.18	897	0.0	$124.46	$1,621.08	$20.00	12.86
Mechanical Closet	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	500	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	500	0.05	32	0.0	$4.39	$95.13	$20.00	17.11
Hallway	11	Compact Fluorescent: Pendant Mount	Wall Switch	42	5,616	Relamp	Yes	11	LED Screw-In Lamps: Plug in Lamps	High/Low Control	18	3,931	0.26	2,052	0.0	$284.76	$991.28	$0.00	3.48
Hallway	1	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	5,616	Relamp	No	1	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	5,616	0.01	76	0.0	$10.57	$107.51	$0.00	10.17
Stage	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	5,616	None	No	4	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	5,616	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	500	Relamp	Yes	4	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	350	0.14	94	0.0	$13.08	$504.00	$75.00	32.81
Ramp	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	5,616	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	5,616	0.05	355	0.0	$49.31	$95.13	$20.00	1.52
Multipurpose Room	28	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	5,616	None	No	28	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	5,616	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	5,616	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	3,931	0.46	3,573	0.0	$495.68	$946.80	$170.00	1.57
Office	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,000	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,400	0.10	283	0.0	$39.23	$420.40	$65.00	9.06
Hallway	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	5,616	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	3,931	0.10	794	0.0	$110.15	$350.40	$30.00	2.91
Men's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,500	0.04	196	0.0	$27.16	$75.20	$15.00	2.22
Women's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	No	1	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	3,500	0.04	196	0.0	$27.16	$75.20	$15.00	2.22
Control Room	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.10	495	0.0	$68.65	$420.40	$65.00	5.18
Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,000	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	700	0.31	424	0.0	$58.84	$721.20	$125.00	10.13

	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
Storage	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,000	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	700	0.20	283	0.0	$39.23	$570.80	$95.00	12.13
Storage	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,000	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,000	0.05	63	0.0	$8.78	$95.13	$20.00	8.56
Vestibule/Hallway	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	5,616	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	High/Low Control	44	3,931	0.20	1,588	0.0	$220.30	$500.80	$60.00	2.00
Mechanical Room	8	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	1,000	Relamp	No	8	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	1,000	0.36	506	0.0	$70.24	$761.07	$160.00	8.56
Aux Gym	21	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	5,616	None	No	21	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	5,616	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	9	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,000	Relamp	Yes	9	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	700	0.46	636	0.0	$88.26	$946.80	$170.00	8.80
Mechanical Mezz	14	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	5,616	Relamp	No	14	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	5,616	0.64	4,975	0.0	$690.32	$1,331.87	$280.00	1.52
Main Gym Entry	1	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	5,616	Relamp	No	1	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	5,616	0.01	76	0.0	$10.57	$107.51	$0.00	10.17
Main Gym Entry	44	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	5,616	None	No	44	Linear Fluorescent - T5HO: 4' T5HO (54W) - 4L	Wall Switch	234	5,616	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	1,000	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	700	0.31	424	0.0	$58.84	$721.20	$125.00	10.13
Women's Restroom	11	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	5,616	Relamp	Yes	11	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	3,931	0.14	1,131	0.0	$156.91	$1,298.57	$20.00	8.15
Office	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,540	0.15	466	0.0	$64.73	$495.60	$80.00	6.42
Men's Restroom	7	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	3,500	Relamp	Yes	7	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	2,450	0.09	448	0.0	$62.23	$868.54	$20.00	13.64
Hallway	14	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	5,616	Relamp	Yes	14	LED Screw-In Lamps: Plug in Lamps	High/Low Control	14	3,931	0.18	1,439	0.0	$199.70	$1,905.08	$0.00	9.54
Hallway	49	Halogen Incandescent: Track Lighting	Wall Switch	50	5,616	Relamp	Yes	49	LED Screw-In Lamps: MR16/Track	High/Low Control	7	3,931	1.80	14,024	0.0	$1,945.83	$4,954.20	$245.00	2.42
Office 166	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,540	0.41	1,244	0.0	$172.60	$871.60	$155.00	4.15
Office 168	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,540	0.10	311	0.0	$43.15	$420.40	$65.00	8.24
Water Service	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,200	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	2,200	0.05	139	0.0	$19.32	$95.13	$20.00	3.89
Office 167	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,540	0.15	466	0.0	$64.73	$495.60	$80.00	6.42
Costume Room 147	12	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	Yes	12	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,540	0.61	1,866	0.0	$258.90	$1,172.40	$215.00	3.70
Drama 165	8	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	Yes	8	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,540	0.41	1,244	0.0	$172.60	$871.60	$155.00	4.15
Art Studio 164	6	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	6	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.31	1,484	0.0	$205.94	$721.20	$125.00	2.89
Art Studio 164	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,500	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,450	0.27	1,319	0.0	$183.06	$738.00	$115.00	3.40
Music Voice Room	3	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	2,200	Relamp	No	3	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	2,200	0.03	89	0.0	$12.42	$322.52	$0.00	25.97

