# Local Government Energy Audit:
## Energy Audit Report

**Presbyterian Church of Lawrenceville**
2688 Main Street
Lawrenceville, NJ 08648

June 21, 2018

Final Report by:
**TRC Energy Services**

# Disclaimer

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

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

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

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

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# 1 EXECUTIVE SUMMARY

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

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, as part of a comprehensive effort to assist New Jersey nonprofits in controlling energy costs and protecting our environment by offering a full spectrum of energy management options.

## 1.1 Facility Summary

Presbyterian Church of Lawrenceville is a 24,000 square foot facility comprised of a sanctuary, kitchen, offices and a pre-school. The building is a single floor with a small attic used for storage purposes. The spaces are connected by hallways of framed glass.

Presbyterian Church of Lawrenceville upgraded much of its lighting to LED around 2014 using the SmartStart Prescriptive Lighting program to help reduce installation costs. The HVAC equipment was installed around 2004. The primary heating source is fuel oil and primary cooling is electric. A thorough description of the facility and our observations are located in Section 2.

## 1.2 Your Cost Reduction Opportunities

### Energy Conservation Measures

TRC Energy Services evaluated 6 projects which represent an opportunity to reduce annual energy costs by $3,169 and annual greenhouse gas emissions by 22,622 lbs $CO_2e$. The measures would pay for themselves in 4.9 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 Presbyterian Church of Lawrenceville's annual energy use by 19.4%.

*Figure 1 – Previous 12 Month Utility Costs*

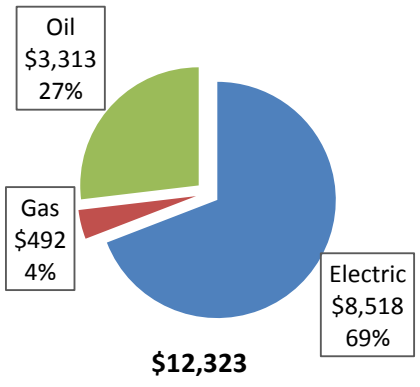
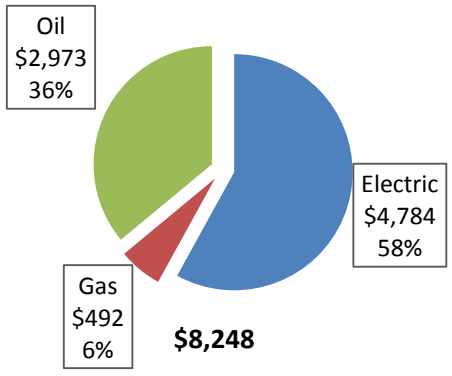



*Figure 2 – Potential Post-Implementation Costs*



A detailed description of Presbyterian Church of Lawrenceville's existing energy use can be found in Section 3, "Site Energy Use and Costs".

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, "Energy Conservation Measures". Measures without an "ECM #" in the table below have been evaluated, but are not recommended for implementation.

*Figure 3 – Summary of Energy Reduction Opportunities*

| Energy Conservation Measure | | Recommend? | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | | **15,167** | **5.5** | **0.0** | **$2,308.20** | **$15,698.76** | **$1,780.00** | **$13,918.76** | **6.03** | **15,274** |
| ECM 1 | Install LED Fixtures | Yes | 1,974 | 0.3 | 0.0 | $300.46 | $3,125.42 | $800.00 | $2,325.42 | 7.74 | 1,988 |
| ECM 2 | Retrofit Fixtures with LED Lamps | Yes | 6,244 | 4.6 | 0.0 | $950.24 | $10,637.36 | $980.00 | $9,657.36 | 10.16 | 6,288 |
| ECM 3 | Install LED Exit Signs | Yes | 6,949 | 0.6 | 0.0 | $1,057.50 | $1,935.99 | $0.00 | $1,935.99 | 1.83 | 6,998 |
| **Lighting Control Measures** | | | **1,734** | **0.8** | **0.0** | **$263.96** | **$2,356.00** | **$680.00** | **$1,676.00** | **6.35** | **1,747** |
| ECM 4 | Install Occupancy Sensor Lighting Controls | Yes | 846 | 0.7 | 0.0 | $128.75 | $1,856.00 | $320.00 | $1,536.00 | 11.93 | 852 |
| ECM 5 | Install Daylight Dimming Controls | Yes | 888 | 0.1 | 0.0 | $135.21 | $500.00 | $360.00 | $140.00 | 1.04 | 895 |
| **Domestic Water Heating Upgrade** | | | **1,683** | **0.0** | **23.9** | **$596.87** | **$71.70** | **$0.00** | **$71.70** | **0.12** | **5,602** |
| ECM 6 | Install Low-Flow Domestic Hot Water Devices | Yes | 1,683 | 0.0 | 23.9 | $596.87 | $71.70 | $0.00 | $71.70 | 0.12 | 5,602 |
| **TOTALS** | | | **18,585** | **6.3** | **23.9** | **$3,169.02** | **$18,126.46** | **$2,460.00** | **$15,666.46** | **4.94** | **22,622** |

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

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

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

**Lighting Controls** measures generally involve the installation of automated controls to turn off lights or reduce light output when conditions allow. Automated control reduces reliance on occupant behavior for adjusting lights. These measures save energy by reducing the amount of time lights are on.

**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.

## Energy Efficient Practices

TRC Energy Services also identified 9 no/low 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 Presbyterian Church of Lawrenceville include:

- Reduce Air Leakage
- Close Doors and Windows
- Use Window Treatments/Coverings
- Perform Lighting Maintenance
- Develop a Lighting Maintenance Schedule

- Ensure Lighting Controls Are Operating Properly
- Use Thermostat Schedules and Temperature Resets
- Clean and/or Replace HVAC Filters
- Water Conservation

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

### Self-Generation Measures

TRC Energy Services evaluated the potential for installing self-generation sources for Presbyterian Church of Lawrenceville. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures. For details on our evaluation and the self-generation potential, please refer to Section 6.

## 1.3 Implementation Planning

To realize the energy savings from the ECMs listed in this report, the equipment changes outlined for each ECM need to be selected and installed through project implementation. One of the first considerations is if there is capital available for project implementation. Another consideration is whether to pursue individual ECMs, a group of ECMs, or a comprehensive approach wherein all ECMs are pursued, potentially in conjunction with other facility projects or improvements.

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

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

- SmartStart
- Direct Install

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 SS incentives, so only after receiving approval may the ECM(s) be installed. The incentive values listed above in Figure 3 represent the SS program and will be explained further in Section 7, as well as the other programs as mentioned below.

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

Additional descriptions of all relevant incentive programs are located in Section 7. 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** | | | |
| Jeanne Aicher | Church Administrator | jaicher@pclawrenceville.org | 609-896-1212 x 109 |
| **TRC Energy Services** | | | |
| Smruti Srinivasan | Auditor | ssrinivasan@trcsolutions.com | (732) 855-0033 |

## 2.2 General Site Information

On October 18, 2016, TRC performed an energy audit at Presbyterian Church of Lawrenceville located in Lawrenceville, NJ. TRC's team met with Jeanne Aicher to review the facility operations and focus the investigation on specific energy-using systems.

Presbyterian Church of Lawrenceville is a 24,000 square foot facility comprised of various space types including a church sanctuary, kitchen, pre-school classrooms, a gym, and office spaces, which are connected by walkways. This is a single story building with a small attic used for storage.

Presbyterian Church of Lawrenceville upgraded much of the lighting to LED around 2014 via the SmartStart Prescriptive Lighting program. HVAC equipment was installed around 2004. The primary heating source is fuel oil and primary cooling is electric. Natural gas consumption is primarily for kitchen equipment.

## 2.3 Building Occupancy

The pre-school and offices are open during the weekdays between 9AM and 1PM and closed during the weekends. The church areas are not functional during the weekdays but are used during the weekends. The church is operated by approximately 12 full-time employees. The typical schedule is presented in the table below. The pre-school is functional only from September to May and has 5 full-time staff.

