



# Local Government Energy Audit: Energy Audit Report



## **Concession Stand**

Ridgeway Avenue

Manchester Township, NJ 08759

Manchester Township

August 8, 2018

Final Report by:

**TRC Energy Services**

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## Disclaimer

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

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

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

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

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# I EXECUTIVE SUMMARY

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The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) Report for the Concession Stand.

The goal of an LGEA report is to provide you with information on how your facility uses energy, identify energy conservation measures (ECMs) that can reduce your energy use, and provide information and assistance to help facilities implement ECMs. The LGEA report also contains valuable information on financial incentives from New Jersey's Clean Energy Program (NJCEP) for implementing ECMs.

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

## I.1 Facility Summary

The Concession Stand is a 2,500 square foot facility comprised a kitchen, restrooms, a recreation office and outdoor seating. The recreation office with a kitchenette is a separate building. They were built in 1990. The building consumes electric for lighting, electric HVAC equipment, domestic hot water, cooking and refrigeration equipment as well as plug loads. The Concession Stand is open between 10AM and 5PM on the weekends from Memorial Day until June 24<sup>th</sup>, and between 10:00 AM and 5:00 PM, 7 days a week from June 24<sup>th</sup> through Labor Day. The Concession Stand is closed after Labor Day until Memorial Day, however, the building is conditioned throughout the winter.

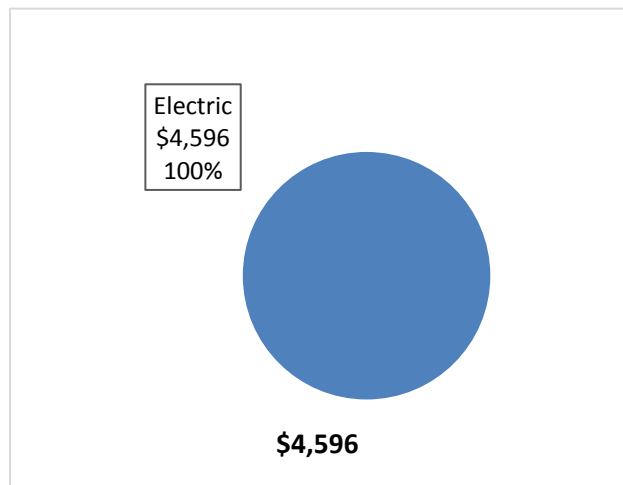
A thorough description of the facility and our observations are located in Section 2.

## I.2 Your Cost Reduction Opportunities

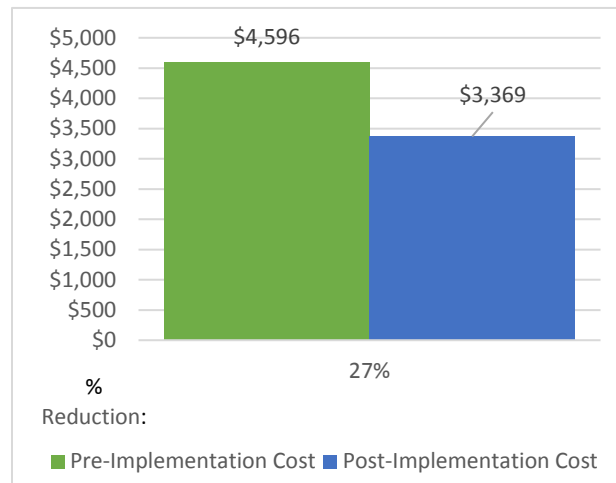
### Energy Conservation Measures

TRC evaluated eight measure and recommends six measures which together represent an opportunity for the Concession Stand to reduce annual energy costs by \$967 and annual greenhouse gas emissions by 6,384 lbs CO<sub>2</sub>e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 5.4 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce the Concession Stand's annual energy use by 27%.

**Figure 1 – Previous 12 Month Utility Costs**



**Figure 2 – Potential Post-Implementation Costs**



A detailed description of the Concession Stand’s existing energy use can be found in Section 3.

Estimates of the total cost, energy savings, and financial incentives for the proposed energy efficient upgrades are summarized below in Figure 3. A brief description of each category can be found below and a description of savings opportunities can be found in Section 4.

Figure 3 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)*	Estimated Net Cost (\$)	Simple Payback Period (yrs)**	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>			<b>5,993</b>	<b>1.6</b>	<b>0.0</b>	<b>\$911.03</b>	<b>\$5,278.64</b>	<b>\$730.00</b>	<b>\$4,548.64</b>	<b>5.0</b>	<b>6,035</b>
ECM 1	Install LED Fixtures	Yes	4,752	0.9	0.0	\$722.38	\$3,580.09	\$530.00	\$3,050.09	4.2	4,785
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	150	0.1	0.0	\$22.85	\$234.00	\$20.00	\$214.00	9.4	151
ECM 3	Retrofit Fixtures with LED Lamps	Yes	600	0.6	0.0	\$91.22	\$1,034.34	\$180.00	\$854.34	9.4	604
ECM 4	Install LED Exit Signs	Yes	491	0.0	0.0	\$74.57	\$430.22	\$0.00	\$430.22	5.8	494
<b>Lighting Control Measures</b>			<b>78</b>	<b>0.0</b>	<b>0.0</b>	<b>\$11.79</b>	<b>\$386.00</b>	<b>\$35.00</b>	<b>\$351.00</b>	<b>29.8</b>	<b>78</b>
	Install Occupancy Sensor Lighting Controls	No	78	0.0	0.0	\$11.79	\$386.00	\$35.00	\$351.00	29.8	78
<b>HVAC System Improvements</b>			<b>329</b>	<b>0.0</b>	<b>0.0</b>	<b>\$50.08</b>	<b>\$659.74</b>	<b>\$0.00</b>	<b>\$659.74</b>	<b>13.2</b>	<b>332</b>
ECM 5	Install Programmable Thermostats	Yes	329	0.0	0.0	\$50.08	\$659.74	\$0.00	\$659.74	13.2	332
<b>Domestic Water Heating Upgrade</b>			<b>17</b>	<b>0.0</b>	<b>0.0</b>	<b>\$2.56</b>	<b>\$7.17</b>	<b>\$0.00</b>	<b>\$7.17</b>	<b>2.8</b>	<b>17</b>
ECM 6	Install Low-Flow Domestic Hot Water Devices	Yes	17	0.0	0.0	\$2.56	\$7.17	\$0.00	\$7.17	2.8	17
<b>Food Service Equipment &amp; Refrigeration Measures</b>			<b>1,659</b>	<b>0.2</b>	<b>0.0</b>	<b>\$252.18</b>	<b>\$2,700.00</b>	<b>\$0.00</b>	<b>\$2,700.00</b>	<b>10.7</b>	<b>1,671</b>
	Replace Refrigeration Equipment	No	1,659	0.2	0.0	\$252.18	\$2,700.00	\$0.00	\$2,700.00	10.7	1,671
<b>TOTALS</b>			<b>8,076</b>	<b>1.9</b>	<b>0.0</b>	<b>\$1,227.65</b>	<b>\$9,031.55</b>	<b>\$765.00</b>	<b>\$8,266.55</b>	<b>6.7</b>	<b>8,132</b>
<b>TOTALS (High Priority)</b>			<b>6,339</b>	<b>1.6</b>	<b>0.0</b>	<b>\$963.67</b>	<b>\$5,945.55</b>	<b>\$730.00</b>	<b>\$5,215.55</b>	<b>5.4</b>	<b>6,384</b>

