HUNTERDON COUNTY
EDUCATIONAL SERVICES COMMISSION

West Amwell Campus
1422 Route 179
Lambertville, NJ 08530

LOCAL GOVERNMENT ENERGY AUDIT PROGRAM
FOR
NEW JERSEY
BOARD OF PUBLIC UTILITIES

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Prepared by:

6 Campus Drive
Parsippany, NJ 07054
(973) 538-2120

CHA PROJECT NO. 30313

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REPORT DISCLAIMER

This audit was conducted in accordance with the standards developed by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) for a Level II audit. Cost and savings calculations for a given measure were estimated to within ±20%, and are based on data obtained from the owner, data obtained during site observations, professional experience, historical data, and standard engineering practice. Cost data does not include soft costs such as engineering fees, legal fees, project management fees, financing, etc.

A thorough walkthrough of the building was performed, which included gathering nameplate information and operating parameters for all accessible equipment and lighting systems. Unless otherwise stated, model, efficiency, and capacity information included in this report were collected directly from equipment nameplates and /or from documentation provided by the owner during the site visit. Typical operation and scheduling information was obtained from interviewing staff and spot measurements taken in the field.

List of Common Energy Audit Abbreviations

- A/C – Air Conditioning
- AHS – Air Handling Unit
- BMS – Building Management System
- Btu – British thermal unit
- CDW – Condenser Water
- CFM – Cubic feet per minute
- CHW – Chilled Water
- DCV – Demand Control Ventilation
- DDC – Direct Digital Control
- DHW – Domestic Hot Water
- DX – Direct Expansion
- EER – Energy Efficiency Ratio
- EF – Exhaust Fan
- EUI – Energy Use Intensity
- Gal – Gallon
- GPD – Gallons per day
- GPF – Gallons Per Flush
- GPH – Gallons per hour
- GPM – Gallons per minute
- GPS – Gallons per second
- HHW – Heating Hot Water
- HID – High Intensity Discharge
- HP – Horsepower
- HRU – Heat Recovery Unit
- HVAC – Heating, Ventilation, Air Conditioning
- HX – Heat Exchanger
- kbtu/mbtu – One thousand (1,000) Btu
- kW – Kilowatt (1,000 watts)
- kWh – Kilowatt-hours
- LED – Light Emitting Diode
- mbh – Thousand Btu per hour
- mmbtu – One million (1,000,000) Btu
- OCC – Occupancy Sensor
- PSI – Pounds per square inch
- RTU – Rooftop Unit
- SBC – System Benefits Charge
- SF – Square foot
- UH – Unit Heater
- V – Volts
- VAV – Variable Air Volume
- VSD – Variable Speed Drive
- W – Watt

1.0 EXECUTIVE SUMMARY

This report summarizes the energy audit performed by CHA for the Hunterdon County Educational Services Commission – West Amwell Campus facility in connection with the New Jersey Board of Public Utilities (NJBPU) Local Government Energy Audit (LGEA) Program. The purpose of this report is to identify energy savings opportunities associated with major energy consumers and inefficient practices. Low-cost and no-cost Energy Conservation Measures (ECMs) have also been identified in this study. This report details the results of the energy audit conducted for the building listed below:

Building Name	Address	Square Feet	Construction Date
West Amwell Campus	1422 Rt 179 Lambertville, NJ 08530	64,000	1979

The potential total annual energy and cost savings for the recommended energy conservation measures (ECM) identified in the survey are shown below:

Building Name	Electric Savings (kWh)	NG Savings (therms)	Total Savings ($)	Payback (years)
West Amwell Campus	202,179	10,744	38,304	17.8

The annual savings for each individual measure are dependent on that measure alone, there are no interactive effects calculated. There are three options shown for lighting ECM savings; only one option can be chosen. The incentives shown (if any) are based only on the SmartStart Incentive Program. Other NJBPU or local utility incentives may also be available/applicable and are further discussed in Section 6.0.

Each measure recommended by CHA typically has a stand-alone simple payback period of 15 years or less. However, if the owner choses to pursue an Energy Savings Improvement Plan (ESIP), high payback measures could be bundled with lower payback measures which ultimately can result in a payback which is favorable for an ESIP project to proceed. Occasionally, we will recommend an ECM that has a longer payback period. This decision is generally based on the need to replace the piece(s) of equipment due to its age, such as a boiler.

The following table provides a detailed summary of each ECM for the building surveyed; including costs, savings, SmartStart incentives and paybacks.

Summary of Energy Conservation Measures

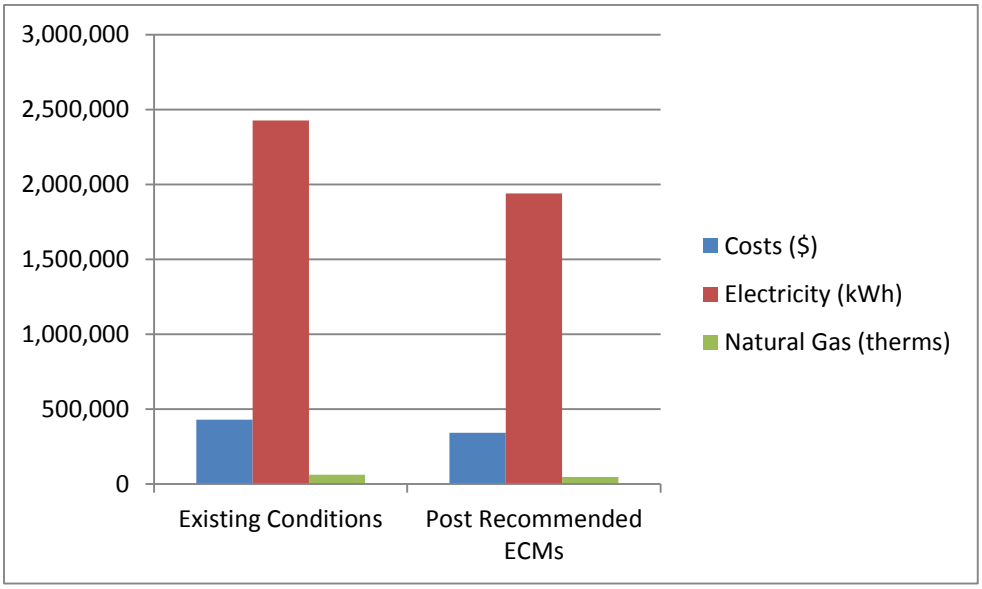
ECM #	Energy Conservation Measure	Est. Costs ($)	Est. Savings ($/year)	Payback w/o Incentive	Potential Incentive ($)*	Payback w/ Incentive	Recommended
1	Insulate Roof	78,721	1,338	58.8	0	58.8	Y
2	Insulate Walls	57,258	835	68.6	0	68.6	Y
3	Replace Windows	219,263	2,337	93.8	0	93.8	Y
4	Replace one boiler	254,085	2,168	117	2,200	116	N
5	Replace UVs with VRV Heat Pumps and ERU	515,903	2,661	193.9	0	193.9	N
6	Replace Cooling units and coils	219,659	7,974	27.5	7300	26.6	Y
7	Install DDC Controls	36,680	11,552	3.2	0	3.2	Y
L1**	Lighting Replacements	179,927	13,391	13.4	22,420	11.7	N
L2**	Lighting Controls	10,212	2,482	4.1	1,550	3.5	N
L3	Lighting Replacements with Controls	190,140	14,268	13.3	23,970	11.6	Y
	Total**	**1,571,709**	**43,133**	**41.0**	**33,470**	**40.1**	
	Total (Recommended)	**801,721**	**38,304**	**18.5**	**31,270**	**17.8**	

* Incentive shown is per the New Jersey SmartStart Program.
** These ECMs are not included in the Total, as they are alternate measures not recommended.

The alternative energy measure *Solar PV Electricity Generation* is also recommended for further study.

If the Hunterdon County ESC implements the recommended ECMs, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	72,601	69,396	35%
Electricity (kWh)	357,401	155,222	57%
Natural Gas (therms)	29,221	18,477	37%
Site EUI (kbtu/SF/Yr)	64.7	37.1	



2.0 BUILDING INFORMATION AND EXISTING CONDITIONS

The following is a summary of the building information related to HVAC, plumbing, building envelope, lighting, kitchen equipment and domestic hot water systems as observed during CHA's site visit. See Appendix B for detailed information on mechanical equipment, including capacities, model numbers and age. See Appendix F for representative photos of some of the existing conditions observed while onsite.

Building Name: Hunterdon County ESC - West Amwell Campus
Address: 1422 Route 179, Lambertville NJ 08530
Gross Floor Area: 64,000 Square Feet
Number of Floors: One floor
Year Built: 1979 - Renovations in 1996 and 2001

Description of Spaces: Classrooms, administrative offices, multipurpose room, gymnasium, kitchen, warehouse, toilet rooms, storage and mechanical spaces.
Description of Occupancy: This is school for students with emotional, cognitive and/or multiple handicaps. There are approximately 30 employees and 70 students.
Building Usage: Normal daily school hours of operation are 8:00 am to 2:30 pm Monday through Friday. The custodial staff occupies the building from 7:00am to 10 pm M-F. The building is used occasionally on weekends and has a partial summer school program that operates until mid-August

Building Envelope

Construction Materials: The building was originally constructed in 1979 as a luggage manufacturing facility. It is a pre-fabricated high-bay metal building which consists of several large structural steel beams with intermediate purlin beams that support the roof and walls. The entire building has a concrete slab floor with perimeter foundation walls and footings. The exterior walls are standing seam metal panels with metal studding and fiberglass insulation. The 2001 gymnasium addition has an EFIS exterior finish and similar stud-wall construction. The stud-wall and insulation only extends upwards to about one foot above the suspended ceilings (approximately 12 feet above the floor). The exterior wall above this point has some original insulation between the purlins, assumed to be R-13 and extends to the roof deck, which is another 12 feet above. There are multiple exterior louvers/penetrations above the ceiling that are remnants from the original factory. The penetrations, as well as, the relatively thin wall insulation allow for excessive infiltration and heat transfer; which is negatively impacting the comfort and energy consumption of the HVAC equipment. We have included an ECM that evaluates the energy savings for adding a layer if 2" spray foam to the exterior walls.

Roof: The roof is nearly flat and is constructed of similar standing seam metal panels. There is minimal (R-13) batt insulation beneath the roof in the purlins. There are many roof penetration, specifically exhaust fans and air intake hoods for the HVAC equipment. The majority of the roof is 1979 vintage and is in poor condition having many leaks. The maintenance personnel have patched/coated section of the roof in an effort to reduce the leakage. The 2001 Gym addition has a black rubber membrane roof system that is in better condition. We have included and ECM that evaluates the savings for installing 2" of spray foam roofing on top of the metal roofing which will reduce heat transfer and correct the leakage issues.

Windows The building has aluminum framed double pane windows installed in 1979 and 1996. The windows are fixed at the top portion and have an operable leaf in the lower portion. The rubber seals are failing and the operable mechanisms are damaged, resulting in drafts. We have included an ECM to evaluate the energy savings for replacing the windows with new double pane windows.

Exterior Doors: The main entrance doors are of similar construction to the windows, double pane glazing with aluminum frames. These doors have had seals and sweeps installed and are in good condition. Other exterior doors include solid metal man doors, that are assumed to be uninsulated; as well as, several roll-up overhead doors that are uninsulated. As these doors are primarily in areas that are minimally heated, the energy savings associated with replacing them is less significant and will yield a long payback. These doors should be considered for replacement with insulated doors as they fail.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: The building has several separate heating systems. The primary source of heat is from two gas fired Peerless hot water boilers that were installed in 1996. The boilers appear to be in good overall condition and have efficiencies of 80-82%. The boilers provide hot water to the classroom unit ventilators and perimeter fin-tube radiation. The hot water is distributed using two 2 HP inline pumps that are presently manually sequenced. Each classroom unit ventilator has a

hot water coil. The second predominant heat source is from 6 gas fired duct furnaces that are associated with ceiling mounted air handling units. These units serve large interior rooms that have no outside walls as well as the main offices. They are also 1996 vintage and have efficiencies of 78-80%. A separate York gas fired packaged roof top unit provides heating and cooling to the gymnasium only. This unit was installed in 2000 and is in good overall condition.

The warehouse spaces are heated using individual gas fired unit heaters, having capacities of 100MBH and an estimated efficiency of 78%.

The corridors are minimally heated by the duct furnaces and are reported to be uncomfortably cold in the winter.

Cooling: Cooling is provided to approximately 2/3 of the building. The warehouse area is not cooled. Cooling is provided by several systems; which include self-contained classroom unit ventilators (HW Heating and DX cooling), DX coils in the air handling systems with matching outdoor condensing units serving the interior spaces and offices and DX cooling within the gymnasium packaged roof top unit. Additional cooling is provide to the IT server room by a small ductless split system. All of the cooling equipment is vintage 1996 and is in fair condition with the exception of the gym unit which is 2000 vintage and is in good condition. We have included an ECM to evaluate the savings potential for replacing the classroom unit ventilators with individual variable refrigeration volume (VRV) heat pumps and a separate ventilation system. Additionally, we have included an ECM for replacing the existing older cooling condensing units and DX coils with modern high-efficiency condensing units.

Ventilation: Ventilation is available to each classroom through the individual classroom unit ventilators. Interior and office spaces are also provided with ventilation via the ducted air handling systems. The gymnasium unit has full ventilation and economizer capabilities as well. Although able to provide adequate ventilation, the classroom unit ventilators have been historically problematic in the winter months; specifically several coils have frozen and burst resulting in damage to the floors. We are including an ECM that evaluates the energy savings resulting from the installation of individual classroom energy recovery units (ERU) which, along with a proposed VRV heat pump system, will allow the unit ventilators to be removed and their large exterior louvers sealed.

Exhaust: The facility has many roof mounted, fractional HP exhaust fans that remove air from the classrooms and the toilet rooms. The majority of these fans operate 24/7, due to a lack of controls. The proposed VRV/ERU ECMs will enable the removal of all classroom fans from the roof, thereby reducing the possibility of roof leaks.

Controls Systems

The building has a non-functioning Johnson Controls Metasys DDC controls system. The system appears to have local access only, no computer or front end software is available. As a result, all of the HVAC is manually operated by the maintenance staff and generally operated in either heating or cooling year round. Space temperatures are maintained at 68°F - 72°F heating and cooling regardless of actual building occupancy. Classroom unit ventilators have unit mounted sensors while the gym and offices have wall mounted sensors.

The boilers and pumps are controlled locally using H-O-A switches. Again, manual operation is performed. It was reported to us by building personnel that the lack of automatic pump sequencing had attributed to the aforementioned coil freeze-ups due to a lack of water flow.

The large high-bay warehouse space is heated to 62°F as controlled by wall mounted-non-programmable thermostats. It is necessary to heat this space due to the domestic water and sprinkler piping that is routed through the warehouse ceiling. An ECM is included to replace the current controls with a basic DDC system having a web-based software that will enable unoccupied temperature setbacks, economizer operations and space scheduling, as well as, providing status alarms and operational trends.

Domestic Hot Water Systems

Domestic hot water is provided to lavatory sinks by one 100 gallon gas fired A.O. Smith water heater. This unit was installed in 1996 and appears to be in good condition; however it has a standard 80% efficiency. A second 50 gallon electric water heater supplies only the kitchen scullery sinks. As the kitchen is used for warming the food only, this water heater is not heavily used. We have included an ECM to evaluate the savings for replacing the gas water heater with a more efficient gas water heater.

Kitchen Equipment

The building has a small warming kitchen. All food is imported and utensils are disposable. There are several electric warmers/coolers and one double door refrigerator freezer. No ECMs are included for upgrading kitchen equipment.

Plug Load

The Hunterdon CESC building has very few PC computers, 2 copiers, and several residential appliances (microwave, refrigerators). The plug load is therefore minimal and No ECMs have been evaluated.

Plumbing Systems

The domestic cold water is obtained on-site using a well and elaborate water treatment system, installed as a result of ground water contamination from a neighboring salt storage facility. This system is maintenance intensive, but necessary. City supplied water is not available. Waste water is pumped to traditional septic field. Plumbing fixtures are 1996 vintage and therefore low-flow (1.6 GPF/ 1.6 GPF/ 2.5 GPM). Several sink faucets are inoperable and the school is pursuing replacement of these as well as the flush valves with battery operated infrared type valves. No water conservation ECMs are considered.

Lighting Systems

Lighting is primarily T-8 32-watt, and some T-12 40-watt 4-foot linear fluorescent lamps mounted in a variety of fixture types. The gym has 400-watt high pressure sodium fixtures, as does the warehouse. Most light fixtures are switched or controlled by breakers. Exterior lighting consists of wall mounted 70-250 watt metal halide wall-packs, and 400 watt metal halide pole-mounted lamps.

Three lighting ECMs have been included which include adding occupancy sensors to the existing lighting, replacement of the T-8 lighting with LED lighting and a third ECM that evaluates the effect of occupancy sensors used with the LED lighting upgrades.

3.0 UTILITIES

Utilities used by the building are delivered and supplied by the following utility companies:

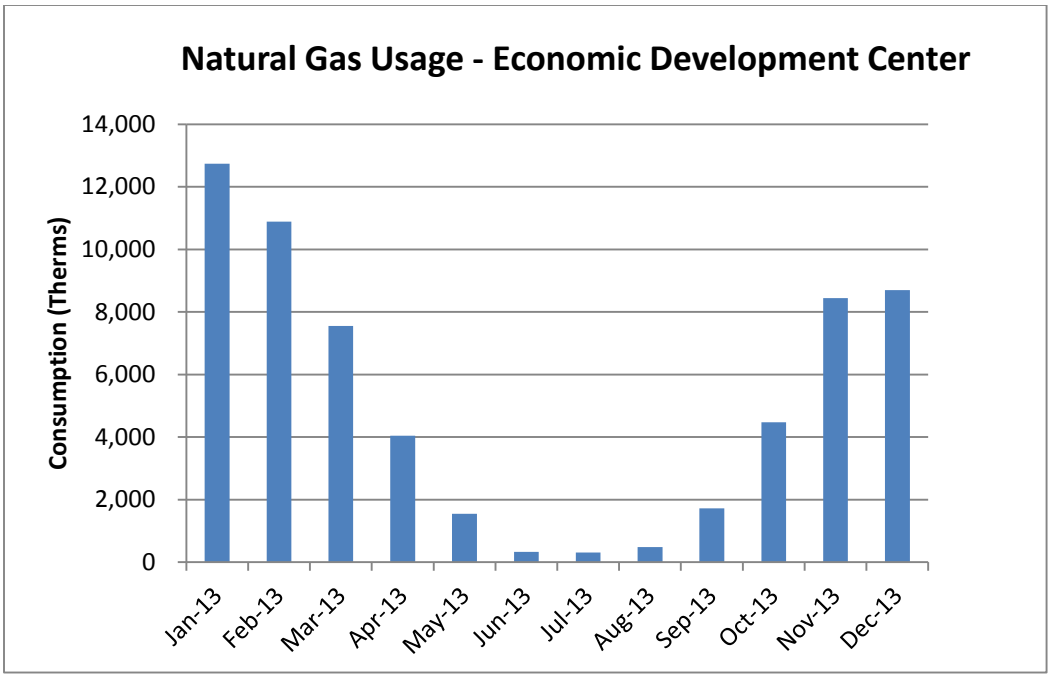
	Electric	Natural Gas
Deliverer	FirstEnergy Solutions Corp.	Elizabethtown Gas
Supplier	JCP&L	Elizabethtown Gas

For the 12-month period ending in December 2013, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	357,401	kWh/yr.
Annual Cost	44,548	$
Blended Unit Rate	0.125	$/kWh
Supply Rate	0.098	$/kWh
Demand Rate	6.27	$/kW
Peak Demand	183.1	kW
Natural Gas		
Annual Usage	29,221	Therms/yr.
Annual Cost	28,053	$
Rate	0.960	$/therm

Blended Rate: Average rate charged determined by the annual cost / annual usage
Supply Rate: Actual rate charged for electricity usage in kWh (based on most recent electric bill)
Demand Rate: Rate charged for actual electrical demand in kW (based on most recent electric bill)

The electrical usage for this building is fairly constant, with increased usage in the summer months for air conditioning. Summer peaks occur during the maximum cooling season. The peaks during winter months which could be caused by electric heaters.



The natural gas usage is mostly driven by space heating in the winter months with a tail-off of usage during the summer months. The building does not have major kitchen use and at least half of domestic hot water is generated by electric water heaters.

See Appendix A for utility analysis.

Under New Jersey's energy deregulation law, the supply portion of the electric (or natural gas) bill is separated from the delivery portion. The supply portion is open to competition, and customers can shop around for the best price for their energy suppliers. The electric and natural gas distribution utilities will still deliver the gas/ electric supplies through their wires and pipes and respond to emergencies, should they arise regardless of where those supplies are purchased. Purchasing the energy supplies from a company other than your electric or gas utility is purely an economic decision; it has no impact on the reliability or safety of the service.

Comparison of Utility Rates to NJ State Average Rates*				Recommended to Shop for Third Party Supplier?
Utility	Units	Building Average Rate	NJ Average Rate	
Electricity	$/kWh	$0.125	$0.13	N
Natural Gas	$/Therm	$0.96	$0.96	N

* Per U.S. Energy Information Administration (2013 data – Electricity and Natural Gas, 2012 data – Fuel Oil)

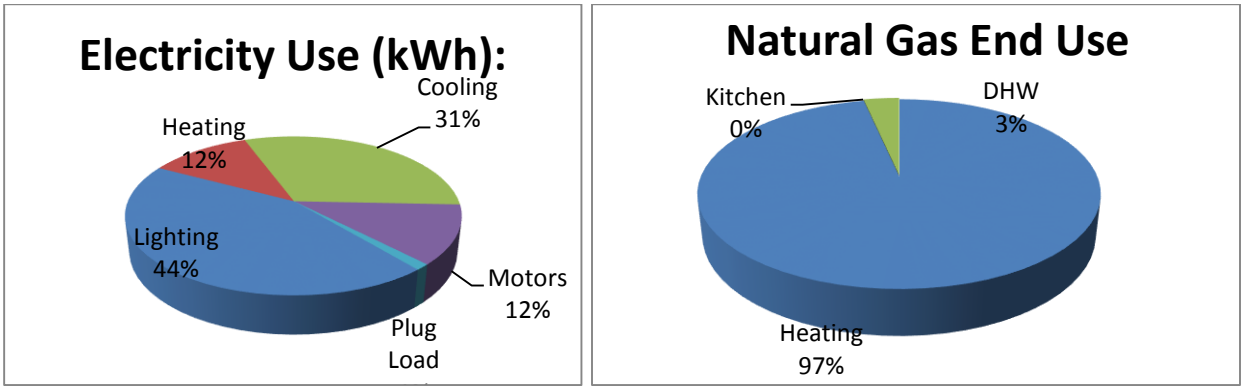
Additional information on selecting a third party energy supplier is available here:

http://www.state.nj.us/bpu/commercial/shopping.html.

See Appendix A for a list of third-party energy suppliers licensed by the Board of Public Utilities to sell within the building's service area.

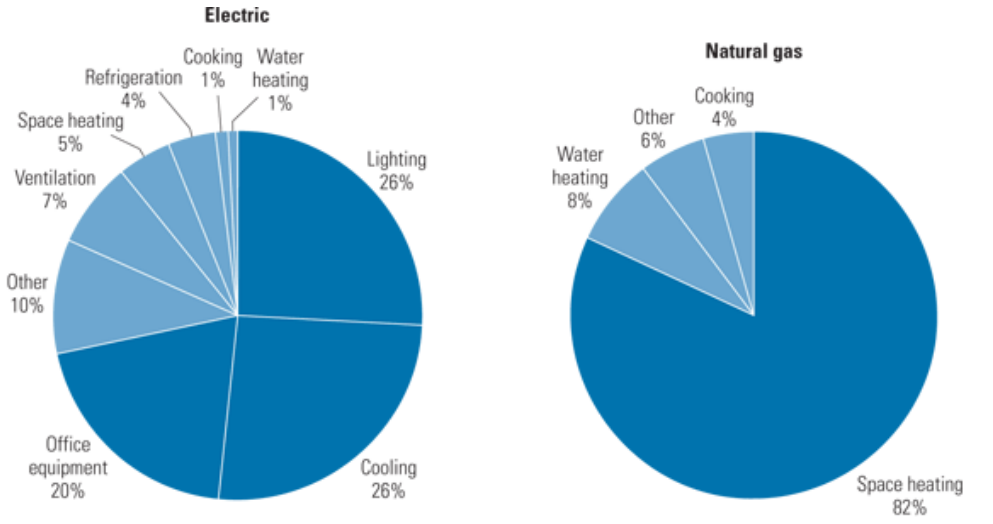
The charts below represent estimated end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

Site End-Use Utility Profile



Most of the electricity consumed by municipal buildings is used to for lighting, cooling, and plug loads such as computers and copiers; most of the natural gas is used for space heating. Each building's energy profile is different, and the following charts represent typical utility profiles for commercial buildings per U.S. Department of Energy.

Typical End-Use Utility Profile for Commercial Buildings



Courtesy: E SOURCE; from Commercial Building Energy Consumption Survey, 1999 data

4.0 BENCHMARKING

The EPA Portfolio Manager benchmarking tool provides a site and source Energy Use Intensity (EUI), as well as, an Energy Star performance rating for qualifying building types. The EUIs are provided in kBtu/ft2/year, and the performance rating represents how energy efficient a building is on a scale of 1 to 100; with 100 being the most efficient. In order for a building to receive an Energy Star label, the energy benchmark rating must be at least 75. As energy use decreases from implementation of the proposed measures, the Energy Star rating will increase. However, the EPA does not have scores for all buildings types. The buildings that do not have energy ratings now are compared with national median EUI.

The sites EUI is the amount of heat and electricity consumed by a building as reflected in its utility bills. Site energy may be delivered to a facility in the form of primary energy, which is raw fuel burned to create heat or electricity; such as natural gas or oil; or as secondary energy, which is the product created from a raw fuel such as electricity or district steam. To provide an equitable comparison for different buildings with varying proportions of primary and secondary energy consumption, Portfolio Manager uses the convention of source EUIs. The source energy also accounts for losses incurred in production, storage, transmission, and delivery of energy to the site; which provides an equivalent measure for various types of buildings with differing energy sources. The results of the benchmarking is contained in the table below. Copies of the benchmarking report are available in Appendix G.

Building	Site EUI kBtu/ft^2/yr	Source EUI Btu/ft^2/yr	Energy Star Rating (1-100)
Hunterdon CESC	64.7	107.8	60

The building has an above average Energy Star Rating Score (50 being the median score). By implementing the measures discussed in this report, it is expected that the EUI can be reduced and the Energy Star Rating increased.

5.0 ENERGY CONSERVATION MEASURES

The following types of energy savings opportunities are identified in this section of the report:

- Energy conservation measures (ECMs) are energy savings recommendations that typically require a financial investment. For these areas of opportunity, CHA prepared detailed calculations, as summarized in this section and in Appendix C. In general, additional savings may exist from reductions in maintenance activities associated with new equipment or better controls; however, for conservatism, maintenance savings are not accounted for in this report; instead the only savings which are reported are those derived directly from reductions in energy which can be tracked by the utility bills.

- Operational and Maintenance measures (O&M) consist of low-cost or no-cost operational opportunities, which if implemented would have positive impacts on overall building operation, comfort levels, and/or energy usage. There are no estimated savings, costs or paybacks associated with the O&M measures included as part of this study.

Energy savings were quantified in the form of:

- Electrical usage (kWh=Kilowatt-hour),
- Electrical demand (kW=kilowatts),
- Natural gas (therms=100,000 Btu),
- Propane gas (gallons=91,650 Btu),
- Fuel oil (gallons =138,700 Btu), and
- Water (kgal=1,000 gallons).

These recommendations are influenced by the time period that it takes for a proposed project to “break even” referred to as “Simple Payback”. Simple payback is calculated by dividing the estimated cost of implementing the ECM by the energy cost savings (in dollars) of that ECM.

Another financial indicator of the performance of a particular ECM is the Return on Investment (ROI), which represents the benefit (annual savings over the life of a project) of an investment divided by the cost of the investment. The result is expressed as a percentage or ratio.

Two other financial analyses included in this report are Internal Rate of Return (IRR) and Net Present Value (NPV). Internal Rate of Return is the discount rate at which the present value of a project costs equals the present value of the project savings. Net Present Value is the difference between present value of an investment’s future net cash flows and the initial investment. If the NPV equals “0”, the project would equate to investing the same amount of dollars at the desired rate. NPV is sometimes referred to as Net Present Worth. These values are provided in the Summary Tab in Appendix C.

5.1 ECM-1 Add Spray Foam Roof Insulation

The roofing system is in poor condition and has minimal insulation; however, structurally sound. Hunterdon CESC is pursuing proposals to add 2" of insulating spray foam and waterproof coating to the entire roof surface. This will improve the thermal value of the roof and rectify the leaking issues in a cost effective manner.

To calculate the savings, the heat losses through the roof assembly were found using the existing roof's R-value of 13 and bin weather data. The values were totaled to determine the existing annual energy losses. The heating and cooling energy loss values were then determined with a thermal resistance, which included the additional R-10 insulation. The total proposed roof R-value with insulation is approximately R-23.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-1 Add Spray Foam Roof Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
78,721	0	932	1,273	1,338	(.97)	0	58.8	58.8

* Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities

This measure is recommended.

5.2 ECM-2 Add Spray Foam wall insulation

As an alternate proposal, Hunterdon will be seeking pricing for installing the same spray foam insulation and decorative EFIS type system to the exterior walls. If implemented, this will seal all existing louver openings and cracks, as well as, improve the thermal resistance of the walls; therefore, reducing drafts and load on the HVAC equipment.

The calculation uses bin weather data and compares the pre and post wall insulation values; which yields pre and post BTU/hr rates, which are then converted into heating and cooling savings.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized as follows:

ECM-2 Add Spray Foam Wall Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
57,258	0	354	824	835	(.98)	0	68.6	68.6

* Incentive shown is per the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is recommended.

5.3 ECM-3 Replace the Windows

The existing double pane windows are in poor condition both thermally and operationally. This ECM evaluates replacing the windows with high performance double glazed windows having thermally broken frames and tight sealing leafs.

The calculations use bin weather data and compares pre and post installation U values and infiltration rates. This results in pre and post BTU/hr rates, which are then converted into heating and cooling savings.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-3 Replace the Windows

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
219,263	0	1,092	2,292	2,337	(.99)	0	93.8	93.8

* Incentive shown is per the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is recommended.

5.4 ECM-4 Boiler and Duct Furnace Replacement

Although the two Peerless boilers are in good condition, they are only 80-82% efficient; The gas fired duct furnaces are 78-80% efficient. This ECM evaluates removing one boiler and replacing it with a high-efficiency condensing gas boiler, which will operate at 90-96% annual efficiency. Then replacing the duct furnaces with hot water coils, which would then be supplied by the new boiler. To implement this ECM, the boiler and duct furnaces would be removed and the new boiler installed. New hot water piping and pumps would be installed to serve the new hot water coils. Duct transitions and electrical work would also be necessary. This would reduce maintenance costs (by eliminating the duct furnaces) and reduce the amount of roof penetrations (duct furnace vents)

The calculation methodology includes comparing the annual fuel consumption at 80% versus 92% while assuming the same annual hours run.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-4 Boiler and duct Furnace Replacement

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
254,085	0	0	2,258	2,168	(1.00)	2,200	117	116

* Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is not recommended.

5.5 ECM-5 Replace Classroom Unit Ventilators with VRV Heat Pumps and ERU Ventilation.

The 12 classroom unit ventilators are self-contained and include full cooling systems and hot water heating coils. The units are 1996 vintage and are less energy efficient than other solutions available today. Furthermore, the large exterior louvers required by these units allow for excessive air infiltration which results in inconsistent occupant comfort. This ECM evaluates replacing these units with ceiling mounted variable refrigeration volume heat pumps that can provide heating or cooling more efficiently. These units do not have the ability to provide ventilation; so it is necessary to include a new ventilation system, which would consist of classroom mounted air to air energy recovery heat exchangers and variable speed driven exhaust fans. These energy recovery units would have enhanced operation using demand controlled ventilation, which would allow only the amount of fresh air needed based on actual classroom occupancy.

The calculation methodology compares the estimated energy efficiency of the unit ventilators (EER) to that of the VRV system. It also takes into consideration the energy reduction for not having to heat or cool the outdoor air at the design minimum airflow of 450 CFM.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-5 Replace Classroom Unit Ventilators with VRV Heat Pumps and ERU Ventilation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
515,903	0	8,926	1,609	2,661	(.97)	0	193.9	193.9

*Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is not recommended.

5.6 ECM-6 Replace Cooling Condensing Units and Coils

There are several direct expansion air cooled condensing units used to cool the building. These units are of various manufactures vintages and capacities, but all are past their useful life. This ECM evaluates replacing these units and their associated cooling coils with equivalent capacity high efficiency units.

The calculation compares pre and post energy efficiency ratios (EER) between the old and new equipment assuming that they maintain the same capacities and run hours. The results are expressed in annual Kwh savings.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-6 Replace Cooling Condensing Units and Coils

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
219,659	27.9	44,022	0	7,974	(.46)	7,300	27.5	26.6

This measure is recommended

5.7 ECM-7 Replace/ Retro-Commission the Control System

The present Johnson Metasys control system is not used and is not user friendly. All HVAC equipment is manually operated by the staff and equipment operates 24/7 regardless of occupancy. No economizer function is implemented although the units appear to be capable of performing this operation. This ECM evaluates the saving associated with replacing this antiquated system with a simple user-friendly control system that will provide unoccupied set-back, space scheduling and economizer operation; as well as, providing remote alarm notifications and historical trending.

The calculation compares pre and post energy efficiency ratios (EER) between the old and new equipment assuming that they maintain the same capacities and run hours. The results are expressed in annual Kwh savings

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-7 Replace/ Retro-commission the Control System

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
36,680	0	43,605	6,356	11,552	(1.67)	0	3.2	3.2

* Does not qualify for Incentive from the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is recommended.

5.8.1 ECM-L1 Lighting Replacement / Upgrades

Overall, energy consumption can be reduced by replacing inefficient bulbs and linear fluorescent bulbs with more efficient LED technology. To compute the annual savings for this ECM, the energy consumption of the current lighting fixtures was established and compared to the proposed fixture power requirement with the same annual hours of operation. The difference between the existing and proposed annual energy consumption was the energy savings. These calculations are based on 1 to 1 replacements of the fixtures, and do not take into account lumen output requirements for a given space. A

more comprehensive engineering study should be performed to determine correct lighting levels.

