Local Government Energy Audit:
Energy Audit Report

Community Center

239 11th St

Barnegat, NJ 08005

Ocean Township

November 6, 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 Community Center.

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 the Ocean Township in New Jersey with controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

1.1 Facility Summary

The Community Center is a 6,780 square foot facility comprised of a large community room, meeting room, kitchen and large living area. The building is used for community purposes including classes, events, and programs as well as rented out periodically for parties. The building is used every day of the week. Occupancy from Monday through Friday, is between 6:00 AM and 2:30 PM with occupancy extending until 5:00 PM some days. Saturdays and Sundays the facility is used between 7:30 AM and 2:30 PM.

Space heating is provided by a boiler that supplies hot water to three small air handlers. Space cooling is provided by three package units. HVAC equipment at the Community Center is aging and inefficient. Facility personnel stated that the equipment is over 15 years old and requires a lot of service. Lighting is provided primarily by fluorescent fixtures with 2 or 4-foot lamps. A thorough description of the facility and our observations are located in Section 2.

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated ten measures including seven high-priority measures which together represent an opportunity for the Community Center to reduce annual energy costs by $1,913 and annual greenhouse gas emissions by 14,253 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in 4.3 years. The breakdown of existing and potential utility costs after project implementation are illustrated in Figure 1 and Figure 2, respectively. Together these measures represent an opportunity to reduce the Community Center's annual energy use by 10%.

Figure 1 – Previous 12 Month Utility Costs

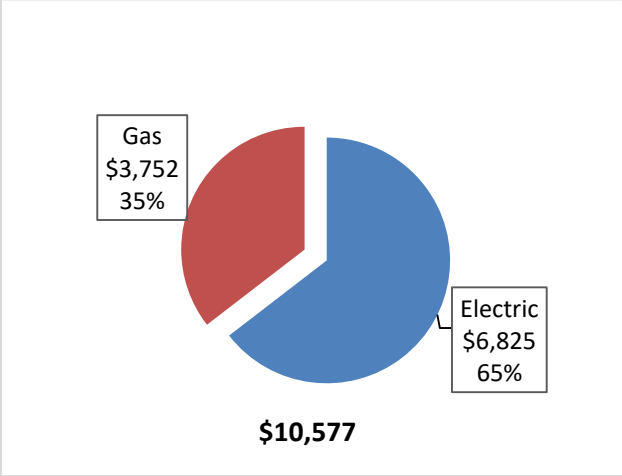
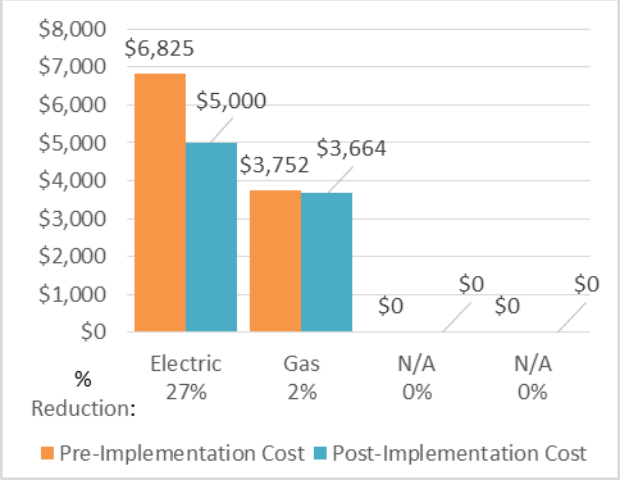


Figure 2 – Potential Post-Implementation Costs



A detailed description of Community Center'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		High Priority?	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			**9,100**	**1.8**	**0.0**	**$1,260.73**	**$6,237.73**	**$145.00**	**$6,092.73**	**4.8**	**9,164**
ECM 1	Install LED Fixtures	Yes	1,192	0.2	0.0	$165.12	$1,850.88	$120.00	$1,730.88	10.5	1,200
ECM 2	Retrofit Fixtures with LED Lamps	Yes	7,908	1.6	0.0	$1,095.61	$4,386.86	$25.00	$4,361.86	4.0	7,963
Lighting Control Measures			**1,952**	**0.5**	**0.0**	**$270.48**	**$1,466.00**	**$160.00**	**$1,306.00**	**4.8**	**1,966**
ECM 3	Install Occupancy Sensor Lighting Controls	Yes	1,952	0.5	0.0	$270.48	$1,466.00	$160.00	$1,306.00	4.8	1,966
Variable Frequency Drive (VFD) Measures			**2,348**	**0.7**	**0.0**	**$325.34**	**$7,993.77**	**$400.00**	**$7,593.77**	**23.3**	**2,365**
	Install VFDs on Constant Volume (CV) HVAC	No	2,348	0.7	0.0	$325.34	$7,993.77	$400.00	$7,593.77	23.3	2,365
Electric Unitary HVAC Measures			**3,351**	**8.4**	**0.0**	**$464.29**	**$27,348.60**	**$1,715.50**	**$25,633.10**	**55.2**	**3,375**
	Install High Efficiency Electric AC	No	3,351	8.4	0.0	$464.29	$27,348.60	$1,715.50	$25,633.10	55.2	3,375
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**22.0**	**$230.90**	**$10,081.44**	**$1,000.00**	**$9,081.44**	**39.3**	**2,578**
	Install High Efficiency Hot Water Boilers	No	0	0.0	22.0	$230.90	$10,081.44	$1,000.00	$9,081.44	39.3	2,578
HVAC System Improvements			**1,745**	**0.0**	**4.9**	**$292.81**	**$698.89**	**$0.00**	**$698.89**	**2.4**	**2,327**
ECM 4	Install Programmable Thermostats	Yes	1,370	0.0	4.9	$240.81	$659.74	$0.00	$659.74	2.7	1,949
ECM 5	Install Pipe Insulation	Yes	375	0.0	0.0	$52.01	$39.15	$0.00	$39.15	0.8	378
Domestic Water Heating Upgrade			**337**	**0.0**	**0.0**	**$46.64**	**$35.85**	**$0.00**	**$35.85**	**0.8**	**339**
ECM 6	Install Low-Flow Domestic Hot Water Devices	Yes	337	0.0	0.0	$46.64	$35.85	$0.00	$35.85	0.8	339
Custom Measures			**38**	**0.0**	**3.6**	**$42.74**	**$150.00**	**$0.00**	**$150.00**	**3.5**	**457**
ECM 7	Weatherstrip Exterior Doors	Yes	38	0.0	3.6	$42.74	$150.00	$0.00	$150.00	3.5	457
TOTAL HIGH PRIORITY MEAURESS			**13,172**	**2.3**	**8.4**	**$1,913.41**	**$8,588.47**	**$305.00**	**$8,283.47**	**4.3**	**14,253**
TOTAL EVALUATED MEAURESS			**18,871**	**11.4**	**30.5**	**$2,933.93**	**$54,012.28**	**$3,420.50**	**$50,591.78**	**17.2**	**22,570**

* - 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.