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

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

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

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

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

**Domestic Hot Water** upgrade measures generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems. New domestic hot water heating systems can provide equivalent, or greater, water heating capacity compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel used for domestic hot water heating due to improved heating efficiency or reducing standby losses.

**Food Service Equipment & Refrigeration** measures generally involve improvements in the efficiency of cooking, food service, dishwashing, and food storage equipment. These measures may include more efficient convection ovens, steamers, ice machines, or refrigeration. These measures save energy by reducing the energy usage with more energy efficient equipment.



## **Energy Efficient Practices**

TRC also identified six low cost (or no cost) energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment lifetime, improve occupant comfort, provide better health and safety, as well as reduce annual energy and O&M costs. Potential opportunities identified at the Concession Stand include:

- Reduce Air Leakage
- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

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

## **On-Site Generation Measures**

TRC evaluated the potential for installing on-site generation for the Concession Stand. Based on the configuration of the site and its loads there is a low potential for installing any PV and combined heat and power self-generation measures.

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

### I.3 Implementation Planning

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

Rebates, incentives, and financing are available from NJCEP, as well as other sources, to help reduce the costs associated with the implementation of energy efficiency projects. Prior to implementing any measure, please review the relevant incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives prior to purchasing materials or commencing with installation.

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

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

For facilities wanting to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 2 are based on the SmartStart program. More details on this program and others are available in Section 8.

This facility may also qualify for the Direct Install program which can provide turnkey installation of multiple measures, through an authorized network of participating contractors. This program can provide substantially higher incentives than SmartStart, up to 70% of the cost of selected measures, although measure eligibility will have to be assessed and be verified by the designated Direct Install contractor and, in most cases, they will perform the installation work.

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services, as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.4 for additional information on the ESIP Program.

The Demand Response Energy Aggregator is a (non-NJCEP) program designed to reduce electric loads at commercial facilities, when wholesale electricity prices are high or when the reliability of the electric grid is threatened due to peak power demand. Demand Response (DR) service providers (a.k.a. Curtailment Service Providers) are registered with PJM, the independent system operator (ISO) for mid-Atlantic state region that is charged with maintaining electric grid reliability. By enabling grid operators to call upon commercial facilities to reduce their electric usage during times of peak demand, the grid is made more reliable and overall transmission costs are reduced for all ratepayers. Curtailment Service Providers provide regular payments to medium and large consumers of electric power for their participation in DR programs. Program participation is voluntary and facilities receive payments whether or not they are called upon to curtail their load during times of peak demand. Refer to Section 7 for additional information on this program.

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

## 2 FACILITY INFORMATION AND EXISTING CONDITIONS

### 2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
<b>Customer</b>			
Joe Veni	Supervising Engineer	jveni@manchestertwp.com	732-65-8121
<b>TRC Energy Services</b>			
Vish Nimbalkar	Auditor	VNaikNimbalkar@trcsolutions.com	(732) 855-0033

### 2.2 General Site Information

On April 18, 2017, TRC performed an energy audit at the Concession Stand located in Manchester Township, New Jersey. TRC's team met with Joe Veni, Supervising Engineer to review the facility operations and help focus our investigation on specific energy-using systems.

The Concession Stand is a 2,500 square foot facility comprised a kitchen, restrooms, a recreation office and outdoor seating. The recreation office with a kitchenette is a separate building. They were built in 1990. The building consumes electric for lighting, electric HVAC equipment, domestic hot water, cooking and refrigeration equipment as well as plug loads. Equipment throughout the building is in fair to good condition.

### 2.3 Building Occupancy

The Concession Stand is open between 10:00 AM and 5:00 PM on the weekends from Memorial Day until June 24<sup>th</sup>, and between 10:00 AM and 5:00 PM, seven days a week from June 24<sup>th</sup> through Labor Day. The Concession Stand is closed after Labor Day until Memorial Day, however, the building is conditioned throughout the winter. The typical schedule is presented in the table below.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Memorial Day until June 24 <sup>th</sup>	Weekday	No Use
Memorial Day until June 24 <sup>th</sup>	Weekend	10:00 AM to 5:00 PM
June 24 <sup>th</sup> until Labor Day	Weekday	10:00 AM to 5:00 PM
June 24 <sup>th</sup> until Labor Day	Weekend	10:00 AM to 5:00 PM
Labor Day to Memorial Day	Weekday	No Use
Labor Day to Memorial Day	Weekend	No Use

## 2.4 Building Envelope

The building is constructed of concrete block. The building has a slightly pitched roof awning which appears to be in good condition. The building has a metal door and a metal roll up door. The windows are double pane with metal frames which are in good condition and show little sign of excessive infiltration.



