



Local Government Energy Audit: Energy Audit Report



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Regional Medical Examiner

State of New Jersey Division
of Law and Public Safety
(NJ-LPS)

325 Norfolk Street
Newark, NJ 07103

September 13, 2018

Final Report by:
TRC Energy Services

Disclaimer

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

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

Estimated installation costs are based on TRC's experience at similar facilities, pricing from local contractors and vendors, and/or cost estimates from *RS Means*. The owner of the facility is encouraged to independently confirm these cost estimates and to obtain multiple estimates when considering measure installations. Since actual installed costs can vary widely for certain measures and conditions, TRC and NJBPU do not guarantee installed cost estimates and shall in no event be held liable should actual installed costs vary from estimates.

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

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I EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for State of New Jersey Division of Law and Public Safety (NJ-LPS).

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

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to assist New Jersey local and state governments in controlling energy costs and protecting our environment by cutting greenhouse gas emissions by offering a full spectrum of building level energy management options. Both the Critical Infrastructure Replacement Study performed by EI Associates, and the HVAC Study Phase Initial Report were used in conjunction with onsite data collection to develop this Energy Audit. This is a second revision of the audit which includes additional Energy Conservation Measures that address specific requests from NJ-LPS.

I.1 Facility Summary

State of New Jersey Division of Law and Public Safety's (NJ-LPS) Regional Medical Examiner office is a 33,000 square foot facility comprised of various space types.

The first floor is a mix of office space, public space, and a morgue. The main energy consuming system on the first floor is related to the operation of the morgue. The autopsy and forensic analysis area operates similar to a hospital with some process equipment. A robust refrigeration system is required for storage. The morgue area is currently mixing air with the front of the building administration space.



The second floor consists of office and lab space with a large mechanical room. There is process equipment used in the labs, and also ventilation hoods as part of those processes.

The lighting system is predominantly an antiquated T12 system with manual controls.

The heating ventilation and air conditioning (HVAC) system is a mix of direct expansion packaged units on the roof and side of the building, and built up air handlers with a chiller and boiler. The systems generally are operated with thermostats.

The building shell consists of brick and concrete with sealed single and double pane windows. The roof is sealed rubber with a mixed stone covering.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated 15 measures which represent an opportunity for State of New Jersey Division of Law and Public Safety (NJ-LPS) to reduce annual energy costs by roughly \$43,878 and annual greenhouse gas emissions by 569,887 lbs CO₂e. The measures would pay for themselves in roughly 20.2 years. The breakdown of existing and potential utility costs is illustrated in Figure 1 and Figure 2, respectively. These projects represent an opportunity to reduce State of New Jersey Division of Law and Public Safety (NJ-LPS)'s annual energy use by 34.1%.

Figure 1 – Previous 12 Month Utility Costs

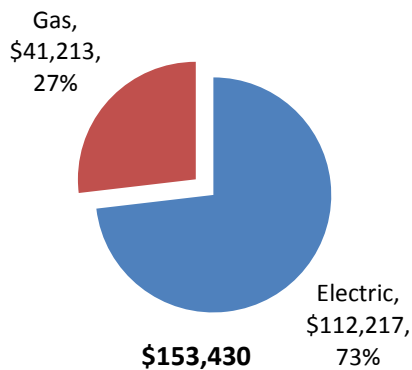
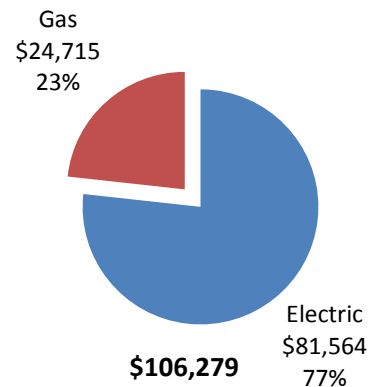


Figure 2 – Potential Post-Implementation Costs



A detailed description of State of New Jersey Division of Law and Public Safety (NJ-LPS)'s existing energy use can be found in Section 3.

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

Figure 3 – Summary of Energy Reduction Opportunities

| Energy Conservation Measure | | Recommend? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated Install Cost (\$) | Estimated Incentive (\$)* | Estimated Net Cost (\$) | Simple Payback Period (yrs)** | CO ₂ e Emissions Reduction (lbs) |
|--|--|------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|---------------------------|-------------------------|-------------------------------|---|
| Lighting Upgrades | | | 170,590 | 24.3 | 0.0 | \$15,460.08 | \$180,545.93 | \$18,575.00 | \$161,970.93 | 10.48 | 171,783 |
| ECM 1 | Install LED Fixtures | Yes | 147,370 | 21.5 | 0.0 | \$13,355.67 | \$174,884.07 | \$18,055.00 | \$156,829.07 | 11.74 | 148,400 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 23,221 | 2.9 | 0.0 | \$2,104.41 | \$5,661.86 | \$520.00 | \$5,141.86 | 2.44 | 23,383 |
| Motor Upgrades | | | 44,635 | 11.0 | 0.0 | \$4,045.12 | \$31,472.88 | \$0.00 | \$31,472.88 | 7.78 | 44,947 |
| ECM 3 | Premium Efficiency Motors | Yes | 44,635 | 11.0 | 0.0 | \$4,045.12 | \$31,472.88 | \$0.00 | \$31,472.88 | 7.78 | 44,947 |
| Variable Frequency Drive (VFD) Measures | | | 18,267 | 4.3 | 0.0 | \$1,655.46 | \$9,184.16 | \$920.00 | \$8,264.16 | 4.99 | 18,394 |
| ECM 4 | Install VFDs on Constant Volume (CV) HVAC | Yes | 18,267 | 4.3 | 0.0 | \$1,655.46 | \$9,184.16 | \$920.00 | \$8,264.16 | 4.99 | 18,394 |
| Electric Unitary HVAC Measures | | | 8,146 | 1.8 | 0.0 | \$738.20 | \$20,907.75 | \$1,185.00 | \$19,722.75 | 26.72 | 8,202 |
| ECM 5 | Install High Efficiency Electric AC | Yes | 8,146 | 1.8 | 0.0 | \$738.20 | \$20,907.75 | \$1,185.00 | \$19,722.75 | 26.72 | 8,202 |
| Gas Heating (HVAC/Process) Replacement | | | 0 | 0.0 | 724.4 | \$6,103.27 | \$80,217.15 | \$9,240.00 | \$70,977.15 | 11.63 | 84,821 |
| ECM 6 | Install High Efficiency Hot Water Boilers | Yes | 0 | 0.0 | 724.4 | \$6,103.27 | \$80,217.15 | \$9,240.00 | \$70,977.15 | 11.63 | 84,821 |
| HVAC System Improvements | | | 26,359 | 2.9 | 285.6 | \$4,795.02 | \$288,194.80 | \$0.00 | \$288,194.80 | 60.10 | 59,984 |
| ECM 7 | Install Programmable Thermostats | Yes | 13,340 | 0.0 | 285.6 | \$3,615.17 | \$13,194.80 | \$0.00 | \$13,194.80 | 3.65 | 46,874 |
| ECM 8 | Partition Morgue Area HVAC Controls | Yes | 13,019 | 2.9 | 0.0 | \$1,179.85 | \$275,000.00 | \$0.00 | \$275,000.00 | 233.08 | 13,110 |
| Domestic Water Heating Upgrade | | | 0 | 0.0 | 138.7 | \$1,168.14 | \$27,050.42 | \$796.00 | \$26,254.42 | 22.48 | 16,234 |
| ECM 9 | Install High Efficiency Gas Water Heater | Yes | 0 | 0.0 | 22.1 | \$186.24 | \$23,000.42 | \$796.00 | \$22,204.42 | 119.23 | 2,588 |
| ECM 10 | Install Low-Flow Domestic Hot Water Devices | Yes | 0 | 0.0 | 116.5 | \$981.91 | \$4,050.00 | \$0.00 | \$4,050.00 | 4.12 | 13,646 |
| Refrigeration Measures | | | 17,999 | 0.2 | 0.0 | \$1,631.20 | \$8,055.00 | \$625.00 | \$7,430.00 | 4.55 | 18,125 |
| ECM 11 | Refrigerator/Freezer Case Electrically Commutated Motors | Yes | 1,186 | 0.1 | 0.0 | \$107.48 | \$3,033.00 | \$400.00 | \$2,633.00 | 24.50 | 1,194 |
| ECM 12 | Refrigeration Controls | Yes | 16,813 | 0.1 | 0.0 | \$1,523.72 | \$5,022.00 | \$225.00 | \$4,797.00 | 3.15 | 16,931 |
| Custom Measures | | | 52,237 | 24.9 | 809.6 | \$8,281.07 | \$272,893.00 | \$0.00 | \$272,893.00 | 32.95 | 147,396 |
| ECM 13 | Window Film | Yes | 17,738 | 0.0 | 808.0 | \$5,014.21 | \$235,125.00 | \$0.00 | \$235,125.00 | 46.89 | 112,469 |
| ECM 14 | Compressor Replacement Storage | Yes | 32,823 | 8.5 | 0.0 | \$2,986.89 | \$35,568.00 | \$0.00 | \$35,568.00 | 11.91 | 33,052 |
| ECM 15 | Door Air Sealing | Yes | 1,676 | 16.4 | 1.6 | \$279.97 | \$2,200.00 | \$0.00 | \$2,200.00 | 7.86 | 1,875 |
| TOTALS | | | 338,232 | 69.5 | 1,958.3 | \$43,877.55 | \$918,521.10 | \$31,341.00 | \$887,180.10 | 20.2 | 569,887 |

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

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

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

Motor Upgrades generally involve replacing old standard efficiency motors with motors of the current efficiency standard (EISA 2007). Motors will be replaced with the same size motors. This measure saves energy by reducing the power used by the motors due to improved electrical efficiency.

Variable Frequency Drives measures generally involve controlling the speed of a motor to achieve a flow or temperature rather than using a valve, damper, or no means at all. These measures save energy by slowing a motor which is an extremely efficient method of control.

Electric Unitary HVAC measures generally involve replacing old inefficient air conditioning systems with modern energy efficient systems. New air conditioning systems can provide cooling equivalent to older air conditioning systems, but use less energy. These measures save energy by reducing the power used by the air conditioning system due to improved electrical efficiency.

Gas Heating (HVAC/Process) measures generally involve replacing old inefficient hydronic heating systems with modern energy efficient systems. Gas heating systems can provide heating equivalent to older systems, but use less energy. These measures save energy by reducing the fuel used by the heating system due to improved combustion and heat transfer efficiency.

HVAC System Improvements generally involve the installation of automated controls to reduce heating and cooling demand when conditions allow. These measures could encompass changing temperature setpoints, using outside air for free cooling, or limiting excessive outside air during extreme outdoor air temperatures. These measures save energy by reducing the demand on the systems and the amount of time systems operate.

Domestic Water Heating upgrade measures generally involve replacing old inefficient domestic water heating systems with modern energy efficient systems. New domestic water heating systems can provide equivalent or greater capacity as older systems, but use less energy. These measures save energy by reducing the fuel used by the domestic water heating systems due to improved efficiency or the removal of standby losses.

Food Service Equipment & Refrigeration measures generally involve improvements in the efficiency of cooking, dish washing, and food storage equipment. These measures could encompass more efficient convection ovens, steamers, ice machines, or refrigeration. These measures save energy by reducing the fuel used due to improved efficiency.

Energy Efficient Practices

TRC also identified 19 low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral and operational adjustments as well as performing routine maintenance on building systems. Through these practices equipment lifetime can be extended; occupant comfort, health and safety can be improved; and annual energy, operation, and maintenance costs can be reduced. Opportunities identified at State of New Jersey Division of Law and Public Safety (NJ-LPS) include:

- Reduce Air Leakage
- Close Doors and Windows
- Use Window Treatments/Coverings
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Ensure Economizers are Functioning Properly
- Assess Chillers & Request Tune-Ups
- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Check for and Seal Duct Leakage
- Perform Proper Boiler Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Replace Computer Monitors
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation sources for State of New Jersey Division of Law and Public Safety (NJ-LPS). Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power on-site generation measures.

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

I.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
- Pay for Performance - Existing Buildings (P4P)
- SREC (Solar Renewable Energy Certificate) Registration Program (SRP)
- Energy Savings Improvement Program (ESIP)
- Demand Response Energy Aggregator

For facilities with capital available for implementation of selected individual measures or phasing implementation of selected measures over multiple years, incentives are available through the SmartStart program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to design the ECM(s), select the equipment and apply for the incentive(s). Program pre-approval is required for some SmartStart incentives, so only after receiving approval may the ECM(s) be installed. The incentive values listed above in Figure 3 represent the SmartStart program and will be explained further in Section 8, as well as the other programs as mentioned below.

For facilities with capital available and an interest in a comprehensive, holistic approach to energy conservation should consider participating in the Pay for Performance- Existing Buildings program. This program has minimum savings requirements and the incentives are based on actual measured performance savings. The application process is more involved, and requires working with an eligible contractor, but may result in more lucrative incentives up to 50% of total project cost.

