Local Government Energy Audit Report

Bnai Keshet Sanctuary

November 7, 2023

Prepared for:

Bnai Keshet

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Montclair, New Jersey 07042

Prepared by:

TRC

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Disclaimer

The goal of this audit report is to identify potential energy efficiency opportunities and help prioritize specific measures for implementation. Most energy conservation measures have received preliminary analysis of feasibility that identifies expected ranges of savings and costs. This level of analysis is usually considered sufficient to establish a basis for further discussion and to help prioritize energy measures.

TRC reviewed the energy conservation measures and estimates of energy savings for technical accuracy. Actual, achieved energy savings depend on behavioral factors and other uncontrollable variables and, therefore, estimates of final energy savings are not guaranteed. TRC and the New Jersey Board of Public Utilities (NJBPU) shall in no event be liable should the actual energy savings vary.

TRC bases estimated material and labor costs primarily on RS Means cost manuals as well as on our experience at similar facilities. This approach is based on standard cost estimating manuals and is vendor neutral. Cost estimates include material and labor pricing associated with one for one equipment replacements. Cost estimates do not include demolition or removal of hazardous waste. The actual implementation costs for energy savings projects are anticipated to be significantly higher based on the specific conditions at your site(s). We strongly recommend that you work with your design engineer or contractor to develop actual project costs for your specific scope of work for the installation of high efficiency equipment. We encourage you to obtain multiple estimates when considering measure installations. Actual installation costs can vary widely based on selected products and installers. TRC and NJBPU do not guarantee cost estimates and shall in no event be held liable should actual installed costs vary from these material and labor estimates.

Incentive values provided in this report are estimated based on previously run state efficiency programs. Incentive levels are not guaranteed. The NJBPU reserves the right to extend, modify, or terminate programs without prior notice. Please review all available utility program incentives and eligibility requirements prior to selecting and installing any energy conservation measures.

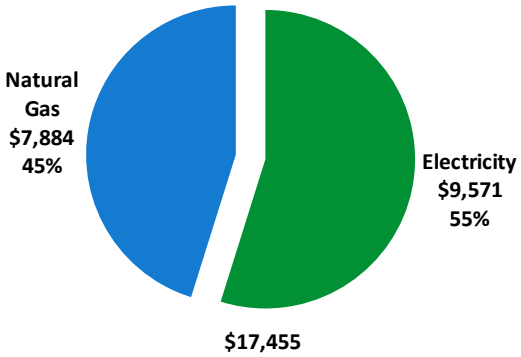
The customer and their respective contractor(s) are responsible to implement energy conservation measures in complete conformance with all applicable local, state, and federal requirements.

Table of Contents

1 EXECUTIVE SUMMARY

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Bnai Keshet Sanctuary. This report provides you with information about your facility's energy use, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help make changes in your facility. TRC conducted this study as part of a comprehensive effort to assist New Jersey school districts and local governments in controlling their energy costs and to help protect our environment by reducing statewide energy consumption.

BUILDING PERFORMANCE REPORT

Annual Utilities	Costs: $17,455 Electricity: 49,750 kWh Natural Gas: 5,443 Therms	
ENERGY STAR® Benchmarking Score	32 *(1-100 scale)*	This building performs at or below the national average. This report contains suggestions about how to improve building performance and reduce energy costs.

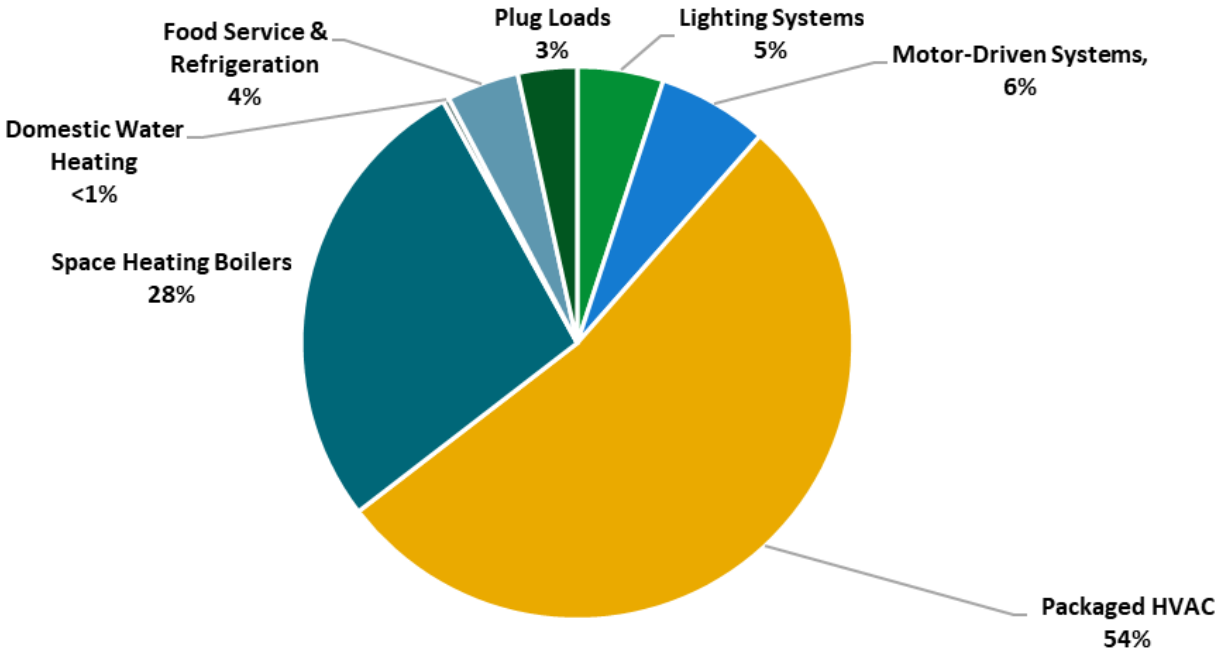


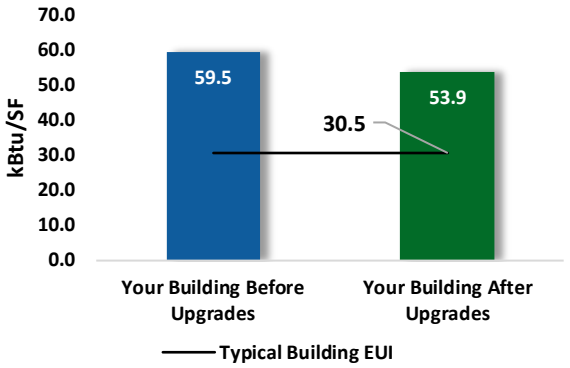
Figure 1 - Energy Use by System

POTENTIAL IMPROVEMENTS

This energy audit considered a range of potential energy improvements in your building. Costs and savings will vary between improvements. Presented below are two potential scopes of work for your consideration.

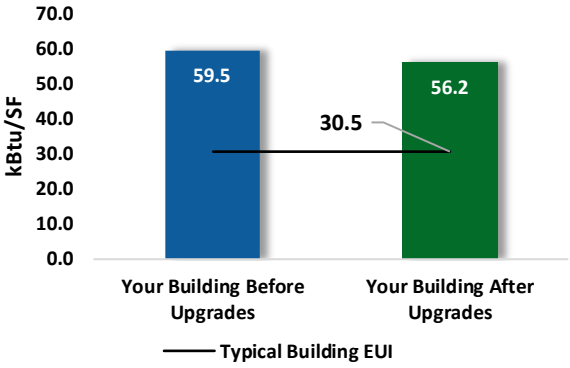
Scenario 1: Full Package (All Evaluated Measures)

Installation Cost	$112,801
Potential Rebates & Incentives[1]	$9,620
Annual Cost Savings	$2,708
Annual Energy Savings	Electricity: 12,132 kWh Natural Gas: 258 Therms
Greenhouse Gas Emission Savings	8 Tons
Simple Payback	38.1 Years
Site Energy Savings (All Utilities)	9%



Scenario 2: Cost Effective Package[2]

Installation Cost	$19,217
Potential Rebates & Incentives	$3,425
Annual Cost Savings	$1,915
Annual Energy Savings	Electricity: 9,378 kWh Natural Gas: 77 Therms
Greenhouse Gas Emission Savings	5 Tons
Simple Payback	8.2 Years
Site Energy Savings (all utilities)	6%



On-site Generation Potential

Photovoltaic	None
Combined Heat and Power	None

[1] Incentives are based on previously run state rebate programs. Contact your utility provider for current program incentives that may apply.

[2] A cost-effective measure is defined as one where the simple payback does not exceed two-thirds of the expected proposed equipment useful life. Simple payback is based on the net measure cost after potential incentives.

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**1,930**	**0.6**	**0**	**$369**	**$847**	**$154**	**$693**	**1.9**	**1,922**
ECM 1	Install LED Fixtures	Yes	200	0.0	0	$38	$200	$25	$175	4.5	201
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	558	0.1	0	$106	$69	$10	$59	0.6	548
ECM 3	Retrofit Fixtures with LED Lamps	Yes	1,172	0.5	0	$225	$578	$119	$459	2.0	1,173
Lighting Control Measures			**1,769**	**0.4**	**0**	**$338**	**$4,457**	**$2,030**	**$2,427**	**7.2**	**1,764**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	213	0.2	0	$40	$2,032	$665	$1,367	33.9	209
ECM 5	Install Photocell Controls	Yes	1,043	0.0	0	$201	$400	$0	$400	2.0	1,051
ECM 6	Install High/Low Lighting Controls	Yes	513	0.2	0	$97	$2,025	$1,365	$660	6.8	504
Motor Upgrades			**368**	**0.6**	**0**	**$71**	**$8,234**	**$0**	**$8,234**	**116.3**	**371**
ECM 7	Premium Efficiency Motors	No	368	0.6	0	$71	$8,234	$0	$8,234	116.3	371
Variable Frequency Drive (VFD) Measures			**3,261**	**3.2**	**0**	**$627**	**$9,249**	**$1,050**	**$8,199**	**13.1**	**3,284**
ECM 8	Install VFDs on Constant Volume (CV) Fans	Yes	3,261	3.2	0	$627	$9,249	$1,050	$8,199	13.1	3,284
Unitary HVAC Measures			**2,385**	**4.3**	**0**	**$459**	**$34,865**	**$1,995**	**$32,870**	**71.6**	**2,402**
ECM 9	Install High Efficiency Air Conditioning Units	No	2,385	4.3	0	$459	$34,865	$1,995	$32,870	71.6	2,402
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**18**	**$263**	**$50,485**	**$4,200**	**$46,285**	**176.1**	**2,125**
ECM 10	Install High Efficiency Hot Water Boilers	No	0	0.0	7	$104	$29,539	$1,200	$28,339	273.7	837
ECM 11	Install High Efficiency Furnaces	No	0	0.0	11	$159	$20,946	$3,000	$17,946	112.6	1,288
HVAC System Improvements			**0**	**0.0**	**8**	**$116**	**$186**	**$28**	**$158**	**1.4**	**939**
ECM 12	Install Pipe Insulation	Yes	0	0.0	8	$116	$186	$28	$158	1.4	939
Domestic Water Heating Upgrade			**1,104**	**0.0**	**0**	**$212**	**$79**	**$38**	**$41**	**0.2**	**1,112**
ECM 13	Install Low-Flow DHW Devices	Yes	1,104	0.0	0	$212	$79	$38	$41	0.2	1,112
Food Service & Refrigeration Measures			**838**	**0.1**	**0**	**$161**	**$2,016**	**$125**	**$1,891**	**11.7**	**844**
ECM 14	Replace Refrigeration Equipment	Yes	838	0.1	0	$161	$2,016	$125	$1,891	11.7	844
Custom Measures			**475**	**0.0**	**0**	**$91**	**$2,383**	**$0**	**$2,383**	**26.2**	**478**
ECM 15	Replace Electric Water Heater with Heat Pump Water Heater	Yes	475	0.0	0	$91	$2,383	$0	$2,383	26.2	478
TOTALS (COST EFFECTIVE MEASURES)			**9,378**	**4.4**	**8**	**$1,915**	**$19,217**	**$3,425**	**$15,792**	**8.2**	**10,343**
TOTALS (ALL MEASURES)			**12,132**	**9.2**	**26**	**$2,708**	**$112,801**	**$9,620**	**$103,181**	**38.1**	**15,241**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

Figure 2 – Evaluated Energy Improvements

For more detail on each evaluated energy improvement and a break out of cost-effective improvements, see **Section 4: Energy Conservation Measures.**

1.1 Planning Your Project

Careful planning makes for a successful energy project. When considering this scope of work, you will have some decisions to make, such as:

- How will the project be funded and/or financed?
- Is it best to pursue individual ECMs, groups of ECMs, or use a comprehensive approach where all ECMs are installed together?
- Are there other facility improvements that should happen at the same time?

Pick Your Installation Approach

Utility-run energy efficiency programs and New Jersey's Clean Energy Programs, give you the flexibility to do a little or a lot. Rebates, incentives, and financing are available to help reduce both your installation costs and your energy bills. If you are planning to take advantage of these programs, make sure to review incentive program guidelines before proceeding. This is important because in most cases you will need to submit applications for the incentives *before* purchasing materials or starting installation.

Options from Your Utility Company

Prescriptive and Custom Rebates

For facilities wishing to pursue only selected individual measures (or planning to phase implementation of selected measures over multiple years), incentives are available through the Prescriptive and Custom Rebates program. To participate, you can use internal resources or an outside firm or contractor to perform the final design of the ECM(s) and install the equipment. Program pre-approval may be required for some incentives. Contact your utility company for more details prior to project installation.

Direct Install

The Direct Install program provides turnkey installation of multiple measures through an authorized contractor. This program can provide incentives up to 70% or 80% of the cost of selected measures. A Direct Install contractor will assess and verify individual measure eligibility and perform the installation work. The Direct Install program is available to sites with an average peak demand of less than 200 kW.

Engineered Solutions

The Engineered Solutions program provides tailored energy-efficiency assistance and turnkey engineering services to municipalities, universities, schools, hospitals, and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. The program provides all professional services from audit, design, construction administration, to commissioning and measurement and verification for custom whole-building energy-efficiency projects. Engineered Solutions allows you to install as many measures as possible under a single project as well as address measures that may not qualify for other programs.

For more details on these programs please contact your utility provider.

Options from New Jersey's Clean Energy Program

Financing and Planning Support with the Energy Savings Improvement Program (ESIP)

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the 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. You have already taken the first step as an LGEA customer, because this report is required to participate in ESIP.

Resiliency with Return on Investment through Combined Heat and Power (CHP)

The CHP program provides incentives for combined heat and power (i.e., cogeneration) and waste heat to power projects. Combined heat and power systems generate power on-site and recover heat from the generation system to meet on-site thermal loads. Waste heat to power systems use waste heat to generate power. You will work with a qualified developer who will design a system that meets your building's heating and cooling needs.

Successor Solar Incentive Program (SuSI)

New Jersey is committed to supporting solar energy. Solar projects help the state reach the renewable goals outlined in the state's Energy Master Plan. The SuSI program is used to register and certify solar projects in New Jersey. Rebates are not available, but certified solar projects are able to earn one SREC II (Solar Renewable Energy Certificates II) for each megawatt-hour of solar electricity produced from a qualifying solar facility.

Ongoing Electric Savings with Demand Response

The Demand Response Energy Aggregator program reduces 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. By enabling commercial facilities to reduce electric demand 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 demand response (DR) programs. Program participation is voluntary, and facilities receive payments regardless of whether they are called upon to curtail their load during times of peak demand.

Large Energy User Program (LEUP)

LEUP is designed to promote self-investment in energy efficiency. It incentivizes owners/users of buildings to upgrade or install energy conserving measures in existing buildings to help offset the capital costs associated with the project. The efficiency upgrades are customized to meet the requirements of the customers' existing facilities, while advancing the State's energy efficiency, conservation, and greenhouse gas reduction goals.

For more details on these programs please visit New Jersey's Clean Energy Program website .

2 Existing Conditions

The New Jersey Board of Public Utilities (NJBPU) has sponsored this Local Government Energy Audit (LGEA) report for Bnai Keshet Sanctuary. This report provides information on how your facility uses energy, identifies energy conservation measures (ECMs) that can reduce your energy use, and provides information and assistance to help you implement the ECMs.

TRC conducted this study as part of a comprehensive effort to assist New Jersey educational and local government facilities in controlling energy costs and protecting our environment by offering a wide range of energy management options and advice.

2.1 Site Overview

On July 19, 2023, TRC performed an energy audit at Bnai Keshet Sanctuary located in Montclair, New Jersey. TRC met with Mark Bograd to review the facility operations and help focus our investigation on specific energy-using systems.

Bnai Keshet Sanctuary is a two-story building with a full basement, adding up to roughly 12,000 square feet. It was built in 1999. Spaces include a large multipurpose sanctuary space, offices, classrooms, corridors, stairwells, small commercial kitchen, elevator, and basement storage and mechanical rooms.

Recent improvements and Facility Concerns

In 2017, the building went through the Direct Install program. Through the program Bnai Keshet management converted most of the lighting over to LEDs and replaced the Sanctuary roof top package unit.

Facility raised concerns about air infiltration, specifically the gap under the Sanctuary door and other building entrances. This can be addressed through replacement of weatherstripping. Facility management also raised concerned about the state of insulation in the attic space.

2.2 Building Occupancy

The facility is primarily occupied Monday, Wednesday, Thursday, Friday, and Saturday. The offices are closed on Tuesday. Services are held Fridays and Saturdays. Saturday services go from 9:00AM to 1:00 PM, sometimes with events occurring after. Attendance ranges from 20 to 200 people.

The building is regularly occupied 9:00 AM to 5:00 PM on weekdays and 8:00 AM to 4:00 PM on Saturday, with services starting at 9:00 AM. However, the building is also occupied sporadically outside of these hours. Additional services and meetings occur sometimes, such as Wednesdays 6:00 to 8:00 PM or some events on Sundays. Holiday and other community events can also occur outside of these defined hours as well.