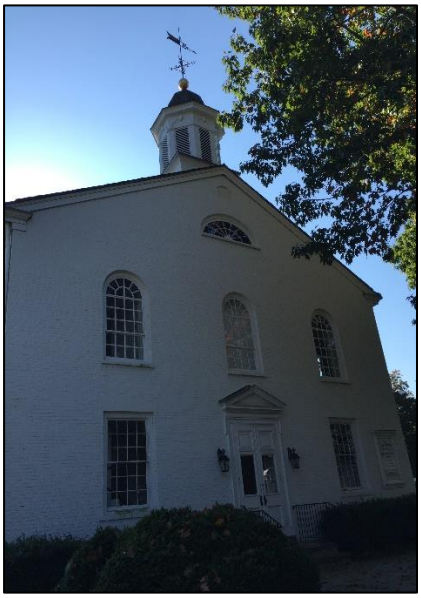
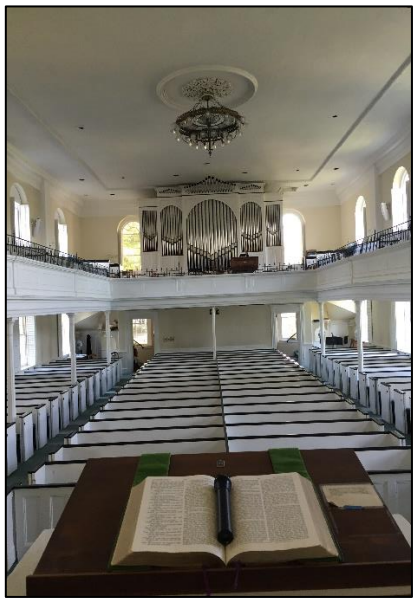
*Figure 5 - Building Schedule*

| Building Name | Weekday/Weekend | Operating Schedule |
|---|---|---|
| Preschool and offices | Weekday | 9AM - 1PM |
| Preschool and offices | Weekend | Closed |
| Church | Weekday | Not Operational |
| Church | Weekend | Saturday 9AM - 1PM<br>Sunday 8AM - 12 PM<br>Sunday 5 PM - 9 PM |

## 2.4 Building Envelope

The building has a brick façade and sheet rock dividing walls. The spaces are connected by walkways that have framed glass construction with single pane glasses. In 1998, the facility implemented a preservation project which included insulating the building, however only single pane windows were installed as a means of preserving the aesthetic look of the church. The corridors do not seem to have any air infiltration but it was observed to be colder compared to areas having double pane windows. The building has a

pitched roof and flat roof in sections which were observed to be in good condition. The windows throughout the exterior are old, arched and single pane windows.


## 2.5 On-site Generation

Presbyterian Church of Lawrenceville does not have any on-site electric generation capacity.

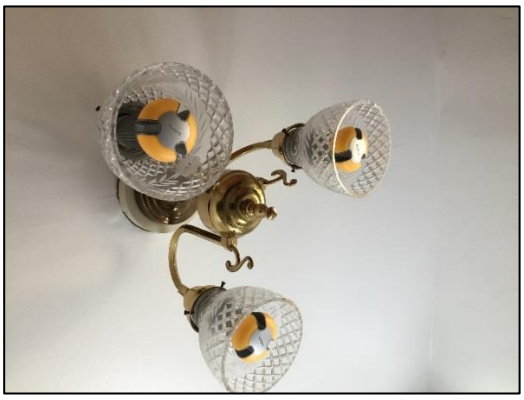
## 2.6 Energy-Using Systems

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

### Lighting System

Lighting is provided predominately by linear 32-Watt fluorescent U-bent T8 lamps with electronic ballasts, LED screw-in lamps as well as compact fluorescent lamps (CFL). Lighting control in most spaces is provided by wall switches. The occupancy sensors are either wall or ceiling mounted depending on the space layout.

The building has exterior lighting, which primarily consists of efficient LED fixtures in garden lightings and high pressure sodium lamps in wall packs. Exterior lighting is controlled by timer.

## Hot Water / Steam System

The heating system consists of two oil, non-condensing hot water boilers with 1110 MBH and 396 MBH output capacity per unit, serving the offices (& sanctuary) and classrooms, respectively. The boilers have a nominal combustion efficiency of 83%. Each boiler is supplied by a dedicated 1 HP and 0.5 HP pump.

The boilers operate simultaneously as they are serving different areas. They were installed around 2004, are in good condition and are well maintained. However, when the boilers are nearing the end of their useful life, the church should consider evaluating the possibility of converting to natural gas-fired condensing hot water boilers.

## Air Conditioning (DX)

Two packaged units, manufactured by Lennox and York, with capacities of 3 and 5 tons which serve the office spaces in the building. These are located on the rooftop. The units are constant air volume with a single 1/2 HP supply fan and no return fan. The areas cooled by packaged units are controlled by individual programmable thermostats in individual zones.

The pre-school classrooms are cooled using window AC units. All of the AC units are over 13 years old and are inefficient. At the end of their useful lives, we recommend that they be replaced with high efficiency ENERGY STAR® rated AC units.

## Domestic Hot Water

The domestic hot water system includes two types of water heaters serving different areas. One (1) Bradford White electric water heater with a 19 gallon capacity serves the office spaces. The second unit is manufactured by Boiler Mate and is an Amtrolan indirect system that heats the water using fuel oil, with an input capacity of 396 MBh and a tank capacity of 41 gallons. This unit serves the pre-school classrooms. The oil-fired system has an efficiency of 83.2% and is at the end of its useful life, therefore we recommend evaluating the possibility of converting to a natural gas-fired, condensing hot water heater.



## Food Service & Refrigeration Equipment

The school has an all-gas kitchen used to prepare lunches, which consists of a gas stove/oven with 10 burners and 2 ovens, under-the-counter dishwasher and commercial refrigerators and freezers. The kitchen is the only space making use of natural gas in the building.


### Plug Load

There were roughly 8 computers and 5 laptops observed in the facility. Other plug load equipment includes printers, refrigerators, coffee machines, LED TV, kettles, fans, etc. There is no centralized PC power management software currently installed.

## 2.7 Water-Using Systems

There are 6 restrooms at this facility. A sampling of restrooms found that all of the faucets are rated approximately for 2.5 gpm or higher, the toilets are rated at 2.5 gallons per flush and the urinals are rated at 2 gallons per flush.

# 3 SITE ENERGY USE AND COSTS

Utility data for electricity, natural gas and No. 2 fuel oil were analyzed to identify opportunities for savings and to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Refer to the Benchmarking section within Section 0 for additional information.

## 3.1 Total Cost of Energy

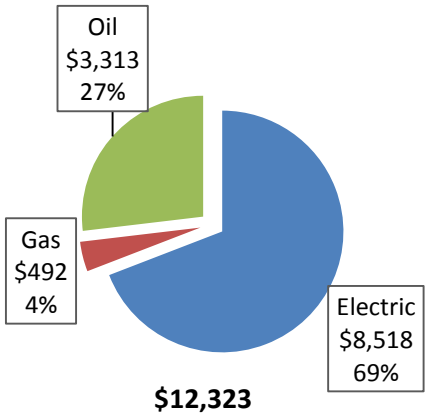
The following energy consumption and cost data is based on the last 12 month period of utility usage data that was provided for each utility. The annual consumption and cost was developed from this information.

*Figure 6 - Utility Summary*

| Utility Summary for Presybeterian Church of Lawrenceville | | |
|---|---|---|
| **Fuel** | **Usage** | **Cost** |
| Electricity | 49,560 kWh | $8,518 |
| Natural Gas | 491 Therms | $492 |
| No. 2 Fuel Oil | 1,675 Gallons | $3,313 |
| **Total** | | **$12,323** |

The current utility cost for this site is $12,323 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 $0.152/kWh, which is the blended rate used throughout the analyses in this report. The monthly electricity consumption and peak demand is represented graphically in the chart below.

