

EAST BRUNSWICK BOARD OF EDUCATION

IRWIN ELEMENTARY SCHOOL

75 Racetrack Road, East Brunswick, NJ 08816

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

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CHA PROJECT NO. 31007

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY	5
2.0 BUILDING INFORMATION AND EXISTING CONDITIONS	8
3.0 UTILITIES	11
4.0 BENCHMARKING.....	16
5.0 ENERGY CONSERVATION MEASURES.....	17
5.1 ECM-1 Replace RTUs with High Efficiency RTUs	18
5.2 ECM-2 Install VFDs for Heating Hot Water Pumps	18
5.3 ECM-3 Install Kitchen Hood Controls.....	19
5.4 ECM-4 Replace DHW Heaters with High Efficiency Condensing Units	19
5.5 ECM-5 Install Low Flow Plumbing Fixtures	20
5.6 ECM-L1 Lighting Replacements/Upgrades w/ Controls.....	20
5.7 Additional O&M Opportunities.....	21
6.0 PROJECT INCENTIVES.....	22
6.1 Incentives Overview.....	22
6.1.1 New Jersey Smart Start Program.....	22
6.1.2 Direct Install Program	22
6.1.3 New Jersey Pay For Performance Program (P4P).....	23
6.1.4 Energy Savings Improvement Plan	24
6.1.5 Renewable Energy Incentive Program.....	25
7.0 ALTERNATIVE ENERGY SCREENING EVALUATION	26
7.1 Solar	26
7.1.1 Photovoltaic Rooftop Solar Power Generation	26
7.1.2 Solar Thermal Hot Water Generation.....	26
7.2 Wind Powered Turbines	26
7.3 Combined Heat and Power Plant.....	27
7.4 Demand Response Curtailment	28
8.0 CONCLUSIONS & RECOMMENDATIONS.....	29

APPENDICES

- A Utility Usage Analysis and List of Third Party Energy Suppliers
- B Equipment Inventory
- C ECM Calculations and Cost Estimates
- D Photos
- E Photovoltaic (PV) Solar Power Generation Analysis
- F EPA Benchmarking Report

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 $\pm 20\%$, 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 East Brunswick Board Of Education 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 are also identified during the study. This report details the results of the energy audit conducted for the building listed below:

Building Name	Address	Square Feet	Construction Date
Irwin Elementary School	75 Racetrack Road East Brunswick NJ 08816	43,279	1958

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)
Irwin Elementary School	87,586	0	13,899	13.7

Each individual measure's annual savings are dependent on that measure alone, there are no interactive effects calculated. 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 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 chooses 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, based on the need to replace that piece(s) of equipment due to its age, such as a boiler for example

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

Summary of Energy Conservation Measures

ECM #	Energy Conservation Measure	Est. Costs (\$)	Est. Savings (\$/year)	Payback w/o Incentive	Potential Incentive (\$)*	Payback w/ Incentive	Recommended
ECM-1	Replace RTU with High Efficiency Units	69,400	2,411	28.8	1,840	28.0	Y
ECM-2	Install VFD on HHW Pumps	14,216	829	17.2	930	16.0	N
ECM-3	Install Kitchen Hood Controls	33,250	963	34.5	90	34.4	N
ECM-4	Replace DHW Heater with Condensing Heater	12,302	147	83.5	300	81.4	N
ECM-5	Install Low Flow Plumbing Fixtures	53,378	19	2,871.7	-	2,871.7	N
ECM-L1	Lighting Replacement With Controls	130,741	11,488	11.4	7,970	10.7	Y
Total**		313,287	15,856	19.8	11,130	19.1	
Total(Recommended)		130,741	13,899	14.4	7,970	13.7	