Childrens religious classes are held Mondays and Wednesdays. The facility is occupied intermittently, as needed for maintenance and operations.

Building Name	Weekday/Weekend	Operating Schedule
Sanctuary	Monday, Wednesday, Thursday, Friday	9:00 AM - 5:00 PM
	Saturday	8:00 AM - 4:00 PM

Figure 3 - Building Occupancy Schedule

2.3 Building Envelope

Building walls are concrete block over wood frame with half the building having a brick façade and the other half cement. The roof is bifurcated in different sections, primarily pitched, but with a few flat sections where HVAC equipment is located. The roof is asphalt shingle, and it is in fair condition. However, there were a few locations at the time of the audit with standing water and moss growing around the condensing units and ductwork.

There is an attic crawl space that shows wood construction. While the floor is insulated, the ceiling of the attic is not and there are two ducted furnaces in the space.

Most of the windows are double glazed and have aluminum frames with a thermal break. The glass-to-frame seals are in fair condition. The operable window weather seals range from fair to poor condition, with some noticeable cracking. The lobby and part of the Sanctuary feature a full wall of windows in good condition. The Sanctuary also has some single paned stained glass with storm windows.

The building has two main entrances with two sets of double doors made of glass inset in metal frames. There are several other exterior doors that are a mix of solid and glass in metal frame construction. While all these doors have some amount of weather stripping, there are still significant gaps. Double doors consistently had gaps in weatherstripping where the doors meet at the top and bottom.

Pitched Roof with Asphalt Shingles

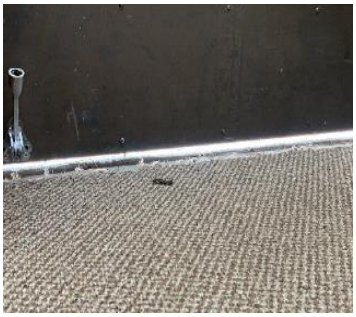
Moss on the Roof

Standing Water on the Roof

Uninsulated Attic

Main Entrance

Kitchen and Sanctuary Doors



Sanctuary Door Gap

Double Door Gap

Kitchen Door Gap

Lobby Windows

Sanctuary Window Detail

Window Seals

2.4 Lighting Systems

The majority of the lighting was converted to LED as part of a Direct Install Program in 2017. The interior lighting is primarily 10-Watt -17-Watt screw-in LED bulbs, mainly in recessed can fixtures, such as in the corridors. A number of LED linear strip and hardwired ceiling mounted fixtures are also common throughout the building's lighting design.

Basement lighting is LED equivalent 4-foot T8 linear tubes of 14-Watts. These are primarily in pendant fixtures. The elevator motor room still had the linear fluorescent 32-Watt, 4-foot T8 lamps.

Bathroom vanity fixtures each have several A19 bulbs, and a mixture of incandescent and LED. While these were supposed to be included in the direct install, not all were switched out. A few CFLs and incandescent were also missed during the lighting retrofit project, often in high ceiling locations.

The sanctuary has a wide variety of fixtures, all converted to LED. The room also benefits from a lot of natural light. Exit signs are LED.

Most fixtures are in new condition, however a certain type of LED bulb used in the conversion are not. The 17-Watt LED bulbs found in some of the interior and exterior recessed cans were found to be in poor condition and excessively overheating.

Interior lighting levels were generally sufficient or higher than may be warranted during daylight hours because of natural light from windows.

LED A19 in Recessed Can

Surface Mounted Linear Strip LED

High Ceiling CFL in Recessed Can

Sanctuary Lighting

Damaged and Overheated 17-Watt LED

Bathroom Vanity

Most lighting fixtures were upgraded to ceiling or wall mounted occupancy sensors in the 2017 Direct Install. A few spaces, such as the basement, closets, small bathrooms, and attic have lighting controlled by switch or draw string.

Wall Occupancy Sensor and Switch

Hallway Ceiling Mounted Occupancy Sensor

Wall Switch

Exterior fixtures include a few decorative wall sconces, bollards, area spots, and parking lot pole lights. The parking lot pole lights were all converted to hardwired LEDs during the Direct Install. A few of the area lights and bollards are still high intensity discharge (HID) lamps. The wall sconces each contain two plug-in twin CFLs. There were also a handful of LED wall packs on the roof.

Exterior light fixtures are controlled by a switches and breakers. Most exterior lighting was on at the time of the audit.

Parking Lot Pole Light

Wall Sconce

Twin CFL

HID Spot

Bollard

Roof LED Wall Pack

2.5 Air Handling Systems

Unit Ventilators

There is a single unit ventilator in the Children's Place room with local controls.

Unit Ventilator

Unit Controls

Unitary Heating Equipment

The Sanctuary stairwell has a 500-Watt electric baseboard heater in fair condition.

Stairwell Electric Radiator

Packaged Units

The Sanctuary is served by a Trane packaged roof top unit (RTU), replaced as part of the 2017 Direct Install program. The cooling system is DX with a capacity of 25 tons and a 12.4 EER efficiency. The heating component is forced air furnace with an 81% AFUE and output capacity of 320 MBh. This unit is referred to as #5 by equipment labels and has a supply fan of 7.5 hp. An enthalpy-controlled economizer was installed on this RTU. The unit is located on the roof directly above the Sanctuary.

The RTU unit is controlled by a local thermostat in the Sanctuary, which was set to 76 degrees during the audit.

RTU #5

RTU #5 Ductwork

Sanctuary Thermostat

RTU #5 Detail

Air Handling Units (AHUs)

The kitchen is served by a Sterling make up air unit with a natural gas heating capacity output of 118.5 MBh and 79% thermal efficiency. The supply fan is ¾ hp. This unit is referred to as "MUA #4" by site labels. Installed in 2000, the unit is in poor condition and beyond its useful life.

The rest of the building, other than the kitchen and sanctuary, is served by six ducted forced air furnaces, each with an outdoor split DX condensing unit. The furnaces each have a ¾ hp supply fan and the condensers have ¼ hp supply fans. An additional 1 hp booster fan on basement furnace ductwork was noted during the site visit. These Trane units are original to the building, installed in 2000, and beyond what is typically considered useful life for such equipment.

Type	Tag	Area Served *	Equipment Location	Capacity	Efficiency
Furnace	1A, 1B	Offices and Classrooms	Attic	93 MBh	92% AFUE
Furnace	2A, 2B	Rear Sanctuary Hall	Basement	113 MBh	91% AFUE
Furnace	3A, 3B	Rabbi Office	Basement	113 MBh	91% AFUE
DX Split	1A, 1B	Offices and Classrooms	Roof	2.50 tons	10.00 EER
DX Split	2A, 2B	Rear Sanctuary Hall	Roof	3.50 tons	10.00 EER
DX Split	3A, 3B	Rabbi Office	Roof	3.50 tons	10.00 EER

*According to equipment labels

Refrigerant line set insulation for the condensing units is in poor condition.

There are also two exhaust fans on the roof with fractional motors, and a kitchen hood fan which sees limited use.

Units are controlled by local thermostats throughout the building. Many of the thermostats are EcoBee smart thermostats which can be controlled remotely through an app, but this function is not currently being used by facility management. Thermostats at the time of the summertime audit read 76 degrees.

Furnaces 1A, 1B

Furnaces 2A, 2B

Furnaces 3A, 3B

MAU #4

Condensing Units 1A, 1B, 2A, 2B

Ecobee Thermostat in Main Office

Refrigerant Line Sets

2.6 Heating Hot Water Systems

Three Dunkirk 184.5 MBh modular hot water boilers serve the building's heating load. The burners are non- modulating with a rated nominal efficiency of 82%. The boilers operated in series serving different sections of the building. The boilers are original to the building, installed in 2000. They are in fair condition for their age but nearing the end of typical useful life for boilers. HVAC equipment is regularly serviced by an outside company.

The boilers are configured in a constant flow primary distribution with three constant speed hot water pumps. Two of the pumps are ¼ hp and the third is 1/3 hp located in the far side of the basement away from the boilers and other two pumps. The pumps are also regularly serviced by the same company. The service record sheet for the 1/3 hp pump says that it is for "Sanctuary Radiant Heat" and notes that it has been "rattling."

Zone thermostats cycle the pumps. An aquastat maintains heating hot water loop temperature. There are roughly 14 feet of 1.25-inch supply and pipe with no insulation on the 1/3 hp pump and that should be replaced. The rest of exposed heating hot water piping had insulation in fair condition.

Boilers

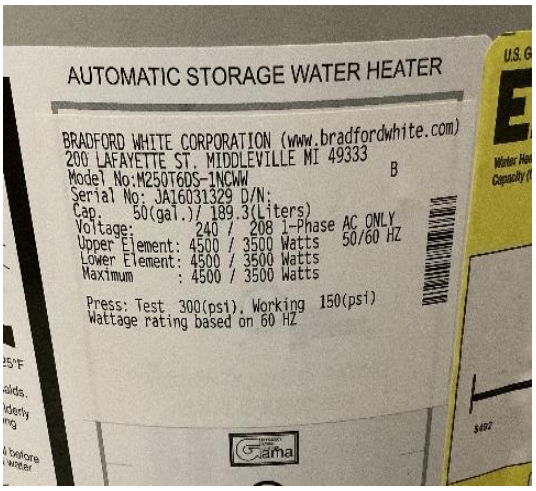
Two ¼ hp HHW Pumps

1/3 hp HHW Pump and Uninsulated Piping

2.7 Domestic Hot Water

Hot water is produced by a Bradford White 50-gallon, 35 kW electric storage water heater. The visible domestic hot water pipe insulation was complete and in good condition.

DHW Heater



Name Plate

2.8 Food Service Equipment

The kitchen has a mix of gas and electric equipment that is used to prepare meals for community events. However, at this time it only gets limited use. Most cooking is done using a gas-fired range. Equipment is not high efficiency and is in good to fair condition.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Kitchen

Gas Range

Gas Stacked Ovens

2.9 Refrigeration

The kitchen has a Beverage-Air two-door stand-up refrigerator, and a Kool-it one-door stand-up freezer, both with solid doors. The refrigerator is standard efficiency, and the freezer is Energy Star rated. All equipment is fair condition.

Visit https://www.energystar.gov/products/commercial_food_service_equipment for the latest information on high efficiency food service equipment.

Refrigerator

Freezer

Energy Star Label

2.10 Plug Load

The location is doing a great job managing the electrical plug loads. This report makes additional suggestions for ECMs in this area as well as energy efficient best practices.

There are six computer workstations throughout the facility. Plug loads include general café, classroom, and office equipment such as printers, a mini fridge, coffeemakers, televisions, space heaters, and microwaves. Some of these items are ENERGY STAR rated, such as the large smart television used for presentations.

There is also a water cooler with a heated water option and a water fountain.

The basement has a small electrical room with the network and signal equipment. This is also where the building's electrical meter is located.

The elevator services all three floors, and it has a 20 hp motor located in a back room on the basement level. It has an efficiency of 72%.

Coffeemaker

Display Monitor

Elevator Motor

Basement Electrical Room

Basement Electrical Room

2.11 Water-Using Systems

There are six restrooms with toilets and sinks. The kitchen has a few sinks, some for prep and one for hand washing. Faucet flow rates are at 1.5 gallons per minute (gpm) or higher. Toilets are rated at 1.6 gallons per flush (gpf).

Restroom Sink 2.0 gpm

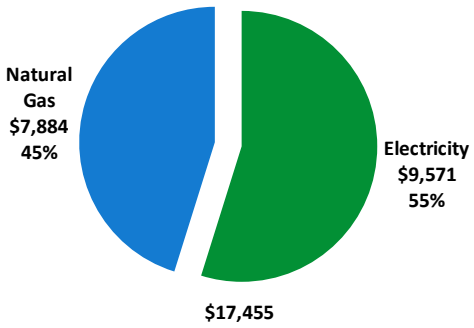
Kitchen Hand Washing Sink

Toilet 1.6 gpf

3 Energy Use and Costs

Twelve months of utility billing data are used to develop annual energy consumption and cost data. This information creates a profile of the annual energy consumption and energy costs.

Utility Summary		
Fuel	**Usage**	**Cost**
Electricity	49,750 kWh	$9,571
Natural Gas	5,443 Therms	$7,884
Total		**$17,455**



An energy balance identifies and quantifies energy use in your various building systems. This can highlight areas with the most potential for improvement. This energy balance was developed using calculated energy use for each of the end uses noted in the figure.

The energy auditor collects information regarding equipment operating hours, capacity, efficiency, and other operational parameters from facility staff, drawings, and on-site observations. This information is used as the inputs to calculate the existing conditions energy use for the site. The calculated energy use is then compared to the historical energy use and the initial inputs are revised, as necessary, to balance the calculated energy use to the historical energy use.

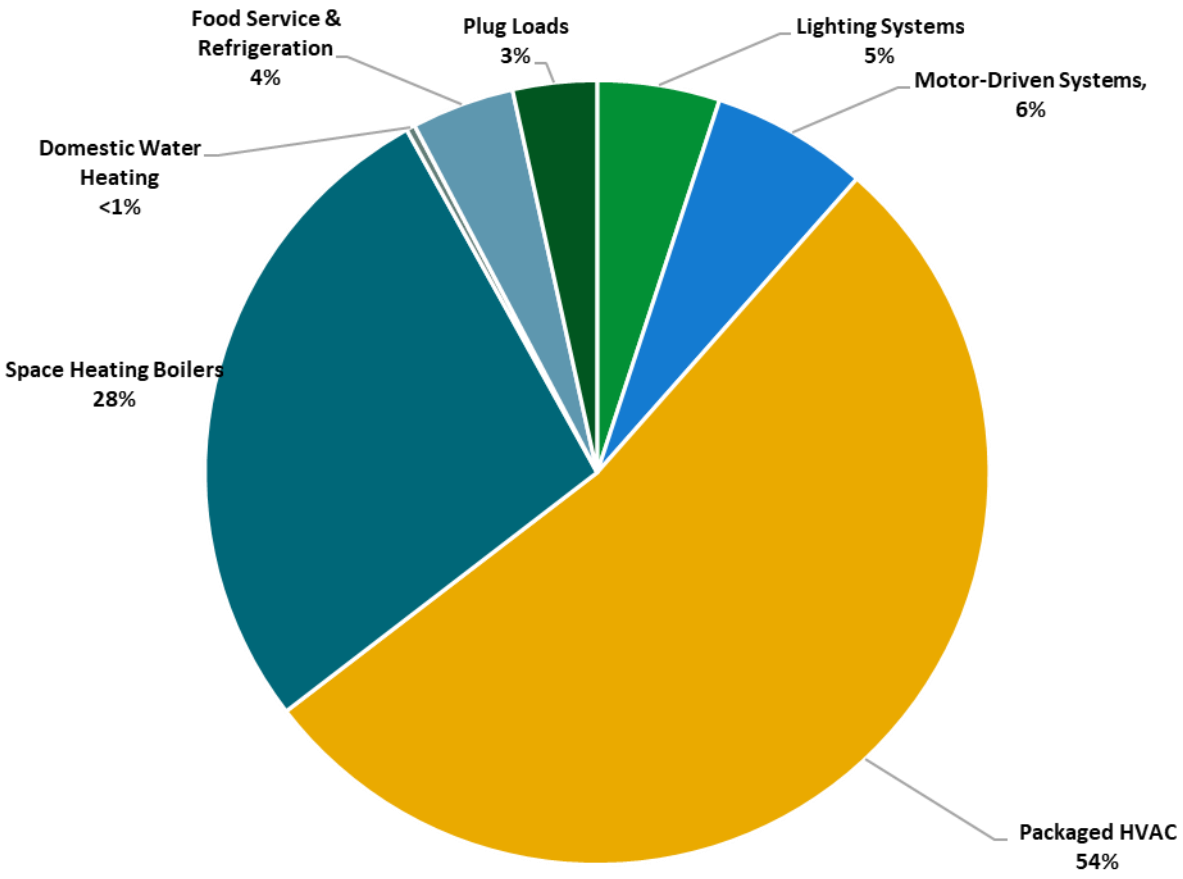
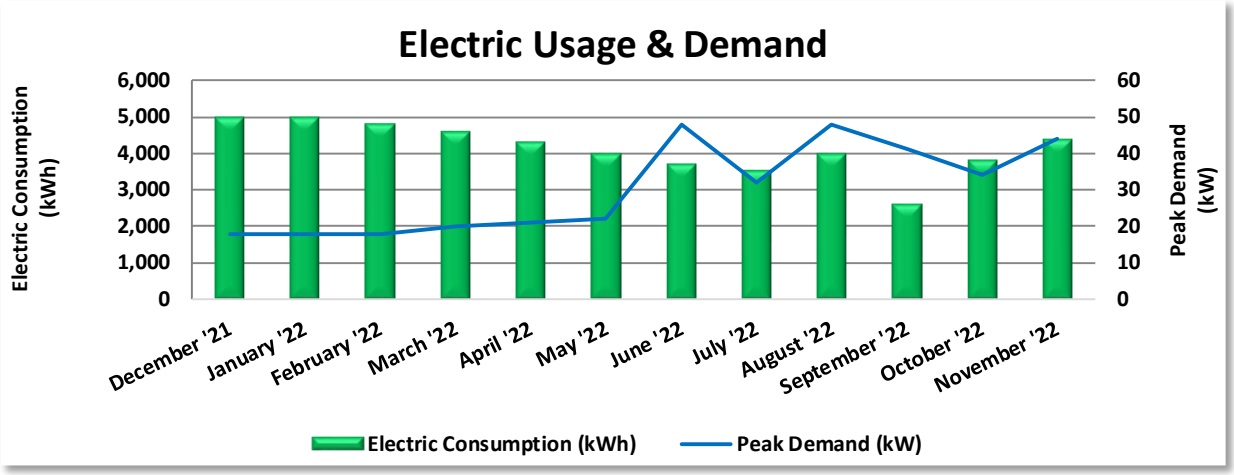


Figure 4 - Energy Balance

3.1 Electricity

PSE&G delivers electricity under rate class General Lighting & Power (GLP), with electric production provided by AP Electric NJ, a third-party supplier.