For facilities without capital available to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with external project development, design, and implementation services as well as financing for implementing ECMs. This LGEA report is the first step for participating in ESIP and should help you determine next steps. Refer to Section 8.4 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a program (non-NJCEP) designed to reduce consumer electric load when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak 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 locally. By enabling grid operators to call upon Curtailment Service Providers and energy consumers to reduce electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and participants will receive payments whether or not their facility is called upon to curtail their load. Refer to Section 7 for additional information on this program.

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

To ensure projects are implemented such that maximum savings and incentives are achieved, bids and specifications should be reviewed by your procurement personnel and/or consultant(s) to ensure that selected equipment coincides with LGEA recommendations, as well as applicable incentive program guidelines and requirements.

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

| Name | Role | E-Mail | Phone # |
|----------------------------|-------------------------|--|----------------|
| Customer | | | |
| Steve Jackson | Head of Maintenance | JacksonS@njdcj.org | 609-292-5210 |
| Dennis Haynes | Chief Financial Officer | HaynesD@njdcj.org | 973-648-7535 |
| TRC Energy Services | | | |
| Brian Dattellas | Auditor | bdattellas@trcsolutions.com | (732) 855-0033 |

2.2 General Site Information

On various days in both December 2016 and January 2017 TRC performed an energy audit at State of New Jersey Division of Law and Public Safety’s (NJ-LPS) Regional Medical Examiner office, located in Newark, New Jersey. TRC’s team met with Steve Jackson to review the facility operations, collect pertinent data, review drawings, and focus the investigation on specific energy-using systems. All site visit data collection was completed during the winter months during heating season.

2.3 Building Occupancy

The Regional Medical Examiner’s office operates on an as-needed basis, but is generally open Monday through Friday from 6:00 AM to 10:00 PM, with some weekend operation. Below are the operational estimates used to develop the models for this report. Based on the function of the facility some variables should be considered in the metrics developed. The typical schedule is presented in the table below.

Figure 5 - Building Schedule

| Building Name | Weekday/Weekend | Operating Schedule |
|-------------------|-----------------|--------------------|
| Medical Examiners | Weekday | 6:00 AM - 10:00 PM |
| Medical Examiners | Weekend | 6:00 AM - 6:00 PM |

2.1 Building Envelope

The structure appears to be a brick and concrete shell built on a concrete slab. The windows are sealed single and double pane and were observed to be in good condition with minimal outside air infiltration. The roof is comprised of rubber covered with stone and was assumed to be original but has possibly been resealed and stoned. Overall, the building envelope was found to be in good condition.

2.2 On-site Generation

There will be an addendum to this report evaluating cost effectiveness for interconnection with the Trigen (Power, Cold and Hot Water) plant of an adjacent college campus. The University of Medicine & Dentistry, affiliated with Rutgers University, is amenable to a relationship of this type and supports the subsequent evaluation.

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



2.3 Energy-Using Systems

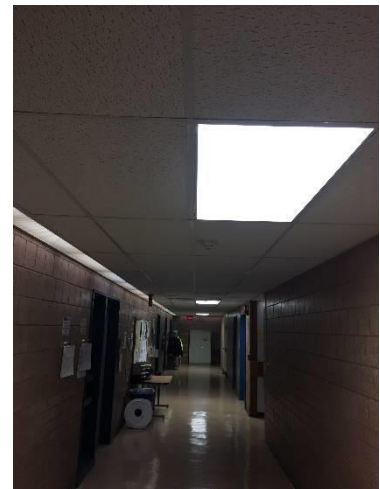
Please refer to Appendix A: Equipment Inventory & Recommendations for an inventory of your equipment.

Lighting System

The lighting system is first generation T12 linear fluorescents and has not been updated. The lay in and surface mount T12 fixtures should be replaced as they have been in service far beyond their useful life. There have been some spot updates on the lighting system in select office spaces and medical rooms, but in general the antiquated T12 system is the predominant technology on site. This high energy using system presents a significant opportunity for the Regional Medical Examiner's office to save energy represented in ECM's 1 and 2 respectively.

Lighting control is provided by wall switches in most instances.

The building has minimal exterior lighting, which primarily consists of efficient high pressure sodium fixtures that are controlled with a panel switch.



Heating Ventilation Air Conditioning Systems

State of New Jersey Division of Law and Public Safety (NJ-LPS) is a 33,000 square foot facility comprised of four unique energy using systems. These systems are comprised of standard lighting, heating, ventilation and air conditioning (HVAC) and building envelope systems, all of which are operational. The facility also has a "process" energy system in that the overall function of the facility is a forensics laboratory.

The HVAC systems at the Regional Medical Examiner's office is comprised of a variety of technologies and controls. The systems operate in support of both comfort cooling and heating and also what will be referred to as process refrigeration, ventilation, cooling and heating. Comfort cooling and heating is generally provided through a built up system which includes Air Handlers 1-6 with two pipe coils fed by a Clima Cool Chiller and two Series 28 H.B. Smith Boilers. Air-handlers are located on the first and second floor in closets and mechanical rooms. In addition, one rooftop Aeon unit services the southeast corner of the building office and conference area.



Separate HVAC systems service the Autopsy Suites; a packaged Aeon unit and a Miller-Picking unit. This is done in an attempt to separate the airside systems in the space. Air handler 1, which is piped from both the chiller and boiler is primarily responsible for mixing morgue air quality with the rest of the building. ECM 8 addresses the mixing issue in the construction of partitions/custom doors and some rerouting of duct to isolate the morgue.

There is also a small data closet split system in service. In general, all systems and equipment were found to be operational and in good condition. The chiller was installed in the summer of 2016 and has yet to go online. A fuel fired temporary chiller was used for cooling in the summer of 2016. This baseline was not used in this report as it would not be consistent with the actual Clima-Cool Chiller. The air handlers with variable speed drives working with existing variable air volume (VAV) boxes were also recently installed. The system is equipped, but not entirely controlled by the existing controls infrastructure.



The Regional Medical Examiner's office has a significant amount of fans and motors affiliated with ventilation for both air quality and process. The system was observed as operational and in good condition. The Laboratory Ventilation process is separately controlled from the standard building ventilation.

Refrigeration Systems

There are also three large walk in refrigeration units at the Regional Medical Examiner's office. One unit, located in the center of the building on the first floor, is fed from a mix of compressors found in the upstairs mechanical room. ECM 14 addresses the potential replacement of this mix of compressors. Two walk-ins are located in an Autopsy Suite on the northwest side of the building; these units also utilize compressors and condensers located on the second floor mechanical room. There is also a packed Aeon Unit located outside of the building and is tied to the Northwest Autopsy Suite. The refrigeration equipment was found to be operational and in good condition, the second floor compressor condition was considered fair.



Domestic Hot Water

The domestic hot water system for the facility consists of two RUUD with an input rating of 1,200 kBtu/hr each and a nominal efficiency of 80%. Each water heater has an 87 gallon storage tank. Two 500-Watt recirculation pumps distribute 120 °F water to the entire site.

Plug load & Vending Machines

There are approximately 30 computer work stations throughout the facility. About 90% of the computers are desktop units with LCD monitors. There is no centralized PC power management software currently installed.

There are roughly two server closets in the facility with cooling provided by split systems with condensers located on the side of the building and on the roof.

The facility has a kitchen on the second floor with standard office kitchen equipment, such as a refrigerator, coffee machine, and hot pot.

2.4 Water-Using Systems

There are six restrooms at this facility. A sampling of restrooms found that the faucets are rated for 2.2 gallons per minute (gpm) or higher, the toilets are rated at 2.5 gallons per flush (gpf) and the urinals are rated at 2 gpf. There are two restrooms with showers that bicycle commuters utilize in the morning and the showerheads are rated at 5 gpm.



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/ft² and energy use/ft². These energy use indices are indicative of the relative energy effectiveness of this building. There are a number of factors that could cause the energy use of this building to vary from the “typical” energy use for other facilities identified as: Hospital/Healthcare. Specific local climate conditions, daily occupancy hours of the facility, seasonal fluctuations in occupancy, daily operating hours of energy use systems, and the behavior of the occupants with regard to operating systems that impact energy use such as turning off appliances and leaving windows open. Please refer to the Benchmarking section within Section 3.4 for additional information.

3.1 Total Cost of Energy

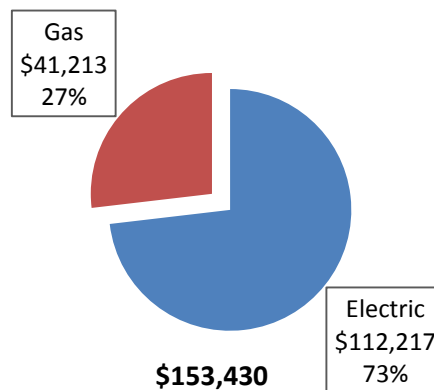
The following energy consumption and cost data is based on the last 12 month period of utility usage data that was provided for each utility. The annual consumption and cost was developed from this information.

Figure 6 - Utility Summary

| Summary for State of New Jersey Division of Law and Public Safety (NJ-LPS) | | |
|--|---------------|------------------|
| Fuel | Usage | Cost |
| Electricity | 1,238,234 kWh | \$112,217 |
| Natural Gas | 48,918 Therms | \$41,213 |
| Total | | \$153,430 |

The current utility cost for this site is \$153,430 as shown in the chart below.

Figure 7 - Energy Cost Breakdown



3.2 Electricity Usage

Electricity is provided by PSE&G. The average electric cost (combined for commodity, transmission and distribution) for the past 12 months is \$0.091/kWh, which is the blended rate used throughout the analyses in this report. The monthly electricity consumption and peak demand is represented graphically in the chart below. In February of 2015 the 266kW demand spike appears to be due to out of season chiller start up.

Figure 8 - Electric Usage & Demand

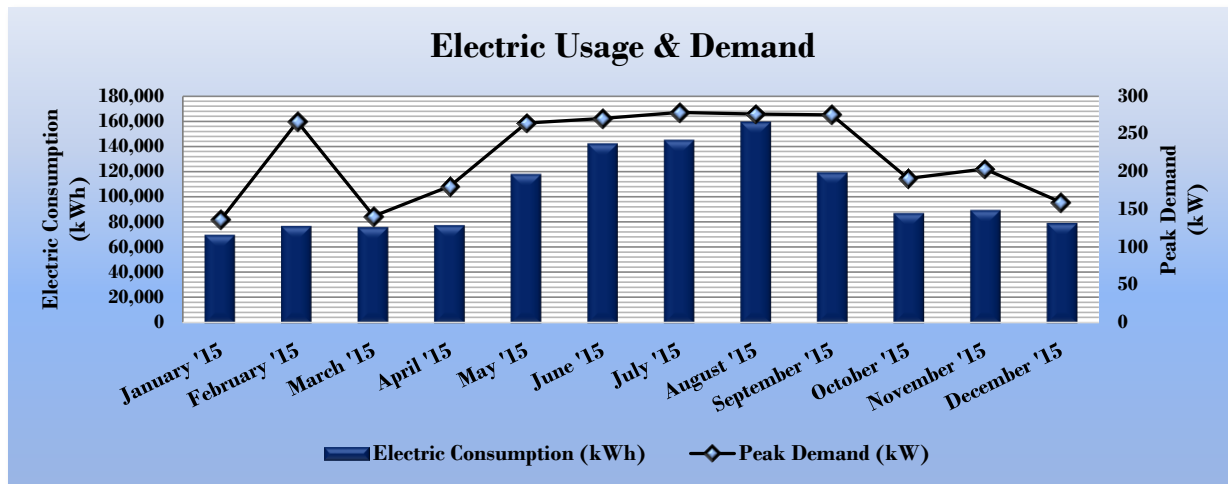


Figure 9 - Electric Usage & Demand

| Electric Billing Data for State of New Jersey Division of Law and Public Safety (NJ-LPS) | | | | | |
|--|----------------|----------------------|--------------|-----------------|---------------------|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Demand Cost | Total Electric Cost |
| 2/1/15 | 31 | 69,885 | 136 | \$2,735 | \$6,411 |
| 3/1/15 | 28 | 76,833 | 266 | \$2,910 | \$7,049 |
| 4/1/15 | 31 | 75,883 | 141 | \$2,914 | \$6,962 |
| 5/1/15 | 30 | 77,523 | 181 | \$3,102 | \$7,112 |
| 6/1/15 | 31 | 117,828 | 264 | \$6,720 | \$10,810 |
| 7/1/15 | 30 | 141,839 | 271 | \$7,340 | \$12,837 |
| 8/1/15 | 31 | 144,752 | 279 | \$7,375 | \$13,100 |
| 9/1/15 | 31 | 159,095 | 276 | \$7,247 | \$14,398 |
| 10/1/15 | 30 | 119,148 | 275 | \$3,980 | \$10,783 |
| 11/1/15 | 31 | 86,978 | 191 | \$2,891 | \$7,882 |
| 12/1/15 | 30 | 89,402 | 203 | \$2,833 | \$8,091 |
| 1/1/16 | 31 | 79,068 | 159 | \$1,857 | \$6,783 |
| Totals | 365 | 1,238,234 | 278.6 | \$51,906 | \$112,217 |
| Annual | 365 | 1,238,234 | 278.6 | \$51,906 | \$112,217 |

3.3 Natural Gas Usage

Natural gas is provided by PSE&G. The average gas cost for the past 12 months is \$0.842/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is represented graphically in the chart below.