## 2.5 On-Site Generation

The Concession Stand does not have any on-site electric generation capacity.

## 2.6 Energy-Using Systems

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

### Lighting System

Lighting at the facility is provided mostly by T8 linear fluorescent lamps with electronic ballasts. There are linear fluorescent lamps with magnetic ballast fixtures in the utility closet. The exit signs in the Concession Stand are lit with incandescent lamps. The exterior of the building include High Pressure Sodium (HPS) fixtures and Halogen Incandescent lamp fixtures. Lighting control in most spaces is provided by manual wall switches.



## Electric HVAC Equipment and Systems

The building is heated by electric space a unit heater that appears to be in good condition. It is manually controlled in an on/off fashion by a wall switch. Based on the utility information, this unit is left on throughout the winter months. The building is cooled by a small roof top unit that appears to be in fair condition. This was inaccessible during the on site assessment and the capacity and efficiency was assumed for the purposes of this report. The roof top unit is manually controlled by a manual dial thermostat.

The recreation office is conditioned by a through wall electric heat pump that is fair condition.



## Domestic Hot Water Heating System

The domestic hot water heating system for the facility consists of a small electric 30 gallon electric storage tank water heater with 3 kW heating coils.

## Food Service Equipment

The kitchen areas have an electric fryer and an electric oven. These are in good condition.



## Refrigeration

The Concession Stand has a freezer chest for ice cream and a storage freezer chest. The kitchen areas also have stand up refrigerators. These are all in fair to good condition. It should be noted that when the Concession Stand is closed, these empty units should be cleaned, unplugged and have the door left a jar to reduce electrical energy consumption.



## **Building Plug Load**

Plug loads throughout the facility include fans and general café equipment.

### **2.7 Water-Using Systems**

There is a regular flow faucet, with the flow rate of 2.2 gallons per minute (gpm) in a restroom at this facility.





### 3 SITE ENERGY USE AND COSTS

Utility data for electricity was analyzed to identify opportunities for savings. In addition, data for electricity was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the “typical” energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.3 for additional information.

#### 3.1 Total Cost of Energy

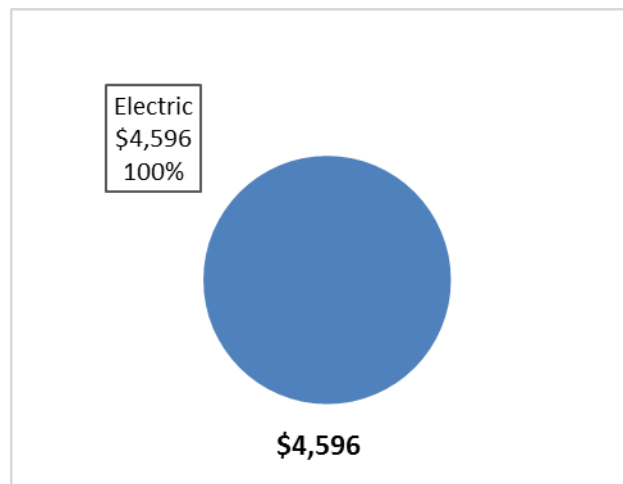
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

*Figure 6 - Utility Summary*

Utility Summary for Concession Stand		
Fuel	Usage	Cost
Electricity	30,236 kWh	\$4,596
Total		\$4,596

The current annual energy cost for this facility is \$4,596 as shown in the chart below.

*Figure 7 - Energy Cost Breakdown*



### 3.2 Electricity Usage

Electricity is provided by JCP&L. The average electric cost over the past 12 months was \$0.152/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The facility does not pay electric demand charges. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 8 - Electric Usage & Demand

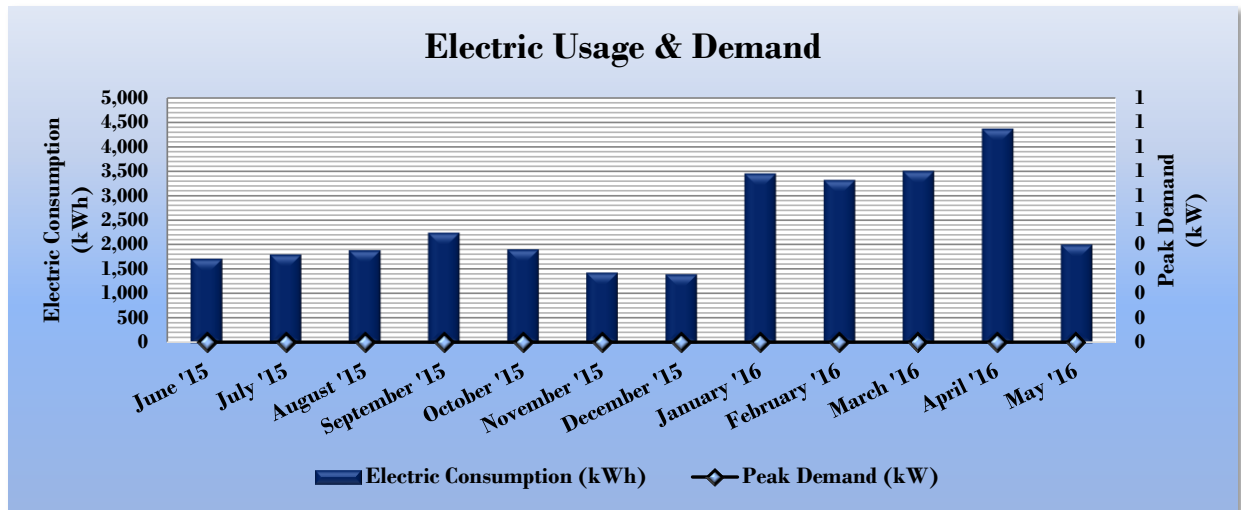


Figure 9 - Electric Usage & Demand

Electric Billing Data for Concession Stand					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
6/25/15	28	1,722			\$288
7/27/15	31	1,806			\$297
8/26/15	29	1,893			\$331
9/25/15	29	2,250			\$383
10/26/15	30	1,909			\$339
11/25/15	29	1,441			\$278
12/28/15	32	1,406			\$243
1/27/16	29	3,454			\$466
2/24/16	27	3,322			\$452
3/24/16	28	3,505			\$471
4/25/16	31	4,359			\$564
5/24/16	28	2,009			\$309
<b>Totals</b>	<b>351</b>	<b>29,076</b>	<b>0</b>	<b>\$0</b>	<b>\$4,420</b>
<b>Annual</b>	<b>365</b>	<b>30,236</b>	<b>0</b>	<b>\$0</b>	<b>\$4,596</b>