*Figure 8 - Electric Usage & Demand*

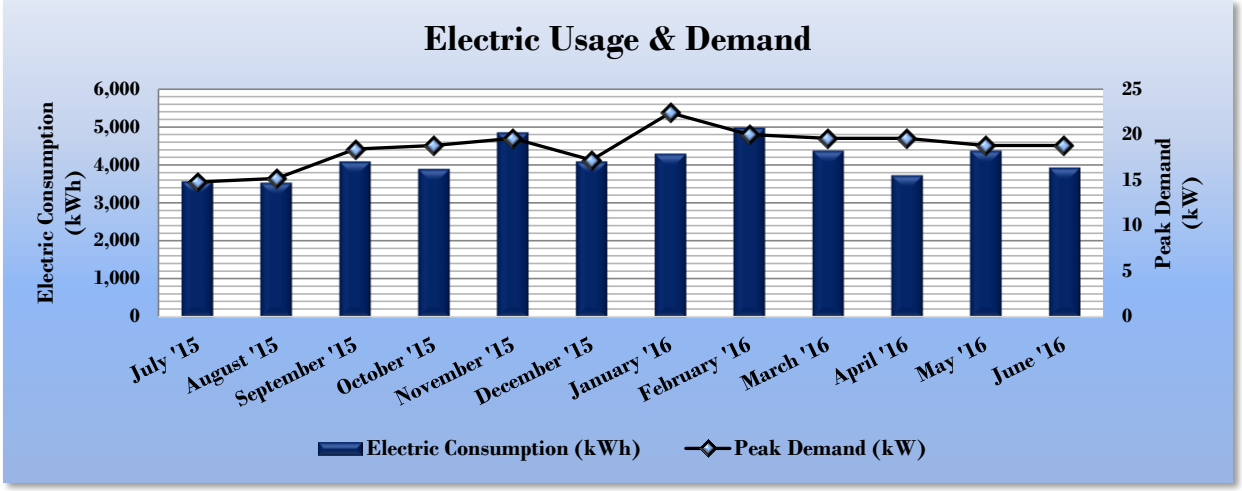



*Figure 9 - Electric Usage & Demand*

| Electric Billing Data for Presybeterian Church of Lawrenceville | | | | | |
|---|---|---|---|---|---|
| Period Ending | Days in Period | Electric Usage (kWh) | Demand (kW) | Demand Cost | Total Electric Cost |
| 7/30/15 | 30 | 3,560 | 15 | $64 | $776 |
| 8/28/15 | 29 | 3,520 | 15 | $66 | $776 |
| 9/29/15 | 32 | 4,080 | 18 | $80 | $830 |
| 10/28/15 | 29 | 3,880 | 19 | $82 | $634 |
| 11/30/15 | 33 | 4,840 | 20 | $86 | $722 |
| 12/30/15 | 30 | 4,080 | 17 | $75 | $640 |
| 1/29/16 | 30 | 4,280 | 22 | $98 | $669 |
| 3/1/16 | 32 | 4,960 | 20 | $87 | $710 |
| 3/31/16 | 30 | 4,360 | 20 | $86 | $675 |
| 4/29/16 | 29 | 3,720 | 20 | $86 | $617 |
| 5/31/16 | 32 | 4,360 | 19 | $83 | $648 |
| 6/29/16 | 29 | 3,920 | 19 | $83 | $821 |
| **Totals** | **365** | **49,560** | **22.4** | **$976** | **$8,518** |
| **Annual** | **365** | **49,560** | **22.4** | **$976** | **$8,518** |

## 3.3 Natural Gas Usage

Natural Gas is provided by PSE&G. The average gas cost for the past 12 months is $1.002/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*

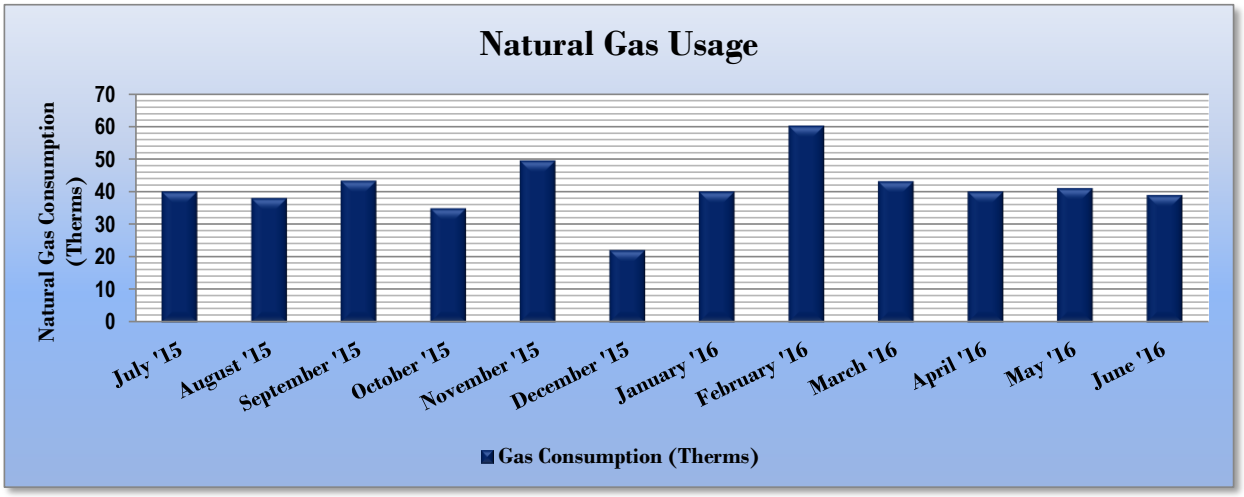



*Figure 11 - Natural Gas Usage*

| Gas Billing Data for Presybeterian Church of Lawrenceville | | | |
|---|---|---|---|
| Period Ending | Days in Period | Natural Gas Usage (Therms) | Natural Gas Cost |
| 7/30/15 | 30 | 40 | $42 |
| 8/28/15 | 29 | 38 | $41 |
| 9/29/15 | 32 | 43 | $45 |
| 10/28/15 | 29 | 35 | $37 |
| 11/30/15 | 33 | 49 | $48 |
| 12/30/15 | 30 | 22 | $29 |
| 1/29/16 | 30 | 40 | $29 |
| 3/1/16 | 32 | 60 | $57 |
| 3/31/16 | 30 | 43 | $42 |
| 4/29/16 | 29 | 40 | $40 |
| 5/31/16 | 32 | 41 | $42 |
| 6/29/16 | 29 | 39 | $40 |
| **Totals** | **365** | **491** | **$492** |
| **Annual** | **365** | **491** | **$492** |

## 3.4 No. 2 Fuel Oil Usage

No. 2 Fuel Oil is provided by Princeton Fuel Oil Company. The average oil cost for the past 12 months is $1.978/gallon, which is the blended rate used throughout the analyses in this report. The oil consumption is shown in the table below.

*Figure 12 –No. 2 Fuel Oil Usage*

| No. 2 Fuel Oil Billing Data for Presybeterian Church of Lawrenceville | | | |
|---|---|---|---|
| **Period Ending** | **Days in Period** | **Oil Usage (Gallons)** | **Fuel Cost** |
| 10/7/15 | 71 | 102 | $235 |
| 11/9/15 | 33 | 90 | $203 |
| 11/27/15 | 18 | 83 | $181 |
| 12/30/15 | 33 | 198 | $374 |
| 1/11/16 | 12 | 123 | $224 |
| 1/22/16 | 11 | 152 | $250 |
| 2/8/16 | 17 | 187 | $336 |
| 2/22/16 | 14 | 186 | $352 |
| 3/17/16 | 24 | 184 | $369 |
| 4/13/16 | 27 | 183 | $373 |
| 6/10/16 | 58 | 188 | $418 |
| 8/15/16 | 66 | 86 | $171 |
| **Totals** | **384** | **1,763** | **$3,486** |
| **Annual** | **365** | **1,675** | **$3,313** |

## 3.5 Benchmarking

This facility was benchmarked through Portfolio Manager, an online tool created and managed by the United State 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.

Energy use intensity is a measure of a facility's energy consumption per square foot, and it is the standard metric for comparing buildings' energy performance. Comparing the EUI of a building with the national median EUI for that building type illustrates whether that building uses more 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 13 - Energy Use Intensity Comparison – Existing Conditions*

| Energy Use Intensity Comparison - Existing Conditions | | |
|---|---|---|
| | Presybeterian Church of Lawrenceville | National Median Building Type: Religious |
| Source Energy Use Intensity (kBtu/ft$^2$) | 34.0 | 70.7 |
| Site Energy Use Intensity (kBtu/ft$^2$) | 18.8 | 36.8 |

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

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

| Energy Use Intensity Comparison - Following Installation of Recommended Measures | | |
|---|---|---|
| | Presybeterian Church of Lawrenceville | National Median Building Type: Religious |
| Source Energy Use Intensity (kBtu/ft$^2$) | 24.7 | 70.7 |
| Site Energy Use Intensity (kBtu/ft$^2$) | 15.1 | 36.8 |

Many buildings can also receive a 1 – 100 ENERGY STAR® score. This score compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide — and may be eligible for ENERGY STAR® certification. **This building has an Energy Star Score of 75.**