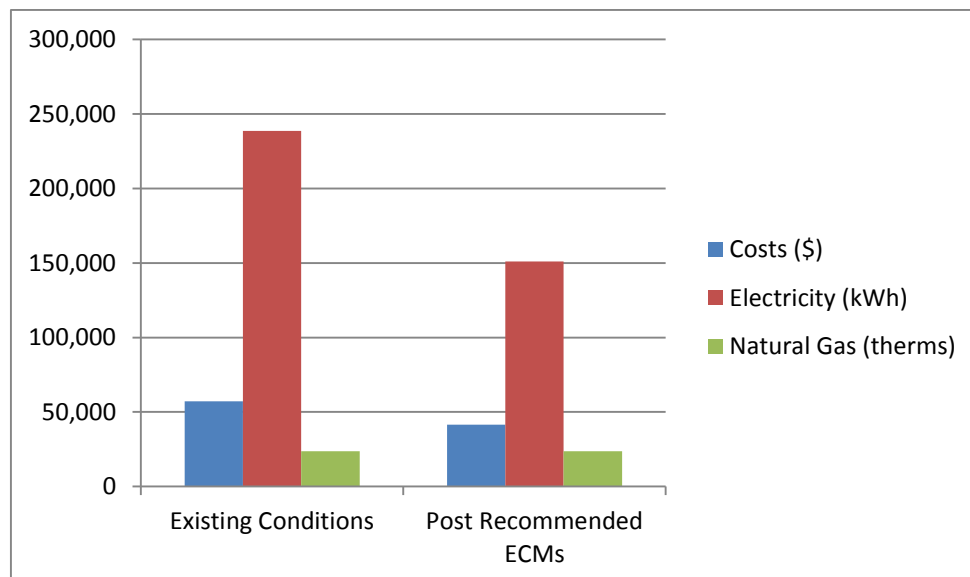
* Incentive shown is per the New Jersey SmartStart Program.

** These ECMs are not included in the Total, as they are alternate measures not recommended.

By implementing the recommended ECMs, the building could result in a total of 37 metric tons of greenhouse gas (GHG) reduction.

If East Brunswick Board Of Education implements the recommended ECMs, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	57,284	43,385	24%
Electricity (kWh)	238,560	150,974	37%
Natural Gas (therms)	23,749	23,749	0%
Site EUI (kbtu/SF/Yr)	73.7	66.8	



2.0 BUILDING INFORMATION AND EXISTING CONDITIONS

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

Building Name: Irwin Elementary School

Address: 75 Racetrack Road, East Brunswick NJ 08816

Gross Floor Area: 43,279 square feet

Number of Floors: This is a Single story building.

Year Built: The school was built in 1958. Over the years a new sections were added and windows and doors were recently replaced.



General

Description of Spaces: The building houses classrooms, office spaces, all purpose/gym, library, computer lab, media center, cafeteria, mechanical room, and storage space.

Description of Occupancy: There are 500 students enrolled with about 50-60 staff personnel

Building Usage: The school operates Monday through Friday from 6:30 AM to 6:00 PM due to after school program and with janitors occupying the facility until 11:00 PM. Typically there are not weekend operations.

Construction Materials: The outside walls are constructed of 8" CMU, 2" insulation and 4" face brick. No ECM associated with wall upgrades was evaluated.

Roof: The roof is flat, insulated and in good condition. No ECM associated with roof replacement was evaluated.

Windows: The windows are double pane in metal frames and recently replaced. No ECM pertaining to window replacements has been evaluated.

Exterior Doors: All exterior doors of the facility are steel doors and appear to be in good condition. No ECM associated with replacing the doors sweeps and seals have been evaluated.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating:

Heating to most areas comes from (2) Benchmark 1000 Aerco condensing gas fired boilers producing heating hot water at 130-140F. The heating hot water is distributed to unit ventilators via (2) 3HP constant speed pumps operating in lead lag mode.

There are (5) roof top units that utilizing gas for heating and electricity for cooling and serving selected classrooms, Computer Lab and Media Center.

Cooling: In addition to above mentioned roof top units, cooling is also provided by (3) window type AC units. No ECM related to window air conditioner has been evaluated since the school is currently installing a new cooling system with an air cooled chiller.

Ventilation: The fresh air for ventilation is provided through roof top equipment. As ventilation rates are assumed to be minimum, there are no ECMs associated with the ventilation system.

Exhaust: This building has few fractional HP exhaust fans serving restrooms, science rooms, kitchen and general exhaust located on the roof. The fans are enclosed and therefore the capacities of fan motors are unknown. No ECMs were evaluated for the exhaust fans.

