Local Government Energy Audit:

Energy Audit Report

Townhouses

Buildings 5, 12, 17

(6-Unit Apartments)

Rowan University

Townhouse Drive
Glassboro, NJ 08028

May 14, 2019

Draft Report by:

TRC Energy Services

Disclaimer

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

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

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

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

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1 Executive Summary

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

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

This study was conducted by TRC Energy Services (TRC), as part of a comprehensive effort to help colleges and universities control their energy costs and help protect our environment by reducing energy consumption statewide.

1.1 Facility Summary

There are 17 townhouses within the Townhouse Apartment Complex at Rowan University. There is a separate Townhouse Community Building and a Townhouse Parking Building. The buildings of the Townhouse Complex were all constructed in 2004. Together the 17 Townhouses provide on-campus housing for up to 684 students.

The townhouse buildings all have one of four basic layouts. The basic layouts depend on the number of townhouse units in each. There are six 8-unit townhouses, four 7-unit townhouses, three 6-unit townhouses, and four 5-unit townhouses. Each of the townhouse units are identical in its layout to all others in the complex. All townhouse units have three floors and are 1,500 sq. ft. in size. All townhouse units have six bedrooms, three bathrooms, a living room, and a kitchen. Each unit has its own front and rear entrances.

This report is for Townhouses 5, 12, and 17. These are all 6-unit townhouses. Each of the buildings is 3-stories high with five 6-bedroom apartments in each. Each building is 7,500 square feet. Together these three buildings house up to 108 students.

The Townhouses are all electric. Power is provided via the campus main account. Power is distributed from the Central Plant, which is provided by Atlantic City Electric or generated on site by the Central Plant's combined heat and power (CHP) system. No oil or natural gas is consumed at the Townhouses, though a portion of the natural gas consumed at the Central Plant is converted to electricity, which supplies the Townhouses.

Heating and cooling to each apartment is provided by a single dedicated *American Standard* split system air-cooled heat pump with 31 MBH of heating and 1.5 tons of cooling capacity. Domestic hot water is provided to each apartment by a single 50-gal electric hot water heater (manufactured by *A.O. Smith* or *Bradford White*).

Each apartment has the same layout, so each hard-wired lighting fixture has the same wattage and is in the same location. Each apartment has 21 interior lighting fixtures and two exterior lighting fixtures (not counting any plug-in floor or table lamps provided by residents). The fixtures are mostly compact fluorescents (CFLs), plus a few 4-foot and 2-foot T8 linear fluorescent fixtures. All interior fixtures are controlled by wall switches. Exterior fixtures are controlled by photocells.

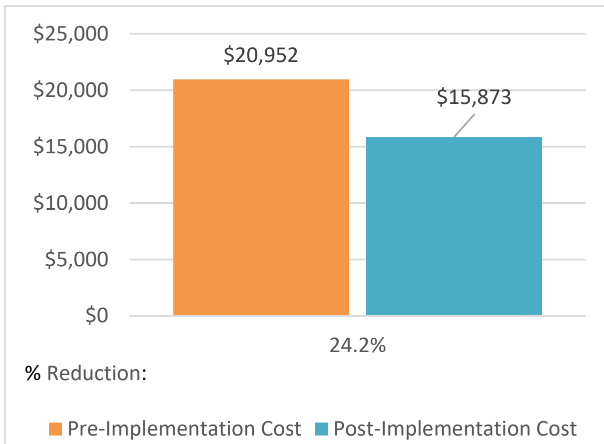
A thorough description of the facility and our observations are in Section 2, "Facility Information and Existing Conditions." See Appendix A for a complete inventory of lighting, HVAC, and other energy-using equipment. A detailed description of Rowan University's existing energy usage can be found in Section 3, "Site Energy Use and Costs".

1.2 Your Cost Reduction Opportunities

Energy Conservation Measures

TRC evaluated three measures which together represent an opportunity for Rowan University to reduce annual energy costs by roughly $5,079 and annual greenhouse gas emissions by 48,867 lbs CO_2e. We estimate that if all measures were implemented as recommended, the project would pay for itself in roughly 14.6 years. A comparison between current and potential future electric costs, after project implementation, are shown in Figure 1. Together these measures represent an opportunity to reduce Rowan University's annual energy use by 24%.

Figure 1 – Current Energy Costs and Potential Savings



Estimates of the total cost, energy savings, and financial incentives for the proposed energy efficient upgrades are summarized below in Figure 2.

Figure 2 – Summary of Energy Reduction Opportunities

Energy Conservation Measure		Recommend?	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades			14,018	7.1	0.0	$1,467.15	$17,252.10	$810.00	$16,442.10	11.2	14,116
ECM 1	Retrofit Fixtures with LED Lamps	Yes	14,018	7.1	0.0	$1,467.15	$17,252.10	$810.00	$16,442.10	11.2	14,116
Electric Unitary HVAC Measures			29,741	1.0	0.0	$3,112.70	$60,872.04	$3,312.00	$57,560.04	18.5	29,949
	Install High Efficiency Heat Pumps	No	29,741	1.0	0.0	$3,112.70	$60,872.04	$3,312.00	$57,560.04	18.5	29,949
Domestic Water Heating Upgrade			4,768	0.0	0.0	$499.01	$387.18	$0.00	$387.18	0.8	4,801
ECM 2	Install Low-Flow Domestic Hot Water Devices	Yes	4,768	0.0	0.0	$499.01	$387.18	$0.00	$387.18	0.8	4,801
TOTALS			48,527	8.1	0.0	$5,078.87	$78,511.32	$4,122.00	$74,389.32	14.6	48,867

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

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

The payback period for the proposed "High Efficiency Heat Pump" measure (shown in Figure 2) exceeds the ASHRAE rated useful life of the equipment (~15 yrs). Therefore, we do **not** recommend that measure for implementation at this time. We estimate that the remaining two measures would reduce building energy usage for the four townhouses by about **9%**. The two measures pay for themselves in energy savings alone in about **8.6 years** and reduce annual greenhouse gas emissions by about 18,918 lbs CO_2e (See Section 4, Figure 11).

A brief description of each category can be found below and a description of savings opportunities can be found in Section 4, "Energy Conservation Measures."

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

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

Domestic Hot Water System Upgrade measures generally involve replacing older inefficient domestic water heating systems with modern energy efficient systems, or installing measures to reduce hot water demand. These measures save energy by reducing the fuel used for domestic hot water heating due to improved heating efficiency, or reducing standby losses and the need for additional water heating.