	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
Practice Rooms	12	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	2,200	Relamp	Yes	12	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	1,540	0.16	483	0.0	$67.05	$1,560.07	$35.00	22.74
Changing 154	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,200	Relamp	Yes	3	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	1,540	0.15	466	0.0	$64.73	$495.60	$80.00	6.42
Dance Studio 155	14	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	14	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.71	3,463	0.0	$480.54	$1,322.80	$245.00	2.24
Dance Studio 155	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,500	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,450	0.27	1,319	0.0	$183.06	$738.00	$115.00	3.40
Art Studio 162	2	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	2	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.10	495	0.0	$68.65	$420.40	$65.00	5.18
Art Studio 162	8	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,500	Relamp	Yes	8	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,450	0.27	1,319	0.0	$183.06	$738.00	$115.00	3.40
Art Studio 161	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.20	990	0.0	$137.30	$570.80	$95.00	3.47
Stage	15	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,200	None	No	15	Linear Fluorescent - T5: 4' T5 (28W) - 2L	Wall Switch	60	2,200	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Hallway	6	Compact Fluorescent: Plug in Lamps Recessed Can	Wall Switch	26	5,616	Relamp	No	6	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	5,616	0.06	457	0.0	$63.40	$645.04	$0.00	10.17
Dance Studio 160	15	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	15	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.76	3,711	0.0	$514.86	$1,398.00	$260.00	2.21
Dance Studio 160	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,450	0.20	990	0.0	$137.30	$621.00	$95.00	3.83
Changing 159	4	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	4	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.20	990	0.0	$137.30	$570.80	$95.00	3.47
Dance Studio 158	16	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	16	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.81	3,958	0.0	$549.19	$1,473.20	$275.00	2.18
Dance Studio 158	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	3,500	Relamp	Yes	6	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	2,450	0.20	990	0.0	$137.30	$621.00	$95.00	3.83
Drama 156	10	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	3,500	Relamp	Yes	10	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,450	0.51	2,474	0.0	$343.24	$1,022.00	$185.00	2.44
Transition Spaces	20	Exit Signs: LED - 2 W Lamp	None	6	8,760	None	No	20	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Parking Lot	23	Metal Halide: (1) 100W Lamp	None	128	3,500	Fixture Replacement	No	23	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	45	3,500	1.55	7,550	0.0	$1,047.56	$8,985.57	$2,300.00	6.38
Building Mounted	10	High-Pressure Sodium: (1) 100W Lamp	None	138	3,500	Fixture Replacement	No	10	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	45	3,500	0.76	3,678	0.0	$510.34	$3,906.77	$1,000.00	5.70
Building Mounted	6	High-Pressure Sodium: (1) 70W Lamp	None	95	3,500	Fixture Replacement	No	6	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	25	3,500	0.34	1,661	0.0	$230.47	$2,344.06	$600.00	7.57
Building Mounted	4	High-Pressure Sodium: (1) 100W Lamp	None	138	0	Fixture Replacement	No	4	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	45	0	0.30	0	0.0	$0.00	$1,562.71	$400.00	0.00
Door Canopy	3	Compact Fluorescent: Plug in Lamp Surface Mounted	None	13	3,500	Relamp	No	3	LED Screw-In Lamps: Plug in Lamps	None	7	3,500	0.01	71	0.0	$9.88	$161.26	$0.00	16.33
Entrance	9	Compact Fluorescent: Plug in Lamp Wall Mounted	None	32	8,760	Relamp	Yes	9	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	6,132	0.16	1,978	0.0	$274.41	$753.78	$35.00	2.62
Entrance	8	Compact Fluorescent: Plug in Lamp Surface Mounted	None	32	3,500	Relamp	Yes	8	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	2,450	0.14	702	0.0	$97.46	$700.02	$35.00	6.82