Controls Systems

Boiler EMS Metasys controls exists that are capable of temperature settings and scheduling. Typical heating temperature is 70 F and cooling is 74F.

Domestic Hot Water Systems

Domestic Hot Water is produced by a Bradford White gas fired 80 gallon capacity Magnum hot water heater installed in 2011. An ECM has been evaluated regarding the DHW heater.

Kitchen Equipment

Operations are mainly warming up and serving. There is no dish washer. The kitchen equipment includes food warmers, gas fired 6 burner stove with ovens, various small appliances, refrigerator and (2) freezers. There is a kitchen hood that is continuously operating. Although a manual switch exists cooks were told not to turn them off due to the fire hazards. An ECM related to hood controls was evaluated.

Plug Load

The facility has computers, copiers, printers, and kitchen appliances that contribute to the plug load in the building. We have evaluated that the plug loads have minimal impact compared to other electric consuming devices therefore no ECMs associated with plug loads have been evaluated.

Plumbing Systems

Most of plumbing fixtures in the building are high flow types, with manual controls. The water utilities for the school district are flat rates that do not change with usage and therefore there is little financial benefit from replacing the plumbing fixtures; however, there are still energy savings and an ECM associated with plumbing fixtures was evaluated.

Lighting Systems

Indoor lighting predominantly consists of standard T-8s and some spot CFLs and few incandescent bulbs (typically in single bathrooms). Lighting is operated on switches. Outdoor lighting consists of several wall mounted HPS. The pole mounted lights in the parking lot are owned by the utility company

3.0 UTILITIES

Natural gas, electricity and water are separately metered into this building. Utilities used by the building are delivered and supplied by the following utility companies:

	Electric	Natural Gas	Water
Deliverer	PSE&G	PSE&G	Town of East Brunswick
Supplier	PSE&G	Direct Energy	N/A

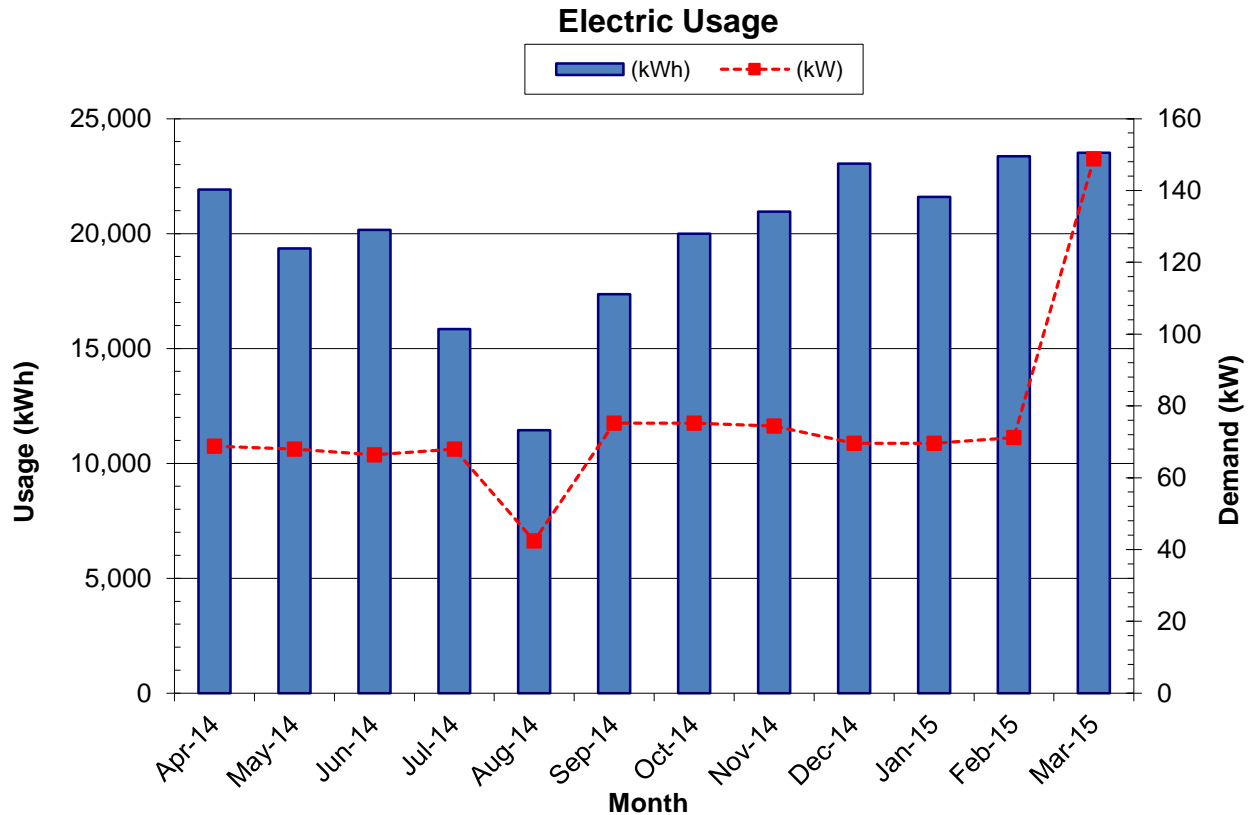
For the 12-month period ending in March 2015, the utilities usages and costs for the building were as follows:

Electric		
Annual Usage	238,560	kWh/yr
Annual Cost	37,832	\$
Blended Rate	0.159	\$/kWh
Consumption Rate	0.135	\$/kWh
Demand Rate	6.20	\$/kW
Peak Demand	148.8	kW
Min. Demand	42.4	kW
Avg. Demand	74.8	kW
Natural Gas		
Annual Usage	23,749	Therms/yr
Annual Cost	19,452	\$
Blended Rate	0.819	\$/therm
Consumption Rate	0.316	\$/therm
Demand Rate	0.503	\$/therm

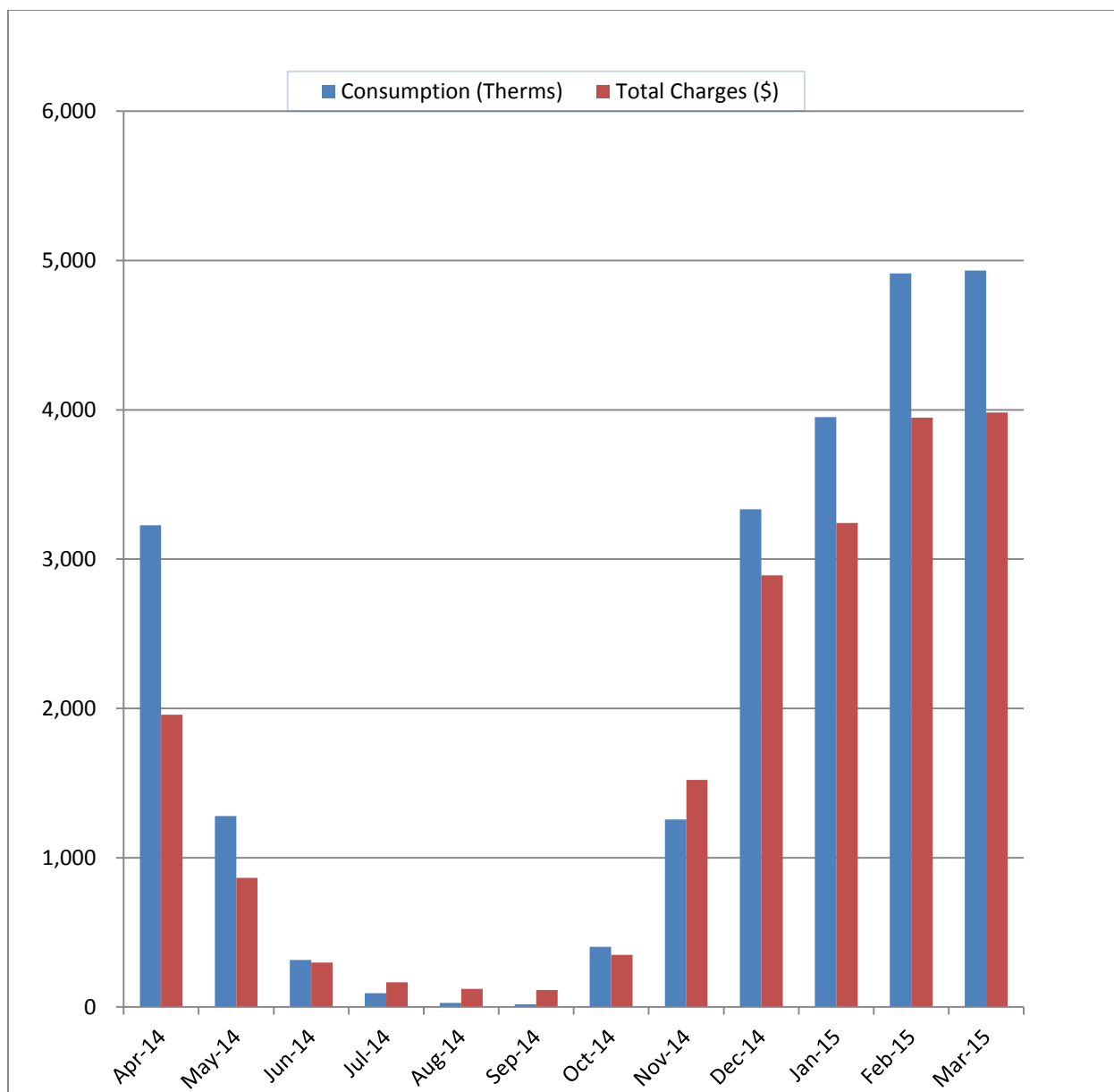
Blended Rate: Average rate charged determined by the annual cost / annual usage