Energy Efficient Practices

TRC also identified 10 low or no cost energy efficient practices. A facility's energy performance can be significantly improved by employing certain behavioral or operational adjustments and by performing better routine maintenance on building systems. These practices can extend equipment life, improve occupant comfort, provide better health and safety, as well as reduce annual energy and operations and maintenance costs. Potential opportunities identified at Rowan University include:

- Reduce Air Leakage
- Close Doors and Windows
- Ensure Lighting Controls Are Operating Properly
- Practice Proper Use of Thermostat Schedules and Temperature Resets
- Clean and/or Replace HVAC Filters
- Check for and Seal Duct Leakage
- Perform Proper Furnace Maintenance
- Perform Proper Water Heater Maintenance
- Install Plug Load Controls
- Water Conservation

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

On-Site Generation Measures

TRC evaluated the potential for installing on-site generation for Rowan University. Based on the configuration of the site, available rooftop space, and its typical electric loads, the Townhouse appear to have a low potential for cost effective installation of a solar photovoltaic (PV) system.

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

1.3 Implementation Planning

To realize the energy savings from the ECMs listed in this report, a project implementation plan must be developed, available capital must be considered, and decisions need to be made whether it is best to pursue individual ECMs separately or a comprehensive approach where all ECMs are implemented together.

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

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

- SmartStart (SS)
- Energy Savings Improvement Program (ESIP)
- Demand Response Energy Aggregator

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

For larger facilities with limited capital availability to implement ECMs, project financing may be available through the Energy Savings Improvement Program (ESIP). Supported directly by the NJBPU, ESIP provides government agencies with project development, design, and implementation support services as well as, attractive financing for implementing ECMs. An LGEA report (or other approved energy audit) is required for participation in ESIP. Please refer to Section 8.2 for additional information on the ESIP Program.

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

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

2 Facility Information and Existing Conditions

2.1 Project Contacts

Figure 3 – Project Contacts

Name	Role	E-Mail	Phone #
Customer			
Kevin Muldoon	Director of Facilities	Muldoon@Rowan.edu	856-256-5170
John Zaruba	Controls System Administrator	Zaruba@Rowan.edu	856-256-4820
Donald Moore	Vice President of Facilities	MooreDo@Rowan.edu	-
TRC Energy Services			
Tom Page	Auditor	tpage@TRCsolutions.com	(732) 855-0033

2.2 General Site Information

On December 28, 2016, TRC performed an energy audit at Rowan University located in Glassboro, NJ. TRC met with Kevin Muldoon to review the facility operations and help focus our investigation on specific energy-using systems.

There are 17 townhouses within the Townhouse Complex at Rowan University. The buildings provide on-campus housing for Rowan University students. There is also a separate Townhouse Community Building and a Townhouse Parking Building. The buildings of the Townhouse Complex were all constructed in 2004. Together the 17 Townhouses provide on-campus housing for up to 684 students.

The townhouse buildings all have one of four basic layouts. The basic layouts depend on the number of townhouse units in each. There are six (6) 8-unit townhouses, four (4) 7-unit townhouses, three (3) 6-unit townhouses, and four (4) 5-unit townhouses. Each of the townhouse units are identical in its layout to all others in the complex. All townhouse units have 3 floors and are 1500 sq. ft. in size. All townhouse units have six bedrooms, three bathrooms, a living room, and a kitchen. Each townhouse unit has its own front and rear entrances.

There are a few apartments in some buildings that have been designed to be ADA-compliant (handicapped accessible), however this does not affect the layout in any significant way. The ADA-compliant units are the same size, have the same number of rooms, and same number of fixtures. There is simply more space provided in ADA-compliant kitchen, bathroom, and bedroom areas.

This report is for Townhouses #5, 12, and 17. These are all 6-unit townhouses. Each of the buildings is 3-stories high with five (5) 6-bedroom apartments in each. Each building is 7,500 square feet. Together these three buildings house up to 108 students.

2.3 Building Occupancy

The Townhouse buildings are typically occupied 24 hours per day by the students who reside there. The Townhouses are occupied year round. Occupancy rates are less during the summer term and during semester breaks.

Figure 4 - Building Schedule

Building Name	Weekday/Weekend	Operating Schedule
Townhouse Building #5	Weekday	24 hrs
Townhouse Building #5	Weekend	24 hrs
Townhouse Building #12	Weekday	24 hrs
Townhouse Building #12	Weekend	24 hrs
Townhouse Building #17	Weekday	24 hrs
Townhouse Building #17	Weekend	24 hrs

2.4 Building Envelope

The Townhouse Complex is 13 years old. It was built to modern building standards and energy codes. The buildings are constructed of concrete masonry block with brick façade and vinyl siding on the second and third floors. The roofs are sloped with asphalt shingles. All townhouses appeared to be well-insulated. Each unit has a wooden front door entrance and wood-framed glass double doors in the back. All windows are double-paned insulated models. The seals on all door and window frames appeared to be tight and well-maintained.

Image 1: Townhouse Windows and Doors

Image 2 (cont.): Townhouse Windows and Doors

2.5 On-Site Generation

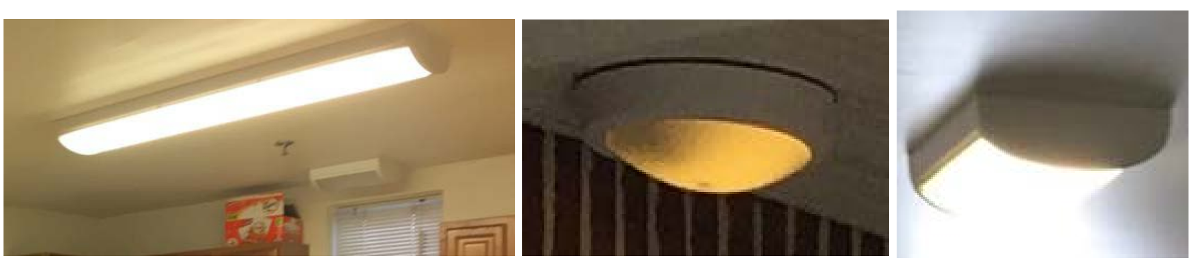
There is no onsite power generation at the Townhouses. However, all campus building on the main electric account, including the Townhouse Complex, receive a portion of their electric demand from power generated by the CHP system at the University's Central Plant.