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
Mechanical	Mechanical	1	Supply Fan	0.1	72.0%	No	4,000	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Activity Wing	1	Supply Fan	20.0	90.0%	Yes	4,000	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Art Wing	1	Supply Fan	20.0	90.0%	Yes	4,000	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Multipurpose Room	1	Supply Fan	15.0	90.0%	Yes	4,000	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	All Purpose Room	1	Supply Fan	15.0	90.0%	Yes	4,000	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Activity Wing	1	Exhaust Fan	15.0	90.0%	Yes	3,391	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Art Wing	1	Exhaust Fan	15.0	90.0%	Yes	3,391	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Multipurpose Room	1	Exhaust Fan	7.5	90.0%	Yes	3,391	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	All Purpose Room	1	Exhaust Fan	2.0	90.0%	Yes	2,745	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Activity Wing	1	Other	0.3	72.0%	No	2,745	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Art Wing	1	Other	0.3	72.0%	No	2,745	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Multipurpose Room	1	Other	0.5	72.0%	No	2,745	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	All Purpose Room	1	Other	0.3	72.0%	No	2,745	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lobby	Lobby	1	Supply Fan	0.8	72.0%	No	6,000	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lobby	Lobby	1	Supply Fan	0.8	72.0%	No	6,000	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Central Corridor	Central Corridor	1	Supply Fan	0.8	72.0%	No	6,000	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHU	Wrestling	1	Supply Fan	15.0	90.0%	No	6,000	No	90.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHU	Wrestling	1	Return Fan	3.0	85.0%	No	4,000	No	85.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Building Exhaust	Restrooms and Janitors	3	Exhaust Fan	0.3	72.0%	No	4,000	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Building Exhaust	Restrooms and Janitors	3	Exhaust Fan	0.2	60.0%	No	4,000	No	60.0%	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
Building Exhaust	Restrooms and Janitors	3	Exhaust Fan	0.1	72.0%	No	4,000	No	72.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Building Exhaust	Kitchen Hood	1	Exhaust Fan	1.5	85.0%	No	2,745	No	85.0%	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
Entryways	Entryways	3	Electric Resistance Heat		10.26	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Storage	Storage	1	Electric Resistance Heat		17.00	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Activity Wing	1	Packaged AC	41.67		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Art Wing	1	Packaged AC	34.42		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Multipurpose Room	1	Split-System AC	50.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	All Purpose Room	1	Split-System AC	50.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lobby	Lobby	1	Packaged AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lobby	Lobby	1	Packaged AC	4.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Central Corridor	Central Corridor	1	Packaged AC	3.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHU	Wrestling	1	Packaged AC	25.00		No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Electric Heat	Variable Air Volume Terminals	15	Electric Resistance Heat		17.07	No							No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Electric Heat	Variable Air Volume Terminals	15	Electric Resistance Heat		13.65	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
Mechanical	Mechanical	1	Warm Air Unit Heater	62.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Activity Wing	1	Furnace	412.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Art Wing	1	Furnace	362.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	Multipurpose Room	1	Furnace	362.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
ERU	All Purpose Room	1	Furnace	297.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lobby	Lobby	1	Furnace	93.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Lobby	Lobby	1	Furnace	93.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Central Corridor	Central Corridor	1	Furnace	93.00	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
AHU	Wrestling	1	Furnace	300.00	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
Various	Various	2	Tankless Water Heater	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Parks & Recreation	Parks & Recreation	1	Storage Tank Water Heater (> 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	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
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Kitchen	1	Stand-Up Freezer, Solid Door (≤15 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Cooking Equipment Inventory & Recommendations

	Existing Conditions			Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	High Efficiency Equipement?	Install High Efficiency Equipment?	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
Kitchen	1	Gas Convection Oven (Full Size)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Dishwasher Inventory & Recommendations

	Existing Conditions					Proposed Conditions	Energy Impact & Financial Analysis						
Location	Quantity	Dishwasher Type	Water Heater Fuel Type	Booster Heater Fuel Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Payback w/ Incentives in Years
Kitchen	1	Under Counter (Low Temp)	Electric	None	Yes	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?
Community Center	10	Computer	100.0	
Community Center	4	Printer	250.0	
Community Center	2	Large Speakers	500.0	
Community Center	4	TV	90.0	
Community Center	1	Mini Fridge	260.0	
Community Center	3	Fans	100.0	
Community Center	1	Microwave	1,500.0	
Community Center	4	Toaster	900.0	
Community Center	1	Coffee Maker	1,700.0	
Community Center	29	Speakers	250.0	
Community Center	1	Clothes Washer/Dryer	3,500.0	
Community Center	1	Buffet Table	1,500.0	

Custom Recommendations

Retro-Commissioning Study & HVAC Improvements

Existing Conditions			Proposed Conditions			Energy Impact & Financial Analysis				
Annual Electric HVAC Energy Use (kWh)	*Annual Heating Energy Use (mmBtu)*	*Annual Fan Energy Use (kWh)*	Assumed % Cooling Savings	Assumed % Heating Savings	Assumed % Motor Savings	Total Annual kWh Savings	Total Annual mmBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Simple Payback Period (Years)
323,593	1,432.7	341,631	4%	9%	3%	23,193	129	$4,866	$16,985	3.49

Equations: (Based on Industry Standards)
Average Cost for retro-commissioining studies and control improvements is $0.30/sqft
Energy savings range between 5% and 20% with a typical payback of two years or less
Based on a comprehensive study by the Environmental Protection Agency, the value of energy savings range from $0.11 and $0.72/sqft
Issues to be Corrected: Heat Wheel Broken in some units, Manual Dial Thermostats, Hardware in place but controls not implemented
http://what-when-how.com/energy-engineering/heat-and-energy-wheels/

Installation of an Energy Management System

Existing Conditions			Proposed Conditions			Energy Impact & Financial Analysis				
Annual Electric HVAC Energy Use (kWh)	*Annual Heating Energy Use (mmBtu)*	*Annual Fan Energy Use (kWh)*	Assumed % Cooling Savings	Assumed % Heating Savings	Assumed % Motor Savings	Total Annual kWh Savings	Total Annual mmBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Simple Payback Period (Years)
323,593	1,432.7	341,631	8%	18%	6%	46,385	258	$9,731	$84,924	8.73

Equations: (Based on Industry Standards)
Average Cost for EMS installation is $1.50/sqft
Energy savings range between 10% and 30%