Variable Frequency Drives (VFDs) are motor control devices. These measures control the speed of a motor so that the motor spins at peak efficiency during partial load conditions. Sensors adapt the speed to flow, temperature, or pressure settings which is much more efficient than using a valve or damper to control flow rates, or running the motor at full speed when only partial power is needed. These measures save energy by controlling motor usage more efficiently.

Electric Unitary HVAC measures generally involve replacing older inefficient air conditioning systems with modern energy efficient systems. New air conditioning systems can provide equivalent cooling to older air condition systems at a reduced energy cost. These measures save energy by reducing the power used by the air conditioning systems, due to improved electrical efficiency.

Gas Heating (HVAC/Process) measures generally involve replacing older inefficient hydronic heating systems with modern energy efficient systems. Gas heating systems can provide equivalent heating compared to older systems at a reduced energy cost. These measures save energy by reducing the fuel demands for heating, due to improved combustion and heat transfer efficiency.

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.

Energy Efficient Practices

TRC also identified 15 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 Community Center include:

- Reduce Air Leakage
- Close Doors and Windows
- Perform Proper Lighting Maintenance
- Develop a Lighting Maintenance Schedule
- Ensure Lighting Controls Are Operating Properly
- Perform Routine Motor Maintenance
- Use Fans to Reduce Cooling Load
- Install Destratification Fans
- Practice Proper Use of Thermostat Schedules and Temperature Resets

- Clean Evaporator/Condenser Coils on AC Systems
- Clean and/or Replace HVAC Filters
- Check for and Seal Duct Leakage
- Perform Proper Boiler Maintenance
- Perform Proper Furnace Maintenance
- Perform Proper Water Heater Maintenance

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

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

1.3 Implementation Planning

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

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

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

- SmartStart
- Direct Install

For facilities wanting to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the SmartStart program. To participate in this program you may utilize internal resources, or an outside firm or contractor, to do the final design of the ECM(s) and do the installation. Program pre-approval is required for some SmartStart incentives, so only after receiving pre-approval should you proceed with ECM installation. The incentive estimates listed above in Figure 3 are based on the SmartStart program. More details on this program and others are available in Section 8.

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 0 for additional information on the ESIP Program.

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

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

2 FACILITY INFORMATION AND EXISTING CONDITIONS

2.1 Project Contacts

Figure 4 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Diane Ambrosio	Business Adminstrator	clerk@twpoceannj.gov	609-693-3302
Dan Kehoe	Foreman - Public Works		609-839-7701
Matt Ambrosio	Superintendent - Public Works		609-618-0892
TRC Energy Services			
Aimee Lalonde	Auditor	alalonde@trcsolutions.com	(732) 855-0033

2.2 General Site Information

On June 27, 2017, TRC performed an energy audit at the Community Center located in Barnegat, New Jersey. TRC's team met with Diane Ambrosio, Business Administrator; Dan Kehoe, Foreman – Public Works; and Matt Ambrosio, Superintendent – Public Works to review the facility operations and help focus our investigation on specific energy-using systems.

The Community Center is a 6,780 square foot facility comprised of a large community room, meeting room, kitchen and large living area. The building is 100% heated and cooled. The HVAC equipment at the Community Center is aging and inefficient. Facility personnel stated that the air-handling units (AHUs) are over 15 years old and require a lot of service. There are three AHUs located in the attic of the building which are equipped with heating and cooling coils. The heating coils are served by gas-fired boilers and the cooling coils are served by outdoor air conditioning units.

2.3 Building Occupancy

The building is used for community purposes including classes, events, and programs as well as rented out periodically for parties. The building is used every day of the week. Occupancy Monday through Friday, is between 6:00 AM and 2:30 PM with occupancy extending until 5:00 PM some days. Saturdays and Sundays the facility is used between 7:30 AM and 2:30 PM. The typical schedule is presented in the table below. During a typical day, the facility is occupied by 100 people.

Figure 5 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Community Center	Weekday	6:00AM - 2:30PM
Community Center	Weekend	7:30AM - 2:30PM

2.4 Building Envelope

The building walls has exterior cladding, pitched roofs, and double-pane, operable windows with wooden or vinyl frames which all appear to be in good condition. The exterior doors are typically metal with metal frames. The exterior doors have either missing or worn weather-stripping materials which show signs of excessive infiltration. There is an opportunity for energy savings by weather-stripping exterior doors to reduce air infiltration, thus reducing the load on the building's HVAC systems.

2.5 On-Site Generation

The Community Center does not have any on-site electric generation capacity. There is very low potential for installing a PV system.

2.6 Energy-Using Systems

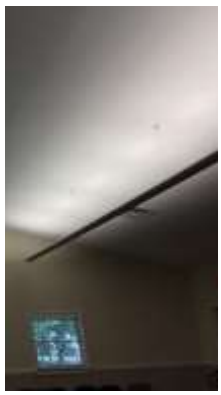
Please see Appendix A: Equipment Inventory & Recommendations for an inventory of the facility's lighting equipment.

Lighting System

The building is primarily lit by linear T8 linear fluorescent fixtures. Fixtures throughout the building include pendant mounted continuous rows fixtures, cove lights and recessed troffer fixtures. Some areas have recessed can fixtures with compact fluorescent plug in lamps. There are also some recessed can fixtures in the lobby area with metal halide lamps. The kitchen has strip fixtures with T12 lamps and are in poor condition and are recommended for replacement.

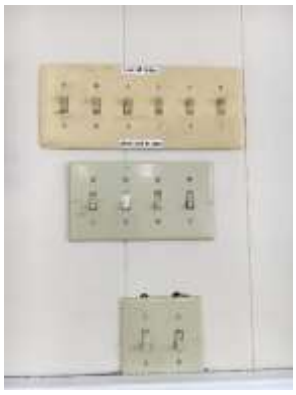






The exterior lighting includes building mounted LED fixtures, lamp fixtures with screw in compact fluorescent lamps, halogen incandescent fixtures, and a fixture with a large high pressure sodium lamp. There is an opportunity for energy savings by upgrading the remaining fixtures to LED technology.

The lighting in individual rooms are manually controlled via wall switches. The restrooms have occupancy based sensors. The large community rooms are equipped with bi-level switching. There is an opportunity for energy savings by installing occupancy-based sensors in locations such as hallways, the meeting room and the game room. The exterior lighting is controlled by a timeclock.


Motors

The HVAC systems that serve the building include fan and pump motors which are generally in good condition and of standard to high efficiency. These include hot water pumps, exhaust fans and supply fan motors.

Domestic Hot Water Heating System

The building is supplied domestic hot water by an electric storage tank water heater that is in good condition. The sink aerators throughout the building are fit with higher flow devices (2.2 gallons per minute [gpm]). There is an opportunity for energy savings by replacing these aerators with low flow devices.