2.6 Energy-Using Systems

Lighting System

Each apartment has the same layout. Each hard-wired lighting fixture has the same wattage in the same location. Each apartment has 21 interior ceiling lighting fixtures and two exterior lighting fixtures (not counting any plug-in floor or table lamps owned by residents). The fixtures mostly use 13-watt compact fluorescent (CFL) bulbs, plus a few 4-foot (32-watt) and 2-foot (17-watt) T8 linear fluorescent fixtures. In each building there is also one separate mechanical room, which contains two additional fixtures.

Image 3: Townhouse Lighting Fixtures



All interior and exterior fixtures are controlled by wall switches only.

There are some post-top walkways lights near the townhouses that use metal halide bulbs and some metal halide fixtures near the dumpsters used by Townhouse residents. Upgrades to all non-building campus exterior lighting (i.e. those not directly attached to the townhouse buildings) will be included in a separate audit report.

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

Heating Ventilation and Air Conditioning (HVAC)

Heating and cooling to each townhouse unit is provided by a single *TRANE/American Standard* split system air-cooled heat pump with a heating capacity of 31,000 Btu/hr and a cooling capacity 1.5 tons. The system consists of a *Heritage 14* model condenser outside, near the back door of each unit, and a single air handling unit (AHU model #4TEE3F31A) with ½-HP fan motor and electric resistance supplementary heating (9.6kW), located in the first floor utility closet of each apartment. Each townhouse unit has its own individual dedicated split system. All HVAC units are identical and were installed in 2014.

To control temperatures and schedules for heating and cooling systems, each townhouse unit has a single pre-set programmable thermostat. The University was closed for winter break when we inspected the Townhouse Complex. Most of the townhouse units were vacant and their thermostats were found to be correctly setback to a minimum temperature unoccupied mode.

The split system has a seasonal energy efficiency rating (SEER) of 14 and a coefficient of performance (COP) of 2.3. However, they are all 13 years old now and should be replaced in a few years.

High efficiency split systems are now available with a SEER as high as 20.0 and heat system COP as high as 3.8 for some small split systems. We investigated options for replacing the existing equipment with higher efficiency units. However, these units are already relatively high efficiency units. Since Rowan University pays a fairly low commercial electric rate, we found that early replacement of these units would likely not be cost effective

Image 4: Split System Condenser Units behind Each Townhouse

Image 5: Programmable Thermostats in Each Townhouse

Image 6: AHU with electric resistance heating in utility closet

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

Domestic Hot Water Heating System

Domestic hot water is provided by a single 50-gal electric hot water heater on the first floor of each apartment. Some are manufactured by *A.O. Smith* and some are *Bradford White* units, but they are virtually identical and all are high efficiency ENERGY STAR® rated models.

Image 7: Domestic Hot Water Heaters

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

Refrigeration

All apartments contain one GE refrigerator. They are all estimated to be about 22 cu ft in size and are ENERGY START® labeled models.

Image 8: Refrigerators

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

Building Plug Load

Besides the refrigerators, the only other University-supplied plug load equipment is a GE electric range and a Sunbeam microwave oven. For the purpose of this analysis we have estimated the plug load for each building based on typical student-owed devices that were present, such as computers, TVs, and desk lamps.

Recommendations regarding upgrades to any student-owned equipment is beyond the scope of this report. However, significant energy savings may be possible through encouraging students to use energy efficient equipment. See Section 5 for more information on this and other energy-saving operations and maintenance measures.

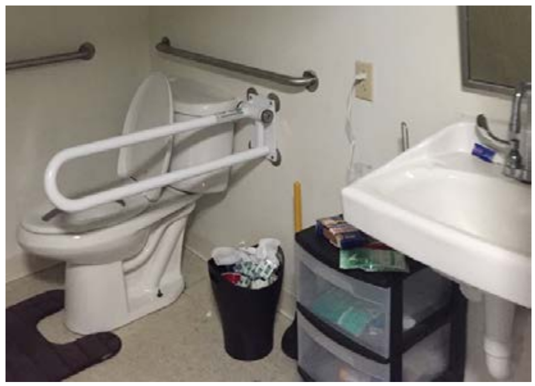
Image 9: Kitchen Plug Load Equipment

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

2.7 Water-Using Systems

The toilets and showers had water-coserving low-flow fixtures. However bathroom sinks were found to have flow rates greater than 2.2 gallons per minute. We recommend upgrading sinks in all bathrooms with low-flow faucet aerators (i.e. 1.0 gpm or less) to reduce water usage and save energy.

Image 10: Bathroom Fixtures



3 SITE ENERGY USE AND COSTS

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

3.1 Total Cost of Energy

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

Figure 5 - Utility Summary

Utility Summary for Rowan University		
Fuel	Usage	Cost
Electricity	200,191 kWh	$20,952
Total		$20,952

The current annual energy cost for this facility is $25,420 as shown in the chart below. The Townhouses are all electric. Power is provided to them via the campus' main electric account. Power is distributed from the Central Plant. Power at the Central Plant is provided by Atlantic City Electric or generated on site. No oil or natural gas is consumed at the Townhouses, though a portion of the natural consumed at the central plant is converted to electricity which supplies the Townhouses.

3.2 Electricity Usage

Electricity is provided by Atlantic City Electric (ACE). The average electric cost for power supplied by ACE over the past 12 months was $0.107/kWh, which is the blended rate that includes energy supply, distribution, and other charges. This rate is used throughout the analyses in this report to assess energy costs and savings. The monthly electricity consumption and peak demand are shown in the chart below.