### 3.3 Benchmarking

This facility was benchmarked using *Portfolio Manager*<sup>®</sup>, an online tool created and managed by the United States Environmental Protection Agency (EPA) through the ENERGY STAR<sup>®</sup> program. *Portfolio Manager*<sup>®</sup> analyzes your building’s consumption data, cost information, and operational use details and then compares its performance against a national median for similar buildings of its type. Metrics provided by this analysis are Energy Use Intensity (EUI) and an ENERGY STAR<sup>®</sup> score for select building types.

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

**Figure 10 - Energy Use Intensity Comparison – Existing Conditions**

Energy Use Intensity Comparison - Existing Conditions		
	Concession Stand	National Median Building Type: Rec./Entertainment/Parks
Source Energy Use Intensity (kBtu/ft <sup>2</sup> )	129.6	96.8
Site Energy Use Intensity (kBtu/ft <sup>2</sup> )	41.3	41.2

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

**Figure 11 - Energy Use Intensity Comparison – Following Installation of Recommended Measures**

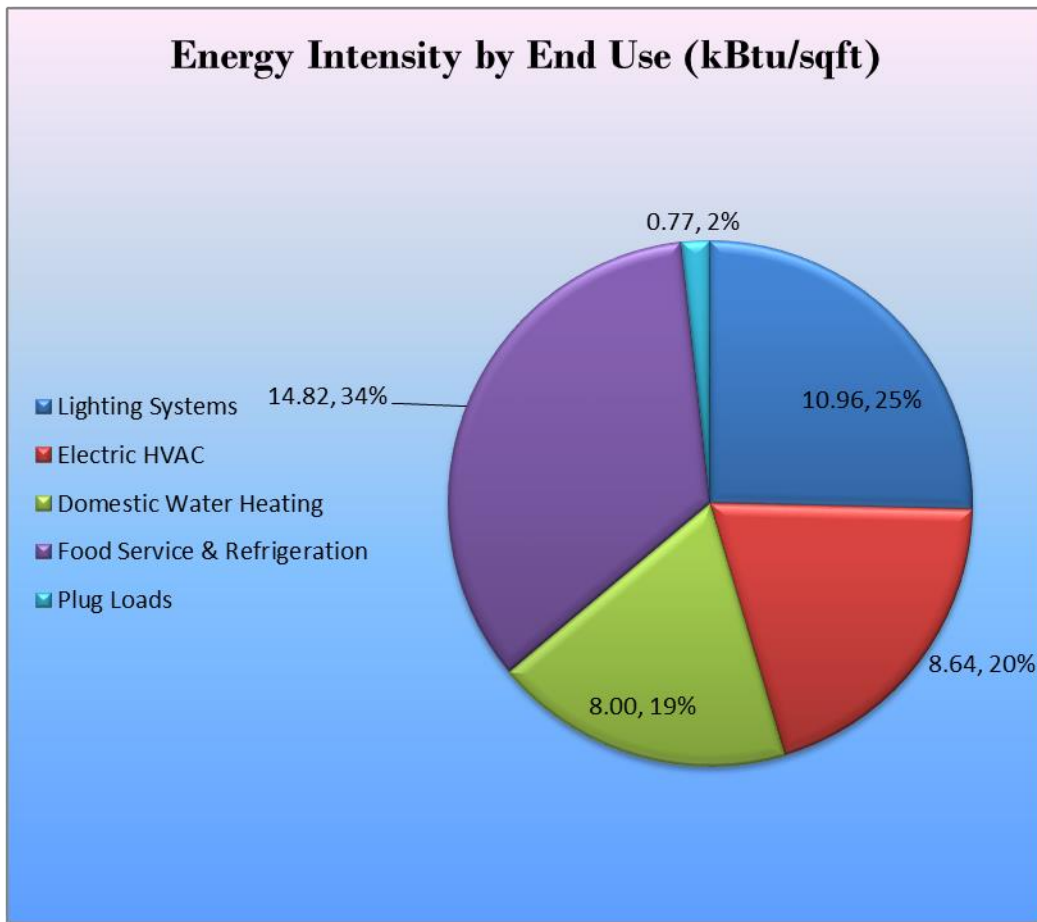
Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Concession Stand	National Median Building Type: Rec./Entertainment/Parks
Source Energy Use Intensity (kBtu/ft <sup>2</sup> )	102.4	96.8
Site Energy Use Intensity (kBtu/ft <sup>2</sup> )	32.6	41.2

Many types of commercial buildings are also eligible to receive an ENERGY STAR<sup>®</sup> score. This score is a percentile ranking from 1 to 100. It compares your building’s energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR<sup>®</sup> certification. Your building is not is one of the building categories that are eligible to receive a score.

### 3.4 Energy End-Use Breakdown

In order to provide a complete overview of energy consumption across building systems, an energy balance was performed at this facility. An energy balance utilizes standard practice engineering methods to evaluate all components of the various electric and fuel-fired systems found in a building to determine their proportional contribution to overall building energy usage. This chart of energy end uses highlights the relative contribution of each equipment category to total energy usage. This can help determine where the greatest benefits might be found from energy efficiency measures.

Figure 12 - Energy Balance (kBtu/SF)



## 4 ENERGY CONSERVATION MEASURES

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

The following sections describe the evaluated measures.