HVAC System

The building is 100% heated and cooled. The HVAC Equipment at the Community Center is aging and inefficient. Facility personnel stated that the air-handling units (AHUs) are over 15 years old and require a lot of service. There are three AHUs located in the attic of the building which are equipped with heating and cooling coils. The heating coils are served by gas-fired boilers and the cooling coils are served by outdoor air conditioning units. The building is heated by a non-condensing, gas-fired hot water boiler that is in fair condition. The boiler provides hot water to baseboard radiators in the restrooms and heating coils in the air-handling units. There are currently outdoor air reset controls, however, only two of four modes are utilized.

There are three air-handling units that serve the building which are equipped with heating and cooling coils and are located in the attic of the building. The outdoor condensing units for cooling are in fair to poor condition and standard efficiency. The refrigerant piping insulation is in poor condition or missing. For the purposes of this report, the efficiencies were derated for the existing equipment.





The building's split AC systems are controlled by thermostats located in the space. These systems are controlled by programmable thermostats which are set at 72°F in the summer months and 68°F during the winter months. The restrooms have manual dial thermostats that were set at 72°F. However, the large spaces felt very cool and the restrooms very warm. The boiler was operating, hot water was being pumped through the baseboards in the restrooms and up to the attic, routed around the air-handers and back down to the boiler. The air-handling units were in cooling mode for the remainder of the building. Additionally, per discussions with facility personnel, there are no current temperature setbacks. There is an opportunity for energy savings by replacing the thermostats in the restrooms with programmable thermostats and scheduling all of them to meet the operating hours of the spaces and ensure the boiler does not run in the summer months.



Food Service Equipment

There is a kitchen which includes a stove and a stand up fridge. This kitchen is typically only used when the large community spaces are rented out for parties. There are no recommendations for improvement.

Building Plug Load

There are large floor fans, ceiling fans and general café equipment. There are no recommendations for improvement.

2.7 Water-Using Systems

There are restrooms in the facility. A sampling of these spaces found that the faucets are rated for 2.2 gpm. There is an opportunity for energy savings by installing low-flow devices throughout the building.

3 SITE ENERGY USE AND COSTS

Utility data for electricity and natural gas was analyzed to identify opportunities for savings. In addition, data for electricity and natural gas was evaluated to determine the annual energy performance metrics for the building in energy cost per square foot and energy usage per square foot. These metrics are an estimate of the relative energy efficiency of this building. There are a number of factors that could cause the energy use of this building to vary from the "typical" energy usage profile for facilities with similar characteristics. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and energy efficient behavior of occupants all contribute to benchmarking scores. Please refer to the Benchmarking section within Section 3.4 for additional information.

3.1 Total Cost of Energy

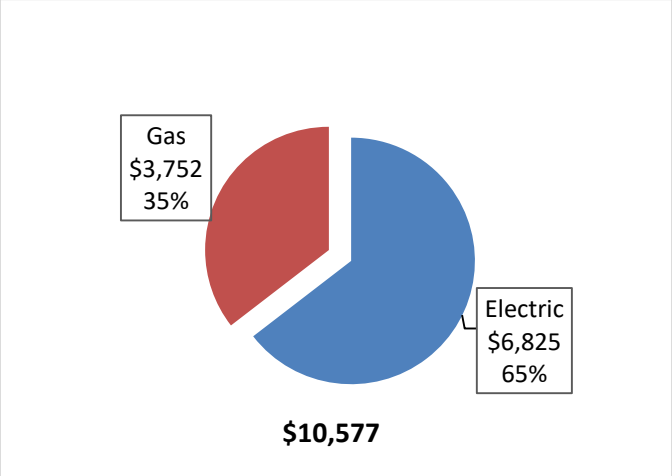
The following energy consumption and cost data is based on the last 12-month period of utility billing data that was provided for each utility. A profile of the annual energy consumption and energy cost of the facility was developed from this information.

Figure 6 - Utility Summary

Utility Summary for Community Center		
Fuel	**Usage**	**Cost**
Electricity	49,265 kWh	$6,825
Natural Gas	3,578 Therms	$3,752
Total		**$10,577**

The current annual energy cost for this facility is $10,577 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 $0.139/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The facility pays electric demand charges. The monthly electricity consumption and peak demand are shown in the chart below. This is a typical profile for a facility with electric cooling. The increase in use in January is attributed to increased heating water pump operation.

Figure 8 - Electric Usage & Demand

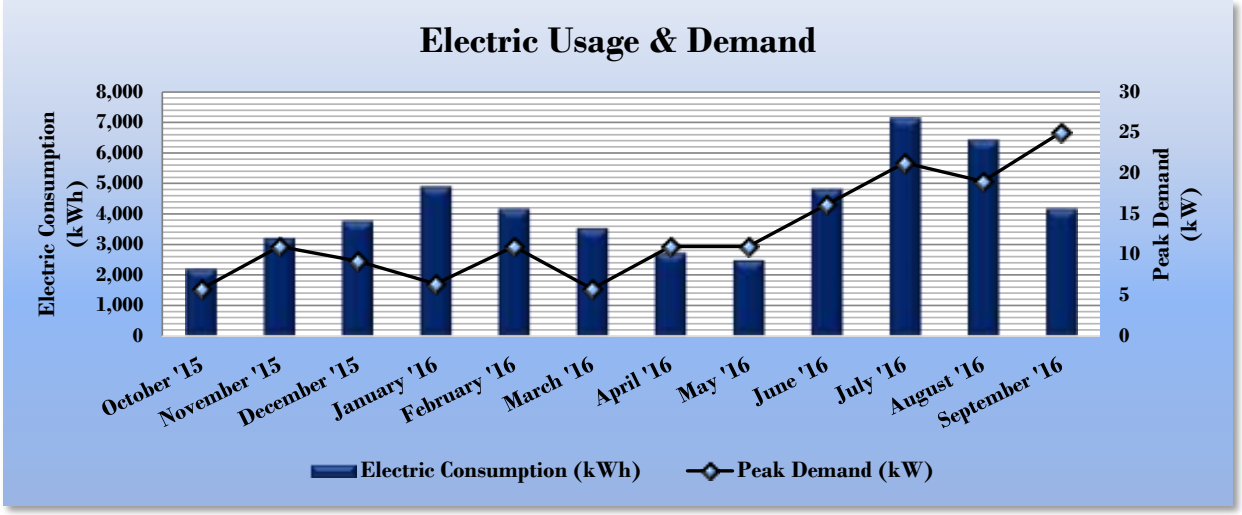


Figure 9 - Electric Usage & Demand

Electric Billing Data for Community Center						
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost	TRC Estimated Usage?
10/29/15	31	2,200	6	$33	$295	Yes
11/27/15	29	3,200	11	$30	$429	Yes
12/29/15	32	3,760	9	$52	$525	No
1/27/16	29	4,880	6	$36	$544	No
2/26/16	30	4,160	11	$62	$581	No
3/28/16	31	3,520	6	$33	$484	No
4/26/16	29	2,720	11	$30	$391	No
5/26/16	30	2,480	11	$30	$360	No
6/23/16	28	4,800	16	$79	$685	Yes
7/27/16	34	7,120	21	$128	$1,011	No
8/25/16	29	6,400	19	$114	$914	No
9/28/16	34	4,160	25	$90	$624	Yes
Totals	**366**	**49,400**	**25**	**$716**	**$6,844**	4
Annual	**365**	**49,265**	**25**	**$714**	**$6,825**	

3.3 Natural Gas Usage

Natural gas is provided by NJ Natural Gas. The average gas cost for the past 12 months is $1.049/therm, which is the blended rate used throughout the analyses in this report. The monthly gas consumption is shown in the chart below. This is a typical profile for a site that uses natural gas primarily for space heating.