Figure 10 - Natural Gas Usage

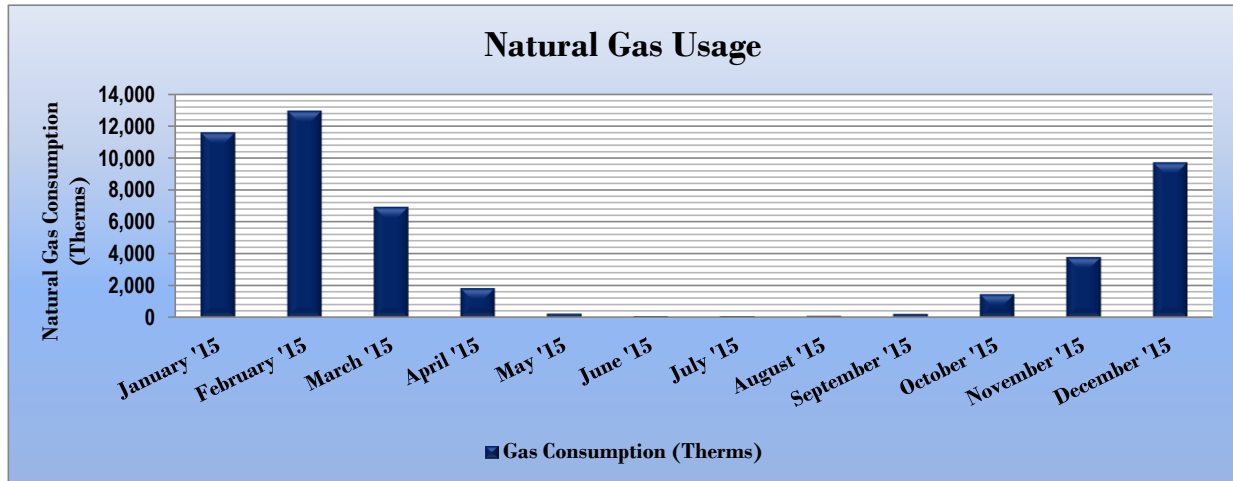


Figure 11 - Natural Gas Usage

| Gas Billing Data for State of New Jersey Division of Law and Public Safety (NJ-LPS) | | | | |
|---|----------------|----------------------------|------------------|----------------------|
| Period Ending | Days in Period | Natural Gas Usage (Therms) | Natural Gas Cost | TRC Estimated Usage? |
| 2/1/15 | 31 | 11,554 | \$9,510 | |
| 3/1/15 | 28 | 12,914 | \$10,459 | |
| 4/1/15 | 31 | 6,911 | \$4,415 | |
| 5/1/15 | 30 | 1,835 | \$1,256 | |
| 6/1/15 | 31 | 251 | \$262 | |
| 7/1/15 | 30 | 95 | \$163 | |
| 8/1/15 | 31 | 90 | \$162 | |
| 9/1/15 | 31 | 102 | \$183 | Yes |
| 10/1/15 | 30 | 235 | \$254 | |
| 11/1/15 | 31 | 1,460 | \$2,654 | |
| 12/1/15 | 30 | 3,774 | \$4,234 | |
| 1/1/16 | 31 | 9,698 | \$7,661 | |
| Totals | 365 | 48,918 | \$41,213 | |
| Annual | 365 | 48,918 | \$41,213 | |

3.4 Benchmarking

This facility was benchmarked through Portfolio Manager®, an online tool created and managed by the United States Environmental Protection Agency (EPA) through the ENERGY STAR® program. Portfolio Manager® analyzes your building’s consumption data, cost information, and operational use details and compares its performance against a yearly baseline, national medians, or similar buildings in your portfolio. Metrics used in this comparison are the Energy Use Intensity (EUI) and ENERGY STAR® score.

The EUI is a measure of a facility’s energy consumption per square foot, and it is the standard metric for comparing buildings’ energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more energy than similar buildings on a square foot basis or if that building performs better than the median. EUI is presented in both “site energy and source energy.” Site energy is the amount of fuel and electricity consumed by a building as reflected in utility bills. Source energy is the raw fuel consumed to generate the energy consumed at the site, factoring in energy production and distribution losses.

Figure 12 - Energy Use Intensity Comparison – Existing Conditions

| Energy Use Intensity Comparison - Existing Conditions | | |
|---|--|--|
| | State of New Jersey Division of Law and Public Safety (NJ-LPS) | National Median Building Type: Hospital/Healthcare |
| Source Energy Use Intensity (kBtu/ft ²) | 557.6 | 389.8 |
| Site Energy Use Intensity (kBtu/ft ²) | 276.3 | 196.9 |

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

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

| Energy Use Intensity Comparison - Following Installation of Recommended Measures | | |
|--|--|--|
| | State of New Jersey Division of Law and Public Safety (NJ-LPS) | National Median Building Type: Hospital/Healthcare |
| Source Energy Use Intensity (kBtu/ft ²) | 385.5 | 389.8 |
| Site Energy Use Intensity (kBtu/ft ²) | 181.9 | 196.9 |

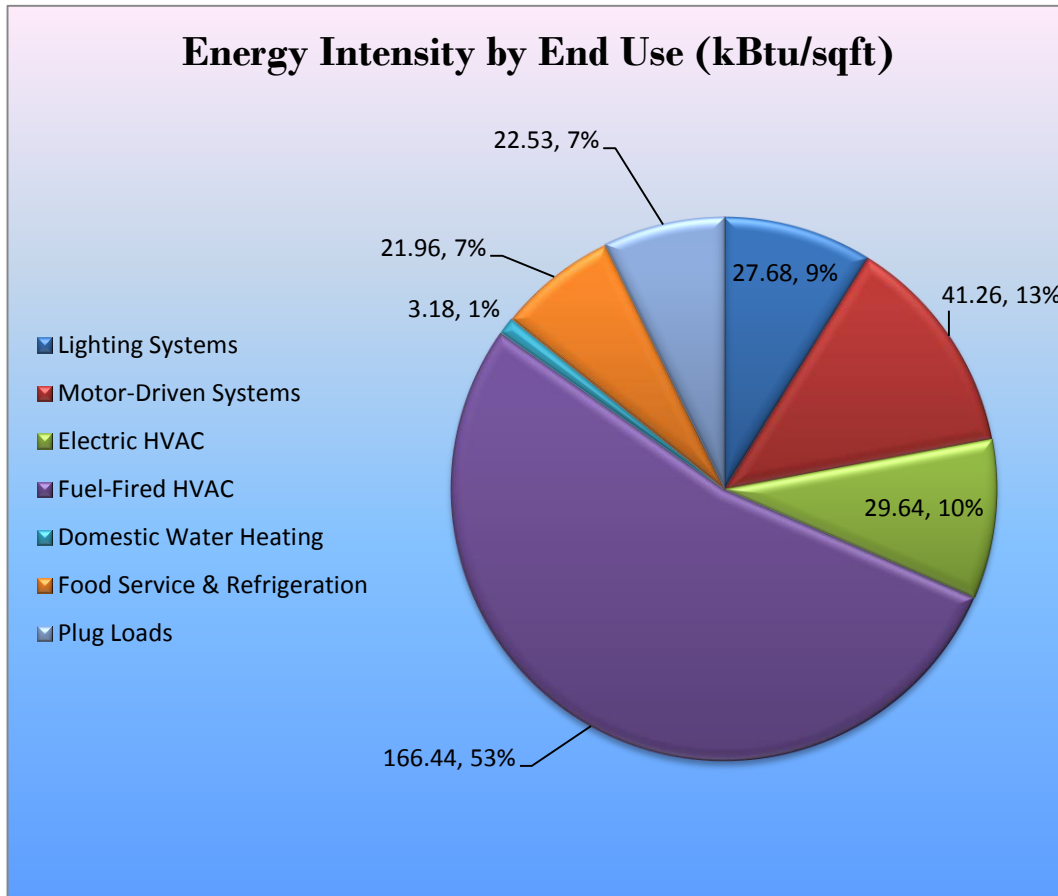
Many buildings can also receive a 1 – 100 ENERGY STAR® score. This score compares your building’s energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide — and may be eligible for ENERGY STAR® certification. This building type does not currently qualify to receive a score.

The Portfolio Manager®, Statement of Energy Performance can be found in Appendix B: ENERGY STAR® Statement of Energy Performance. Also, a Portfolio Manager® account has been created online for your facility and you will be provided with the login information for the account. We encourage you to update your utility information in Portfolio Manager® regularly, so that you can keep track of your building’s performance. Free online training is available to help you use ENERGY STAR® Portfolio Manager® to track your building’s performance at: <https://www.energystar.gov/buildings/training>.

3.5 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building and determine their proportional contribution to overall building energy usage. This visual representation of energy end uses highlights systems that may benefit most from energy efficiency projects.

Figure 14 - Energy Balance (% and kBtu/SF)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 15 – Summary of Recommended ECMs

| Energy Conservation Measure | | Recommend? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated Install Cost (\$) | Estimated Incentive (\$)* | Estimated Net Cost (\$) | Simple Payback Period (yrs)** | CO ₂ e Emissions Reduction (lbs) |
|--|--|------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|---------------------------|-------------------------|-------------------------------|---|
| Lighting Upgrades | | | 170,590 | 24.3 | 0.0 | \$15,460.08 | \$180,545.93 | \$18,575.00 | \$161,970.93 | 10.48 | 171,783 |
| ECM 1 | Install LED Fixtures | Yes | 147,370 | 21.5 | 0.0 | \$13,355.67 | \$174,884.07 | \$18,055.00 | \$156,829.07 | 11.74 | 148,400 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 23,221 | 2.9 | 0.0 | \$2,104.41 | \$5,661.86 | \$520.00 | \$5,141.86 | 2.44 | 23,383 |
| Motor Upgrades | | | 44,635 | 11.0 | 0.0 | \$4,045.12 | \$31,472.88 | \$0.00 | \$31,472.88 | 7.78 | 44,947 |
| ECM 3 | Premium Efficiency Motors | Yes | 44,635 | 11.0 | 0.0 | \$4,045.12 | \$31,472.88 | \$0.00 | \$31,472.88 | 7.78 | 44,947 |
| Variable Frequency Drive (VFD) Measures | | | 18,267 | 4.3 | 0.0 | \$1,655.46 | \$9,184.16 | \$920.00 | \$8,264.16 | 4.99 | 18,394 |
| ECM 4 | Install VFDs on Constant Volume (CV) HVAC | Yes | 18,267 | 4.3 | 0.0 | \$1,655.46 | \$9,184.16 | \$920.00 | \$8,264.16 | 4.99 | 18,394 |
| Electric Unitary HVAC Measures | | | 8,146 | 1.8 | 0.0 | \$738.20 | \$20,907.75 | \$1,185.00 | \$19,722.75 | 26.72 | 8,202 |
| ECM 5 | Install High Efficiency Electric AC | Yes | 8,146 | 1.8 | 0.0 | \$738.20 | \$20,907.75 | \$1,185.00 | \$19,722.75 | 26.72 | 8,202 |
| Gas Heating (HVAC/Process) Replacement | | | 0 | 0.0 | 724.4 | \$6,103.27 | \$80,217.15 | \$9,240.00 | \$70,977.15 | 11.63 | 84,821 |
| ECM 6 | Install High Efficiency Hot Water Boilers | Yes | 0 | 0.0 | 724.4 | \$6,103.27 | \$80,217.15 | \$9,240.00 | \$70,977.15 | 11.63 | 84,821 |
| HVAC System Improvements | | | 26,359 | 2.9 | 285.6 | \$4,795.02 | \$288,194.80 | \$0.00 | \$288,194.80 | 60.10 | 59,984 |
| ECM 7 | Install Programmable Thermostats | Yes | 13,340 | 0.0 | 285.6 | \$3,615.17 | \$13,194.80 | \$0.00 | \$13,194.80 | 3.65 | 46,874 |
| ECM 8 | Partition Morgue Area HVAC Controls | Yes | 13,019 | 2.9 | 0.0 | \$1,179.85 | \$275,000.00 | \$0.00 | \$275,000.00 | 233.08 | 13,110 |
| Domestic Water Heating Upgrade | | | 0 | 0.0 | 138.7 | \$1,168.14 | \$27,050.42 | \$796.00 | \$26,254.42 | 22.48 | 16,234 |
| ECM 9 | Install High Efficiency Gas Water Heater | Yes | 0 | 0.0 | 22.1 | \$186.24 | \$23,000.42 | \$796.00 | \$22,204.42 | 119.23 | 2,588 |
| ECM 10 | Install Low-Flow Domestic Hot Water Devices | Yes | 0 | 0.0 | 116.5 | \$981.91 | \$4,050.00 | \$0.00 | \$4,050.00 | 4.12 | 13,646 |
| Refrigeration Measures | | | 17,999 | 0.2 | 0.0 | \$1,631.20 | \$8,055.00 | \$625.00 | \$7,430.00 | 4.55 | 18,125 |
| ECM 11 | Refrigerator/Freezer Case Electrically Commutated Motors | Yes | 1,186 | 0.1 | 0.0 | \$107.48 | \$3,033.00 | \$400.00 | \$2,633.00 | 24.50 | 1,194 |
| ECM 12 | Refrigeration Controls | Yes | 16,813 | 0.1 | 0.0 | \$1,523.72 | \$5,022.00 | \$225.00 | \$4,797.00 | 3.15 | 16,931 |
| Custom Measures | | | 52,237 | 24.9 | 809.6 | \$8,281.07 | \$272,893.00 | \$0.00 | \$272,893.00 | 32.95 | 147,396 |
| ECM 13 | Window Film | Yes | 17,738 | 0.0 | 808.0 | \$5,014.21 | \$235,125.00 | \$0.00 | \$235,125.00 | 46.89 | 112,469 |
| ECM 14 | Compressor Replacement Storage | Yes | 32,823 | 8.5 | 0.0 | \$2,986.89 | \$35,568.00 | \$0.00 | \$35,568.00 | 11.91 | 33,052 |
| ECM 15 | Door Air Sealing | Yes | 1,676 | 16.4 | 1.6 | \$279.97 | \$2,200.00 | \$0.00 | \$2,200.00 | 7.86 | 1,875 |
| TOTALS | | | 338,232 | 69.5 | 1,958.3 | \$43,877.55 | \$918,521.10 | \$31,341.00 | \$887,180.10 | 20.2 | 569,887 |

* - 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

Our recommendations for lighting upgrades are summarized in Figure 16 below.