### 4.1 Recommended ECMs

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

*Figure 13 – 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>5,993</b>	<b>1.6</b>	<b>0.0</b>	<b>\$911.03</b>	<b>\$5,278.64</b>	<b>\$730.00</b>	<b>\$4,548.64</b>	<b>5.0</b>	<b>6,035</b>
ECM 1	Install LED Fixtures	4,752	0.9	0.0	\$722.38	\$3,580.09	\$530.00	\$3,050.09	4.2	4,785
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	150	0.1	0.0	\$22.85	\$234.00	\$20.00	\$214.00	9.4	151
ECM 3	Retrofit Fixtures with LED Lamps	600	0.6	0.0	\$91.22	\$1,034.34	\$180.00	\$854.34	9.4	604
ECM 4	Install LED Exit Signs	491	0.0	0.0	\$74.57	\$430.22	\$0.00	\$430.22	5.8	494
<b>HVAC System Improvements</b>		<b>329</b>	<b>0.0</b>	<b>0.0</b>	<b>\$50.08</b>	<b>\$659.74</b>	<b>\$0.00</b>	<b>\$659.74</b>	<b>13.2</b>	<b>332</b>
ECM 5	Install Programmable Thermostats	329	0.0	0.0	\$50.08	\$659.74	\$0.00	\$659.74	13.2	332
<b>Domestic Water Heating Upgrade</b>		<b>17</b>	<b>0.0</b>	<b>0.0</b>	<b>\$2.56</b>	<b>\$7.17</b>	<b>\$0.00</b>	<b>\$7.17</b>	<b>2.8</b>	<b>17</b>
ECM 6	Install Low-Flow Domestic Hot Water Devices	17	0.0	0.0	\$2.56	\$7.17	\$0.00	\$7.17	2.8	17
<b>TOTALS</b>		<b>6,339</b>	<b>1.6</b>	<b>0.0</b>	<b>\$963.67</b>	<b>\$5,945.55</b>	<b>\$730.00</b>	<b>\$5,215.55</b>	<b>5.4</b>	<b>6,384</b>

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

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

## 4.1.1 Lighting Upgrades

Our recommendations for upgrades to existing lighting fixtures are summarized in Figure 14 below.

*Figure 14 – 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Upgrades</b>		<b>5,993</b>	<b>1.6</b>	<b>0.0</b>	<b>\$911.03</b>	<b>\$5,278.64</b>	<b>\$730.00</b>	<b>\$4,548.64</b>	<b>5.0</b>	<b>6,035</b>
ECM 1	Install LED Fixtures	4,752	0.9	0.0	\$722.38	\$3,580.09	\$530.00	\$3,050.09	4.2	4,785
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	150	0.1	0.0	\$22.85	\$234.00	\$20.00	\$214.00	9.4	151
ECM 3	Retrofit Fixtures with LED Lamps	600	0.6	0.0	\$91.22	\$1,034.34	\$180.00	\$854.34	9.4	604
ECM 4	Install LED Exit Signs	491	0.0	0.0	\$74.57	\$430.22	\$0.00	\$430.22	5.8	494

During lighting upgrade planning and design, we recommend a comprehensive approach that considers both the efficiency of the lighting fixtures and how they are controlled.

### **ECM I: 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 <sub>2</sub> e Emissions Reduction (lbs)
Interior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0
Exterior	4,752	0.9	0.0	\$722.38	\$3,580.09	\$530.00	\$3,050.09	4.2	4,785

#### *Measure Description*

We recommend replacing existing exterior high pressure sodium (HPS) fixtures with new reduced wattage high performance LED light fixtures. This measure saves energy by installing LEDs which use less power than other technologies with a comparable light output. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are much longer than traditional lighting technologies.

## **ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers**

### *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 <sub>2</sub> e Emissions Reduction (lbs)
Interior	150	0.1	0.0	\$22.85	\$234.00	\$20.00	\$214.00	9.4	151
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

### *Measure Description*

We recommend retrofitting existing T12 lamp fluorescent fixtures by removing fluorescent tubes and ballasts and replacing them with LEDs and LED drivers (if necessary), which are designed to be used retrofitted fluorescent fixtures. The measure uses the existing fixture housing but replaces the rest of the components with more efficient lighting technology. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes.

## **ECM 3: Retrofit Fixtures with LED Lamps and Drivers**

### *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 <sub>2</sub> e Emissions Reduction (lbs)
Interior	437	0.4	0.0	\$66.43	\$907.03	\$170.00	\$737.03	11.1	440
Exterior	163	0.2	0.0	\$24.79	\$127.30	\$10.00	\$117.30	4.7	164

### *Measure Description*

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

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

## **ECM 4: 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 <sub>2</sub> e Emissions Reduction (lbs)
Interior	491	0.0	0.0	\$74.57	\$430.22	\$0.00	\$430.22	5.8	494
Exterior	0	0.0	0.0	\$0.00	\$0.00	\$0.00	\$0.00	0.0	0

### *Measure Description*

We recommend replacing all incandescent exit signs with LED exit signs. LED exit signs require virtually no maintenance and have a life expectancy of at least 20 years. This measure saves energy by installing LED fixtures, which use less power than other technologies with an equivalent lighting output.



## 4.1.2 HVAC System Upgrades

Our recommendation for HVAC system improvement are summarized in Figure 15 below.

*Figure 15 - Summary of HVAC System Improvement ECMs*

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
<b>HVAC System Improvements</b>		<b>329</b>	<b>0.0</b>	<b>0.0</b>	<b>\$50.08</b>	<b>\$659.74</b>	<b>\$0.00</b>	<b>\$659.74</b>	<b>13.2</b>	<b>332</b>
ECM 5	Install Programmable Thermostats	329	0.0	0.0	\$50.08	\$659.74	\$0.00	\$659.74	13.2	332

### ECM 5: Install Programmable Thermostats

#### *Summary of Measure Economics*

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings (\$)	Estimated Install Cost (\$)	Estimated Incentive (\$)	Estimated Net Cost (\$)	Simple Payback Period (yrs)	CO <sub>2</sub> e Emissions Reduction (lbs)
329	0.0	0.0	\$50.08	\$659.74	\$0.00	\$659.74	13.2	332

#### *Measure Description*

We recommend replacing the manual thermostat that controls the packaged roof top unit in the summer months with a programmable thermostat and replacing the wall switch that controls the electric space unit heater in the winter months with a programmable thermostat. Manual thermostats are generally adjusted to a single heating and cooling setpoint and left at that setting regardless of occupancy in the area served by the HVAC equipment. As a result, the same level of heating and cooling is provided regardless of the occupancy in the space. Programmable thermostats can be set to maintain different temperature settings for different times of day and for different days of the week. By reducing heating temperature setpoints and raising cooling temperature setpoints when space are unoccupied, the operation of the HVAC equipment is reduced while still maintaining reasonable space temperatures for building usage at all times.