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 electric usage is pretty consistent throughout the year and varies somewhat with the seasons. This building is minimal cooled and thus is not typically used during the cooling season, shown above. However, a new chiller is in the process of being installed.



The natural gas usage in this building is for heating and DHW production, and therefore the usage in summer months is relatively small compared with heating months. The gas usage during the heating season is correlated to winter weather conditions.

It was observed from the gas utility bills supplied to CHA that there were imbalance charges which were effecting the data to have higher cost and uses appearing as peaks in utility usage. After research it was found that the reasons for this imbalance comes from the daily contracted quantities (DCQ). Below is a description of the DCQ and an explanation of how it causes imbalances.

***Daily Contracted Quantities (DCQ's)**

Residential, Commercial and Industrial customers will have DCQ's (Daily Contracted Quantities) posted to the account, one for each month of the year. These DCQ's are based upon the customer's weather-normalized historical usage, prorated from their meter reading periods to calendar months and then divided by the number of days in the calendar month. These 12 monthly DCQ's are what Public Service would expect the customer to consume, under normal weather conditions and if the customer utilized his gas equipment in the same manner as was utilized historically. However, weather is rarely normal, so we expect that there will be a difference between actual usage and the DCQ's. This imbalance is used to adjust the DCQ delivery in the second succeeding month. For example, an imbalance from the billing period in February will adjust April's calendar month delivery; March's imbalance will adjust May's delivery. The DCQ's will be updated each year on the anniversary date in which they were originally posted, to correctly reflect any changes in a customer usage pattern or change in equipment.

TPS's must deliver the Aggregate Daily Contract Quantity for its customers as set forth in PSE&G's Gas Tariff -Third Party Supplier Requirements.

*Information taken from PSE&G Third Party Supplier Gas Choice Operating Manual

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	School Average Rate	NJ Average Rate	
Electricity	\$/kWh	\$0.159	\$0.13	Y
Natural Gas	\$/Therm	\$0.819	\$0.96	N