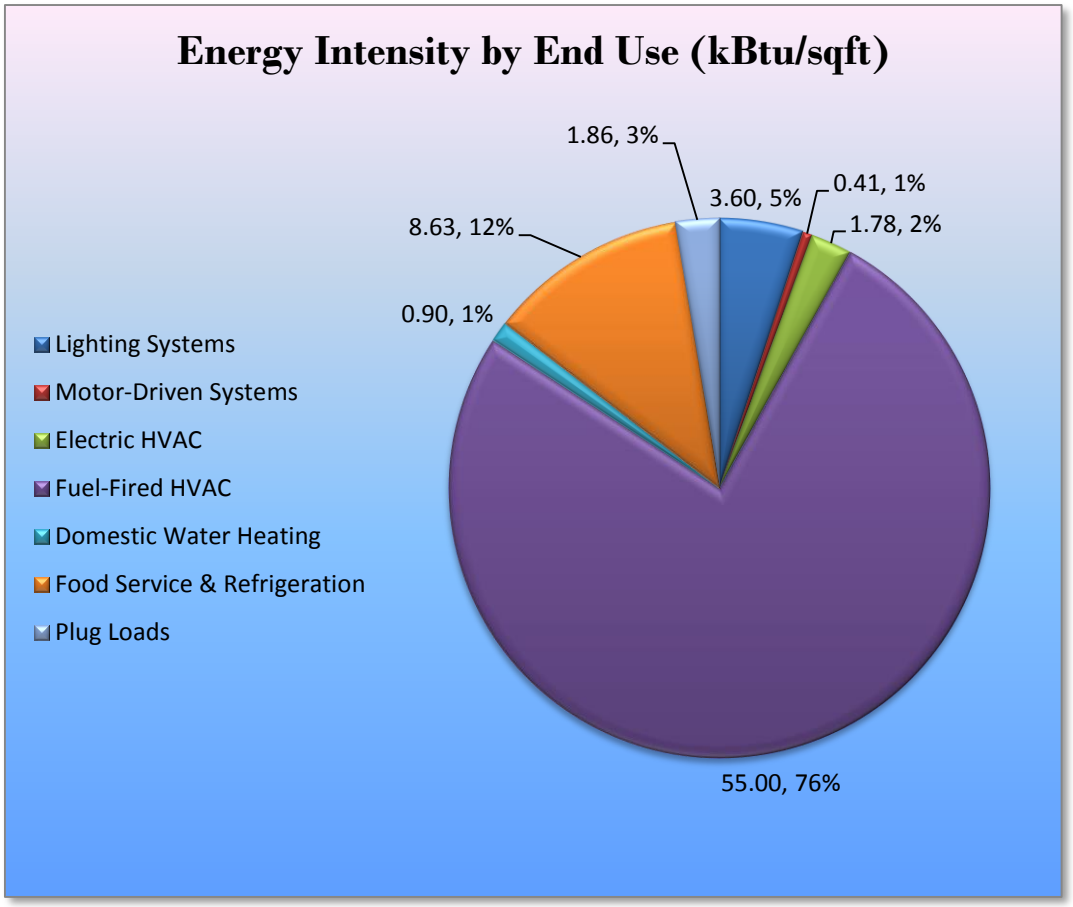
The Portfolio Manager Statement of Energy Performance is in Appendix B. For more information on Energy Star certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1

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

## 3.6 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 15 - Energy Balance ( % and kBtu/SF)*



# 4 Energy Conservation Measures

*Level of Analysis*

The goal of this audit report is to identify potential energy projects, help prioritize specific measures for implementation, and set Presbyterian Church of Lawrenceville on the path to receive financial incentives. For this audit report, most measures have received a preliminary analysis of feasibility which identifies expected ranges of savings and costs. This level of analysis is considered sufficient to make "Go/No-Go" decisions and to prioritize energy projects. Savings are based on the New Jersey Board of Public Utilities New Jersey Clean Energy Program Protocols to Measure Resource Savings dated June 29, 2016. Further analysis or investigation may be required to calculate more accurate savings to support any custom SmartStart or Direct Install applications. Financial incentives for the ECMs identified in this report have been calculated based the NJ prescriptive SmartStart program. Depending on your implementation strategy, the project may be eligible for more lucrative incentives through other programs as identified in Section 7.

The following sections describe the evaluated measures.

## 4.1 Recommended ECMs

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

*Figure 16 – Summary of Recommended ECMs*

| Energy Conservation Measure | | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($)* | Estimated Net Cost ($) | Simple Payback Period (yrs)** | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | **15,167** | **5.5** | **0.0** | **$2,308.20** | **$15,698.76** | **$1,780.00** | **$13,918.76** | **6.03** | **15,274** |
| ECM 1 | Install LED Fixtures | 1,974 | 0.3 | 0.0 | $300.46 | $3,125.42 | $800.00 | $2,325.42 | 7.74 | 1,988 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 6,244 | 4.6 | 0.0 | $950.24 | $10,637.36 | $980.00 | $9,657.36 | 10.16 | 6,288 |
| ECM 3 | Install LED Exit Signs | 6,949 | 0.6 | 0.0 | $1,057.50 | $1,935.99 | $0.00 | $1,935.99 | 1.83 | 6,998 |
| **Lighting Control Measures** | | **1,734** | **0.8** | **0.0** | **$263.96** | **$2,356.00** | **$680.00** | **$1,676.00** | **6.35** | **1,747** |
| ECM 4 | Install Occupancy Sensor Lighting Controls | 846 | 0.7 | 0.0 | $128.75 | $1,856.00 | $320.00 | $1,536.00 | 11.93 | 852 |
| ECM 5 | Install Daylight Dimming Controls | 888 | 0.1 | 0.0 | $135.21 | $500.00 | $360.00 | $140.00 | 1.04 | 895 |
| **Domestic Water Heating Upgrade** | | **1,683** | **0.0** | **23.9** | **$596.87** | **$71.70** | **$0.00** | **$71.70** | **0.12** | **5,602** |
| ECM 6 | Install Low-Flow Domestic Hot Water Devices | 1,683 | 0.0 | 23.9 | $596.87 | $71.70 | $0.00 | $71.70 | 0.12 | 5,602 |
| **TOTALS** | | **18,585** | **6.3** | **23.9** | **$3,169.02** | **$18,126.46** | **$2,460.00** | **$15,666.46** | **4.94** | **22,622** |

* - 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).

Please refer to Appendix A: Equipment Inventory & Recommendations for a detailed list of the locations and light fixtures affected by this measure.

### 4.1.1 Lighting Upgrades

Lighting Upgrades include several "submeasures" as outlined in Figure 17 below.

*Figure 17 – Summary of Lighting Upgrade ECMs*

| Energy Conservation Measure | | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Upgrades** | | **15,167** | **5.5** | **0.0** | **$2,308.20** | **$15,698.76** | **$1,780.00** | **$13,918.76** | **6.03** | **15,274** |
| ECM 1 | Install LED Fixtures | 1,974 | 0.3 | 0.0 | $300.46 | $3,125.42 | $800.00 | $2,325.42 | 7.74 | 1,988 |
| ECM 2 | Retrofit Fixtures with LED Lamps | 6,244 | 4.6 | 0.0 | $950.24 | $10,637.36 | $980.00 | $9,657.36 | 10.16 | 6,288 |
| ECM 3 | Install LED Exit Signs | 6,949 | 0.6 | 0.0 | $1,057.50 | $1,935.99 | $0.00 | $1,935.99 | 1.83 | 6,998 |

## ECM 1: Install LED Fixtures

*Summary of Measure Economics*

| Interior/ Exterior | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| Interior | 0 | 0.0 | 0.0 | $0.00 | $0.00 | $0.00 | $0.00 | 0.00 | 0 |
| Exterior | 1,974 | 0.3 | 0.0 | $300.46 | $3,125.42 | $800.00 | $2,325.42 | 7.74 | 1,988 |

*Measure Description*

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

Maintenance savings are anticipated since LED sources have burn hours 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.

## ECM 2: Retrofit Fixtures with LED Lamps

*Summary of Measure Economics*

| Interior/ Exterior | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| Interior | 6,244 | 4.6 | 0.0 | $950.24 | $10,637.36 | $980.00 | $9,657.36 | 10.16 | 6,288 |
| Exterior | 0 | 0.0 | 0.0 | $0.00 | $0.00 | $0.00 | $0.00 | 0.00 | 0 |

*Measure Description*

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

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

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

### ECM 3: Install LED Exit Signs

*Summary of Measure Economics*

| Interior/ Exterior | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|
| Interior | 6,949 | 0.6 | 0.0 | $1,057.50 | $1,935.99 | $0.00 | $1,935.99 | 1.83 | 6,998 |
| Exterior | 0 | 0.0 | 0.0 | $0.00 | $0.00 | $0.00 | $0.00 | 0.00 | 0 |

*Measure Description*

This measure evaluates replacing incandescent lighting in exit signs with LEDs. LED sources require virtually no maintenance and LED exit signs have a life expectancy of at least 20 years. Many manufacturers can provide retrofit kits that meet fire and safety code requirements. Retrofit kits are less expensive and simpler to install than replacement signs, however, new fixtures would have a longer useful life and are therefore recommended.