Figure 16 – 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 ₂ e Emissions Reduction (lbs) |
|-----------------------------|----------------------------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Lighting Upgrades | | 170,590 | 24.3 | 0.0 | \$15,460.08 | \$180,545.93 | \$18,575.00 | \$161,970.93 | 10.48 | 171,783 |
| ECM 1 | Install LED Fixtures | 147,370 | 21.5 | 0.0 | \$13,355.67 | \$174,884.07 | \$18,055.00 | \$156,829.07 | 11.74 | 148,400 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 23,221 | 2.9 | 0.0 | \$2,104.41 | \$5,661.86 | \$520.00 | \$5,141.86 | 2.44 | 23,383 |

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 ₂ e Emissions Reduction (lbs) |
|-----------------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Interior | 133,606 | 17.2 | 0.0 | \$12,108.35 | \$172,684.07 | \$18,055.00 | \$154,629.07 | 12.77 | 134,541 |
| Exterior | 13,763 | 4.3 | 0.0 | \$1,247.32 | \$2,200.00 | \$0.00 | \$2,200.00 | 1.76 | 13,859 |

Measure Description

This measure evaluates replacing existing fixtures containing fluorescent fixtures prominent throughout the Regional Medical Examiner’s office space with new high performance LED light fixtures. The existing fixtures are well past their useful life. This measure saves energy by installing LED sources which use less power than other technologies with a comparable light output.

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

During planning and design for the installation of new fixtures, we recommend a holistic approach that considers both the technology of the lighting sources and how they are controlled. Due to the function of the Regional Medical Examiners we have not recommended a controls package as part of this report.

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 ₂ e Emissions Reduction (lbs) |
|-----------------------|--|-----------------------------------|--------------------------------------|--|-----------------------------------|--------------------------------|-------------------------------|--------------------------------------|--|
| Interior | 23,221 | 2.9 | 0.0 | \$2,104.41 | \$5,661.86 | \$520.00 | \$5,141.86 | 2.44 | 23,383 |
| Exterior | 0 | 0.0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | 0.00 | 0 |

Measure Description

This measure evaluates replacing incandescent, high pressure sodium, halogen screw-in/plug-in, and compact fluorescent lamps with LED lamps. This measure addresses the non-linear fluorescent lighting in Regional Medical Examiner's office. This measure saves energy by installing LED sources which use less power than other technologies with a comparable light output.

Maintenance savings are anticipated since LED sources have burn hours which are more than Maintenance savings may be partially offset by the higher material costs associated with LED sources.

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

4.1.2 Motor Upgrades

Our recommendations for motor upgrade measures are summarized in Figure 17 below.

Figure 17-Summary of Motor 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 ₂ e Emissions Reduction (lbs) |
|-----------------------------|---------------------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|---------------------------|-------------------------|-------------------------------|---|
| Motor Upgrades | | 44,635 | 11.0 | 0.0 | \$4,045.12 | \$31,472.88 | \$0.00 | \$31,472.88 | 7.78 | 44,947 |
| ECM 3 | Premium Efficiency Motors | 44,635 | 11.0 | 0.0 | \$4,045.12 | \$31,472.88 | \$0.00 | \$31,472.88 | 7.78 | 44,947 |

ECM 3: Premium Efficiency Motors

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 44,635 | 11.0 | 0.0 | \$4,045.12 | \$31,472.88 | \$0.00 | \$31,472.88 | 7.78 | 44,947 |

Measure Description

This measure evaluates replacing standard efficiency motors with EISA 2007 efficiency motors. The evaluation assumes existing motors will be replaced with the same size motors. It is important that the speed of each new motor match the speed of the motor it replaces as closely as possible. The base case motor efficiencies are obtained from nameplate information or through age estimates. Proposed case premium motor efficiencies are obtained from the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings (2016)*. Savings are based on the difference between baseline and proposed efficiencies and the annual operating hours. The Regional Medical Examiner's office has a variety of motors used in conditioned air distribution, ventilation, and fume hoods. Many of the motors are already NEMA premium rated. The measure only contains those motors that were found to be rated below the NEMA premium standard.

4.1.3 Variable Frequency Drive Measures

Our recommendations for variable frequency drive (VFD) measures are summarized in Figure 18 below.

Figure 18 – Summary of Variable Frequency Drive 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 ₂ e Emissions Reduction (lbs) |
|---|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Variable Frequency Drive (VFD) Measures | 18,267 | 4.3 | 0.0 | \$1,655.46 | \$9,184.16 | \$920.00 | \$8,264.16 | 4.99 | 18,394 |
| ECM 4 Install VFDs on Constant Volume (CV) HVAC | 18,267 | 4.3 | 0.0 | \$1,655.46 | \$9,184.16 | \$920.00 | \$8,264.16 | 4.99 | 18,394 |

ECM 4: Install Variable Speed Drives

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 18,267 | 4.3 | 0.0 | \$1,655.46 | \$9,184.16 | \$920.00 | \$8,264.16 | 4.99 | 18,394 |

Measure Description

This measure evaluates installing a variable frequency drive (VFD) to control supply fan motor speed and converting the constant-volume, single-zone air handling system into a variable-air-volume (VAV) system, or for large motors that are exhausting the laboratory and morgue. The zone thermostats will modulate the VFD speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature. Energy savings result from reducing fan speed (and power) when there is a reduced load in the zone. The magnitude of energy savings is based on the amount of time at reduced loads.

4.1.4 Electric Unitary HVAC Measures

Our recommendations for unitary HVAC measures are summarized in Figure 19 below.

Figure 19 - Summary of Unitary HVAC 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 ₂ e Emissions Reduction (lbs) |
|---|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Electric Unitary HVAC Measures | 8,146 | 1.8 | 0.0 | \$738.20 | \$20,907.75 | \$1,185.00 | \$19,722.75 | 26.72 | 8,202 |
| ECM 5 Install High Efficiency Electric AC | 8,146 | 1.8 | 0.0 | \$738.20 | \$20,907.75 | \$1,185.00 | \$19,722.75 | 26.72 | 8,202 |

ECM 5: Install High Efficiency Electric AC

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 8,146 | 1.8 | 0.0 | \$738.20 | \$20,907.75 | \$1,185.00 | \$19,722.75 | 26.72 | 8,202 |

Measure Description

This measure evaluates replacing the packaged Miller-Picking unit with high efficiency packaged unit to serve the Autopsy Suite. There have been significant improvements in both compressor and fan motor efficiencies in the past several years. Therefore, electricity savings can be achieved by replacing old units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the old and new unit, the cooling load, and the annual operating hours.

4.1.5 Gas Heating (HVAC/Process) Replacement

Our recommendations for gas heating replacement measures are summarized in Figure 20 below.

Figure 20 - Summary of Gas Heating Replacement 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 ₂ e Emissions Reduction (lbs) |
|---|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Gas Heating (HVAC/Process) Replacement | 0 | 0.0 | 724.4 | \$6,103.27 | \$80,217.15 | \$9,240.00 | \$70,977.15 | 11.63 | 84,821 |
| ECM 6 Install High Efficiency Hot Water Boilers | 0 | 0.0 | 724.4 | \$6,103.27 | \$80,217.15 | \$9,240.00 | \$70,977.15 | 11.63 | 84,821 |

ECM 6: Install High Efficiency Hot Water Boilers

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 0 | 0.0 | 724.4 | \$6,103.27 | \$80,217.15 | \$9,240.00 | \$70,977.15 | 11.63 | 84,821 |

Measure Description

This measure evaluates replacing old inefficient hot water boilers with high efficiency condensing hot water boilers. Significant improvements have been made in combustion technology resulting in increases in overall boiler efficiency. Savings result from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% (recommended 94%, if condensing is achieved) efficiency under the proper conditions. The boiler efficiency increases as the return water temperature drops below 130°F. Therefore, condensing hydronic boilers were only evaluated when the return water temperature is less than 130°F during most of the operating hours. As a result condensing hydronic boilers are recommended for this site. It should be noted that condensing boilers produce acidic condensate that needs to be drained.

4.1.6 HVAC Control System Improvements

Our recommendations for HVAC system improvement measures are summarized in Figure 21 below.

Figure 21 - Summary of HVAC System Improvement 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 ₂ e Emissions Reduction (lbs) |
|---------------------------------|-------------------------------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| HVAC System Improvements | | 26,359 | 2.9 | 285.6 | \$4,795.02 | \$288,194.80 | \$0.00 | \$288,194.80 | 60.10 | 59,984 |
| ECM 7 | Install Programmable Thermostats | 13,340 | 0.0 | 285.6 | \$3,615.17 | \$13,194.80 | \$0.00 | \$13,194.80 | 3.65 | 46,874 |
| ECM 8 | Partition Morgue Area HVAC Controls | 13,019 | 2.9 | 0.0 | \$1,179.85 | \$275,000.00 | \$0.00 | \$275,000.00 | 233.08 | 13,110 |

ECM 7: Install Programmable Thermostats

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 13,340 | 0.0 | 285.6 | \$3,615.17 | \$13,194.80 | \$0.00 | \$13,194.80 | 3.65 | 46,874 |

Measure Description

This measure evaluates replacing manual thermostats with programmable thermostats throughout the State Medical Examiner’s office. Manual thermostats are currently being adjusted to a single heating and cooling setpoint and left at that setting regardless of occupancy in the area served by the HVAC equipment. As a result, the same level of heating and cooling is provided regardless of the occupancy in the space. Programmable thermostats can be set to maintain different temperature settings for different times of day and days of the week based on occupancy and the building schedule. By setting the heating temperature setpoint down and the cooling temperature setpoint up, for times that the conditioned space is not occupied, the operation of the HVAC equipment is reduced while still maintaining reasonable space temperatures during unoccupied periods.

The thermostat provides savings by reducing heating and cooling energy when a room is unoccupied, and/or through scheduling.

ECM 8: Partition Morgue Area with Enhanced Economizer Control

Summary of Measure Economics

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings (\$) | Estimated Install Cost (\$) | Estimated Incentive (\$) | Estimated Net Cost (\$) | Simple Payback Period (yrs) | CO ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 13,019 | 2.9 | 0.0 | \$1,179.85 | \$275,000.00 | \$0.00 | \$275,000.00 | 233.08 | 13,110 |

Measure Description

One of the major issues with the Regional Medical Examiner’s office HVAC system stems for the requirement for 100% Outside Air (OA) in certain areas of the building, specifically the morgue area. Introducing outside air can decrease energy costs when the outside air temperature and humidity can provide desirable air temperatures that allow for the conditioning equipment to not operate. In short, the boiler and chiller can shut down for periods of time resulting in energy savings. Outside air can also result in increased energy usage when the conditioning equipment needs to work harder to get the incoming air to a desirable temperature.

Due to the function of the Regional Medical Examiner’s office, there is a requirement for fresh air (100%) at all times in the morgue area. Currently 100% outside air is being introduced to all areas of the office apart from the space on the second floor being serviced by the roof top Aeon unit. This measure gains full control of the economizers for all AHU’s and RTU’s feeding the building, and modulates the outside air intake based on outside air temperatures and humidity through a dual enthalpy economizers controls.

The key to making this control strategy work is building partitions and door ways that allow for physical isolation of the morgue area space and isolation of the associated air distribution infrastructure. This allows the morgue area to operate on 100% outside air, and the rest of the building to modulate OA intake resulting in energy savings and better air quality. We have included rough estimates to address the construction costs associated with isolating the morgue area. These costs are estimates and it is our recommendation that the Regional Medical Examiner’s office pursue an estimate from a contractor to better understand the many options for isolation of the morgue area.