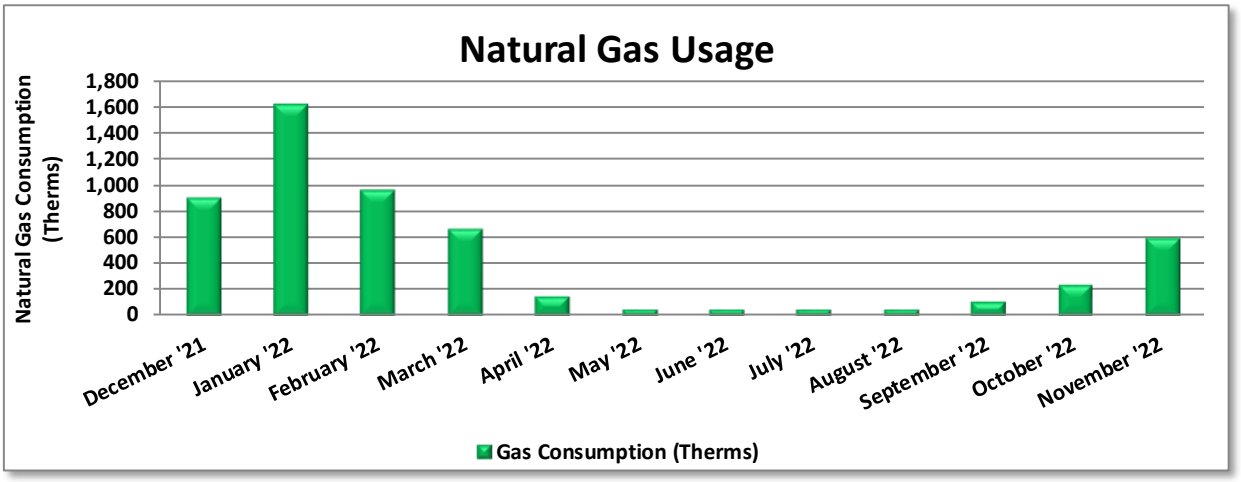
Electric Billing Data					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Demand Cost	Total Electric Cost
1/7/22	31	5,000	18	$71	$751
2/7/22	31	5,000	18	$71	$867
3/9/22	30	4,800	18	$71	$722
4/7/22	29	4,600	20	$79	$807
5/9/22	32	4,300	21	$84	$842
6/8/22	30	4,000	22	$306	$913
7/8/22	30	3,700	48	$696	$603
8/8/22	31	3,550	32	$469	$1,025
9/7/22	30	4,000	48	$703	$634
10/6/22	29	2,600	41	$164	$910
11/4/22	29	3,800	34	$158	$591
12/7/22	33	4,400	44	$205	$907
Totals	**365**	**49,750**	**48**	**$3,077**	**$9,571**
Annual	**365**	**49,750**	**48**	**$3,077**	**$9,571**

Notes:

- Peak demand of 48 kW occurred in June '22.
- Average demand over the past 12 months was 30 kW.
- The average electric cost over the past 12 months was $0.192/kWh, which is the blended rate that includes energy supply, distribution, demand, and other charges. This report uses this blended rate to estimate energy cost savings.
- This site had some PSE$G billing issues. PSE&G did a 485-day re-bill in October 2022, so monthly consumption is estimated.

3.2 Natural Gas

PSE&G delivers natural gas under rate class General Service Gas Heating - GSG (HTG), with natural gas supply provided by Constellation, a third-party supplier.



Gas Billing Data			
Period Ending	**Days in Period**	**Natural Gas Usage (Therms)**	**Natural Gas Cost**
1/7/22	31	901	$1,413
2/7/22	31	1,620	$2,319
3/9/22	30	969	$1,247
4/7/22	29	671	$707
5/9/22	32	147	$188
6/8/22	30	46	$76
7/8/22	30	46	$74
8/8/22	31	46	$84
9/7/22	30	46	$81
10/6/22	29	112	$191
11/4/22	29	243	$373
12/7/22	33	596	$1,132
Totals	**365**	**5,443**	**$7,884**
Annual	**365**	**5,443**	**$7,884**

Notes:

- The average gas cost for the past 12 months is $1.449/therm, which is the blended rate used throughout the analysis.

3.3 Benchmarking

Your building was benchmarked using the United States Environmental Protection Agency's (EPA) *Portfolio Manager®* software. Benchmarking compares your building's energy use to that of similar buildings across the country, while neutralizing variations due to location, occupancy, and operating hours. Some building types can be scored with a 1-100 ranking of a building's energy performance relative to the national building market. A score of 50 represents the national average and a score of 100 is best.

This ENERGY STAR benchmarking score provides a comprehensive snapshot of your building's energy performance. It assesses the building's physical assets, operations, and occupant behavior, which is compiled into a quick and easy-to-understand score.

Benchmarking Score	32

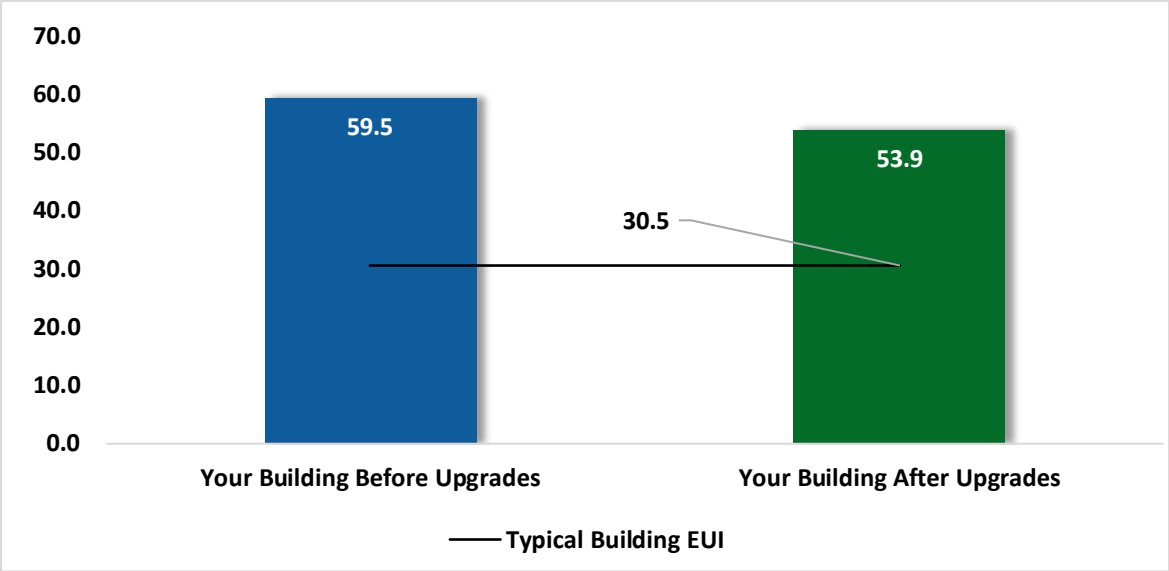


Figure 5 - Energy Use Intensity Comparison[3]

Energy use intensity (EUI) measures energy consumption per square foot and is the standard metric for comparing buildings' energy performance. A lower EUI means better performance and less energy consumed. Several factors can cause a building to vary from typical energy usage. Local weather conditions, building age and insulation levels, equipment efficiency, daily occupancy hours, changes in occupancy throughout the year, equipment operating hours, and occupant behavior all contribute to a building's energy use and the benchmarking score.

[3] Based on all evaluated ECMs

Tracking Your Energy Performance

Keeping track of your energy use monthly is one of the best ways to keep energy costs in check. Update your utility information in Portfolio Manager regularly, so that you can keep track of your building's performance.

We have created a Portfolio Manager account for your facility and have already entered the monthly utility data shown above for you. Account login information for your account will be sent via email.

Free online training is available to help you use ENERGY STAR Portfolio Manager to track your building's performance at: https://www.energystar.gov/buildings/training.

For more information on ENERGY STAR and Portfolio Manager, visit their website.

4 Energy Conservation Measures

The goal of this audit report is to identify and evaluate potential energy efficiency improvements and provide information about the cost effectiveness of those improvements. Most energy conservation measures have received preliminary analysis of feasibility, which identifies expected ranges of savings. This level of analysis is typically sufficient to demonstrate project cost-effectiveness and help prioritize energy measures.

Calculations of energy use and savings are based on the current version of the *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*, which is approved by the NJBPU. Further analysis or investigation may be required to calculate more precise savings based on specific circumstances.

Operation and maintenance costs for the proposed new equipment will generally be lower than the current costs for the existing equipment—especially if the existing equipment is at or past its normal useful life. We have conservatively assumed there to be no impact on overall maintenance costs over the life of the equipment.

Financial incentives in this report are based on the previously run state rebate program SmartStart, which has been retired. Now, all investor-owned gas and electric utility companies are offering complementary energy efficiency programs directly to their customers. Some measures and proposed upgrades may be eligible for higher incentives than those shown below. The incentives in the summary tables should be used for high-level planning purposes. To verify incentives, reach out to your utility provider or visit the NJCEP website for more information.

For a detailed list of the locations and recommended energy conservation measures for all inventoried equipment, see Appendix A: Equipment Inventory & Recommendations.

#	Energy Conservation Measure	Cost Effective?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			**1,930**	**0.6**	**0**	**$369**	**$847**	**$154**	**$693**	**1.9**	**1,922**
ECM 1	Install LED Fixtures	Yes	200	0.0	0	$38	$200	$25	$175	4.5	201
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	Yes	558	0.1	0	$106	$69	$10	$59	0.6	548
ECM 3	Retrofit Fixtures with LED Lamps	Yes	1,172	0.5	0	$225	$578	$119	$459	2.0	1,173
Lighting Control Measures			**1,769**	**0.4**	**0**	**$338**	**$4,457**	**$2,030**	**$2,427**	**7.2**	**1,764**
ECM 4	Install Occupancy Sensor Lighting Controls	Yes	213	0.2	0	$40	$2,032	$665	$1,367	33.9	209
ECM 5	Install Photocell Controls	Yes	1,043	0.0	0	$201	$400	$0	$400	2.0	1,051
ECM 6	Install High/Low Lighting Controls	Yes	513	0.2	0	$97	$2,025	$1,365	$660	6.8	504
Motor Upgrades			**368**	**0.6**	**0**	**$71**	**$8,234**	**$0**	**$8,234**	**116.3**	**371**
ECM 7	Premium Efficiency Motors	No	368	0.6	0	$71	$8,234	$0	$8,234	116.3	371
Variable Frequency Drive (VFD) Measures			**3,261**	**3.2**	**0**	**$627**	**$9,249**	**$1,050**	**$8,199**	**13.1**	**3,284**
ECM 8	Install VFDs on Constant Volume (CV) Fans	Yes	3,261	3.2	0	$627	$9,249	$1,050	$8,199	13.1	3,284
Unitary HVAC Measures			**2,385**	**4.3**	**0**	**$459**	**$34,865**	**$1,995**	**$32,870**	**71.6**	**2,402**
ECM 9	Install High Efficiency Air Conditioning Units	No	2,385	4.3	0	$459	$34,865	$1,995	$32,870	71.6	2,402
Gas Heating (HVAC/Process) Replacement			**0**	**0.0**	**18**	**$263**	**$50,485**	**$4,200**	**$46,285**	**176.1**	**2,125**
ECM 10	Install High Efficiency Hot Water Boilers	No	0	0.0	7	$104	$29,539	$1,200	$28,339	273.7	837
ECM 11	Install High Efficiency Furnaces	No	0	0.0	11	$159	$20,946	$3,000	$17,946	112.6	1,288
HVAC System Improvements			**0**	**0.0**	**8**	**$116**	**$186**	**$28**	**$158**	**1.4**	**939**
ECM 12	Install Pipe Insulation	Yes	0	0.0	8	$116	$186	$28	$158	1.4	939
Domestic Water Heating Upgrade			**1,104**	**0.0**	**0**	**$212**	**$79**	**$38**	**$41**	**0.2**	**1,112**
ECM 13	Install Low-Flow DHW Devices	Yes	1,104	0.0	0	$212	$79	$38	$41	0.2	1,112
Food Service & Refrigeration Measures			**838**	**0.1**	**0**	**$161**	**$2,016**	**$125**	**$1,891**	**11.7**	**844**
ECM 14	Replace Refrigeration Equipment	Yes	838	0.1	0	$161	$2,016	$125	$1,891	11.7	844
Custom Measures			**475**	**0.0**	**0**	**$91**	**$2,383**	**$0**	**$2,383**	**26.2**	**478**
ECM 15	Replace Electric Water Heater with Heat Pump Water Heater	Yes	475	0.0	0	$91	$2,383	$0	$2,383	26.2	478
TOTALS			**12,132**	**9.2**	**26**	**$2,708**	**$112,801**	**$9,620**	**$103,181**	**38.1**	**15,241**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

Figure 6 – All Evaluated ECMs

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**1,930**	**0.6**	**0**	**$369**	**$847**	**$154**	**$693**	**1.9**	**1,922**
ECM 1	Install LED Fixtures	200	0.0	0	$38	$200	$25	$175	4.5	201
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	558	0.1	0	$106	$69	$10	$59	0.6	548
ECM 3	Retrofit Fixtures with LED Lamps	1,172	0.5	0	$225	$578	$119	$459	2.0	1,173
Lighting Control Measures		**1,769**	**0.4**	**0**	**$338**	**$4,457**	**$2,030**	**$2,427**	**7.2**	**1,764**
ECM 4	Install Occupancy Sensor Lighting Controls	213	0.2	0	$40	$2,032	$665	$1,367	33.9	209
ECM 5	Install Photocell Controls	1,043	0.0	0	$201	$400	$0	$400	2.0	1,051
ECM 6	Install High/Low Lighting Controls	513	0.2	0	$97	$2,025	$1,365	$660	6.8	504
Variable Frequency Drive (VFD) Measures		**3,261**	**3.2**	**0**	**$627**	**$9,249**	**$1,050**	**$8,199**	**13.1**	**3,284**
ECM 8	Install VFDs on Constant Volume (CV) Fans	3,261	3.2	0	$627	$9,249	$1,050	$8,199	13.1	3,284
HVAC System Improvements		**0**	**0.0**	**8**	**$116**	**$186**	**$28**	**$158**	**1.4**	**939**
ECM 12	Install Pipe Insulation	0	0.0	8	$116	$186	$28	$158	1.4	939
Domestic Water Heating Upgrade		**1,104**	**0.0**	**0**	**$212**	**$79**	**$38**	**$41**	**0.2**	**1,112**
ECM 13	Install Low-Flow DHW Devices	1,104	0.0	0	$212	$79	$38	$41	0.2	1,112
Food Service & Refrigeration Measures		**838**	**0.1**	**0**	**$161**	**$2,016**	**$125**	**$1,891**	**11.7**	**844**
ECM 14	Replace Refrigeration Equipment	838	0.1	0	$161	$2,016	$125	$1,891	11.7	844
Custom Measures		**475**	**0.0**	**0**	**$91**	**$2,383**	**$0**	**$2,383**	**26.2**	**478**
ECM 15	Replace Electric Water Heater with Heat Pump Water Heater	475	0.0	0	$91	$2,383	$0	$2,383	26.2	478
TOTALS		**9,378**	**4.4**	**8**	**$1,915**	**$19,217**	**$3,425**	**$15,792**	**8.2**	**10,343**

* - All incentives presented in this table are included as placeholders for planning purposes and are based on previously run state rebate programs. Contact your utility provider for details on current programs.

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

Figure 7 – Cost Effective ECMs

4.1 Lighting

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		**1,930**	**0.6**	**0**	**$369**	**$847**	**$154**	**$693**	**1.9**	**1,922**
ECM 1	Install LED Fixtures	200	0.0	0	$38	$200	$25	$175	4.5	201
ECM 2	Retrofit Fluorescent Fixtures with LED Lamps and Drivers	558	0.1	0	$106	$69	$10	$59	0.6	548
ECM 3	Retrofit Fixtures with LED Lamps	1,172	0.5	0	$225	$578	$119	$459	2.0	1,173

When considering lighting upgrades, we suggest using a comprehensive design approach that simultaneously upgrades lighting fixtures and controls to maximize energy savings and improve occupant lighting. Comprehensive design will also consider appropriate lighting levels for different space types to make sure that the right amount of light is delivered where needed. If conversion to LED light sources is proposed, we suggest converting all of a specific lighting type (e.g., linear fluorescent) to LED lamps to minimize the number of lamp types in use at the facility, which should help reduce future maintenance costs.

ECM 1: Install LED Fixtures

Replace existing fixtures containing HID lamps with new LED light fixtures. This measure saves energy by installing LEDs, which use less power than other technologies with a comparable light output.

In some cases, HID fixtures can be retrofit with screw-based LED lamps. Replacing an existing HID fixture with a new LED fixture will generally provide better overall lighting optics; however, replacing the HID lamp with a LED screw-in lamp is typically a less expensive retrofit. We recommend you work with your lighting contractor to determine which retrofit solution is best suited to your needs and will be compatible with the existing fixture(s).

Maintenance savings may also be achieved since LED lamps last longer than other light sources and therefore do not need to be replaced as often.

Affected Building Areas: exterior area flood light

ECM 2: Retrofit Fluorescent Fixtures with LED Lamps and Drivers

Retrofit fluorescent fixtures by removing the fluorescent tubes and ballasts and replacing them with LED tubes and LED drivers (if necessary), which are designed to be used in retrofitted fluorescent fixtures.