Programmable thermostats provide energy savings by reducing heating and cooling energy usage when a room is unoccupied.

### 4.1.3 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic water heating system improvements are summarized in Figure 16 below.

*Figure 16 - 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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Domestic Water Heating Upgrade</b>	<b>17</b>	<b>0.0</b>	<b>0.0</b>	<b>\$2.56</b>	<b>\$7.17</b>	<b>\$0.00</b>	<b>\$7.17</b>	<b>2.8</b>	<b>17</b>
ECM 6   Install Low-Flow Domestic Hot Water Devices	17	0.0	0.0	\$2.56	\$7.17	\$0.00	\$7.17	2.8	17

#### **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 <sub>2</sub> e Emissions Reduction (lbs)
17	0.0	0.0	\$2.56	\$7.17	\$0.00	\$7.17	2.8	17

*Measure Description*

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators can reduce hot water usage, relative to standard aerators, which saves energy.

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

## 4.2 ECMs Evaluated But Not Recommended

The measures below have been evaluated by the auditor but are not recommended for implementation at the facility. Reasons for exclusion can be found in each measure description section.

**Figure 17 – Summary of Measures Evaluated, But Not Recommended**

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 <sub>2</sub> e Emissions Reduction (lbs)
<b>Lighting Control Measures</b>	<b>78</b>	<b>0.0</b>	<b>0.0</b>	<b>\$11.79</b>	<b>\$386.00</b>	<b>\$35.00</b>	<b>\$351.00</b>	<b>29.8</b>	<b>78</b>
Install Occupancy Sensor Lighting Controls	78	0.0	0.0	\$11.79	\$386.00	\$35.00	\$351.00	29.8	78
<b>Food Service Equipment &amp; Refrigeration Measures</b>	<b>1,659</b>	<b>0.2</b>	<b>0.0</b>	<b>\$252.18</b>	<b>\$2,700.00</b>	<b>\$0.00</b>	<b>\$2,700.00</b>	<b>10.7</b>	<b>1,671</b>
Replace Refrigeration Equipment	1,659	0.2	0.0	\$252.18	\$2,700.00	\$0.00	\$2,700.00	10.7	1,671
<b>TOTALS</b>	<b>1,737</b>	<b>0.2</b>	<b>0.0</b>	<b>\$263.98</b>	<b>\$3,086.00</b>	<b>\$35.00</b>	<b>\$3,051.00</b>	<b>11.6</b>	<b>1,749</b>

\* - 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).

### 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 <sub>2</sub> e Emissions Reduction (lbs)
78	0.0	0.0	\$11.79	\$386.00	\$35.00	\$351.00	29.8	78

#### Measure Description

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

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

#### Reasons for not Recommending

This measure is not recommended based on the poor payback period.

## Replace Refrigeration Equipment

### *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 <sub>2</sub> e Emissions Reduction (lbs)
1,659	0.2	0.0	\$252.18	\$2,700.00	\$0.00	\$2,700.00	10.7	1,671

### *Measure Description*

We recommend replacing the older large storage freezer chest with new ENERGY STAR® high efficiency equipment. There have been many improvements in refrigeration system equipment, operation, and insulation. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

### *Reasons for not Recommending*

This measure is not recommended based on the unfavorable payback period. However, it should be noted that when the Concession Stand is closed, these empty units should be cleaned, unplugged and have the door left ajar to reduce electrical energy consumption.

## 5 ENERGY EFFICIENT PRACTICES

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

### Reduce Air Leakage

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

### Close Doors and Windows

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

### Perform Proper Lighting Maintenance

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

### Perform Proper Water Heater Maintenance

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

## **Plug Load Controls**

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

## **Water Conservation**

Installing low-flow faucets or faucet aerators, low-flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and water. These devices save energy by reducing the overall amount of hot water used hence reducing the energy used to heat the water. The flow ratings for EPA WaterSense™ (<http://www3.epa.gov/watersense/products>) labeled devices are 1.5 gpm for bathroom faucets, 2.0 gpm for showerheads, and 1.28 gpm for pre-rinse spray valves.

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 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 ON-SITE GENERATION MEASURES

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

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

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

### 6.1 Photovoltaic

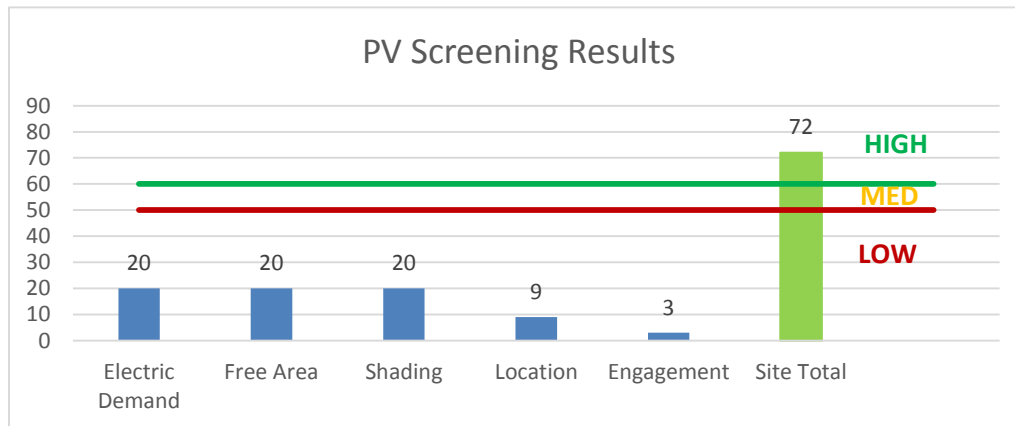
Sunlight can be converted into electricity using photovoltaics (PV) modules. Modules are racked together into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is interconnected to the facility’s electrical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

The facility requested TRC to analyze the solar potential at a former landfill site owned by the township located at 1360 Route 70, Whiting, New Jersey. The image below shows the area considered for the solar PV. The area is approximately 117,000 sq. feet.