Figure 10 - Natural Gas Usage

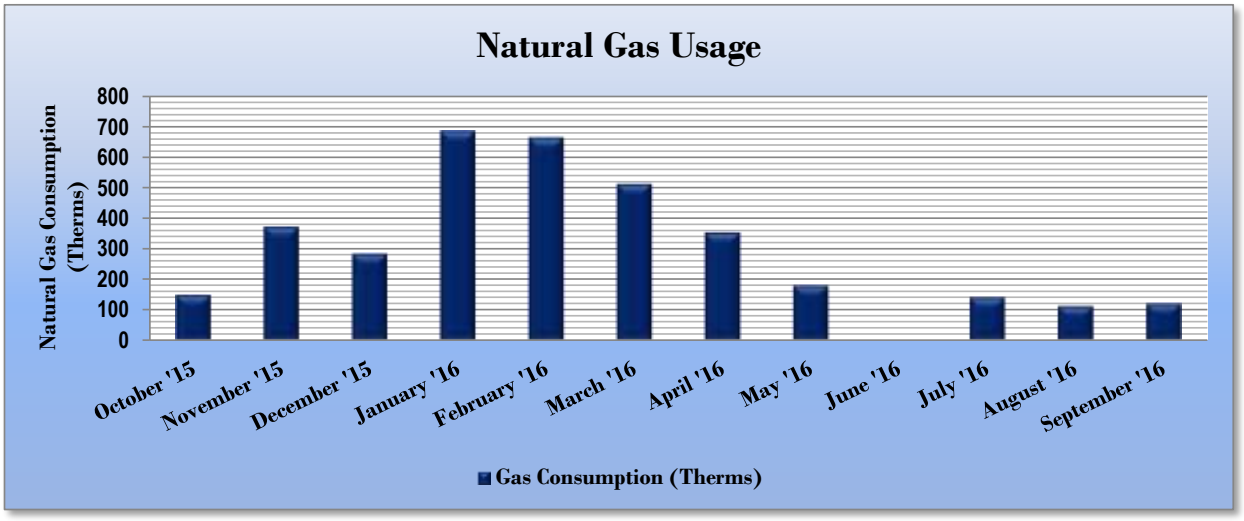


Figure 11 - Natural Gas Usage

Gas Billing Data for Community Center			
Period Ending	Days in Period	Natural Gas Usage (Therms)	Natural Gas Cost
11/3/15	32	149	$204
12/4/15	31	372	$368
1/6/16	33	284	$311
2/4/16	29	685	$599
3/1/16	26	663	$582
4/5/16	35	511	$454
5/4/16	29	353	$350
6/4/16	31	179	$227
7/7/16	33	0	$96
8/1/16	25	141	$193
8/31/16	30	112	$177
9/30/16	30	120	$182
Totals	**364**	**3,568**	**$3,742**
Annual	**365**	**3,578**	**$3,752**

3.4 Benchmarking

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

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

Figure 12 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Community Center	National Median Building Type: Rec./Entertainment/Parks
Source Energy Use Intensity (kBtu/ft^2)	133.3	96.8
Site Energy Use Intensity (kBtu/ft^2)	77.6	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 13 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

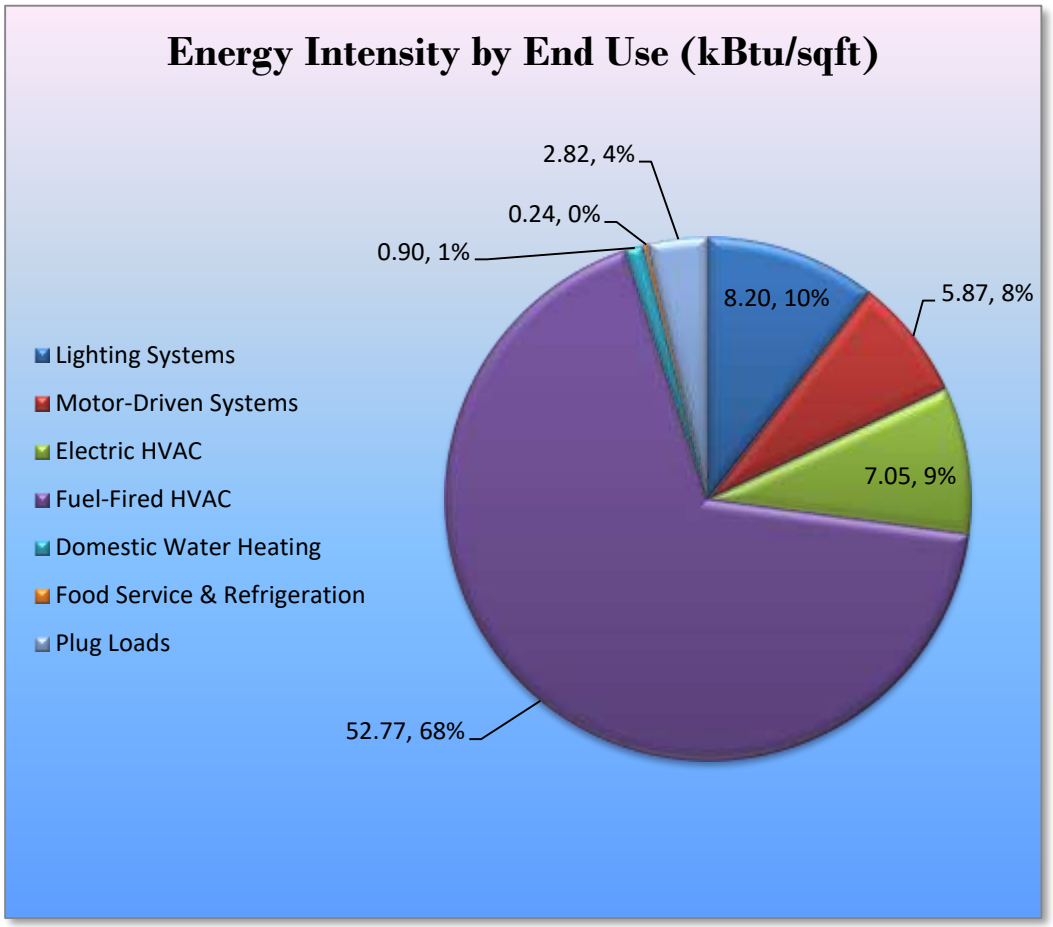
Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Community Center	National Median Building Type: Rec./Entertainment/Parks
Source Energy Use Intensity (kBtu/ft^2)	111.1	96.8
Site Energy Use Intensity (kBtu/ft^2)	69.7	41.2