The measure uses the existing fixture housing but replaces the electric components with more efficient lighting technology, which use less power than other lighting technologies but provides equivalent lighting output. Maintenance savings may also be achieved since LED tubes last longer than fluorescent tubes and, therefore, do not need to be replaced as often.

Affected Building Areas: elevator fluorescent fixtures with T12 tubes

ECM 3: Retrofit Fixtures with LED Lamps

Replace fluorescent, HID, and incandescent lamps with LED lamps. Many LED tubes are direct replacements for existing fluorescent tubes and can be installed while leaving the fluorescent fixture ballast in place. LED lamps can be used in existing fixtures as a direct replacement for most other lighting technologies. Be sure to specify replacement lamps that are compatible with existing dimming controls, where applicable. In some circumstances, you may need to upgrade your dimming system for optimum performance.

This measure saves energy by installing LEDs, which use less power than other lighting technologies yet provide equivalent lighting output for the space. Maintenance savings may also be available, as longer-lasting LEDs lamps will not need to be replaced as often as the existing lamps.

Affected Building Areas: areas with T8 linear fluorescents, incandescent and CFL lamps (basement, bathrooms, storage areas, high ceiling recessed can fixtures), exterior sconce, exterior bollards

4.2 Lighting Controls

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Control Measures		**1,769**	**0.4**	**0**	**$338**	**$4,457**	**$2,030**	**$2,427**	**7.2**	**1,764**
ECM 4	Install Occupancy Sensor Lighting Controls	213	0.2	0	$40	$2,032	$665	$1,367	33.9	209
ECM 5	Install Photocell Controls	1,043	0.0	0	$201	$400	$0	$400	2.0	1,051
ECM 6	Install High/Low Lighting Controls	513	0.2	0	$97	$2,025	$1,365	$660	6.8	504

Lighting controls reduce energy use by turning off or lowering lighting fixture power levels when not in use. A comprehensive approach to lighting design should upgrade the lighting fixtures and the controls together for maximum energy savings and improved lighting for occupants.

ECM 4: Install Occupancy Sensor Lighting Controls

Install occupancy sensors to control lighting fixtures in areas that are frequently unoccupied, even for short periods. For most spaces, we recommend that lighting controls use dual technology sensors, which reduce the possibility of lights turning off unexpectedly.

Occupancy sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Most occupancy sensor lighting controls allow users to manually turn fixtures on/off, as needed. Some controls can also provide dimming options.

Occupancy sensors can be mounted on the wall at existing switch locations, mounted on the ceiling, or in remote locations. In general, wall switch replacement sensors are best suited to single occupant offices and other small rooms. Ceiling-mounted or remote mounted sensors are used in large spaces, locations without local switching, and where wall switches are not in the line-of-sight of the main work area.

This measure provides energy savings by reducing the lighting operating hours.

Affected Building Areas: offices, conference rooms, classrooms

ECM 5: Install Photocell Controls

Install photocells to eliminate exterior lighting use during daytime periods.

Photocells or photocell sensors are lighting controls used for dusk to dawn applications to automatically turn the fixtures on or off. Photo controls detect the amount of light outside and once the light level reaches a low point, the fixture will switch on. During the day, the photocell will detect higher amounts of light and will turn the fixture off.

Photocells may be fixture mounted or wired externally and connected by line voltage to a single light fixture or to a series of fixtures.

This measure reduces energy use in exterior areas to restrict operation to non-daylight periods.

Affected Building Areas: exterior fixtures

ECM 6: Install High/Low Lighting Controls

Install occupancy sensors to provide dual level lighting control for lighting fixtures in spaces that are infrequently occupied but may require some level of continuous lighting for safety or security reasons.

Lighting fixtures with these controls operate at default low levels when the area is unoccupied to provide minimal lighting to meet security or safety code requirements for egress. Sensors detect occupancy using ultrasonic and/or infrared sensors. When an occupant enters the space, the lighting fixtures switch to full lighting levels. Fixtures automatically switch back to low level after a predefined period of vacancy. In parking lots and parking garages with significant ambient lighting, this control can sometimes be combined with photocell controls to turn the lights off when there is sufficient daylight.

The controller lowers the light level by dimming the fixture output. Therefore, the controlled fixtures need to have a dimmable ballast or driver. This will need to be considered when selecting retrofit lamps and bulbs for the areas proposed for high/low control.

For this type of measure the occupancy sensors will generally be ceiling or fixture mounted. Sufficient sensor coverage must be provided to ensure that lights turn on in each area as occupants approach the area.

This measure provides energy savings by reducing the light fixture power draw when reduced light output is appropriate.

Affected Building Areas: basement, corridors, stairs 1 and 2

4.3 Motors

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Motor Upgrades		**368**	**0.6**	**0**	**$71**	**$8,234**	**$0**	**$8,234**	**116.3**	**371**
ECM 7	Premium Efficiency Motors	368	0.6	0	$71	$8,234	$0	$8,234	116.3	371

ECM 7: Premium Efficiency Motors

We evaluated replacing standard efficiency motors with IHP 2014 efficiency motors. This evaluation assumes that existing motors will be replaced with motors of equivalent size and type. In some cases, additional savings may be possible by downsizing motors to better meet the motor's current load requirements.

Affected Motors:

Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Additional Motor Description
Basement Mechanical	Building heating	2	Heating Hot Water Pump	0.3	
Basement Mechanical	Building heating	1	Heating Hot Water Pump	0.3	
Attic	Rabbi Office	2	Supply Fan	0.8	
Basement Mechanical	Offices and Classrooms	2	Supply Fan	0.8	
Basement Mechanical	Rear Santuary Hall	2	Supply Fan	0.8	

Values are based on the difference between baseline and proposed efficiencies and the assumed annual operating hours. The base case motor energy consumption is estimated using the efficiencies found on nameplates or estimated based on the age of the motor and our best estimates of motor run hours. Efficiencies of proposed motor upgrades are obtained from the current *New Jersey's Clean Energy Program Protocols to Measure Resource Savings*.

4.4 Variable Frequency Drives (VFD)

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Variable Frequency Drive (VFD) Measures		**3,261**	**3.2**	**0**	**$627**	**$9,249**	**$1,050**	**$8,199**	**13.1**	**3,284**
ECM 8	Install VFDs on Constant Volume (CV) Fans	3,261	3.2	0	$627	$9,249	$1,050	$8,199	13.1	3,284

Variable frequency drives control motors for fans, pumps, and process equipment based on the actual output required of the driven equipment. Energy savings result from more efficient control of motor energy usage when equipment operates at partial load. The magnitude of energy savings depends on the estimated amount of time that the motor would operate at partial load. For equipment with proposed VFDs, we have included replacing the controlled motor with a new inverter duty rated motor to conservatively account for the cost of an inverter duty rated motor.

ECM 8: Install VFDs on Constant Volume (CV) Fans

Install VFDs to control constant volume fan motor speeds. This converts a 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 signal the VFD to adjust fan speed to maintain the appropriate temperature in the zone, while maintaining a constant supply air temperature.

For air handlers with direct expansion (DX) cooling systems, the minimum air flow across the cooling coil required to prevent the coil from freezing must be determined during the final project design. The control system programming should maintain the minimum air flow whenever the compressor is operating. Prior to implementation, verify minimum fan speed in cooling mode with the manufacturer. Note that savings will vary depending on the operating characteristics of each AHU.

Energy savings result from reducing the fan speed (and power) when conditions allow for reduced air flow.

Affected Air Handlers: RTU #5, MUA #4.

4.5 Unitary HVAC

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Unitary HVAC Measures		**2,385**	**4.3**	**0**	**$459**	**$34,865**	**$1,995**	**$32,870**	**71.6**	**2,402**
ECM 9	Install High Efficiency Air Conditioning Units	2,385	4.3	0	$459	$34,865	$1,995	$32,870	71.6	2,402

Consider Replacing the unitary HVAC units has a long payback period and may not be justifiable based simply on energy considerations. However, most of the units are nearing or have reached the end of their normal useful life. Typically, the marginal cost of purchasing a high efficiency unit can be justified by the marginal savings from the improved efficiency. When the split systems are eventually replaced, consider purchasing equipment that exceeds the minimum efficiency required by building codes.

ECM 9: Install High Efficiency Air Conditioning Units

We evaluated replacing standard efficiency packaged air conditioning units with high efficiency packaged air conditioning units. Some the replacement units will incorporate efficient gas furnaces. 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 and heating load, and the estimated annual operating hours.

Affected Units: split systems 1A, 1B, 2A, 2B, 3A, and 3B

4.6 Gas-Fired Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Gas Heating (HVAC/Process) Replacement		**0**	**0.0**	**18**	**$263**	**$50,485**	**$4,200**	**$46,285**	**176.1**	**2,125**
ECM 10	Install High Efficiency Hot Water Boilers	0	0.0	7	$104	$29,539	$1,200	$28,339	273.7	837
ECM 11	Install High Efficiency Furnaces	0	0.0	11	$159	$20,946	$3,000	$17,946	112.6	1,288

ECM 10: Install High Efficiency Hot Water Boilers

We evaluated the replacement of older inefficient hot water boilers with high efficiency hot water boilers. Energy savings results from improved combustion efficiency and reduced standby losses at low loads.

For the purposes of this analysis, we evaluated the replacement of boilers on a one-for-one basis with equipment of the same capacity. We recommend that you work with your mechanical design team to select boilers that are sized appropriately for the heating load. In many cases installing multiple modular boilers, rather than one or two large boilers, will result in higher overall plant efficiency while providing additional system redundancy.

Replacing the boilers has a long payback and may not be justifiable based simply on energy considerations. However, the boilers at the end of their normal useful life. Typically, the marginal cost of purchasing high efficiency boilers can be justified by the marginal savings from the improved efficiency. When the boiler is eventually replaced, consider purchasing boilers that exceed the minimum efficiency required by building codes. We also recommend working with your mechanical design team to determine whether the heating system can operate with return water temperatures below 130°F, which would allow the use of condensing boilers.

Affected Units: Dunkirk hot water boilers

ECM 11: Install High Efficiency Furnaces

We evaluated the replacement of standard efficiency furnaces with condensing furnaces. Improved combustion technology and heat exchanger design optimize heat recovery from the combustion gases, which can significantly improve furnace efficiency. Savings result from improved system efficiency.

Note: these units produce acidic condensate that require proper drainage.

Affected Units: furnaces 1A, 1B, 2A, 2B, 3A, and 3B

4.7 HVAC Improvements

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
HVAC System Improvements		**0**	**0.0**	**8**	**$116**	**$186**	**$28**	**$158**	**1.4**	**939**
ECM 12	Install Pipe Insulation	0	0.0	8	$116	$186	$28	$158	1.4	939

ECM 12: Install Pipe Insulation

Install insulation on heating water system piping. Distribution system losses are dependent on system fluid 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. When the insulation is exposed to water, 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 heat transfer in the distribution system.

Affected Systems: hot water piping on radiant heating supply pump

4.8 Domestic Water Heating

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		**1,104**	**0.0**	**0**	**$212**	**$79**	**$38**	**$41**	**0.2**	**1,112**
ECM 13	Install Low-Flow DHW Devices	1,104	0.0	0	$212	$79	$38	$41	0.2	1,112

ECM 13: Install Low-Flow DHW Devices

Install low-flow devices to reduce overall hot water demand. The following low-flow devices are recommended to reduce hot water usage:

Device	Flow Rate
Faucet aerators (lavatory)	0.5 gpm
Faucet aerator (kitchen)	1.5 gpm
Showerhead	2.0 gpm
Pre-rinse spray valve (kitchen)	1.28 gpm

Low-flow devices reduce the overall water flow from the fixture, while still providing adequate pressure for washing.

Additional cost savings may result from reduced water usage.

4.9 Food Service & Refrigeration Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Food Service & Refrigeration Measures		**838**	**0.1**	**0**	**$161**	**$2,016**	**$125**	**$1,891**	**11.7**	**844**
ECM 14	Replace Refrigeration Equipment	838	0.1	0	$161	$2,016	$125	$1,891	11.7	844

ECM 14: Replace Refrigeration Equipment

Replace existing commercial refrigerator with new ENERGY STAR rated equipment. The energy savings associated with this measure come from reduced energy usage, due to more efficient technology, and reduced run times.

Affected Systems: stand-up refrigerator

4.10 Custom Measures

#	Energy Conservation Measure	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated M&L Cost ($)	Estimated Incentive ($)*	Estimated Net M&L Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Custom Measures		**475**	**0.0**	**0**	**$91**	**$2,383**	**$0**	**$2,383**	**26.2**	**478**
ECM 15	Replace Electric Water Heater with Heat Pump Water Heater	475	0.0	0	$91	$2,383	$0	$2,383	26.2	478

CM 15: Replace Electric Water Heater with Heat Pump Water Heater

A typical electric water heater uses electric resistance coils to heat water at a coefficient of performance (COP) of 1. Air source heat pump water heaters (HPWH) use a refrigeration cycle to transfer heat from the surrounding air to the domestic water. The typical average COP for a HPWH is about 2.5, so they require significantly less electricity to produce the same amount of hot water as a traditional electric water heater. There are two types of HPWH, those integrated with the heat pump and storage tank in the same unit, and those that are split into two sections (with the storage tank separate from the heat pump). The following addresses integrated HPWH.

HPWH reject cold air. As such, they need to be installed in an unconditioned space of about 750 cubic feet with good ventilation. Ideal locations are garages, large enclosed, unconditioned storage areas, or areas with excess heat such as a furnace or boiler room.[4] The HPWH will also produce condensate so accommodations for draining the condensate need to be provided.

Most HPWH operate effectively down to an air temperature of 40 °F. Below that temperature, an electric resistance booster heater is typically required to achieve full heating capacity. It is critical that the HPWH controls are set up so that the electric resistance heat only engages when the air temperature is too cold for the HPWH to extract heat from it. HPWHs have a slow recovery. During periods of high demand, the electric resistance heating element, if enabled, may be energized to maintain set point, thus reducing the overall efficiency of the unit. It is recommended that a careful analysis of the hot water demand be conducted to determine if the application makes economic sense, and the HPWH heating capacity and storage are properly sized.

HPWH operate most effectively when the temperature difference between the incoming and outgoing water is high. Generally, this means that cold make-up water should be piped to the bottom of the tank and return water should be piped to the top of the tank in order to maintain stratification within the storage tank. Water should be drawn from the bottom of the tank to be heated. If there is a DHW recirculation pump, it should only be operated during high hot water demand periods.

4.11 Measures for Future Consideration

There are additional opportunities for improvement that Bnai Keshet may wish to consider. These potential upgrades typically require further analysis, involve substantial capital investment, and/or include significant system reconfiguration. These measures are therefore beyond the scope of this energy audit. These measures are described here to support a whole building approach to energy efficiency and sustainability.

Bnai Keshet may wish to consider the Energy Savings Improvement Program (ESIP) or other whole building approach. With interest in implementing comprehensive, largescale and/or complex system wide projects, these measures may be pursued during development of a future energy savings plan. We recommend that you work with your energy service company (ESCO) and/or design team to:

- Evaluate these measures further.
- Develop firm costs.
- Determine measure savings.
- Prepare detailed implementation plans.

Other modernization or capital improvement funds may be leveraged for these types of refurbishments. As you plan for capital upgrades, be sure to consider the energy impact of the building systems and controls being specified.

[4] https://basc.pnnl.gov/code-compliance/heat-pump-water-heaters-code-compliance-brief#:~:text=HPWH%20must%20have%20unrestricted%20airflow,depending%20on%20size%20of%20system

Installation of a Building Automation System

Most larger facilities have some type of building automation system (BAS), which provides for centralization, remote control, and monitoring of HVAC equipment and sometimes lighting or other building systems. A BAS utilizes a system of temperature and pressure sensors that obtain feedback about field conditions and provide signals to control systems that adjust HVAC system operation for optimal functioning. Thirty years ago, most control systems were pneumatic systems driven by compressed air, with pneumatic thermostats and air driven actuators for valves and dampers. Pneumatics controls have largely been replaced by direct digital control (DDC) systems, but many pneumatic systems remain. Contemporary DDC systems afford tighter controls and enhanced monitoring and trending capabilities as compared to the older systems.

Often smaller facilities are not equipped with central controls. For many small sites, it has been less costly to install distributed local controls, such as programmable thermostats and timeclocks, rather than centralized DDC. Local controls do a reasonably good job of scheduling equipment and maintaining operating conditions by relying on controls integral to HVAC units, such as logic for compressor staging, to manage the equipment operating algorithms.

Even for smaller sites, inefficiencies arise when temperature sensors and thermostat schedules are not maintained, when there are separate systems for heating and cooling, and especially when equipment is added, or the facility is reconfigured or repurposed.

Based on our survey, it appears that the installation of a BAS at your site could increase the efficiency of your building HVAC system operation.

A controls upgrade would enable automated equipment start and stop times, temperature setpoints, and lockouts and deadbands to be programmed remotely using a graphic interface. Controls can be configured to optimize ventilation and outside air intake by adjusting economizer position, damper function, and fan speed. Existing chilled and hot water distribution system controls are typically tied in, including associated pumps and valves. Coordinated control of HVAC systems is dependent on a network of sensors and status points. A comprehensive building control system provides monitoring and control for all HVAC systems, so operators can adjust system programming for optimal comfort and energy savings.

It is recommended that an HVAC engineer or contractor who specializes in BAS be contacted for a detailed evaluation and implementation costs. For the purposes of this report, the potential energy savings and measure costs were estimated based on industry standards and previous project experience. Further analysis should be conducted for the feasibility of this measure. This is not an investment grade analysis nor should be used as a basis for design and construction.

5 Energy Efficient Best Practices

A whole building maintenance plan will extend equipment life; improve occupant comfort, health, and safety; and reduce energy and maintenance costs.