Supporting calculations, including assumptions for lighting hours and annual energy usage for each fixture, are provided in Appendix C and summarized below:

ECM-L1 Lighting Replacement / Upgrades

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
179,927	44.1	102,764	0	13,391	(.35)	22,420	13.4	11.7

* LED retrofits must go through the "custom" measures incentive option under New Jersey SmartStart Program. There are no "prescriptive" incentives for LED retrofits. Projects must achieve a minimum of 75,000 kWh annual savings to qualify for "custom" incentives. See section 6.0 for other incentive opportunities

This measure is not recommended in lieu of ECM L3.

5.8.2 ECM-L2 Install Lighting Controls (Occupancy Sensors)

Review of the comprehensive lighting survey determined that lighting in some areas could benefit from installation of occupancy sensors to turn off lights when they are unoccupied.

This measure recommends installing occupancy sensors for the current lighting system. Using a process similar to that utilized in the previous section, the energy savings for this measure was calculated by applying the known fixture wattages in the space to the estimated existing and proposed times of operation for each fixture.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-L2 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
10,212	0	25,329	0	2,482	(2.60)	1550	4.1	3.5

* Incentive shown is per the New Jersey SmartStart Program. See section 6.0 for other incentive opportunities.

This measure is not recommended in lieu of ECM L3.

5.8.3 ECM-L3 Lighting Replacements with Controls (Occupancy Sensors)

This measure is a combination of ECM-L1 and ECM-L2; recommending replace/upgrade the current lighting fixtures to more efficient ones and installing occupancy sensors on the new lights. Interactive effects of the higher efficiency lights and occupancy sensors lead the energy and cost savings for this measure to not be cumulative or equivalent to the sum of replacing the lighting fixtures alone and installing occupancy sensors without the

lighting upgrade. The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-L3 Lighting Replacements with Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
190,140	44.1	111,709	0	14,268	(.34)	23,970	13.3	11.6

* LED retrofits must go through the "custom" measures incentive option under New Jersey SmartStart Program. There are no "prescriptive" incentives for LED retrofits. Projects must achieve a minimum of 75,000 kWh annual savings to qualify for "custom" incentives. See section 6.0 for other incentive opportunities

This measure is recommended.

5.9 Additional O&M Opportunities

This list of operations and maintenance (O&M) - type measures represent low-cost or no-cost opportunities, which if implemented will have a positive impact on the overall building operations, comfort and/or energy consumption. The recommended O&M measures for this building are as follows:

- Set computers monitors to turn off and computers to sleep mode when not in use
- Purchase ENERGY STAR® label Appliances
- Disconnect unnecessary or unused small appliances and electronics when not in use to reduce phantom loads
- Train staff to turn off lights when rooms are unoccupied
- Develop an Energy Master Plan to measure and track energy performance

6.0 PROJECT INCENTIVES

6.1 Incentives Overview

The following sections give detailed information on available incentive programs including New Jersey Smart Start, Direct Install, New Jersey Pay for Performance (P4P) and Energy Savings Improvement Plan (ESIP). If the school wishes to and is eligible to participate in the Energy Savings Improvement Plan (ESIP) program and/or the Pay for Performance Incentive Program (P4P), it cannot participate in either the Smart Start or Direct Install Programs. Refer to Appendix D for more information on the Smart Start program.

6.2 New Jersey Smart Start Program

For this energy audit, The New Jersey Smart Start Incentives are used in the energy savings calculations, where applicable. This program is intended for medium and large energy users and provides incentives for:

- Electric Chillers
- Gas Chillers
- Gas Heating
- Unitary HVAC
- Ground Source Heat Pumps
- Variable Frequency Drives/Motors
- Refrigeration
- Prescriptive and Performance Lighting and Lighting Controls

The equipment is procured using a typical bid-build method. It is then installed, paid for and then the incentives are reimbursed to the owner.

6.3 Direct Install Program

The Direct Install Program applies to smaller facilities that have a peak electrical demand of 200 kW or less in any of the previous 12 months. Buildings must be located in New Jersey and served by one of the state's public, regulated electric utility companies.

Direct Install was funded through New Jersey's Clean Energy Program and is designed to provide capital for building energy upgrade projects to fast track implementation. The program will pay up to 70% of the costs for lighting, HVAC, motors, refrigeration, and other equipment upgrades with higher efficiency alternatives. If a building is eligible for this funding, the Direct Install Program can reduce the implementation cost of energy conservation projects.

The Direct Install program has specific HVAC equipment and lighting requirements and is generally applicable only to smaller package HVAC units, small boilers and lighting retrofits.

The program pays a maximum amount of $125,000 per building, and up to $250,000 per customer per year. Installations must be completed by an approved Direct Install participating contractor, a list of which can be found on the New Jersey Clean Energy

Website. Contractors will coordinate with the applicant to arrange installation of recommended measures identified in a previous energy assessment, such as this energy audit. The incentive is reimbursed to the owner upon successful replacement and payment of the equipment.

The building does qualify for this program because its electrical demand is less than the maximum peak electrical demand of 200 kW for the last 12 month period.

6.4 New Jersey Pay For Performance Program (P4P)

This building may be eligible for incentives from the New Jersey Office of Clean Energy. The most significant incentives are available from the New Jersey Pay for Performance (P4P) Program. The P4P program is designed to offset the cost of energy conservation projects for facilities that pay the Societal Benefits Charge (SBC) and whose demand (kW) in any of the preceding 12 months exceeds 200 kW. This demand minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations and *is not applicable to public schools*. Facilities that meet this criterion must also achieve a minimum performance target of 15% energy reduction by using the EPA Portfolio Manager benchmarking tool before and after implementation of the measure(s). If the participant is a municipal electric company customer, and a customer of a regulated gas New Jersey Utility, only gas measures will be eligible under the Program. Available incentives are as follows:

Incentive #1: Energy Reduction Plan – This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP). The ERP must include a detailed energy audit of the desired ECMs, energy savings calculations (using building modeling software) and inputting of all utility bills into the EPA Portfolio Manager website.

- Incentive Amount: $0.10/SF
- Minimum incentive: $5,000
- Maximum Incentive: $50,000 or 50% of Facility annual energy cost

The standard incentive pays $0.10 per square foot, up to a maximum of $50,000, not to exceed 50% of facility annual energy cost, paid after approval of application. For Customers that have successfully participated in the LGEA program incentive#1 will be reduced by 50% to $0.05/SF up to $25,000. rather than the standard incentive noted above. The ERP must be completed by a Certified Energy Manager (CEM) and submitted along with the project application.

Incentive #2: Installation of Recommended Measures – This incentive is based on projected energy savings as determined in Incentive #1 (Minimum 15% savings must be achieved), and is paid upon successful installation of recommended measures.

<u>Electric</u>

- Base incentive based on 15% savings: $0.09/ per projected kWh saved.
- For each % over 15% add: $0.005 per projected kWh saved.
- Maximum incentive: $0.11/ kWh per projected kWh saved.

<u>Gas</u>

- Base incentive based on 15% savings: $0.90/ per projected Therm saved.

- For each % over 15% add: $0.05 per projected Therm saved.
- Maximum incentive: $1.25 per projected Therm saved.

Incentive cap: 25% of total project cost

Incentive #3: Post-Construction Benchmarking Report – This incentive is paid after acceptance of a report proving energy savings over one year utilizing the Environmental Protection Agency (EPA) Portfolio Manager benchmarking tool.

Electric
- Base incentive based on 15% savings: $0.09/ per projected kWh saved.
- For each % over 15% add: $0.005 per projected kWh saved.
- Maximum incentive: $0.11/ kWh per projected kWh saved.

Gas
- Base incentive based on 15% savings: $0.90/ per projected Therm saved.
- For each % over 15% add: $0.05 per projected Therm saved.
- Maximum incentive: $1.25 per projected Therm saved.

The total value of Incentive #2 and #3 may not exceed 50% of the total project cost. Incentives will be limited to $1 million per gas and electric account per building with a maximum of $2 million per project.

For the purpose of demonstrating the eligibility of the ECM's to meet the minimum savings requirement of 15% annual savings for the Pay for Performance Program, all ECM's identified in this report have been included in these incentive calculations. The results for the building are shown in Appendix C.

6.5 Energy Savings Improvement Plan

The Energy Savings Improvement Program (ESIP) allows government agencies to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. Under the recently enacted Chapter 4 of the Laws of 2009 (the law), the ESIP provides all government agencies in New Jersey with a flexible tool to improve and reduce energy usage with minimal expenditure of new financial resources.

ESIP allows local units to use "energy savings obligations" (ESO) to pay for the capital costs of energy improvements to their facilities. ESIP loans have a maximum loan term of 15 year. ESOs are not considered "new general obligation debt" of a local unit and do not count against debt limits or require voter approval. They may be issued as refunding bonds or leases. Savings generated from the installation of energy conservation measures pay the principal of and interest on the bonds; for that reason, the debt service created by the ESOs is not paid from the debt service fund, but is paid from the general fund.

For local governments interested in pursuing an ESIP, the first step is to perform an energy audit. Pursuing a Local Government Energy Audit through New Jersey's Clean Energy Program is a valuable first step to the ESIP approach. The "Local Finance Notice" outlines how local governments can develop and implement an ESIP for their facilities. The ESIP can be prepared internally if the entity has qualified staff. If not, the ESIP must be

implemented by an independent contractor and not by the energy savings company producing the Energy Reduction Plan.

The ESIP approach may not be appropriate for all energy conservation and energy efficiency improvements. Local units should carefully consider all alternatives to develop an approach that best meets their needs.

6.6 Renewable Energy Incentive Program

The Renewable Energy Incentive Program (REIP) is part of New Jersey's efforts to reach its Energy Master Plan goals of striving to use 30 percent of electricity from renewable sources by 2020.

Incentives for sustainable bio-power projects and for energy storage projects are currently under development, with competitive solicitations for each of those technologies expected to begin in the first quarter of 2014. The wind program is currently on hold.

New solar projects are no longer eligible for REIP incentives, but can register for Solar Renewable Energy Certificates (SRECs) through the SREC Registration Program (SRP).

7.0 ALTERNATIVE ENERGY SCREENING EVALUATION

7.1 Solar

7.1.1 ECM-S1 Photovoltaic Rooftop Solar Power Generation

The building was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter. The amount of available roof area determines how large of a solar array can be installed on any given roof. The table below summarizes the approximate roof area available on the building and the associated solar array size that can be installed.

Available Roof Area (Ft^2)	Potential PV Array Size (kW)
32,157	250

The PVWATTS solar power generation model was utilized to calculate PV power generation; this model is provided in Appendix E.

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey Solar Renewable Energy Certificates Program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. Payments that will be received by the PV producer (school) will change from year to year dependent upon supply and demand. There is no definitive way to calculate an exact price that will be received by the PV producer for SREC credits over the next 15 years. Renewable Energy Consultants estimates an average of $155/SREC for 2014 and this number was utilized in the cash flow for this report.

The system costs for PV installations were derived from recent solar contractor budgetary pricing in the state of New Jersey and include the total cost of the system installation (PV panels, inverters, wiring, ballast, controls). The cost of installation is currently about $4.00 per watt or $4,000 per kW of installed system, for a typical system. There are other considerations that have not been included in this pricing, such as the condition of the roof and need for structural reinforcement. Photovoltaic systems can be ground mounted if the roof is not suitable; however, this installation requires a substantial amount of open property (not wooded) and underground wiring, which adds more cost. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will most likely need to be replaced during the useful life of the PV system.

The implementation cost and savings related to this ECM are presented in Appendix E and summarized as follows:

Photovoltaic (PV) Rooftop Solar Power Generation – 250 kW System

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable SREC	Payback (without SREC)	Payback (with SREC)	Recommended
	Electricity		Natural Gas					
$	kW	kWh	Therms	$	$	Years	Years	Y/N
1,000,000	250.0	318,504	0	39,813	57,968	25.1	10.2	FS

Note: CHA typically recommends a more detailed evaluation be conducted for the installation of PV Solar arrays when the screening evaluation shows a payback of less than 20 years. Therefore, this ECM is recommended for further study. Before implementation is pursued, the school district should consult with a certified solar PV contractor, and replace the roof.

7.1.2 Solar Thermal Hot Water Generation

Active solar thermal systems use solar collectors to gather the sun's energy to heat a fluid. An absorber in the collector (usually black colored piping) converts the sun's energy into heat. The heat is transferred to circulating water, antifreeze, or air for immediate use or is storage for later utilization. Applications for active solar thermal energy include supplementing domestic hot water, heating swimming pools, space heating or preheating air in residential and commercial buildings.

A standard solar hot water system is typically composed of solar collectors, heat storage vessel, piping, circulators, and controls. Systems are typically integrated to work alongside a conventional heating system that provides heat when solar resources are not sufficient. The solar collectors are usually placed on the roof of the building, oriented south, and tilted at the same angle as the site's latitude, to maximize the amount of solar radiation collected on a yearly basis.

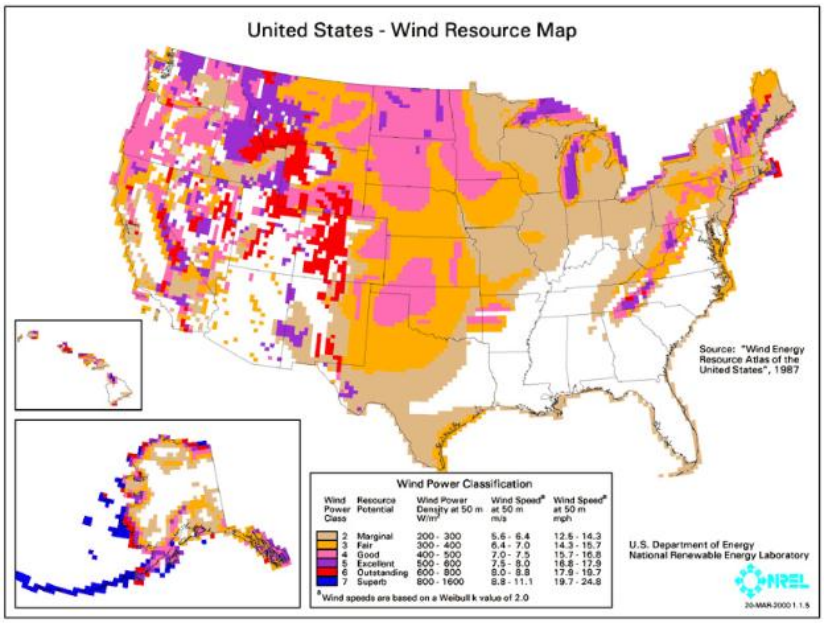
Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping). The most practical system would transfer the heat from the panels to thermal storage tanks and then use the pre-heated water for domestic hot water production. DHW is presently produced by natural gas fired water heaters and, therefore, this measure would offer natural gas utility savings. Unfortunately, the amount of domestic hot water that is currently used by this building is very small. Installing a solar domestic hot water system is not recommended due to the limited amount of domestic hot water presently consumed by the building.

This measure is not recommended due to the relatively low domestic hot water usage.

7.2 Wind Powered Turbines

Wind power is the conversion of kinetic energy from wind into mechanical power that is used to drive a generator which creates electricity by means of a wind turbine. A wind turbine consists of rotor and blades connected to a gearbox and generator that are mounted onto a tower. Newer wind turbines also use advanced technology to generate

electricity at a variety of frequencies depending on the wind speed, convert it to DC and then back to AC before sending it to the grid. Wind turbines range from 50 – 750 kW for utility scale turbines down to below 50 kW for residential use. On a scale of 1 (the lowest) to 7 (the highest), Class 3 and above (wind speeds of 13 mph or greater) are generally considered "good wind resource" according to the Wind Energy Development Programmatic EIS Information Center hosted by the Bureau of Land Management. According to the map below, published by NREL, Newark, NJ is classified as Class 1 at 50m, meaning the city would not be a good candidate for wind power.



This measure is not recommended due to the location of the building.

7.3 Combined Heat and Power Plant

Combined heat and power (CHP), cogeneration, is self-production of electricity on-site with beneficial recovery of the heat byproduct from the electrical generator. Common CHP equipment includes reciprocating engine-driven, micro turbines, steam turbines, and fuel cells. Typical CHP customers include industrial, commercial, institutional, educational institutions, and multifamily residential facilities. CHP systems that are commercially viable at the present time are sized approximately 50 kW and above, with numerous options in blocks grouped around 300 kW, 800 kW, 1,200 kW and larger. Typically, CHP systems are used to produce a portion of the electricity needed by a facility some or all of the time, with the balance of electric needs satisfied by purchase from the grid.

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. This building has sufficient need for electrical generation and the ability to use most of the thermal byproduct during the winter; however thermal usage during the summer months does not exist. Thermal energy produced by the CHP plant in the warmer months will be wasted. An absorption chiller could be installed to utilize the

heat to produce chilled water; however, there is no chilled water distribution system in the building. CHP is not recommended due to the building's limited summer thermal demand.

This measure is not recommended due to the absence of year-round thermal loads which are needed for efficiency CHP operation. However, a mini-size CHP could be an option for the school to consider. The sizing and energy savings of the mini-size CHP require further study.

7.4 Demand Response Curtailment

Presently, electricity is delivered by PSE&G, which receives the electricity from regional power grid RFC. PSE&G is the regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia including the State of New Jersey.

Utility Curtailment is an agreement with the utility provider's regional transmission organization and an approved Curtailment Service Provider (CSP) to shed electrical load by either turning major equipment off or energizing all or part of a facility utilizing an emergency generator; therefore, reducing the electrical demand on the utility grid. This program is to benefit the utility company during high demand periods and the utility provider offers incentives to the CSP to participate in this program. Enrolling in the program will require program participants to drop electrical load or turn on emergency generators during high electrical demand conditions or during emergencies. Part of the program also will require that program participants reduce their required load or run emergency generators with notice to test the system.

A pre-approved CSP will require a minimum of 100 kW of load reduction to participate in any curtailment program. From January 2013 through June 2014 the following table summarizes the electricity load profile for the building.

Building Electric Load Profile

Peak Demand kW	Min Demand kW	Avg Demand kW	Onsite Generation Y/N	Eligible? Y/N
715	437	585	N	Y

This measure is not recommended for further review because the building usage does not lend itself to load sharing.

8.0 CONCLUSIONS & RECOMMENDATIONS

The following section summarizes the LGEA energy audit conducted by CHA for the facility.

The following projects should be considered for implementation:

- Add Spray Foam Roof Insulation
- Add Spray Foam Wall Insulation
- Replace Windows
- Replace Cooling Condensing Units and Coils
- Install DDC controls
- Lighting Replacements with Controls (Occupancy Sensors)

The potential annual energy and cost savings for the recommended ECMs are shown in the following table.

Electric Savings (kWh)	Natural Gas Savings (therms)	Total Savings ($)	Payback (years)
202,179	10,744	38,054	17.8

If the recommended ECMs are implemented, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs ($)	72,601	69,396	35%
Electricity (kWh)	357,401	155,222	57%
Natural Gas (therms)	29,221	18,477	37%
Site EUI (kbtu/SF/Yr)	64.7	37.1	

Next Steps: This energy audit has identified several areas of potential energy savings. The school can use this information to pursue incentives offered by the NJBPU's NJ Clean Energy Program.

APPENDIX A

Utility Usage Analysis and Alternate Utility Suppliers

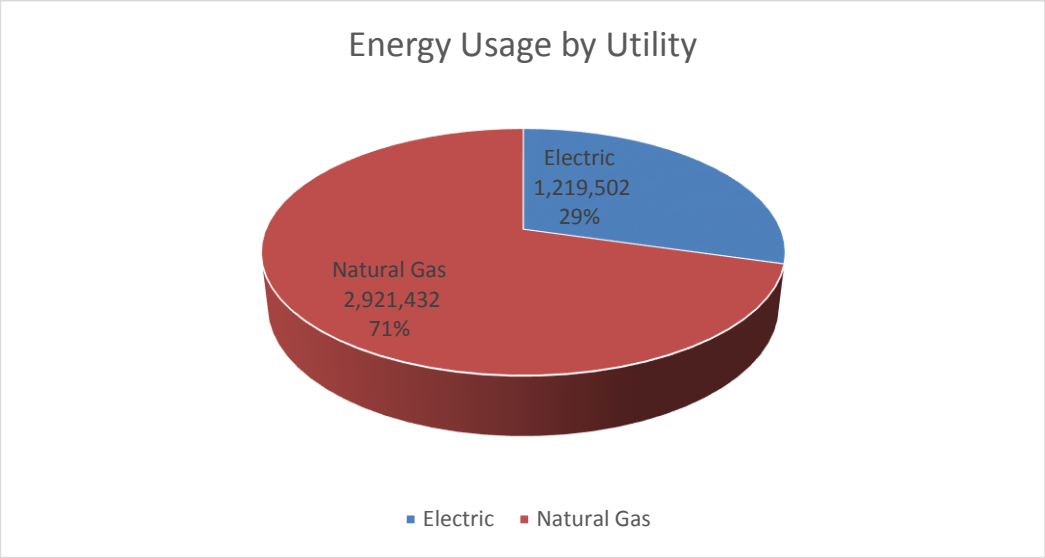
Local Government Energy Audit
Hunterdon County Educational Service Commission
West Amwell Campus - 1422 Route 179, Lambertville, NJ

Annual Utilities

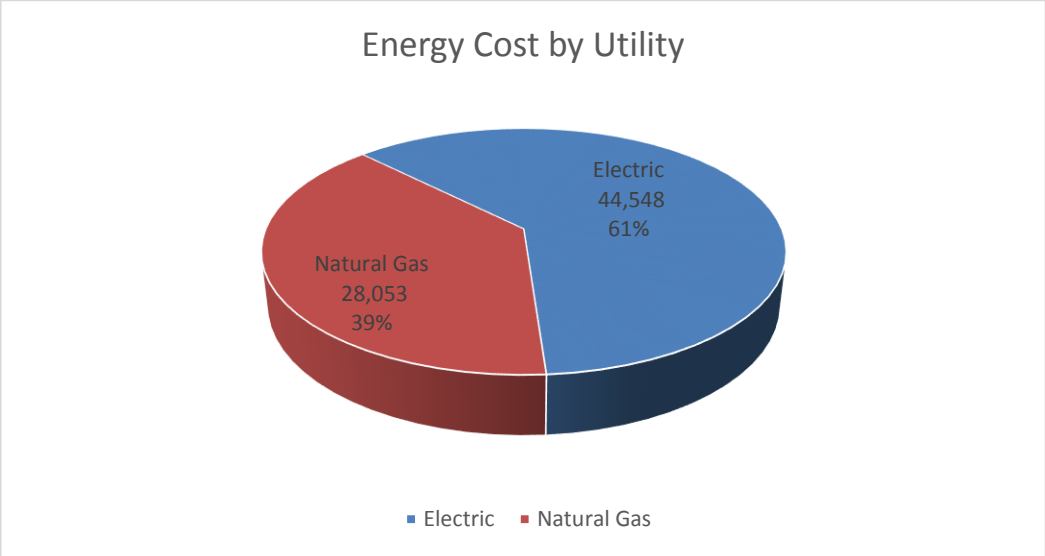
12-month Summary

Electric		
Annual Usage	357,401	kWh/yr
Annual Cost	44,548	$
Blended Rate	0.125	$/kWh
Consumption Rate	0.098	$/kWh
Demand Rate	6.27	$/kW
Peak Demand	183.1	kW
Min. Demand	93.1	kW
Avg. Demand	128.9	kW
Natural Gas		
Annual Usage	29,221	Therms/yr
Annual Cost	28,053	$
Blended Rate	0.960	$/therm
Consumption Rate	0.881	$/therm
Demand Rate	0.079	$/therm
Energy Summary		
Building Area	64,000	SF
Energy Usage Intensity (EUI)	65	KBtu/SF/yr
Energy Cost Index (ECI)	1.13	$/SF/yr
Total Annual Utility Costs	72,601	$

Utility	KBtu	%
Electric	1,219,502	29%
Natural Gas	2,921,432	71%
	4,140,934	100%



Utility	$	%
Electric	44,548	61%
Natural Gas	28,053	39%
	72,601	100%



Local Government Energy Audit
Hunterdon County Educational Service Commission
West Amwell Campus - 1422 Route 179, Lambertville, NJ

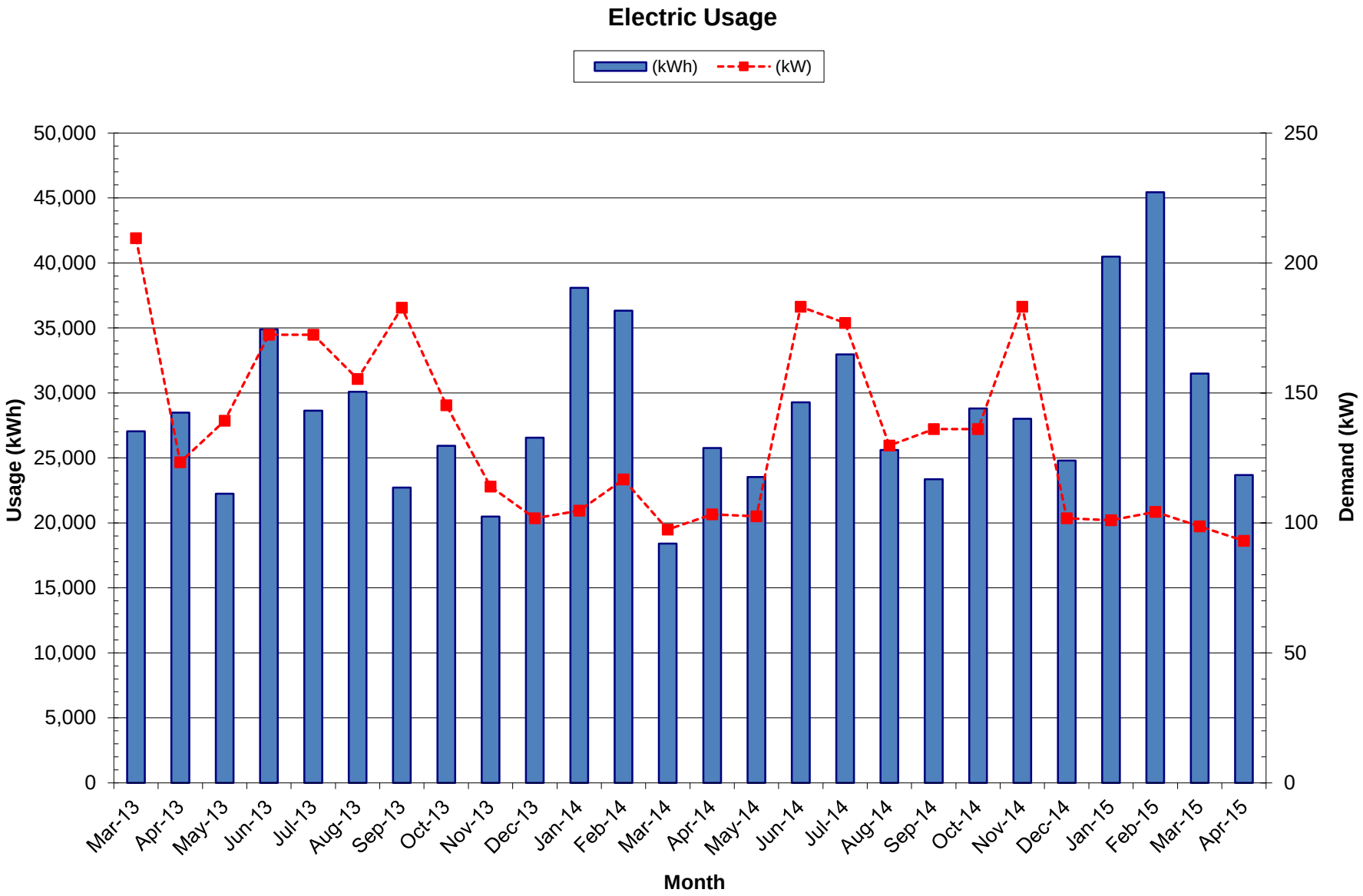
Electric Service

For Service at: West Amwell Campus - 1422 Route 179, Lambertville, NJ
Account No.: 100-003-681-051
Meter No.: S36434286
Delivery: JCP&L
Supply: FirstEnergy Solutions Corp.

					Provider Charges			Unit Costs				
	Consumption		Demand		Delivery	Supplier	Total	Demand	Consumption	Delivery	Supplier	Blended Rate
Month	(kWh)	($)	(kW)	($)	($)	($)	($)	($/kW)	($/kWh)	($/kWh)	($/kWh)	($/kWh)
March-13	27,040	2,329.12	209.5	673.67	1,172.73	1,830.06	3,002.79	3.216	0.086	0.043	0.068	0.111
April-13	28,480	2,450.38	123.3	809.40	1,332.25	1,927.53	3,259.78	6.564	0.086	0.047	0.068	0.114
May-13	22,240	1,924.97	139.3	912.92	1,332.69	1,505.20	2,837.89	6.554	0.087	0.060	0.068	0.128
June-13	34,880	3,420.11	172.4	1,208.11	1,841.31	2,786.91	4,628.22	7.008	0.098	0.053	0.080	0.133
July-13	28,640	2,818.46	172.4	1,208.11	1,738.23	2,288.34	4,026.57	7.008	0.098	0.061	0.080	0.141
August-13	30,080	2,957.30	155.4	1,090.13	1,644.04	2,403.39	4,047.43	7.015	0.098	0.055	0.080	0.135
September-13	22,720	2,247.69	182.8	1,280.25	1,712.61	1,815.33	3,527.94	7.004	0.099	0.075	0.080	0.155
October-13	25,920	2,653.70	145.2	851.09	1,433.78	2,071.01	3,504.79	5.862	0.102	0.055	0.080	0.135
November-13	20,480	2,029.14	114.0	749.23	1,142.02	1,636.35	2,778.37	6.572	0.099	0.056	0.080	0.136
December-13	26,560	2,615.98	101.8	670.30	1,164.14	2,122.14	3,286.28	6.584	0.098	0.044	0.080	0.124
January-14	38,080	3,681.98	104.7	689.06	1,328.45	3,042.59	4,371.04	6.581	0.097	0.035	0.080	0.115
February-14	36,320	3,504.85	116.7	766.70	1,369.58	2,901.97	4,271.55	6.570	0.096	0.038	0.080	0.118
March-14	18,400	1,792.69	97.4	534.86	857.39	1,470.16	2,327.55	5.491	0.097	0.047	0.080	0.126
April-14	25,760	2,501.05	103.3	680.00	1,122.83	2,058.22	3,181.05	6.583	0.097	0.044	0.080	0.123
May-14	23,520	2,288.12	102.5	674.83	1,083.70	1,879.25	2,962.95	6.584	0.097	0.046	0.080	0.126
June-14	29,280	2,840.28	183.1	1,282.36	1,783.17	2,339.47	4,122.64	7.004	0.097	0.061	0.080	0.141
July-14	32,960	3,190.09	176.9	1,239.34	1,795.93	2,633.50	4,429.43	7.006	0.097	0.054	0.080	0.134
August-14	25,600	2,492.48	129.7	911.77	1,358.81	2,045.44	3,404.25	7.030	0.097	0.053	0.080	0.133
September-14	23,360	2,290.97	136.1	956.18	1,380.69	1,866.46	3,247.15	7.026	0.098	0.059	0.080	0.139
October-14	28,800	2,802.60	136.1	892.22	1,393.70	2,301.12	3,694.82	6.556	0.097	0.048	0.080	0.128
November-14	28,000	2,723.70	183.1	590.25	1,076.75	2,237.20	3,313.95	3.224	0.097	0.038	0.080	0.118
December-14	24,800	2,418.31	101.8	670.30	1,107.09	1,981.52	3,088.61	6.584	0.098	0.045	0.080	0.125
January-15	40,480	3,914.33	101.0	665.12	1,345.10	3,234.35	4,579.45	6.585	0.097	0.033	0.080	0.113
February-15	45,440	4,417.80	104.2	685.82	1,472.96	3,630.66	5,103.62	6.582	0.097	0.032	0.080	0.112
March-15	31,481	3,110.99	98.7	603.63	1,196.17	2,518.45	3,714.62	6.119	0.099	0.038	0.080	0.118
April-15	23,680	2,360.11	93.1	526.57	994.65	1,892.03	2,886.68	5.656	0.100	0.042	0.080	0.122
Total (All)	**743,001**	**$71,777.20**	**209.5**	**21,822.22**	**$35,180.77**	**$58,418.65**	**$93,599.42**	**$6.263**	**$0.097**	**$0.047**	**$0.079**	**$0.126**
Total (last 12-months)	**357,401**	**$34,849.78**	**183.1**	**9,698.39**	**$15,988.72**	**$28,559.45**	**$44,548.17**	**$6.272**	**$0.098**	**$0.045**	**$0.080**	**$0.125**
Notes	1A	1B	2A	2B	3	4	5	6	7	8	9	9

1A.) Number of kWh of electric energy used per month
1B.) Consumption charges ($)
2A.) Number of kW of power measured
2B.) Demand charges ($)
3.) Electric charges from Delivery provider
4.) Electric charges from Supply provider - note, includes 8.875% tax
5.) Total charges (Delivery + Supplier)
6.) Demand charges ($) / Demand (kW)
7.) Consumption charges ($) / Consumption (kWh)
8.) Delivery Charges ($) / Consumption (kWh)
9.) Supplier Charges ($) / Consumption (kWh)
10.) Total Charges ($) / Consumption (kWh)

36% of blended rate (fixed portion of the bill that can't be negotiated)
64% of blended rate (portion of the bill that can be negotiated)