4.1.7 Domestic Water Heating Upgrade

Our recommendations for domestic water heating measures are summarized in Figure 22 below.

Figure 22 - Summary of Domestic Water Heating 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 ₂ e Emissions Reduction (lbs) |
|---------------------------------------|---|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Domestic Water Heating Upgrade | | 0 | 0.0 | 138.7 | \$1,168.14 | \$27,050.42 | \$796.00 | \$26,254.42 | 22.48 | 16,234 |
| ECM 9 | Install High Efficiency Gas Water Heater | 0 | 0.0 | 22.1 | \$186.24 | \$23,000.42 | \$796.00 | \$22,204.42 | 119.23 | 2,588 |
| ECM 10 | Install Low-Flow Domestic Hot Water Devices | 0 | 0.0 | 116.5 | \$981.91 | \$4,050.00 | \$0.00 | \$4,050.00 | 4.12 | 13,646 |

ECM 9: Install High Efficiency Gas Water Heater

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 0 | 0.0 | 22.1 | \$186.24 | \$23,000.42 | \$796.00 | \$22,204.42 | 119.23 | 2,588 |

Measure Description

This measure evaluates the savings from replacing a tank water heater with a high efficiency tank water heater. Improvements in combustion efficiency and reductions in heat loss have improved the overall efficiency of water heaters. Savings result from less gas used during combustion and less time operating during standby to maintain the water tank temperature.

ECM 10: Install Low-Flow DHW Devices

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 0 | 0.0 | 116.5 | \$981.91 | \$4,050.00 | \$0.00 | \$4,050.00 | 4.12 | 13,646 |

Measure Description

This measure evaluates the savings from installing low flow domestic water devices to reduce overall water flow in general and hot water flow in particular. Low flow showerheads and faucet aerators reduce the water flow, relative to standard showerheads and aerators, from the fixture. Pre-rinse spray valves—often used in commercial and institutional kitchens—are designed to remove food waste from dishes prior to dishwashing. Replacing standard pre-rinse spray valves with low flow valves will reduce water use.

All of the low flow devices reduce the overall water flow from the fixture which generally reduces the amount of hot water used resulting in energy and water savings.

4.1.8 Refrigeration Measures

Our recommendations for food service and refrigeration measures are summarized in Figure 23 below.

Figure 23 - Summary of Food Service Equipment & Refrigeration 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 ₂ e Emissions Reduction (lbs) |
|--|--|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Food Service Equipment & Refrigeration Measures | | 17,999 | 0.2 | 0.0 | \$1,631.20 | \$8,055.00 | \$625.00 | \$7,430.00 | 4.55 | 18,125 |
| ECM 11 | Refrigerator/Freezer Case Electrically Commutated Motors | 1,186 | 0.1 | 0.0 | \$107.48 | \$3,033.00 | \$400.00 | \$2,633.00 | 24.50 | 1,194 |
| ECM 12 | Refrigeration Controls | 16,813 | 0.1 | 0.0 | \$1,523.72 | \$5,022.00 | \$225.00 | \$4,797.00 | 3.15 | 16,931 |

ECM 11: Refrigerator/Freezer Case Electrically Commutated Motors

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 1,186 | 0.1 | 0.0 | \$107.48 | \$3,033.00 | \$400.00 | \$2,633.00 | 24.50 | 1,194 |

Measure Description

This measure evaluates replacing shaded pole or permanent split capacitor (PSC) motors with electronically commutated (EC) motors in existing walk-in, multi-deck and free standing coolers and freezers. These fractional horsepower EC motors are significantly more efficient than mechanically commutated, brushed motors, particularly at low speeds or partial load. By employing variable-speed technology, EC motors are able to optimize fan speeds for changing load requirements. Because these motors are brushless and utilize DC power, losses due to friction and phase shifting are eliminated. Savings for this measure take into account both the increased efficiency of the motor as well as the reduction in refrigeration load due to motor heat loss.

ECM 12: Refrigeration 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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 16,813 | 0.1 | 0.0 | \$1,523.72 | \$5,022.00 | \$225.00 | \$4,797.00 | 3.15 | 16,931 |

Measure Description

This measure evaluates the installation of possible additional controls to optimize the operation of the refrigeration system. Due to the complexity of the refrigeration system on site we recommend the Regional Medical Examiner work with a refrigeration contractor to explore this measure further specifically for the central storage walk-in.

Many walk-in coolers and freezers have continuously operating electric heaters on the doors to prevent condensation formation. This measure adds a control system feature to shut off the door heaters when the humidity level is low enough that condensation will not occur if the heaters are off. This is accomplished by measuring the ambient humidity and temperature of the store, comparing that to the dew point, and using pulse width modulation to control the anti-sweat door heaters.

Defrost controllers can be used to override defrost of evaporator fans when the defrost operation is not necessary, reducing annual energy consumption. This measure is applicable to existing evaporator fans with a traditional electric defrost mechanism.

Many walk-in coolers and freezers have evaporator fans which run continuously. The measure adds a control system feature to automatically shut off evaporator fans when the cooler's thermostat is not calling for cooling.

Novelty coolers often run continuously. This measure adds a control system feature to automatically shut off novelty coolers based on pre-set store operating hours. Based on programmed hours, the control mechanism shuts off the cooler at the end of business and then begins operation on reduced cycles. Regular compressor operation begins the following day an hour before the start of business.

Savings for each of the control measures account for reduction in operating hours of the controlled component as well as reduction in the refrigeration heat load as appropriate.

4.1.9 Custom Measures

Our recommendations for additional opportunities identified by the auditor are addressed in Figure 24 below.

Figure 24 - 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 ₂ e Emissions Reduction (lbs) |
|-----------------------------|--------------------------------|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| Custom Measures | | 52,237 | 24.9 | 809.6 | \$8,281.07 | \$272,893.00 | \$0.00 | \$272,893.00 | 32.95 | 147,396 |
| ECM 13 | Window Film | 17,738 | 0.0 | 808.0 | \$5,014.21 | \$235,125.00 | \$0.00 | \$235,125.00 | 46.89 | 112,469 |
| ECM 14 | Compressor Replacement Storage | 32,823 | 8.5 | 0.0 | \$2,986.89 | \$35,568.00 | \$0.00 | \$35,568.00 | 11.91 | 33,052 |
| ECM 15 | Door Air Sealing | 1,676 | 16.4 | 1.6 | \$279.97 | \$2,200.00 | \$0.00 | \$2,200.00 | 7.86 | 1,875 |

ECM 13: Window Film

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 17,738 | 0.0 | 808.0 | \$5,014.21 | \$235,125.00 | \$0.00 | \$235,125.00 | 46.89 | 112,469 |

Measure Description

There are a variety of plastic window films available for commercial buildings. Application of window film boosts the U-Value of the existing window resulting in better heating and cooling losses. Window replacement was also evaluated. Window film in conjunction with some replacement of frames provided a more cost effective solution. An additional factor taken into consideration was the relative good condition of the existing windows.

ECM 14: Compressor Replacement Storage

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 32,823 | 8.5 | 0.0 | \$2,986.89 | \$35,568.00 | \$0.00 | \$35,568.00 | 11.91 | 33,052 |

Measure Description

This measure evaluates replacement of three refrigeration compressors located in the second floor mechanical room. These compressors are serving the walk in units in the morgue area. Installing three new compressors will result in an efficiency gain. This coupled with the run hours of the walk-ins will lead to power side energy savings, and increased reliability of the refrigeration system overall.

ECM 15: Door Air Sealing

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 ₂ e Emissions Reduction (lbs) |
|-------------------------------|--------------------------|-----------------------------|---------------------------------|-----------------------------|--------------------------|-------------------------|-----------------------------|---|
| 1,676 | 16.4 | 1.6 | \$279.97 | \$2,200.00 | \$0.00 | \$2,200.00 | 7.86 | 1,875 |

Measure Description

The Regional Medical Examiner's office has two main points of entry. The main entrance and the rear, or employee/process entrance. Both entrances would benefit from low cost door sealing which would result in less infiltration. The rear entrance leads into a spot heated garage area. This recommendation addresses sealing the outside doors as well as the two points of entry inside the garage area.

5 ENERGY EFFICIENT PRACTICES

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

Reduce Air Leakage

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

Close Doors and Windows

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

Use Window Treatments/Coverings

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

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Ensure Lighting Controls Are Operating Properly

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

Perform 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.

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

Ensure Economizers are Functioning Properly

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

Assess Chillers & Request Tune-Ups

Chillers are responsible for a substantial portion of a commercial building's overall energy usage. When components of a chiller are not optimized, this can quickly result in a noticeable increase in energy bills. Chiller diagnostics can produce a 5% to 10% cost avoidance potential from discovery and implementation of low/no cost optimization strategies.

Clean Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Check for and Seal Duct Leakage

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

Perform Proper Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to retain proper functionality and efficiency of the heating system. Fuel burning equipment should undergo yearly tune-ups to ensure they are operating as safely and efficiently as possible from a combustion standpoint. A tune-up should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely. Buildup of dirt, dust, or deposits on the internal surfaces of a boiler can greatly affect its heat transfer efficiency. These deposits can accumulate on the water side or fire side of the boiler. Boilers should be cleaned regularly according to the manufacturer's instructions to remove this build up in order to sustain efficiency and equipment life.

Perform Proper Water Heater Maintenance

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

Plug Load Controls

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

Replace Computer Monitors

Replacing old computer monitors or displays with efficient monitors will reduce energy use. ENERGY STAR® rated monitors have specific requirements for on mode power consumption as well as idle and sleep mode power. According to the ENERGY STAR® website monitors that have earned the ENERGY STAR® label are 25% more efficient than standard monitors.

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).

Refer to Section 4.1.7 for any low-flow ECM recommendations.

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.

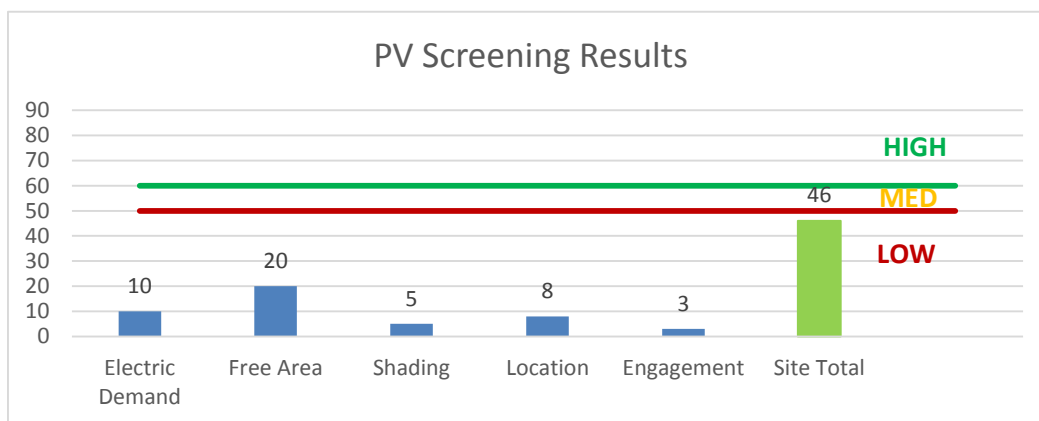
Preliminary screenings were performed to determine the potential that a generation project could provide a cost-effective solution for your facility. Before making a decision to implement, a feasibility study should be conducted that would take a detailed look at existing energy profiles, siting, interconnection,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

6.1 Photovoltaic

A photovoltaic array for the Regional Medical Examiner’s office was evaluated for cost effectiveness and general feasibility. The evaluation metrics below indicate a relatively *Low* system potential due to costs and available space on the roof. The analysis evaluated a hybrid array utilizing the available space on the roof as well as canopies in the small parking lot on the east side of the building. The costs associated with the construction of canopies often leads to a decrease in cost effectiveness, usually due to the small size of the parking lot.

If State of New Jersey Division of Law and Public Safety (NJ-LPS) is interested in pursuing the installation of PV, we recommended a full feasibility study be conducted.