Operation and maintenance (O&M) plans enhance the operational efficiency of HVAC and other energy intensive systems and could save 5% –20% of the energy usage in your building without substantial capital investment. A successful plan includes your records of energy usage trends and costs, building equipment lists, current maintenance practices, and planned capital upgrades, and it incorporates your ideas for improved building operation. Your plan will address goals for energy-efficient operation, provide detail on how to reach the goals, and outline procedures for measuring and reporting whether goals have been achieved.

You may already be doing some of these things—see our list below for potential additions to your maintenance plan. Be sure to consult with qualified equipment specialists for details on proper maintenance and system operation.

Energy Tracking with ENERGY STAR Portfolio Manager

You've heard it before—you cannot manage what you do not measure. ENERGY STAR Portfolio Manager is an online tool that you can use to measure and track energy and water consumption, as well as greenhouse gas emissions[5]. Your account has already been established. Now you can continue to keep tabs on your energy performance every month.

Weatherization

Caulk or weather strip leaky doors and windows to reduce drafts and loss of heated or cooled air. Sealing cracks and openings can reduce heating and cooling costs, improve building durability, and create a healthier indoor environment. Materials used may include caulk, polyurethane foam, and other weather-stripping materials. There is an energy savings opportunity by reducing the uncontrolled air exchange between the outside and inside of the building. Blower door assisted comprehensive building air sealing will reduce the amount of air exchange, which will in turn reduce the load on the buildings heating and cooling equipment, providing energy savings and increased occupant comfort.

Doors and Windows

Close exterior doors and windows in heated and cooled areas. Leaving doors and windows open leads to a loss of heat during the winter and chilled air during the summer. Reducing air changes per hour can lead to increased occupant comfort as well as heating and cooling savings, especially when combined with proper HVAC controls and adequate ventilation.

[5] https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager.

Window Treatments/Coverings

Use high-reflectivity films or cover windows with shades or shutters to reduce solar heat gain and reduce the load on cooling and heating systems. Older, single-pane windows and east- or west-facing windows are especially prone to solar heat gain. In addition, use shades or shutters at night during cold weather to reduce heat loss.

Lighting Maintenance

Clean lamps, reflectors and lenses of dirt, dust, oil, and smoke buildup every six to twelve months. Light levels decrease over time due to lamp aging, lamp and ballast failure, and buildup of dirt and dust. Together, this can reduce total light output by up to 60% while still drawing full power.

In addition to routine cleaning, developing a maintenance schedule can ensure that maintenance is performed regularly, and it can reduce the overall cost of fixture re-lamping and re-ballasting. Group re-lamping and re-ballasting maintains lighting levels and minimizes the number of site visits by a lighting technician or contractor, decreasing the overall cost of maintenance.

Lighting Controls

As part of a lighting maintenance schedule, test lighting controls to ensure proper functioning. For occupancy sensors, this requires triggering the sensor and verifying that the sensor's timer settings are correct. For daylight and photocell sensors, maintenance involves cleaning sensor lenses and confirming that setpoints and sensitivity are configured properly. Adjust exterior lighting time clock controls seasonally as needed to match your lighting requirements.

Motor Maintenance

Motors have many moving parts. As these parts degrade over time, the efficiency of the motor is reduced. Routine maintenance prevents damage to motor components. Routine maintenance should include 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.

Fans to Reduce Cooling Load

Install ceiling fans to supplement your cooling system. Thermostat settings can typically be increased by 4°F with no change in overall occupant comfort due to the wind chill effect of moving air.

Thermostat Schedules and Temperature Resets

Use thermostat setback temperatures and schedules to reduce heating and cooling energy use during periods of low or no occupancy. 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 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.

Economizer Maintenance

Economizers can significantly reduce cooling system load. A malfunctioning economizer can increase the amount of heating and mechanical cooling required by introducing excess amounts of cold or hot outside air. Common economizer malfunctions include broken outdoor thermostat or enthalpy control or dampers that are stuck or improperly adjusted.

Periodic inspection and maintenance will keep economizers working in sync with the heating and cooling system. This maintenance should be part of annual system maintenance, and it should include proper setting of the outdoor thermostat/enthalpy control, inspection of control and damper operation, lubrication of damper connections, and adjustment of minimum damper position.

AC System Evaporator/Condenser Coil Cleaning

Dirty evaporator and condenser coils restrict air flow and restrict heat transfer. This increases the loads on the evaporator and condenser fan and decreases overall cooling system performance. Keeping the coils clean allows the fans and cooling system to operate more efficiently.

HVAC Filter Cleaning and Replacement

Air filters should be checked regularly (often monthly) and cleaned or replaced when appropriate. Air filters reduce indoor air pollution, increase occupant comfort, and help keep equipment operating efficiently. If the building has a building management system, consider installing a differential pressure switch across filters to send an alarm about premature fouling or overdue filter replacement. Over time, filters become less and less effective as particulate buildup increases. Dirty filters also restrict air flow through the air conditioning or heat pump system, which increases the load on the distribution fans.

Ductwork Maintenance

Duct maintenance has two primary goals: keep the ducts clean to avoid air quality problems and seal leaks to save energy. Check for cleanliness, obstructions that block airflow, water damage, and leaks. Ducts should be inspected at least every two years.

The biggest symptoms of clogged air ducts are differing temperatures throughout the building and areas with limited airflow from supply registers. If a particular air duct is clogged, then air flow will only be cut off to some rooms in the building—not all of them. The reduced airflow will make it more difficult for those areas to reach the temperature setpoint, which will cause the HVAC system to run longer to cool or heat that area properly. If you suspect clogged air ducts, ensure that all areas in front of supply registers are clear of items that may block or restrict air flow, and you should check for fire dampers or balancing dampers that have failed closed.

Duct leakage in commercial buildings can account for 5%–25% of the supply airflow. In the case of rooftop air handlers, duct leakage can occur to the outside of the building wasting conditioned air. Check ductwork for leakage. Eliminating duct leaks can improve ventilation system performance and reduce heating and cooling system operation.

Distribution system losses are dependent on-air system temperature, the size of the distribution system, and the level of insulation of the ductwork. Significant energy savings can be achieved when insulation has not been well maintained. When the insulation is missing or worn, the system efficiency can be significantly reduced. This measure saves energy by reducing heat transfer in the distribution system.

Boiler Maintenance

Many boiler problems develop slowly over time, so regular inspection and maintenance is essential to keeping the heating system running efficiently and preventing expensive repairs. Annual tune-ups should include a combustion analysis to analyze the exhaust from the boilers and to ensure the boiler is operating safely and efficiently. Boilers should be cleaned according to the manufacturer's instructions to remove soot and scale from the boiler sections to improve heat transfer.

Furnace Maintenance

Preventative 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 check for gas / carbon monoxide leaks; change the air and fuel filters; check components for cracks, corrosion, dirt, or debris build-up; ensure the ignition system is working properly; test and adjust operation and safety controls; inspect electrical connections; and lubricate motors and bearings.

Optimize HVAC Equipment Schedules

Energy management systems (BAS) typically provide advanced controls for building HVAC systems, including chillers, boilers, air handling units, rooftop units and exhaust fans. The BAS monitors and reports operational status, schedules equipment start and stop times, locks out equipment operation based on outside air or space temperature, and often optimizes damper and valve operation based on complex algorithms. These BAS features, when in proper adjustment, can improve comfort for building occupants and save substantial energy.

Know your BAS scheduling capabilities. Regularly monitor HVAC equipment operating schedules and match them to building operating hours in order to eliminate unnecessary equipment operation and save energy. Monitoring should be performed often at sites with frequently changing usage patterns – daily in some cases. We recommend using the *optimal start* feature of the BAS (if available) to optimize the building warmup sequence. Most BAS scheduling programs provide for holiday schedules, which can be used during reduced use or shutdown periods. Finally, many systems are equipped with a one-time override function, which can be used to provide additional space conditioning due to a one-time, special event. When available this override feature should be used rather than changing the base operating schedule.

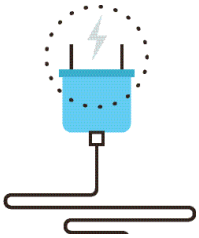
Water Heater Maintenance

The lower the supply water temperature that is used for hand washing sinks, the less energy is needed to heat the water. Reducing the temperature results in energy savings and the change is often unnoticeable to users. Be sure to review the domestic water temperature requirements for sterilizers and dishwashers as you investigate reducing the supply water temperature.

Also, preventative maintenance can extend the life of the system, maintain energy efficiency, and ensure safe operation. At least once a year, follow manufacturer instructions to 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. Annual checks should include checks for:

- Leaks or heavy corrosion on the pipes and valves.
- 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 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 more than three years old, have a technician inspect the sacrificial anode annually.

Plug Load Controls



Reducing plug loads is a common way to decrease your electrical use. Limiting the energy use of plug loads can include increasing occupant awareness, removing under-used equipment, installing hardware controls, and using software controls. Consider enabling the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips[6]. Your local utility may offer incentives or rebates for this equipment.

Computer Monitor Replacement

ENERGY STAR labeled computer monitors can be up to 25% more efficient than standard monitors. ENERGY STAR rated monitors have power consumption requirements for different operating modes such as on, idle, and sleep.

Water Conservation

Installing dual flush or low-flow toilets and low-flow/waterless urinals are ways to reduce water use. The EPA WaterSense® ratings for urinals is 0.5 gallons per flush (gpf) and for flush valve toilets is 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

For more information regarding water conservation go to the EPA's WaterSense website[7] or download a copy of EPA's "WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities"[8] to get ideas for creating a water management plan and best practices for a wide range of water using systems.

[6] For additional information refer to "Assessing and Reducing Plug and Process Loads in Office Buildings" http://www.nrel.gov/docs/fy13osti/54175.pdf, or "Plug Load Best Practices Guide" http://www.advancedbuildings.net/plug-load-best-practices-guide-offices.

[7] https://www.epa.gov/watersense.

[8] https://www.epa.gov/watersense/watersense-work-0.

Water conservation devices that do not reduce hot water consumption will not provide energy savings at the site level, but they may significantly affect your water and sewer usage costs. Any reduction in water use does however ultimately reduce grid-level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users.

If the facility has detached buildings with a master water meter for the entire campus, check for unnatural wet areas in the lawn or water seeping in the foundation at water pipe penetrations through the foundation. Periodically check overnight meter readings when the facility is unoccupied, and there is no other scheduled water usage.

Manage irrigation systems to use water more effectively outside the building. Adjust spray patterns so that water lands on intended lawns and plantings and not on pavement and walls. Consider installing an evapotranspiration irrigation controller that will prevent over-watering.

Procurement Strategies

Purchasing efficient products reduces energy costs without compromising quality. Consider modifying your procurement policies and language to require ENERGY STAR or WaterSense products where available.

6 On-site Generation

You don't have to look far in New Jersey to see one of the thousands of solar electric systems providing clean power to homes, businesses, schools, and government buildings. On-site generation includes both renewable (e.g., solar, wind) and non-renewable (e.g., fuel cells) technologies that generate power to meet all or a portion of the facility's electric energy needs. Also referred to as distributed generation, these systems contribute to greenhouse gas (GHG) emission reductions, demand reductions, and reduced customer electricity purchases, which results in improved electric grid reliability through better use of transmission and distribution systems.

Preliminary screenings were performed to determine if an on-site generation measure could be a cost-effective solution for your facility. Before deciding to install an on-site generation system, we recommend conducting a feasibility study to analyze 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 Solar Photovoltaic

Photovoltaic (PV) panels convert sunlight into electricity. Individual panels are combined into an array that produces direct current (DC) electricity. The DC current is converted to alternating current (AC) through an inverter. The inverter is then connected to the building's electrical distribution system.

A preliminary screening based on the facility's electric demand, size and location of free area, and shading elements shows that the facility has no potential for installing a PV array.

This facility does not appear to meet the minimum criteria for a cost-effective solar PV installation. To be cost-effective, a solar PV array needs certain minimum criteria, such as sufficient and sustained electric demand and sufficient flat or south-facing rooftop or other unshaded space on which to place the PV panels.

The graphic below displays the results of the PV potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

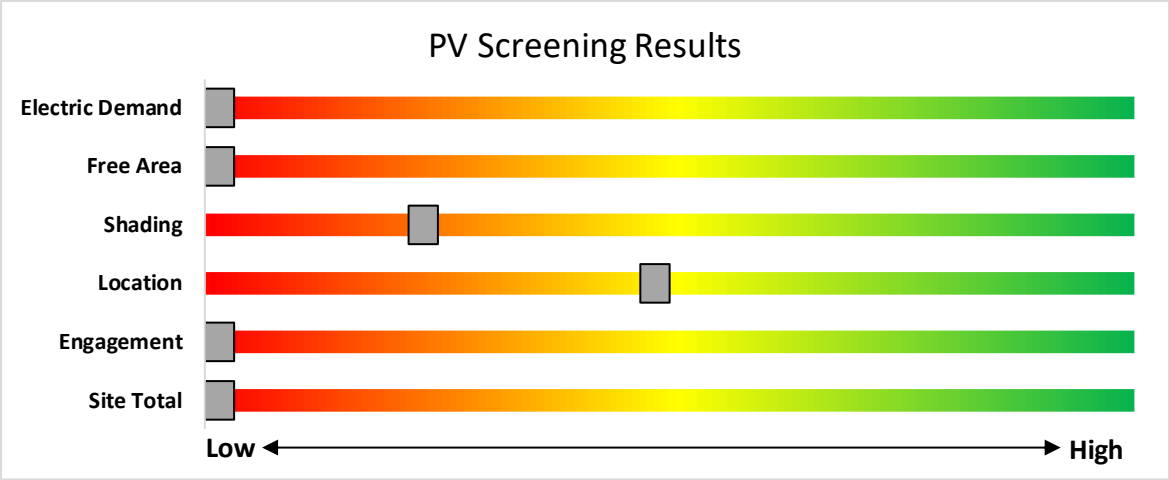


Figure 8 - Photovoltaic Screening

Successor Solar Incentive Program (SuSI)

The SuSI program replaces the SREC Registration Program (SRP) and the Transition Incentive (TI) program. The SuSI program is used to register and certify solar projects in New Jersey. Rebates are not available for solar projects. Solar projects may qualify to earn SREC- IIs (Solar Renewable Energy Certificates-II), however, the project owners *must* register their solar projects prior to the start of construction to establish the project's eligibility.

Get more information about solar power in New Jersey or find a qualified solar installer who can help you decide if solar is right for your building:

Successor Solar Incentive Program (SuSI): https://www.njcleanenergy.com/renewable-energy/programs/susi-program

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

6.2 Combined Heat and Power

Combined heat and power (CHP) generates electricity at the facility and puts waste heat energy to good use. Common types of CHP systems are reciprocating engines, microturbines, fuel cells, backpressure steam turbines, and (at large facilities) gas turbines.

CHP systems typically produce a portion of the electric power used on-site, with the balance of electric power needs supplied by the local utility company. The heat is used to supplement (or replace) existing boilers and provide space heating and/or domestic hot water heating. Waste heat can also be routed through absorption chillers for space cooling.

The key criteria used for screening is the amount of time that the CHP system would operate at full load and the facility's ability to use the recovered heat. Facilities with a continuous need for large quantities of waste heat are the best candidates for CHP.

A preliminary screening based on heating and electrical demand, siting, and interconnection shows that the facility has no potential for installing a cost-effective CHP system.

Based on a preliminary analysis, the facility does not appear to meet the minimum requirements for a cost-effective CHP installation. The lack of gas service, low or infrequent thermal load, and lack of space for siting the equipment are the most significant factors contributing to the lack of CHP potential.

The graphic below displays the results of the CHP potential screening conducted as a part of this audit. The position of each slider indicates the potential (potential increases to the right) that each factor contributes to the overall site potential.

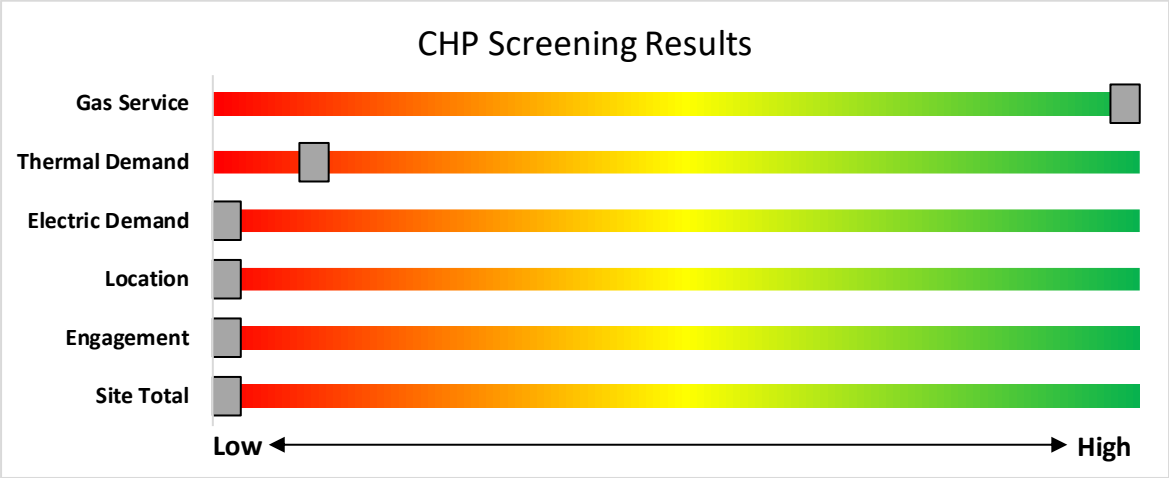


Figure 9 - Combined Heat and Power Screening

Find a qualified firm that specializes in commercial CHP cost assessment and installation: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/tools-and-resources/tradeally/approved_vendorsearch/

7 ELECTRIC VEHICLES (EV)

All electric vehicles (EVs) have an electric motor instead of an internal combustion engine. EVs function by plugging into a charge point, taking electricity from the grid, and then storing it in rechargeable batteries. Although electricity production may contribute to air pollution, the U.S. EPA categorizes all-electric vehicles as zero-emission vehicles because they produce no direct exhaust or tailpipe emissions.