A reduction in maintenance costs will be realized with the proposed retrofit because lamps will not have to be replaced as frequently.

## 4.1.2 Lighting Control Measures

Lighting control measures include several “submeasures” as outlined in Figure 18 below.

*Figure 18 – Summary of Lighting Control ECMs*

| Energy Conservation Measure | | Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lighting Control Measures** | | **1,734** | **0.8** | **0.0** | **$263.96** | **$2,356.00** | **$680.00** | **$1,676.00** | **6.35** | **1,747** |
| ECM 4 | Install Occupancy Sensor Lighting Controls | 846 | 0.7 | 0.0 | $128.75 | $1,856.00 | $320.00 | $1,536.00 | 11.93 | 852 |
| ECM 5 | Install Daylight Dimming Controls | 888 | 0.1 | 0.0 | $135.21 | $500.00 | $360.00 | $140.00 | 1.04 | 895 |

## ECM 4: Install Occupancy Sensor Lighting Controls

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 846 | 0.7 | 0.0 | $128.75 | $1,856.00 | $320.00 | $1,536.00 | 11.93 | 852 |

*Measure Description*

This measure evaluates installing occupancy sensors to control light fixtures that are currently manually controlled in restrooms and private offices. Sensors detect occupancy using ultrasonic and/or infrared wave technologies. Lighting systems are enabled when an occupant is detected. Fixtures are automatically turned off after an area has been vacant for a preset period. Occupants will also be able to manually turn off fixtures. Energy savings result from only operating lighting systems when they are required.

Occupancy sensors may be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. Ceiling-mounted or remote-mounted sensors require the use of low voltage switching relays or a wireless signal to the switch. In general, use wall switch replacement sensors for single occupant offices and other small rooms. Install ceiling-mounted or remote mounted sensors in locations without local switching, in situations where the existing wall switches are not in the line-of-sight of the main work area, and in large spaces. We recommend a holistic design approach that considers both the technology of the lighting sources and how they are controlled.

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

## ECM 5: Install Daylight Dimming Controls

*Summary of Measure Economics*

| Annual Electric Savings (kWh) | Peak Demand Savings (kW) | Annual Fuel Savings (MMBtu) | Annual Energy Cost Savings ($) | Estimated Install Cost ($) | Estimated Incentive ($) | Estimated Net Cost ($) | Simple Payback Period (yrs) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 888 | 0.1 | 0.0 | $135.21 | $500.00 | $360.00 | $140.00 | 1.04 | 895 |

*Measure Description*

This measure evaluates installing ceiling-mounted, adjustable, indoor photosensor controls that serve the day-lit areas. Photosensor control is recommended for fixtures that are located adjacent to window spaces with ample daylight. Light fixtures must be capable of continuous or at least four steps of dimming. This measure would reduce energy use by fixtures in spaces when appropriate light levels are met via daylight.

Optimum light levels and the method of dimming should be determined during the design phase of this project. We recommend a holistic design approach that considers both the technology of the lighting sources and how they are controlled.

### 4.1.3 Domestic Water Heating Upgrade

Domestic water heating measures include several "submeasures" as outlined in Figure 19 below.

***Figure 19 - 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) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Domestic Water Heating Upgrade** | | **1,683** | **0.0** | **23.9** | **$596.87** | **$71.70** | **$0.00** | **$71.70** | **0.12** | **5,602** |
| ECM 6 | Install Low-Flow Domestic Hot Water Devices | 1,683 | 0.0 | 23.9 | $596.87 | $71.70 | $0.00 | $71.70 | 0.12 | 5,602 |

## ECM 6: 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) | $CO_2e$ Emissions Reduction (lbs) |
|---|---|---|---|---|---|---|---|---|
| 1,683 | 0.0 | 23.9 | $596.87 | $71.70 | $0.00 | $71.70 | 0.12 | 5,602 |

*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.

# 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 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.

## Use 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.

## 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.

## 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 4.1.3 for any low-flow ECM recommendations.

# 6 SELF-GENERATION MEASURES

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

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

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

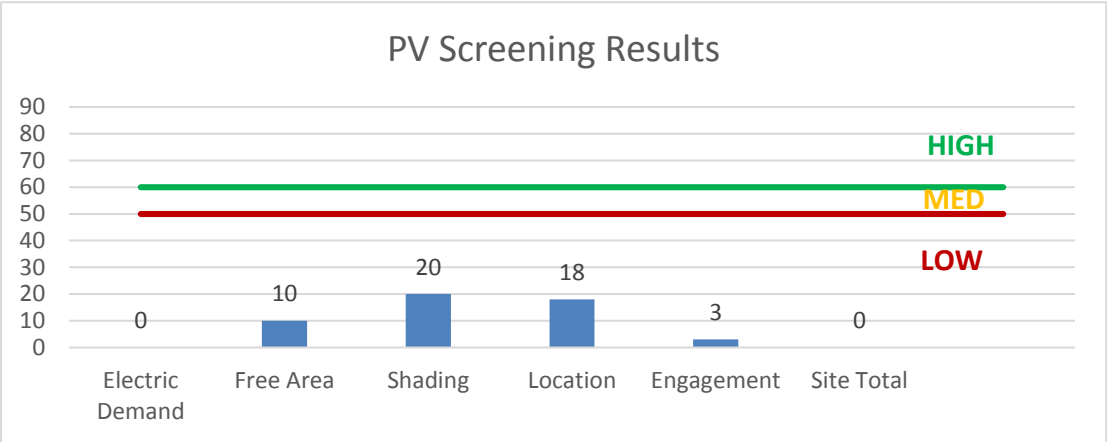
## 6.1 Photovoltaic

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

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

In order to be cost-effective, a solar PV array generally needs a minimum of 4,000 sq ft of flat or south-facing rooftop, or other unshaded space, on which to place the PV panels. In our opinion, the facility does appear not meet these minimum criteria for cost-effective PV installation.

***Figure 20 - Photovoltaic Screening***



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

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.

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

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

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

For a list of qualified firms in 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/

# 7 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and others, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's 1999 Electricity Restructuring Law which requires all customers of investor-owned electric and gas utilities to pay this charge on their monthly energy bills. As a contributor to the fund you were able to participate in the LGEA program and are also eligible to utilize the equipment incentive programs. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 21 for a list of the eligible programs identified for each recommended ECM.

*Figure 21 - ECM Incentive Program Eligibility*

| Energy Conservation Measure | | SmartStart Prescriptive | SmartStart Custom | Direct Install | Pay For Performance Existing Buildings | Large Energy Users Program | Combined Heat & Power and Fuel Cell |
|---|---|---|---|---|---|---|---|
| ECM 1 | Install LED Fixtures | x | | x | | | |
| ECM 2 | Retrofit Fixtures with LED Lamps | x | | x | | | |
| ECM 3 | Install LED Exit Signs | | | x | | | |
| ECM 4 | Install Occupancy Sensor Lighting Controls | x | | x | | | |
| ECM 5 | Install Daylight Dimming Controls | x | | x | | | |
| ECM 6 | Install Low-Flow Domestic Hot Water Devices | | | 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

## 7.1 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 for various energy efficiency equipment based on national/market trends, new technologies or changes in efficiency baselines.

**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

All customer sizes and types may be served by this program. This program provides an effective mechanism for securing incentives for individual projects that may be completed at once or over several years.

**Incentives**

The prescriptive path provides fixed incentives for specific energy efficiency measures whereas the custom measure path provides incentives for unique or specialized technologies that are not addressed through prescriptive offerings.