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

3.5 Energy End-Use Breakdown

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

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



4 ENERGY CONSERVATION MEASURES

Level of Analysis

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

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

Figure 15 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**9,100**	**1.8**	**0.0**	**$1,260.73**	**$6,237.73**	**$145.00**	**$6,092.73**	**4.8**	**9,164**
ECM 1	Install LED Fixtures	1,192	0.2	0.0	$165.12	$1,850.88	$120.00	$1,730.88	10.5	1,200
ECM 2	Retrofit Fixtures with LED Lamps	7,908	1.6	0.0	$1,095.61	$4,386.86	$25.00	$4,361.86	4.0	7,963
Lighting Control Measures		**1,952**	**0.5**	**0.0**	**$270.48**	**$1,466.00**	**$160.00**	**$1,306.00**	**4.8**	**1,966**
ECM 3	Install Occupancy Sensor Lighting Controls	1,952	0.5	0.0	$270.48	$1,466.00	$160.00	$1,306.00	4.8	1,966
HVAC System Improvements		**1,745**	**0.0**	**4.9**	**$292.81**	**$698.89**	**$0.00**	**$698.89**	**2.4**	**2,327**
ECM 4	Install Programmable Thermostats	1,370	0.0	4.9	$240.81	$659.74	$0.00	$659.74	2.7	1,949
ECM 5	Install Pipe Insulation	375	0.0	0.0	$52.01	$39.15	$0.00	$39.15	0.8	378
Domestic Water Heating Upgrade		**337**	**0.0**	**0.0**	**$46.64**	**$35.85**	**$0.00**	**$35.85**	**0.8**	**339**
ECM 6	Install Low-Flow Domestic Hot Water Devices	337	0.0	0.0	$46.64	$35.85	$0.00	$35.85	0.8	339
Custom Measures		**38**	**0.0**	**3.6**	**$42.74**	**$150.00**	**$0.00**	**$150.00**	**3.5**	**457**
ECM 7	Weatherstrip Exterior Doors	38	0.0	3.6	$42.74	$150.00	$0.00	$150.00	3.5	457
TOTALS		**13,172**	**2.3**	**8.4**	**$1,913.41**	**$8,588.47**	**$305.00**	**$8,283.47**	**4.3**	**14,253**

* - 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 16 below.

Figure 16 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**9,100**	**1.8**	**0.0**	**$1,260.73**	**$6,237.73**	**$145.00**	**$6,092.73**	**4.8**	**9,164**
ECM 1	Install LED Fixtures	1,192	0.2	0.0	$165.12	$1,850.88	$120.00	$1,730.88	10.5	1,200
ECM 2	Retrofit Fixtures with LED Lamps	7,908	1.6	0.0	$1,095.61	$4,386.86	$25.00	$4,361.86	4.0	7,963

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 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	670	0.2	0.0	$92.80	$1,460.20	$20.00	$1,440.20	15.5	675
Exterior	522	0.0	0.0	$72.31	$390.68	$100.00	$290.68	4.0	526

Measure Description

We recommend replacing the linear fluorescent T12 lamp strip fixtures in the kitchen with new surface mounted LED fixtures. This provides an opportunity for energy savings as shown above, however, the simple payback is high due to the assumed low-run hours of these fixtures. This measure is recommended based on the existing condition of the fixtures.

We also recommend replacing the high pressure sodium flood fixture on the exterior of the building (mounted on the brick chimney) with a new LED flood fixture. The proposed lighting equipment are new high performance LEDs which have much longer lifespans. Therefore, this measure saves energy by reducing the electrical demand and use of the light fixtures, while improving light output as well as reducing required maintenance.

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	6,124	1.6	0.0	$848.44	$3,848.74	$5.00	$3,843.74	4.5	6,167
Exterior	1,784	0.0	0.0	$247.18	$538.12	$20.00	$518.12	2.1	1,797

Measure Description

We recommend re-lamping existing linear fluorescent fixtures by removing fluorescent tubes and replacing them with LEDs (assuming the existing ballasts are compatible with the proposed LED lamps). This measure uses the existing fixture housing but replaces the lamps with more efficient lighting technology. We also recommend replacing all compact fluorescent and incandescent lamps with LED lamps. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space. Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than 10 times longer than many incandescent lamps.

4.1.2 Lighting Control Measures

Our recommendation for upgrades to existing lighting fixtures is summarized Figure 17 below.

Figure 17 – 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		**1,952**	**0.5**	**0.0**	**$270.48**	**$1,466.00**	**$160.00**	**$1,306.00**	**4.8**	**1,966**
ECM 3	Install Occupancy Sensor Lighting Controls	1,952	0.5	0.0	$270.48	$1,466.00	$160.00	$1,306.00	4.8	1,966

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 3: Install Occupancy Sensor Lighting Controls

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
1,952	0.5	0.0	$270.48	$1,466.00	$160.00	$1,306.00	4.8	1,966

Measure Description

We recommend installing occupancy sensors to control lighting fixtures that are currently controlled by manual switches in the hallway, large community room, meeting room and large game room. 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.

4.1.3 HVAC System Upgrades

Our recommendations for HVAC system improvement are summarized Figure 18 below.

Figure 18- 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_2e Emissions Reduction (lbs)
HVAC System Improvements		**1,745**	**0.0**	**4.9**	**$292.81**	**$698.89**	**$0.00**	**$698.89**	**2.4**	**2,327**
ECM 4	Install Programmable Thermostats	1,370	0.0	4.9	$240.81	$659.74	$0.00	$659.74	2.7	1,949
ECM 5	Install Pipe Insulation	375	0.0	0.0	$52.01	$39.15	$0.00	$39.15	0.8	378

ECM 4: 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_2e Emissions Reduction (lbs)
1,370	0.0	4.9	$240.81	$659.74	$0.00	$659.74	2.7	1,949

Measure Description

We recommend replacing manual thermostats with programmable thermostats in the restrooms. 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.

At the time of the energy audit, the heating and cooling systems were in operation simultaneously to meet the needs of the restrooms in heating mode and the large open spaces in cooling mode. We recommend ensuring only heating or cooling is provided to the facility at a time. Additionally, the elderly ladies occupying the large game room were cold and wanted to turn the air conditioning down. This provides an opportunity to adjust temperature set points based on the schedule of the spaces as well as the age of occupants. For example, less cooling is required for older occupants and will save energy. Lastly, we recommend that the facility considers turning off boilers in the summer months.

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

ECM 5: Install Pipe Insulation

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)
375	0.0	0.0	$52.01	$39.15	$0.00	$39.15	0.8	378

Measure Description

We recommend installing insulation on the cooling system liquid refrigerant piping. Distribution system losses are dependent on refrigerant temperature, the size of the distribution system, and the level of insulation of the piping. Significant energy savings can be achieved when insulation has not been well maintained by replacing missing or degraded insulation. When the insulation is exposed to outdoor temperatures, when the insulation has been removed from some areas of the pipe, or when valves have not been properly insulated system efficiency can be significantly reduced. This measure saves energy by reducing energy losses from the distribution system.