EVs are typically more expensive than similar conventional and hybrid vehicles, although some cost can be recovered through fuel savings, federal tax credit, or state incentives.

7.1 Electric Vehicle Charging

EV charging stations provide a means for electric vehicle operators to recharge their batteries at a facility. While many EV drivers charge at home, others do not have access to regular home charging, and the ability to charge at work or in public locations is critical to making EVs practical for more drivers. Charging can also be used for electric fleet vehicles, which can reduce fuel and maintenance costs for fleets that replace gas or diesel vehicles with EVs.

EV charging comes in three main types. For this assessment, the screening considers addition of Level 2 charging, which is most common at workplaces and other public locations. Depending on the site type and usage, other levels of charging power may be more appropriate.

The preliminary assessment of EV charging at the facility shows that there is medium potential for adding EV chargers to the facility's parking, based on potential costs of installation and other site factors.

The primary costs associated with installing EV charging are the charger hardware and the cost to extend power from the facility to parking spaces. This may include upgrades to electric panels to serve increased loads.

The type and size of the parking area impact the costs and feasibility of adding EV charging. Parking structure installations can be less costly than surface lot installations as power may be readily available, and equipment and wiring can be surface mounted. Parking lot installations often require trenching through concrete or asphalt surface. Large parking areas provide greater flexibility in charger siting than smaller lots.

The location and capacity of facility electric panels also impact charger installation costs. A Level 2 charger generally requires a dedicated 208-240V, 40 Amp circuit. The electric panel nearest the planned installation may not have available capacity and may need to be upgraded to serve new EV charging loads. Alternatively, chargers could be powered from a more distant panel. The distance from the panel to the location of charging stations ties directly to costs, as conduits, cables, and potential trenching costs all increase on a per-foot basis. The more charging stations planned, the more likely it is that additional electrical capacity will be needed.

Other factors to consider when planning for EV charging at a facility include who the intended users are, how long they park vehicles at the site, and whether they will need to pay for the electricity they use.

The graphic below displays the results of the EV charging assessment conducted as part of this audit. The position of each slider indicates the impact each factor has on the feasibility of installing EV charging at the site.

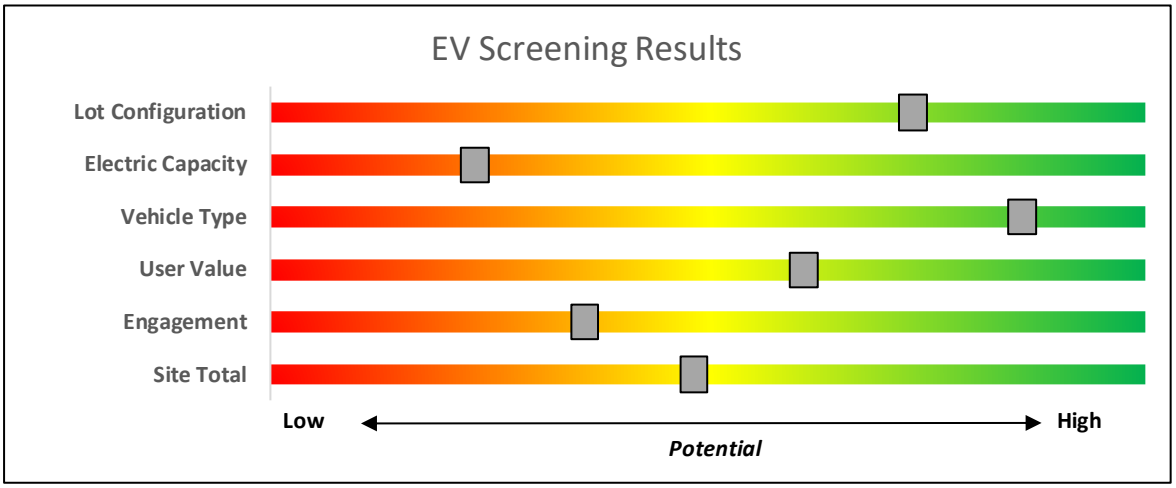


Figure 10 – EV Charger Screening

Electric Vehicle Programs Available

New Jersey is leading the way on electric vehicle (EV) adoption on the East Coast. There are several programs designed to encourage EV adoption in New Jersey, which is crucial to reaching a 100% clean energy future.

NJCEP offers a variety of EV programs for vehicles, charging stations, and fleets. Certain EV charging stations that receive electric utility service from Atlantic City Electric Company (ACE) or Public Service Electric & Gas Company (PSE&G), may be eligible for additional electric vehicle charging incentives directly from the utility. Projects may be eligible for both the incentives offered by this BPU program and incentives offered by ACE or PSE&G, up to 90% of the combined charger purchase and installation costs. Please check ACE or PSE&G program eligibility requirements before purchasing EV charging equipment, as additional conditions on types of eligible chargers may apply for utility incentives.

Both Jersey Central Power & Light (JCP&L) and Rockland Electric (RECO) have filed proposals for EV charging programs. BPU staff is currently reviewing those proposals.

For more information and to keep up to date on all EV programs please visit https://www.njcleanenergy.com/commercial-industrial/programs/electric-vehicle-programs

8 PROJECT FUNDING AND INCENTIVES

Ready to improve your building's performance? New Jersey's Clean Energy Programs and Utility Energy Efficiency Programs can help. Pick the program that works best for you. This section provides an overview of currently available incentive programs in.

8.1 Utility Energy Efficiency Programs

The Clean Energy Act, signed into law by Governor Murphy in 2018, requires New Jersey's investor-owned gas and electric utilities to reduce their customers' use by set percentages over time. To help reach these targets the New Jersey Board of Public Utilities approved a comprehensive suite of energy efficiency programs to be run by the utility companies.

Prescriptive and Custom

The Prescriptive and Custom rebate program through your utility provider offers incentives for installing prescriptive and custom energy efficiency measures at your facility. This program provides an effective mechanism for securing incentives for energy efficiency measures installed individually or as part of a package of energy upgrades. This program serves most common equipment types and sizes.

Equipment Examples

Lighting
Lighting Controls
HVAC Equipment
Refrigeration
Gas Heating
Gas Cooling
Commercial Kitchen Equipment
Food Service Equipment
Variable Frequency Drives
Electronically Commutate Motors
Variable Frequency Drives
Plug Loads Controls
Washers and Dryers
Agricultural
Water Heating

The Prescriptive program provides fixed incentives for specific energy efficiency measures. Prescriptive incentives vary by equipment type. The Custom program provides incentives for more unique or specialized technologies or systems that are not addressed through prescriptive incentives.

Direct Install

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 or less 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.

How to Participate

To participate in Direct Install, you will work with a participating contractor. 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 Direct Install program, subject to program rules and eligibility, while the remaining percent of the cost is paid to the contractor by the customer.

Engineered Solutions

The Engineered Solutions Program provides tailored energy-efficiency assistance and services to municipalities, universities, schools, hospitals and healthcare facilities (MUSH), non-profit entities, and multifamily buildings. Customers receive expert guided services, including investment-grade energy auditing, engineering design, installation assistance, construction administration, commissioning, and measurement and verification (M&V) services to support the implementation of cost-effective and comprehensive efficiency projects. Engineered Solutions is generally a good option for medium to large sized facilities with a peak demand over 200 kW looking to implement as many measures as possible under a single project to achieve deep energy savings. Engineered Solutions has an added benefit of addressing measures that may not qualify for other programs. Many facilities pursuing an Energy Savings Improvement Program loan also use this program. Incentives for this program are based on project scope and energy savings achieved.

For more information on any of these programs, contact your local utility provider or visit https://www.njcleanenergy.com/transition.

8.2 New Jersey's Clean Energy Programs

Save money while saving the planet! New Jersey's Clean Energy Program is a statewide program that offers incentives, programs, and services that benefit New Jersey residents, businesses, educational, non-profit, and government entities to help them save energy, money, and the environment.

Large Energy Users

The Large Energy Users Program (LEUP) is designed to foster self-directed investment in energy projects. This program is offered to New Jersey's largest energy customers that annually contribute at least $200,000 to the NJCEP aggregate of all buildings/sites. This equates to roughly $5 million in energy costs in the prior fiscal year.

Incentives

Incentives are based on the specifications below. The maximum incentive per entity is the lesser of:

- $4 million
- 75% of the total project(s) cost
- 90% of total NJCEP fund contribution in previous year
- $0.33 per projected kWh saved; $3.75 per projected Therm saved annually

How to Participate

To participate in LEUP, you will first need submit an enrollment application. This program requires all qualified and approved applicants to submit an energy plan that outlines the proposed energy efficiency work for review and approval. Applicants may submit a Draft Energy Efficiency Plan (DEEP), or a Final Energy Efficiency Plan (FEEP). Once the FEEP is approved, the proposed work can begin.

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

Combined Heat and Power

The Combined Heat & Power (CHP) program provides incentives for eligible CHP or waste heat to power (WHP) projects. Eligible CHP or WHP projects must achieve an annual system efficiency of at least 65% (lower heating value, or LHV), based on total energy input and total utilized energy output. Mechanical energy may be included in the efficiency evaluation.

Incentives

Eligible Technologies	Size (Installed Rated Capacity)[1]	Incentive ($/kW)	% of Total Cost Cap per Project[3]	$ Cap per Project[3]
Powered by non-renewable or renewable fuel source[4]	≤500 kW	$2,000	30-40%[2]	$2 million
Gas Internal Combustion Engine	>500 kW - 1 MW	$1,000		
Gas Combustion Turbine	> 1 MW - 3 MW	$550	30%	$3 million
Microturbine Fuel Cells with Heat Recovery	>3 MW	$350		
Waste Heat to Power*	<1 MW	$1,000	30%	$2 million
	> 1MW	$500		$3 million

*Waste Heat to Power: Powered by non-renewable fuel source, heat recovery or other mechanical recovery from existing equipment utilizing new electric generation equipment (e.g. steam turbine).

Check the NJCEP website for details on program availability, current incentive levels, and requirements.

How to Participate

You will work with a qualified developer or consulting firm to complete the CHP application. Once the application is approved the project can be installed. Information about the CHP program can be found at www.njcleanenergy.com/CHP.

Successor Solar Incentive Program (SuSI)

The SuSI program replaces the SREC Registration Program (SRP) and the Transition Incentive (TI) program. The program is used to register and certify solar projects in New Jersey. Rebates are not available for solar projects, but owners of solar projects *must* register their projects prior to the start of construction to establish the project's eligibility to earn SREC-IIs (Solar Renewable Energy Certificates-II). SuSI consists of two sub-programs. The Administratively Determined Incentive (ADI) Program and the Competitive Solar Incentive (CSI) Program.

Administratively Determined Incentive (ADI) Program

The ADI Program provides administratively set incentives for net metered residential projects, net metered non-residential projects 5 MW or less, and all community solar projects.

After the registration is accepted, construction is complete, and a complete final as-built packet has been submitted, the project is issued a New Jersey certification number, which enables it to generate New Jersey SREC- IIs.

Market Segments	Size MW dc	Incentive Value ($/SREC II)	Public Entities Incentive Value - $20 Adder ($/SRECII)
Net Metered Residential	All types and sizes	$90	N/A
Small Net Metered Non-Residential located on Rooftop, Carport, Canopy and Floating Solar	Projects smaller than 1 MW	$100	$120
Large Net Metered Non-Residential located on Rooftop, Carport, Canopy and Floating Solar	Projects 1 MW to 5 MW	$90	$110
Small Net Metered Non-Residential Ground Mount	Projects smaller than 1 MW	$85	$105
Large Net Metered Non-Residential Ground Mount	Projects 1 MW to 5 MW	$80	$100
LMI Community Solar	Up to 5 MW	$90	N/A
Non-LMI Community Solar	Up to 5 MW	$70	N/A
Interim Subsection (t)	All types and sizes	$100	N/A

Eligible projects may generate SREC-IIs for 15 years following the commencement of commercial operations which is defined as permission to operate (PTO) from the Electric Distribution Company. After 15 years, projects may be eligible for a NJ Class I REC.

SREC-IIs will be purchased monthly by the SREC-II Program Administrator who will allocate the SREC-IIs to the Load Serving Entities (BGS Providers and Third-Party Suppliers) annually based on their market share of retail electricity sold during the relevant Energy Year.

The ADI Program online portal is now open to new registrations.

Competitive Solar Incentive Program

The Competitive Solar Incentive (CSI) Program will provide competitively set incentives for grid supply projects and net metered non-residential projects greater than 5MW (dc). The program is currently under development. For updates, please continue to check the Solar Proceedings page on the New Jersey's Clean Energy Program website.

Solar projects help the State of New Jersey reach renewable energy goals outlined in the state's Energy Master Plan.

If you are considering installing solar photovoltaics on your building, visit the following link for more information: https://njcleanenergy.com/renewable-energy/programs/susi-program.

Energy Savings Improvement Program

The Energy Savings Improvement Program (ESIP) serves New Jersey's government agencies by financing energy projects. An ESIP is a type of performance contract, whereby school districts, counties, municipalities, housing authorities, and other public and state entities enter into contracts to help finance building energy upgrades. Annual payments are lower than the savings projected from the energy conservation measures (ECMs), ensuring that ESIP projects are cash flow positive for the life of the contract.

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 described above can also be used to help further reduce the total project cost of eligible measures.

How to Participate

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 used 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 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. Carefully consider all alternatives to develop an approach that best meets your needs. A detailed program descriptions and application can be found at www.njcleanenergy.com/ESIP.

ESIP is a program delivered directly by the NJBPU and is not an NJCEP incentive program. As mentioned above, you can use NJCEP incentive programs to help further reduce costs when developing the energy savings plan. Refer to the ESIP guidelines at the link above for further information and guidance on next steps.

9 PROJECT DEVELOPMENT

Energy conservation measures (ECMs) have been identified for your site, and their energy and economic analyses are provided within this LGEA report. Note that some of the identified projects may be mutually exclusive, such as replacing equipment versus upgrading motors or controls. The next steps with project development are to set goals and create a comprehensive project plan. The graphic below provides an overview of the process flow for a typical energy efficiency or renewable energy project. We recommend implementing as many ECMs as possible prior to undertaking a feasibility study for a renewable project. The cyclical nature of this process flow demonstrates the ongoing work required to continually improve building energy efficiency over time. If your building(s) scope of work is relatively simple to implement or small in scope, the measurement and verification (M&V) step may not be required. It should be noted through a typical project cycle, there will be changes in costs based on specific scopes of work, contractor selections, design considerations, construction, etc. The estimated costs provided throughout this LGEA report demonstrate the unburdened turn-key material and labor cost only. There will be contingencies and additional costs at the time of implementation. We recommend comprehensive project planning that includes the review of multiple bids for project work, incorporates potential operations and maintenance (O&M) cost savings, and maximizes your incentive potential.

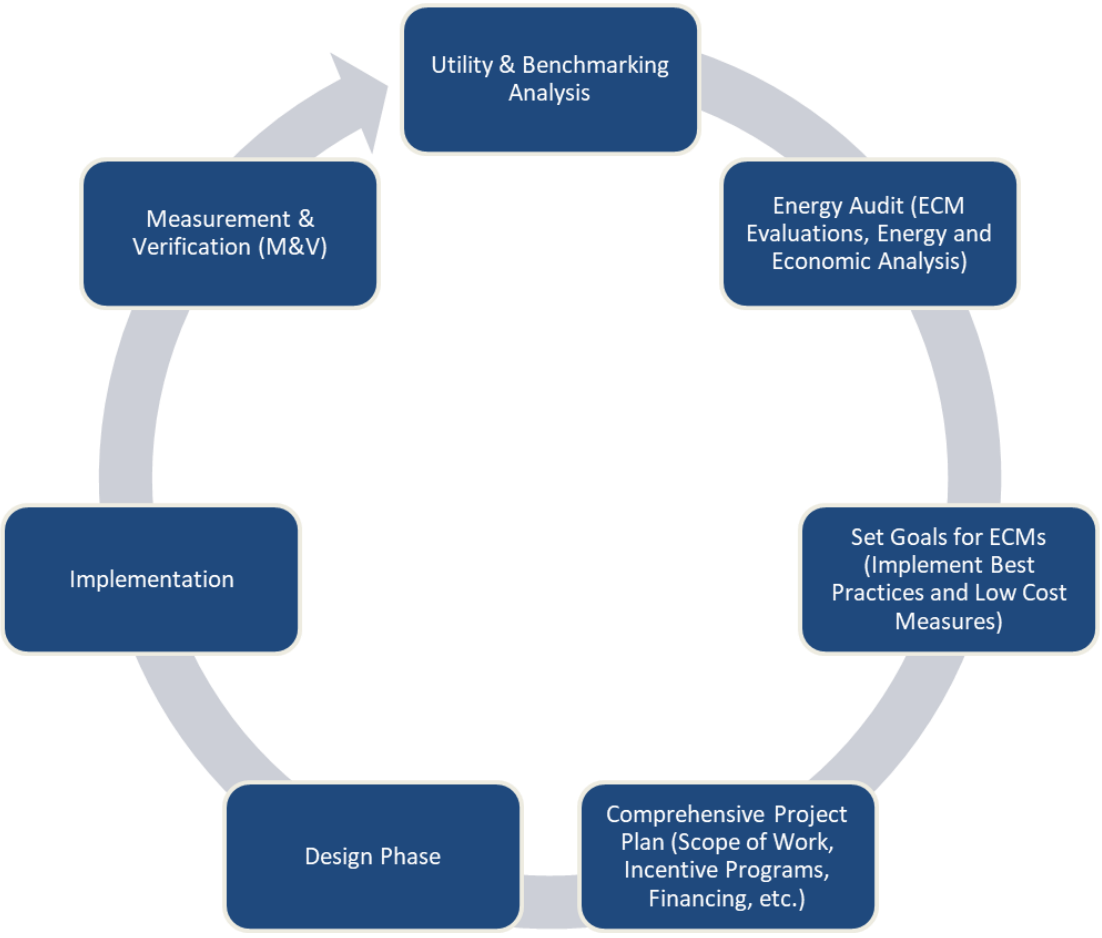


Figure 11 – Project Development Cycle

10 Energy Purchasing and Procurement Strategies

10.1 Retail Electric Supply Options

Energy deregulation in New Jersey has increased energy buyers' options by separating the function of electricity distribution from that of electricity supply. 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 already buys electricity from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party electric suppliers is available at the NJBPU website[9].