Figure 6 - Graph of 12 Months Electric Usage & Demand

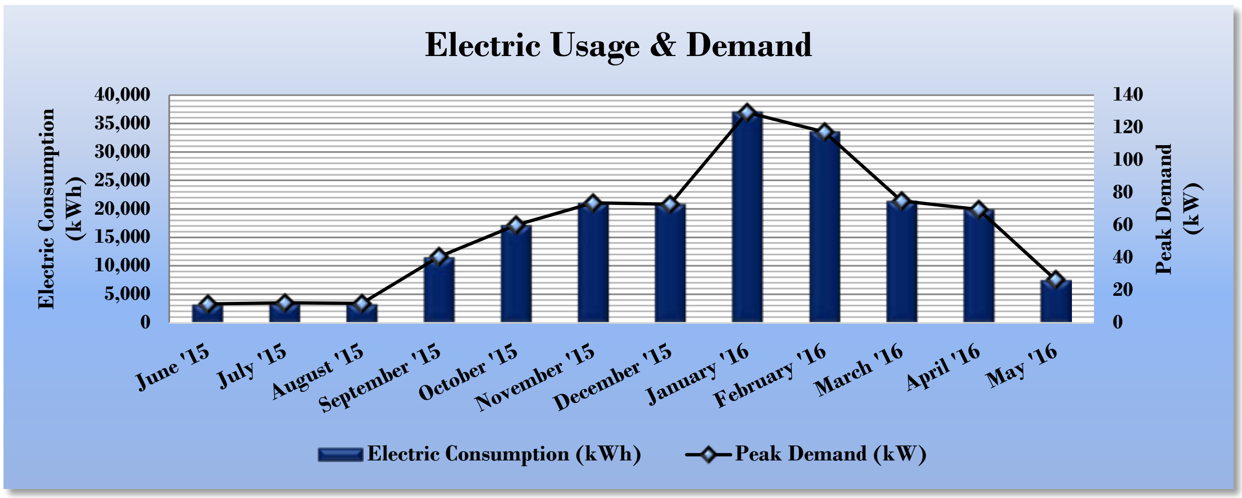


Figure 7 - Table of 12 Months Electric Usage & Demand

Electric Billing Data for Rowan University					
Period Ending	Days in Period	Electric Usage (kWh)	Demand (kW)	Total Electric Cost	TRC Estimated Usage?
6/30/15	30	3,309	12	$354	Yes
7/31/15	31	3,495	12	$503	Yes
8/31/15	31	3,428	12	$514	Yes
9/30/15	30	11,629	41	$1,368	Yes
10/31/15	31	17,214	60	$1,617	Yes
11/30/15	30	21,120	74	$1,989	Yes
12/31/15	31	20,901	73	$1,863	Yes
1/31/16	31	37,032	129	$3,893	Yes
2/29/16	29	33,585	117	$4,397	Yes
3/31/16	31	21,453	75	$1,890	Yes
4/30/16	30	19,977	70	$1,949	Yes
5/31/16	31	7,596	27	$672	Yes
Totals	366	200,740	129	$21,009	12
Annual	365	200,191	129	$20,952	

Electric rates shown above are for the campus's main electric account. Total usage for the Townhouses was estimated by TRC based on submeter provided to us by the University. Not all Townhouses have submeters, but there was submeter data available for at least one or two townhouses of each size and layout. Those townhouses without submetered electric data were estimated based on the usage of other similar buildings.

TRC recommends that Rowan University add smart electric meters to all Townhouses (and other campus buildings without individual metering) to better monitor and track electric usage throughout the campus.

3.3 Benchmarking

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

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

Figure 8 - Energy Use Intensity Comparison – Existing Conditions

Energy Use Intensity Comparison - Existing Conditions		
	Rowan University	National Median Building Type: Multifamily
Source Energy Use Intensity (kBtu/ft^2)	79.4	127.9
Site Energy Use Intensity (kBtu/ft^2)	25.3	78.8

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

Figure 9 - Energy Use Intensity Comparison – Following Installation of Recommended Measures

Energy Use Intensity Comparison - Following Installation of Recommended Measures		
	Rowan University	National Median Building Type: Multifamily
Source Energy Use Intensity (kBtu/ft^2)	72.0	127.9
Site Energy Use Intensity (kBtu/ft^2)	22.9	78.8

Many types of commercial buildings are also eligible to receive an ENERGY STAR® score. This score is a percentile ranking from 1 to 100. It compares your building's energy performance to similar buildings nationwide. A score of 50 represents median energy performance, while a score of 75 means your building performs better than 75 percent of all similar buildings nationwide and may be eligible for ENERGY STAR® certification.

The Townhouse Buildings appear to be significantly more efficient compared to the National Median EUI score for Multi-family Residence buildings. However, they belong to a building category which is not currently eligible to receive an ENERGY STAR® score.

A Portfolio Manager® Statement of Energy Performance (SEP) was generated for this facility, see **Appendix B: EPA Statement of Energy Performance**.

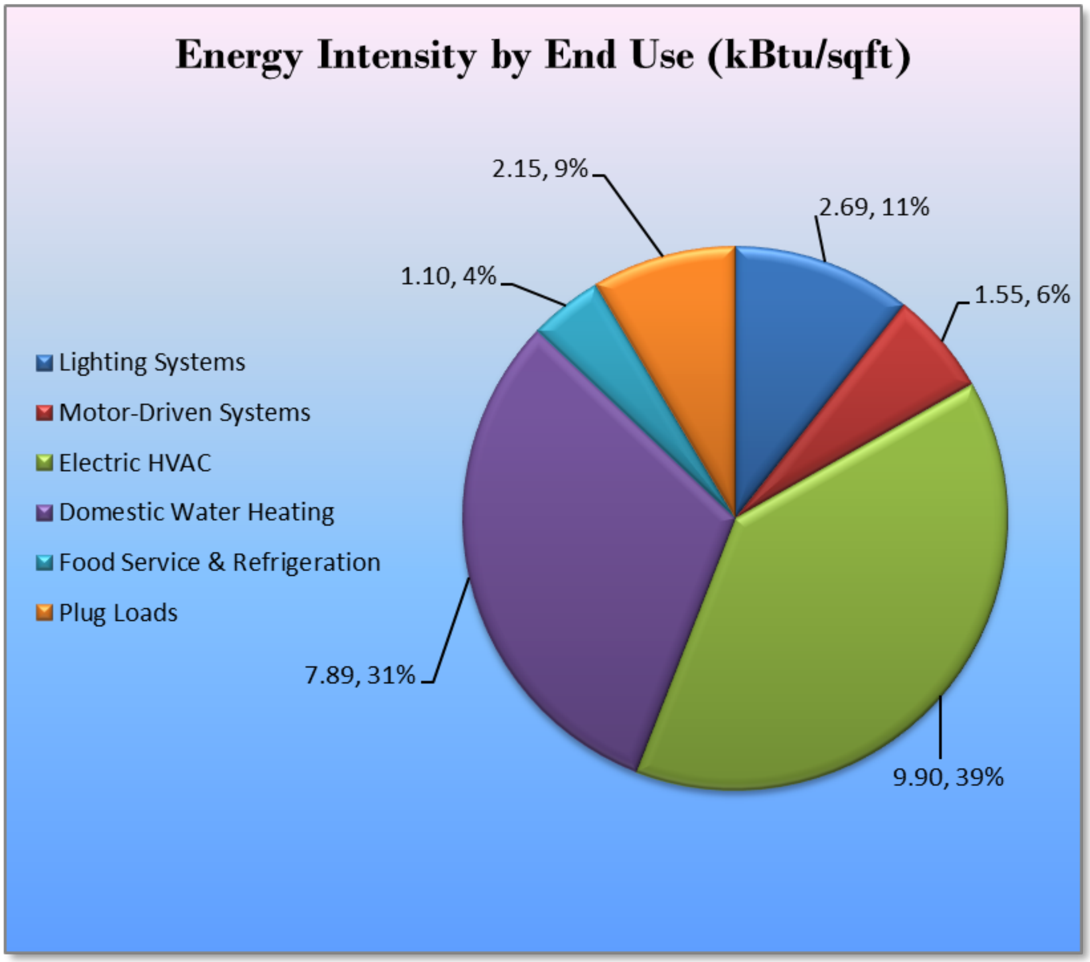
For more information on Energy Star certification go to: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/earn-recognition/energy-star-certification/how-app-1.