Electric Usage
(kWh)
(kW)
Usage (kWh)
Demand (kW)
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
250
200
150
100
50
0
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
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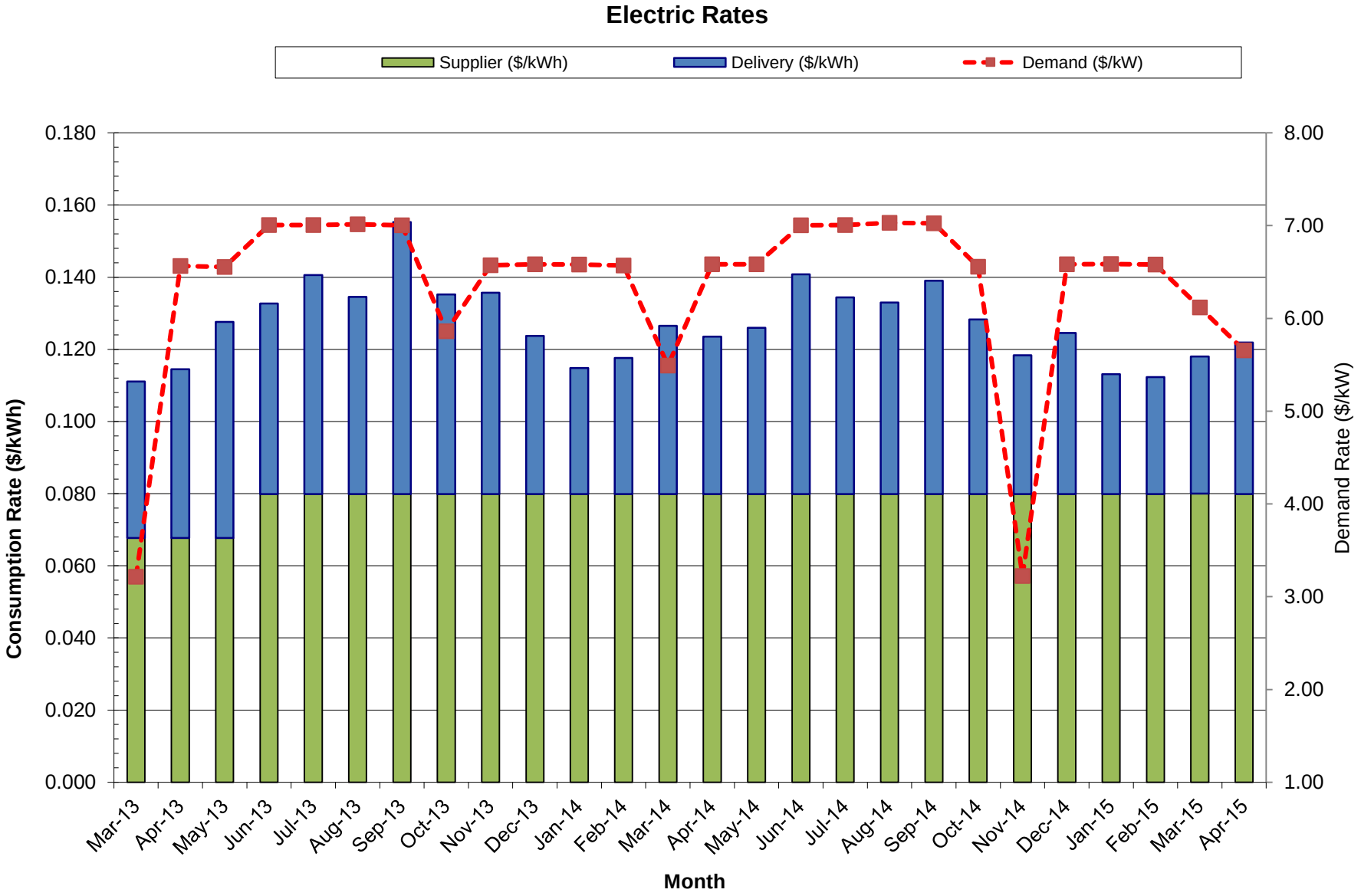
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
Month

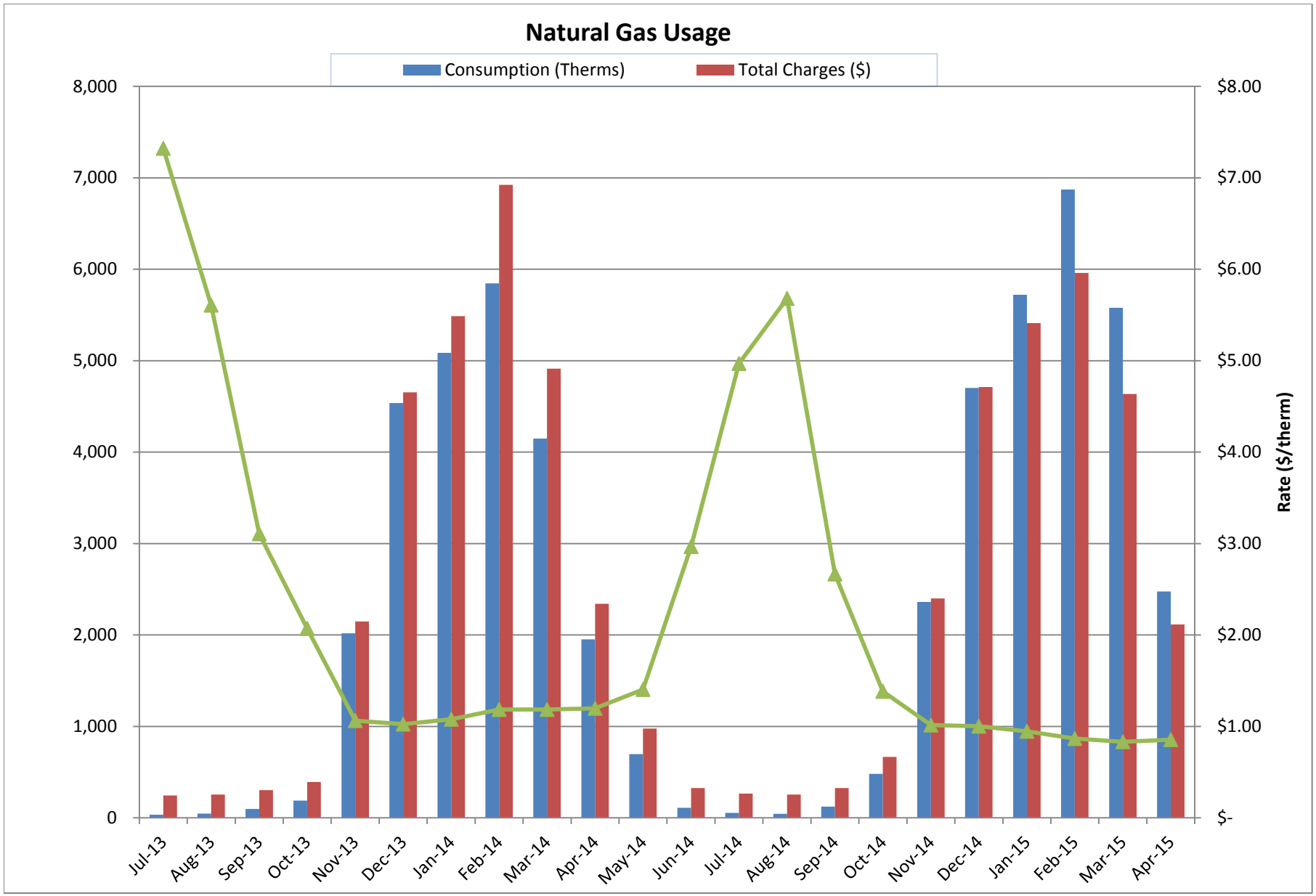

Electric Rates
Supplier ($/kWh)
Delivery ($/kWh)
Demand ($/kW)
Consumption Rate ($/kWh)
Demand Rate ($/kW)
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15
Month

Local Government Energy Audit
Hunterdon County Educational Service Commission
West Amwell Campus - 1422 Route 179, Lambertville, NJ

Natural Gas Service

For Service at: West Amwell Campus - 1422 Route 179, Lambertville, NJ
Account No.: 5686245371
Meter No: 654075
Delivery: Elizabeth Town Gas
Supply: Elizabeth Town Gas

Month	Consumption (Therms)	Demand Charge ($)	Consumption Charge ($)	Total Charges ($)	Demand Rate ($/Therm)	Consumption Rate ($/Therm)	Total Rate ($/Therm)
July-13	33.3	191.40	52.43	243.83	5.748	1.574	7.322
August-13	45.3	191.40	62.54	253.94	4.225	1.381	5.606
September-13	97.6	191.40	111.84	303.24	1.961	1.146	3.107
October-13	189.8	191.40	201.90	393.30	1.008	1.064	2.072
November-13	2,019.0	191.40	1,957.07	2,148.47	0.095	0.969	1.064
December-13	4,536.8	191.40	4,463.09	4,654.49	0.042	0.984	1.026
January-14	5,086.1	191.40	5,296.59	5,487.99	0.038	1.041	1.079
February-14	5,844.9	191.40	6,732.67	6,924.07	0.033	1.152	1.185
March-14	4,148.3	191.40	4,720.66	4,912.06	0.046	1.138	1.184
April-14	1,952.2	191.40	2,149.21	2,340.61	0.098	1.101	1.199
May-14	696.3	191.40	786.41	977.81	0.275	1.129	1.404
June-14	110.2	191.40	135.43	326.83	1.737	1.229	2.966
July-14	53.3	191.40	73.46	264.86	3.591	1.378	4.969
August-14	44.7	191.40	62.50	253.90	4.282	1.398	5.680
September-14	122.7	191.40	135.68	327.08	1.560	1.106	2.666
October-14	482.1	191.40	475.84	667.24	0.397	0.987	1.384
November-14	2,361.8	191.40	2,207.40	2,398.80	0.081	0.935	1.016
December-14	4,702.1	191.40	4,521.05	4,712.45	0.041	0.961	1.002
January-15	5,720.4	191.40	5,220.81	5,412.21	0.033	0.913	0.946
February-15	6,872.7	191.40	5,769.54	5,960.94	0.028	0.839	0.867
March-15	5,578.0	191.40	4,443.85	4,635.25	0.034	0.797	0.831
April-15	2,477.0	191.40	1,923.78	2,115.18	0.077	0.777	0.854
Total (All)	**53,174.6**	**$ 4,210.80**	**$ 51,503.75**	**$ 55,714.55**	**0.079**	**0.969**	**1.048**
Total (last 12-months)	**29,221.3**	**$ 2,296.80**	**$ 25,755.75**	**$ 28,052.55**	**0.079**	**0.881**	**0.960**
		8.2%	91.8%	100.0%			


Natural Gas Usage
Consumption (Therms)
Total Charges ($)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$-
Rate ($/therm)
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
Feb-15
Mar-15
Apr-15

ELIZABETHTOWN GAS CO. SERVICE TERRITORY
Last Updated: 12/11/14

***CUSTOMER CLASS** - R – RESIDENTIAL C – COMMERCIAL I – INDUSTRIAL

Supplier	Telephone & Web Site	*Customer Class
Abest Power & Gas of NJ, LLC 202 Smith Street Perth Amboy, NJ 08861	(888) 987-6937 www.AbestPower.com	**R/C/I** **ACTIVE**
Alpha Gas and Electric, LLC 641 5th Street Lakewood, NJ 08701	855-553-6374 www.alphagasandelectric.com	**R/C** **ACTIVE**
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	201-384-5552 www.astralenergyllc.com	**R/C/I** **ACTIVE**
BBPC, LLC d/b/a Great Eastern Energy 116 Village Blvd. Suite 200 Princeton, NJ 08540	888-651-4121 www.greateasternenergy.com	**C** **ACTIVE**
Choice Energy, LLC 4257 US Highway 9, Suite 6C Freehold, NJ 07728	(888) 565-4490 www.4choiceenergy.com	**R/C/I**
Clearview Electric Inc. **d/b/a Clearview Gas** 1744 Lexington Ave. Pennsauken, NJ 08110	800-746-4720 www.clearviewenergy.com	**R/C** **ACTIVE**
Colonial Energy, Inc. 83 Harding Road Wyckoff, NJ 07481	845-429-3229 www.colonialgroupinc.com	**C/I** **ACTIVE**
Commerce Energy, Inc. 7 Cedar Terrace Ramsey, NJ 07746	888-817-8572 www.commerceenergy.com	**R** **ACTIVE**
Compass Energy Services, Inc. 33 Wood Avenue South, Suite 610 Iselin, NJ 08830	866-867-8328 www.compassenergy.net	**C/I** **ACTIVE**
ConocoPhillips Company 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	800-646-4427 www.conocophillips.com	**C/I** **ACTIVE**
Consolidated Edison Solutions, Inc. Cherry Tree Corporate Center 535 State Highway 38, Suite 140	888-665-0955	**C/I**

Cherry Hill, NJ 08002	www.conedsolutions.com	**ACTIVE**
Constellation NewEnergy-Gas Division, LLC 116 Village Boulevard, Suite 200 Princeton, NJ 08540	800-785-4373 www.constellation.com	**C/I** **ACTIVE**
Constellation Energy Gas Choice, Inc. 116 Village Blvd., Suite 200 Princeton, NJ 08540	800-785-4373 www.constellation.com	**R/C/I** **ACTIVE**
Direct Energy Business Marketing, LLC (fka Hess Energy Marketing, LLC) One Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 http://www.business.directenergy.com/	**C/I** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	866-547-2722 www.directenergy.com	**R/C/I** **INACTIVE**
Direct Energy Small Business, LLC(fka Hess Small Business Services, LLC) One Hess Plaza Woodbridge, NJ 07095	(888) 464-4377 http://www.business.directenergy.com/	**C/I** **ACTIVE**
Energy Plus Natural Gas LP 309 Fellowship Road, East Gate Center Suite 200 Mt. Laurel, NJ 08054	877-866-9193 www.energypluscompany.com	**R/C** **ACTIVE**
UGI Energy Services, Inc. d/b/a GASMARK 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	856-273-9995 www.ugienergyservices.com	**C/I** **ACTIVE**
Gateway Energy Services Corporation 120 Wood Avenue, Suite 611 Iselin, NJ 08830	800-313-8333 Residential 800-715-8777 Commercial www.gesc.com	**R/C** **ACTIVE**
Glacial Energy of New Jersey, Inc. 21 Pine Street, Suite 237 Rockaway, NJ 07866	1-888-452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Global Energy Marketing LLC 129 Wentz Avenue Springfield, NJ 07081	800-542-0778 www.globalp.com	**C/I** **ACTIVE**
Great Eastern Energy 116 Village Blvd., Suite 200 Princeton, NJ 08540	888-651-4121 www.greateastern.com	**C/I** **ACTIVE**
Greenlight Energy 330 Hudson Street, Suite 4	718-204-7467	**C**

Hoboken, NJ 07030	www.greenlightenergy.us	**ACTIVE**
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095	800-437-7872 www.hess.com	**C/I** **ACTIVE**
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	888-264-4908 www.hikoenergy.com	**R/C/I** **ACTIVE**
Infinite Energy dba Intelligent Energy 1200 Route 22 East Suite 2000 Bridgewater, NJ 08807-2943	(800) 927-9794 www.InfiniteEnergy.com	**R/C/I** **ACTIVE**
Marathon Power LLC 302 Main Street Paterson, NJ 07505	888-779-7255 www.mecny.com	**R/C/I** **ACTIVE**
Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724	1-877-750-7046 www.metromediaenergy.com	**C/I** **ACTIVE**
NATGASCO (Supreme Energy, Inc.) 532 Freeman Street Orange, NJ 07050	800-840-4427 www.supremeenergyinc.com	**R/C** **ACTIVE**
Naughton Energy Corporation 1898 Route 940, Box 709 Pocono Pines, PA 18350	800-372-6942 www.naughtonenergy.com	**C/I** **ACTIVE**
New Energy Services LLC 101 Neptune Ave. Deal, NJ 07723`	800-660-3643 www.newenergyservicesllc.com	**R/C/I** **ACTIVE**
North Eastern States, Inc. d/b/a Entrust Energy 90 Washington Valley Road Bedminster, NJ 07921	(888) 535-6340 www.entrustenergy.com	**R/C/I** **ACTIVE**
Palmco Energy NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	877-726-5862 www.PalmcoEnergy.com	**R/C/I** **ACTIVE**
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	855-32-POWER (76937) www.plymouthenergy.com	**R/C/I** **ACTIVE**
Power Management Co., LLC d/b/a PMC Lightsavers Limited Liability Company 1600 Moseley Road Victor, NY 14564	(585) 249-1360 www.powermanagementco.com	**C/I** **ACTIVE**

PPL EnergyPlus, LLC **Shrewsbury Executive Offices** 788 Shrewsbury Avenue Suite 2200 Tinton Falls, NJ 07724	(732) 741-0505 www.pplenergyplus.com	**C/I** **ACTIVE**
PPL EnergyPlus Retail, LLC Shrewsbury Executive Offices 788 Shrewsbury Avenue, Suite 220 Tinton Falls, NJ 07724	(732) 741-0505 – 2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Progressive Energy Consulting, LLC PO Box 4582 Wayne, New Jersey 07474	(917) 837-7400 Progressivenrg@optionline.net	**R/C/I** **ACTIVE**
Prospect Resources, Inc. Incorp. Services Inc. 208 W. State Street Trenton, NJ 08608-1002	(847) 673-1959 www.prospectresources.com	**C** **ACTIVE**
Residents Energy, LLC 550 Broad Street Newark, NJ 07102	(888) 828-7374 www.residentsenergy.com	**R/C**
Respond Power LLC 1001 East Lawn Drive Teaneck, NJ 07666	877-973-7763 www.respondpower.com	**R/C/I** **ACTIVE**
RTE Enterprises, LLC 8 Gary Lane Califon, NJ 07830	N/A www.RTEenterprises.net	**C/I** **ACTIVE**
Save on Energy, LLC 1101 Red Ventures Drive Fort Mill, SC 29707	1 (877) 658-3183 www.saveonenergy.com	**R/C** **ACTIVE**
SIMEC, LLC 116 Village Blvd. Suite 200 Princeton, NJ 08540	(917) 620-0249 www.simecenergy.com	**R/C/I**
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	800-266-6020 www.southjerseyenergy.com	**R/C/I** **ACTIVE**
Sperian Energy Corp. Bridgewater Center 1200 Route 22 East Bridgewater, NJ 08807	888-682-8082 www.sperianenergy.com	**R/C/I** **ACTIVE**
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	855-466-2842 www.spragueenergy.com	**C/I** **ACTIVE**
Stream Energy New Jersey, LLC 309 Fellowship Road, Suite 200 Mt. Laurel, NJ 08054	(877) 369-8150 www.streamenergy.net	**R/C** **ACTIVE**

Summit Energy Services, Inc. 10350 Ormsby Park Place Suite 400 Louisville, KY 40223	1 (800) 90-SUMMIT www.summitenergy.com	**C/I** **ACTIVE**
Tiger Natural Gas, Inc. dba Tiger, Inc. 234 20th Avenue Brick, NJ 008724	888-875-6122 www.tigernaturalgas.com	**R/C/I** **ACTIVE**
UGI Energy Services, Inc. **dba UGI Energy Link** 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	800-427-8545 www.ugienergylink.com	**C/I** **ACTIVE**
Vista Energy Marketing, L.P. 197 State Route 18 South, Suite 3000 South Wing East Brunswick, NJ 08816	888-508-4782 www.vistaenergymarketing.com	**R/C/I** **ACTIVE**
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	800-557-1121 www.woodruffenergy.com	**R/C/I** **ACTIVE**
Woodruff Energy US LLC 73 Water St., P.O. Box 777 Bridgeton, NJ 08302	856-455-1111 800-557-1121 www.woodruffenergy.com	**C/I** **ACTIVE**
XOOM Energy New Jersey, LLC 744 Broad Street. 16th Floor Newark, NJ 07102	(888) 997-8979 www.xoomenergy.com	**R/C/I** **ACTIVE**
Your Energy Holdings, LLC One International Boulevard, Suite 400 Mahwah, NJ 07495-0400	855-732-2493 www.thisisyourenergy.com	**R/C/I** **ACTIVE**

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JCP&L SERVICE TERRITORY
Last Updated: 12/11/14

***CUSTOMER CLASS** - **R – RESIDENTIAL C – COMMERCIAL I –INDUSTRIAL**

Supplier	Telephone & Web Site	*Customer Class
Abest Power & Gas of NJ, LLC 202 Smith Street Perth Amboy, NJ 08861	(888) 987-6937 www.AbestPower.com	**R/C/I** **ACTIVE**
AEP Energy, Inc. f/k/a/ BlueStar Energy Services 309 Fellowship Road, Fl.2 Mount Laurel, NJ 08054	(866) 258-3782 www.aepenergy.com	**R/C/I** **ACTIVE**
Alpha Gas and Electric, LLC 641 5th Street Lakewood, NJ 08701	(855) 553-6374 www.alphagasandelectric.com	**R/C** **ACTIVE**
Ambit Northeast, LLC 103 Carnegie Center Suite 300 Princeton, NJ 08540	(877) 30-AMBIT (877) 302-6248 www.ambitenergy.com	**R/C** **ACTIVE**
American Powernet Management 437 Grove Street Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	**C/I** **ACTIVE**
AP Gas & Electric, (NJ) LLC 10 North Park Place, Suite 420 Morristown, NJ 07960	(855) 544-4895 www.apgellc.com	**R/C/I** **ACTIVE**
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	(201) 384-5552 www.astralenergyllc.com	**R/C/I** **ACTIVE**
BBPC, LLC d/b/a Great Eastern Energy 116 Village Blvd. Suite 200 Princeton, NJ 08540	(888) 651-4121 www.greateasternenergy.com	**C/I** **ACTIVE**
Blue Pilot Energy, LLC 197 State Rte. 18 South Ste. 3000 East Brunswick, NJ 08816	(800)-451-6956 www.bluepilotenergy.com	**R/C** **ACTIVE**
Brick Standard, LLC 235 Hudson Street Suite 1 Hoboken, NJ 07030	(201)706-8101 www.standardalternative.com	**C/I** **ACTIVE**

Champion Energy Services, LLC 1200 Route 22 East Bridgewater, NJ 08807	(888) 653-0093 www.championenergyservices.com	**R/C/I** **ACTIVE**
Choice Energy, LLC 4257 US Highway 9, Suite 6C Freehold, NJ 07728	888-565-4490 www.4choiceenergy.com	**R/C** **ACTIVE**
Choice Energy Services Retail, LP 30 Montgomery Street Suite 1410 Jersey City, NJ 07032	(888) 341-6370 www.choiceenergyservices.com	**R/C/I** **ACTIVE**
Clearview Electric, Inc. 1744 Lexington Avenue Pennsauken, NJ 08110	(888) CLR-VIEW (800) 746- 4702 www.clearviewenergy.com	**R/C/I** **ACTIVE**
Commerce Energy, Inc. 7 Cedar Terrace Ramsey, NJ 07446	1-866-587-8674 www.commerceenergy.com	**R/C** **ACTIVE**
Community Energy Inc. 51 Sandbrook Headquarters Road Stockton, NJ 08559	(866)946-3123 www.communityenergyinc.com	**R/C/I** **ACTIVE**
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway Suite 180 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com	**C/I** **ACTIVE**
ConocoPhillips Company 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(800) 646-4427 www.conocophillips.com	**C/I** **ACTIVE**
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.constellation.com	**R/C/I** **ACTIVE**
Constellation Energy 900A Lake Street, Suite 2 Ramsey, NJ 07446	(877) 997-9995 www.constellation.com	**R** **ACTIVE**
Direct Energy Business, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(888) 925-9115 http://www.business.directenergy.com/	**C/I** **ACTIVE**

Direct Energy Business Marketing, LLC 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 http://www.business.directenergy.com/	**C/I** **ACTIVE**
Direct Energy Services, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com	**C/I** **INACTIVE**
Direct Energy Small Business, LLC (fka Hess Small Business Services, LLC) One Hess Plaza Woodbridge, NJ 07095	(888) 464-4377 http://www.business.directenergy.com/	**C/I** **ACTIVE**
Discount Energy Group, LLC 811 Church Road, Suite 149 Cherry Hill, NJ 08002	(800) 282-3331 www.discountenergygroup.com	**R/C** **ACTIVE**
DTE Energy Supply, Inc. One Gateway Center, Suite 2600 Newark, NJ 07102	(877) 332-2450 www.dtesupply.com	**C/I** **ACTIVE**
Energy Plus Holdings LLC 309 Fellowship Road East Gate Center, Suite 200 Mt. Laurel, NJ 08054	(877) 866-9193 www.energypluscompany.com	**R/C** **ACTIVE**
Energy.me Midwest LLC 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270 www.energy.me	**R/C/I** **ACTIVE**
Ethical Electric Benefit Co. d/b/a Ethical Electric 100 Overlook Center, 2nd Fl. Princeton, NJ 08540	(888) 444-9452 www.ethicalelectric.com	**R/C** **ACTIVE**
FirstEnergy Solutions Corp. 150 West State Street Trenton, NJ 08608	(866) 625-7318 www.fes.com	**C/I** **ACTIVE**
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com	**R/C/I** **ACTIVE**
GDF SUEZ Energy Resources NA, Inc. 333 Thornall Street	(866) 999-8374	**C/I**

Sixth Floor Edison, NJ 08819	www.gdfsuezenergyresources.com	**ACTIVE**
GDF Suez Retail Energy Solutions LLC d/b/a THINK ENERGY 333 Thornall St. Sixth Floor Edison, NJ 08819	1-866-252-0078 www.mythinkenergy.com	**R/C/I** **ACTIVE**
Glacial Energy of New Jersey, Inc. 21 Pine Street, Suite 237 Rockaway, NJ 07866	(888) 452-2425 www.glacialenergy.com	**C/I** **ACTIVE**
Global Energy Marketing LLC 129 Wentz Avenue Springfield, NJ 07081	(800) 542-0778 www.globalp.com	**R/C/I** **ACTIVE**
Green Mountain Energy Company 211 Carnegie Center Drive Princeton, NJ 08540	(866) 767-5818 www.greenmountain.com/commercial-home	**C/I** **ACTIVE**
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com	**C/I** **ACTIVE**
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	(877) 887-6866 www.idtenergy.com	**R/C** **ACTIVE**
Independence Energy Group, LLC 211 Carnegie Center Princeton, NJ 08540	(877) 235-6708 www.chooseindependence.com	**R/C** **ACTIVE**
Inspire Energy Holdings LLC 923 Haddonfield Road 3rd Fl. Building B2 Cherry Hill, NJ 08002	(866) 403-2620 www.inspireenergy.com	**R/C/I**
Integrys Energy Services, Inc. 33 Wood Ave, South, Suite 610 Iselin, NJ 08830	(800) 536-0151 www.integrysenergy.com	**C/I** **ACTIVE**
Liberty Power Delaware, LLC3000 Atrium Way Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	**R/C/I** **ACTIVE**

Liberty Power Holdings, LLC 3000 Atrium Way Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	**R/C/I** **ACTIVE**
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	**C/I** **ACTIVE**
Marathon Power LLC 302 Main Street Paterson, NJ 07505	(888) 779-7255 www.mecny.com	**R/C/I** **ACTIVE**
MP2 Energy NJ, LLC 111 River Street, Suite 1204 Hoboken, NJ 07030	(877) 238-5343 www.mp2energy.com	**R/C/I** **ACTIVE**
NATGASCO, Inc. (Supreme Energy, Inc.) 532 Freeman St. Orange, NJ 07050	(800) 840-4427 www.supremeenergyinc.com	**R/C** **ACTIVE**
NextEra Energy Services New Jersey, LLC 651 Jernee Mill Road Sayreville, NJ 08872	(877) 528-2890 Commercial (800) 882-1276 Residential www.nexteraenergyservices.com	**R/C/I** **ACTIVE**
New Jersey Gas & Electric 10 North Park Place Suite 420 Morristown, NJ 07960	(866) 568-0290 www.NJGandE.com	**R/C/I** **ACTIVE**
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.noblesolutions.com	**C/I** **ACTIVE**
Nordic Energy Services, LLC 50 Tice Boulevard, Suite 340 Woodcliff Lake, NJ 07677	(877) 808-1027 www.nordiceenergy.us.com	**R/C/I** **ACTIVE**
North American Power and Gas, LLC 222 Ridgedale Ave. Cedar Knolls, NJ 07927	(888) 313-9086 www.napower.com	**R/C/I** **ACTIVE**
North Eastern States, Inc. d/b/a Entrust Energy 90 Washington Valley Road Bedminster, NJ 07921	(888) 535-6340 www.entrustenergy.com	**R/C/I** **ACTIVE**

Oasis Power, LLC d/b/a Oasis Energy 11152 Westheimer, Suite 901 Houston, TX 77042	(800)324-3046 www.oasisenergy.com	**R/C** **ACTIVE**
Palmco Power NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com	**R/C/I** **ACTIVE**
Park Power, LLC 1200 South Church St. Suite 23 Mount Laurel, NJ 08054	856-778-0079 www.parkpower.com	**R/C/I** **ACTIVE**
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	(855) 32-POWER (76937) www.plymouthenergy.com	**R/C/I** **ACTIVE**
Power Management Co., LLC d/b/a PMC Lightsavers Limited Liability Company 1600 Moseley Road Victor, NY 14564	(585) 249-1360 www.powermanagementco.com	**C/I** **ACTIVE**
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	**C/I** **ACTIVE**
PPL EnergyPlus Retail, LLC 788 Shrewsbury Avenue, Suite 220 Tinton Falls, NJ 07724	(732) 741-0505 – 2000 www.pplenergyplus.com	**C/I** **ACTIVE**
Progressive Energy Consulting, LLC PO Box 4582 Wayne, New Jersey 07474	(917) 837-7400 Progressivenrg@optionline.net	**R/C/I** **ACTIVE**
Prospect Resources, Inc. 208 W. State Street Trenton, NJ 08608-1002	(847) 673-1959 www.prospectresources.com	**C** **ACTIVE**
Public Power & Utility of New Jersey, LLC One International Blvd, Suite 400 Mahwah, NJ 07495	(888) 354-4415 www.ppandu.com	**R/C/I** **ACTIVE**

Reliant Energy 211 Carnegie Center Princeton, NJ 08540	(877) 297-3795 (877) 297-3780 www.reliant.com	**R/C/I** **ACTIVE**
ResCom Energy LLC 18C Wave Crest Ave. Winfield Park, NJ 07036	(888) 238-4041 http://rescomenergy.com	**R/C/I** **ACTIVE**
Residents Energy, LLC **550 Broad Street** **Newark, NJ 07102**	(888) 828-7374 www.residentsenergy.com	**R/C**
Respond Power LLC 1001 East Lawn Drive Teaneck, NJ 07666	(888) 625-6760 www.majorenergy.com	**R/C/I** **ACTIVE**
SFE Energy One Gateway Center Suite 2600 Newark, NJ 07012	1 (877) 316-6344 www.sfeenergy.com	**R/C/I** **ACTIVE**
SIMEC, LLC 116 Village Blvd. Suite 200 Princeton, NJ 08540	(917) 620-0249 www.simecenergy.com	**R/C/I** **ACTIVE**
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, NJ 08007	(800) 695-0666 www.sjnaturalgas.com	**C** **ACTIVE**
SmartEnergy Holdings, LLC 100 Overlook Center 2nd Floor Princeton, NJ 08540	(800) 443-4440 www.smartenergy.com	**R/C/I** **ACTIVE**
South Jersey Energy Company 1 South Jersey Plaza Route 54 Folsom, NJ 08037	(800) 800-266-6020 www.southjerseyenergy.com	**R/C/I** **ACTIVE**
Sperian Energy Corp. 1200 Route 22 East, Suite 2000 Bridgewater, NJ 08807	(888) 682-8082 www.sperianenergy.com	**R/C/I** **ACTIVE**
Starion Energy PA Inc. 101 Warburton Avenue Hawthorne, NJ 07506	(800) 600-3040 www.starionenergy.com	**R/C/I** **ACTIVE**
Stream Energy New Jersey, LLC 309 Fellowship Road Suite 200	(877) 369-8150 www.streamenergy.net	**R/C** **ACTIVE**

Mt. Laurel, NJ 08054		
Summit Energy Service, Inc. 10350 Ormsby Park Place Suite 400 Louisville, KY 40223	1 (800) 90-SUMMIT www.summitenergy.com	**C/I** **ACTIVE**
Texas Retail Energy LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663 Attn: Chris Hendrix	(866) 532-0761 texasretailenergy.com	**C/I** **ACTIVE**
TransCanada Power Marketing Ltd. 190 Middlesex Essex Turnpike, Suite 200 Iselin, NJ 08830	(877) MEGAWAT www.transcanada.com/powermarketing	**C/I** **ACTIVE**
TriEagle Energy, LP 90 Washington Valley Rd Bedminster, NJ 07921	(877) 933-2453 www.trieagleenergy.com	**R/C/I** **ACTIVE**
UGI Energy Services, Inc. **dba UGI Energy Link** 224 Strawbridge Drive Suite 107 Moorestown, NJ 08057	(800) 427-8545 www.ugienergylinks.com	**C/I** **ACTIVE**
Verde Energy USA, Inc. 2001 Route 46 Waterview Plaza Suite 301 Parsippany, NJ 07054	(800) 388-3862 www.lowcostpower.com	**R/C** **ACTIVE**
Viridian Energy 2001 Route 46 Waterview Plaza Suite 310 Parsippany, NJ 07054	(866) 663-2508 www.viridian.com	**R/C/I** **ACTIVE**
XOOM Energy New Jersey, LLC 744 Broad Street. 16th Floor Newark, NJ 07102	(888) 997-8979 www.xoomenergy.com	**R/C/I** **ACTIVE**
YEP Energy 89 Headquarters Plaza North #1463 Morristown, NJ 07960	(855) 363-7736 www.yepenergyNJ.com	**R/C/I** **ACTIVE**

Your Energy Holdings, LLC One International Boulevard Suite 400 Mahwah, NJ 07495-0400	(855) 732-2493 www.thisisyourenergy.com	**R/C/I** **ACTIVE**