10.2 Retail Natural Gas Supply Options

The natural gas market in New Jersey is also deregulated. Most customers that remain with the utility for natural gas service pay rates that are market based and fluctuate monthly. The utility provides basic gas supply service 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 typically depends on whether a customer prefers 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 does not already purchase natural gas from a third-party supplier, consider shopping for a reduced rate from third-party natural gas suppliers. If your facility already purchases natural gas from a third-party supplier, review and compare prices at the end of each contract year.

A list of licensed third-party natural gas suppliers is available at the NJBPU website[10].

[9] www.state.nj.us/bpu/commercial/shopping.html.

[10] 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	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Bathroom foyer	1	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	S	15	1,000		None	No	1	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	15	1,000	0.0	0	0	$0	$0	$0	0.0
Corridor 1	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 1	13	LED Lamps: (1) 15W A19 Screw-In Lamp	Occupancy Sensor	S	15	4,380		None	No	13	LED Lamps: (1) 15W A19 Screw-In Lamp	Occupancy Sensor	15	4,380	0.0	0	0	$0	$0	$0	0.0
Electrical Room 1	1	Compact Fluorescent: (1) 26W Spiral Plug-In Lamp	Wall Switch	S	26	200	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	200	0.0	3	0	$1	$17	$1	24.8
Exterior	6	Compact Fluorescent: (2) 13W Biaxial Plug-In Lamps	None	S	26	5,000	3, 5	Relamp	Yes	6	LED Lamps: GX23 (Plug-In) Lamps	Photocell	13	4,380	0.0	438	0	$84	$350	$12	4.0
Exterior	3	High-Pressure Sodium: (1) 35W Lamp	None	S	46	5,000	3, 5	Relamp	Yes	3	LED - Fixtures: Bollard Fixture	Photocell	15	4,380	0.0	493	0	$95	$72	$72	0.0
Exterior	1	LED Lamps: (1) 17W A19 Screw-In Lamp	None	S	17	5,000	5	None	Yes	1	LED Lamps: (1) 17W A19 Screw-In Lamp	Photocell	17	4,380	0.0	11	0	$2	$0	$0	0.0
Exterior	2	LED Lamps: (1) 5W A19 Screw-In Lamp	None	S	5	5,000	5	None	Yes	2	LED Lamps: (1) 5W A19 Screw-In Lamp	Photocell	5	4,380	0.0	6	0	$1	$0	$0	0.0
Exterior	4	LED - Fixtures: Cobrahead Pole Mount	None	S	50	8,760	5	None	Yes	4	LED - Fixtures: Cobrahead Pole Mount	Photocell	50	4,380	0.0	876	0	$169	$0	$0	0.0
Exterior	1	Metal Halide: (1) 100W Lamp	None	S	128	2,000	1	Fixture Replacement	No	1	LED - Fixtures: Landscape/Accent Flood and Spot Luminaires	None	28	2,000	0.0	200	0	$38	$200	$25	4.5
Front Entrance	1	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	S	15	5,000		None	No	1	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	15	5,000	0.0	0	0	$0	$0	$0	0.0
Kitchen 1	4	LED - Fixtures: Ceiling Mount	Wall Switch	S	40	800	4	None	Yes	4	LED - Fixtures: Ceiling Mount	Occupancy Sensor	40	552	0.0	43	0	$8	$270	$35	29.0
Kitchen 1	1	LED - Fixtures: Track or Mono-Point Directional Lighting Fixtures	Wall Switch	S	40	800		None	No	1	LED - Fixtures: Track or Mono-Point Directional Lighting Fixtures	Wall Switch	40	800	0.0	0	0	$0	$0	$0	0.0
Kitchen storage	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	160		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	160	0.0	0	0	$0	$0	$0	0.0
Kitchen storage	1	LED - Fixtures: Ceiling Mount	Wall Switch	S	40	160		None	No	1	LED - Fixtures: Ceiling Mount	Wall Switch	40	160	0.0	0	0	$0	$0	$0	0.0
Lobby 1	4	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	S	15	2,000	6	None	Yes	4	LED Lamps: (1) 15W A19 Screw-In Lamp	High/Low Control	15	1,380	0.0	40	0	$8	$225	$140	11.2
Lobby 1	7	LED Lamps: (1) 17W PAR30 Screw-In Lamp	Wall Switch	S	17	2,000	6	None	Yes	7	LED Lamps: (1) 17W PAR30 Screw-In Lamp	High/Low Control	17	1,380	0.0	80	0	$15	$450	$245	13.6
Main Office	4	LED Lamps: (2) 15W A19 Screw-In Lamps	Occupancy Sensor	S	30	2,000		None	No	4	LED Lamps: (2) 15W A19 Screw-In Lamps	Occupancy Sensor	30	2,000	0.0	0	0	$0	$0	$0	0.0
Main Office - back	2	LED Lamps: (2) 15W A19 Screw-In Lamps	Occupancy Sensor	S	30	1,200		None	No	2	LED Lamps: (2) 15W A19 Screw-In Lamps	Occupancy Sensor	30	1,200	0.0	0	0	$0	$0	$0	0.0
Restroom - Female 1	1	LED Lamps: (1) 17W A19 Screw-In Lamp	Occupancy Sensor	S	17	600		None	No	1	LED Lamps: (1) 17W A19 Screw-In Lamp	Occupancy Sensor	17	600	0.0	0	0	$0	$0	$0	0.0
Restroom - Female 1	1	LED Lamps: (8) 3.5W A19 Screw-In Lamps	Occupancy Sensor	S	28	600		None	No	1	LED Lamps: (8) 3.5W A19 Screw-In Lamps	Occupancy Sensor	28	600	0.0	0	0	$0	$0	$0	0.0
Restroom - Female 1	2	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	40	600		None	No	2	LED - Fixtures: Ceiling Mount	Occupancy Sensor	40	600	0.0	0	0	$0	$0	$0	0.0
Restroom - Fishbowl	1	LED Lamps: (4) 9W A19 Screw-In Lamps	Wall Switch	S	36	200		None	No	1	LED Lamps: (4) 9W A19 Screw-In Lamps	Wall Switch	36	200	0.0	0	0	$0	$0	$0	0.0
Restroom - Male 1	1	LED Lamps: (1) 17W A19 Screw-In Lamp	Occupancy Sensor	S	17	600		None	No	1	LED Lamps: (1) 17W A19 Screw-In Lamp	Occupancy Sensor	17	600	0.0	0	0	$0	$0	$0	0.0
Restroom - Male 1	1	LED Lamps: (8) 3.5W A19 Screw-In Lamps	Occupancy Sensor	S	28	600		None	No	1	LED Lamps: (8) 3.5W A19 Screw-In Lamps	Occupancy Sensor	28	600	0.0	0	0	$0	$0	$0	0.0

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Restroom - Male 1	2	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	40	600		None	No	2	LED - Fixtures: Ceiling Mount	Occupancy Sensor	40	600	0.0	0	0	$0	$0	$0	0.0
Sanctuary	5	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	5	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Sanctuary	8	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	600		None	No	8	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	600	0.0	0	0	$0	$0	$0	0.0
Sanctuary	9	LED - Fixtures: Ceiling Mount	Wall Switch	S	33	1,000		None	No	9	LED - Fixtures: Ceiling Mount	Wall Switch	33	1,000	0.0	0	0	$0	$0	$0	0.0
Sanctuary	5	LED - Fixtures: Cove Mount	Wall Switch	S	14	600		None	No	5	LED - Fixtures: Cove Mount	Wall Switch	14	600	0.0	0	0	$0	$0	$0	0.0
Sanctuary	1	LED - Fixtures: Decorative: Other	None	S	10	8,760		None	No	1	LED - Fixtures: Decorative: Other	None	10	8,760	0.0	0	0	$0	$0	$0	0.0
Sanctuary	12	LED Lamps: (1) 17W PAR30 Screw-In Lamp	Wall Switch	S	17	1,000		None	No	12	LED Lamps: (1) 17W PAR30 Screw-In Lamp	Wall Switch	17	1,000	0.0	0	0	$0	$0	$0	0.0
Sanctuary	20	LED Lamps: (1) 17W PAR30 Screw-In Lamp	Wall Switch	S	17	1,000		None	No	20	LED Lamps: (1) 17W PAR30 Screw-In Lamp	Wall Switch	17	1,000	0.0	0	0	$0	$0	$0	0.0
Storage 3	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	S	40	200		None	No	1	LED - Fixtures: Ceiling Mount	Occupancy Sensor	40	200	0.0	0	0	$0	$0	$0	0.0
Storage fishbowl	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	100		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	100	0.0	0	0	$0	$0	$0	0.0
The Fishbowl	6	LED Lamps: (2) 15W A19 Screw-In Lamps	Occupancy Sensor	S	30	1,000		None	No	6	LED Lamps: (2) 15W A19 Screw-In Lamps	Occupancy Sensor	30	1,000	0.0	0	0	$0	$0	$0	0.0
Balcony Room	2	Compact Fluorescent: (1) 27W Spiral Plug-In Lamp	Wall Switch	S	27	1,000	3, 4	Relamp	Yes	2	LED Lamps: BR30 Lamps	Occupancy Sensor	20	690	0.0	29	0	$5	$164	$26	25.5
Balcony Room	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Balcony Room	9	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	1,000	4	None	Yes	9	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	690	0.0	27	0	$5	$270	$35	45.8
Children's Place	8	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	1,000	4	None	Yes	8	LED Lamps: (1) 9W A19 Screw-In Lamp	Occupancy Sensor	9	690	0.0	24	0	$5	$270	$35	51.5
Corridor 2	2	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	2	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Corridor 2	2	Incandescent: (1) 75W BR30 Screw-In Lamp	Wall Switch	S	75	1,000	3, 6	Relamp	Yes	2	LED Lamps: BR30 Lamps	High/Low Control	20	690	0.1	132	0	$25	$273	$76	7.9
Corridor 2	18	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	S	15	1,000	6	None	Yes	18	LED Lamps: (1) 15W A19 Screw-In Lamp	High/Low Control	15	690	0.1	90	0	$17	$675	$630	2.6
Office - Enclosed 2	4	LED Lamps: (1) 17W A19 Screw-In Lamp	Wall Switch	S	17	600	4	None	Yes	4	LED Lamps: (1) 17W A19 Screw-In Lamp	Occupancy Sensor	17	414	0.0	14	0	$3	$270	$35	90.9
Prayer Room	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	1,000		None	No	1	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	1,000	0.0	0	0	$0	$0	$0	0.0
Restroom - all gender 1	1	Incandescent: (8) 25W A19 Screw-In Lamps	Occupancy Sensor	S	200	600	3	Relamp	No	1	LED Lamps: A19 Lamps	Occupancy Sensor	10	600	0.2	123	0	$23	$138	$8	5.6
Restroom - all gender 1	1	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Occupancy Sensor	S	40	600		None	No	1	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Occupancy Sensor	40	600	0.0	0	0	$0	$0	$0	0.0
Restroom - all gender 2	1	LED Lamps: (8) 5W A19 Screw-In Lamps	Occupancy Sensor	S	40	600		None	No	1	LED Lamps: (8) 5W A19 Screw-In Lamps	Occupancy Sensor	40	600	0.0	0	0	$0	$0	$0	0.0
Restroom - all gender 2	1	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Occupancy Sensor	S	40	600		None	No	1	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Occupancy Sensor	40	600	0.0	0	0	$0	$0	$0	0.0
Restroom - RET 1	1	Incandescent: (4) 60W A19 Screw-In Lamps	Wall Switch	S	240	200	3	Relamp	No	1	LED Lamps: A19 Lamps	Wall Switch	10	200	0.2	50	0	$9	$69	$4	6.9

	Existing Conditions						Proposed Conditions								Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Light Level	Watts per Fixture	Annual Operating Hours	ECM #	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
RET Office	6	LED - Fixtures: Ceiling Mount	Wall Switch	S	20	1,000	4	None	Yes	6	LED - Fixtures: Ceiling Mount	Occupancy Sensor	20	690	0.0	40	0	$8	$270	$35	30.9
Study room	1	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Wall Switch	S	40	600		None	No	1	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Wall Switch	40	600	0.0	0	0	$0	$0	$0	0.0
Attic	2	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	S	9	200		None	No	2	LED Lamps: (1) 9W A19 Screw-In Lamp	Wall Switch	9	200	0.0	0	0	$0	$0	$0	0.0
Basement Mechanical	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Basement Mechanical	2	LED Lamps: (1) 9.8W A19 Screw-In Lamp	Wall Switch	S	10	500	4	None	Yes	2	LED Lamps: (1) 9.8W A19 Screw-In Lamp	Occupancy Sensor	10	345	0.0	3	0	$1	$116	$20	154.6
Basement Mechanical	20	LED - Linear Tubes: (1) 4' Lamp	Wall Switch	S	15	500	4	None	Yes	20	LED - Linear Tubes: (1) 4' Lamp	Occupancy Sensor	15	345	0.1	49	0	$9	$450	$450	0.0
Electrical Room 2	1	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	S	15	500		None	No	1	LED Lamps: (1) 15W A19 Screw-In Lamp	Wall Switch	15	500	0.0	0	0	$0	$0	$0	0.0
Elevator room	1	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	S	62	200	3	Relamp	No	1	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	200	0.0	7	0	$1	$37	$10	19.7
Elevator	1	Linear Fluorescent - T12: 4' T12 (40W) - 2L	None	S	88	8,760	2	Relamp & Reballast	No	1	LED - Linear Tubes: (2) 4' Lamps	None	29	8,760	0.1	558	0	$106	$69	$10	0.6
Roof	2	LED - Fixtures: Wall Pack	None	S	40	5,000	5	None	Yes	2	LED - Fixtures: Wall Pack	Photocell	40	4,380	0.0	50	0	$10	$200	$0	21.0
Roof 2	1	LED - Fixtures: Wall Pack	None	S	40	5,000	5	None	Yes	1	LED - Fixtures: Wall Pack	Photocell	40	4,380	0.0	25	0	$5	$0	$0	0.0
Stairs 1	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs 1	3	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Wall Switch	S	36	3,000	6	None	Yes	3	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	High/Low Control	36	2,070	0.0	108	0	$21	$225	$105	5.8
Stairs 2	1	Exit Signs: LED - 2 W Lamp	None	S	6	8,760		None	No	1	Exit Signs: LED - 2 W Lamp	None	6	8,760	0.0	0	0	$0	$0	$0	0.0
Stairs 2	5	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	Wall Switch	S	36	3,000	6	None	Yes	5	LED - Fixtures: Ambient - 4' - Direct/Indirect Fixture	High/Low Control	36	2,070	0.0	181	0	$34	$225	$175	1.5

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?	Manufacturer	Model	Remaining Useful Life	Annual Operating Hours	ECM #	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Roof	Ductwork	2	Exhaust Fan	0.1	65.0%	No			W	2,745		No	65.0%	No		0.0	0	0	$0	$0	$0	0.0
Kitchen 1	Kitchen Stovetop	1	Kitchen Hood Exhaust Fan	0.8	83.5%	No			W	50		No	83.5%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical	Ductwork	1	Ventilation Fan	1.0	75.5%	No	Marathon Motors	7VA56T17D2100F	W	1,500		No	75.5%	No		0.0	0	0	$0	$0	$0	0.0
Elevator room	Elevator	1	Other	20.0	72.0%	No	US Motors	D04-J198-M	W	300		No	72.0%	No		0.0	0	0	$0	$0	$0	0.0
Basement Mechanical	Building heating	2	Heating Hot Water Pump	0.3	65.0%	No	US Motors	SA55NXSFA-4885	W	1,000	6	Yes	69.5%	No		0.0	28	0	$5	$897	$0	167.2
Basement Mechanical	Building heating	1	Heating Hot Water Pump	0.3	65.0%	No	Emerson	S55JXDYD-2680	W	1,000	6	Yes	73.4%	No		0.0	33	0	$6	$455	$0	72.1
Roof - MUA#4	Kitchen	1	Supply Fan	0.8	70.0%	No				1,000	7	No	81.1%	Yes	1	0.3	374	0	$72	$3,308	$50	45.3
Sanctuary Roof - #5	Sanctuary	1	Supply Fan	7.5	70.0%	No				700	7	No	88.5%	Yes	1	3.0	2,888	0	$556	$5,940	$1,000	8.9
Sanctuary Roof	Sanctuary	2	Supply Fan	1.0	70.0%	No				700	7	No	82.5%	Yes	2	0.7	712	0	$137	$7,634	$150	54.6
Attic	Rabbi Office	2	Supply Fan	0.8	70.0%	No				280	6	Yes	81.1%	No		0.1	46	0	$9	$1,696	$0	191.9
Basement Mechanical	Offices and Classrooms	2	Supply Fan	0.8	70.0%	No				280	6	Yes	81.1%	No		0.1	46	0	$9	$1,696	$0	191.9
Basement Mechanical	Rear Santuary Hall	2	Supply Fan	0.8	70.0%	No				280	6	Yes	81.1%	No		0.1	46	0	$9	$1,696	$0	191.9