4.1.4 Domestic Hot Water Heating System Upgrades

Our recommendation for domestic water heating system improvements is summarized in **Error! Reference source not found.**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		**337**	**0.0**	**0.0**	**$46.64**	**$35.85**	**$0.00**	**$35.85**	**0.8**	**339**
ECM 6	Install Low-Flow Domestic Hot Water Devices	337	0.0	0.0	$46.64	$35.85	$0.00	$35.85	0.8	339

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)
337	0.0	0.0	$46.64	$35.85	$0.00	$35.85	0.8	339

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.

4.1.5 Custom Measures

Additional custom measure energy saving opportunities are addressed in this section. Recommended custom measures are summarized in Figure 20 below.

Figure 20 - Summary of Custom ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Custom Measures		**38**	**0.0**	**3.6**	**$42.74**	**$150.00**	**$0.00**	**$150.00**	**3.5**	**457**
ECM 7	Weatherstrip Exterior Doors	38	0.0	3.6	$42.74	$150.00	$0.00	$150.00	3.5	457

ECM 7: Weather-strip Exterior Doors

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)
38	0.0	3.6	$42.74	$150.00	$0.00	$150.00	3.5	457

Measure Description

We recommend weather-stripping the exterior doors in the building. There were a total of three double doors which have missing or worn weather-stripping with clear air gaps. Building envelopes that limit air infiltration and that have adequate insulation play a key role in optimizing heating and cooling efficiency, controlling moisture, and providing occupant comfort. Cracks and gaps throughout your building – around windows and doors, through utility openings, at the foundation and roof may not seem significant, but their effects add up. Reducing uncontrolled air infiltration through air sealing is a cost effective way to improve the performance and energy efficiency of your facility. The proper sealing of sources for air infiltration and exfiltration will mitigate the air through the building and thus reduce the load on the facility's heating and cooling equipment. Exterior doors should be properly weather-stripped which may include the installation of a bottom sweep, center sweep and weather-stripping around the perimeter of the door.

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 21 – 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_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures	**2,348**	**0.7**	**0.0**	**$325.34**	**$7,993.77**	**$400.00**	**$7,593.77**	**23.3**	**2,365**
Install VFDs on Constant Volume (CV) HVAC	2,348	0.7	0.0	$325.34	$7,993.77	$400.00	$7,593.77	23.3	2,365
Electric Unitary HVAC Measures	**3,351**	**8.4**	**0.0**	**$464.29**	**$27,348.60**	**$1,715.50**	**$25,633.10**	**55.2**	**3,375**
Install High Efficiency Electric AC	3,351	8.4	0.0	$464.29	$27,348.60	$1,715.50	$25,633.10	55.2	3,375
Gas Heating (HVAC/Process) Replacement	**0**	**0.0**	**22.0**	**$230.90**	**$10,081.44**	**$1,000.00**	**$9,081.44**	**39.3**	**2,578**
Install High Efficiency Hot Water Boilers	0	0.0	22.0	$230.90	$10,081.44	$1,000.00	$9,081.44	39.3	2,578
TOTALS	**5,700**	**9.1**	**22.0**	**$1,020.52**	**$45,423.81**	**$3,115.50**	**$42,308.31**	**41.5**	**8,317**

* - 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 VFDs on Constant Volume (CV) HVAC

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)
2,348	0.7	0.0	$325.34	$7,993.77	$400.00	$7,593.77	23.3	2,365

Measure Description

We evaluated installing variable frequency drives (VFDs) to control supply fan motor speeds to convert the constant-volume, single-zone air handling system into a variable-air-volume (VAV) system. A separate VFD is usually required to control the return fan motor or dedicated exhaust fan motor, if the air handler has one. Zone thermostats will cause the VFD to modulate fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature. Energy savings results from reducing fan speed (and power) when there is a reduced load required for the zone. The magnitude of energy savings is based on the estimated amount of time that fan motors operate at partial load.

Reasons for not Recommending

The simple payback is longer than the typical useful life of the existing equipment.

Install High Efficiency Air Conditioning Units

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
3,351	8.4	0.0	$464.29	$27,348.60	$1,715.50	$25,633.10	55.2	3,375

Measure Description

We evaluated replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system. The magnitude of energy savings for this measure depends on the relative efficiency of the older unit versus the new high efficiency unit, the average cooling load, and the estimated annual operating hours.

Reasons for not Recommending

The simple payback is longer than the typical useful life of the proposed equipment. However, the existing condensing units serving the three air handlers are approaching the end of their useful life. We recommend that the site consider installing units with a higher efficiency when the existing units are replaced since the marginal cost of more efficient units over standard units will payback over the life of the equipment.

Install High Efficiency Hot Water Boilers

Summary of Measure Economics

Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
0	0.0	22.0	$230.90	$10,081.44	$1,000.00	$9,081.44	39.3	2,578

Measure Description

We evaluated replacing older inefficient hot water boilers with high efficiency hot water boilers. Significant improvements have been made in combustion technology resulting in increased overall boiler efficiency. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

The most notable efficiency improvement is condensing hydronic boilers that can achieve over 90% efficiency under the proper conditions. Condensing hydronic boilers typically operate at efficiencies between 85% and 87% (comparable to other high efficiency boilers) when the return water temperature is above 130°F. The boiler efficiency increases as the return water temperature drops below 130°F.

Reasons for not Recommending

The simple payback for this measure is longer than is normally justified strictly on the basis of energy savings. However, when the boiler is replaced we recommend that the site evaluate installing a condensing boiler and modifying the distribution system if necessary so that water returns to the boiler below 130°F.

5 ENERGY EFFICIENT PRACTICES

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

Reduce Air Leakage

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

Close Doors and Windows

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

Perform Proper Lighting Maintenance

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

Develop a Lighting Maintenance Schedule

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

Ensure Lighting Controls Are Operating Properly

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

Perform Routine Motor Maintenance

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

Use Fans to Reduce Cooling Load

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

Install Destratification Fans

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

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

Practice Proper Use of Thermostat Schedules and Temperature Resets

Ensure thermostats are correctly set back. By employing proper set back temperatures and schedules, facility heating and cooling costs can be reduced dramatically during periods of low or no occupancy. As such, thermostats should be programmed for a setback of 5°F-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 Evaporator/Condenser Coils on AC Systems

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

Clean and/or Replace HVAC Filters

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

Check for and Seal Duct Leakage

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

Perform Proper Boiler Maintenance

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

Perform Proper Furnace Maintenance

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

Perform Proper Water Heater Maintenance

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

6 On-Site Generation Measures

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

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

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

6.1 Photovoltaic

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

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

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

7 DEMAND RESPONSE

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

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

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

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

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

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

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

In our opinion this building is not a good candidate for DR.