APPENDIX B

Equipment Inventory

Hunterdon County Educational Services Commission
CHA Project# 30313

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size	Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
UV-1,2,3,4,5,6,7,8	8	Trane	TACA04060F01SOWOOBO1MBO	W96E14752, W96E14748, W96E14751, W96E14750, W96E14749, W96G23372, W96G23371, W96G23370	Unit ventilator	48 MBH	9.0 EER	Classrooms 100-107	Classrooms	1996	-4	
DF-2,5,6,7	4	Trane	GLND010AEE10000	A96D34800, A96D34802, A96D34803, A96D34804	Gas Duct Heater	100 MBH	78%	EAH-3,1,2,4	Offices	2001	1	
DF-1,3,4,8	4	Trane	GLND010AEE10000	A96D34797, A96D34798, A96D34799, A96D34801	Gas Duct Heater	100MBH	78%	AHU-1,3,4,2	offcies	2001	1	
AHU-1	1	Trane	MCCA012GAMOABA000F0CAA00A0A-0000AC000B00AB00	K96E43549	Modular Climate Changers	-	NA	Above Storage Room	Building	2001	5	
AHU-2	1	Trane	MCCA006GAMOABA000C0CAA00A0A-0000AA000B00AB00	K96E43511	Modular Climate Changers	-	NA	Above Classrooms 123/126	Building	2001	5	
AC-1	1	Addison	RC144003F 12 Ton	10902501001	Air Conditioners	144MBH	9.0 EER	Exterior	Classrooms	2001	1	
AC-2	1	McQuoy	AP01505 15 Ton	STNU0108	Air Conditioners	180MBH	9.0 EER	Exterior	Offices	2001	1	
AC-3	1	Trane	TTA090A300CB 7.5 Ton	L095N2	Air Conditioners	90MBH	9.0 EER	Exterior	Offices	1996	-4	
AC-4	1	Trane	RAUCC256BK130 25 Ton	J96081092	Air Conditioners	300MBH	9.0 EER	Exterior	Multipurpose	1992	-8	
AC-5	1	Trane	TTA180C300CD 15 Ton	L2321BZAH	Air Conditioners	180MBH	9.0 EER	Exterior	Offices	1992	-8	
AC-6	1	Inter City	MH-00008736 5 Ton	L933350055	Air Conditioners	60MBH	9.0 EER	Exterior	Offices	1993	-7	
AC-7	1	York HP	EASE-F0365A 3 Ton	EADM027650	Air Conditioners	36MBH	9.0 EER	Exterior	Offices	2002	2	
AC-8	1	Lennox Hp	HP18-411U-7P 1.5 Ton	5187H64577	Air Conditioners	18MBH	9.0 EER	Exterior	Offices	1987	-13	
AC-9	1	Lennox HP	HP18-411U-3P 1.5 Ton	5187H64577	Air Conditioners	18MBH	9.0 EER	Exterior	Offices	1987	-13	
AC-10	1	Trane	TTA150B300BB 12.5 Ton	L1235AXAH	Air Conditioners	150MBH	9.0 EER	Exterior	Classrooms	1993	1	
AHU-3	1	Trane	MCCA010GAMOABA000E0CAA00A0A-AC000B00AB00	K96E43879	Modular Climate Changers	-	-	Above General Office	Building	1996	1	
AHU-4	1	Trane	MCCA008GAMOABA000E0CAA00A0A-BA000B00AB00	K96E43478	Modular Climate Changers	-	-	Above Student Staff Research	Building	1996	1	
HB-1,2	2	Peerless	211A-05	211-11675-0596, 211-11676-0596	Hydronic Boiler	840 MBH	80%	Boiler Room	Building	1996	6	
P1,2	2	Taco	P63CYY-3338	1638C393	In-line pump	2 HP	-	Boiler Room	Boilers	1996	1	
EF-1,1A	2	Loren Cook	60C3B	214S4320320000007010596, 214S432032007020596	Exhaust Fan	.25 HP	-	Roof	Building	1996	-4	
EF-2	1	Loren Cook	80C3B	214S4320320000028010596	Exhaust Fan	.25 HP	-	Roof	-	1996	-4	

Hunterdon County Educational Services Commission
CHA Project# 30313

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size	Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)	Other Info.
EF-3,4	2	Loren Cook	120C5B	214S4320320000038010596, 214S4320320000048010596	Exhaust Fan	.5 HP	-	Roof	-	1996	-4	
EF-5, 8	2	Loren Cook	180C8B-33	214S4320320000058010596, 214S4320320000009010596	Exhaust Fan	.25 HP	-	Roof	-	1996	-4	
EF-6,6A, 9	3	Loren Cook	100C3B	214S4320320000069010596, 214S4320320000069020596, 214S4320320001010105 96	Exhaust Fan	.25 HP	-	Roof	-	1996	-4	
EF-7	1	Loren Cook	135C3B 33	214S4320320000079010596	Exhaust Fan	.25 HP	-	Roof	-	1996	-4	
EF-10,10A,10B, 10C	4	Loren Cook	70C3B	214S4320320000017010596, 214S4320320000017020596, 214S4320320000017030596, 214S4320320000017040596	Exhaust Fan	.25 HP	-	Roof	-	1996	-4	
V-1,1A,3	3	Loren Cook	12x16VI	214S4320320000111010596, 214S4320320000111020596, 214S4320320000125010596	Exhaust Fan	-	-	Roof above boiler rm.	Boiler Room	1996	-4	
V-2	1	Loren Cook	18x42VI	214S4320320000118010596	Exhaust Fan	-	-	Roof	-	1996	-4	
V-4	1	Loren Cook	16x24VI	214S4320320000131010596	Exhaust Fan	-	-	Roof	-	1996	-4	
SF-1,2	2	Loren Cook	GN-820	214S4320320000170405 96, 214S4320320000017040596	Exhaust Fan	-	-	Above Boiler Rom Ceiling	Boiler Room	1996	-4	

Hunterdon County Educational Service Commission - West Amwell Campus
CHA Project No.30313
Existing Lighting & Audit Input

Cost of Electricity: **$0.098** **$/kWh**
$6.27 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
35LED	115	Classrooms	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.54	SW	1800	972	OCC	
35LED	115	Classrooms	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	SW	1800	486	OCC	
35LED	Computer Lab	Classrooms	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	SW	1800	486	OCC	
35LED	Computer Lab	Classrooms	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	SW	1800	486	OCC	
35LED	Computer Lab	Classrooms	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	SW	1800	486	OCC	
35LED	Woodshop	Classrooms	14	T 32 R F 3 (ELE)	F43ILL/2	90	1.26	SW	1800	2,268	OCC	
35LED	Woodshop	Classrooms	4	T 32 R F 3 (ELE)	F43ILL/2	90	0.36	SW	1800	648	OCC	
35LED	Woodshop Office	Offices	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	2600	468	OCC	
32LED	Woodshop Small Room	Classrooms	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	1800	216	OCC	
35LED	Art	Classrooms	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	SW	1800	486	OCC	
35LED	Art	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	1800	1,944	OCC	
35LED	Art Office	Offices	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	2600	468	OCC	
32LED	Art Small Room	Storage Areas	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	1040	125	None	
32LED	Art Kiln	Classrooms	1	1T 32 R F 2 (ELE)	F42LL	60	0.06	SW	1800	108	OCC	
32LED	Art/Woodshop Common Room	Offices	4	1T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2600	624	OCC	
35LED	All Purpose Room	Auditorium	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	1200	1,296	C-OCC	
35LED	All Purpose Room	Auditorium	13	T 32 R F 3 (ELE)	F43ILL/2	90	1.17	SW	1200	1,404	C-OCC	
35LED	Kitchen	cafeteria	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.54	SW	1000	540	C-OCC	
32LED	All Purpose Room Storage	Storage Areas	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	1040	125	None	
71	TO Room	Storage Areas	1	I 60	I60/1	60	0.06	SW	1040	62	None	
4LED	Storage	Storage Areas	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.07	SW	1040	75	None	
32LED	Mens Room	Restroom	3	1T 32 R F 2 (ELE)	F42LL	60	0.18	SW	3120	562	None	
32LED	Ladies Room	Restroom	4	1T 32 R F 2 (ELE)	F42LL	60	0.24	SW	3120	749	None	
32LED	Boiler Room	Mechanical Room	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	8736	1,048	None	
71	TO Room	Storage Areas	1	I 60	I60/1	60	0.06	SW	1040	62	None	
32LED	Storage	Storage Areas	3	1T 32 R F 2 (ELE)	F42LL	60	0.18	SW	1040	187	None	
35LED	Office across 112	Offices	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	2600	468	OCC	
35LED	Office across 113	Offices	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	2600	468	OCC	
32LED	Storage across 113	Storage Areas	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	1040	125	None	
32LED	Small Bathroom 1	Restroom	1	1T 32 R F 2 (ELE)	F42LL	60	0.06	SW	3120	187	None	
32LED	Small Bathroom 2	Restroom	1	1T 32 R F 2 (ELE)	F42LL	60	0.06	SW	3120	187	None	
32LED	Small Bathroom 3	Restroom	1	1T 32 R F 2 (ELE)	F42LL	60	0.06	SW	3120	187	None	
32LED	Small Bathroom 4	Restroom	1	1T 32 R F 2 (ELE)	F42LL	60	0.06	SW	3120	187	None	
32LED	Hallway 1	Common Areas	7	1T 32 R F 2 (ELE)	F42LL	60	0.42	SW	1800	756	None	
32LED	Hallway 3	Common Areas	10	1T 32 R F 2 (ELE)	F42LL	60	0.60	SW	1800	1,080	None	
32LED	Hallway 4	Common Areas	10	1T 32 R F 2 (ELE)	F42LL	60	0.60	SW	1800	1,080	None	
32LED	Hallway 5	Common Areas	10	1T 32 R F 2 (ELE)	F42LL	60	0.60	SW	1800	1,080	None	
32LED	Hallway 6	Common Areas	10	1T 32 R F 2 (ELE)	F42LL	60	0.60	SW	1800	1,080	None	
32LED	Hallway 7	Common Areas	10	1T 32 R F 2 (ELE)	F42LL	60	0.60	SW	1800	1,080	None	
32LED	Hallway 8	Common Areas	10	1T 32 R F 2 (ELE)	F42LL	60	0.60	SW	1800	1,080	None	
32LED	Hallway 14	Common Areas	10	1T 32 R F 2 (ELE)	F42LL	60	0.60	SW	1800	1,080	None	
32LED	Custodian Hall	Common Areas	5	1T 32 R F 2 (ELE)	F42LL	60	0.30	SW	1800	540	None	
30	Storage Next to Custodian	Storage Areas	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.23	SW	1040	236	None	
32LED	Hallway to Gym	Common Areas	10	1T 32 R F 2 (ELE)	F42LL	60	0.60	SW	1800	1,080	None	
9LED	Gym	Gymnasium	8	High Bay MH 400	MH400/1	458	3.66	SW	3000	10,992	C-OCC	
9LED	Gym	Gymnasium	8	High Bay MH 400	MH400/1	458	3.66	SW	3000	10,992	C-OCC	
9LED	Gym	Gymnasium	8	High Bay MH 400	MH400/1	458	3.66	SW	3000	10,992	C-OCC	
71	Gym Storage 1	Storage Areas	4	I 60	I60/1	60	0.24	SW	1040	250	None	
71	Gym Storage 2	Storage Areas	4	I 60	I60/1	60	0.24	SW	1040	250	None	
9LED	Warehouse	Common Areas	20	High Bay MH 400	MH400/1	458	9.16	Breaker	1800	16,488	None	
141LED	Outside Light Pole	Outdoor Lighting	5	HPS 200	HPS200/1	250	1.25	Timer	3640	4,550	None	
227LED	Outdoor Wall Packs (SM)	Outdoor Lighting	13	70 W MH Wall Pack	MH70/1	95	1.24	Timer	3640	4,495	None	
68LED	Outdoor Wall Packs (M)	Outdoor Lighting	3	175 MH WALL	MH175/1	215	0.65	Timer	3640	2,348	None	
169LED	Outdoor Wall Packs (LG)	Outdoor Lighting	8	WP 250 MH	MH250/1	295	2.36	Timer	3640	8,590	None	
	Total		**591**				**69.10**			**156,852**		

Hunterdon County Educational Service Commission - West Amwell Campus
CHA Project No.30313
ECM-L1 Lighting Replacements

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	**Unique description of the location - Room number/Room name: Floor number (if applicable)**	**No. of fixtures before the retrofit**	**"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape**	**Code from Table of Standard Fixture Wattages**	**Value from Table of Standard Fixture Wattages**	**(Watts/Fixt) * (Fixt No.)**	**Pre-inst. control device**	**Estimated daily hours for the usage group**	**(kW/space) * (Annual Hours)**	**No. of fixtures after the retrofit**	**"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape**	**Code from Table of Standard Fixture Wattages**	**Value from Table of Standard Fixture Wattages**	**(Watts/Fixt) * (Number of Fixtures)**	**Retrofit control device**	**Estimated annual hours for the usage group**	**(kW/space) * (Annual Hours)**	**(Original Annual kWh) - (Retrofit Annual kWh)**	**(Original Annual kW) - (Retrofit Annual kW)**	**(kWh Saved) * ($/kWh)**	**Cost for renovations to lighting system**	**Prescriptive Lighting Measures**	**Length of time for renovations cost to be recovered**	**Length of time for renovations cost to be recovered**
35LED	Lobby	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	972	6	T 59 R LED	RTLED38	38	0.2	SW	1,800	410	562	0.3	$ 78.52	$ 1,417.50	$300	18.1	14.2
35LED	Data Closet	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	8736	1,572	2	T 59 R LED	RTLED38	38	0.1	SW	8,736	664	909	0.1	$ 96.86	$ 472.50	$100	4.9	3.8
30	Principals Office	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.2	SW	2600	590	1	T 28 R F 4	F44SSILL	96	0.1	SW	2,600	250	341	0.1	$ 43.24	$ 270.00	$0	6.2	6.2
4LED	Principals Office	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	2600	374	2	2T XX R LED	2RTLED	25	0.1	SW	2,600	130	244	0.1	$ 31.03	$ 405.00	$0	13.1	13.1
4LED	Conference Room	6	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.4	SW	2600	1,123	6	2T XX R LED	2RTLED	25	0.2	SW	2,600	390	733	0.3	$ 93.08	$ 1,215.00	$0	13.1	13.1
4LED	Office Hall	9	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.6	SW	1800	1,166	9	2T XX R LED	2RTLED	25	0.2	SW	1,800	405	761	0.4	$ 106.45	$ 1,822.50	$0	17.1	17.1
6LED	Office Hall	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	1800	259	1	T 74 R LED	RTLED50	50	0.1	SW	1,800	90	169	0.1	$ 23.66	$ 236.25	$0	10.0	10.0
41LED	Office Hall	1	1B 40 R F 2 (MAG)	F42SS	94	0.1	SW	1800	169	1	4 ft LED Tube	200732x2	30	0.0	SW	1,800	54	115	0.1	$ 16.11	$ 233.70	$0	14.5	14.5
25LED	Front Office	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2600	291	4	EVO20/10	EVO20/10	22	0.1	SW	2,600	229	62	0.0	$ 7.92	$ 1,555.00	$200	196.3	171.1
32LED	Front Office	4	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2600	624	4	STLED4	STLED4	40	0.2	SW	2,600	416	208	0.1	$ 26.41	$ 1,426.80	$180	54.0	47.2
32LED	Front Office (Copier)	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2600	156	1	STLED4	STLED4	40	0.0	SW	2,600	104	52	0.0	$ 6.60	$ 356.70	$45	54.0	47.2
32LED	Small Interior Office	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2600	312	2	STLED4	STLED4	40	0.1	SW	2,600	208	104	0.0	$ 13.20	$ 713.40	$90	54.0	47.2
41LED	Office Bathroom Men	1	1B 40 R F 2 (MAG)	F42SS	94	0.1	SW	3120	293	1	4 ft LED Tube	200732x2	30	0.0	SW	3,120	94	200	0.1	$ 24.39	$ 233.70	$0	9.6	9.6
41LED	Office Bathroom Women	1	1B 40 R F 2 (MAG)	F42SS	94	0.1	SW	3120	293	1	4 ft LED Tube	200732x2	30	0.0	SW	3,120	94	200	0.1	$ 24.39	$ 233.70	$0	9.6	9.6
4LED	Office	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	2600	374	2	2T XX R LED	2RTLED	25	0.1	SW	2,600	130	244	0.1	$ 31.03	$ 405.00	$0	13.1	13.1
30	Electical Room	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.2	SW	8736	1,983	1	T 28 R F 4	F44SSILL	96	0.1	SW	8,736	839	1,144	0.1	$ 122.01	$ 270.00	$0	2.2	2.2
106	Office Side Exit	4	SP 65 I	I65/1	65	0.3	SW	1800	468	4	CF 26	CFQ26/1-L	27	0.1	SW	1,800	194	274	0.2	$ 38.25	$ 27.00	$0	0.7	0.7
185LED	Office w/ Window 1	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	SW	2,600	260	634	0.2	$ 80.54	$ 472.50	$0	5.9	5.9
106	Office w/ Window 1	2	SP 65 I	I65/1	65	0.1	SW	2600	338	2	CF 26	CFQ26/1-L	27	0.1	SW	2,600	140	198	0.1	$ 25.08	$ 13.50	$0	0.5	0.5
185LED	Office w/ Window 2	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	SW	2,600	260	634	0.2	$ 80.54	$ 472.50	$0	5.9	5.9
106	Office w/ Window 2	2	SP 65 I	I65/1	65	0.1	SW	2600	338	2	CF 26	CFQ26/1-L	27	0.1	SW	2,600	140	198	0.1	$ 25.08	$ 13.50	$0	0.5	0.5
185LED	Office w/ Window 3	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	SW	2,600	260	634	0.2	$ 80.54	$ 472.50	$0	5.9	5.9
106	Office w/ Window 3	2	SP 65 I	I65/1	65	0.1	SW	2600	338	2	CF 26	CFQ26/1-L	27	0.1	SW	2,600	140	198	0.1	$ 25.08	$ 13.50	$0	0.5	0.5
185LED	Office w/ Window 4	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	SW	2,600	260	634	0.2	$ 80.54	$ 472.50	$0	5.9	5.9
106	Office w/ Window 4	2	SP 65 I	I65/1	65	0.1	SW	2600	338	2	CF 26	CFQ26/1-L	27	0.1	SW	2,600	140	198	0.1	$ 25.08	$ 13.50	$0	0.5	0.5
185LED	Office w/ Window 5	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	SW	2,600	260	634	0.2	$ 80.54	$ 472.50	$0	5.9	5.9
106	Office w/ Window 5	2	SP 65 I	I65/1	65	0.1	SW	2600	338	2	CF 26	CFQ26/1-L	27	0.1	SW	2,600	140	198	0.1	$ 25.08	$ 13.50	$0	0.5	0.5
106	Faculty Room	13	SP 65 I	I65/1	65	0.8	SW	2600	2,197	13	CF 26	CFQ26/1-L	27	0.4	SW	2,600	913	1,284	0.5	$ 163.05	$ 87.75	$0	0.5	0.5
4LED	Faculty Room Bathroom 1	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	3120	225	1	2T XX R LED	2RTLED	25	0.0	SW	3,120	78	147	0.0	$ 17.91	$ 202.50	$0	11.3	11.3
4LED	Faculty Room Bathroom 2	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	3120	225	1	2T XX R LED	2RTLED	25	0.0	SW	3,120	78	147	0.0	$ 17.91	$ 202.50	$0	11.3	11.3
185LED	Classroom next to Faculty Room	10	T 40 R F 4 (ELE)	F44SE	172	1.7	SW	1800	3,096	10	T 74 R LED	RTLED50	50	0.5	SW	1,800	900	2,196	1.2	$ 307.03	$ 2,362.50	$0	7.7	7.7
35LED	Office Hall	5	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	810	5	T 59 R LED	RTLED38	38	0.2	SW	1,800	342	468	0.3	$ 65.43	$ 1,181.25	$250	18.1	14.2
185LED	Facility Director Office	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	SW	2,600	260	634	0.2	$ 80.54	$ 472.50	$0	5.9	5.9
185LED	Office	3	T 40 R F 4 (ELE)	F44SE	172	0.5	SW	2600	1,342	3	T 74 R LED	RTLED50	50	0.2	SW	2,600	390	952	0.4	$ 120.80	$ 708.75	$0	5.9	5.9
6LED	Life Skills Entrance	2	T 34 R F 4 (MAG)	F44EE	144	0.3	SW	1800	518	2	T 74 R LED	RTLED50	50	0.1	SW	1,800	180	338	0.2	$ 47.31	$ 472.50	$0	10.0	10.0
6LED	Life Skills Room	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	1800	259	1	T 74 R LED	RTLED50	50	0.1	SW	1,800	90	169	0.1	$ 23.66	$ 236.25	$0	10.0	10.0
6LED	Life Skills Kitchen	2	T 34 R F 4 (MAG)	F44EE	144	0.3	SW	1800	518	2	T 74 R LED	RTLED50	50	0.1	SW	1,800	180	338	0.2	$ 47.31	$ 472.50	$0	10.0	10.0
4LED	Life Skills Bath	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	1800	130	1	2T XX R LED	2RTLED	25	0.0	SW	1,800	45	85	0.0	$ 11.83	$ 202.50	$0	17.1	17.1
6LED	Like Skills Laundry	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	1800	259	1	T 74 R LED	RTLED50	50	0.1	SW	1,800	90	169	0.1	$ 23.66	$ 236.25	$0	10.0	10.0
32LED	Nurse Office	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936	6	STLED4	STLED4	40	0.2	SW	2,600	624	312	0.1	$ 39.61	$ 2,140.20	$270	54.0	47.2
32LED	Nurse Treat	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2600	468	3	STLED4	STLED4	40	0.1	SW	2,600	312	156	0.1	$ 19.80	$ 1,070.10	$135	54.0	47.2
32LED	Nurse Cot	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2600	312	2	STLED4	STLED4	40	0.1	SW	2,600	208	104	0.0	$ 13.20	$ 713.40	$90	54.0	47.2
4LED	Nurse Bath	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	3120	225	1	2T XX R LED	2RTLED	25	0.0	SW	3,120	78	147	0.0	$ 17.91	$ 202.50	$0	11.3	11.3
71	Nurse Closet	1	I 60	I60/1	60	0.1	SW	1040	62	1	CF 26	CFQ26/1-L	27	0.0	SW	1,040	28	34	0.0	$ 5.85	$ 6.75	$0	1.2	1.2
41LED	GED	6	1B 40 R F 2 (MAG)	F42SS	94	0.6	SW	2600	1,466	6	4 ft LED Tube	200732x2	30	0.2	SW	2,600	468	998	0.4	$ 126.74	$ 1,402.20	$0	11.1	11.1
41LED	Office	8	1B 40 R F 2 (MAG)	F42SS	94	0.8	SW	2600	1,955	8	4 ft LED Tube	200732x2	30	0.2	SW	2,600	624	1,331	0.5	$ 168.99	$ 1,869.60	$0	11.1	11.1
4LED	Office closet	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	1040	75	1	2T XX R LED	2RTLED	25	0.0	SW	1,040	26	49	0.0	$ 8.33	$ 202.50	$0	24.3	24.3
41LED	Office	4	1B 40 R F 2 (MAG)	F42SS	94	0.4	SW	2600	978	4	4 ft LED Tube	200732x2	30	0.1	SW	2,600	312	666	0.3	$ 84.50	$ 934.80	$0	11.1	11.1
35LED	Hall	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	1800	324	2	T 59 R LED	RTLED38	38	0.1	SW	1,800	137	187	0.1	$ 26.17	$ 472.50	$100	18.1	14.2
32LED	Hall	7	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	1800	756	7	STLED4	STLED4	40	0.3	SW	1,800	504	252	0.1	$ 35.23	$ 2,496.90	$315	70.9	61.9
35LED	100	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	SW	1,800	616	842	0.5	$ 117.78	$ 2,126.25	$450	18.1	14.2
35LED	101	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	SW	1,800	616	842	0.5	$ 117.78	$ 2,126.25	$450	18.1	14.2
35LED	102	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	SW	1,800	616	842	0.5	$ 117.78	$ 2,126.25	$450	18.1	14.2
35LED	103	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	SW	1,800	616	842	0.5	$ 117.78	$ 2,126.25	$450	18.1	14.2
35LED	104	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	SW	1,800	616	842	0.5	$ 117.78	$ 2,126.25	$450	18.1	14.2
35LED	105	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	SW	1,800	616	842	0.5	$ 117.78	$ 2,126.25	$450	18.1	14.2
35LED	106	8	T 32 R F 3 (ELE)	F43ILL/2	90	0.7	SW	1800	1,296	8	T 59 R LED	RTLED38	38	0.3	SW	1,800	547	749	0.4	$ 104.69	$ 1,890.00	$400	18.1	14.2
35LED	107	8	T 32 R F 3 (ELE)	F43ILL/2	90	0.7	SW	1800	1,296	8	T 59 R LED	RTLED38	38	0.3	SW	1,800	547	749	0.4	$ 104.69	$ 1,890.00	$400	18.1	14.2
35LED	108	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	SW	1,800	616	842	0.5	$ 117.78	$ 2,126.25	$450	18.1	14.2
35LED	109	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	SW	1,800	616	842	0.5	$ 117.78	$ 2,126.25	$450	18.1	14.2
35LED	110	14	T 32 R F 3 (ELE)	F43ILL/2	90	1.3	SW	1800	2,268	14	T 59 R LED	RTLED38	38	0.5	SW	1,800	958	1,310	0.7	$ 183.21	$ 3,307.50	$700	18.1	14.2
35LED	111	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	1800	2,430	15	T 59 R LED	RTLED38	38	0.6	SW	1,800	1,026	1,404	0.8	$ 196.30	$ 3,543.75	$750	18.1	14.2
35LED	112	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	972	6	T 59 R LED	RTLED38	38	0.2	SW	1,800	410	562	0.3	$ 78.52	$ 1,417.50	$300	18.1	14.2
35LED	112	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	SW	1,800	205	281	0.2	$ 39.26	$ 708.75	$150	18.1	14.2
35LED	113	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	972	6	T 59 R LED	RTLED38	38	0.2	SW	1,800	410	562	0.3	$ 78.52	$ 1,417.50	$300	18.1	14.2
35LED	113	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	SW	1,800	205	281	0.2	$ 39.26	$ 708.75	$150	18.1	14.2
35LED	114	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	972	6	T 59 R LED	RTLED38	38	0.2	SW	1,800	410	562	0.3	$ 78.52	$ 1,417.50	$300	18.1	14.2
35LED	114	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	SW	1,800	205	281	0.2	$ 39.26	$ 708.75	$150	18.1	14.2
35LED	115	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	972	6	T 59 R LED	RTLED38	38	0.2	SW	1,800	410	562	0.3	$ 78.52	$ 1,417.50	$300	18.1	14.2
35LED	115	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	SW	1,800	205	281	0.2	$ 39.26	$ 708.75	$150	18.1	14.2
35LED	Computer Lab	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	SW	1,800	205	281	0.2	$ 39.26	$ 708.75	$150	18.1	14.2
35LED	Computer Lab	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	SW	1,800	205	281	0.2	$ 39.26	$ 708.75	$150	18.1	14.2
35LED	Computer Lab	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	SW	1,800	205	281	0.2	$ 39.26	$ 708.75	$150	18.1	14.2
35LED	Woodshop	14	T 32 R F 3 (ELE)	F43ILL/2	90	1.3	SW	1800	2,268	14	T 59 R LED	RTLED38	38	0.5	SW	1,800	958	1,310	0.7	$ 183.21	$ 3,307.50	$700	18.1	14.2
35LED	Woodshop	4	T 32 R F 3 (ELE)	F43ILL/2	90	0.4	SW	1800	648	4	T 59 R LED	RTLED38	38	0.2	SW	1,800	274	374	0.2	$ 52.35	$ 945.00	$200	18.1	14.2
35LED	Woodshop Office	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2600	468	2	T 59 R LED	RTLED38	38	0.1	SW	2,600	198	270	0.1	$ 34.33	$ 472.50	$100	13.8	10.9
32LED	Woodshop Small Room	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1800	216	2	STLED4	STLED4	40	0.1	SW	1,800	144	72	0.0	$ 10.07	$ 713.40	$90	70.9	61.9
35LED	Art	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	SW	1,800	205	281	0.2	$ 39.26	$ 708.75	$150	18.1	14.2
35LED	Art	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	1800	1,944	12	T 59 R LED	RTLED38	38	0.5	SW	1,800	821	1,123	0.6	$ 157.04	$ 2,835.00	$600	18.1	14.2
35LED	Art Office	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2600	468	2	T 59 R LED	RTLED38	38	0.1	SW	2,600	198	270	0.1	$ 34.33	$ 472.50	$100	13.8	10.9
32LED	Art Small Room	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1040	125	2	STLED4	STLED4	40	0.1	SW	1,040	83	42	0.0	$ 7.09	$ 713.40	$90	100.7	88.0
32LED	Art Kiln	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1800	108	1	STLED4	STLED4	40	0.0	SW	1,800	72	36	0.0	$ 5.03	$ 356.70	$45	70.9	61.9
32LED	Art/Woodshop Common Room	4	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2600	624	4	STLED4	STLED4	40	0.2	SW	2,600	416	208	0.1	$ 26.41	$ 1,426.80	$180	54.0	47.2
35LED	All Purpose Room	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	1200	1,296	12	T 59 R LED	RTLED38	38	0.5	SW	1,200	547	749	0.6	$ 120.35	$ 2,835.00	$600	23.6	18.6
35LED	All Purpose Room	13	T 32 R F 3 (ELE)	F43ILL/2	90	1.2	SW	1200	1,404	13	T 59 R LED	RTLED38	38	0.5	SW	1,200	593	811	0.7	$ 130.38	$ 3,071.25	$650	23.6	18.6
35LED	Kitchen	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1000	540	6	T 59 R LED	RTLED38	38	0.2	SW	1,000	228	312	0.3	$ 54.06	$ 1,417.50	$300	26.2	20.7
32LED	All Purpose Room Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1040	125	2	STLED4	STLED4	40	0.1	SW	1,040	83	42	0.0	$ 7.09	$ 713.40	$90	100.7	88.0
71	TO Room	1	I 60	I60/1	60	0.1	SW	1040	62	1	CF 26	CFQ26/1-L	27	0.0	SW	1,040	28	34	0.0	$ 5.85	$ 6.75	$0	1.2	1.2
4LED	Storage	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	1040	75	1	2T XX R LED	2RTLED	25	0.0	SW	1,040	26	49	0.0	$ 8.33	$ 202.50	$0	24.3	24.3
32LED	Mens Room	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	3120	562	3	STLED4	STLED4	40	0.1	SW	3,120	374	187	0.1	$ 22.86	$ 1,070.10	$135	46.8	40.9
32LED	Ladies Room	4	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	3120	749	4	STLED4	STLED4	40	0.2	SW	3,120	499	250	0.1	$ 30.48	$ 1,426.80	$180	46.8	40.9
32LED	Boiler Room	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	8736	1,048	2	STLED4	STLED4	40	0.1	SW	8,736	699	349	0.0	$ 37.26	$ 713.40	$90	19.1	16.7
71	TO Room	1	I 60	I60/1	60	0.1	SW	1040	62	1	CF 26	CFQ26/1-L	27	0.0	SW	1,040	28	34	0.0	$ 5.85	$ 6.75	$0	1.2	1.2
32LED	Storage	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	1040	187	3	STLED4	STLED4	40	0.1	SW	1,040	125	62	0.1	$ 10.63	$ 1,070.10	$135	100.7	88.0
35LED	Office across 112	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2600	468	2	T 59 R LED	RTLED38	38	0.1	SW	2,600	198	270	0.1	$ 34.33	$ 472.50	$100	13.8	10.9
35LED	Office across 113	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2600	468	2	T 59 R LED	RTLED38	38	0.1	SW	2,600	198	270	0.1	$ 34.33	$ 472.50	$100	13.8	10.9
32LED	Storage across 113	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1040	125	2	STLED4	STLED4	40	0.1	SW	1,040	83	42	0.0	$ 7.09	$ 713.40	$90	100.7	88.0
32LED	Small Bathroom 1	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	3120	187	1	STLED4	STLED4	40	0.0	SW	3,120	125	62	0.0	$ 7.62	$ 356.70	$45	46.8	40.9
32LED	Small Bathroom 2	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	3120	187	1	STLED4	STLED4	40	0.0	SW	3,120	125	62	0.0	$ 7.62	$ 356.70	$45	46.8	40.9
32LED	Small Bathroom 3	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	3120	187	1	STLED4	STLED4	40	0.0	SW	3,120	125	62	0.0	$ 7.62	$ 356.70	$45	46.8	40.9
32LED	Small Bathroom 4	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	3120	187	1	STLED4	STLED4	40	0.0	SW	3,120	125	62	0.0	$ 7.62	$ 356.70	$45	46.8	40.9
32LED	Hallway 1	7	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	1800	756	7	STLED4	STLED4	40	0.3	SW	1,800	504	252	0.1	$ 35.23	$ 2,496.90	$315	70.9	61.9
32LED	Hallway 3	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	SW	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$450	70.9	61.9
32LED	Hallway 4	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	SW	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$450	70.9	61.9
32LED	Hallway 5	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	SW	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$450	70.9	61.9
32LED	Hallway 6	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	SW	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$450	70.9	61.9
32LED	Hallway 7	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	SW	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$450	70.9	61.9
32LED	Hallway 8	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	SW	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$450	70.9	61.9
32LED	Hallway 14	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	SW	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$450	70.9	61.9
32LED	Custodian Hall	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	1800	540	5	STLED4	STLED4	40	0.2	SW	1,800	360	180	0.1	$ 25.17	$ 1,783.50	$225	70.9	61.9
30	Storage Next to Custodian	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.2	SW	1040	236	1	T 28 R F 4	F44SSILL	96	0.1	SW	1,040	100	136	0.1	$ 23.21	$ 270.00	$0	11.6	11.6
32LED	Hallway to Gym	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	SW	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$450	70.9	61.9
9LED	Gym	8	High Bay MH 400	MH400/1	458	3.7	SW	3000	10,992	8	BAYLED78W	BAYLED78W	93	0.7	SW	3,000	2,232	8,760	2.9	$ 1,078.25	$ 5,616.00	$0	5.2	5.2
9LED	Gym	8	High Bay MH 400	MH400/1	458	3.7	SW	3000	10,992	8	BAYLED78W	BAYLED78W	93	0.7	SW	3,000	2,232	8,760	2.9	$ 1,078.25	$ 5,616.00	$0	5.2	5.2
9LED	Gym	8	High Bay MH 400	MH400/1	458	3.7	SW	3000	10,992	8	BAYLED78W	BAYLED78W	93	0.7	SW	3,000	2,232	8,760	2.9	$ 1,078.25	$ 5,616.00	$0	5.2	5.2
71	Gym Storage 1	4	I 60	I60/1	60	0.2	SW	1040	250	4	CF 26	CFQ26/1-L	27	0.1	SW	1,040	112	137	0.1	$ 23.39	$ 27.00	$0	1.2	1.2
71	Gym Storage 2	4	I 60	I60/1	60	0.2	SW	1040	250	4	CF 26	CFQ26/1-L	27	0.1	SW	1,040	112	137	0.1	$ 23.39	$ 27.00	$0	1.2	1.2
9LED	Warehouse	20	High Bay MH 400	MH400/1	458	9.2	Breaker	1800	16,488	20	BAYLED78W	BAYLED78W	93	1.9	Breaker	1,800	3,348	13,140	7.3	$ 1,837.15	$ 14,040.00	$0	7.6	7.6
141LED	Outside Light Pole	5	HPS 200	HPS200/1	250	1.3	Timer	3640	4,550	5	FXLED78	FXLED78/1	78	0.4	Timer	3,640	1,420	3,130	0.9	$ 371.51	$ 4,220.98	$500	11.4	10.0
227LED	Outdoor Wall Packs (SM)	13	70 W MH Wall Pack	MH70/1	95	1.2	Timer	3640	4,495	13	FXLED18	FXLED18/1	18	0.2	Timer	3,640	852	3,644	1.0	$ 432.42	$ 5,501.93	$1,300	12.7	9.7
68LED	Outdoor Wall Packs (M)	3	175 MH WALL	MH175/1	215	0.6	Timer	3640	2,348	3	WPLED26	WPLED26	30	0.1	Timer	3,640	328	2,020	0.6	$ 239.75	$ 1,506.60	$0	6.3	6.3
169LED	Outdoor Wall Packs (LG)	8	WP 250 MH	MH250/1	295	2.4	Timer	3640	8,590	8	FXLED78	FXLED78/1	78	0.6	Timer	3,640	2,271	6,319	1.7	$ 749.92	$ 6,753.56	$1,400	9.0	7.1