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

3.4 Energy End-Use Breakdown

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

Figure 10 - Energy Balance (kBtu/ft^2 and %)



4 ENERGY CONSERVATION MEASURES

Level of Analysis

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

The following sections describe the evaluated measures.

4.1 Recommended ECMs

The measures below have been evaluated and are recommended for implementation at the Townhouses.

Figure 11 – Summary of Recommended ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		14,018	7.1	0.0	$1,467.15	$17,252.10	$810.00	$16,442.10	11.2	14,116
ECM 1	Retrofit Fixtures with LED Lamps	14,018	7.1	0.0	$1,467.15	$17,252.10	$810.00	$16,442.10	11.2	14,116
Domestic Water Heating Upgrade		4,768	0.0	0.0	$499.01	$387.18	$0.00	$387.18	0.8	4,801
ECM 2	Install Low-Flow Domestic Hot Water Devices	4,768	0.0	0.0	$499.01	$387.18	$0.00	$387.18	0.8	4,801
TOTALS		18,786	7.1	0.0	$1,966.16	$17,639.28	$810.00	$16,829.28	8.6	18,918

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

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

4.1.1 Lighting Upgrades

Recommended upgrades to existing lighting fixtures are summarized in Figure 12 below.

Figure 12 – Summary of Lighting Upgrade ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Lighting Upgrades		14,018	7.1	0.0	$1,467.15	$17,252.10	$810.00	$16,442.10	11.2	14,116
ECM 1	Retrofit Fixtures with LED Lamps	14,018	7.1	0.0	$1,467.15	$17,252.10	$810.00	$16,442.10	11.2	14,116

Please see **Appendix A: Equipment Inventory & Recommendations** for a detailed list of the locations and recommended upgrades for each lighting measure.

ECM 1: Retrofit Fixtures with LED Lamps

Summary of Measure Economics

Interior/ Exterior	Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Interior	11,142	6.4	0.0	$1,166.14	$15,704.10	$810.00	$14,894.10	12.8	11,220
Exterior	2,876	0.7	0.0	$301.01	$1,548.00	$0.00	$1,548.00	5.1	2,896

Measure Description

We recommend retrofitting existing CFL and fluorescent fixtures with LED tubes and bulbs. Because the existing lighting fixtures are already fairly energy efficient, and because Rowan University pays a relatively low electric rate, replacement of the entire fixture was not deemed to be cost effective. LED bulbs can be used in existing fixtures as a direct replacement for most other lighting technologies. This measure saves energy by installing LEDs which use less power than other lighting technologies yet provide equivalent lighting output for the space.

Additional savings from lighting maintenance can be anticipated since LEDs have lifetimes which are more than twice that of a fluorescent tubes and more than 10 times longer than many incandescent lamps.

4.1.2 Domestic Hot Water Heating System Upgrades

Our recommendations for domestic hot water system improvements are summarized in Figure 13 below.

Figure 13 - Summary of Domestic Water Heating ECMs

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)	Estimated Net Cost ($)	Simple Payback Period (yrs)	CO_2e Emissions Reduction (lbs)
Domestic Water Heating Upgrade		4,768	0.0	0.0	$499.01	$387.18	$0.00	$387.18	0.8	4,801
ECM 2	Install Low-Flow Domestic Hot Water Devices	4,768	0.0	0.0	$499.01	$387.18	$0.00	$387.18	0.8	4,801

ECM 2: Install Low-Flow DHW Devices

Measure Description

We recommend installing low-flow domestic hot water devices to reduce overall hot water demand. Energy demand from domestic hot water heating systems can be reduced by reducing water usage in general. Faucet aerators can reduce hot water usage, relative to standard faucets. Low-flow faucet devices reduce the overall water flow from the fixture, while still adequate pressure for washing. This reduces the amount of water used per day resulting in energy and water savings.

Please see **Appendix A: Equipment Inventory & Recommendations** for more details on the facility's existing domestic hot water equipment and recommended system upgrades.

4.2 ECMs Evaluated But Not Recommended

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

Figure 14 – Summary of Measures Evaluated, But Not Recommended

Energy Conservation Measure		Annual Electric Savings (kWh)	Peak Demand Savings (kW)	Annual Fuel Savings (MMBtu)	Annual Energy Cost Savings ($)	Estimated Install Cost ($)	Estimated Incentive ($)*	Estimated Net Cost ($)	Simple Payback Period (yrs)**	CO_2e Emissions Reduction (lbs)
Electric Unitary HVAC Measures		29,741	1.0	0.0	$3,112.70	$60,872.04	$3,312.00	$57,560.04	18.5	29,949
	Install High Efficiency Heat Pumps	29,741	1.0	0.0	$3,112.70	$60,872.04	$3,312.00	$57,560.04	18.5	29,949
TOTALS		29,741	1.0	0.0	$3,112.70	$60,872.04	$3,312.00	$57,560.04	18.5	29,949

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

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

Install High Efficiency Heat Pumps

Measure Description

We evaluated the replacement of existing heat pumps with higher efficiency heat pumps. There have been significant improvements in both compressor and fan motor efficiencies over the past several years. Therefore, electricity savings can be achieved by replacing older units with new high efficiency units. A higher EER or SEER rating indicates a more efficient cooling system and a higher HPSF rating indicates more efficient heating mode. 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 heating and cooling loads, and the estimated annual operating hours.

Reasons for not Recommending

The payback for this measure was estimated to be 18.1 years, which is beyond the ASHRAE typical rated lifetime for the equipment (~15 yrs). Therefore, we do not recommend early replacement of the split system heat pump equipment. All units are 13 years old and will need to be replaced in a few years. At that time, we recommend replacing the existing units with the highest efficiency split system units that are available for that size range in order to save electric usage. Figure 14 above shows the estimated costs, savings, and incentives currently available for such an upgrade.