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

Figure 22 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings	Large Energy Users Program	Combined Heat & Power and Fuel Cell
ECM 1	Install LED Fixtures	x		x			
ECM 2	Retrofit Fixtures with LED Lamps	x		x			
ECM 3	Install Occupancy Sensor Lighting Controls	x		x			
ECM 4	Install Programmable Thermostats			x			
ECM 5	Install Pipe Insulation			x			
ECM 6	Install Low-Flow Domestic Hot Water Devices			x			
ECM 7	Weatherstrip Exterior Doors						

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

Electric Chillers
Electric Unitary HVAC
Gas Cooling
Gas Heating
Gas Water Heating
Ground Source Heat Pumps
Lighting
Lighting Controls
Refrigeration Doors
Refrigeration Controls
Refrigerator/Freezer Motors
Food Service Equipment
Variable Frequency Drives

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

Incentives

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

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

How to Participate

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

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

8.2 Direct Install

Overview

Direct Install is a turnkey program available to existing small to medium-sized facilities with an average peak electric demand that does not exceed 200 kW over the recent 12-month period. You 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. Each entity is limited to incentives up to $250,000 per fiscal year.

How to Participate

To participate in Direct Install, you will need to contact the participating contractor assigned to 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.

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

8.3 Energy Savings Improvement Program

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

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

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

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

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

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

8.4 Demand Response Energy Aggregator

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

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

See Section 7 for additional information.

9 ENERGY PURCHASING AND PROCUREMENT STRATEGIES

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Hallway	1	Compact Fluorescent: Recessed Can	Wall Switch	64	2,938	Relamp	No	1	LED Screw-In Lamps: Plug in Lamps	Wall Switch	14	2,938	0.04	147	0.0	$20.35	$107.51	$0.00	5.28
Hallway	7	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	2,938	Relamp	Yes	7	LED - Linear Tubes: (2) 2' Lamps	Occupancy Sensor	17	2,057	0.12	490	0.0	$67.93	$607.40	$0.00	8.94
Large Community Room	20	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,938	Relamp	Yes	20	LED - Linear Tubes: (3) 4' Lamps	Occupancy Sensor	44	2,057	1.02	4,153	0.0	$575.40	$2,044.00	$70.00	3.43
Large Community Room	3	Linear Fluorescent - T8: 4' T8 (32W) - 3L	Wall Switch	93	2,938	Relamp	No	3	LED - Linear Tubes: (3) 4' Lamps	Wall Switch	44	2,938	0.12	493	0.0	$68.30	$225.60	$0.00	3.30
Boiler Room	1	Incandescent: Screw in Lamp	Wall Switch	60	500	Relamp	No	1	LED Screw-In Lamps: <Enter Fixture Description>	Wall Switch	7	500	0.04	30	0.0	$4.15	$53.75	$5.00	11.75
Meeting Room	9	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Wall Switch	114	2,938	Relamp	Yes	9	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,057	0.54	2,193	0.0	$303.84	$972.20	$20.00	3.13
Men's Restroom	1	Compact Fluorescent: Recessed Can	Occupancy Sensor	64	2,057	Relamp	No	1	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	2,057	0.04	116	0.0	$16.10	$107.51	$0.00	6.68
Men's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	114	2,057	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,057	0.05	130	0.0	$18.03	$95.13	$0.00	5.28
Men's Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	2,057	Relamp	No	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,057	0.07	203	0.0	$28.17	$179.50	$0.00	6.37
Women's Restroom	1	Compact Fluorescent: Recessed Can	Occupancy Sensor	64	2,057	Relamp	No	1	LED Screw-In Lamps: Plug in Lamps	Occupancy Sensor	14	2,057	0.04	116	0.0	$16.10	$107.51	$0.00	6.68
Women's Restroom	1	Linear Fluorescent - T8: 4' T8 (32W) - 4L	Occupancy Sensor	114	2,057	Relamp	No	1	LED - Linear Tubes: (4) 4' Lamps	Occupancy Sensor	58	2,057	0.05	130	0.0	$18.03	$95.13	$0.00	5.28
Women's Restroom	5	Linear Fluorescent - T8: 4' T8 (32W) - 1L	Occupancy Sensor	32	2,057	Relamp	No	5	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	2,057	0.07	203	0.0	$28.17	$179.50	$0.00	6.37
Kitchen	2	Linear Fluorescent - T12: 8' T12 (75W) - 2L	Wall Switch	158	2,938	Fixture Replacement	No	2	LED - Fixtures: Wrapped Lens	Wall Switch	44	2,938	0.19	757	0.0	$104.87	$1,460.20	$20.00	13.73
Large Game Room	32	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Wall Switch	22	2,938	None	Yes	32	Linear Fluorescent - T8: 2' T8 (17W) - 1L	Occupancy Sensor	22	2,057	0.17	701	0.0	$97.14	$540.00	$70.00	4.84
Exterior Canopy	1	Compact Fluorescent: Canopy	None	13	4,745	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	None	7	4,745	-0.01	-38	0.0	-$5.20	$53.75	$0.00	-10.34
Exterior	4	Halogen Incandescent: Screw in Lamp	None	100	4,745	Relamp	No	4	LED Screw-In Lamps: Flood Lamps	None	9	4,745	-0.03	-193	0.0	-$26.74	$430.61	$20.00	-15.35
Exterior	1	Compact Fluorescent: Surface Mount	None	13	4,745	Relamp	No	1	LED Screw-In Lamps: Screw in Lamps	None	7	4,745	-0.01	-38	0.0	-$5.20	$53.75	$0.00	-10.34
Exterior	4	LED - Fixtures: Outdoor Porch Wall Mount	None	9	4,745	None	No	4	LED - Fixtures: Outdoor Porch Wall Mount	None	9	4,745	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior	1	High-Pressure Sodium: (1) 150W Lamp	None	188	4,745	Fixture Replacement	No	1	LED - Fixtures: Outdoor Wall-Mounted Area Fixture	None	78	4,745	-0.06	-418	0.0	-$57.94	$390.68	$100.00	-5.02

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Hydronic Heating System	1	Heating Hot Water Pump	0.5	60.0%	No	2,938	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Attic	AHU-1	1	Supply Fan	2.0	84.0%	No	2,938	No	84.0%	Yes	1	0.29	939	0.0	$130.14	$2,728.85	$160.00	19.74
Attic	AHU-2	1	Supply Fan	1.5	84.0%	No	2,938	No	84.0%	Yes	1	0.22	704	0.0	$97.60	$2,632.46	$120.00	25.74
Attic	AHU-3	1	Supply Fan	1.5	84.0%	No	2,938	No	84.0%	Yes	1	0.22	704	0.0	$97.60	$2,632.46	$120.00	25.74
Attic	Hydronic Heating System	2	Heating Hot Water Pump	0.5	60.0%	No	2,938	No	60.0%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Restrooms	Restrooms	2	Exhaust Fan	0.5	60.0%	No	2,938	No	60.0%	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
AHU in Attic, Outdoor Condensing Units	AHU-1	1	Split-System AC	10.00		Yes	1	Split-System AC	10.00		18.00		No	3.57	1,426	0.0	$197.57	$11,637.70	$730.00	55.21
AHU in Attic, Outdoor Condensing Units	AHU-2	1	Split-System AC	7.50		Yes	1	Split-System AC	7.50		18.00		No	2.68	1,070	0.0	$148.18	$8,728.28	$547.50	55.21
AHU in Attic, Outdoor Condensing Units	AHU-3	1	Split-System AC	6.00		Yes	1	Split-System AC	6.00		18.00		No	2.14	856	0.0	$118.54	$6,982.62	$438.00	55.21