Hunterdon County Educational Service Commission - West Amwell Campus
CHA Project No.30313
ECM-L1 Lighting Replacements

		EXISTING CONDITIONS								RETROFIT CONDITIONS							COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
	Total	591				69.1			514,253	591			4,974	25.0			54,088	102,764	44.1	$13,391	$179,927	$22,420		
																	Demand Savings			44.1	$3,320			
																	kWh Savings			102,764	$10,071			
																	Total savings				$13,391		13.4	11.8

APPENDIX C

ECM Calculations

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313

Rate of Discount (used for NPV) 3.0%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost			Equivalent Energy	
$ 0.125	$/kWh blended		0.000420205	64,000	Electric	Natural Gas	Steam	(kBtu)	% Total
$ 0.098	$/kWh supply	357,401	0.000420205		$ 79,398	$ 28,053	$ -	1,219,810	29%
$ 6.27	$/kW demand	183.1	0						0%
$ 0.96	$/Therm	29,221	0.001					2,922,130	71%
$ -	$/kgals	-	0						0%
$ -	$/Mlb	-	0.05					0	0%
								4,141,940	**Total kBtu**

Hunterdon County ESC - West Amwell Campus

Recommend? Y or N		Item	Savings kW	kWh	therms	Steam Mlbs	Water kgal	$	Cost	Simple Payback	Life Expectancy	Equivalent CO_2 (Metric tons)	NJ Smart Start Inventive	Fuel Savings mmBtu	Payback w/ Incentives	Simple Projected Lifetime Savings kW	kWh	mlbs	kgal/yr	$	ROI	NPV	IRR
Y	ECM-1	Roof Insulation	0.0	932	1,273	0	0	$1,338	$78,721	58.8	20	1.7		127	58.8	0.0	18,634	0	0	$ 2,329	-97%	($58,684)	-8.6%
Y	ECM-2	Wall Insulation	0.0	354	824	0	0	$835	$57,258	68.6	20	1.0		82	68.6	0.0	7,083	0	0	$ 885	-98%	($44,755)	-9.6%
Y	ECM-3	Window Replacement	0.0	1,092	2,292	0	0	$2,337	$219,263	93.8	20	2.8		229	93.8	0.0	21,850	0	0	$ 2,731	-99%	($184,273)	-11.7%
N	ECM-4	Replace One Boiler and all Duct Furnaces	0.0	0	2,258	0	0	$2,168	$254,085	117.2	20	2.3	$2,200	226	116.2	0.0	0	0	0	$ -	-100%	($221,604)	-13.0%
N	ECM-5	Replace UV with VRV and Energy Recovery	0.0	8,926	1,609	0	0	$2,661	$515,903	193.9	15	5.4		161	193.9	0.0	133,895	0	0	$ 16,737	-97%	($483,979)	-22.3%
Y	ECM-6	Replace Air Conditioning Units and Coils	27.9	47,022		0	0	$7,974	$219,659	27.5	15	19.8		0	27.5	417.8	705,333	0	0	########	-46%	($124,462)	-6.8%
Y	ECM-7	Install New Wireless DDC Controls - Temperature Setback	0.0	43,605	6,356	0	0	$11,552	$36,680	3.2	18	24.7		636	3.2	0.0	784,883	0	0	$ 98,110	167%	$122,841	31.8%
N	ECM-L1	Lighting Replacements	44.1	102,764	0	0	0	$13,391	$179,927	13.4	15	43.2		0	13.4	661.7	1,541,460	0	0	########	35%	($20,069)	1.4%
N	ECM-L2	Lighting Controls (Occupancy Sensors)	0.0	19,084	0	0	0	$1,870	$9,943	5.3	15	8.0		0	5.3	0.0	286,260	0	0	$ 35,783	260%	$12,381	17.0%
Y	ECM-L3	Lighting Replacements with Controls	44.1	109,174	0	0	0	$14,018	$189,870	13.5	15	45.9		0	13.5	661.5	1,637,610	0	0	########	34%	($22,522)	1.3%
		Total Project Savings	**116.1**	**332,953**	**14,611**	**0**	**0**	**$ 58,144**	**$ 1,761,309**	**30.3**	**15.8**	**122**	**$0**	**1,461**	**30.3**	**1,323**	**5,137,007**	**-**	**-**	########	**-56%**	#########	**-7.7%**
		Recommended Energy Measures (highlighted green above)	**72.0**	**202,179**	**10,744**	**0**	**0**	**$ 38,054**	**$ 801,451**	**21.1**	**18.0**	**96**	**$0**	**1,074**	**21.1**	**1,079**	**3,175,392**	**-**	**-**	########	**-40%**	**($276,995)**	**-1.6%**
		% of Existing	**39.3%**	**56.6%**	**36.8%**		**0.0%**																

City: Philadelphia, PA

DB Temp	Enthalpy h (Btu/lb)	Bin Hours	Occupied Hours/Week: 65 Building Operating Hours	37.5 People Occupied Hours	50 Equipment Run Hours	70 Library Occupied Hours	30 Proposed 3rd Floor Hours
102.5	41.0						
97.5	33.1	3	1	1	1	1	1
92.5	38.0	33	13	7	10	14	6
87.5	36.2	123	48	27	37	51	22
82.5	33.8	477	185	106	142	199	85
77.5	32.7	656	254	146	195	273	117
72.5	31.0	742	287	166	221	309	133
67.5	28.1	784	303	175	233	327	140
62.5	24.6	983	380	219	293	410	176
57.5	21.2	625	242	140	186	260	112
52.5	18.3	540	209	121	161	225	96
47.5	16.0	457	177	102	136	190	82
42.5	14.4	671	260	150	200	280	120
37.5	12.5	1,067	413	238	318	445	191
32.5	10.5	685	265	153	204	285	122
27.5	8.5	369	143	82	110	154	66
22.5	7.0	321	124	72	96	134	57
17.5	5.3	184	71	41	55	77	33
12.5	3.8	40	15	9	12	17	7
7.5	2.3	0	0	0	0	0	0
2.5	1.3	0	0	0	0	0	0
-2.5							
-7.5							

Multipliers	
Material:	1.048
Labor:	1.669
Equipment:	1.322

Heating System Efficiency	80%
Cooling Eff (kW/ton)	1.3

Heating		
Hours	4,334	Hrs
Weighted Avg	38	F
Avg	33	F

Cooling		
Hours	4,426	Hrs
Weighted Avg	68	F
Avg	78	F

HEAT GAIN/LOSS WORKSHEET

Project Name:	Hunterdon County Educational Services	**Project No.:**	CHA Project Number: 30313		
Location	Lambertville, NJ	**Site Elevation:**	200 **Feet**	**Specific Volume**	14.00 CF/#
Building Name	West Amwell Campus	**Date:**	07/01/15		
Engineer:	CHA				

Building/Facility Designation School & Office Building

Outdoor Winter Design DB Temperature	13 ***F**	**Indoor Winter Design DB Temperature**	72 ***F**
Outdoor Summer Design DB Temperature	95 ***F**	**Indoor Summer Design DB Temperature**	72 ***F**
Outdoor Summer Design WB Temperature	69 ***F**	**Indoor Summer Design WB Temperature**	60 ***F**
Outdoor Summer Humidity Ratio	0.0127 **#/#**	**Indoor Air (70*F) Humidity Ratio**	0.0078 **#/#**

ENVELOPE DESCRIPTIONS (Descriptions are from Interior to Exterior)

Walls (Select One - Type X)		R Value	Wall Type
x	Steel Siding, 4" Insulation, Sheetrock	15.2	1
	Plaster or Gypsum, frame construction, 5" Insulation, 1" stucco	18.2	1
	Stone/Brick walls, air space, 4" insulation, Gyp board interior (2.5' total wall thick)	21.2	2
	Plaster or Gypsum, frame construction, 3" Insulation, 8" LW CMU	7.8	5
	4" Face Brick, 2" Concrete, 1" Insulation, Exterior Finish	5.1	12
	4" Face Brick, 4" Concrete, 1" Insulation, Exterior Finish	4.0	11
	Interior Finish, 2" Insulation, 8" CMU, 4" Face Brick	10.9	16
	Finished Surface, 8" LW CMU (filled), Air Space, 4" Face Brick	11.1	16
	Stucco or Gypsum, 2.5" Insul, Face Brick	14.3	10
	4" Block, 1" insulation, 8" Block	19.9	16
	U value calculator		

Roofs (Select One)		R Value	Roof Type
	Tectum Deck, 3.3" Insul., BU Roof	13.0	1
x	Steel Deck, 4" Insul	15.2	1
	Attic Roof with 6" Insul.	25.0	4
	4" HW Concrete Deck, BU Roof	2.7	2
	Ceiling, 3" Insulation, 4" Concrete Deck, BU Roof	14.9	4
	Ceiling, 4" Concrete Deck, 3" Insulation, BU Roof	18.0	13
	Ceiling, 4" Concrete Deck, 6" Insulation, BU Roof	21.7	14
	Ceiling, Wood Deck, 6" Insulation, Felt & Membrane	22.7	10
	Wood Deck, 6" insulation, Felt & Membrane	18.0	
	U value calculator		

Windows (Select One)		U Value
x	Aluminum Frame, 1/4" SP Glazing	1.03
	Aluminum Frame, 1/4" DP Glazing	0.60
	Aluminum Frame, 3/16" DP Glazing	0.62
	Aluminum Frame, 1/2" DP Glazing	0.50
	Skylights	0.90
	Other	

	No Storm
Flat Glass	1.05
Flat Glass (e=.6)	1.00
Flat Glass (e=0.4)	0.90
Flat Glass (e=0.2)	0.77
Double Glaze (3/16 in air)	0.63
Double Glaze (1/4 in air)	0.60
Double Glaze (1/2 in air)	0.53

HEAT GAIN/LOSS WORKSHEET

Project Name:	Hunterdon County Educational Services	**Project No.:**	CHA Project Number: 30313		
Location	Lambertville, NJ	**Site Elevation:**	200 **Feet**	**Specific Volume**	14.00 CF/#
Building Name	West Amwell Campus	**Date:**	07/01/15		
Engineer:	CHA				

Building/Facility Designation School & Office Building

Double Glaze (e=.6)	0.50
Double Glaze (e=0.4)	0.42
Double Glaze (e=0.2)	0.35
Triple Glaze (1/4 in air)	0.42
Triple Glaze (1/2 in air)	0.35

BUILDING CHARACTERISTICS

Roof Area	32,250 SF			
Occupied Area	46,320 SF	**Return Plenum?**	n	

	Gross Wall Length	Average Wall Height	Ceiling Height	Window Area	Door Area	Net Wall Area
North Exposure	292 Ft	25.8 Ft	15.0 Ft	420 SF	98 SF	7,028 SF
East Exposure	200 Ft	28.0 Ft	15.0 Ft	0 SF	98 SF	5,502 SF
South Exposure	292 Ft	25.8 Ft	15.0 Ft	342 SF	260 SF	6,944 SF
West Exposure	200 Ft	22.0 Ft	15.0 Ft	372 SF	49 SF	3,979 SF

Occupied Forced Ventilation	7,500 cfm	450.0 AC/hr
Unoccupied Forced Ventilation	1,300 cfm	78.0 AC/hr

HEAT GAIN/LOSS WORKSHEET

Project Name:	Hunterdon County Educational Services	**Project No.:**	CHA Project Number: 30313		
Location	Lambertville, NJ	**Site Elevation:**	200 **Feet**	**Specific Volume**	14.00 CF/#
Building Name	West Amwell Campus	**Date:**	07/01/15		
Engineer:	CHA				

Building/Facility Designation School & Office Building

COOLING HEAT GAINS TO THE ROOM - SENSIBLE

SOLAR GAINS

WINDOWS	**AREA (SF)**	**SHGF**		**Shade Coef**	**Cooling Load Factor**		**Solar Heat Gain**	
North Exposure	420	38	btu/h/sf	1.0	0.75	Glass Type C	11,970	Btu/hr
East Exposure	0	216	btu/h/sf	1.0	0.31	Glass Type C	0	Btu/hr
South Exposure	342	216	btu/h/sf	1.0	0.58	Glass Type C	42,846	Btu/hr
West Exposure	372	216	btu/h/sf	1.0	0.29	Glass Type C	23,302	Btu/hr
								78,118 Btu/h

CONDUCTION

	NET AREA (SF)	**U-VALUE**	**Cooling Load Temp. Dif.**	**Return Air Factor**	**Room Heat Gain**	
North Exposure	3,862	0.07	20 *F	1.0	5,098	Btu/hr
East Exposure	2,902	0.07	39 *F	1.0	7,470	Btu/hr
South Exposure	3,778	0.07	27 *F	1.0	6,732	Btu/hr
West Exposure	2,579	0.07	22 *F	1.0	3,745	Btu/hr
Roof	32,250	0.07	75 *F	1.0	159,638	Btu/hr
Fenestration	1,134	1.03	23 *F		26,864	Btu/hr
Doors	505	0.14	27 *F		1,904	Btu/hr
Ceiling	46,320	0.14	0 *F		0	Btu/hr
Partition		0.05	0 *F		0	Btu/hr
Floor	46,320	0.04	0 *F		0	Btu/hr
						211,451 Btu/h

INTERNAL HEAT GAINS (all loads below are based on Occupied Periods) **Room Heat Gain**

Lights	0.50	w/sf x	46,320	Occ Area =	23.2	kW x 3.4x	1.0	RAF =	79,045	Btu/h
Plug Load	0.10	w/sf x	46,320	Occ Area =	4.6	kW x 3.4x	1.0	RAF =	15,809	Btu/h
People	100	people x	255	btu/person x	100%	time in space =			25,500	Btu/h
Computer Work Stations			5	Units x	120	W/Unit x 3414 =			2,048	Btu/h
Equipment		10.0	kW x 3.413 =						34,130	Btu/h
Misc.									0	Btu/h
										156,532 Btu/h

VENTILATION AND INFILTRATION

		Infiltration Factor	**Perimeter Ratio**	**Coef**	**Temp. Diff.**	**Room Heat Gain**	
Walls	13,121 SF	0.10	CFM/SF	1.04	23 *F	34,014	Btu/h

HEAT GAIN/LOSS WORKSHEET

Project Name:	Hunterdon County Educational Services	**Project No.:**	CHA Project Number: 30313		
Location	Lambertville, NJ	**Site Elevation:**	200 **Feet**	**Specific Volume**	14.00 CF/#
Building Name	West Amwell Campus	**Date:**	07/01/15		
Engineer:	CHA				

Building/Facility Designation School & Office Building

Doors	505	SF	0.10	CFM/LF	0.59	LF/SF	1.04	23 *F	773 Btu/h
Windows	1,134	SF	0.10	CFM/LF	0.53	LF/SF	1.04	23 *F	1,571 Btu/h
Ventilation	7,500	cfm					1.04	23 *F	194,425 Btu/h
									230,783 Btu/h
Infiltration	1,403	cfm	84.2	AC/hr					

0

COOLING HEAT GAINS TO THE RA PLENUM - SENSIBLE

4,950

CONDUCTION

	NET AREA (SF)	U-VALUE	Cooling Load Temp. Dif.	Return Air Factor	Room Heat Gain
North Exposure	3,166	0.07	20	1.0	4,179 Btu/hr
East Exposure	2,600	0.07	39	1.0	6,692 Btu/hr
South Exposure	3,166	0.07	27	1.0	5,642 Btu/hr
West Exposure	1,400	0.07	22	1.0	2,033 Btu/hr
Roof	32,250	0.07	75	1.0	159,638 Btu/hr
					178,184 Btu/h

INTERNAL HEAT GAINS

Lights	0.50 w/sf x	46,320 Occ Area =	23.2 kW x3413x	1.00 RAF =	79,045 Btu/h	
Misc.					0 Btu/h	
						79,045 Btu/h

SENSIBLE HEAT GAINS - TEMP. DEPENDENT	
Solar	78,118
Conduction to Room	211,451
Conduction to Plenum	178,184
Ventilation and Infiltration	230,783
Sub Total	**698,535**

SENSIBLE HEAT GAINS - TEMP. INDEPENDENT	
Internal Gains to Room	156,532
Internal Gains to Plenum	79,045
Sub Total	**235,577**

HEAT GAIN/LOSS WORKSHEET

Project Name:	Hunterdon County Educational Services	**Project No.:**	CHA Project Number: 30313		
Location	Lambertville, NJ	**Site Elevation:**	200 **Feet**	**Specific Volume**	14.00 CF/#
Building Name	West Amwell Campus	**Date:**	07/01/15		
Engineer:	CHA				

Building/Facility Designation School & Office Building

LATENT COOLING LOADS

Infiltration

			Infiltration Factor		Air Density	Humidity Ratio Dif.		Room Heat Gain	
Walls	42,582	SF	0.10	CFM/SF	4,629	0.0049	#/#	96,858	Btu/h
Doors	505	SF	0.10	CFM/LF	4,629	0.0049	#/#	678	Btu/h
Windows	1,134	SF	0.10	CFM/LF	4,629	0.0049	#/#	1,378	Btu/h
Ventilation	7,500	cfm			4,629	0.0049	#/#	170,596	Btu/h
People	100	people	1.00	time in space		250	Btu/hr/person	25,000	Btu/h
									294,510 Btu/h

Cooling Load Summary

	Sensible	Latent	Total		
Temperature Dependent Gains	698,535	294,510	993,045		
Temperature Indep. Gains	235,577		235,577	SHR=	0.76
Total	934,112	294,510	1,228,622		

Building Cooling Load 102.4 Tons at 452 SF/Ton

Building Air Flow to Condition Space based on a 12*F Temp Rise is **54,050 CFM**

1.17 CFM/sf

HEATING CALCULATION

CONDUCTION

	NET AREA (SF)	U-VALUE	Heating Load Temp. Dif.	Room Heat Gain	
North Exposure	7,028	0.07	60	27,599	Btu/h
East Exposure	5,502	0.07	60	21,606	Btu/h
South Exposure	6,944	0.07	60	27,269	Btu/h
West Exposure	3,979	0.07	60	15,626	Btu/h
Fenestration	1,134	1.03	60	69,497	Btu/h
Roof	32,250	0.07	60	126,646	Btu/h
Doors	505	0.14	60	4,197	Btu/h

HEAT GAIN/LOSS WORKSHEET

Project Name:	Hunterdon County Educational Services	**Project No.:**	CHA Project Number: 30313
Location	Lambertville, NJ	**Site Elevation:**	200 **Feet**
Building Name	West Amwell Campus	**Date:**	07/01/15
Engineer:	CHA		

Specific Volume 14.00 CF/#

Building/Facility Designation School & Office Building

Ceiling	46,320	0.14	60	386,000	Btu/h
Partition	0	0.05	0	0	Btu/h
Floor	32,250	0.04	20	25,800	Btu/h

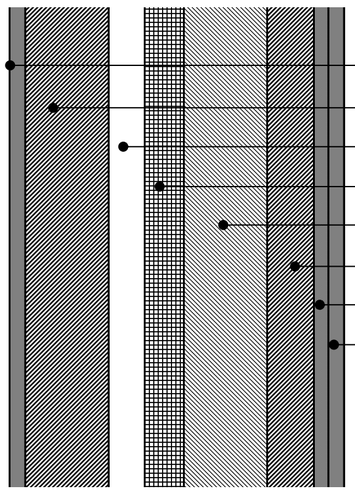
Ventilation and Infiltration

		Infiltration Factor	**Coef**	**Temp. Difference**	**Air Flow**	**Room Heat Gain**
Walls	23,453 SF	0.10 CFM/SF	1.04	60	2,345 cfm	145,632 Btu/h
Doors	505 SF	0.10 CFM/LF	1.04	60	30 cfm	1,850 Btu/h
Windows	1,134 SF	0.10 CFM/LF	1.04	60	61 cfm	3,763 Btu/h
Ventilation Load	7,500 cfm		1.04	60	7,500 cfm	502,970 Btu/h
Total Ventilation & Infiltration Load					9,936 cfm	654,215 Btu/h

Building Heating Load	**1,358,454**	**btu/h**
	29.3	btu/sf

Wall 1

0% Percent of total wall area



Wall Component	Ri	REF
#VALUE!	0.17	2
#VALUE!	11	9
#VALUE!	0	15
#VALUE!	0	36
#VALUE!	0	22
#VALUE!	0	15
#VALUE!	0.56	28
#VALUE!	0.68	1
0	0	
0	0	
0	0	

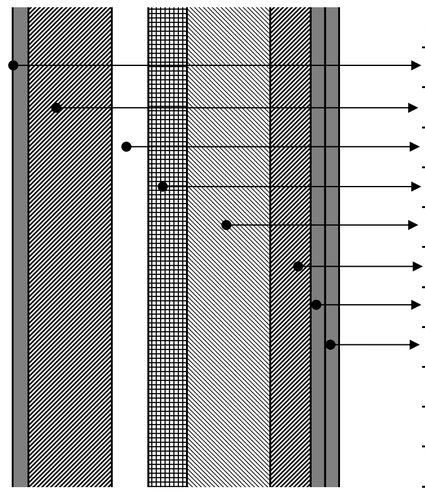
TOTAL OF R-VALUES >>> 12.41

INSULATION FACTOR (0-100%) 95%

U-VALUE >>> 0.085

Wall 2

0% Percent of total wall area



Wall Component	Ri	REF
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	
0	0	

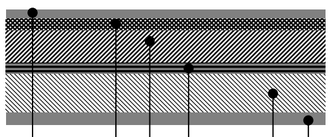
TOTAL OF R-VALUES >>> 0

INSULATION FACTOR (0-100%) 95%

U-VALUE >>> 0.000

Roof 1

0% Percent of total roof area



Roof Component	Ri	REF
#VALUE!	0.61	1
#VALUE!	0.5	34
#VALUE!	0	28
0	0	18
0	0	28
#VALUE!	0.17	2

TOTAL OF R-VALUES >>> 1.28

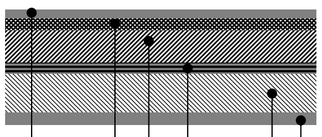
INSULATION FACTOR (0-100%) 100%

U-VALUE >>> 0.781

Est R-Value 1.28

Roof 2

0% Percent of total roof area



Roof Component	Ri	REF
0	0.61	1
0	0	
0	0.33	19
0	0	
0	10	6
0	0.25	3

TOTAL OF R-VALUES >>> 11.19

INSULATION FACTOR (0-100%) 100%

U-VALUE >>> 0.089

Est R-Value 11.19

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

Doors

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	7.0	7.0	2	98.0	56.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	98.0	56.0
East	7.0	7.0	2	98.0	56.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	98.0	56.0
South	7.0	7.0	3	147.0	84.0
	3.5	7.0	2	49.0	42.0
	8.0	8.0	1	64.0	32.0
				0.0	0.0
			Sub-total	260.0	158.0
West	7.0	7.0	1	49.0	28.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	49.0	28.0
			Total	**505.0**	**298.0**

LF/SF
0.59

Walls

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet	
North	105.0	22.0	1	2310.0	254.0	
	187.0	28.0	1	5236.0	430.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
	292.0			7546.0	684.0	Ave. height 25.8

All wall quantities must remain equal to 1

Average height wall automatically linked

East	200.0	28.0	1	5600.0	456.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
	200.0			5600.0	456.0	Ave. height 28.0

Average height wall automatically linked

South	105.0	22.0	1	2310.0	254.0	
	187.0	28.0	1	5236.0	430.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	
				0.0	0.0	

				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	292.0			7546.0	684.0	25.8	Average height wall automatically linked
West	200.0	22.0	1	4400.0	444.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
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				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0		
				0.0	0.0	Ave. height	
	200.0			4400.0	444.0	22.0	Average height auto linked to block load sheet

Windows

	Width (ft)	Height (ft)	Quantity	Area (SF)	Lineal Feet
North	10.0	6.0	7	420.0	224.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	420.0	224.0

East				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	0.0	0.0
South	6.0	6.0	1	36.0	24.0
	12.0	6.0	2	144.0	72.0
	18.0	6.0	1	108.0	48.0
	9.0	6.0	1	54.0	30.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	342.0	174.0
West	10.0	6.0	5	300.0	160.0
	6.0	6.0	2	72.0	48.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
				0.0	0.0
			Sub-total	372.0	208.0
			Total	**1134.0**	**606.0**

LF/SF
0.53

Building Volume Calculator

Width(ft)	Length (ft)	Height(ft)	Count	Volume (cf)	
10	10	10	1	1,000	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
				-	
			Total	**1,000**	**CF**

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

Reconcile Thermal Model

Building Footprint	46,320	SF	Ex Occupied Clng Temp.	72	*F	Ex Occupied Htg Temp.	72 *F
Heating Efficiency	80%		Ex Unoccupied Clng Temp.	72	*F	Ex Unoccupied Htg Temp.	72 *F
Cooling Efficiency	1.30	KW/Ton	Occupied Cooling UA	(20,337)	btu/hr/°F	Occupied Heating UA	11,836 btu/hr/°F
Internal Gains	235,577	btu/h	Unoccupied Cooling UA	(16,941)	btu/hr/°F	Unoccupied Heating UA	11,836 btu/hr/°F
Unoc Internal Gain factor	0.7		Cooling Occ Enthalpy Setpoint	27.5	Btu/lb		
Ave Occ Internal Gain Factor	1		Cooling Unocc Enthalpy Setpoint	27.5	Btu/lb		
Economizer available (Y/N)	No						

					EXISTING LOADS									
					Occupied			Unoccupied						
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Total Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Available Economizer Cooling Mlbs	Necessary Cooling Energy kWh	Existing Cooling Energy kWh	Existing Heating Energy Therms
97.5	33.1	3	1	2	-518,595	-252,067	-235,577	-431,986	-94,774	-164,904	0	264	264	0
92.5	38.0	33	13	20	-416,910	-468,359	-235,577	-347,283	-176,097	-164,904	0	3,059	3,059	0
87.5	36.2	123	48	75	-315,224	-391,199	-235,577	-262,580	-147,086	-164,904	0	9,550	9,550	0
82.5	33.8	477	185	292	-213,539	-283,118	-235,577	-177,877	-106,449	-164,904	0	28,872	28,872	0
77.5	32.7	656	254	402	-111,854	-230,459	-235,577	-93,173	-86,650	-164,904	0	30,910	30,910	0
72.5	31.0	742	287	455	-10,169	-155,892	-235,577	-8,470	-58,614	-164,904	0	23,924	23,924	0
67.5	28.1	784	303	481	53,262	48,288	-235,577	53,262	18,156	-164,904	0	9,272	9,272	0
62.5	24.6	983	380	603	112,442	101,940	-235,577	112,442	38,328	-164,904	0	1,796	1,796	0
57.5	21.2	625	242	383	171,621	155,593	-235,577	171,621	58,501	-164,904	0	0	0	589
52.5	18.3	540	209	331	230,801	209,246	-235,577	230,801	78,674	-164,904	0	0	0	1,132
47.5	16.0	457	177	280	289,981	262,899	-235,577	289,981	98,847	-164,904	0	0	0	1,486
42.5	14.4	671	260	411	349,161	316,551	-235,577	349,161	119,019	-164,904	0	0	0	2,955
37.5	12.5	1,067	413	654	408,341	370,204	-235,577	408,341	139,192	-164,904	0	0	0	5,931
32.5	10.5	685	265	420	467,520	423,857	-235,577	467,520	159,365	-164,904	0	0	0	4,598
27.5	8.5	369	143	226	526,700	477,510	-235,577	526,700	179,538	-164,904	0	0	0	2,903
22.5	7.0	321	124	197	585,880	531,163	-235,577	585,880	199,711	-164,904	0	0	0	2,895
17.5	5.3	184	71	113	645,060	584,815	-235,577	645,060	219,883	-164,904	0	0	0	1,872
12.5	3.8	40	15	25	704,239	638,468	-235,577	704,239	240,056	-164,904	0	0	0	453
7.5	2.3	0	0	0	763,419	692,121	-235,577	763,419	260,229	-164,904	0	0	0	0
2.5	1.3	0	0	0	822,599	745,774	-235,577	822,599	280,402	-164,904	0	0	0	0
TOTALS		**8,760**	**3,389**	**5,371**								**107,648**	**107,648**	**24,814**

Existing Building Ventilation & Infiltration (occ)	**9,936**	**cfm**
Overheat Ventilation Factor	**1.00**	
Additional ventilation to offset overheat	**0**	**cfm**
Existing Building Ventilation & Infiltration (unocc)	**3,736**	**cfm**
Economizer Ventilation (from AHU's)		**cfm**

Energy Use Indices (calculated)

	Base Case
Heating	**24,814**
Target ->	**28,229**
	87.9%

	Base Case
Cooling	**107,648**
Target ->	**112,000**
	96.1%

CHA Consulting Inc. Confidential Workbook

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-1: Install Roof Insulation

Existing Roof Area	32,250	sf
Existing U-value	0.07	Btu/hr/(sf*F)
Existing R-value	15.2	
Proposed R-value	23	
Proposed U-value	0.04	Btu/hr/(sf*F)
Heating System Efficiency	80%	
Cooling System Efficiency	1.30	kW/Ton
Heating "On" Temp	60	F

Existing Cooling

Existing Cooling Load Temp Diff.	75	F
Existing Max. Roof Cooling Load	159,638	Btu/hr

Proposed Cooling

Proposed Cooling Load	104,256	Btu/hr
Occupied Cooling Setpoint	72	F
Unoccupied Cooling Setpoint	72	F

Existing Heating

Existing Heating Load Temp Diff.	60	F
Existing Max. Roof Heating Load	126,646	Btu/hr

Proposed Heating

Proposed Heating Load	82,710	Btu/hr
Occupied Heating Setpoint	72	F
Unoccupied Heating Setpoint	65	F

Existing Heating Total	293,494,874	Btu/yr
Proposed Heating Total	191,676,381	Btu/yr
Savings	101,818,493	Btu/yr
Input	**1,272.73**	**Therms**
Existing Cooling Total	2,686	kWh/yr
Proposed Cooling Total	1,754	kWh/yr
Savings	**932**	kWh/yr

				Occupied				Unoccupied							
Avg Outdoor Air Temp. Bins °F	**Existing Equipment Bin Hours**	**Occupied Equipment Bin Hours**	**Unoccupied Equipment Bin Hours**	**Existing Heat Gain**	**Proposed Heat Gain**	**Existing Heat Loss**	**Proposed Heat Loss**	**Existing Heat Gain**	**Proposed Heat Gain**	**Existing Heat Loss**	**Proposed Heat Loss**	**Existing Cooling Load**	**Existing Heating Load**	**Proposed Cooling Load**	**Proposed Heating Load**
				(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Kwh)	(Btu/yr)	(Kwh)	(Btu/yr)
102.5	0	0	0	64,919	42,398	-	-	64,919	42,398	-	-	0.00	-	0.00	-
97.5	3	1	2	54,277	35,447	-	-	54,277	35,447	-	-	17.64	-	11.52	-
92.5	33	13	20	43,634	28,497	-	-	43,634	28,497	-	-	155.99	-	101.88	-
87.5	123	48	75	32,992	21,546	-	-	32,992	21,546	-	-	439.62	-	287.10	-
82.5	477	185	292	22,349	14,596	-	-	22,349	14,596	-	-	1,154.90	-	754.24	-
77.5	656	254	402	11,707	7,645	-	-	11,707	7,645	-	-	831.96	-	543.34	-
72.5	742	287	455	1,064	695	-	-	1,064	695	-	-	85.55	-	55.87	-
67.5	784	303	481	-	-	-	-	-	-	-	-	0.00	-	0.00	-
62.5	983	380	603	-	-	-	-	-	-	-	-	-	-	-	-
57.5	625	242	383	-	-	30,863	20,156	-	-	15,964	10,426	-	13,580,273	-	8,869,040
52.5	540	209	331	-	-	41,506	27,107	-	-	26,606	17,376	-	17,480,306	-	11,416,083
47.5	457	177	280	-	-	52,148	34,057	-	-	37,249	24,327	-	19,657,141	-	12,837,736
42.5	671	260	411	-	-	62,791	41,008	-	-	47,891	31,277	-	36,003,134	-	23,513,019
37.5	1,067	413	654	-	-	73,433	47,958	-	-	58,534	38,227	-	68,606,433	-	44,805,664
32.5	685	265	420	-	-	84,076	54,908	-	-	69,176	45,178	-	51,334,542	-	33,525,694
27.5	369	143	226	-	-	94,718	61,859	-	-	79,819	52,128	-	31,580,288	-	20,624,535
22.5	321	124	197	-	-	105,361	68,809	-	-	90,461	59,079	-	30,888,526	-	20,172,757
17.5	184	71	113	-	-	116,003	75,760	-	-	101,104	66,029	-	19,663,793	-	12,842,080
12.5	40	15	25	-	-	126,646	82,710	-	-	111,746	72,980	-	4,700,438	-	3,069,774
7.5	0	0	0	-	-	137,288	89,661	-	-	122,389	79,930	-	-	-	-
2.5	0	0	0	-	-	147,931	96,611	-	-	133,031	86,880	-	-	-	-
TOTALS	**8,760**	**3,389**	**5,371**									**2,685.7**	**293,494,874**	**1,754**	**191,676,381**

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-1: Install Roof Insulation - Cost

Multipliers	
Material:	1.05
Labor:	1.67
Equipment:	1.32

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Spray Foam Roof Insulation	32,250	SF	$ 1.93	$ 0.25	$ -	$ 65,230	$ 13,456	$ -	$ 78,686	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

Note: cost for this measure includes incremental cost of installing additional insulation only, this does not include costs for a new roof
Note: Cost Estimates are for energy calculations only, do not use for procurement