5 Energy Efficient Practices

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

Reduce Air Leakage

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

Close Doors and Windows

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

Ensure Lighting Controls Are Operating Properly

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

Practice Proper Use of Thermostat Schedules and Temperature Resets

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

Clean and/or Replace HVAC Filters

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

Check for and Seal Duct Leakage

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

Perform Proper Furnace Maintenance

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

Perform Proper Water Heater Maintenance

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

Plug Load Controls

There are a variety of ways to limit the energy use of plug loads including increasing occupant awareness, removing under-utilized equipment, installing hardware controls, and using software controls. Some control steps to take are to enable the most aggressive power settings on existing devices or install load sensing or occupancy sensing (advanced) power strips. For additional information refer to "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.

Water Conservation

Installing low-flow faucets or faucet aerators, low-flow showerheads, and kitchen sink pre-rinse spray valves saves both energy and water. These devices save energy by reducing the overall amount of hot water used hence reducing the energy used to heat the water. The flow ratings for EPA WaterSense™ (http://www3.epa.gov/watersense/products) labeled devices are 1.25 gpm for bathroom faucets, 2.0 gpm for showerheads, and 1.28 gpm for pre-rinse spray valves.

Installing dual flush or low-flow toilets and low-flow or waterless urinals are additional ways to reduce the sites water use, however, these devices do not provide energy savings at the site level. Any reduction in water use does however ultimately reduce grid level electricity use since a significant amount of electricity is used to deliver water from reservoirs to end users. The EPA WaterSense™ ratings for urinals is 0.5 gallons per flush (gpf) and toilets that use as little as 1.28 gpf (this is lower than the current 1.6 gpf federal standard).

Refer to Section 4.1.2 for any low-flow ECM recommendations.

6 On-Site Generation Measures

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

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

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

6.1 Photovoltaic

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

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

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

Some rooftops were south-facing, but unobstructed areas are relatively small. For this reason, the Townhouse rooftops are not good candidates for solar development.

Figure 15 - Photovoltaic Screening

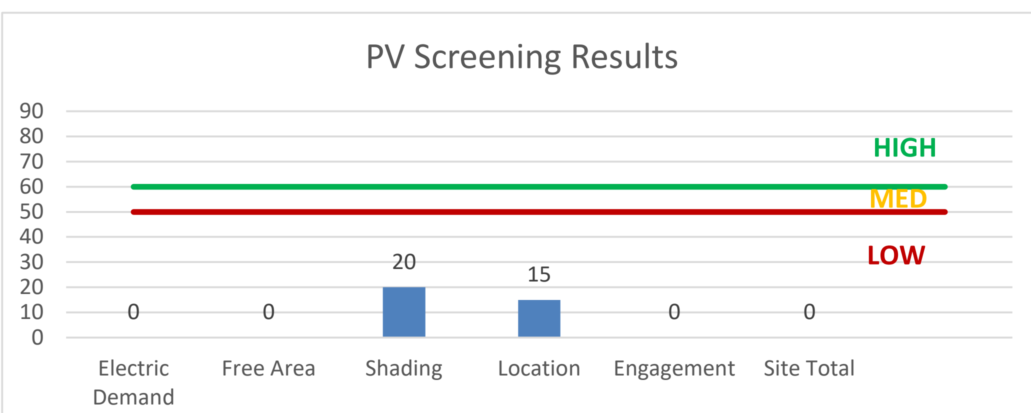


Image 11: Aerial View of Townhouse Complex

We analyzed the rooftop areas for all of the buildings in the Townhouse Complex for their potential to be used for solar PV power generation. Less than half of the Townhouses appeared to have some potential for solar development. Those rooftop areas that might be suitable (highlighted in the image above) appeared to be relatively small and probably too widely dispersed for such a project to be cost-effective.

If Rowan University is interested in solar power generation, then this site and other campus buildings should have a full assessment by a qualified solar installer in order to more assess the solar potential there more accurately. However, we believe it is likely that many other buildings on campus (with larger flat rooftops) would probably be better candidates for solar power development.

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

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

7 Demand Response

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

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

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

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

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

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

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

The Townhouses would likely not qualify for participation in a demand response program on their own, but perhaps when grouped with potential demand reductions at other campus buildings, they might qualify.

8 PROJECT FUNDING / INCENTIVES

The NJCEP is able to provide the incentive programs described below, and other benefits to ratepayers, because of the Societal Benefits Charge (SBC) Fund. The SBC was created by the State of New Jersey's Electricity Restructuring Law (1999), which requires all customers of investor-owned electric and gas utilities to pay a surcharge on their monthly energy bills. As a customer of a state-regulated electric or gas utility and therefore a contributor to the fund your organization is eligible to participate in the LGEA program and also eligible to receive incentive payment for qualifying energy efficiency measures. Also available through the NJBPU are some alternative financing programs described later in this section. Please refer to Figure 16 for a list of the eligible programs identified for each recommended ECM.

Figure 16 - ECM Incentive Program Eligibility

Energy Conservation Measure		SmartStart Prescriptive	SmartStart Custom	Direct Install	Pay For Performance Existing Buildings
ECM 1	Retrofit Fixtures with LED Lamps	X			
ECM 2	Install Low-Flow Domestic Hot Water Devices				

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

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

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

8.1 SmartStart

Overview

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

Equipment with Prescriptive Incentives Currently Available:

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

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

Incentives

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

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

How to Participate

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

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

8.2 Energy Savings Improvement Program

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

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

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

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

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

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

8.3 Demand Response Energy Aggregator

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

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

9 Energy Purchasing and Procurement Strategies

9.1 Retail Electric Supply Options

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

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

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

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

9.2 Retail Natural Gas Supply Options

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

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

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

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

Appendix A: Equipment Inventory & Recommendations

Lighting Inventory & Recommendations

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Townhouse-500 (units 501-506)	12	Compact Fluorescent: 2 x 13W CFLs (2-pin)	None	26	4,380	Relamp	No	12	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	None	10	4,380	0.22	959	0.0	$100.34	$516.00	$0.00	5.14
(6) Living Rooms	6	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	2,230	Relamp	No	6	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	2,230	0.11	244	0.0	$25.54	$258.00	$0.00	10.10
(6) Kitchens	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,230	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,230	0.23	503	0.0	$52.68	$351.00	$60.00	5.52
(6) Kitchens	6	Compact Fluorescent: 23W CFL (Screw-in)	Wall Switch	23	2,230	Relamp	No	6	LED Screw-In Lamps: 15W LED Bulb (Screw-in)	Wall Switch	15	2,230	0.05	122	0.0	$12.77	$160.50	$30.00	10.22
(18) Bathrooms	18	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,000	Relamp	No	18	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,000	0.33	328	0.0	$34.36	$867.60	$180.00	20.01
(18) Bathrooms	18	Compact Fluorescent: 2 x 9W CFLs	Wall Switch	18	1,000	Relamp	No	18	LED Screw-In Lamps: (2) 3.5W LED PL Bulbs	Wall Switch	7	1,000	0.23	226	0.0	$23.62	$759.60	$0.00	32.15
(18) Hallways	18	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	2,230	Relamp	No	18	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	2,230	0.33	732	0.0	$76.63	$774.00	$0.00	10.10
(6) Bedrooms per Unit (A-F)	36	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	1,630	Relamp	No	36	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	1,630	0.66	1,070	0.0	$112.02	$1,548.00	$0.00	13.82
(6) Stairwells	12	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	2,230	Relamp	No	12	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	2,230	0.22	488	0.0	$51.08	$516.00	$0.00	10.10
(6) Closets	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	None	33	300	None	No	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	None	33	300	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Rm 507	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	100	None	No	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Townhouse-1200 (units 1201-1206)	12	Compact Fluorescent: 2 x 13W CFLs (2-pin)	None	26	4,380	Relamp	No	12	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	None	10	4,380	0.22	959	0.0	$100.34	$516.00	$0.00	5.14
(6) Living Rooms	6	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	2,230	Relamp	No	6	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	2,230	0.11	244	0.0	$25.54	$258.00	$0.00	10.10
(6) Kitchens	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,230	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,230	0.23	503	0.0	$52.68	$351.00	$60.00	5.52
(6) Kitchens	6	Compact Fluorescent: 23W CFL (Screw-in)	Wall Switch	23	2,230	Relamp	No	6	LED Screw-In Lamps: 15W LED Bulb (Screw-in)	Wall Switch	15	2,230	0.05	122	0.0	$12.77	$160.50	$30.00	10.22
(18) Bathrooms	18	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,000	Relamp	No	18	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,000	0.33	328	0.0	$34.36	$867.60	$180.00	20.01
(18) Bathrooms	18	Compact Fluorescent: 2 x 9W CFLs	Wall Switch	18	1,000	Relamp	No	18	LED Screw-In Lamps: (2) 3.5W LED PL Bulbs	Wall Switch	7	1,000	0.23	226	0.0	$23.62	$759.60	$0.00	32.15
(18) Hallways	18	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	2,230	Relamp	No	18	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	2,230	0.33	732	0.0	$76.63	$774.00	$0.00	10.10
(6) Bedrooms per Unit (A-F)	36	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	1,630	Relamp	No	36	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	1,630	0.66	1,070	0.0	$112.02	$1,548.00	$0.00	13.82
(6) Stairwells	12	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	2,230	Relamp	No	12	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	2,230	0.22	488	0.0	$51.08	$516.00	$0.00	10.10
(6) Closets	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	None	33	300	None	No	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	None	33	300	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Rm 1207	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	100	None	No	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Townhouse-1700 (units 1701-1706)	12	Compact Fluorescent: 2 x 13W CFLs (2-pin)	None	26	4,380	Relamp	No	12	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	None	10	4,380	0.22	959	0.0	$100.34	$516.00	$0.00	5.14

	Existing Conditions					Proposed Conditions							Energy Impact & Financial Analysis						
Location	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Fixture Recommendation	Add Controls?	Fixture Quantity	Fixture Description	Control System	Watts per Fixture	Annual Operating Hours	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
(6) Living Rooms	6	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	2,230	Relamp	No	6	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	2,230	0.11	244	0.0	$25.54	$258.00	$0.00	10.10
(6) Kitchens	6	Linear Fluorescent - T8: 4' T8 (32W) - 2L	Wall Switch	62	2,230	Relamp	No	6	LED - Linear Tubes: (2) 4' Lamps	Wall Switch	29	2,230	0.23	503	0.0	$52.68	$351.00	$60.00	5.52
(6) Kitchens	6	Compact Fluorescent: 23W CFL (Screw-in)	Wall Switch	23	2,230	Relamp	No	6	LED Screw-In Lamps: 15W LED Bulb (Screw-in)	Wall Switch	15	2,230	0.05	122	0.0	$12.77	$160.50	$30.00	10.22
(18) Bathrooms	18	Linear Fluorescent - T8: 2' T8 (17W) - 2L	Wall Switch	33	1,000	Relamp	No	18	LED - Linear Tubes: (2) 2' Lamps	Wall Switch	17	1,000	0.33	328	0.0	$34.36	$867.60	$180.00	20.01
(18) Bathrooms	18	Compact Fluorescent: 2 x 9W CFLs	Wall Switch	18	1,000	Relamp	No	18	LED Screw-In Lamps: (2) 3.5W LED PL Bulbs	Wall Switch	7	1,000	0.23	226	0.0	$23.62	$759.60	$0.00	32.15
(18) Hallways	18	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	2,230	Relamp	No	18	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	2,230	0.33	732	0.0	$76.63	$774.00	$0.00	10.10
(6) Bedrooms per Unit (A-F)	36	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	1,630	Relamp	No	36	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	1,630	0.66	1,070	0.0	$112.02	$1,548.00	$0.00	13.82
(6) Stairwells	12	Compact Fluorescent: 2 x 13W CFLs (2-pin)	Wall Switch	26	2,230	Relamp	No	12	LED Screw-In Lamps: (2) 5W LED Bulbs (2-pin)	Wall Switch	10	2,230	0.22	488	0.0	$51.08	$516.00	$0.00	10.10
(6) Closets	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	None	33	300	None	No	6	Linear Fluorescent - T8: 2' T8 (17W) - 2L	None	33	300	0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Rm 1707	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	100	None	No	2	Linear Fluorescent - T8: 4' T8 (32W) - 2L	None	62	100	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Motor Inventory & Recommendations

		Existing Conditions						Proposed Conditions				Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	Motor Quantity	Motor Application	HP Per Motor	Full Load Efficiency	VFD Control?	Annual Operating Hours	Install High Efficiency Motors?	Full Load Efficiency	Install VFDs?	Number of VFDs	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Bathrooms	3 Bathrooms per Unit	54	Exhaust Fan	0.1	82.5%	No	150	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Heat Pump Fan	One per Unit	18	Ventilation Fan	0.5	82.5%	Yes	1,500	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Exterior Condenser Unit	One per Unit	18	Ventilation Fan	0.1	82.5%	Yes	1,500	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechanical Rm	One per Building	3	Ventilation Fan	0.1	82.5%	No	500	No	82.5%	No		0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Electric HVAC Inventory & Recommendations