Figure 25 - Photovoltaic Screening



| | | |
|----------------------------|-----------|-----------|
| Potential | Low | |
| System Potential | 129 | kW DC STC |
| Electric Generation | 97,066 | kWh/yr |
| Displaced Cost | \$8,440 | /yr |
| Installed Cost | \$625,000 | |

Rebates are not available for solar projects, but owners choosing to implement solar projects MUST register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order to establish the project’s eligibility to earn SRECs. Registration of the intent to participate in New Jersey’s solar marketplace provides market participants with information about the pipeline of anticipated new solar capacity and insight into future SREC pricing. Refer to Section 8.3 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

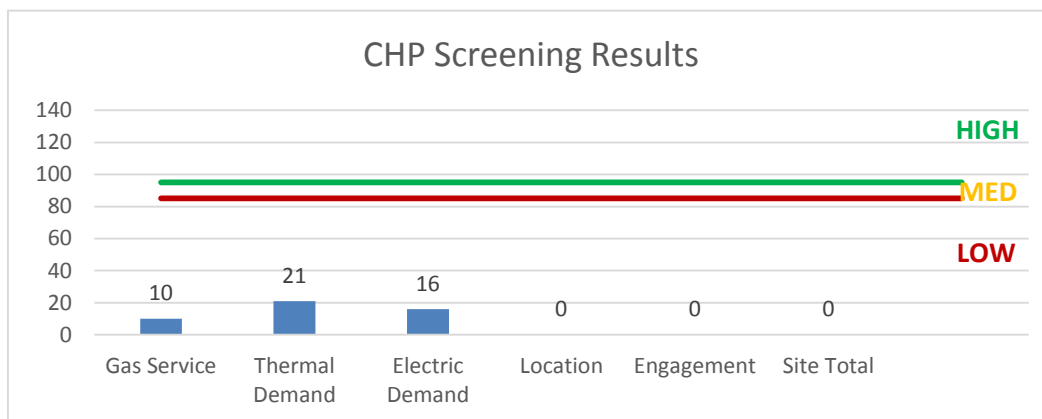
In non-industrial settings, combined heat and power (CHP) is the on-site generation of electricity and recovery of heat which is put to beneficial use. Common prime movers in CHP applications include reciprocating engines, microturbines, fuel cells, and (at large facilities) gas turbines. Electricity is typically interconnected to the sites local distribution system. Heat is recovered from the exhaust stream and the ancillary cooling system and interconnected to the existing hot water (or steam) distribution system.

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.

A low and infrequent thermal load is the main factor contributing to the *Low* potential for CHP at the Regional Medical Examiner’s office. A simple summer domestic hot water load is usually not enough load to accommodate standard CHP thermal requirements. 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 NJ 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 26 - Combined Heat and Power Screening



7 DEMAND RESPONSE

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

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

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

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

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

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

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding the program rules and requirements for metering and controls, a facility's ability to temporarily reduce electric load, as well as the payments involved in participating in the program. Also, these providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment to help ensure compliance of all terms and conditions of a DR contract.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey’s Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 27 for a list of the eligible programs identified for each recommended ECM.

Figure 27 - ECM Incentive Program Eligibility

| Energy Conservation Measure | | SmartStart Prescriptive | SmartStart Custom | Direct Install | Pay For Performance Existing Buildings |
|-----------------------------|--|-------------------------|-------------------|----------------|--|
| ECM 1 | Install LED Fixtures | X | | | X |
| ECM 2 | Retrofit Fixtures with LED Lamps | X | | | X |
| ECM 3 | Premium Efficiency Motors | X | | | X |
| ECM 4 | Install VFDs on Constant Volume (CV) HVAC | X | | | X |
| ECM 5 | Install High Efficiency Electric AC | X | | | X |
| ECM 6 | Install High Efficiency Hot Water Boilers | X | | | X |
| ECM 7 | Install Programmable Thermostats | X | | | X |
| ECM 8 | Partition Morgue Area HVAC Controls | X | | | X |
| ECM 9 | Install High Efficiency Gas Water Heater | X | | | X |
| ECM 10 | Install Low-Flow Domestic Hot Water Devices | X | | | X |
| ECM 11 | Refrigerator/Freezer Case Electrically Commutated Motors | X | | | X |
| ECM 12 | Refrigeration Controls | | X | | X |
| ECM 13 | Window Film | | X | | X |
| ECM 14 | Compressor Replacement Storage | | X | | X |
| ECM 15 | Door Air Sealing | | | | X |

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

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

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

8.1 SmartStart

Overview

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

Prescriptive Equipment Incentives Available:

Electric Chillers
Electric Unitary HVAC
Gas Cooling
Gas Heating
Gas Water Heating
Ground Source Heat Pumps
Lighting

Lighting Controls
Refrigeration Doors
Refrigeration Controls
Refrigerator/Freezer Motors
Food Service Equipment
Variable Frequency Drives

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

Incentives

The SmartStart prescriptive incentive program provides fixed incentives for specific energy efficiency measures, whereas the SmartStart custom program provides incentives for new and innovative technologies, or process improvements not defined through one of the prescriptive incentives listed above.

Although your facility is an existing building, and only the prescriptive incentives have been applied in the calculations, the SmartStart custom measure path is recommended for ECM 13-15. These incentives are calculated utilizing a number of factors, including project cost, energy savings and comparison to existing conditions or a defined standard. To qualify, the proposed measure(s) must be at least 2% more efficient than current energy code or recognized industry standard, and save at least 75,000 kWh or 1,500 therms annually.

SmartStart 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 in the SmartStart program (inclusive of prescriptive and custom) 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 prescriptive program you will need to submit an application for the specific equipment installed or 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. Please note that SmartStart custom application requirements are different from the prescriptive applications and will most likely require additional effort to complete.

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

8.2 Pay for Performance - Existing Buildings

Overview

The Pay for Performance – Existing Buildings (P4P) program is designed for larger customers with a peak demand over 200 kW in any of the preceding 12 months. Under this program the minimum installed scope of work must include at least two unique measures resulting in at least 15% energy savings, where lighting cannot make up the majority of the savings. P4P is generally a good option for medium to large sized facilities looking to implement as many measures as possible under a single project in order to achieve deep energy savings. This program has an added benefit of evaluating a broad spectrum of measures that may not otherwise qualify under other programs. Many facilities pursuing ESIP also utilize the P4P program.

Incentives

Incentives are calculated based on estimated and achieved energy savings ranging from \$0.18-\$0.22/kWh and \$1.80-\$2.50/therm, capped at the lesser of 50% total project cost, or \$1 million per electric account and \$1 million per natural gas account, per fiscal year, not to exceed \$2 million per project. An incentive of \$0.15/square foot is also available to offset the cost of developing the Energy Reduction Plan (see below) contingent on the project moving forward with measure installation.

How to Participate

To participate in the Pay for Performance- Existing Buildings program you will need to contact one of the pre-approved consultants and contractors (“Partners”). Under direct contract to you, the Partner will help further evaluate the measures identified in this report through development of the Energy Reduction Plan (ERP), assist you in implementing selected measures, and verify actual savings one year after the installation. At each of these three milestones your Partner will also facilitate securing program incentives.

Approval of the final scope of work is required by the program prior to installation completion. Although installation can be accomplished by a contractor of your choice (some P4P Partners are also contractors) or by internal personnel, the Partner must remain involved to ensure compliance with the program guidelines and requirements.

Detailed program descriptions, instructions for applying, applications and list of Partners can be found at: www.njcleanenergy.com/P4P.

8.3 SREC Registration Program

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

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

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

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

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

8.4 Energy Savings Improvement Program

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

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

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

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

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

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

8.5 Demand Response Energy Aggregator

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

Curtailment Service Providers typically offer free assessments to determine a facility's eligibility to participate in a DR program. They will provide details regarding the program rules and requirements for metering and controls, a facility's ability to temporarily reduce electric load, as well as the payments involved in participating in the program. Also, these providers usually offer multiple options for DR to larger facilities and may also install controls or remote monitoring equipment to help ensure compliance of all terms and conditions of a DR contract.

See Section 7 for additional information.

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 |
| Hallway 1st | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 5,616 | Fixture Replacement | No | 8 | LED - Fixtures: Ambient 2x4 Fixture | Wall Switch | 45 | 5,616 | 0.40 | 3,100 | 0.0 | \$280.95 | \$4,872.17 | \$200.00 | 16.63 |
| Hallway 1st | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| 17 | 2 | Linear Fluorescent - T12: 2' T12 (20W) - 2L | Wall Switch | 50 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.05 | 371 | 0.0 | \$33.59 | \$836.33 | \$90.00 | 22.22 |
| Refrigeration | 8 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 5,616 | Fixture Replacement | No | 8 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.10 | 764 | 0.0 | \$69.22 | \$3,345.33 | \$360.00 | 43.13 |
| Xray Room | 4 | Linear Fluorescent - T12: 2' T12 (20W) - 2L | Wall Switch | 50 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 2' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.10 | 741 | 0.0 | \$67.18 | \$836.33 | \$80.00 | 11.26 |
| Xray Room | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.03 | 241 | 0.0 | \$21.89 | \$418.17 | \$45.00 | 17.05 |
| Xray Room | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.03 | 241 | 0.0 | \$21.89 | \$418.17 | \$45.00 | 17.05 |
| Autopsy Suite | 4 | U-Bend Fluorescent - T12: U T12 (34W) - 2L | Wall Switch | 72 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.08 | 607 | 0.0 | \$54.97 | \$1,672.66 | \$180.00 | 27.16 |
| Autopsy Suite | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 4L | Wall Switch | 114 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.07 | 545 | 0.0 | \$49.37 | \$418.17 | \$45.00 | 7.56 |
| Autopsy Suite | 8 | Halogen Incandescent: PAR | Wall Switch | 60 | 5,616 | Relamp | No | 8 | LED Screw-In Lamps: LED | Wall Switch | 18 | 5,616 | 0.24 | 1,887 | 0.0 | \$171.01 | \$800.00 | \$80.00 | 4.21 |
| Autopsy Suite | 4 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.12 | 966 | 0.0 | \$87.54 | \$1,672.66 | \$180.00 | 17.05 |
| Womans Bathroom | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.03 | 241 | 0.0 | \$21.89 | \$418.17 | \$45.00 | 17.05 |
| Womans Bathroom | 1 | Linear Fluorescent - T12: 3' T12 (30W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| Womans Bathroom | 1 | Halogen Incandescent: PAR | Wall Switch | 60 | 5,616 | Relamp | No | 1 | LED Screw-In Lamps: LED | Wall Switch | 18 | 5,616 | 0.03 | 236 | 0.0 | \$21.38 | \$100.00 | \$10.00 | 4.21 |
| Womans Bathroom | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| Womans Bathroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | 32 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.01 | 84 | 0.0 | \$7.63 | \$418.17 | \$45.00 | 48.88 |
| Mens Bathroom | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.03 | 241 | 0.0 | \$21.89 | \$418.17 | \$45.00 | 17.05 |
| Mens Bathroom | 1 | Linear Fluorescent - T12: 3' T12 (30W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| Mens Bathroom | 1 | Halogen Incandescent: PAR | Wall Switch | 60 | 5,616 | Relamp | No | 1 | LED Screw-In Lamps: LED | Wall Switch | 18 | 5,616 | 0.03 | 236 | 0.0 | \$21.38 | \$100.00 | \$10.00 | 4.21 |
| Mens Bathroom | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| Mens Bathroom | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | 32 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.01 | 84 | 0.0 | \$7.63 | \$418.17 | \$45.00 | 48.88 |
| 129 | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.06 | 483 | 0.0 | \$43.77 | \$836.33 | \$90.00 | 17.05 |
| 122 | 6 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.19 | 1,449 | 0.0 | \$131.31 | \$2,509.00 | \$270.00 | 17.05 |
| Dark Room | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 1L | Wall Switch | 46 | 1,000 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 1,000 | 0.04 | 58 | 0.0 | \$5.26 | \$836.33 | \$90.00 | 141.99 |
| Dark Room | 3 | Halogen Incandescent: PAR | Wall Switch | 60 | 1,000 | Relamp | No | 3 | LED Screw-In Lamps: LED | Wall Switch | 18 | 1,000 | 0.09 | 126 | 0.0 | \$11.42 | \$131.86 | \$30.00 | 8.92 |

| Location | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|-----------------|---------------------|--|----------------|-------------------|------------------------|------------------------|---------------|------------------|--|----------------|-------------------|------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | 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 |
| Te Room | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.08 | 651 | 0.0 | \$59.04 | \$1,672.66 | \$180.00 | 25.28 |
| Slop Sink | 1 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| 116 | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |
| 116 | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |
| 116 | 6 | Linear Fluorescent - T 12: 4' T 12 (40W) - 4L | Wall Switch | 176 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.57 | 4,414 | 0.0 | \$400.04 | \$2,509.00 | \$270.00 | 5.60 |
| 116 | 6 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.19 | 1,449 | 0.0 | \$131.31 | \$2,509.00 | \$270.00 | 17.05 |
| 116 | 6 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.19 | 1,449 | 0.0 | \$131.31 | \$2,509.00 | \$270.00 | 17.05 |
| EL Room | 1 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| 120 | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |
| 121 | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.06 | 483 | 0.0 | \$43.77 | \$836.33 | \$90.00 | 17.05 |
| Boiler Room | 4 | Linear Fluorescent - T 12: 8' T 12 (75W) - 2L | Wall Switch | 158 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.33 | 2,538 | 0.0 | \$230.05 | \$1,672.66 | \$180.00 | 6.49 |
| 136 Tissue | 7 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 7 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.15 | 1,140 | 0.0 | \$103.32 | \$2,927.16 | \$315.00 | 25.28 |
| 138 Wash Closet | 1 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| 137 | 6 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.13 | 977 | 0.0 | \$88.56 | \$2,509.00 | \$270.00 | 25.28 |
| 137 | 1 | Linear Fluorescent - T 12: 4' T 12 (40W) - 4L | Wall Switch | 176 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.09 | 736 | 0.0 | \$66.67 | \$418.17 | \$45.00 | 5.60 |
| AHU 1 SL | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |
| AHU 1 SL | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |
| AHU 1 SL | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |
| Loading Doc | 1 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| Loading Doc | 4 | Metal Halide: (1) 175W Lamp | Wall Switch | 215 | 5,616 | Relamp | No | 4 | LED Screw-In Lamps: LED | Wall Switch | 18 | 5,616 | 0.57 | 4,425 | 0.0 | \$401.06 | \$400.00 | \$40.00 | 0.90 |
| Decomp | 9 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 9 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.28 | 2,173 | 0.0 | \$196.97 | \$3,763.49 | \$405.00 | 17.05 |
| Decomp | 5 | Linear Fluorescent - T 8: 4' T 8 (32W) - 2L | Wall Switch | 62 | 5,616 | Fixture Replacement | No | 5 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.06 | 477 | 0.0 | \$43.26 | \$2,090.83 | \$225.00 | 43.13 |
| 139 | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.06 | 483 | 0.0 | \$43.77 | \$836.33 | \$90.00 | 17.05 |
| 139 | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 4L | Wall Switch | 176 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.19 | 1,471 | 0.0 | \$133.35 | \$836.33 | \$90.00 | 5.60 |
| Elv | 6 | LED - Fixtures: Ambient - 3' - Indirect/Direct Fixture | Wall Switch | 25 | 5,616 | None | No | 6 | LED - Fixtures: Ambient - 3' - Indirect/Direct Fixture | Wall Switch | 25 | 5,616 | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |

| Location | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---------------------------|---------------------|---|----------------|-------------------|------------------------|------------------------|---------------|------------------|---|----------------|-------------------|------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | 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 |
| Con Room | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.06 | 483 | 0.0 | \$43.77 | \$836.33 | \$90.00 | 17.05 |
| Lobby | 15 | Mercury Vapor: (1) 100W Lamp | Wall Switch | 125 | 5,616 | Relamp | No | 15 | LED Screw-In Lamps: LED | Wall Switch | 18 | 5,616 | 1.16 | 9,014 | 0.0 | \$816.88 | \$1,500.00 | \$150.00 | 1.65 |
| 1st Floor Total | 12 | Exit Signs: Incandescent | Wall Switch | 40 | 8,760 | Relamp | No | 12 | LED Screw-In Lamps: 2 W Lamp | Wall Switch | 2 | 8,760 | 0.33 | 3,995 | 0.0 | \$362.01 | \$1,200.00 | \$60.00 | 3.15 |
| Records | 6 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.19 | 1,449 | 0.0 | \$131.31 | \$2,509.00 | \$270.00 | 17.05 |
| Records | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.12 | 966 | 0.0 | \$87.54 | \$1,672.66 | \$180.00 | 17.05 |
| Entrance | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.12 | 966 | 0.0 | \$87.54 | \$1,672.66 | \$180.00 | 17.05 |
| Entrance | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.12 | 966 | 0.0 | \$87.54 | \$1,672.66 | \$180.00 | 17.05 |
| Mens Bathroom | 1 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| Womans Bathroom | 1 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| Conference Room #2 | 6 | Linear Fluorescent - T 8: 4' T 8 (32W) - 2L | Wall Switch | 62 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.07 | 573 | 0.0 | \$51.91 | \$2,509.00 | \$270.00 | 43.13 |
| Conference Room #2 | 1 | Linear Fluorescent - T 8: 4' T 8 (32W) - 1L | Wall Switch | 32 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.01 | 84 | 0.0 | \$7.63 | \$418.17 | \$45.00 | 48.88 |
| Reception | 24 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 24 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.74 | 5,796 | 0.0 | \$525.25 | \$10,035.98 | \$1,080.00 | 17.05 |
| Reception | 5 | Linear Fluorescent - T 12: 4' T 12 (40W) - 4L | Wall Switch | 176 | 5,616 | Fixture Replacement | No | 5 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.47 | 3,678 | 0.0 | \$333.37 | \$2,090.83 | \$225.00 | 5.60 |
| Reception | 1 | Halogen Incandescent: PAR | Wall Switch | 60 | 5,616 | Relamp | No | 1 | LED Screw-In Lamps: LED | Wall Switch | 18 | 5,616 | 0.03 | 236 | 0.0 | \$21.38 | \$100.00 | \$10.00 | 4.21 |
| 103 | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.12 | 966 | 0.0 | \$87.54 | \$1,672.66 | \$180.00 | 17.05 |
| 104 | 3 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 3 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.09 | 724 | 0.0 | \$65.66 | \$1,254.50 | \$135.00 | 17.05 |
| 105 | 3 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 3 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.09 | 724 | 0.0 | \$65.66 | \$1,254.50 | \$135.00 | 17.05 |
| 106 | 3 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 3 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.09 | 724 | 0.0 | \$65.66 | \$1,254.50 | \$135.00 | 17.05 |
| 107 | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.06 | 483 | 0.0 | \$43.77 | \$836.33 | \$90.00 | 17.05 |
| 108 | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.06 | 483 | 0.0 | \$43.77 | \$836.33 | \$90.00 | 17.05 |
| 2nd Floor Mens Bathroom | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.12 | 966 | 0.0 | \$87.54 | \$1,672.66 | \$180.00 | 17.05 |
| 2nd Floor Mens Bathroom | 2 | Linear Fluorescent - T 12: 3' T 12 (30W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |
| 2nd Floor Mens Bathroom | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |
| 2nd Floor Womens Bathroom | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.12 | 966 | 0.0 | \$87.54 | \$1,672.66 | \$180.00 | 17.05 |
| 2nd Floor Womens Bathroom | 2 | Linear Fluorescent - T 12: 3' T 12 (30W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |

| Location | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---------------------------|---------------------|---|----------------|-------------------|------------------------|------------------------|---------------|------------------|---|----------------|-------------------|------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | 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 |
| 2nd Floor Womens Bathroom | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |
| Lunch Area | 8 | Mercury Vapor: (1) 175W Lamp | Wall Switch | 205 | 5,616 | Fixture Replacement | No | 8 | | Wall Switch | 45 | 5,616 | 0.92 | 7,188 | 0.0 | \$651.47 | \$800.00 | \$0.00 | 1.23 |
| 202 | 4 | Mercury Vapor: (1) 175W Lamp | Wall Switch | 205 | 5,616 | Fixture Replacement | No | 4 | | Wall Switch | 45 | 5,616 | 0.46 | 3,594 | 0.0 | \$325.74 | \$400.00 | \$0.00 | 1.23 |
| 207 | 18 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 18 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.38 | 2,932 | 0.0 | \$265.68 | \$7,526.99 | \$810.00 | 25.28 |
| Kitchen | 6 | Mercury Vapor: (1) 175W Lamp | Wall Switch | 205 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: LED | Wall Switch | 45 | 5,616 | 0.69 | 5,391 | 0.0 | \$488.60 | \$600.00 | \$0.00 | 1.23 |
| 206 | 1 | Halogen Incandescent: PAR | Wall Switch | 60 | 5,616 | Relamp | No | 1 | LED Screw-In Lamps: LED | Wall Switch | 18 | 5,616 | 0.03 | 236 | 0.0 | \$21.38 | \$130.00 | \$10.00 | 5.61 |
| Business Area | 6 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.13 | 977 | 0.0 | \$88.56 | \$2,509.00 | \$270.00 | 25.28 |
| Business Area | 3 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 3 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.09 | 724 | 0.0 | \$65.66 | \$1,254.50 | \$135.00 | 17.05 |
| 216 | 6 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.19 | 1,449 | 0.0 | \$131.31 | \$2,509.00 | \$270.00 | 17.05 |
| 205 | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.12 | 966 | 0.0 | \$87.54 | \$1,672.66 | \$180.00 | 17.05 |
| 204 | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.04 | 326 | 0.0 | \$29.52 | \$836.33 | \$90.00 | 25.28 |
| 207 | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.08 | 651 | 0.0 | \$59.04 | \$1,672.66 | \$180.00 | 25.28 |
| 239 | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 3L | Wall Switch | 127 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.24 | 1,842 | 0.0 | \$166.94 | \$1,672.66 | \$180.00 | 8.94 |
| 234 | 4 | Linear Fluorescent - T 12: 4' T 12 (40W) - 3L | Wall Switch | 127 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.24 | 1,842 | 0.0 | \$166.94 | \$1,672.66 | \$180.00 | 8.94 |
| 235 | 3 | Linear Fluorescent - T 12: 4' T 12 (40W) - 3L | Wall Switch | 127 | 5,616 | Fixture Replacement | No | 3 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.18 | 1,382 | 0.0 | \$125.20 | \$1,254.50 | \$135.00 | 8.94 |
| 234 | 6 | Linear Fluorescent - T 12: 4' T 12 (40W) - 3L | Wall Switch | 127 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.35 | 2,763 | 0.0 | \$250.41 | \$2,509.00 | \$270.00 | 8.94 |
| 234 | 12 | Linear Fluorescent - T 12: 4' T 12 (40W) - 3L | Wall Switch | 127 | 5,616 | Fixture Replacement | No | 12 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.71 | 5,526 | 0.0 | \$500.82 | \$5,017.99 | \$540.00 | 8.94 |
| Hallway 2nd | 12 | Linear Fluorescent - T 12: 4' T 12 (40W) - 4L | Wall Switch | 176 | 5,616 | Fixture Replacement | No | 12 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 1.13 | 8,828 | 0.0 | \$800.09 | \$5,017.99 | \$540.00 | 5.60 |
| Hallway 2nd | 14 | Linear Fluorescent - T 12: 4' T 12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 14 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.29 | 2,280 | 0.0 | \$206.64 | \$5,854.32 | \$630.00 | 25.28 |
| 225 | 8 | Linear Fluorescent - T 12: 8' T 12 (75W) - 2L | Wall Switch | 158 | 5,616 | Fixture Replacement | No | 8 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.65 | 5,077 | 0.0 | \$460.10 | \$3,345.33 | \$360.00 | 6.49 |
| 227 | 2 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.06 | 483 | 0.0 | \$43.77 | \$836.33 | \$90.00 | 17.05 |
| 226 | 7 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 7 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.22 | 1,690 | 0.0 | \$153.20 | \$2,927.16 | \$315.00 | 17.05 |
| 221 | 12 | Linear Fluorescent - T 12: 4' T 12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 12 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.37 | 2,898 | 0.0 | \$262.62 | \$5,017.99 | \$540.00 | 17.05 |
| 221 | 3 | Linear Fluorescent - T 12: 4' T 12 (40W) - 4L | Wall Switch | 176 | 5,616 | Fixture Replacement | No | 3 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.28 | 2,207 | 0.0 | \$200.02 | \$1,254.50 | \$135.00 | 5.60 |
| Stairwells | 12 | Halogen Incandescent: PAR | Wall Switch | 60 | 5,616 | Relamp | No | 12 | LED Screw-In Lamps: LED | Wall Switch | 18 | 5,616 | 0.36 | 2,830 | 0.0 | \$256.52 | \$1,200.00 | \$120.00 | 4.21 |

| Location | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|----------|---------------------|---|----------------|-------------------|------------------------|------------------------|---------------|------------------|---|----------------|-------------------|------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | 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 |
| 220 | 1 | Linear Fluorescent - T12: 4' T12 (40W) - 1L | Wall Switch | 46 | 5,616 | Fixture Replacement | No | 1 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 17 | 5,616 | 0.02 | 163 | 0.0 | \$14.76 | \$418.17 | \$45.00 | 25.28 |
| 214 | 16 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 16 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.50 | 3,864 | 0.0 | \$350.17 | \$6,690.66 | \$720.00 | 17.05 |
| 218 | 6 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 6 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.19 | 1,449 | 0.0 | \$131.31 | \$2,509.00 | \$270.00 | 17.05 |
| 277 | 12 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 12 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.37 | 2,898 | 0.0 | \$262.62 | \$5,017.99 | \$540.00 | 17.05 |
| 206 | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | Wall Switch | 176 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.19 | 1,471 | 0.0 | \$133.35 | \$836.33 | \$90.00 | 5.60 |
| 206 | 3 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 3 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.09 | 724 | 0.0 | \$65.66 | \$1,254.50 | \$135.00 | 17.05 |
| 231 | 4 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | Wall Switch | 176 | 5,616 | Fixture Replacement | No | 4 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.38 | 2,943 | 0.0 | \$266.70 | \$1,672.66 | \$180.00 | 5.60 |
| 231 | 9 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 9 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.28 | 2,173 | 0.0 | \$196.97 | \$3,763.49 | \$405.00 | 17.05 |
| 210 | 3 | Linear Fluorescent - T12: 4' T12 (40W) - 2L | Wall Switch | 88 | 5,616 | Fixture Replacement | No | 3 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.09 | 724 | 0.0 | \$65.66 | \$1,254.50 | \$135.00 | 17.05 |
| 211 | 2 | Linear Fluorescent - T12: 4' T12 (40W) - 4L | Wall Switch | 176 | 5,616 | Fixture Replacement | No | 2 | LED - Fixtures: Ambient - 4' - Direct Fixture | Wall Switch | 45 | 5,616 | 0.19 | 1,471 | 0.0 | \$133.35 | \$836.33 | \$90.00 | 5.60 |
| Outside | 22 | Mercury Vapor: (1) 250W Lamp | None | 290 | 2,300 | Fixture Replacement | No | 22 | LED - Fixtures: LED | None | 18 | 2,300 | 4.31 | 13,763 | 0.0 | \$1,247.32 | \$2,200.00 | \$0.00 | 1.76 |