$ 78,686	Subtotal
$ 35.00	Contingency
$ 78,721	**Total**

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-2: Install Wall Insulation

Existing Roof Area	23,453	sf
Existing U-value	0.07	Btu/hr/(sf*F)
Existing R-value	15.2	
Proposed R-value	23	
Proposed U-value	0.04	Btu/hr/(sf*F)
Heating System Efficiency	80%	
Cooling System Efficiency	1.30	kW/Ton
Heating "On" Temp	60	F

Existing Cooling

Existing Cooling Load Temp Diff.	75	F
Existing Max. Roof Cooling Load	159,638	Btu/hr

Proposed Cooling

Proposed Cooling Load	104,256	Btu/hr
Occupied Cooling Setpoint	72	F
Unoccupied Cooling Setpoint	80	F

Existing Heating

Existing Heating Load Temp Diff.	60	F
Existing Max. Roof Heating Load	126,646	Btu/hr

Proposed Heating

Proposed Heating Load	82,710	Btu/hr
Occupied Heating Setpoint	72	F
Unoccupied Heating Setpoint	60	F

Existing Heating Total	189,906,077	Btu/yr
Proposed Heating Total	124,024,345	Btu/yr
Savings	65,881,732	Btu/yr
Input	**823.52**	**Therms**
Existing Cooling Total	1,021	kWh/yr
Proposed Cooling Total	667	kWh/yr
Savings	**354**	kWh/yr

				Occupied				Unoccupied							
Avg Outdoor Air Temp. Bins °F	**Existing Equipment Bin Hours**	**Occupied Equipment Bin Hours**	**Unoccupied Equipment Bin Hours**	**Existing Heat Gain**	**Proposed Heat Gain**	**Existing Heat Loss**	**Proposed Heat Loss**	**Existing Heat Gain**	**Proposed Heat Gain**	**Existing Heat Loss**	**Proposed Heat Loss**	**Existing Cooling Load**	**Existing Heating Load**	**Proposed Cooling Load**	**Proposed Heating Load**
				(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Mlbs)	(Btu/yr)	(Mlbs)	(Btu/yr)
102.5	0	0	0	47,211	30,833	-	-	34,828	22,745	-	-	0.00	-	0.00	-
97.5	3	1	2	39,471	25,778	-	-	27,088	17,691	-	-	10.36	-	6.77	-
92.5	33	13	20	31,732	20,724	-	-	19,349	12,636	-	-	86.30	-	56.36	-
87.5	123	48	75	23,992	15,669	-	-	11,609	7,582	-	-	218.53	-	142.72	-
82.5	477	185	292	16,253	10,615	-	-	3,870	2,527	-	-	447.55	-	292.29	-
77.5	656	254	402	8,513	5,560	-	-	-	-	-	-	234.09	-	152.88	-
72.5	742	287	455	774	505	-	-	-	-	-	-	24.07	-	15.72	-
67.5	784	303	481	-	-	-	-	-	-	-	-	0.00	-	0.00	-
62.5	983	380	603	-	-	-	-	-	-	-	-	-	-	-	-
57.5	625	242	383	-	-	22,445	14,658	-	-	3,870	2,527	-	6,910,259	-	4,512,970
52.5	540	209	331	-	-	30,184	19,713	-	-	11,609	7,582	-	10,149,788	-	6,628,650
47.5	457	177	280	-	-	37,924	24,767	-	-	19,349	12,636	-	12,126,675	-	7,919,720
42.5	671	260	411	-	-	45,663	29,822	-	-	27,088	17,691	-	22,998,447	-	15,019,885
37.5	1,067	413	654	-	-	53,402	34,876	-	-	34,828	22,745	-	44,829,337	-	29,277,258
32.5	685	265	420	-	-	61,142	39,931	-	-	42,567	27,800	-	34,081,397	-	22,257,966
27.5	369	143	226	-	-	68,881	44,985	-	-	50,307	32,854	-	21,215,048	-	13,855,177
22.5	321	124	197	-	-	76,621	50,040	-	-	58,046	37,909	-	20,939,743	-	13,675,381
17.5	184	71	113	-	-	84,360	55,094	-	-	65,786	42,963	-	13,426,910	-	8,768,880
12.5	40	15	25	-	-	92,100	60,149	-	-	73,525	48,018	-	3,228,473	-	2,108,459
7.5	0	0	0	-	-	99,839	65,203	-	-	81,265	53,073	-	-	-	-
2.5	0	0	0	-	-	107,579	70,258	-	-	89,004	58,127	-	-	-	-
TOTALS	**8,760**	**3,389**	**5,371**									**1,020.9**	**189,906,077**	**667**	**124,024,345**

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-2: Install Wall Insulation - Cost

Multipliers	
Material:	1.05
Labor:	1.67
Equipment:	1.32

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
4" of Additional Tapered Rigid Insulation (R-20)	23,453	SF	$ 1.93	$ 0.25	$ -	$ 47,437	$ 9,786	$ -	$ 57,223	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

Note: cost for this measure includes incremental cost of installing additional insulation only, this does not include costs for a new roof
Note: Cost Estimates are for energy calculations only, do not use for procurement

$ 57,223	Subtotal
$ 35.00	Contingency
$ 57,258	**Total**

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-3: Window Replacement/Upgrade

Description Existing windows are 1980's vintage single pane glass with aluminum frames. Many of the tilt -out portions' of the windows have been damaged resulting in improper sealing and higher than normal air infiltration. This calculation evaluates replacing the windows with double pane, lo can decrease energy usage.

	Occupied Cooling Hours per Week		68	Hours		
	Occupied Heating Hours per Week		68	Hours		
Given	Heating Energy Cost		$0.96	$/Therm		
	Cooling Energy Cost		$0.125	$/Kwh		
	Occupied Cooling Setpoint Temperature		70.0	Degrees F		(Assumption)
	Occupied Cooling Avg Space Air Enthalpy		27.5	btu/# air		(Assumption)
	Occupied Heating Setpoint Temperature		72.0	Degrees F	Occupied	(Assumption)
	Unoccupied Heating Setpoint Temperature		72.0	Degrees F	Unoccupied	(Assumption)
	Window Area	From Walls, Windows and Doors Tab	1,134	sq.ft.		(From window survey)
	Window Perimeter		606	ft		(From window survey)
	Proposed U factor		0.45	Btu/(h*sqft*degf)		(From window vendor)
	Proposed Air Infiltration		0.05	cfm/ft		(From window vendor)
	Cooling Conversion		12,000	Btu/ton		
	Heating Btu Conversion		1,000,000	Btu/MMBtu		
Assumptions	Existing U factor		1.13	Btu/(h*sqft*degf)		(From ASHRAE Fundamentals)
	Existing Air Infiltration		0.50	cfm/ft		(From ASHRAE Fundamentals)
	Heating System Efficiency		80%			
	Cooling System Efficiency		1.30	kW/Ton		

Formula Cooling Energy Conduction = (Existing U x Area x (OA Temp - RA Temp) x Op Hours)

Heating Energy Conduction = (Existing U x Area x (RA Temp - OA Temp) x Op Hours)
Cooling Energy Infiltration = (4.5 x Leakage x Perimeter x (OA Enthalpy - RA Enthalpy) x Op Hours)
Heating Energy Infiltration = 1.08 x Leakage x Perimeter x (RA temp - OA temp) x Op Hours)
Load = (Conduction) + (Infiltration)
Cooling Energy = (Cooling Load) / (12,000 Btu/Ton) x (kw/Ton)
Heating Energy = (Heating Load) / (1,000,000 Btu/MMBtu) / (Boiler Efficiency)
Energy Cost = (Energy) x (Cost/Unit)

Existing

Operation	OA Enthalpy	OA Temp	Total Hours	Cooling Occupied Hours	Heating Occupied Hours	Heating Unoccupied Hours	Cooling Occupied Conduction	Heating Occupied Conduction	Heating Unoccupied Conduction		Cooling Occupied Infiltration	Heating Occupied Infiltration	Heating Unoccupied Infiltration
Cooling	33.138	97.5	3	1.2	0.0	0.0	42,790	0	0		9,334	0	0
Cooling	37.98	92.5	33	13.4	0.0	0.0	385,112	0	0		190,781	0	0
Cooling	36.25	87.5	123	49.8	0.0	0.0	1,116,437	0	0		593,945	0	0
Cooling	33.83	82.5	477	193.1	0.0	0.0	3,092,570	0	0		1,666,980	0	0
Cooling	32.65	77.5	656	265.5	0.0	0.0	2,551,856	0	0		1,866,125	0	0
Cooling	30.99	72.5	742	300.3	0.0	0.0	962,133	0	0		1,427,817	0	0
Heating	28.14	67.5	784	0.0	317.3	466.7	0	1,829,868	2,690,982		0	467,299	687,204
Heating	24.58	62.5	983	0.0	397.9	585.1	0	4,843,600	7,122,941		0	1,236,924	1,819,006
Heating	21.24	57.5	625	0.0	253.0	372.0	0	4,700,447	6,912,422		0	1,200,367	1,765,246
Heating	18.34	52.5	540	0.0	218.6	321.4	0	5,461,595	8,031,758		0	1,394,744	2,051,094
Heating	16.05	47.5	457	0.0	185.0	272.0	0	5,807,289	8,540,130		0	1,483,024	2,180,918
Heating	14.40	42.5	671	0.0	271.6	399.4	0	10,266,813	15,098,255		0	2,621,866	3,855,686
Heating	12.47	37.5	1,067	0.0	431.9	635.1	0	19,093,021	28,077,972		0	4,875,841	7,170,354
Heating	10.46	32.5	685	0.0	277.3	407.7	0	14,033,914	20,638,108		0	3,583,882	5,270,414
Heating	8.54	27.5	369	0.0	149.4	219.6	0	8,516,821	12,524,736		0	2,174,966	3,198,479
Heating	6.95	22.5	321	0.0	129.9	191.1	0	8,241,407	12,119,716		0	2,104,632	3,095,048
Heating	5.26	17.5	184	0.0	74.5	109.5	0	5,201,223	7,648,857		0	1,328,252	1,953,311
Heating	3.83	12.5	40	0.0	16.2	23.8	0	1,234,435	1,815,345		0	315,241	463,590
Heating	2.31	7.5	0	0.0	0.0	0.0	0	0	0		0	0	0
Heating	1.31	2.5	0	0.0	0.0	0.0	0	0	0		0	0	0
Subtotal =			**8,760**	**823**	**2,722**	**4,004**	**8,150,899**	**89,230,431**	**131,221,222**	**btu**	**5,754,983**	**22,787,038**	**33,510,350**

	Conduction	Infiltration		
Cooling Load =	(8150899) + (	5754983) =		**13,905,882 btu**
	Cooling Load			
Cooling Energy =	(13905882)/(	12000) * (	1.30) =	**1506 kWh**
	Cooling Energy	Cooling Cost		
Cooling Energy Cost =	(1506.47) x (	$0.125) =		**$ 188.31**
	Conduction	Infiltration		
Heating Load =	(220451653) + (	56297388) =		**276,749,040 btu**
	Heating Load	Heat Content		
Heating Energy =	(276749040)/(	80%)/(	100000) =	**3,459 Therms**
	Heating Energy	Heating Cost		
Heating Energy Cost =	(3459.36) x (	$0.960) =		**$ 3,321**

Operation	OA Enthalpy	OA Temp	Total Hours	Cooling Occupied Hours	Heating Occupied Hours	Heating Unoccupied Hours	Cooling Occupied Conduction	Heating Occupied Conduction	Heating Unoccupied Conduction	Cooling Occupied Infiltration	Heating Occupied Infiltration	Heating Unoccupied Infiltration
Cooling	33.138	97.5	3	1.2	0.0	0.0	17,040	0	0	933	0	0
Cooling	37.98	92.5	33	13.4	0.0	0.0	153,363	0	0	19,078	0	0
Cooling	36.25	87.5	123	49.8	0.0	0.0	444,599	0	0	59,395	0	0
Cooling	33.83	82.5	477	193.1	0.0	0.0	1,231,554	0	0	166,698	0	0
Cooling	32.65	77.5	656	265.5	0.0	0.0	1,016,226	0	0	186,613	0	0
Cooling	30.99	72.5	742	300.3	0.0	0.0	383,150	0	0	142,782	0	0
Heating	28.14	67.5	784	0.0	317.3	466.7	0	728,708	1,071,630	0	46,730	68,720
Heating	24.58	62.5	983	0.0	397.9	585.1	0	1,928,867	2,836,569	0	123,692	181,901
Heating	21.24	57.5	625	0.0	253.0	372.0	0	1,871,859	2,752,734	0	120,037	176,525
Heating	18.34	52.5	540	0.0	218.6	321.4	0	2,174,972	3,198,488	0	139,474	205,109
Heating	16.05	47.5	457	0.0	185.0	272.0	0	2,312,637	3,400,937	0	148,302	218,092
Heating	14.40	42.5	671	0.0	271.6	399.4	0	4,088,554	6,012,579	0	262,187	385,569
Heating	12.47	37.5	1,067	0.0	431.9	635.1	0	7,603,415	11,181,493	0	487,584	717,035
Heating	10.46	32.5	685	0.0	277.3	407.7	0	5,588,727	8,218,716	0	358,388	527,041
Heating	8.54	27.5	369	0.0	149.4	219.6	0	3,391,654	4,987,727	0	217,497	319,848
Heating	6.95	22.5	321	0.0	129.9	191.1	0	3,281,976	4,826,436	0	210,463	309,505
Heating	5.26	17.5	184	0.0	74.5	109.5	0	2,071,283	3,046,005	0	132,825	195,331
Heating	3.83	12.5	40	0.0	16.2	23.8	0	491,589	722,925	0	31,524	46,359
Heating	2.31	7.5	0	0.0	0.0	0.0	0	0	0	0	0	0
Heating	1.31	2.5	0	0.0	0.0	0.0	0	0	0	0	0	0
Subtotal =			**8,760**	**823**	**2,722**	**4,004**	**3,245,933**	**35,534,242**	**52,256,239 btu**	**575,498**	**2,278,704**	**3,351,035**

	Conduction	Infiltration		
Cooling Load =	(3245933) + (	575498) =		**3,821,432 btu**
	Cooling Load			
Cooling Energy =	(3821432)/(	12000) * (	1.30) =	**414 kWh**
	Cooling Energy	Cooling Cost		
Cooling Energy Cost =	(413.99) x (	$0.125) =		**$ 51.75**
	Conduction	Infiltration		
Heating Load =	(87790481) + (	5629739) =		**93,420,220 btu**
	Heating Load	Heat Content		
Heating Energy =	(93420220)/(	80%) / (	100000) =	**1168 Therms**
	Heating Energy	Heating Cost		
Heating Energy Cost =	(1167.75) x (	$0.960) =		**$ 1,121**

Summary

EXISTING COOLING ENERGY	**1506.47**	**kWh**	**$ 188.31**
EXISTING HEATING ENERGY	**3459.36**	**Therms**	**$ 3,320.99**
EXISTING ENERGY COST			**$ 3,509.30**

PROPOSED COOLING ENERGY	**413.99**	**kWh**	**$ 51.75**
PROPOSED HEATING ENERGY	**1167.75**	**Therms**	**$ 1,121.04**
PROPOSED ENERGY COST			**$ 1,172.79**

COOLING ENERGY SAVINGS	**1092.48**	**kWh**	**$ 136.56**
HEATING ENERGY SAVINGS	**2291.61**	**Therms**	**$ 2,199.95**
ENERGY COST SAVINGS			**$ 2,336.51**

Comments

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-3: Window Replacement/Upgrade - Cost

Multipliers	
Material:	1.05
Labor:	1.67
Equipment:	1.32

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									$ -	
New Windows	1134	SF	$ 65	$ 45	$ -	$ 77,248	$ 85,169	$ -	$ 162,417	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

Note: Cost Estimates are for energy calculations only, do not use for procurement

$ 162,417	Subtotal
$ 56,846	35% Contingency
$ 219,263	**Total**

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-4: Replace One Boiler

Description : The facility currently has two natural gas hot water boilers. Each boiler has a combustion efficiency of 80%. The building also uses duct furnaces to heat offices and larger spaces. This ECM evaluates the potential savings for replacing one boiler with a high efficiency condensing boiler that would operate as the primary heating source. The remaining boiler would operate for supplemental heating only. The duct furnaces would be replaces with equivalently sized hot water coils supplied by the boilers.

Existing Fuel	Nat.Gas
Proposed Fuel	Nat.Gas

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 0.96	/Therm	
Proposed Fuel Cost	$ 0.96	/ Therm	From actual bills
Baseline Fuel Use	28,229	Therms	Based on historical utility data
Existing Boiler Plant Efficiency	80%		Estimated
Baseline Boiler Load	22,583	Therms	
Baseline Fuel Cost	$ 27,100		
Proposed Boiler Plant Efficiency	92%		New Boiler seasonal efficiency
Proposed Fuel Use	25,971	Therms	
Proposed Fuel Savings	2,258		
Proposed Fuel Cost	$ 24,932		
Cost Savings	$ 2,168		

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-4: Replace One Boiler - Cost

Multipliers	
Material:	1.05
Labor:	1.67
Equipment:	1.32

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Demolition	1	LS	$ -	$ 5,000	$ -	$ -	$ 8,345	$ -	$ 8,345	Engineer's Estimate
2.0 MBH condensing boiler	1	LS	$ 35,000	$ 15,000	$ -	$ 36,680	$ 25,035	$ -	$ 61,715	RS Means
Venting and combustion air	1	LS	$ 2,500	$ 1,500		$ 2,620	$ 2,504	$ -	$ 5,124	RS Means
Piping, Valves, etc	8	EA	$ 3,500	$ 1,500		$ 29,344	$ 20,028	$ -	$ 49,372	RS Means
8 HW coils and valves	8	EA	$ 1,500	$ 1,500		$ 12,576	$ 20,028	$ -	$ 32,604	RS Means
Sheetmetal work	8	EA	$ 1,500	$ 1,000		$ 12,576	$ 13,352	$ -	$ 25,928	RS Means
Electrical work	1	LS	$ 1,500	$ 1,000		$ 1,572	$ 1,669	$ -	$ 3,241	RS Means
General const	1	LS	$ 1,000	$ 500		$ 1,048	$ 835	$ -	$ 1,883	RS Means
						$ -	$ -	$ -	$ -	RS Means

Note: Costs do not include Asbestos Abatement
Note: Cost Estimates are for enery calulations only, do not use for procurement

$ 188,211	Subtotal
$ 65,873.85	35% Contingency
$ 254,085	**Total**

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-5: Replace Unit Ventilators with Variable Refrigerant Volume Heat Pumps & Energy Recovery

Description: This ECM evaluates the potential energy savings associated with replacing the existing self contained heating/ cooling unit ventilators with a variable refrigerant volume heat pump system and separate energy recovery ventilation system

Existing Fuel Electric
Proposed Fuel Electric

Cooling Savings

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 0.13		
Proposed Fuel Cost	$ 0.13	/ kWh	
Baseline Fuel Use	22,400	Kwh/y	20% of total cooling allocation
Existing Cooling Efficiency	1.3	EER	Based on manufactures ratings
Baseline Cooling Usage	76,428,800	Btu/yr	
Baseline Fuel Cost	2,800	$	
Proposed Cooling Efficiency	0.8	EER	Based on manufacturer's ratings
Baseline Cooling Usage	76,428,800.0		
Proposed Cooling Usage	45,972,211	Btu/y	
Proposed Fuel Use	13,474	Kwh/y	
Proposed Fuel Cost	1,684	$	
Proposed Cost Savings	1,116	$	

Ventilation Savings

	Value	Units	Formula/Comments
Baseline Fuel Cost	$ 0.96		
Proposed Fuel Cost	$ 0.96	/ kWh	
Baseline Fuel Use	1,694	Therms	30% of the heating load X 20% of the total heating load for ventilation
Baseline Ventilation Usage	169,400,000	Btu/yr	
Baseline Fuel Cost	1,626	$	
			Based on manufacturer's ratings
Baseline Ventilation Usage	169,400,000.0	Btu/yr	
Proposed Ventilation Efficiency	95	%	Based manufactures data
Proposed Fuel Use	85	Therms	
Proposed Fuel Cost	81	$	
Proposed Cost Savings	1,545	$	

Savings Summary	2,661	$/ year

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-5: Replace Unit Ventilators with Variable Refrigerant Volume Heat Pumps & Energy Recovery - Cost

Multipliers	
Material:	1.05
Labor:	1.67
Equipment:	1.32

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Remove Unit Ventilators	12	EA	$ -	$ 500		$ -	$ 10,014	$ -	$ 10,014	
VRF Heat Pump Condensing units	3	EA	$ 10,000	$ 3,500	$ 500	$ 31,440	$ 17,525	$ 1,983	$ 50,948	
VRF Heat Pump Evaporator Units	12	EA	$ 2,500	$ 2,000		$ 31,440	$ 40,056	$ -	$ 71,496	
Refrigeration piping and adaptors	12	EA	$ 1,000	$ 2,000		$ 12,576	$ 40,056	$ -	$ 52,632	
Variable air volume energy recovery units	12	EA	$ 7,500	$ 2,000		$ 94,320	$ 40,056	$ -	$ 134,376	
Electrical work	1	LS	$ 20,000	$ 25,000		$ 20,960	$ 41,725	$ -	$ 62,685	
						$ -	$ -	$ -	$ -	

Note: Cost Estimates are for energy calculations only, do not use for procurement

$ 382,151	Subtotal
$ 133,752.68	35% Contingency
$ 515,903	**Total**

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
ECM-6 **Replace Air Conditioning Units and Coils**

Description: The school has older, less efficient cooling systems. This ECM evaluates the electrical savings resulting from upgrading these units to new, high efficiency cooling units.

Equipment Tag	Equipment Description	General Type	Cooling Capacity (Btu/h)	Heating Capacity (Btu/h)
AC-1	Addison	Split	144,000	NA
AC-2	McQuay	Split	180,000	NA
AC-3	Trane	Split	90,000	NA
AC-4	Trane	Split	300,000	NA
AC-5	Trane	Split	180,000	NA
AC-6	Inter City	Split	60,000	NA
AC-7	York	Split	36,000	NA
AC-8	Lennox	Split HP	18,000	NA
AC-9	Lennox	Split HP	18,000	NA
AC-10	Trane	Split	150,000	NA

Item	Value	Units	Formula/Comments
Demand Rate	$ 6.27	/ kW	From utility analysis
Electricity Rate	$ 0.13	/kWh	From utility analysis
FORMULA CONSTANTS			
Coincidence Factor	0.67		NJ Protocols
Conversion	3.412	btu/kW	
COOLING			
Cooling Capacity	1,176,000	btu/hr	Total of all cooling equipment
Baseline EER	11.0		NJ Protocols
Proposed EER	18.0		NJ Protocols
Equivalent Full Load Hours	1,131	hrs	NJ Protocols
Demand Savings	27.86	kW	
Energy Savings	47,022	kWh	
SAVINGS			
Demand Savings	27.86	kW	
Energy Savings	47,022	kWh	
Cost Savings	$ 7,974		

Savings calculation formulas are taken from NJ Protocols document for Electric HVAC Equipment

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

Replace A/C Units - Cost

Multipliers	
Material:	1.05
Labor:	1.67
Equipment:	1.32

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Demolition	10	EA	$ -	$ 150	$ -	$ -	$ 2,504	$ -	$ 2,504	Engineer's Estimate
144000 Condensing unit and coil	1	EA	$ 12,000	$ 2,500	$ -	$ 12,576	$ 4,173	$ -	$ 16,749	Engineer's Estimate
180000 Condensing unit and coil	1	EA	$ 12,500	$ 2,500	$ -	$ 13,100	$ 4,173	$ -	$ 17,273	RS Means
90000 Condensing unit and coil	1	EA	$ 10,000	$ 2,500		$ 10,480	$ 4,173	$ -	$ 14,653	RS Means
300000 Condensing unit and coil	1	EA	$ 17,500	$ 4,500		$ 18,340	$ 7,511	$ -	$ 25,851	RS Means
180000 Condensing unit and coil	1	EA	$ 12,500	$ 2,500		$ 13,100	$ 4,173	$ -	$ 17,273	RS Means
60000 Condensing unit and coil	1	EA	$ 3,500	$ 1,000		$ 3,668	$ 1,669	$ -	$ 5,337	RS Means
36000 Condensing unit and coil	1	EA	$ 3,000	$ 1,000	$ -	$ 3,144	$ 1,669	$ -	$ 4,813	Engineer's Estimate
18000 Condensing unit and coil	1	EA	$ 2,500	$ 1,000	$ -	$ 2,620	$ 1,669	$ -	$ 4,289	RS Means
18000 Condensing unit and coil	1	EA	$ 2,500	$ 1,000		$ 2,620	$ 1,669	$ -	$ 4,289	RS Means
150000 Condensing unit and coil	1	EA	$ 17,500	$ 2,500		$ 18,340	$ 4,173	$ -	$ 22,513	RS Means
Refrigeration	10	EA	$ 500	$ 500		$ 5,240	$ 8,345	$ -	$ 13,585	RS Means
Wiring	10	EA	$ 500	$ 500		$ 5,240	$ 8,345	$ -	$ 13,585	RS Means

$ 162,711	Subtotal
$ 56,948.68	35% Contingency
$ 219,659	**Total**

Note: Cost Estimates are for energy calculations only, do not use for procurement

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-7: Implement Temporary Unoccupied Setback

Description: The existing JCI controls system is not providing night temperature set-back. It is proposed to retro-commission/ upgrade this system to change the building temperature set points when the building is unoccupied. This change in temperatures will result in a reduced heating and cooling load, resulting in thermal and electrical energy savings.

Utility Costs

Blended Electric Rate	$0.13	/ kWh
Blended Natural Gas Rate	$0.96	/ Therm

Building Inputs

Building Footprint	46,320	SF	Ex Occupied Clng Temp.	72	*F	Ex Occupied Htg Temp.	72	*F	**Heating Energy Savings**	**6,356**	**Therms**
Heating Efficiency	80%	Eff	Ex Unoccupied Clng Temp.	72	*F	Ex Unoccupied Htg Temp.	72	*F	**Cooling Energy Savings**	**43,605**	**kWh**
Cooling Efficiency	1.30	EER	Prop Occupied Clng Temp.	72	*F	Prop Occupied Htg Temp.	70	*F			
Building Balance Temp.	60	*F	Prop Unoccupied Clng Temp.	76	*F	Prop Unoccupied Htg Temp.	65	*F			
Internal Gains	235,577	btu/h	Occupied Cooling UA	-20,337	btu/hr/°F	Occupied Heating UA	11,836	btu/hr/°F			
Unoc Internal Gain factor	0.03		Unoccupied Cooling UA	-16,941	btu/hr/°F	Unoccupied Heating UA	11,836	btu/hr/°F			
Ave Occ Internal Gain Factor	0.7		Cooling Occ Enthalpy Setpoint	27.5	Btu/lb						
			Cooling Unocc Enthalpy Setpoint	27.5	Btu/lb						

Heating and cooling energy are unrelated in this model. If the building being analyzed is not cooled, disregard cooling energy calculations

					EXISTING LOADS						PROPOSED LOADS									
					Occupied			Unoccupied			Occupied			Unoccupied						
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Unoccupied Envelope Load BTUH	Ventilation Load BTUH	Internal Gain BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy Therms	Proposed Heating Energy Therms
A		B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	K	L	M	N
97.5	33.14	3	1	2	-518,595	-252,067	-164,904	-431,986	-94,774	-7,067	-518,595	-252,067	-164,904	-364,224	-94,774	-7,067	264	211	0	0
92.5	37.98	33	13	20	-416,910	-468,359	-164,904	-347,283	-176,097	-7,067	-416,910	-468,359	-164,904	-279,520	-176,097	-7,067	3,059	2,467	0	0
87.5	36.25	123	48	75	-315,224	-391,199	-164,904	-262,580	-147,086	-7,067	-315,224	-391,199	-164,904	-194,817	-147,086	-7,067	9,550	7,343	0	0
82.5	33.83	477	185	292	-213,539	-283,118	-164,904	-177,877	-106,449	-7,067	-213,539	-283,118	-164,904	-110,114	-106,449	-7,067	28,872	20,312	0	0
77.5	32.65	656	254	402	-111,854	-230,459	-164,904	-93,173	-86,650	-7,067	-111,854	-230,459	-164,904	-25,411	-86,650	-7,067	30,910	19,137	0	0
72.5	30.99	742	287	455	-10,169	-155,892	-164,904	-8,470	-58,614	-7,067	-10,169	-155,892	-164,904	0	0	-7,067	23,924	10,642	0	0
67.5	28.14	784	303	481	53,262	48,288	-164,904	53,262	18,156	-7,067	29,590	26,826	-164,904	0	0	-7,067	9,272	3,933	0	0
62.5	24.58	983	380	603	112,442	101,940	-164,904	112,442	38,328	-7,067	88,770	80,479	-164,904	29,590	10,086	-7,067	1,796	0	1,318	266
57.5	21.24	625	242	383	171,621	155,593	-164,904	171,621	58,501	-7,067	147,949	134,132	-164,904	88,770	30,259	-7,067	0	0	1,559	890
52.5	18.34	540	209	331	230,801	209,246	-164,904	230,801	78,674	-7,067	207,129	187,785	-164,904	147,949	50,432	-7,067	0	0	1,970	1,392
47.5	16.05	457	177	280	289,981	262,899	-164,904	289,981	98,847	-7,067	266,309	241,438	-164,904	207,129	70,605	-7,067	0	0	2,195	1,706
42.5	14.40	671	260	411	349,161	316,551	-164,904	349,161	119,019	-7,067	325,489	295,090	-164,904	266,309	90,778	-7,067	0	0	3,996	3,279
37.5	12.47	1,067	413	654	408,341	370,204	-164,904	408,341	139,192	-7,067	384,669	348,743	-164,904	325,489	110,950	-7,067	0	0	7,586	6,445
32.5	10.46	685	265	420	467,520	423,857	-164,904	467,520	159,365	-7,067	443,848	402,396	-164,904	384,669	131,123	-7,067	0	0	5,661	4,928
27.5	8.54	369	143	226	526,700	477,510	-164,904	526,700	179,538	-7,067	503,028	456,049	-164,904	443,848	151,296	-7,067	0	0	3,475	3,080
22.5	6.95	321	124	197	585,880	531,163	-164,904	585,880	199,711	-7,067	562,208	509,701	-164,904	503,028	171,469	-7,067	0	0	3,393	3,050
17.5	5.26	184	71	113	645,060	584,815	-164,904	645,060	219,883	-7,067	621,388	563,354	-164,904	562,208	191,641	-7,067	0	0	2,157	1,961
12.5	3.83	40	15	25	704,239	638,468	-164,904	704,239	240,056	-7,067	680,568	617,007	-164,904	621,388	211,814	-7,067	0	0	515	472
7.5	2.31	0	0	0	763,419	692,121	-164,904	763,419	260,229	-7,067	739,747	670,660	-164,904	680,568	231,987	-7,067	0	0	0	0
2.5	1.31	0	0	0	822,599	745,774	-164,904	822,599	280,402	-7,067	798,927	724,313	-164,904	739,747	252,160	-7,067	0	0	0	0
TOTALS		**8,760**	**3,389**	**5,371**													**107,648**	**64,044**	**33,825**	**27,469**

Existing Building Ventilation & Infiltration (occ)	**9,936**	**cfm**
Overheat Ventilation Factor	**1.00**	
Additional ventilation to offset overheat	**0**	**cfm**
Existing Building Ventilation & Infiltration (unocc)	**3,736**	**cfm**

CHA Consulting Inc. Confidential Workbook

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

ECM-7: Implement Temporary Unoccupied Setback - Cost

Multipliers	
Material:	1.05
Labor:	1.67
Equipment:	1.32

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
RCx existing controls	1	LS		$ 5,000	$ -	$ -	$ 8,345	$ -	$ 8,345	Estimated M & L
Upgrade controls	1	LS	$ 10,000	$ 5,000	$ -	$ 10,480	$ 8,345	$ -	$ 18,825	Estimated M & L

Note: Cost Estimates are for energy calculations only, do not use for procurement

$ 27,170	Subtotal
$ 9,509.50	35% Contingency
$ 36,680	**Total**

Hunterdon County Educational Services Commission - LGEA
CHA Project Number: 30313
Hunterdon County ESC - West Amwell Campus

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per April, 2012.
Building must have a minimum average electric demand of 100 kW. This minimum is waived for buildings owned by local governments or non-profit organizations.
At a minimum, all recommended measures were used for this calculation. To qualify for P4P incentives, the following P4P requirements must be met:

- At least 15% source energy savings
- No more than 50% savings from lighting measures
- Scope includes more than one measure
- Project has at least a 10% internal rate of return
- At least 50% of the source energy savings must come from investor-owned electricity and/or natural gas (note: exemption for fuel conversions)

Total Building Area (Square Feet)	64,000
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilities (BPU)

Incentive #1		
Audit is funded by NJ BPU	$0.05	$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$79,398	$28,053
Existing Usage (from utility)	357,401	29,221
Proposed Savings	202,179	10,744
Existing Total MMBtus	4,142	
Proposed Savings MMBtus	1,764	
% Energy Reduction	**42.6%**	
Proposed Annual Savings	$38,054	

	Min (Savings = 15%)		Increase (Savings > 15%)		Max Incentive		Achieved Incentive	
	$/kWh	$/therm	$/kWh	$/therm	$/kWh	$/therm	$/kWh	$/therm
Incentive #2	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.11	$1.25
Incentive #3	$0.09	$0.90	$0.005	$0.05	$0.11	$1.25	$0.11	$1.25

	Incentives $		
	Elec	Gas	Total
			$5,000
Incentive #1	$0	$0	$5,000
Incentive #2	$22,240	$13,430	$35,669
Incentive #3	$22,240	$13,430	$35,669
Total All Incentives	**$44,479**	**$26,860**	**$76,339**

Total Project Cost	$189,932

		Allowable Incentive
% Incentives #1 of Utility Cost*	4.7%	$5,000
% Incentives #2 of Project Cost**	18.8%	$35,669
% Incentives #3 of Project Cost**	18.8%	$35,669
Total Eligible Incentives***	**$76,339**	
Project Cost w/ Incentives	$113,593	

Project Payback (years)	
w/o Incentives	w/ Incentives
5.0	3.0

* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if it is.
** Maximum allowable amount of Incentive #2 is 25% of total project cost.
Maximum allowable amount of Incentive #3 is 25% of total project cost.
*** Maximum allowable amount of Incentive #1 is $50,000 if not funded by NJ BPU, and $25,000 if it is.
Maximum allowable amount of Incentive #2 & #3 is $1 million per gas account and $1 million per electric account; maximum 2 million per project