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

**How to Participate**

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

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

## 7.2 Direct Install

**Overview**

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

**Incentives**

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

**How to Participate**

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

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

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

# 8 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

## 8.1 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.

## 8.2 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.

## Lighting Inventory & Recommendations

| | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Front Entrance | 2 | LED - Fixtures: Architectural Flood/Spot Luminaire | Daylight Dimming | 64 | 832 | None | No | 2 | LED - Fixtures: Architectural Flood/Spot Luminaire | Daylight Dimming | 64 | 832 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Front Entrance | 2 | LED Screw-In Lamps: Wall mount fixture - 3 lamps | Wall Switch | 33 | 2,912 | None | No | 2 | LED Screw-In Lamps: Wall mount fixture - 3 lamps | Wall Switch | 33 | 2,912 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Entrance corridor | 4 | LED Screw-In Lamps: Recessed fixture | Wall Switch | 60 | 156 | None | No | 4 | LED Screw-In Lamps: Recessed fixture | Wall Switch | 60 | 156 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Sanctuary | 12 | LED Screw-In Lamps: Recessed fixture | Wall Switch | 60 | 520 | None | No | 12 | LED Screw-In Lamps: Recessed fixture | Wall Switch | 60 | 520 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Sanctuary | 2 | Incandescent: Chandalier - 12 lamps | Wall Switch | 480 | 520 | Relamp | No | 2 | LED Screw-In Lamps: Chandalier | Wall Switch | 11 | 520 | 0.76 | 551 | 0.0 | $83.88 | $1,290.07 | $240.00 | 12.52 |
| Sanctuary | 8 | Incandescent: Wall mount fixture - 1 lamp | High/Low Control | 100 | 1,165 | Relamp | No | 8 | LED Screw-In Lamps: Wall mount fixture | High/Low Control | 14 | 1,165 | 0.56 | 906 | 0.0 | $137.81 | $430.02 | $80.00 | 2.54 |
| Altar | 2 | Linear Fluorescent - T8: 2' T8 (17W) - 1L | Wall Switch | 22 | 208 | Relamp | No | 2 | LED - Linear Tubes: (1) 2' Lamp | Wall Switch | 9 | 208 | 0.02 | 6 | 0.0 | $0.97 | $63.80 | $10.00 | 55.71 |
| Corridor | 8 | Compact Fluorescent: Recessed fixture - 1 lamp | Wall Switch | 26 | 1,664 | Relamp | No | 8 | LED Screw-In Lamps: Recessed fixture | Wall Switch | 11 | 1,664 | 0.10 | 226 | 0.0 | $34.34 | $430.02 | $80.00 | 10.19 |
| Corridor | 2 | Compact Fluorescent: Wall mount fixture - 1 lamp | Wall Switch | 26 | 1,664 | Relamp | No | 2 | LED Screw-In Lamps: Wall mount fixture | Wall Switch | 11 | 1,664 | 0.02 | 56 | 0.0 | $8.58 | $107.51 | $20.00 | 10.19 |
| Corridor | 3 | Exit Signs: Incandescent | None | 45 | 8,760 | Fixture Replacement | No | 3 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.10 | 1,158 | 0.0 | $176.25 | $322.67 | $0.00 | 1.83 |
| Boiler Room | 1 | LED Screw-In Lamps: Wall hanging fixture | Wall Switch | 14 | 52 | None | No | 1 | LED Screw-In Lamps: Wall hanging fixture | Wall Switch | 14 | 52 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Corridor | 4 | Compact Fluorescent: Wall mount fixture - 1 lamp | Wall Switch | 26 | 1,664 | Relamp | No | 4 | LED Screw-In Lamps: Wall mount fixture | Wall Switch | 11 | 1,664 | 0.05 | 113 | 0.0 | $17.17 | $215.01 | $40.00 | 10.19 |
| Corridor | 4 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 18 | 1,664 | None | No | 4 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 18 | 1,664 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Lounge | 16 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 520 | Relamp | Yes | 16 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 364 | 0.51 | 366 | 0.0 | $55.66 | $1,127.20 | $20.00 | 19.89 |
| Classroom 105 | 8 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 920 | Relamp | Yes | 8 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 644 | 0.25 | 324 | 0.0 | $49.23 | $621.60 | $20.00 | 12.22 |
| Classroom 106 | 8 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 920 | Relamp | Yes | 8 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 644 | 0.25 | 324 | 0.0 | $49.23 | $621.60 | $20.00 | 12.22 |
| Hallway | 8 | Compact Fluorescent: Wall mount fixture - 1 lamp | Wall Switch | 26 | 1,664 | Relamp | Yes | 8 | LED Screw-In Lamps: Wall mount fixture | Occupancy Sensor | 11 | 1,165 | 0.12 | 275 | 0.0 | $41.89 | $546.02 | $100.00 | 10.65 |
| Storage Closet | 2 | Compact Fluorescent: Wall mount fixture - 2 lamps | Wall Switch | 26 | 20 | None | No | 2 | Compact Fluorescent: Wall mount fixture - 2 lamps | Wall Switch | 26 | 20 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Hallway | 3 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 1,664 | Relamp | Yes | 3 | LED - Linear Tubes: (2) 4' Lamps | Occupancy Sensor | 29 | 1,165 | 0.10 | 235 | 0.0 | $35.80 | $291.50 | $50.00 | 6.75 |
| Attic | 2 | LED Screw-In Lamps: Wall hanging fixture - 1 lamp | Wall Switch | 17 | 52 | None | No | 2 | LED Screw-In Lamps: Wall hanging fixture - 1 lamp | Wall Switch | 17 | 52 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Attic | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | 32 | 52 | Relamp | No | 4 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | 15 | 52 | 0.06 | 4 | 0.0 | $0.63 | $143.60 | $0.00 | 229.41 |
| Women's Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | 32 | 780 | Relamp | Yes | 4 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 546 | 0.07 | 77 | 0.0 | $11.72 | $259.60 | $40.00 | 18.73 |
| Women's Room | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 780 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 780 | 0.02 | 26 | 0.0 | $3.89 | $63.20 | $0.00 | 16.25 |
| Men's Room | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | 32 | 780 | Relamp | Yes | 4 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 546 | 0.07 | 77 | 0.0 | $11.72 | $259.60 | $40.00 | 18.73 |
| Men's Room | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 780 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 780 | 0.02 | 26 | 0.0 | $3.89 | $63.20 | $0.00 | 16.25 |