		Existing Conditions				Proposed Conditions								Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Install High Efficiency System?	System Quantity	System Type	Cooling Capacity per Unit (Tons)	Heating Capacity per Unit (kBtu/hr)	Cooling Mode Efficiency (SEER/EER)	Heating Mode Efficiency (COP)	Install Dual Enthalpy Economizer?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
All Townhouses	Each Unit	18	Split-System Air-Source HP	1.50	31.00	Yes	18	Split-System Air-Source HP	2.00	24.40	20.00	3.08	No	1.03	29,741	0.0	$3,112.70	$60,872.04	$3,312.00	18.49

DHW Inventory & Recommendations

		Existing Conditions		Proposed Conditions						Energy Impact & Financial Analysis						
Location	Area(s)/System(s) Served	System Quantity	System Type	Replace?	System Quantity	System Type	Fuel Type	System Efficiency	Efficiency Units	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Mechnical Closet	Kitchen & Restrooms	9	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00
Mechnical Closet	Kitchen & Restrooms	9	Storage Tank Water Heater (≤ 50 Gal)	No						0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Low-Flow Device Recommendations

	Recommedation Inputs				Energy Impact & Financial Analysis						
Location	Device Quantity	Device Type	Existing Flow Rate (gpm)	Proposed Flow Rate (gpm)	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Restroom	54	Faucet Aerator (Lavatory)	2.20	1.00	0.00	4,768	0.0	$499.01	$387.18	$0.00	0.78

Commercial Refrigerator/Freezer Inventory & Recommendations

	Existing Conditions			Proposed Condi	Energy Impact & Financial Analysis						
Location	Quantity	Refrigerator/ Freezer Type	ENERGY STAR Qualified?	Install ENERGY STAR Equipment?	Total Peak kW Savings	Total Annual kWh Savings	Total Annual MMBtu Savings	Total Annual Energy Cost Savings	Total Installation Cost	Total Incentives	Simple Payback w/ Incentives in Years
Kitchen	18	Stand-Up Refrigerator, Solid Door (16 - 30 cu. ft.)	Yes	No	0.00	0	0.0	$0.00	$0.00	$0.00	0.00

Plug Load Inventory

	Existing Conditions			
Location	Quantity	Equipment Description	Energy Rate (W)	ENERGY STAR Qualified?
All Townhouses	36	Desktop Computer	150.0	No
All Townhouses	36	LCD Monitor	35.0	Yes
All Townhouses	36	Laptops	29.0	Yes
All Townhouses	18	LCD TVs 32"-42"	44.0	Yes
All Townhouses	18	LCD TVs <32"	31.0	Yes
All Townhouses	18	Microwaves	1,000.0	No
All Townhouses	18	Toaster Oven	1,000.0	No
All Townhouses	36	Desk/Table Lamps (Student-Owned)	45.0	No
All Townhouses	18	Electric Stove/Oven	1,500.0	No

Appendix B: EPA Statement of Energy Performance

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

Townhouse Building No. 05

Primary Property Type: Multifamily Housing
Gross Floor Area (ft²): 9,000
Built: 2004

For Year Ending: May 31, 2016
Date Generated: May 17, 2017

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Townhouse Building No. 05 290 Mullica Hill Road Glassboro, New Jersey 08028	Rowan University 290 Mullica Hill Road Glassboro, NJ 08028 (609) 617-7096	Bill Conley 290 Mullica Hill Road Glassboro, NJ 08028 (609) 617-7096 TempBenchmarking@Rowan.edu

Property ID: 5889471

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
25.4 kBtu/ft²

Source EUI
79.7 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	228,308 (100%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	40.7
National Median Source EUI (kBtu/ft²)	127.9
% Diff from National Median Source EUI	-38%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	26

Signature & Stamp of Verifying Professional

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

Signature: __________________________Date: ____________

Licensed Professional

____ _________
,
(____)____-______
____

Professional Engineer Stamp
(if applicable)

ENERGY STAR® Statement of Energy Performance

LEARN MORE AT energystar.gov

N/A

ENERGY STAR® Score[1]

Townhouse Building No. 12

Primary Property Type: Multifamily Housing
Gross Floor Area (ft²): 9,000
Built: 2004

For Year Ending: May 31, 2016
Date Generated: May 17, 2017

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Townhouse Building No. 12 290 Mullica Hill Road Glassboro, New Jersey 08028	Rowan University 290 Mullica Hill Road Glassboro, NJ 08028 (609) 617-7096	Bill Conley 290 Mullica Hill Road Glassboro, NJ 08028 (609) 617-7096 TempBenchmarking@Rowan.edu

Property ID: 5890196

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
25.4 kBtu/ft²

Source EUI
79.7 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	228,308 (100%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	40.7
National Median Source EUI (kBtu/ft²)	127.9
% Diff from National Median Source EUI	-38%

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	26

Signature & Stamp of Verifying Professional

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

Signature: _________________________ Date: ____________

Licensed Professional

____ _________
,
(____)____-______
____

Professional Engineer Stamp (if applicable)

ENERGY STAR® Statement of Energy Performance

N/A

ENERGY STAR® Score[1]

Townhouse Building No. 17

Primary Property Type: Multifamily Housing
Gross Floor Area (ft²): 9,000
Built: 2004

For Year Ending: May 31, 2016
Date Generated: May 17, 2017

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

Property & Contact Information

Property Address	Property Owner	Primary Contact
Townhouse Building No. 17 290 Mullica Hill Road Glassboro, New Jersey 08028	Rowan University 290 Mullica Hill Road Glassboro, NJ 08028 (609) 617-7096	Bill Conley 290 Mullica Hill Road Glassboro, NJ 08028 (609) 617-7096 TempBenchmarking@Rowan.edu

Property ID: 5890199

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
25.4 kBtu/ft²

Source EUI
79.7 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	228,308 (100%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	40.7
National Median Source EUI (kBtu/ft²)	127.9
% Diff from National Median Source EUI	-38%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	26

Signature & Stamp of Verifying Professional

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

Signature: ________________________Date: ____________

Licensed Professional

____ _________
,
(____)____-______
____

Professional Engineer Stamp
(if applicable)