Hunterdon County Educational Service Commission - West Amwell Campus
CHA Project No.30313
Existing Lighting & Audit Input

Cost of Electricity: **$0.098** **$/kWh**
$6.27 **$/kW**

			EXISTING CONDITIONS									Retrofit Control	
	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	Describe Usage Type using Operating Hours	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	Retrofit control device	Notes
35LED	Lobby	Common Areas	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.54	SW	1800	972	None	
35LED	Data Closet	Mechanical Room	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	8736	1,572	None	
30	Principals Office	Offices	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.23	SW	2600	590	OCC	
4LED	Principals Office	Offices	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.14	SW	2600	374	OCC	
4LED	Conference Room	Offices	6	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.43	SW	2600	1,123	OCC	
4LED	Office Hall	Common Areas	9	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.65	SW	1800	1,166	None	
6LED	Office Hall	Common Areas	1	T 34 R F 4 (MAG)	F44EE	144	0.14	SW	1800	259	None	
41LED	Office Hall	Common Areas	1	1B 40 R F 2 (MAG)	F42SS	94	0.09	SW	1800	169	None	
25LED	Front Office	Offices	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.11	SW	2600	291	OCC	
32LED	Front Office	Offices	4	1T 32 R F 2 (ELE)	F42LL	60	0.24	SW	2600	624	OCC	
32LED	Front Office (Copier)	Offices	1	1T 32 R F 2 (ELE)	F42LL	60	0.06	SW	2600	156	OCC	
32LED	Small Interior Office	Offices	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
41LED	Office Bathroom Men	Restroom	1	1B 40 R F 2 (MAG)	F42SS	94	0.09	SW	3120	293	None	
41LED	Office Bathroom Women	Restroom	1	1B 40 R F 2 (MAG)	F42SS	94	0.09	SW	3120	293	None	
4LED	Office	Offices	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.14	SW	2600	374	OCC	
30	Electical Room	Mechanical Room	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.23	SW	8736	1,983	None	
106	Office Side Exit	Common Areas	4	SP 65 I	I65/1	65	0.26	SW	1800	468	None	
185LED	Office w/ Window 1	Offices	2	T 40 R F 4 (ELE)	F44SE	172	0.34	SW	2600	894	OCC	
106	Office w/ Window 1	Offices	2	SP 65 I	I65/1	65	0.13	SW	2600	338	OCC	
185LED	Office w/ Window 2	Offices	2	T 40 R F 4 (ELE)	F44SE	172	0.34	SW	2600	894	OCC	
106	Office w/ Window 2	Offices	2	SP 65 I	I65/1	65	0.13	SW	2600	338	OCC	
185LED	Office w/ Window 3	Offices	2	T 40 R F 4 (ELE)	F44SE	172	0.34	SW	2600	894	OCC	
106	Office w/ Window 3	Offices	2	SP 65 I	I65/1	65	0.13	SW	2600	338	OCC	
185LED	Office w/ Window 4	Offices	2	T 40 R F 4 (ELE)	F44SE	172	0.34	SW	2600	894	OCC	
106	Office w/ Window 4	Offices	2	SP 65 I	I65/1	65	0.13	SW	2600	338	OCC	
185LED	Office w/ Window 5	Offices	2	T 40 R F 4 (ELE)	F44SE	172	0.34	SW	2600	894	OCC	
106	Office w/ Window 5	Offices	2	SP 65 I	I65/1	65	0.13	SW	2600	338	OCC	
106	Faculty Room	Offices	13	SP 65 I	I65/1	65	0.85	SW	2600	2,197	OCC	
4LED	Faculty Room Bathroom 1	Restroom	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.07	SW	3120	225	None	
4LED	Faculty Room Bathroom 2	Restroom	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.07	SW	3120	225	None	
185LED	Classroom next to Faculty Room	Classrooms	10	T 40 R F 4 (ELE)	F44SE	172	1.72	SW	1800	3,096	OCC	
35LED	Office Hall	Common Areas	5	T 32 R F 3 (ELE)	F43ILL/2	90	0.45	SW	1800	810	None	
185LED	Facility Director Office	Offices	2	T 40 R F 4 (ELE)	F44SE	172	0.34	SW	2600	894	OCC	
185LED	Office	Offices	3	T 40 R F 4 (ELE)	F44SE	172	0.52	SW	2600	1,342	OCC	
6LED	Life Skills Entrance	Classrooms	2	T 34 R F 4 (MAG)	F44EE	144	0.29	SW	1800	518	OCC	
6LED	Life Skills Room	Classrooms	1	T 34 R F 4 (MAG)	F44EE	144	0.14	SW	1800	259	OCC	
6LED	Life Skills Kitchen	Classrooms	2	T 34 R F 4 (MAG)	F44EE	144	0.29	SW	1800	518	OCC	
4LED	Life Skills Bath	Classrooms	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.07	SW	1800	130	OCC	
6LED	Like Skills Laundry	Classrooms	1	T 34 R F 4 (MAG)	F44EE	144	0.14	SW	1800	259	OCC	
32LED	Nurse Office	Offices	6	1T 32 R F 2 (ELE)	F42LL	60	0.36	SW	2600	936	OCC	
32LED	Nurse Treat	Offices	3	1T 32 R F 2 (ELE)	F42LL	60	0.18	SW	2600	468	OCC	
32LED	Nurse Cot	Offices	2	1T 32 R F 2 (ELE)	F42LL	60	0.12	SW	2600	312	OCC	
4LED	Nurse Bath	Restroom	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.07	SW	3120	225	None	
71	Nurse Closet	Storage Areas	1	I 60	I60/1	60	0.06	SW	1040	62	None	
41LED	GED	Offices	6	1B 40 R F 2 (MAG)	F42SS	94	0.56	SW	2600	1,466	OCC	
41LED	Office	Offices	8	1B 40 R F 2 (MAG)	F42SS	94	0.75	SW	2600	1,955	OCC	
4LED	Office closet	Storage Areas	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.07	SW	1040	75	None	
41LED	Office	Offices	4	1B 40 R F 2 (MAG)	F42SS	94	0.38	SW	2600	978	OCC	
35LED	Hall	Common Areas	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	1800	324	None	
32LED	Hall	Common Areas	7	1T 32 R F 2 (ELE)	F42LL	60	0.42	SW	1800	756	None	
35LED	100	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	SW	1800	1,458	OCC	
35LED	101	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	SW	1800	1,458	OCC	
35LED	102	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	SW	1800	1,458	OCC	
35LED	103	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	SW	1800	1,458	OCC	
35LED	104	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	SW	1800	1,458	OCC	
35LED	105	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	SW	1800	1,458	OCC	
35LED	106	Classrooms	8	T 32 R F 3 (ELE)	F43ILL/2	90	0.72	SW	1800	1,296	OCC	
35LED	107	Classrooms	8	T 32 R F 3 (ELE)	F43ILL/2	90	0.72	SW	1800	1,296	OCC	
35LED	108	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	SW	1800	1,458	OCC	
35LED	109	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	SW	1800	1,458	OCC	
35LED	110	Classrooms	14	T 32 R F 3 (ELE)	F43ILL/2	90	1.26	SW	1800	2,268	OCC	
35LED	111	Classrooms	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.35	SW	1800	2,430	OCC	
35LED	112	Classrooms	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.54	SW	1800	972	OCC	
35LED	112	Classrooms	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	SW	1800	486	OCC	
35LED	113	Classrooms	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.54	SW	1800	972	OCC	
35LED	113	Classrooms	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	SW	1800	486	OCC	
35LED	114	Classrooms	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.54	SW	1800	972	OCC	
35LED	114	Classrooms	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	SW	1800	486	OCC	

Hunterdon County Educational Service Commission - West Amwell Campus
CHA Project No.30313
ECM-L2 Install Occupancy Sensors

		EXISTING CONDITIONS					RETROFIT CONDITIONS				COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
35LED	Lobby	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	0.5	None	1800	972.0	0.0	0.0	$0.00	$0.00	$0.00		
35LED	Data Closet	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	0.2	None	8736	1,572.5	0.0	0.0	$0.00	$0.00	$0.00		
30	Principals Office	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.2	0.2	OCC	1820	413.1	177.1	0.0	$17.35	$128.25	$20.00	7.4	6.2
4LED	Principals Office	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	0.1	OCC	1820	262.1	112.3	0.0	$11.01	$128.25	$20.00	11.7	9.8
4LED	Conference Room	6	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.4	0.4	OCC	1820	786.2	337.0	0.0	$33.02	$128.25	$20.00	3.9	3.3
4LED	Office Hall	9	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.6	0.6	None	1800	1,166.4	0.0	0.0	$0.00	$0.00	$0.00		
6LED	Office Hall	1	T 34 R F 4 (MAG)	F44EE	144	0.1	0.1	None	1800	259.2	0.0	0.0	$0.00	$0.00	$0.00		
41LED	Office Hall	1	1B 40 R F 2 (MAG)	F42SS	94	0.1	0.1	None	1800	169.2	0.0	0.0	$0.00	$0.00	$0.00		
25LED	Front Office	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	0.1	OCC	1820	203.8	87.4	0.0	$8.56	$128.25	$20.00	15.0	12.6
32LED	Front Office	4	1T 32 R F 2 (ELE)	F42LL	60	0.2	0.2	OCC	1820	436.8	187.2	0.0	$18.35	$128.25	$20.00	7.0	5.9
32LED	Front Office (Copier)	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	OCC	1820	109.2	46.8	0.0	$4.59	$128.25	$20.00	28.0	23.6
32LED	Small Interior Office	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	OCC	1820	218.4	93.6	0.0	$9.17	$128.25	$20.00	14.0	11.8
41LED	Office Bathroom Men	1	1B 40 R F 2 (MAG)	F42SS	94	0.1	0.1	None	3120	293.3	0.0	0.0	$0.00	$0.00	$0.00		
41LED	Office Bathroom Women	1	1B 40 R F 2 (MAG)	F42SS	94	0.1	0.1	None	3120	293.3	0.0	0.0	$0.00	$0.00	$0.00		
4LED	Office	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	0.1	OCC	1820	262.1	112.3	0.0	$11.01	$128.25	$20.00	11.7	9.8
30	Electical Room	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.2	0.2	None	8736	1,983.1	0.0	0.0	$0.00	$0.00	$0.00		
106	Office Side Exit	4	SP 65 I	I65/1	65	0.3	0.3	None	1800	468.0	0.0	0.0	$0.00	$0.00	$0.00		
185LED	Office w/ Window 1	2	T 40 R F 4 (ELE)	F44SE	172	0.3	0.3	OCC	1820	626.1	268.3	0.0	$26.30	$128.25	$20.00	4.9	4.1
106	Office w/ Window 1	2	SP 65 I	I65/1	65	0.1	0.1	OCC	1820	236.6	101.4	0.0	$9.94	$128.25	$20.00	12.9	10.9
185LED	Office w/ Window 2	2	T 40 R F 4 (ELE)	F44SE	172	0.3	0.3	OCC	1820	626.1	268.3	0.0	$26.30	$128.25	$20.00	4.9	4.1
106	Office w/ Window 2	2	SP 65 I	I65/1	65	0.1	0.1	OCC	1820	236.6	101.4	0.0	$9.94	$128.25	$20.00	12.9	10.9
185LED	Office w/ Window 3	2	T 40 R F 4 (ELE)	F44SE	172	0.3	0.3	OCC	1820	626.1	268.3	0.0	$26.30	$128.25	$20.00	4.9	4.1
106	Office w/ Window 3	2	SP 65 I	I65/1	65	0.1	0.1	OCC	1820	236.6	101.4	0.0	$9.94	$128.25	$20.00	12.9	10.9
185LED	Office w/ Window 4	2	T 40 R F 4 (ELE)	F44SE	172	0.3	0.3	OCC	1820	626.1	268.3	0.0	$26.30	$128.25	$20.00	4.9	4.1
106	Office w/ Window 4	2	SP 65 I	I65/1	65	0.1	0.1	OCC	1820	236.6	101.4	0.0	$9.94	$128.25	$20.00	12.9	10.9
185LED	Office w/ Window 5	2	T 40 R F 4 (ELE)	F44SE	172	0.3	0.3	OCC	1820	626.1	268.3	0.0	$26.30	$128.25	$20.00	4.9	4.1
106	Office w/ Window 5	2	SP 65 I	I65/1	65	0.1	0.1	OCC	1820	236.6	101.4	0.0	$9.94	$128.25	$20.00	12.9	10.9
106	Faculty Room	13	SP 65 I	I65/1	65	0.8	0.8	OCC	1820	1,537.9	659.1	0.0	$64.59	$128.25	$20.00	2.0	1.7
4LED	Faculty Room Bathroom 1	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	0.1	None	3120	224.6	0.0	0.0	$0.00	$0.00	$0.00		
4LED	Faculty Room Bathroom 2	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	0.1	None	3120	224.6	0.0	0.0	$0.00	$0.00	$0.00		
185LED	Classroom next to Faculty Room	10	T 40 R F 4 (ELE)	F44SE	172	1.7	1.7	OCC	1260	2,167.2	928.8	0.0	$91.02	$128.25	$20.00	1.4	1.2
35LED	Office Hall	5	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	0.5	None	1800	810.0	0.0	0.0	$0.00	$0.00	$0.00		
185LED	Facility Director Office	2	T 40 R F 4 (ELE)	F44SE	172	0.3	0.3	OCC	1820	626.1	268.3	0.0	$26.30	$128.25	$20.00	4.9	4.1
185LED	Office	3	T 40 R F 4 (ELE)	F44SE	172	0.5	0.5	OCC	1820	939.1	402.5	0.0	$39.44	$128.25	$20.00	3.3	2.7
6LED	Life Skills Entrance	2	T 34 R F 4 (MAG)	F44EE	144	0.3	0.3	OCC	1260	362.9	155.5	0.0	$15.24	$128.25	$20.00	8.4	7.1
6LED	Life Skills Room	1	T 34 R F 4 (MAG)	F44EE	144	0.1	0.1	OCC	1260	181.4	77.8	0.0	$7.62	$128.25	$20.00	16.8	14.2
6LED	Life Skills Kitchen	2	T 34 R F 4 (MAG)	F44EE	144	0.3	0.3	OCC	1260	362.9	155.5	0.0	$15.24	$128.25	$20.00	8.4	7.1
4LED	Life Skills Bath	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	0.1	OCC	1260	90.7	38.9	0.0	$3.81	$128.25	$20.00	33.7	28.4
6LED	Like Skills Laundry	1	T 34 R F 4 (MAG)	F44EE	144	0.1	0.1	OCC	1260	181.4	77.8	0.0	$7.62	$128.25	$20.00	16.8	14.2
32LED	Nurse Office	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	0.4	OCC	1820	655.2	280.8	0.0	$27.52	$128.25	$20.00	4.7	3.9
32LED	Nurse Treat	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	0.2	OCC	1820	327.6	140.4	0.0	$13.76	$128.25	$20.00	9.3	7.9
32LED	Nurse Cot	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	OCC	1820	218.4	93.6	0.0	$9.17	$128.25	$20.00	14.0	11.8
4LED	Nurse Bath	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	0.1	None	3120	224.6	0.0	0.0	$0.00	$0.00	$0.00		
71	Nurse Closet	1	I 60	I60/1	60	0.1	0.1	None	1040	62.4	0.0	0.0	$0.00	$0.00	$0.00		
41LED	GED	6	1B 40 R F 2 (MAG)	F42SS	94	0.6	0.6	OCC	1820	1,026.5	439.9	0.0	$43.11	$128.25	$20.00	3.0	2.5
41LED	Office	8	1B 40 R F 2 (MAG)	F42SS	94	0.8	0.8	OCC	1820	1,368.6	586.6	0.0	$57.48	$128.25	$20.00	2.2	1.9
4LED	Office closet	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	0.1	None	1040	74.9	0.0	0.0	$0.00	$0.00	$0.00		
41LED	Office	4	1B 40 R F 2 (MAG)	F42SS	94	0.4	0.4	OCC	1820	684.3	293.3	0.0	$28.74	$128.25	$20.00	4.5	3.8
35LED	Hall	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	0.2	None	1800	324.0	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Hall	7	1T 32 R F 2 (ELE)	F42LL	60	0.4	0.4	None	1800	756.0	0.0	0.0	$0.00	$0.00	$0.00		
35LED	100	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	0.8	OCC	1260	1,020.6	437.4	0.0	$42.87	$128.25	$20.00	3.0	2.5
35LED	101	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	0.8	OCC	1260	1,020.6	437.4	0.0	$42.87	$128.25	$20.00	3.0	2.5
35LED	102	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	0.8	OCC	1260	1,020.6	437.4	0.0	$42.87	$128.25	$20.00	3.0	2.5
35LED	103	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	0.8	OCC	1260	1,020.6	437.4	0.0	$42.87	$128.25	$20.00	3.0	2.5
35LED	104	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	0.8	OCC	1260	1,020.6	437.4	0.0	$42.87	$128.25	$20.00	3.0	2.5
35LED	105	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	0.8	OCC	1260	1,020.6	437.4	0.0	$42.87	$128.25	$20.00	3.0	2.5
35LED	106	8	T 32 R F 3 (ELE)	F43ILL/2	90	0.7	0.7	OCC	1260	907.2	388.8	0.0	$38.10	$128.25	$20.00	3.4	2.8
35LED	107	8	T 32 R F 3 (ELE)	F43ILL/2	90	0.7	0.7	OCC	1260	907.2	388.8	0.0	$38.10	$128.25	$20.00	3.4	2.8
35LED	108	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	0.8	OCC	1260	1,020.6	437.4	0.0	$42.87	$128.25	$20.00	3.0	2.5
35LED	109	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	0.8	OCC	1260	1,020.6	437.4	0.0	$42.87	$128.25	$20.00	3.0	2.5
35LED	110	14	T 32 R F 3 (ELE)	F43ILL/2	90	1.3	1.3	OCC	1260	1,587.6	680.4	0.0	$66.68	$128.25	$20.00	1.9	1.6
35LED	111	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	1.4	OCC	1260	1,701.0	729.0	0.0	$71.44	$128.25	$20.00	1.8	1.5
35LED	112	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	0.5	OCC	1260	680.4	291.6	0.0	$28.58	$128.25	$20.00	4.5	3.8
35LED	112	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	0.3	OCC	1260	340.2	145.8	0.0	$14.29	$128.25	$20.00	9.0	7.6
35LED	113	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	0.5	OCC	1260	680.4	291.6	0.0	$28.58	$128.25	$20.00	4.5	3.8
35LED	113	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	0.3	OCC	1260	340.2	145.8	0.0	$14.29	$128.25	$20.00	9.0	7.6
35LED	114	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	0.5	OCC	1260	680.4	291.6	0.0	$28.58	$128.25	$20.00	4.5	3.8
35LED	114	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	0.3	OCC	1260	340.2	145.8	0.0	$14.29	$128.25	$20.00	9.0	7.6
35LED	115	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	0.5	OCC	1260	680.4	291.6	0.0	$28.58	$128.25	$20.00	4.5	3.8
35LED	115	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	0.3	OCC	1260	340.2	145.8	0.0	$14.29	$128.25	$20.00	9.0	7.6
35LED	Computer Lab	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	0.3	OCC	1260	340.2	145.8	0.0	$14.29	$128.25	$20.00	9.0	7.6
35LED	Computer Lab	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	0.3	OCC	1260	340.2	145.8	0.0	$14.29	$128.25	$20.00	9.0	7.6
35LED	Computer Lab	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	0.3	OCC	1260	340.2	145.8	0.0	$14.29	$128.25	$20.00	9.0	7.6
35LED	Woodshop	14	T 32 R F 3 (ELE)	F43ILL/2	90	1.3	1.3	OCC	1260	1,587.6	680.4	0.0	$66.68	$128.25	$20.00	1.9	1.6
35LED	Woodshop	4	T 32 R F 3 (ELE)	F43ILL/2	90	0.4	0.4	OCC	1260	453.6	194.4	0.0	$19.05	$128.25	$20.00	6.7	5.7
35LED	Woodshop Office	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	0.2	OCC	1820	327.6	140.4	0.0	$13.76	$128.25	$20.00	9.3	7.9
32LED	Woodshop Small Room	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	OCC	1260	151.2	64.8	0.0	$6.35	$128.25	$20.00	20.2	17.0
35LED	Art	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	0.3	OCC	1260	340.2	145.8	0.0	$14.29	$128.25	$20.00	9.0	7.6
35LED	Art	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	1.1	OCC	1260	1,360.8	583.2	0.0	$57.15	$128.25	$20.00	2.2	1.9
35LED	Art Office	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	0.2	OCC	1820	327.6	140.4	0.0	$13.76	$128.25	$20.00	9.3	7.9
32LED	Art Small Room	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	None	1040	124.8	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Art Kiln	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	OCC	1260	75.6	32.4	0.0	$3.18	$128.25	$20.00	40.4	34.1
32LED	Art/Woodshop Common Room	4	1T 32 R F 2 (ELE)	F42LL	60	0.2	0.2	OCC	1820	436.8	187.2	0.0	$18.35	$128.25	$20.00	7.0	5.9
35LED	All Purpose Room	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	1.1	C-OCC	840	907.2	388.8	0.0	$38.10	$270.00	$35.00	7.1	6.2
35LED	All Purpose Room	13	T 32 R F 3 (ELE)	F43ILL/2	90	1.2	1.2	C-OCC	840	982.8	421.2	0.0	$41.28	$270.00	$35.00	6.5	5.7

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		EXISTING CONDITIONS					RETROFIT CONDITIONS				COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kW Saved) * ($/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
35LED	Kitchen	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	0.5	C-OCC	1000	540.0	0.0	0.0	$0.00	$270.00	$35.00		#DIV/0!
32LED	All Purpose Room Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	None	1040	124.8	0.0	0.0	$0.00	$0.00	$0.00		
71	TO Room	1	I 60	I60/1	60	0.1	0.1	None	1040	62.4	0.0	0.0	$0.00	$0.00	$0.00		
4LED	Storage	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	0.1	None	1040	74.9	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Mens Room	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	0.2	None	3120	561.6	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Ladies Room	4	1T 32 R F 2 (ELE)	F42LL	60	0.2	0.2	None	3120	748.8	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Boiler Room	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	None	8736	1,048.3	0.0	0.0	$0.00	$0.00	$0.00		
71	TO Room	1	I 60	I60/1	60	0.1	0.1	None	1040	62.4	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Storage	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	0.2	None	1040	187.2	0.0	0.0	$0.00	$0.00	$0.00		
35LED	Office across 112	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	0.2	OCC	1820	327.6	140.4	0.0	$13.76	$128.25	$20.00	9.3	7.9
35LED	Office across 113	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	0.2	OCC	1820	327.6	140.4	0.0	$13.76	$128.25	$20.00	9.3	7.9
32LED	Storage across 113	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	None	1040	124.8	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Small Bathroom 1	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	None	3120	187.2	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Small Bathroom 2	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	None	3120	187.2	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Small Bathroom 3	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	None	3120	187.2	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Small Bathroom 4	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	0.1	None	3120	187.2	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Hallway 1	7	1T 32 R F 2 (ELE)	F42LL	60	0.4	0.4	None	1800	756.0	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Hallway 3	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	0.6	None	1800	1,080.0	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Hallway 4	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	0.6	None	1800	1,080.0	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Hallway 5	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	0.6	None	1800	1,080.0	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Hallway 6	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	0.6	None	1800	1,080.0	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Hallway 7	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	0.6	None	1800	1,080.0	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Hallway 8	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	0.6	None	1800	1,080.0	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Hallway 14	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	0.6	None	1800	1,080.0	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Custodian Hall	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	0.3	None	1800	540.0	0.0	0.0	$0.00	$0.00	$0.00		
30	Storage Next to Custodian	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.2	0.2	None	1040	236.1	0.0	0.0	$0.00	$0.00	$0.00		
32LED	Hallway to Gym	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	0.6	None	1800	1,080.0	0.0	0.0	$0.00	$0.00	$0.00		
9LED	Gym	8	High Bay MH 400	MH400/1	458	3.7	3.7	C-OCC	2400	8,793.6	2,198.4	0.0	$215.44	$270.00	$35.00	1.3	1.1
9LED	Gym	8	High Bay MH 400	MH400/1	458	3.7	3.7	C-OCC	2400	8,793.6	2,198.4	0.0	$215.44	$270.00	$35.00	1.3	1.1
9LED	Gym	8	High Bay MH 400	MH400/1	458	3.7	3.7	C-OCC	2400	8,793.6	2,198.4	0.0	$215.44	$270.00	$35.00	1.3	1.1
71	Gym Storage 1	4	I 60	I60/1	60	0.2	0.2	None	1040	249.6	0.0	0.0	$0.00	$0.00	$0.00		
71	Gym Storage 2	4	I 60	I60/1	60	0.2	0.2	None	1040	249.6	0.0	0.0	$0.00	$0.00	$0.00		
9LED	Warehouse	20	High Bay MH 400	MH400/1	458	9.2	9.2	None	1800	16,488.0	0.0	0.0	$0.00	$0.00	$0.00		
141LED	Outside Light Pole	5	HPS 200	HPS200/1	250	1.3	1.3	None	3640	4,550.0	0.0	0.0	$0.00	$0.00	$0.00		
227LED	Outdoor Wall Packs (SM)	13	70 W MH Wall Pack	MH70/1	95	1.2	1.2	None	3640	4,495.4	0.0	0.0	$0.00	$0.00	$0.00		
68LED	Outdoor Wall Packs (M)	3	175 MH WALL	MH175/1	215	0.6	0.6	None	3640	2,347.8	0.0	0.0	$0.00	$0.00	$0.00		
169LED	Outdoor Wall Packs (LG)	8	WP 250 MH	MH250/1	295	2.4	2.4	None	3640	8,590.4	0.0	0.0	$0.00	$0.00	$0.00		
	Total	**591**				**69.1**	**69.1**			**131,523.07**	**25,329.12**	**0.0**	**2482.3**	**10212.8**	**1550.0**		
										Demand Savings			**0.0**	**$0**			
										kWh Savings			**25,329**	**$2,482**			
										Total Savings				**$2,482**		**4.1**	**3.5**