| | 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 |
| Classroom 104 | 8 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 920 | Relamp | Yes | 8 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 644 | 0.25 | 324 | 0.0 | $49.23 | $621.60 | $20.00 | 12.22 |
| Classroom 104 | 1 | Exit Signs: Incandescent | None | 45 | 8,760 | Fixture Replacement | No | 1 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.03 | 386 | 0.0 | $58.75 | $107.56 | $0.00 | 1.83 |
| Fellowship center | 16 | LED - Fixtures: High-Bay | None | 71 | 1,195 | None | No | 16 | LED - Fixtures: High-Bay | None | 71 | 1,195 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Classroom 103 | 8 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 920 | Relamp | Yes | 8 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 644 | 0.25 | 324 | 0.0 | $49.23 | $621.60 | $20.00 | 12.22 |
| Classroom 102 | 8 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 920 | Relamp | Yes | 8 | LED - Linear Tubes: (2) U-Lamp | Occupancy Sensor | 33 | 644 | 0.25 | 324 | 0.0 | $49.23 | $621.60 | $20.00 | 12.22 |
| Classroom 102 | 1 | Exit Signs: Incandescent | None | 45 | 8,760 | Fixture Replacement | No | 1 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.03 | 386 | 0.0 | $58.75 | $107.56 | $0.00 | 1.83 |
| Storage Closet | 1 | Compact Fluorescent: Wall mount fixture - 2 lamps | Wall Switch | 26 | 1,664 | Relamp | No | 1 | LED Screw-In Lamps: Wall mount fixture | Wall Switch | 11 | 1,664 | 0.01 | 28 | 0.0 | $4.29 | $53.75 | $10.00 | 10.19 |
| Main Kitchen | 14 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 920 | Relamp | No | 14 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 920 | 0.33 | 422 | 0.0 | $64.23 | $884.80 | $0.00 | 13.78 |
| Main Kitchen | 4 | Exit Signs: Incandescent | None | 45 | 8,760 | Fixture Replacement | No | 4 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.13 | 1,544 | 0.0 | $235.00 | $430.22 | $0.00 | 1.83 |
| Closet | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 52 | Relamp | No | 1 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 52 | 0.03 | 2 | 0.0 | $0.30 | $58.50 | $10.00 | 164.36 |
| Women's Room | 4 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 18 | 780 | None | Yes | 4 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Occupancy Sensor | 18 | 546 | 0.02 | 19 | 0.0 | $2.90 | $116.00 | $20.00 | 33.13 |
| Men's Room | 4 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 18 | 728 | None | Yes | 4 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Occupancy Sensor | 18 | 510 | 0.02 | 18 | 0.0 | $2.70 | $116.00 | $20.00 | 35.50 |
| Hallway - backside | 4 | Incandescent: Recessed fixture - 1 lamp | Wall Switch | 60 | 1,664 | Relamp | Yes | 4 | LED Screw-In Lamps: Recessed fixture | Occupancy Sensor | 11 | 1,165 | 0.17 | 393 | 0.0 | $59.86 | $331.01 | $60.00 | 4.53 |
| Hallway - backside | 1 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 1,664 | Relamp | No | 1 | LED - Linear Tubes: (3) 4' Lamps | Wall Switch | 44 | 1,664 | 0.04 | 93 | 0.0 | $14.16 | $75.20 | $15.00 | 4.25 |
| Storage Closet | 1 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 17 | 52 | None | No | 1 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 17 | 52 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Office | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 1,040 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 1,040 | 0.02 | 34 | 0.0 | $5.19 | $63.20 | $0.00 | 12.19 |
| Hallway | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 1,040 | Relamp | No | 2 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 1,040 | 0.05 | 68 | 0.0 | $10.37 | $126.40 | $0.00 | 12.19 |
| Hallway | 2 | Exit Signs: Incandescent | None | 45 | 8,760 | Fixture Replacement | No | 2 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.06 | 772 | 0.0 | $117.50 | $215.11 | $0.00 | 1.83 |
| 4 Yrs Classroom | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | 32 | 920 | Relamp | No | 5 | LED - Linear Tubes: (1) 4' Lamp | Wall Switch | 15 | 920 | 0.07 | 91 | 0.0 | $13.84 | $179.50 | $25.00 | 11.16 |
| 4 Yrs Classroom | 3 | Exit Signs: Incandescent | None | 45 | 8,760 | Fixture Replacement | No | 3 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.10 | 1,158 | 0.0 | $176.25 | $322.67 | $0.00 | 1.83 |
| 4 Yrs Classroom | 10 | Linear Fluorescent - T8: 4' T8 (32W) - 1L | Wall Switch | 32 | 920 | Relamp | Yes | 10 | LED - Linear Tubes: (1) 4' Lamp | Occupancy Sensor | 15 | 644 | 0.18 | 227 | 0.0 | $34.57 | $475.00 | $70.00 | 11.72 |
| 3 Yrs Classroom | 2 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 920 | Relamp | No | 2 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 920 | 0.05 | 60 | 0.0 | $9.18 | $126.40 | $0.00 | 13.78 |
| 3 Yrs Classroom | 4 | Linear Fluorescent - T8: 4' T8 (32W) - 3L | Wall Switch | 93 | 920 | Relamp | Yes | 4 | LED - Linear Tubes: (3) 4' Lamps | Occupancy Sensor | 44 | 644 | 0.20 | 260 | 0.0 | $39.58 | $416.80 | $80.00 | 8.51 |
| 3 Yrs Classroom | 2 | Exit Signs: Incandescent | None | 45 | 8,760 | Fixture Replacement | No | 2 | LED Exit Signs: 2 W Lamp | None | 6 | 8,760 | 0.06 | 772 | 0.0 | $117.50 | $215.11 | $0.00 | 1.83 |
| Associate Pastor's office | 4 | LED Screw-In Lamps: Recessed fixture - 1 lamp | Wall Switch | 18 | 2,080 | None | No | 4 | LED Screw-In Lamps: Recessed fixture - 1 lamp | Wall Switch | 18 | 2,080 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

| | Existing Conditions | | | | | Proposed Conditions | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Fixture Recommendation | Add Controls? | Fixture Quantity | Fixture Description | Control System | Watts per Fixture | Annual Operating Hours | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Hallway | 3 | LED Screw-In Lamps: Recessed fixture - 1 lamp | Wall Switch | 18 | 1,664 | None | No | 3 | LED Screw-In Lamps: Recessed fixture - 1 lamp | Wall Switch | 18 | 1,664 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Hallway | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 1,664 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 1,664 | 0.02 | 55 | 0.0 | $8.30 | $63.20 | $0.00 | 7.62 |
| Office | 5 | Linear Fluorescent - T8: 4' T8 (32W) - 2L | Wall Switch | 62 | 2,080 | Relamp | No | 5 | LED - Linear Tubes: (2) 4' Lamps | Wall Switch | 29 | 2,080 | 0.13 | 388 | 0.0 | $59.02 | $292.50 | $50.00 | 4.11 |
| Children's Mini stores | 4 | LED Screw-In Lamps: Spot fixtures | Wall Switch | 20 | 920 | None | No | 4 | LED Screw-In Lamps: Spot fixtures | Wall Switch | 20 | 920 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Children's Mini stores | 2 | LED Screw-In Lamps: Recessed fixture - 1 lamp | Wall Switch | 18 | 920 | None | No | 2 | LED Screw-In Lamps: Recessed fixture - 1 lamp | Wall Switch | 18 | 920 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Stairwell | 1 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 18 | 520 | None | No | 1 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 18 | 520 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Office - 2nd floor | 1 | LED Screw-In Lamps: Wall hanging fixture - 1 lamp | Wall Switch | 18 | 2,080 | None | No | 1 | LED Screw-In Lamps: Wall hanging fixture - 1 lamp | Wall Switch | 18 | 2,080 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Office - 2nd floor | 4 | LED Screw-In Lamps: Spot fixtures | Wall Switch | 20 | 520 | None | No | 4 | LED Screw-In Lamps: Spot fixtures | Wall Switch | 20 | 520 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Closet | 1 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 40 | 52 | None | No | 1 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 40 | 52 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Manager's Office | 5 | LED Screw-In Lamps: Recessed fixture - 1 lamp | Wall Switch | 18 | 1,664 | None | Yes | 5 | LED Screw-In Lamps: Recessed fixture - 1 lamp | Occupancy Sensor | 18 | 1,165 | 0.02 | 51 | 0.0 | $7.73 | $116.00 | $20.00 | 12.43 |
| Manager's Office | 3 | LED Screw-In Lamps: Spot fixtures | Wall Switch | 20 | 520 | None | No | 3 | LED Screw-In Lamps: Spot fixtures | Wall Switch | 20 | 520 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Chapel | 2 | Exit Signs: Incandescent | Wall Switch | 45 | 8,760 | Fixture Replacement | No | 2 | LED Exit Signs: 2 W Lamp | Wall Switch | 6 | 8,760 | 0.06 | 772 | 0.0 | $117.50 | $215.11 | $0.00 | 1.83 |
| Behind Chapel | 1 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 18 | 1,664 | None | No | 1 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 18 | 1,664 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Pastor's office | 3 | LED Screw-In Lamps: Spot fixtures | Wall Switch | 20 | 1,664 | None | No | 3 | LED Screw-In Lamps: Spot fixtures | Wall Switch | 20 | 1,664 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Pastor's office | 1 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 20 | 1,664 | None | No | 1 | LED Screw-In Lamps: Wall mount fixture - 1 lamp | Wall Switch | 20 | 1,664 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Small kitchen | 1 | U-Bend Fluorescent - T8: U T8 (32W) - 2L | Wall Switch | 62 | 520 | Relamp | No | 1 | LED - Linear Tubes: (2) U-Lamp | Wall Switch | 33 | 520 | 0.02 | 17 | 0.0 | $2.59 | $63.20 | $0.00 | 24.37 |
| Small kitchen | 1 | LED Screw-In Lamps: Wall hanging fixture - 1 lamp | Wall Switch | 17 | 1,664 | None | No | 1 | LED Screw-In Lamps: Wall hanging fixture - 1 lamp | Wall Switch | 17 | 1,664 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Bathroom | 3 | LED Screw-In Lamps: Chandalier - 3 lamps | Wall Switch | 51 | 1,664 | Relamp | No | 3 | LED Screw-In Lamps: Chandalier | Wall Switch | 11 | 1,664 | 0.10 | 226 | 0.0 | $34.34 | $483.78 | $90.00 | 11.47 |
| Storage Closet | 1 | Compact Fluorescent: Recessed fixture - 1 lamp | Wall Switch | 52 | 1,664 | Relamp | No | 1 | LED Screw-In Lamps: Recessed fixture | Wall Switch | 11 | 1,664 | 0.03 | 77 | 0.0 | $11.73 | $53.75 | $10.00 | 3.73 |
| Exterior | 18 | LED Screw-In Lamps: Spot fixtures | Daylight Dimming | 20 | 4,368 | None | No | 18 | LED Screw-In Lamps: Spot fixtures | Daylight Dimming | 20 | 4,368 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Exterior | 11 | LED Screw-In Lamps: Recessed fixture - 1 lamp | Wall Switch | 17 | 4,368 | None | No | 11 | LED Screw-In Lamps: Recessed fixture - 1 lamp | Wall Switch | 17 | 4,368 | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Exterior | 4 | High-Pressure Sodium: (1) 70W Lamp | Wall Switch | 95 | 4,368 | Fixture Replacement | Yes | 4 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Daylight Dimming | 45 | 2,184 | 0.24 | 1,431 | 0.0 | $217.83 | $1,812.71 | $580.00 | 5.66 |
| Exterior | 4 | High-Pressure Sodium: (1) 70W Lamp | Wall Switch | 95 | 4,368 | Fixture Replacement | Yes | 4 | LED - Fixtures: Outdoor Wall-Mounted Area Fixture | Daylight Dimming | 45 | 2,184 | 0.24 | 1,431 | 0.0 | $217.83 | $1,812.71 | $580.00 | 5.66 |