Motor Inventory & Recommendations

| Location | Area(s)/System(s) Served | Existing Conditions | | | | | | Proposed Conditions | | | | Energy Impact & Financial Analysis | | | | | | |
|----------|--------------------------|---------------------|------------------------|--------------|----------------------|--------------|------------------------|---------------------------------|----------------------|---------------|----------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | | 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 |
| EF1 | Room 235 | 13 | Exhaust Fan | 5.1 | 75.0% | No | 4,000 | Yes | 89.5% | No | | 7.91 | 32,052 | 0.0 | \$2,904.79 | \$15,983.37 | \$0.00 | 5.50 |
| AHU 1 | 1st Floor | 1 | Supply Fan | 7.5 | 83.0% | Yes | 4,000 | Yes | 91.7% | No | | 0.47 | 1,919 | 0.0 | \$173.88 | \$1,153.79 | \$0.00 | 6.64 |
| AHU 2 | 2nd Floor | 1 | Supply Fan | 7.5 | 83.0% | Yes | 4,000 | Yes | 91.7% | No | | 0.47 | 1,919 | 0.0 | \$173.88 | \$1,153.79 | \$0.00 | 6.64 |
| AHU 3 | Misc Loads | 1 | Supply Fan | 7.5 | 83.0% | Yes | 4,000 | Yes | 91.7% | No | | 0.47 | 1,919 | 0.0 | \$173.88 | \$1,153.79 | \$0.00 | 6.64 |
| AHU 4 | Misc Loads | 1 | Supply Fan | 1.0 | 87.0% | No | 4,000 | No | 87.0% | No | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| AHU 5 | Misc Loads | 1 | Supply Fan | 1.0 | 87.0% | Yes | 4,000 | No | 87.0% | No | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| AHU 6 | Misc Loads | 1 | Supply Fan | 1.0 | 87.0% | No | 4,000 | No | 87.0% | No | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| MAU 1 | Autopsy | 1 | Supply Fan | 8.5 | 78.0% | No | 4,000 | Yes | 91.7% | No | | 0.90 | 3,644 | 0.0 | \$330.21 | \$1,153.79 | \$0.00 | 3.49 |
| RTU 1,2 | Administrative | 2 | Supply Fan | 5.0 | 87.0% | No | 4,000 | Yes | 89.5% | No | | 0.18 | 719 | 0.0 | \$65.12 | \$1,842.12 | \$0.00 | 28.29 |
| HWPumps | Facility | 2 | Heating Hot Water Pump | 5.0 | 89.5% | No | 3,200 | Yes | 89.5% | No | | 0.00 | 0 | 0.0 | \$0.00 | \$1,842.12 | \$0.00 | 0.00 |
| CHWPumps | Facility | 2 | Chilled Water Pump | 5.0 | 89.5% | Yes | 3,200 | Yes | 89.5% | No | | 0.00 | 0 | 0.0 | \$0.00 | \$1,842.12 | \$0.00 | 0.00 |
| CWPumps | Facility | 2 | Condenser Water Pump | 1.5 | 80.0% | Yes | 3,200 | Yes | 87.5% | No | | 0.18 | 575 | 0.0 | \$52.15 | \$1,517.09 | \$0.00 | 29.09 |
| EF14 | Room 236 (GX) | 1 | Exhaust Fan | 0.3 | 75.0% | No | 4,000 | No | 75.0% | No | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| EF15 | Rooms 233/234 | 1 | Exhaust Fan | 0.5 | 75.0% | No | 4,000 | Yes | 78.2% | No | | 0.02 | 61 | 0.0 | \$5.53 | \$615.12 | \$0.00 | 111.17 |
| EF16/17 | Rooms 128/139/144 | 1 | Exhaust Fan | 5.0 | 85.0% | No | 4,000 | Yes | 89.5% | Yes | 1 | 2.01 | 8,514 | 0.0 | \$771.61 | \$4,196.91 | \$400.00 | 4.92 |
| EF18/19 | Rooms 146/147 | 1 | Exhaust Fan | 5.0 | 85.0% | No | 4,000 | Yes | 89.5% | Yes | 1 | 2.01 | 8,514 | 0.0 | \$771.61 | \$4,196.91 | \$400.00 | 4.92 |
| EF20 | Room 122 | 1 | Exhaust Fan | 0.3 | 75.0% | No | 4,000 | No | 75.0% | No | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| EF22 | Room 147 | 1 | Exhaust Fan | 0.5 | 75.0% | No | 4,000 | Yes | 78.2% | No | | 0.02 | 61 | 0.0 | \$5.53 | \$615.12 | \$0.00 | 111.17 |
| EF22 | Rooms 217/218/219 | 1 | Exhaust Fan | 0.3 | 75.0% | No | 4,000 | No | 75.0% | No | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| RAF1 | AHU / Return Air | 1 | Exhaust Fan | 1.5 | 75.0% | No | 4,000 | Yes | 87.5% | Yes | 1 | 0.71 | 3,005 | 0.0 | \$272.36 | \$3,391.00 | \$120.00 | 12.01 |

Electric HVAC Inventory & Recommendations

| Location | Area(s)/System(s) Served | Existing Conditions | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | | | |
|----------|---------------------------------|---------------------|------------------------|----------------------------------|-------------------------------------|---------------------------------|-----------------|-------------|----------------------------------|-------------------------------------|------------------------------------|-------------------------------|-----------------------------------|-----------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|
| | | 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 |
| Roof | Room 235 | 1 | Ductless Mini-Split AC | 2.50 | | No | | | | | | Yes | #N/A | #N/A | 0.0 | #N/A | \$500.00 | \$0.00 | #N/A |
| RTU -2 | Refridgeration | 1 | Packaged AC | 15.00 | | No | | | | | | Yes | #N/A | #N/A | 0.0 | #N/A | \$900.00 | \$0.00 | #N/A |
| MAU -1 | Autopsy Make Up Air / DX / Heat | 1 | Packaged AC | 15.00 | | Yes | 1 | Packaged AC | 15.00 | | 11.50 | No | 1.82 | 8,146 | 0.0 | \$738.20 | \$20,907.75 | \$1,185.00 | 26.72 |

Electric Chiller Inventory & Recommendations

| Location | Area(s)/System(s) Served | Existing Conditions | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | | |
|-----------------|--------------------------|---------------------|---------------------------|----------------------------------|-----------------------------------|------------------|-------------|--------------------------|-------------------------|-------------------------------|------------------------------------|-----------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | | Chiller Quantity | System Type | Cooling Capacity per Unit (Tons) | Install High Efficiency Chillers? | Chiller Quantity | System Type | Constant/ Variable Speed | Cooling Capacity (Tons) | Full Load Efficiency (kW/Ton) | IPLV Efficiency (kW/Ton) | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Mechanical Room | AHU's | 1 | Air-Cooled Scroll Chiller | 96.00 | No | | | | | | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |

Fuel Heating Inventory & Recommendations

| Location | Area(s)/System(s) Served | Existing Conditions | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | | |
|-----------------|--------------------------------------|---------------------|---------------------------------|--------------------------------|---------------------------------|-----------------|-----------------------------|--------------------------------|--------------------|--------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|------|
| | | 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 | |
| Loading Dock | Reznor Hanging Unit | 2 | Warm Air Unit Heater | 150.00 | No | | | | | | | 0.00 | 0 | 0.0 | \$0.00 | \$0.00 | \$0.00 | 0.00 |
| Mechanical Room | Space Heating / HW Boiler / Seris 28 | 2 | Non-Condensing Hot Water Boiler | 2,100.00 | Yes | 2 | Condensing Hot Water Boiler | 2,100.00 | 94.00% | Et | 0.00 | 0 | 160.4 | \$1,351.59 | \$80,217.15 | \$9,240.00 | 52.51 | |

Programmable Thermostat Recommendations

| Location | Area(s)/System(s) Affected | Recommendation Inputs | | | | Energy Impact & Financial Analysis | | | | | | |
|----------|----------------------------|-----------------------|--|--|--|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | | Thermostat Quantity | Cooling Capacity of Controlled System (Tons) | Electric Heating Capacity of Controlled System (kBtu/hr) | Output Heating Capacity of Controlled System (MBh) | 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 |
| BMS | Entire Building | 40 | 150.00 | 1,500.00 | 3,500.00 | 0.00 | 13,340 | 285.6 | \$3,615.17 | \$13,194.80 | \$0.00 | 3.65 |

DHW Inventory & Recommendations

| Location | Area(s)/System(s) Served | Existing Conditions | | Proposed Conditions | | | | | | Energy Impact & Financial Analysis | | | | | | |
|-----------|--------------------------|---------------------|--------------------------------------|---------------------|-----------------|--------------------------------------|-------------|-------------------|------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | | 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 |
| 1st Floor | DHW Loads | 1 | Storage Tank Water Heater (> 50 Gal) | Yes | 1 | Storage Tank Water Heater (> 50 Gal) | Natural Gas | 95.00% | Et | 0.00 | 0 | 12.2 | \$102.43 | \$11,500.21 | \$398.00 | 108.39 |
| 2nd Floor | DHW Loads | 1 | Storage Tank Water Heater (> 50 Gal) | Yes | 1 | Storage Tank Water Heater (> 50 Gal) | Natural Gas | 95.00% | Et | 0.00 | 0 | 12.2 | \$102.43 | \$11,500.21 | \$398.00 | 108.39 |

Low-Flow Device Recommendations

| Location | Recommendation Inputs | | | | Energy Impact & Financial Analysis | | | | | | |
|------------|-----------------------|---------------------------|--------------------------|--------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | Device Quantity | Device Type | Existing Flow Rate (gpm) | Proposed Flow Rate (gpm) | 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 |
| Throughout | 40 | Faucet Aerator (Lavatory) | 2.50 | 1.00 | 0.00 | 0 | 113.7 | \$957.96 | \$3,600.00 | \$0.00 | 3.76 |
| Throughout | 5 | Faucet Aerator (Kitchen) | 2.50 | 2.20 | 0.00 | 0 | 2.8 | \$23.95 | \$450.00 | \$0.00 | 18.79 |

Walk-In Cooler/Freezer Inventory & Recommendations

| Location | Existing Conditions | | Proposed Conditions | | | Energy Impact & Financial Analysis | | | | | | |
|--------------------------|-------------------------|---------------------------------|-----------------------------------|-----------------------------------|---------------------------------|------------------------------------|--------------------------|----------------------------|----------------------------------|-------------------------|------------------|---------------------------------------|
| | Cooler/Freezer Quantity | Case Type/Temperature | Install EC Evaporator Fan Motors? | Install Electric Defrost Control? | Install Evaporator Fan Control? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Storage / 2nd Floor Mech | 1 | Medium Temp Freezer (0F to 30F) | Yes | No | Yes | 0.07 | 6,000 | 0.0 | \$543.73 | \$3,190.50 | \$275.00 | 5.36 |
| Cooling Tower Landing | 1 | Medium Temp Freezer (0F to 30F) | Yes | No | Yes | 0.07 | 6,000 | 0.0 | \$543.73 | \$2,280.60 | \$155.00 | 3.91 |
| Outside Aeon | 1 | Low Temp Freezer (-35F to -5F) | Yes | No | Yes | 0.07 | 6,000 | 0.0 | \$543.73 | \$2,583.90 | \$195.00 | 4.39 |

Plug Load Inventory

| Existing Conditions | | | | |
|---------------------|----------|--------------------------|-----------------|------------------------|
| Location | Quantity | Equipment Description | Energy Rate (W) | ENERGY STAR Qualified? |
| Conference Room #2 | 1 | Refrigerator Residential | 250.0 | No |
| Conference Room #2 | 1 | HotPot | 75.0 | No |
| 207 | 1 | TV | 175.0 | Yes |
| Kitchen | 1 | Refrigerator Residential | 250.0 | No |
| Kitchen | 1 | HotPot | 75.0 | No |
| Lab 239 | 1 | Process / Testing | 4,000.0 | No |
| Lab 238 | 1 | Process / Testing | 4,000.0 | No |
| Lab 237 | 1 | Process / Testing | 4,000.0 | No |
| Lab 236 | 1 | Process / Testing | 4,000.0 | No |
| Lab 235 | 1 | Process / Testing | 4,000.0 | No |
| Lab 234 | 1 | Process / Testing | 4,000.0 | No |
| Lab 233 | 1 | Process / Testing | 4,000.0 | No |
| Autopsy | 1 | Process / Testing | 4,000.0 | No |
| Decomp | 1 | Process / Testing | 4,000.0 | No |

Appendix B: ENERGY STAR[®] Statement of Energy Performance

The ENERGY STAR[®] Statement of Energy Performance has been requested, but none provided at the time of this report.