Hunterdon County Educational Service Commission - West Amwell Campus

CHA Project No.30313

ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
35LED	Lobby	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	972	6	T 59 R LED	RTLED38	38	0.2	None	1,800	410	562	0.3	$ 78.52	$ 1,417.50	$ 300	18.1	14.2
35LED	Data Closet	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	8736	1,572	2	T 59 R LED	RTLED38	38	0.1	None	8,736	664	909	0.1	$ 96.86	$ 472.50	$ 100	4.9	3.8
30	Principals Office	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.2	SW	2600	590	1	T 28 R F 4	F44SSILL	96	0.1	OCC	1,820	175	415	0.1	$ 50.58	$ 398.25	$ 20	7.9	7.5
4LED	Principals Office	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	2600	374	2	2T XX R LED	2RTLED	25	0.1	OCC	1,820	91	283	0.1	$ 34.85	$ 533.25	$ 20	15.3	14.7
4LED	Conference Room	6	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.4	SW	2600	1,123	6	2T XX R LED	2RTLED	25	0.2	OCC	1,820	273	850	0.3	$ 104.54	$ 1,343.25	$ 20	12.8	12.7
4LED	Office Hall	9	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.6	SW	1800	1,166	9	2T XX R LED	2RTLED	25	0.2	None	1,800	405	761	0.4	$ 106.45	$ 1,822.50	$ -	17.1	17.1
6LED	Office Hall	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	1800	259	1	T 74 R LED	RTLED50	50	0.1	None	1,800	90	169	0.1	$ 23.66	$ 236.25	$ -	10.0	10.0
41LED	Office Hall	1	1B 40 R F 2 (MAG)	F42SS	94	0.1	SW	1800	169	1	4 ft LED Tube	200732x2	30	0.0	None	1,800	54	115	0.1	$ 16.11	$ 233.70	$ -	14.5	14.5
25LED	Front Office	4	R 13 C CF 2 (ELE)	CFQ13/2-L	28	0.1	SW	2600	291	4	EVO20/10	EVO20/10	22	0.1	OCC	1,820	160	131	0.0	$ 14.65	$ 1,683.25	$ 220	114.9	99.9
32LED	Front Office	4	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2600	624	4	STLED4	STLED4	40	0.2	OCC	1,820	291	333	0.1	$ 38.64	$ 1,555.05	$ 200	40.2	35.1
32LED	Front Office (Copier)	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2600	156	1	STLED4	STLED4	40	0.0	OCC	1,820	73	83	0.0	$ 9.66	$ 484.95	$ 65	50.2	43.5
32LED	Small Interior Office	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2600	312	2	STLED4	STLED4	40	0.1	OCC	1,820	146	166	0.0	$ 19.32	$ 841.65	$ 110	43.6	37.9
41LED	Office Bathroom Men	1	1B 40 R F 2 (MAG)	F42SS	94	0.1	SW	3120	293	1	4 ft LED Tube	200732x2	30	0.0	None	3,120	94	200	0.1	$ 24.39	$ 233.70	$ -	9.6	9.6
41LED	Office Bathroom Women	1	1B 40 R F 2 (MAG)	F42SS	94	0.1	SW	3120	293	1	4 ft LED Tube	200732x2	30	0.0	None	3,120	94	200	0.1	$ 24.39	$ 233.70	$ -	9.6	9.6
4LED	Office	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	2600	374	2	2T XX R LED	2RTLED	25	0.1	OCC	1,820	91	283	0.1	$ 34.85	$ 533.25	$ 20	15.3	14.7
30	Electical Room	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.2	SW	8736	1,983	1	T 28 R F 4	F44SSILL	96	0.1	None	8,736	839	1,144	0.1	$ 122.01	$ 270.00	$ -	2.2	2.2
106	Office Side Exit	4	SP 65 I	I65/1	65	0.3	SW	1800	468	4	CF 26	CFQ26/1-L	27	0.1	None	1,800	194	274	0.2	$ 38.25	$ 27.00	$ -	0.7	0.7
185LED	Office w/ Window 1	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	OCC	1,820	182	712	0.2	$ 88.18	$ 600.75	$ 20	6.8	6.6
106	Office w/ Window 1	2	SP 65 I	I65/1	65	0.1	SW	2600	338	2	CF 26	CFQ26/1-L	27	0.1	OCC	1,820	98	240	0.1	$ 29.21	$ 141.75	$ 20	4.9	4.2
185LED	Office w/ Window 2	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	OCC	1,820	182	712	0.2	$ 88.18	$ 600.75	$ 20	6.8	6.6
106	Office w/ Window 2	2	SP 65 I	I65/1	65	0.1	SW	2600	338	2	CF 26	CFQ26/1-L	27	0.1	OCC	1,820	98	240	0.1	$ 29.21	$ 141.75	$ 20	4.9	4.2
185LED	Office w/ Window 3	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	OCC	1,820	182	712	0.2	$ 88.18	$ 600.75	$ 20	6.8	6.6
106	Office w/ Window 3	2	SP 65 I	I65/1	65	0.1	SW	2600	338	2	CF 26	CFQ26/1-L	27	0.1	OCC	1,820	98	240	0.1	$ 29.21	$ 141.75	$ 20	4.9	4.2
185LED	Office w/ Window 4	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	OCC	1,820	182	712	0.2	$ 88.18	$ 600.75	$ 20	6.8	6.6
106	Office w/ Window 4	2	SP 65 I	I65/1	65	0.1	SW	2600	338	2	CF 26	CFQ26/1-L	27	0.1	OCC	1,820	98	240	0.1	$ 29.21	$ 141.75	$ 20	4.9	4.2
185LED	Office w/ Window 5	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	OCC	1,820	182	712	0.2	$ 88.18	$ 600.75	$ 20	6.8	6.6
106	Office w/ Window 5	2	SP 65 I	I65/1	65	0.1	SW	2600	338	2	CF 26	CFQ26/1-L	27	0.1	OCC	1,820	98	240	0.1	$ 29.21	$ 141.75	$ 20	4.9	4.2
106	Faculty Room	13	SP 65 I	I65/1	65	0.8	SW	2600	2,197	13	CF 26	CFQ26/1-L	27	0.4	OCC	1,820	639	1,558	0.5	$ 189.88	$ 216.00	$ 20	1.1	1.0
4LED	Faculty Room Bathroom 1	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	3120	225	1	2T XX R LED	2RTLED	25	0.0	None	3,120	78	147	0.0	$ 17.91	$ 202.50	$ -	11.3	11.3
4LED	Faculty Room Bathroom 2	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	3120	225	1	2T XX R LED	2RTLED	25	0.0	None	3,120	78	147	0.0	$ 17.91	$ 202.50	$ -	11.3	11.3
185LED	Classroom next to Faculty Room	10	T 40 R F 4 (ELE)	F44SE	172	1.7	SW	1800	3,096	10	T 74 R LED	RTLED50	50	0.5	OCC	1,260	630	2,466	1.2	$ 333.49	$ 2,490.75	$ 20	7.5	7.4
35LED	Office Hall	5	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	810	5	T 59 R LED	RTLED38	38	0.2	None	1,800	342	468	0.3	$ 65.43	$ 1,181.25	$ 250	18.1	14.2
185LED	Facility Director Office	2	T 40 R F 4 (ELE)	F44SE	172	0.3	SW	2600	894	2	T 74 R LED	RTLED50	50	0.1	OCC	1,820	182	712	0.2	$ 88.18	$ 600.75	$ 20	6.8	6.6
185LED	Office	3	T 40 R F 4 (ELE)	F44SE	172	0.5	SW	2600	1,342	3	T 74 R LED	RTLED50	50	0.2	OCC	1,820	273	1,069	0.4	$ 132.27	$ 837.00	$ 20	6.3	6.2
6LED	Life Skills Entrance	2	T 34 R F 4 (MAG)	F44EE	144	0.3	SW	1800	518	2	T 74 R LED	RTLED50	50	0.1	OCC	1,260	126	392	0.2	$ 52.60	$ 600.75	$ 20	11.4	11.0
6LED	Life Skills Room	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	1800	259	1	T 74 R LED	RTLED50	50	0.1	OCC	1,260	63	196	0.1	$ 26.30	$ 364.50	$ 20	13.9	13.1
6LED	Life Skills Kitchen	2	T 34 R F 4 (MAG)	F44EE	144	0.3	SW	1800	518	2	T 74 R LED	RTLED50	50	0.1	OCC	1,260	126	392	0.2	$ 52.60	$ 600.75	$ 20	11.4	11.0
4LED	Life Skills Bath	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	1800	130	1	2T XX R LED	2RTLED	25	0.0	OCC	1,260	32	98	0.0	$ 13.15	$ 330.75	$ 20	25.1	23.6
6LED	Like Skills Laundry	1	T 34 R F 4 (MAG)	F44EE	144	0.1	SW	1800	259	1	T 74 R LED	RTLED50	50	0.1	OCC	1,260	63	196	0.1	$ 26.30	$ 364.50	$ 20	13.9	13.1
32LED	Nurse Office	6	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	2600	936	6	STLED4	STLED4	40	0.2	OCC	1,820	437	499	0.1	$ 57.95	$ 2,268.45	$ 290	39.1	34.1
32LED	Nurse Treat	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2600	468	3	STLED4	STLED4	40	0.1	OCC	1,820	218	250	0.1	$ 28.98	$ 1,198.35	$ 155	41.4	36.0
32LED	Nurse Cot	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	2600	312	2	STLED4	STLED4	40	0.1	OCC	1,820	146	166	0.0	$ 19.32	$ 841.65	$ 110	43.6	37.9
4LED	Nurse Bath	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	3120	225	1	2T XX R LED	2RTLED	25	0.0	None	3,120	78	147	0.0	$ 17.91	$ 202.50	$ -	11.3	11.3
71	Nurse Closet	1	I 60	I60/1	60	0.1	SW	1040	62	1	CF 26	CFQ26/1-L	27	0.0	None	1,040	28	34	0.0	$ 5.85	$ 6.75	$ -	1.2	1.2
41LED	GED	6	1B 40 R F 2 (MAG)	F42SS	94	0.6	SW	2600	1,466	6	4 ft LED Tube	200732x2	30	0.2	OCC	1,820	328	1,139	0.4	$ 140.50	$ 1,530.45	$ 20	10.9	10.8
41LED	Office	8	1B 40 R F 2 (MAG)	F42SS	94	0.8	SW	2600	1,955	8	4 ft LED Tube	200732x2	30	0.2	OCC	1,820	437	1,518	0.5	$ 187.34	$ 1,997.85	$ 20	10.7	10.6
4LED	Office closet	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	1040	75	1	2T XX R LED	2RTLED	25	0.0	None	1,040	26	49	0.0	$ 8.33	$ 202.50	$ -	24.3	24.3
41LED	Office	4	1B 40 R F 2 (MAG)	F42SS	94	0.4	SW	2600	978	4	4 ft LED Tube	200732x2	30	0.1	OCC	1,820	218	759	0.3	$ 93.67	$ 1,063.05	$ 20	11.3	11.1
35LED	Hall	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	1800	324	2	T 59 R LED	RTLED38	38	0.1	None	1,800	137	187	0.1	$ 26.17	$ 472.50	$ 100	18.1	14.2
32LED	Hall	7	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	1800	756	7	STLED4	STLED4	40	0.3	None	1,800	504	252	0.1	$ 35.23	$ 2,496.90	$ 315	70.9	61.9
35LED	100	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	OCC	1,260	431	1,027	0.5	$ 135.88	$ 2,254.50	$ 470	16.6	13.1
35LED	101	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	OCC	1,260	431	1,027	0.5	$ 135.88	$ 2,254.50	$ 470	16.6	13.1
35LED	102	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	OCC	1,260	431	1,027	0.5	$ 135.88	$ 2,254.50	$ 470	16.6	13.1
35LED	103	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	OCC	1,260	431	1,027	0.5	$ 135.88	$ 2,254.50	$ 470	16.6	13.1
35LED	104	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	OCC	1,260	431	1,027	0.5	$ 135.88	$ 2,254.50	$ 470	16.6	13.1
35LED	105	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	OCC	1,260	431	1,027	0.5	$ 135.88	$ 2,254.50	$ 470	16.6	13.1
35LED	106	8	T 32 R F 3 (ELE)	F43ILL/2	90	0.7	SW	1800	1,296	8	T 59 R LED	RTLED38	38	0.3	OCC	1,260	383	913	0.4	$ 120.78	$ 2,018.25	$ 420	16.7	13.2
35LED	107	8	T 32 R F 3 (ELE)	F43ILL/2	90	0.7	SW	1800	1,296	8	T 59 R LED	RTLED38	38	0.3	OCC	1,260	383	913	0.4	$ 120.78	$ 2,018.25	$ 420	16.7	13.2
35LED	108	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	OCC	1,260	431	1,027	0.5	$ 135.88	$ 2,254.50	$ 470	16.6	13.1
35LED	109	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	SW	1800	1,458	9	T 59 R LED	RTLED38	38	0.3	OCC	1,260	431	1,027	0.5	$ 135.88	$ 2,254.50	$ 470	16.6	13.1
35LED	110	14	T 32 R F 3 (ELE)	F43ILL/2	90	1.3	SW	1800	2,268	14	T 59 R LED	RTLED38	38	0.5	OCC	1,260	670	1,598	0.7	$ 211.36	$ 3,435.75	$ 720	16.3	12.8
35LED	111	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	1800	2,430	15	T 59 R LED	RTLED38	38	0.6	OCC	1,260	718	1,712	0.8	$ 226.46	$ 3,672.00	$ 770	16.2	12.8
35LED	112	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	972	6	T 59 R LED	RTLED38	38	0.2	OCC	1,260	287	685	0.3	$ 90.58	$ 1,545.75	$ 320	17.1	13.5
35LED	112	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	OCC	1,260	144	342	0.2	$ 45.29	$ 837.00	$ 170	18.5	14.7
35LED	113	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	972	6	T 59 R LED	RTLED38	38	0.2	OCC	1,260	287	685	0.3	$ 90.58	$ 1,545.75	$ 320	17.1	13.5
35LED	113	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	OCC	1,260	144	342	0.2	$ 45.29	$ 837.00	$ 170	18.5	14.7
35LED	114	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	972	6	T 59 R LED	RTLED38	38	0.2	OCC	1,260	287	685	0.3	$ 90.58	$ 1,545.75	$ 320	17.1	13.5
35LED	114	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	OCC	1,260	144	342	0.2	$ 45.29	$ 837.00	$ 170	18.5	14.7
35LED	115	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1800	972	6	T 59 R LED	RTLED38	38	0.2	OCC	1,260	287	685	0.3	$ 90.58	$ 1,545.75	$ 320	17.1	13.5
35LED	115	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	OCC	1,260	144	342	0.2	$ 45.29	$ 837.00	$ 170	18.5	14.7
35LED	Computer Lab	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	OCC	1,260	144	342	0.2	$ 45.29	$ 837.00	$ 170	18.5	14.7
35LED	Computer Lab	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	OCC	1,260	144	342	0.2	$ 45.29	$ 837.00	$ 170	18.5	14.7
35LED	Computer Lab	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	OCC	1,260	144	342	0.2	$ 45.29	$ 837.00	$ 170	18.5	14.7
35LED	Woodshop	14	T 32 R F 3 (ELE)	F43ILL/2	90	1.3	SW	1800	2,268	14	T 59 R LED	RTLED38	38	0.5	OCC	1,260	670	1,598	0.7	$ 211.36	$ 3,435.75	$ 720	16.3	12.8
35LED	Woodshop	4	T 32 R F 3 (ELE)	F43ILL/2	90	0.4	SW	1800	648	4	T 59 R LED	RTLED38	38	0.2	OCC	1,260	192	456	0.2	$ 60.39	$ 1,073.25	$ 220	17.8	14.1
35LED	Woodshop Office	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2600	468	2	T 59 R LED	RTLED38	38	0.1	OCC	1,820	138	330	0.1	$ 40.14	$ 600.75	$ 120	15.0	12.0
32LED	Woodshop Small Room	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1800	216	2	STLED4	STLED4	40	0.1	OCC	1,260	101	115	0.0	$ 14.30	$ 841.65	$ 110	58.9	51.2
35LED	Art	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	SW	1800	486	3	T 59 R LED	RTLED38	38	0.1	OCC	1,260	144	342	0.2	$ 45.29	$ 837.00	$ 170	18.5	14.7
35LED	Art	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	1800	1,944	12	T 59 R LED	RTLED38	38	0.5	OCC	1,260	575	1,369	0.6	$ 181.17	$ 2,963.25	$ 620	16.4	12.9
35LED	Art Office	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2600	468	2	T 59 R LED	RTLED38	38	0.1	OCC	1,820	138	330	0.1	$ 40.14	$ 600.75	$ 120	15.0	12.0
32LED	Art Small Room	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1040	125	2	STLED4	STLED4	40	0.1	None	1,040	83	42	0.0	$ 7.09	$ 713.40	$ 90	100.7	88.0
32LED	Art Kiln	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1800	108	1	STLED4	STLED4	40	0.0	OCC	1,260	50	58	0.0	$ 7.15	$ 484.95	$ 65	67.8	58.7
32LED	Art/Woodshop Common Room	4	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	2600	624	4	STLED4	STLED4	40	0.2	OCC	1,820	291	333	0.1	$ 38.64	$ 1,555.05	$ 200	40.2	35.1
35LED	All Purpose Room	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	1200	1,296	12	T 59 R LED	RTLED38	38	0.5	C-OCC	840	383	913	0.6	$ 136.43	$ 3,105.00	$ 635	22.8	18.1
35LED	All Purpose Room	13	T 32 R F 3 (ELE)	F43ILL/2	90	1.2	SW	1200	1,404	13	T 59 R LED	RTLED38	38	0.5	C-OCC	840	415	989	0.7	$ 147.80	$ 3,341.25	$ 685	22.6	18.0
35LED	Kitchen	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.5	SW	1000	540	6	T 59 R LED	RTLED38	38	0.2	C-OCC	1,000	228	312	0.3	$ 54.06	$ 1,687.50	$ 335	31.2	25.0
32LED	All Purpose Room Storage	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1040	125	2	STLED4	STLED4	40	0.1	None	1,040	83	42	0.0	$ 7.09	$ 713.40	$ 90	100.7	88.0
71	TO Room	1	I 60	I60/1	60	0.1	SW	1040	62	1	CF 26	CFQ26/1-L	27	0.0	None	1,040	28	34	0.0	$ 5.85	$ 6.75	$ -	1.2	1.2
4LED	Storage	1	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	SW	1040	75	1	2T XX R LED	2RTLED	25	0.0	None	1,040	26	49	0.0	$ 8.33	$ 202.50	$ -	24.3	24.3
32LED	Mens Room	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	3120	562	3	STLED4	STLED4	40	0.1	None	3,120	374	187	0.1	$ 22.86	$ 1,070.10	$ 135	46.8	40.9
32LED	Ladies Room	4	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	3120	749	4	STLED4	STLED4	40	0.2	None	3,120	499	250	0.1	$ 30.48	$ 1,426.80	$ 180	46.8	40.9
32LED	Boiler Room	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	8736	1,048	2	STLED4	STLED4	40	0.1	None	8,736	699	349	0.0	$ 37.26	$ 713.40	$ 90	19.1	16.7
71	TO Room	1	I 60	I60/1	60	0.1	SW	1040	62	1	CF 26	CFQ26/1-L	27	0.0	None	1,040	28	34	0.0	$ 5.85	$ 6.75	$ -	1.2	1.2
32LED	Storage	3	1T 32 R F 2 (ELE)	F42LL	60	0.2	SW	1040	187	3	STLED4	STLED4	40	0.1	None	1,040	125	62	0.1	$ 10.63	$ 1,070.10	$ 135	100.7	88.0
35LED	Office across 112	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2600	468	2	T 59 R LED	RTLED38	38	0.1	OCC	1,820	138	330	0.1	$ 40.14	$ 600.75	$ 120	15.0	12.0
35LED	Office across 113	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.2	SW	2600	468	2	T 59 R LED	RTLED38	38	0.1	OCC	1,820	138	330	0.1	$ 40.14	$ 600.75	$ 120	15.0	12.0
32LED	Storage across 113	2	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	1040	125	2	STLED4	STLED4	40	0.1	None	1,040	83	42	0.0	$ 7.09	$ 713.40	$ 90	100.7	88.0
32LED	Small Bathroom 1	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	3120	187	1	STLED4	STLED4	40	0.0	None	3,120	125	62	0.0	$ 7.62	$ 356.70	$ 45	46.8	40.9
32LED	Small Bathroom 2	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	3120	187	1	STLED4	STLED4	40	0.0	None	3,120	125	62	0.0	$ 7.62	$ 356.70	$ 45	46.8	40.9
32LED	Small Bathroom 3	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	3120	187	1	STLED4	STLED4	40	0.0	None	3,120	125	62	0.0	$ 7.62	$ 356.70	$ 45	46.8	40.9
32LED	Small Bathroom 4	1	1T 32 R F 2 (ELE)	F42LL	60	0.1	SW	3120	187	1	STLED4	STLED4	40	0.0	None	3,120	125	62	0.0	$ 7.62	$ 356.70	$ 45	46.8	40.9
32LED	Hallway 1	7	1T 32 R F 2 (ELE)	F42LL	60	0.4	SW	1800	756	7	STLED4	STLED4	40	0.3	None	1,800	504	252	0.1	$ 35.23	$ 2,496.90	$ 315	70.9	61.9
32LED	Hallway 3	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	None	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$ 450	70.9	61.9
32LED	Hallway 4	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	None	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$ 450	70.9	61.9
32LED	Hallway 5	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	None	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$ 450	70.9	61.9
32LED	Hallway 6	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	None	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$ 450	70.9	61.9
32LED	Hallway 7	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	None	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$ 450	70.9	61.9
32LED	Hallway 8	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	None	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$ 450	70.9	61.9
32LED	Hallway 14	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	None	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$ 450	70.9	61.9
32LED	Custodian Hall	5	1T 32 R F 2 (ELE)	F42LL	60	0.3	SW	1800	540	5	STLED4	STLED4	40	0.2	None	1,800	360	180	0.1	$ 25.17	$ 1,783.50	$ 225	70.9	61.9
30	Storage Next to Custodian	1	1 B 96 C F 2 (MAG)	F82EHS	227	0.2	SW	1040	236	1	T 28 R F 4	F44SSILL	96	0.1	None	1,040	100	136	0.1	$ 23.21	$ 270.00	$ -	11.6	11.6
32LED	Hallway to Gym	10	1T 32 R F 2 (ELE)	F42LL	60	0.6	SW	1800	1,080	10	STLED4	STLED4	40	0.4	None	1,800	720	360	0.2	$ 50.33	$ 3,567.00	$ 450	70.9	61.9
9LED	Gym	8	High Bay MH 400	MH400/1	458	3.7	SW	3000	10,992	8	BAYLED78W	BAYLED78W	93	0.7	C-OCC	2,400	1,786	9,206	2.9	$ 1,122.00	$ 5,886.00	$ 35	5.2	5.2
9LED	Gym	8	High Bay MH 400	MH400/1	458	3.7	SW	3000	10,992	8	BAYLED78W	BAYLED78W	93	0.7	C-OCC	2,400	1,786	9,206	2.9	$ 1,122.00	$ 5,886.00	$ 35	5.2	5.2
9LED	Gym	8	High Bay MH 400	MH400/1	458	3.7	SW	3000	10,992	8	BAYLED78W	BAYLED78W	93	0.7	C-OCC	2,400	1,786	9,206	2.9	$ 1,122.00	$ 5,886.00	$ 35	5.2	5.2
71	Gym Storage 1	4	I 60	I60/1	60	0.2	SW	1040	250	4	CF 26	CFQ26/1-L	27	0.1	None	1,040	112	137	0.1	$ 23.39	$ 27.00	$ -	1.2	1.2
71	Gym Storage 2	4	I 60	I60/1	60	0.2	SW	1040	250	4	CF 26	CFQ26/1-L	27	0.1	None	1,040	112	137	0.1	$ 23.39	$ 27.00	$ -	1.2	1.2
9LED	Warehouse	20	High Bay MH 400	MH400/1	458	9.2	Breaker	1800	16,488	20	BAYLED78W	BAYLED78W	93	1.9	None	1,800	3,348	13,140	7.3	$ 1,837.15	$ 14,040.00	$ -	7.6	7.6
141LED	Outside Light Pole	5	HPS 200	HPS200/1	250	1.3	Timer	3640	4,550	5	FXLED78	FXLED78/1	78	0.4	None	3,640	1,420	3,130	0.9	$ 371.51	$ 4,220.98	$ 500	11.4	10.0
227LED	Outdoor Wall Packs (SM)	13	70 W MH Wall Pack	MH70/1	95	1.2	Timer	3640	4,495	13	FXLED18	FXLED18/1	18	0.2	None	3,640	852	3,644	1.0	$ 432.42	$ 5,501.93	$ 1,300	12.7	9.7
68LED	Outdoor Wall Packs (M)	3	175 MH WALL	MH175/1	215	0.6	Timer	3640	2,348	3	WPLED26	WPLED26	30	0.1	None	3,640	328	2,020	0.6	$ 239.75	$ 1,506.60	$ -	6.3	6.3
169LED	Outdoor Wall Packs (LG)	8	WP 250 MH	MH250/1	295	2.4	Timer	3640	8,590	8	FXLED78	FXLED78/1	78	0.6	None	3,640	2,271	6,319	1.7	$ 749.92	$ 6,753.56	$ 1,400	9.0	7.1
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Hunterdon County Educational Service Commission - West Amwell Campus
CHA Project No.30313
ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
															0	#N/A								#VALUE!

Hunterdon County Educational Service Commission - West Amwell Campus
CHA Project No.30313
ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh	Number of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual $ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback With Out Incentive	Simple Payback
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-inst. control device	Estimated daily hours for the usage group	(kW/space) * (Annual Hours)	No. of fixtures after the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Estimated annual hours for the usage group	(kW/space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * ($/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered
															0	#N/A								#VALUE!

Hunterdon County Educational Service Commission - West Amwell Campus
CHA Project No.30313
ECM-L3 Lighting Replacements with Occupancy Sensors

		EXISTING CONDITIONS								RETROFIT CONDITIONS								COST & SAVINGS ANALYSIS						
	Area Description	**No. of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Exist Control**	**Annual Hours**	**Annual kWh**	**Number of Fixtures**	**Standard Fixture Code**	**Fixture Code**	**Watts per Fixture**	**kW/Space**	**Retrofit Control**	**Annual Hours**	**Annual kWh**	**Annual kWh Saved**	**Annual kW Saved**	**Annual $ Saved**	**Retrofit Cost**	**NJ Smart Start Lighting Incentive**	**Simple Payback With Out Incentive**	**Simple Payback**
Field Code	**Unique description of the location - Room number/Room name: Floor number (if applicable)**	**No. of fixtures before the retrofit**	**Lighting Fixture Code**	**Code from Table of Standard Fixture Wattages**	**Value from Table of Standard Fixture Wattages**	**(Watts/Fixt) * (Fixt No.)**	**Pre-inst. control device**	**Estimated daily hours for the usage group**	**(kW/space) * (Annual Hours)**	**No. of fixtures after the retrofit**	**Lighting Fixture Code**	**Code from Table of Standard Fixture Wattages**	**Value from Table of Standard Fixture Wattages**	**(Watts/Fixt) * (Number of Fixtures)**	**Retrofit control device**	**Estimated annual hours for the usage group**	**(kW/space) * (Annual Hours)**	**(Original Annual kWh) - (Retrofit Annual kWh)**	**(Original Annual kW) - (Retrofit Annual kW)**	**(kWh Saved) * ($/kWh)**	**Cost for renovations to lighting system**	**Prescriptive Lighting Measures**	**Length of time for renovations cost to be recovered**	**Length of time for renovations cost to be recovered**
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	Total	**591**				**69.1**			**156,852**	**591**				**25.0**			**45,142**	**111,709.8**	**44.1**	**14,268**	**190,140**	**$23,970**		
																	Demand Savings			**44.1**	**$3,320**			
																	kWh Savings			**111,710**	**$10,948**			
																	Total Savings				**$14,268**		**13.3**	**11.6**

APPENDIX D

(REMOVED)

APPENDIX E

Photovoltaic Analysis

Photovoltaic (PV) Solar Power Generation - Screening Assessment

***** OWNER NAME *****
***** NAME OF BUILDING *****

Cost of Electricity	$0.125	/kWh
Electricity Usage	357,401	kWh/yr
System Unit Cost	$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	Federal Tax Credit	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$1,000,000	**250.0**	**318,504**	**0**	**$39,813**	**0**	**$39,813**	**$0**	**$57,968**	**25.1**	**10.2**

** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= $182 /1000kwh

Area Output*
4,320 m2
46,495 ft2

Perimeter Output*
264 m
866 ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
32,157 ft2

Approximate System Size: Is the roof flat? (Yes/No) Yes

8 watt/ft2
257,257 DC watts
250 kW Enter into PV Watts

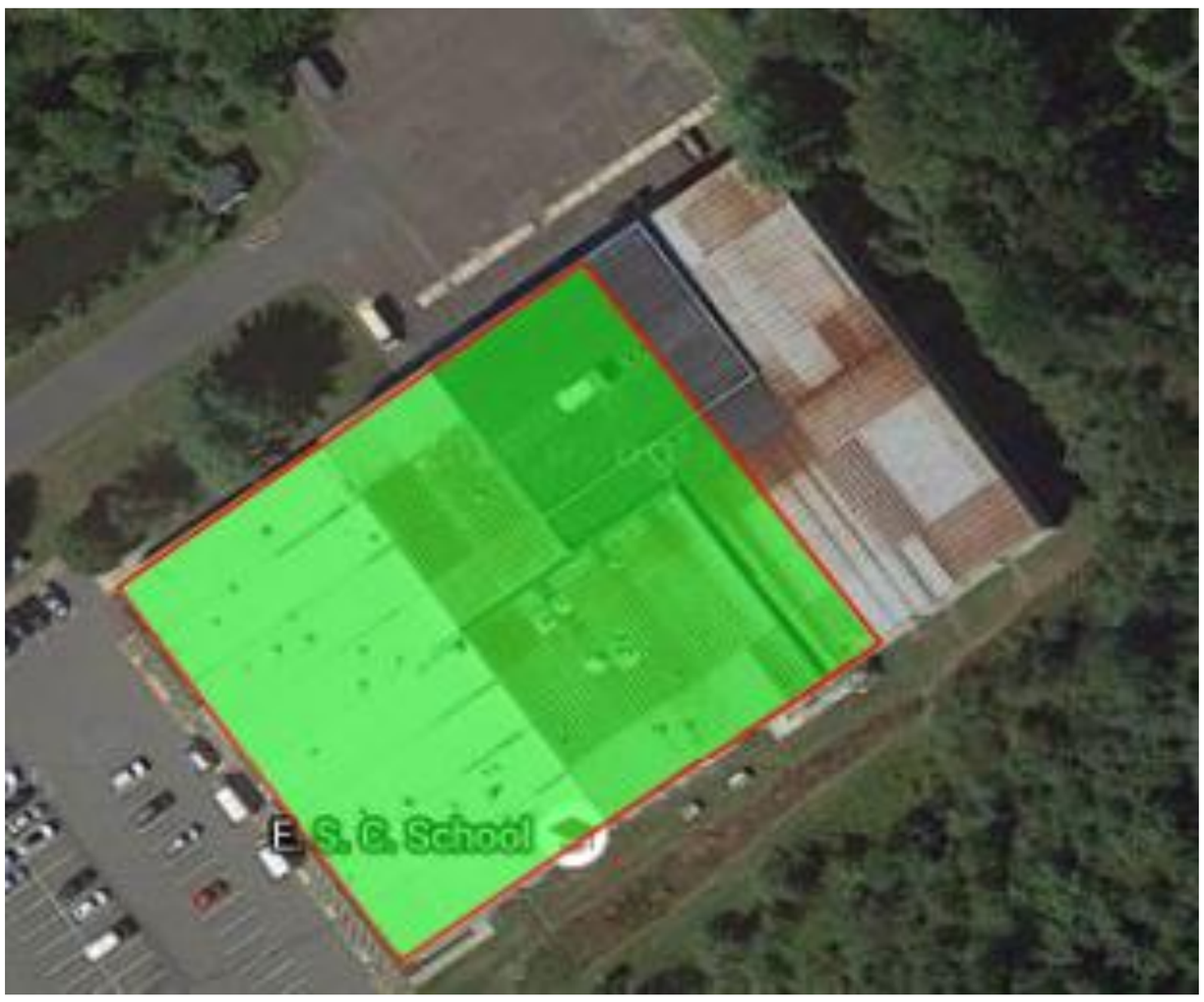
PV Watts Inputs***

Array Tilt Angle	20	Enter into PV Watts (always 20 if flat, if pitched - enter estimated roof angle)
Array Azimuth	180	Enter into PV Watts (default)
Zip Code	08530	Enter into PV Watts
DC/AC Derate Factor	0.83	Enter info PV Watts

PV Watts Output
318,504 annual kWh calculated in PV Watts program

% Offset Calc

Usage	357,401	(from utilities)
PV Generation	318,504	(generated using PV Watts)
% offset	89%	



* http://www.freemaptools.com/area-calculator.htm
** http://www.flettexchange.com
*** http://gisatnrel.nrel.gov/PVWatts_Viewer/index.html

APPENDIX F

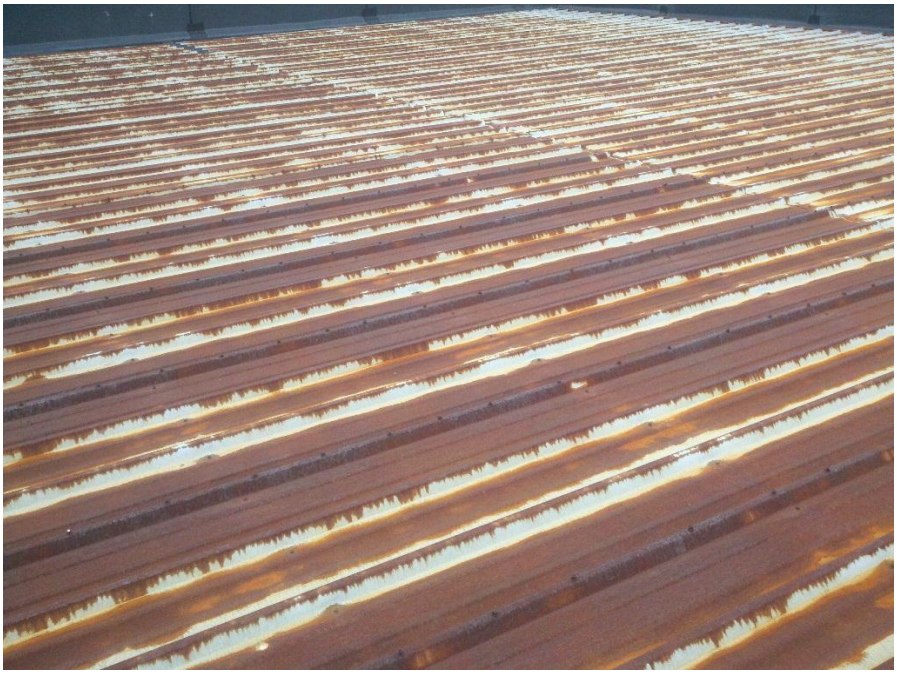
Photos

Void above ceiling

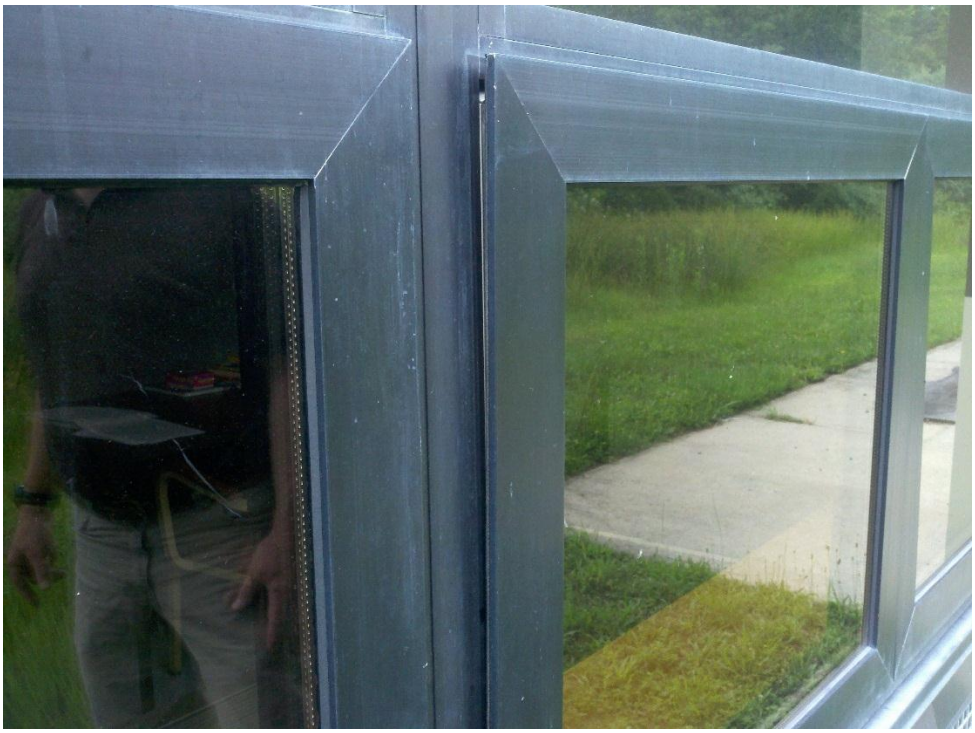
Deteriorated block at window

Old Exhaust Fan Louver

Coated Metal Roof

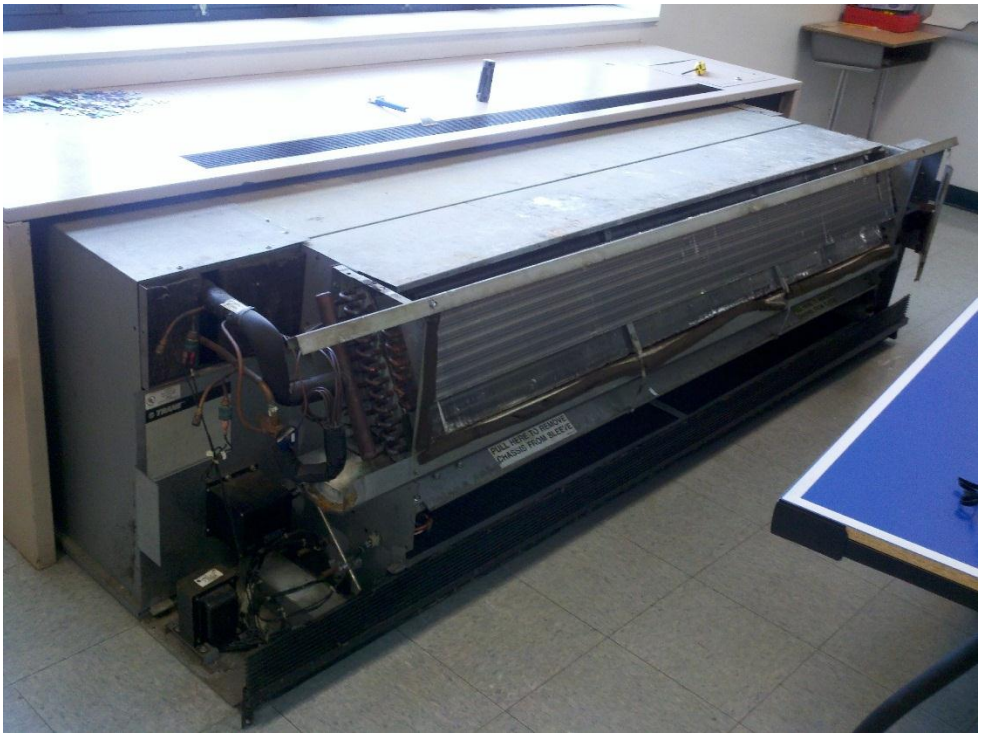


Un-coated Metal Roof



Typical Tilt-Out Section of Window

Damage to Condenser Coil



Typical Self-Contained Classroom Unit Ventilator

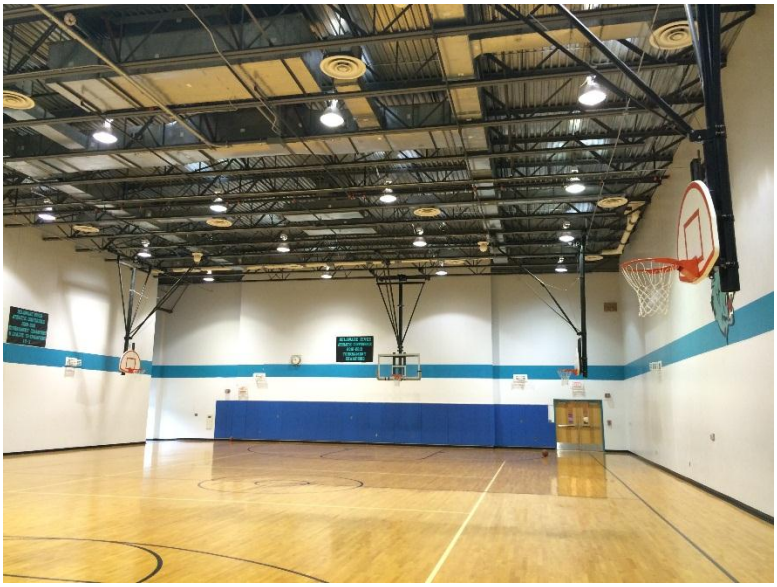
Typical condensing units

Typical Gas Duct Furnace

Peerless Boiler

Johnson Metasys DDC

AO Smith Gas Water Heater



Metal Halide Gym Lights (On, no occupancy)

APPENDIX G

EPA Benchmarking Report

ENERGY STAR® Statement of Energy Performance

60

ENERGY STAR® Score[1]

West Amwell Campus

Primary Property Function: K-12 School
Gross Floor Area (ft²): 64,000
Built: 1979

For Year Ending: April 30, 2015
Date Generated: July 20, 2015

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
West Amwell Campus 1422 route 179 Lambertville, New Jersey 08530	Hunterdon County Educational Services Commission 51 Sawmill Road Lebanon, NJ 08833 (____)____-_____	Chuck Miles 51 Sawmill Road Lebanon, NJ 08833 9085727200 Pdubuc@chacompanies.com

Property ID: 4483313

Energy Consumption and Energy Use Intensity (EUI)

Site EUI
64.7 kBtu/ft²

Source EUI
107.8 kBtu/ft²

Annual Energy by Fuel	
Electric - Grid (kBtu)	1,219,452 (29%)
Natural Gas (kBtu)	2,922,130 (71%)

National Median Comparison	
National Median Site EUI (kBtu/ft²)	71.2
National Median Source EUI (kBtu/ft²)	118.6
% Diff from National Median Source EUI	-9%
Annual Emissions	
Greenhouse Gas Emissions (Metric Tons CO2e/year)	318

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)