## Motor Inventory & Recommendations

| | | Existing Conditions | | | | | | Proposed Conditions | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | Motor Quantity | Motor Application | HP Per Motor | Full Load Efficiency | VFD Control? | Annual Operating Hours | Install High Efficiency Motors? | Full Load Efficiency | Install VFDs? | Number of VFDs | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler room | Boiler | 1 | Boiler Feed Water Pump | 1.0 | 80.0% | No | 2,745 | No | 80.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler room | Boiler | 1 | Boiler Feed Water Pump | 0.5 | 77.0% | No | 2,745 | No | 77.0% | No | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Electric HVAC Inventory & Recommendations

| | | Existing Conditions | | | | Proposed Conditions | | | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (kBtu/hr) | Install High Efficiency System? | System Quantity | System Type | Cooling Capacity per Unit (Tons) | Heating Capacity per Unit (kBtu/hr) | Cooling Mode Efficiency (SEER/EER) | Heating Mode Efficiency (COP) | Install Dual Enthalpy Economizer? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Classroom 105 | Classroom 105 | 1 | Window AC | 1.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Attic | Couple of office spaces | 1 | Packaged AC | 3.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Classroom 103 | Classroom 103 | 1 | Window AC | 1.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Office 2nd floor | Office 2nd floor | 1 | Window AC | 1.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Opposite building | Rest of the office spaces | 1 | Packaged AC | 5.00 | | No | | | | | | | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Fuel Heating Inventory & Recommendations

| | | Existing Conditions | | | Proposed Conditions | | | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Area(s)/System(s) Served | System Quantity | System Type | Output Capacity per Unit (MBh) | Install High Efficiency System? | System Quantity | System Type | Output Capacity per Unit (MBh) | Heating Efficiency | Heating Efficiency Units | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Boiler room - office zone | Offices, Santuary | 1 | Non-Condensing Hot Water Boiler | 1,110.00 | No | | | | | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Boiler room - Classroom | Classroom | 1 | Non-Condensing Hot Water Boiler | 396.00 | No | | | | | | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## DHW Inventory & Recommendations

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

## Low-Flow Device Recommendations

| | Recommedation Inputs | | | | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | 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 |
| Kitchen | 4 | Faucet Aerator (Kitchen) | 2.50 | 2.20 | 0.00 | 1,683 | 0.0 | $256.16 | $28.68 | $0.00 | 0.11 |
| Classroom 106 | 2 | Faucet Aerator (Kitchen) | 2.50 | 2.20 | 0.00 | 0 | 3.4 | $48.67 | $14.34 | $0.00 | 0.29 |
| Ladies Room | 1 | Faucet Aerator (Lavatory) | 2.50 | 1.00 | 0.00 | 0 | 8.5 | $121.68 | $7.17 | $0.00 | 0.06 |
| 4 years - Classroom | 1 | Faucet Aerator (Kitchen) | 2.50 | 2.20 | 0.00 | 0 | 1.7 | $24.34 | $7.17 | $0.00 | 0.29 |
| 3 years - Classroom | 1 | Faucet Aerator (Kitchen) | 2.50 | 2.20 | 0.00 | 0 | 1.7 | $24.34 | $7.17 | $0.00 | 0.29 |
| Bathroom | 1 | Faucet Aerator (Lavatory) | 2.50 | 1.00 | 0.00 | 0 | 8.5 | $121.68 | $7.17 | $0.00 | 0.06 |

## Commercial Refrigerator/Freezer Inventory & Recommendations

| | Existing Conditions | | | Proposed Condi | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Refrigerator/ Freezer Type | ENERGY STAR Qualified? | Install ENERGY STAR Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen | 1 | Stand-Up Refrigerator, Solid Door (>50 cu. ft.) | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |
| Kitchen | 1 | Stand-Up Freezer, Solid Door (16 - 30 cu. ft.) | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Cooking Equipment Inventory & Recommendations

| | Existing Conditions | | | Proposed Conditions | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Equipment Type | High Efficiency Equipement? | Install High Efficiency Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Simple Payback w/ Incentives in Years |
| Kitchen | 2 | Gas Convection Oven (Full Size) | No | No | 0.00 | 0 | 0.0 | $0.00 | $18,580.09 | $1,000.00 | 0.00 |
| Kitchen | 1 | Gas Combination Oven/Steam Cooker (<15 Pans) | No | No | 0.00 | 0 | 0.0 | $0.00 | $16,598.81 | $750.00 | 0.00 |

## Dishwasher Inventory & Recommendations

| | Existing Conditions | | | | | Proposed Conditions | Energy Impact & Financial Analysis | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | Quantity | Dishwasher Type | Water Heater Fuel Type | Booster Heater Fuel Type | ENERGY STAR Qualified? | Install ENERGY STAR Equipment? | Total Peak kW Savings | Total Annual kWh Savings | Total Annual MMBtu Savings | Total Annual Energy Cost Savings | Total Installation Cost | Total Incentives | Payback w/ Incentives in Years |
| Kitchen | 1 | Under Counter (High Temp) | Natural Gas | N/A | No | No | 0.00 | 0 | 0.0 | $0.00 | $0.00 | $0.00 | 0.00 |

## Plug Load Inventory

| | Existing Conditions | | | |
|---|---|---|---|---|
| Location | Quantity | Equipment Description | Energy Rate (W) | ENERGY STAR Qualified? |
| Presybeterian Church | 8 | Computer | 75.0 | Yes |
| Presybeterian Church | 5 | Printer - Small | 15.0 | Yes |
| Presybeterian Church | 1 | Printer - Big | 40.0 | Yes |
| Presybeterian Church | 3 | Microwave | 1,000.0 | No |
| Presybeterian Church | 1 | Refrigerator - Medium | 400.0 | No |
| Presybeterian Church | 1 | Refrigerator - Big | 600.0 | No |
| Presybeterian Church | 3 | Coffee Machine | 900.0 | No |
| Presybeterian Church | 1 | Toaster Oven | 1,000.0 | No |
| Presybeterian Church | 1 | TV - LED | 120.0 | Yes |
| Presybeterian Church | 1 | Space Heater | 1,500.0 | No |
| Presybeterian Church | 3 | Kettle | 1,800.0 | No |
| Presybeterian Church | 10 | Standing Fan | 60.0 | No |
| Presybeterian Church | 2 | Ceiling Fans | 60.0 | No |

# ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

**75**

**ENERGY STAR® Score**[1]

## Presybeterian Church of Lawrenceville

**Primary Property Type:** Worship Facility
**Gross Floor Area (ft²):** 12,000
**Built:** 1764

**For Year Ending:** June 30, 2016
**Date Generated:** May 23, 2017

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

### Property & Contact Information

| Property Address | Property Owner | Primary Contact |
|---|---|---|
| Presybeterian Church of Lawrenceville<br>2688 Main Street<br>Lawrenceville, New Jersey 08648 | _____<br>,<br>(___)___-_____ | ____ _____<br>,<br>(___)___-_____<br>_____ |

**Property ID**: 5532495

### Energy Consumption and Energy Use Intensity (EUI)

**Site EUI**
38.9 kBtu/ft²

**Source EUI**
69.5 kBtu/ft²

| Annual Energy by Fuel | |
|---|---|
| Natural Gas (kBtu) | 49,139 (10%) |
| Fuel Oil (No. 2) (kBtu) | 247,406 (53%) |
| Electric - Grid (kBtu) | 169,713 (36%) |

| National Median Comparison | |
|---|---|
| National Median Site EUI (kBtu/ft²) | 53.6 |
| National Median Source EUI (kBtu/ft²) | 95.9 |
| % Diff from National Median Source EUI | -28% |
| **Annual Emissions** | |
| Greenhouse Gas Emissions (Metric Tons CO2e/year) | 40 |

### Signature & Stamp of Verifying Professional

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

Signature: _____ Date: _____

**Licensed Professional**

____ _____
,
(___)___-_____
_____

**Professional Engineer Stamp (if applicable)**