Fuel Heating Inventory & Recommendations

		Existing Conditions			Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Output Capacity per Unit (MBh)	Install High Efficiency System?	System Quantity	System Type	Output Capacity per Unit (MBh)	Heating Efficiency	Heating Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechanical Room	Whole Building	1	Non-Condensing Hot Water Boiler	420.00	Yes	1	Condensing Hot Water Boiler	420.00	91.00%	Et	0.00	0	22.0	$230.90	$10,081.44	$1,000.00	39.33

Programmable Thermostat Recommendations

		Recommendation Inputs				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	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
Restrooms	Hot Water Baseboard	2	0.00		84.00	0.00	1,370	4.9	$240.81	$659.74	$0.00	2.74

Pipe Insulation Recommendations

		Recommendation Inputs		Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	Length of Uninsulated Pipe (ft)	Pipe Diameter (in)	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
Refrigerant Piping	Split AC Systems	9	1.00	0.00	375	0.0	$52.01	$39.15	$0.00	0.75

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
Mechanical Room	Whole Building	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

	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
Men's Restroom	2	Faucet Aerator (Lavatory)	2.20	1.00	0.00	135	0.0	$18.66	$14.34	$0.00	0.77
Women's Restroom	3	Faucet Aerator (Lavatory)	2.20	1.00	0.00	202	0.0	$27.98	$21.51	$0.00	0.77

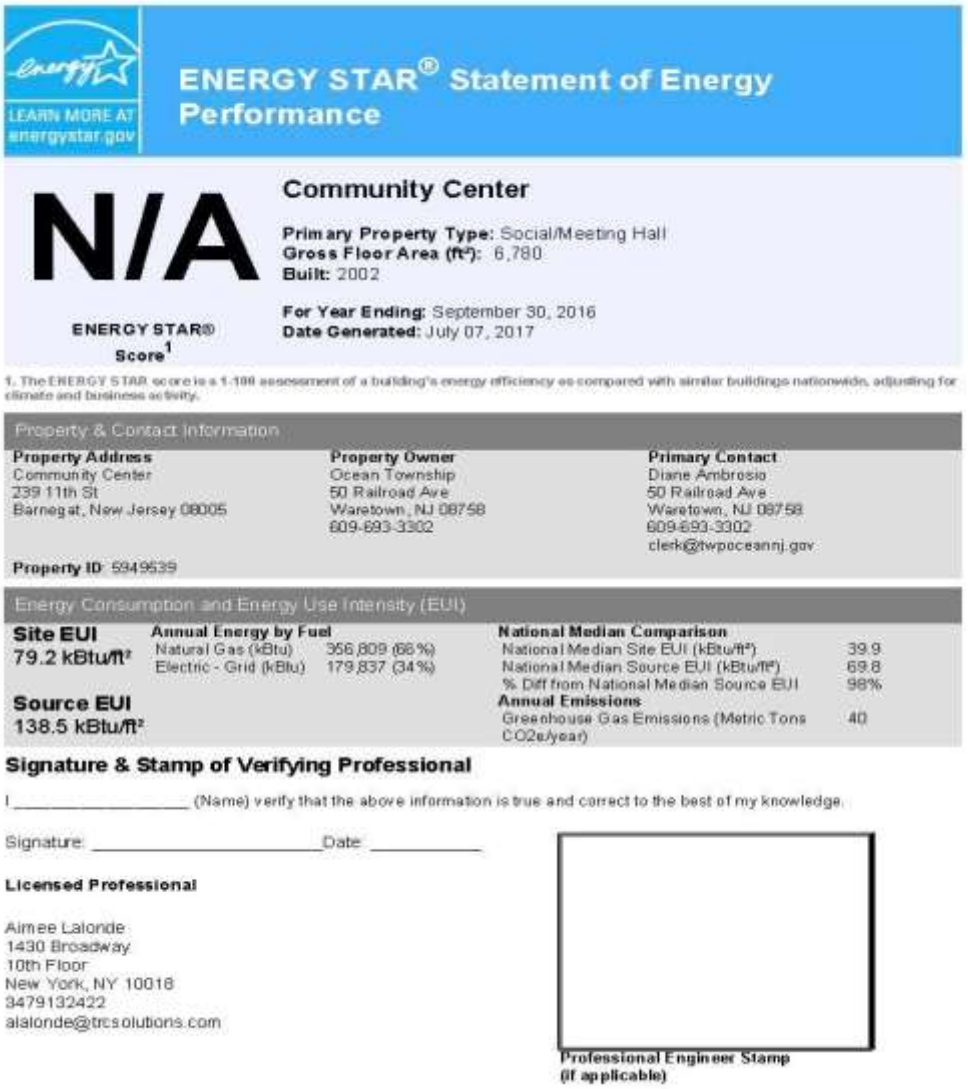
Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	1	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	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?
Community Center	1	Electric Unit Heater	1,500.0	
Community Center	6	Ceiling Fans	200.0	
Community Center	3	Floor Fans	186.5	
Community Center	2	Microwaves	1,850.0	
Community Center	1	Coffee Maker	1,200.0	
Community Center	1	TV	120.0	
Community Center	4	Automatic Door Openers	1,500.0	

Appendix B: ENERGY STAR® Statement of Energy Performance



ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

Community Center

Primary Property Type: Social/Meeting Hall
Gross Floor Area (ft²): 6,780
Built: 2002

For Year Ending: September 30, 2016
Date Generated: July 07, 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
Community Center 239 11th St Barnegat, New Jersey 08005	Ocean Township 50 Railroad Ave Waretown, NJ 08758 609-693-3302	Diane Ambrosio 50 Railroad Ave Waretown, NJ 08758 609-693-3302 clerk@twpoceannj.gov

Property ID: 6949639

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
79.2 kBtu/ft²

Source EUI
138.5 kBtu/ft²

Annual Energy by Fuel		
Natural Gas (kBtu)	356,809	(66%)
Electric - Grid (kBtu)	179,837	(34%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	39.9
National Median Source EUI (kBtu/ft²)	69.8
% Diff from National Median Source EUI	98%
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

Aimee Lalonde
1430 Broadway
10th Floor
New York, NY 10018
3479132422
alalonde@trcsolutions.com

Professional Engineer Stamp (if applicable)