Packaged 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 (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Manufacturer	Model	Remaining Useful Life	ECM #	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (MBh)	Cooling Mode Efficiency (SEER/IEER/ EER)	Heating Mode Efficiency	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Sanctuary Roof	Sanctuary	1	Forced Air Furnace	25.00	320.00	12.40	0.81 AFUE	Trane	YHD300G3RHA05H	W		No							0.0	0	0	$0	$0	$0	0.0
Roof	Offices and Classrooms	1	Split-System	2.50		10.00		Trane	TTA030C300A1	B	8	Yes	1	Split-System	2.50		16.00		0.6	314	0	$60	$4,634	$263	72.4
Roof	Offices and Classrooms	1	Split-System	2.50		10.00		Trane	TTA030C300A1	B	8	Yes	1	Split-System	2.50		16.00		0.6	314	0	$60	$4,634	$263	72.4
Roof	Rear Santuary Hall	1	Split-System	3.50		10.00		Trane	TTA042C300B0	B	8	Yes	1	Split-System	3.50		16.00		0.8	439	0	$85	$6,399	$368	71.4
Roof	Rear Santuary Hall	1	Split-System	3.50		10.00		Trane	TTA042C300B0	B	8	Yes	1	Split-System	3.50		16.00		0.8	439	0	$85	$6,399	$368	71.4
Roof	Rabbi Office	1	Split-System	3.50		10.00		Trane	TTA042C300B0	B	8	Yes	1	Split-System	3.50		16.00		0.8	439	0	$85	$6,399	$368	71.4
Roof	Rabbi Office	1	Split-System	3.50		10.00		Trane	TTA042C300B0	B	8	Yes	1	Split-System	3.50		16.00		0.8	439	0	$85	$6,399	$368	71.4
Roof	Kitchen	1	Package Unit		118.50		0.79 Et	Sterling	E1G-PV15C6C01K41B2A	B		No							0.0	0	0	$0	$0	$0	0.0
Stairs 1	Stairs 1	1	Electric Resistance Heat		1.71		1 Et			W		No							0.0	0	0	$0	$0	$0	0.0
Attic	Rabbi Office	2	Forced Air Furnace		113.00		0.913 AFUE	Trane	TUC120C960B6	B	10	Yes	2	Forced Air Furnace		113.00		0.97 AFUE	0.0	0	4	$59	$7,227	$1,000	105.6
Basement Mechanical	Offices and Classrooms	2	Forced Air Furnace		93.00		0.921 AFUE	Trane	TUC100C960B6	B	10	Yes	2	Forced Air Furnace		93.00		0.97 AFUE	0.0	0	3	$41	$6,492	$1,000	132.7
Basement Mechanical	Rear Santuary Hall	2	Forced Air Furnace		113.00		0.913 AFUE	Trane	TUC120C960B6	B	10	Yes	2	Forced Air Furnace		113.00		0.97 AFUE	0.0	0	4	$59	$7,227	$1,000	105.6

Space Heating Boiler 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)	Manufacturer	Model	Remaining Useful Life	ECM #	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Basement Mechanical	Heating in all areas excluding Sanctuary and Ktichen	3	Non-Condensing Hot Water Boiler	185	Dunkirk	XEB-7	B	9	Yes	3	Non-Condensing Hot Water Boiler	185	85.00%	AFUE	0.0	0	7	$104	$29,539	$1,200	273.7

Pipe Insulation Recommendations

		Recommendation Inputs			Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Affected	ECM #	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Basement Mechanical	Heating Hot Water Systems	11	14	1.25	0.0	0	8	$116	$186	$28	1.4

DHW Inventory & Recommendations

		Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Manufacturer	Model	Remaining Useful Life	ECM #	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Basement Mechanical	bathrooms and kitchen hot water	1	Storage Tank Water Heater (≤ 50 Gal)	Bradford White	M250T6DS-1NCWW	W		No						0.0	0	0	$0	$0	$0	0.0

Low-Flow Device Recommendations

	Recommedation Inputs					Energy Impact & Financial Analysis						
Location	ECM #	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	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen 1	12	1	Faucet Aerator (Kitchen)	2.00	1.50	0.0	41	0	$8	$7	$2	0.7
Restroom - Female 1	12	2	Faucet Aerator (Lavatory)	1.50	0.50	0.0	164	0	$31	$14	$7	0.2
Restroom - Fishbowl	12	1	Faucet Aerator (Lavatory)	2.00	0.50	0.0	123	0	$24	$7	$4	0.2
Restroom - Male 1	12	2	Faucet Aerator (Lavatory)	1.50	0.50	0.0	164	0	$31	$14	$7	0.2
Restroom - all gender 1	12	2	Faucet Aerator (Lavatory)	2.00	0.50	0.0	245	0	$47	$14	$7	0.2
Restroom - all gender 2	12	2	Faucet Aerator (Lavatory)	2.00	0.50	0.0	245	0	$47	$14	$7	0.2
Restroom - RET 1	12	1	Faucet Aerator (Lavatory)	2.00	0.50	0.0	123	0	$24	$7	$4	0.2

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	Manufacturer	Model	ENERGY STAR Qualified?	ECM #	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen 1	1	Stand-Up Refrigerator, Solid Door (31 - 50 cu. ft.)	Beverage-Air	ER48-1AS	No	13	Yes	0.1	838	0	$161	$2,016	$125	11.7
Kitchen 1	1	Stand-Up Freezer, Solid Door (16 - 30 cu. ft.)	Kool-it	KBSF-1	Yes		No	0.0	0	0	$0	$0	$0	0.0

Cooking Equipment Inventory & Recommendations

	Existing Conditions					Proposed Conditions		Energy Impact & Financial Analysis						
Location	Quantity	Equipment Type	Manufacturer	Model	High Efficiency Equipement?	ECM #	Install High Efficiency Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen 1	1	Commercial Gas Range	Sierra		No		No	0.0	0	0	$0	$0	$0	0.0
Kitchen 1	1	Commercial Stacked Rack Oven	Vulcan		No		No	0.0	0	0	$0	$0	$0	0.0

Plug Load Inventory

	Existing Conditions					
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?	Manufacturer	Model
Kitchen 1	1	Coffee Machine	4,500	No		
Main Office	1	Coffee Machine	900	No		
Main Office	1	Desktop	250	No		
Main Office - back	1	Desktop	250	No		
Office - Enclosed 2	1	Desktop	250	No		
Prayer Room	1	Desktop	250	No		
RET Office	1	Desktop	250	No		
Electrical Room 2	1	Desktop	250	No		
Children's Place	2	Electric Space Heater	1,500	No		
Kitchen 1	1	Microwave	1,500	No		
RET Office	1	Other	200	No		
Electrical Room 2	1	Server equipment	1,500	No		
Main Office	1	Paper Shredder	900	No		
Main Office	1	Printer/Copier (Large)	900	No		
RET Office	1	Printer/Copier (Large)	900	No		
Children's Place	1	Refrigerator (Mini)	400	No		
Prayer Room	1	Smart Board	200	No		
Lobby 1	1	Television	120	No		
The Fishbowl	1	Television	200	No		
Kitchen 1	1	Toaster	1,000	No		
Corridor 1	1	Water Cooler	590	No		
Bathroom foyer	1	Water Fountain	800	No		

Custom (High Level) Measure Analysis

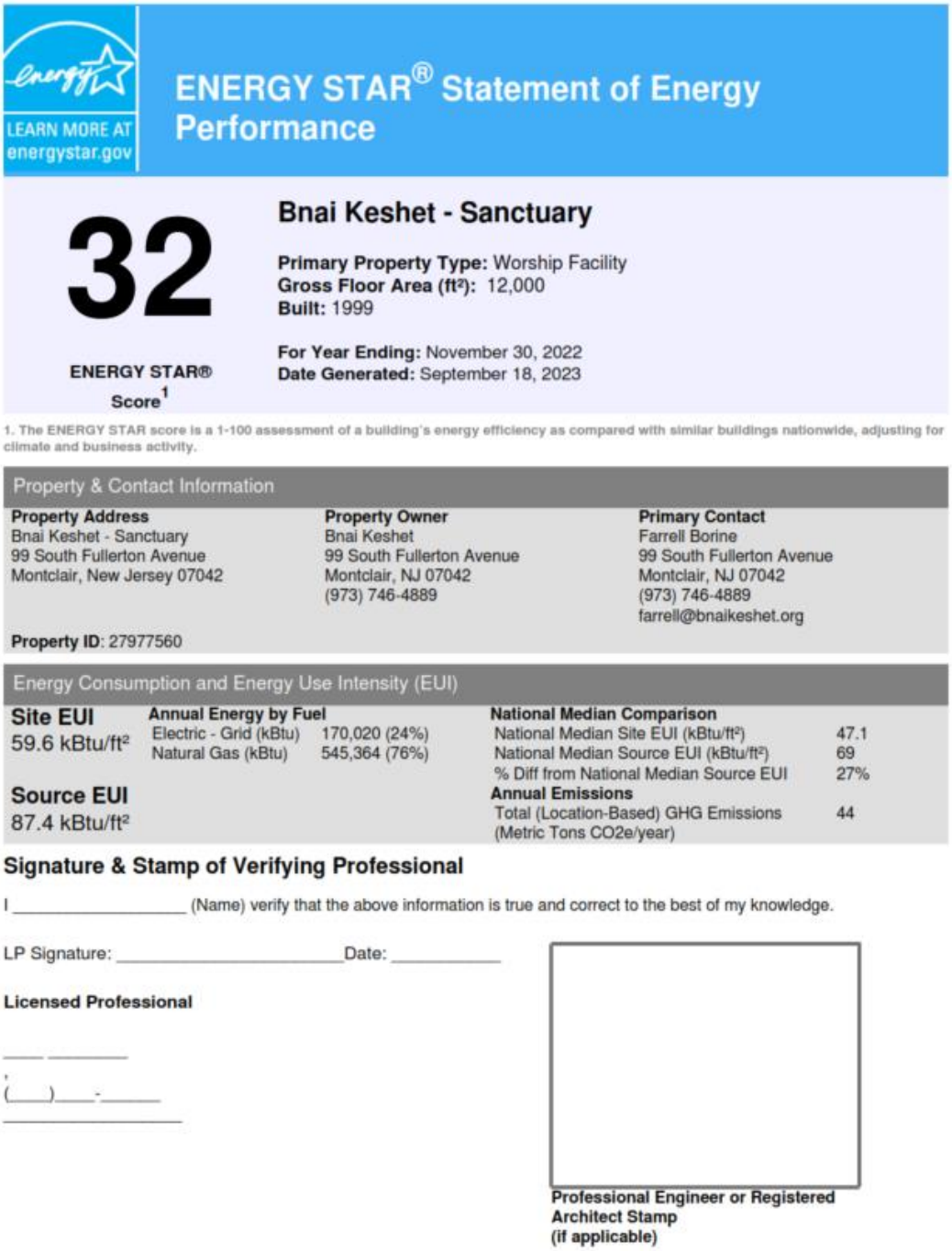
Electric Tank Water Heater to HPWH

NOTE: HPWH calculation should not be used for existing water heaters with a storage capacity greater than 120 gal.

Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis										
Description	Area(s)/System(s) Served	SF of Area Served	Fuel Type	Input Capacity per Unit (kW)	Tank Capacity per Unit (Gal)	Description	COP	Tank Capacity per Unit (Gal)	Estimated Unit Cost	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Estimated M&L Cost ($)	Base Incentives	Enhanced Incentives	Total Incentives	Total Net Cost	Payback w/o Incentives in Years	Payback w/ Incentives in Years
Storage Tank Water Heater (≤50 Gal)	bathrooms and kitchen hot water	3,000	Electric	35.0	50	Heat Pump Water Heater	2.5	50	$2,383.17	0.00	475	0	$91	$2,383	$0	$0	$0	$2,383	26.19	26.19
			Electric																	
			Electric																	

APPENDIX B: ENERGY STAR STATEMENT OF ENERGY PERFORMANCE

Energy use intensity (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.



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ENERGY STAR® Statement of Energy Performance

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ENERGY STAR® Score[1]

Bnai Keshet - Sanctuary

Primary Property Type: Worship Facility
Gross Floor Area (ft²): 12,000
Built: 1999

For Year Ending: November 30, 2022
Date Generated: September 18, 2023

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
Bnai Keshet - Sanctuary 99 South Fullerton Avenue Montclair, New Jersey 07042	Bnai Keshet 99 South Fullerton Avenue Montclair, NJ 07042 (973) 746-4889	Farrell Borine 99 South Fullerton Avenue Montclair, NJ 07042 (973) 746-4889 farrell@bnaikeshet.org

Property ID: 27977560

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
59.6 kBtu/ft²

Source EUI
87.4 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	170,020 (24%)
Natural Gas (kBtu)	545,364 (76%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	47.1
National Median Source EUI (kBtu/ft²)	69
% Diff from National Median Source EUI	27%
Annual Emissions	
Total (Location-Based) GHG Emissions (Metric Tons CO2e/year)	44

Signature & Stamp of Verifying Professional

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

LP Signature: _____ Date: _____

Licensed Professional

____ _____
,
(___)___-_____
_____

Professional Engineer or Registered Architect Stamp (if applicable)

APPENDIX C: GLOSSARY

TERM	DEFINITION
Blended Rate	Used to calculate fiscal savings associated with measures. The blended rate is calculated by dividing the amount of your bill by the total energy use. For example, if your bill is $22,217.22, and you used 266,400 kilowatt-hours, your blended rate is 8.3 cents per kilowatt-hour.
Btu	*British thermal unit*: a unit of energy equal to the amount of heat required to increase the temperature of one pound of water by one-degree Fahrenheit.
CHP	*Combined heat and power*. Also referred to as cogeneration.
COP	*Coefficient of performance*: a measure of efficiency in terms of useful energy delivered divided by total energy input.
Demand Response	Demand response reduces or shifts electricity usage at or among participating buildings/sites during peak energy use periods in response to time-based rates or other forms of financial incentives.
DCV	*Demand control ventilation*: a control strategy to limit the amount of outside air introduced to the conditioned space based on actual occupancy need.
US DOE	*United States Department of Energy*
EC Motor	*Electronically commutated motor*
ECM	*Energy conservation measure*
EER	*Energy efficiency ratio*: a measure of efficiency in terms of cooling energy provided divided by electric input.
EUI	*Energy Use Intensity:* measures energy consumption per square foot and is a standard metric for comparing buildings' energy performance.
Energy Efficiency	Reducing the amount of energy necessary to provide comfort and service to a building/area. Achieved through the installation of new equipment and/or optimizing the operation of energy use systems. Unlike conservation, which involves some reduction of service, energy efficiency provides energy reductions without sacrifice of service.
ENERGY STAR	ENERGY STAR is the government-backed symbol for energy efficiency. The ENERGY STAR program is managed by the EPA.
EPA	*United States Environmental Protection Agency*
Generation	The process of generating electric power from sources of primary energy (e.g., natural gas, the sun, oil).
GHG	*Greenhouse gas* gases that are transparent to solar (short-wave) radiation but opaque to long-wave (infrared) radiation, thus preventing long-wave radiant energy from leaving Earth's atmosphere. The net effect is a trapping of absorbed radiation and a tendency to warm the planet's surface.
gpf	*Gallons per flush*

gpm	*Gallon per minute*
HID	*High intensity discharge:* high-output lighting lamps such as high-pressure sodium, metal halide, and mercury vapor.
hp	*Horsepower*
HPS	*High-pressure sodium*: a type of HID lamp.
HSPF	*Heating seasonal performance factor:* a measure of efficiency typically applied to heat pumps. Heating energy provided divided by seasonal energy input.
HVAC	*Heating, ventilating, and air conditioning*
IHP 2014	US DOE Integral Horsepower rule. The current ruling regarding required electric motor efficiency.
IPLV	*Integrated part load value:* a measure of the part load efficiency usually applied to chillers.
kBtu	One thousand British thermal units
kW	*Kilowatt*: equal to 1,000 Watts.
kWh	*Kilowatt-hour*: 1,000 Watts of power expended over one hour.
LED	*Light emitting diode*: a high-efficiency source of light with a long lamp life.
LGEA	*Local Government Energy Audit*
Load	The total power a building or system is using at any given time.
Measure	A single activity, or installation of a single type of equipment, that is implemented in a building system to reduce total energy consumption.
MH	*Metal halide*: a type of HID lamp.
MBh	*Thousand Btu per hour*
MBtu	*One thousand British thermal units*
MMBtu	*One million British thermal units*
MV	*Mercury Vapor:* a type of HID lamp.
NJBPU	*New Jersey Board of Public Utilities*
NJCEP	*New Jersey's Clean Energy Program:* NJCEP is a statewide program that offers financial incentives, programs and services for New Jersey residents, business owners and local governments to help them save energy, money, and the environment.
psig	Pounds per square inch gauge
Plug Load	Refers to the amount of power used in a space by products that are powered by means of an ordinary AC plug.
PV	*Photovoltaic:* refers to an electronic device capable of converting incident light directly into electricity (direct current).

SEER	*Seasonal energy efficiency ratio:* a measure of efficiency in terms of annual cooling energy provided divided by total electric input.
SEP	*Statement of energy performance:* a summary document from the ENERGY STAR Portfolio Manager.
Simple Payback	The amount of time needed to recoup the funds expended in an investment or to reach the break-even point between investment and savings.
SREC (II)	*Solar renewable energy credit*: a credit you can earn from the state for energy produced from a photovoltaic array.
T5, T8, T12	A reference to a linear lamp diameter. The number represents increments of $1/8^{th}$ of an inch.
Temperature Setpoint	The temperature at which a temperature regulating device (thermostat, for example) has been set.
therm	100,000 Btu. Typically used as a measure of natural gas consumption.
tons	A unit of cooling capacity equal to 12,000 Btu/hr.
Turnkey	Provision of a complete product or service that is ready for immediate use.
VAV	*Variable air volume*
VFD	*Variable frequency drive*: a controller used to vary the speed of an electric motor.
WaterSense®	The symbol for water efficiency. The WaterSense® program is managed by the EPA.
Watt (W)	Unit of power commonly used to measure electricity use.