A preliminary screening based on the facility’s electric demand, size and location of free area, and shading elements shows that the site has a high potential for cost-effective installation of a PV array. Please refer to the Municipal Building energy audit report for further details on the cost and savings analysis of installing solar PV at the location shown above. TRC recommends that the site be assessed by a qualified solar installer. Site conditions need to be assessed and options for sale of power or usage by municipal buildings need to be more fully explored in order to determine project cost-effectiveness.

**Figure 18 - Photovoltaic Screening**



Solar projects must register their projects in the SREC (Solar Renewable Energy Certificate) Registration Program (SRP) prior to the start of construction in order to establish the project’s eligibility to earn SRECs. Registration of the intent to participate in New Jersey’s solar marketplace provides market participants with information about developed new solar projects and insight into future SREC pricing. Refer to Section 8.3 for additional information.

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

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



## 6.2 Combined Heat and Power

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

CHP systems are typically used to produce a portion of the electric power used onsite by a facility, with the balance of electric power needs supplied by grid purchases. The heat is used to supplement (or supplant) existing boilers for the purpose of space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for the purpose of space cooling. The key criteria used for screening, however, is the amount of time the system operates at full load and the facility's ability to use the recovered heat. Facilities with continuous use for large quantities of waste heat are the best candidates for CHP. As the concession stand does not have a need for heat constantly or have a natural gas connection, a CHP is not suitable at this location.

## 7 DEMAND RESPONSE

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

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

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

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

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

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

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

## 8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey’s Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 19 for a list of the eligible programs identified for each recommended ECM.

*Figure 19 - 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 Fluorescent Fixtures with LED Lamps and Drivers	x		x			
ECM 3	Retrofit Fixtures with LED Lamps	x		x			
ECM 4	Install LED Exit Signs	x		x			
ECM 5	Install Programmable Thermostats			x			
ECM 6	Install Low-Flow Domestic Hot Water Devices			x			

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

Generally, the incentive values provided throughout the report assume the SmartStart program is utilized because it provides a consistent basis for comparison of available incentives for various measures, though in many cases incentive amounts may be higher through participation in other programs.

Brief descriptions of all relevant financing and incentive programs are located in the sections below. Further information, including most current program availability, requirements, and incentive levels can be found at: [www.njcleanenergy.com/ci](http://www.njcleanenergy.com/ci).

## 8.1 SmartStart

### Overview

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

### **Equipment with Prescriptive Incentives Currently Available:**

*Electric Chillers*

*Electric Unitary HVAC*

*Gas Cooling*

*Gas Heating*

*Gas Water Heating*

*Ground Source Heat Pumps*

*Lighting*

*Lighting Controls*

*Refrigeration Doors*

*Refrigeration Controls*

*Refrigerator/Freezer Motors*

*Food Service Equipment*

*Variable Frequency Drives*

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

### Incentives

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

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

### How to Participate

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

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

## 8.2 Direct Install

### Overview

Direct Install is a turnkey program available to existing small to medium-sized facilities with a peak electric demand that does not exceed 200 kW for any recent 12-month period. You will work directly with a pre-approved contractor who will perform a free energy assessment at your facility, identify specific eligible measures, and provide a clear scope of work for installation of selected measures. Energy efficiency measures may include lighting and lighting controls, refrigeration, HVAC, motors, variable speed drives and controls.

### Incentives

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

### How to Participate

To participate in the Direct Install program you will need to contact the participating contractor who the region of the state where your facility is located. A complete list of Direct Install program partners is provided on the Direct Install website linked below. The contractor will be paid the measure incentives directly by the program 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 and eligibility, while the remaining 30% of the cost is paid to the contractor by the customer.

Since Direct Install offers a free assessment of eligible measures, Direct Install is also available to small businesses and other commercial facilities too that may not be eligible for the more detailed facility audits provided by LGEA.

Detailed program descriptions and applications can be found at: [www.njcleanenergy.com/DI](http://www.njcleanenergy.com/DI).

### 8.3 SREC Registration Program

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

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

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

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

Information about the SRP can be found at: [www.njcleanenergy.com/srec](http://www.njcleanenergy.com/srec).

## 8.4 Energy Savings Improvement Program

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

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

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

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

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

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

## 9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

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### 9.1 Retail Electric Supply Options

In 1999, New Jersey State Legislature passed the Electric Discount & Energy Competition Act (EDECA) to restructure the electric power industry in New Jersey. This law deregulated the retail electric markets, allowing all consumers to shop for service from competitive electric suppliers. The intent was to create a more competitive market for electric power supply in New Jersey. As a result, utilities were allowed to charge Cost of Service and customers were given the ability to choose a third party (i.e. non-utility) energy supplier.

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. So, though you may choose a different company from which to buy your electric power, responsibility for your facility's interconnection to the grid and repair to local power distribution will still reside with the traditional utility company serving your region.

If your facility is not purchasing electricity from a third party supplier, consider shopping for a reduced rate from third party electric suppliers. If your facility is purchasing electricity from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party electric suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: [www.state.nj.us/bpu/commercial/shopping.html](http://www.state.nj.us/bpu/commercial/shopping.html).

### 9.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey has also been deregulated. Most customers that remain with the utility for natural gas service pay rates that are market-based and that fluctuate on a monthly basis. The utility provides basic gas supply service (BGSS) to customers who choose not to buy from a third party Supplier for natural gas commodity.

A customer's decision about whether to buy natural gas from a retail supplier is typically dependent upon whether a customer seeks budget certainty and/or longer-term rate stability. Customers can secure longer-term fixed prices by signing up for service through a third party retail natural gas supplier. Many larger natural gas customers may seek the assistance of a professional consultant to assist in their procurement process.

If your facility is not purchasing natural gas from a third party supplier, consider shopping for a reduced rate from third party natural gas suppliers. If your facility is purchasing natural gas from a third party supplier, review and compare prices at the end of the current contract or every couple years.

A list of third party natural gas suppliers, who are licensed by the state to provide service in New Jersey, can be found online at: [www.state.nj.us/bpu/commercial/shopping.html](http://www.state.nj.us/bpu/commercial/shopping.html).



# Appendix A: Equipment Inventory & Recommendations

## Lighting Inventory & Recommendations

Location	Existing Conditions					Proposed Conditions								Energy Impact & Financial Analysis						
	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years	
Kitchen	5	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	1,274	Relamp	Yes	5	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	892	0.16	266	0.0	\$40.38	\$562.50	\$85.00	11.83	
Kitchen	1	Exit Signs: Incandescent	None	20	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	141	0.0	\$21.44	\$107.56	\$0.00	5.02	
Utility Closet	2	Linear Fluorescent - T12: 4' T12 (40W) - 2L	Wall Switch	88	1,274	Relamp & Reballast	Yes	2	LED - Linear Tubes: (2) 4' Lamps	Occupancy Sensor	29	892	0.12	198	0.0	\$30.16	\$350.00	\$20.00	10.94	
Outdoor Sitting	6	High-Pressure Sodium: (1) 100W Lamp	None	138	4,000	Fixture Replacement	No	6	LED - Fixtures: Downlight Recessed	None	30	4,000	0.57	2,981	0.0	\$453.13	\$1,626.70	\$30.00	3.52	
Exterior	5	High-Pressure Sodium: (1) 100W Lamp	None	138	4,000	Fixture Replacement	No	5	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	30	4,000	0.47	2,484	0.0	\$377.61	\$1,953.39	\$500.00	3.85	
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	637	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	637	0.06	48	0.0	\$7.35	\$117.00	\$20.00	13.20	
Restroom	1	Exit Signs: Incandescent	None	20	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	141	0.0	\$21.44	\$107.56	\$0.00	5.02	
Restroom	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	637	Relamp	No	2	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	637	0.06	48	0.0	\$7.35	\$117.00	\$20.00	13.20	
Restroom	1	Exit Signs: Incandescent	None	20	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	141	0.0	\$21.44	\$107.56	\$0.00	5.02	
Recreation Office	4	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	637	Relamp	No	4	LED - Linear Tubes: (4) 4' Lamps	Wall Switch	58	637	0.20	164	0.0	\$24.94	\$380.53	\$80.00	12.05	
Recreation Office	1	Exit Signs: Incandescent	None	20	8,760	Fixture Replacement	No	1	LED Exit Signs: 2 W Lamp	None	6	8,760	0.01	141	0.0	\$21.44	\$107.56	\$0.00	5.02	
Exterior	1	Halogen Incandescent: Spot Light Fixtures 2L Each	None	150	637	Relamp	No	1	LED Screw-In Lamps: Spot Lamps	None	22	637	0.11	94	0.0	\$14.25	\$63.65	\$5.00	4.11	
Exterior	1	Halogen Incandescent: Spot Light Fixtures 2L Each	None	150	637	Relamp	No	1	LED Screw-In Lamps: Spot Lamps	None	22	637	0.11	94	0.0	\$14.25	\$63.65	\$5.00	4.11	

### Electric HVAC Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
		System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Concession Stand	Unit Heater	1	Electric Resistance Heat		11.95	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Roof	Concession Stand	1	Packaged AC	2.00		No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Recreation Office	Recreation Office	1	Through-The-Wall HP	2.00	11.95	No							No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Programmable Thermostat Recommendations

Location	Area(s)/System(s) Affected	Recommendation Inputs				Energy Impact & Financial Analysis						
		Thermostat Quantity	Cooling Capacity of Controlled System (Tons)	Electric Heating Capacity of Controlled System (kBtu/hr)	Output Heating Capacity of Controlled System (MBh)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Concession Stand	RTU	1	2.00	0.00		0.00	187	0.0	\$28.37	\$329.87	\$0.00	11.63
Concession Stand	Electric Unit Heater	1	0.00	11.95		0.00	143	0.0	\$21.71	\$329.87	\$0.00	15.19

### DHW Inventory & Recommendations

Location	Area(s)/System(s) Served	Existing Conditions				Proposed Conditions					Energy Impact & Financial Analysis					
		System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Concession Stand	Concession Stand	1	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

### Low-Flow Device Recommendations

Location	Recommendation Inputs				Energy Impact & Financial Analysis						
	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Restroom	1	Faucet Aerator (Lavatory)	2.20	1.00	0.00	17	0.0	\$2.56	\$7.17	\$0.00	2.80

### Commercial Refrigerator/Freezer Inventory & Recommendations

Location	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
	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
Concession Stand	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Concession Stand	1	Freezer Chest	Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Concession Stand	1	Freezer Chest	No	Yes	0.19	1,659	0.0	\$252.18	\$2,700.00	\$0.00	10.71

### Cooking Equipment Inventory & Recommendations

Location	Existing Conditions				Proposed Conditions	Energy Impact & Financial Analysis						
	Quantity	Equipment Type		High Efficiency Equipment?	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Electric Fryer		Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00
Kitchen	1	Electric Convection Oven (Half Size)		Yes	No	0.00	0	0.0	\$0.00	\$0.00	\$0.00	0.00

**Plug Load Inventory**

Existing Conditions				
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
Concession Stand	1	Exhaust Hood Fan	746.0	
Concession Stand	1	Coffee Maker	1,500.0	
Concession Stand	1	Microwave	1,500.0	
Concession Stand	1	Hot Dog Seller	750.0	
Concession Stand	1	Fan	100.0	