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

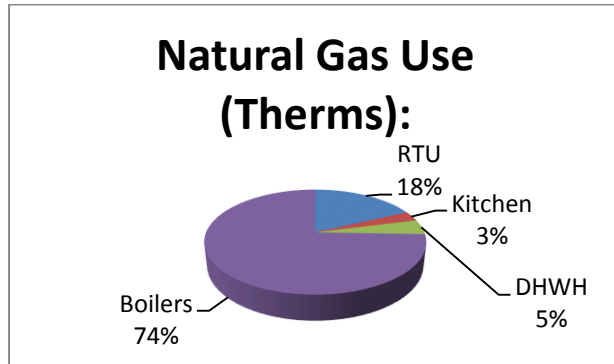
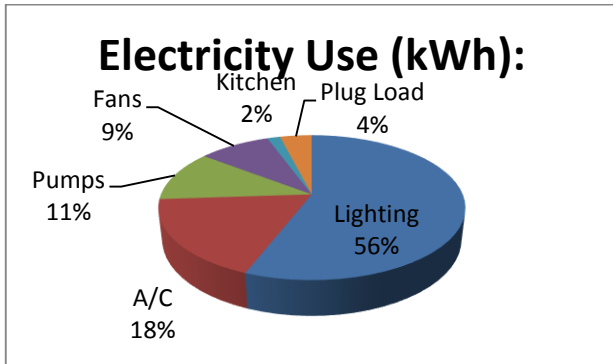
Additional information on selecting a third party energy supplier is available here:

<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.

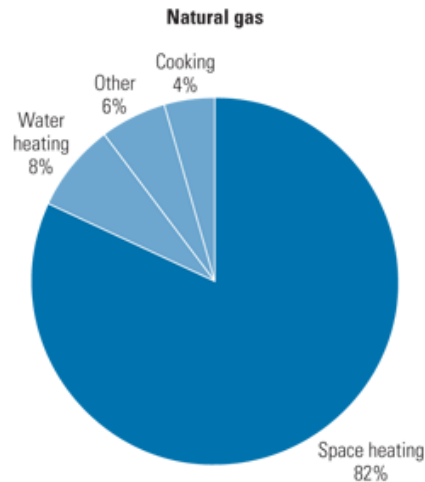
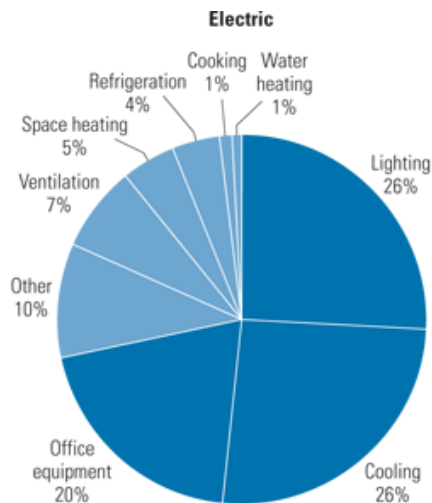
The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

Site End-Use Utility Profile



Most of the electricity consumed by educational facilities 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 school's energy profile is different, and the following charts represent typical utility profiles for K-12 schools per U.S. Department of Energy.

Typical End-Use Utility Profile for Educational Facilities



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 types of buildings. The buildings that do not have energy ratings now are compared with national median EUI.

The site EUI is the amount of heat and electricity consumed by a building as reflected in 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 provide an equivalent measure for various types of buildings with differing energy sources. The results of the benchmarking are contained in the table below. Copies of the benchmarking report are available in Appendix F.

Site EUI kBtu/ft ² /yr	Source EUI (kBtu/ft ² /yr)	Energy Star Rating (1-100)
73.7	116.7	73

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

EPA Portfolio Manager can be accessed with the following:

Web URL: <https://portfoliomanager.energystar.gov/pm/login.html>

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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- 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 or 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 Replace RTUs with High Efficiency RTUs

The school has 5 rooftop units installed in 1997. The 5 units are either at the end of their useful life or past their useful life. This ECM evaluates the energy savings associated with replacing older less efficient rooftop units with modern high efficiency rooftop units of the same capacities. Calculations show savings in electric power consumption only as it is assumed that the gas furnaces will have the same efficiencies.

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

ECM-1 Replace RTUs with High Efficiency RTUs

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas				
\$	kW	kWh	Therms	\$	\$	Years	Years
69,400	8.0	13,464	-	2,411	(0.4)	1,840	28.8

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

This measure is recommended due to age and condition of the equipment.

5.2 ECM-2 Install VFDs for Heating Hot Water Pumps

Currently two (2) 3 HP Hot Water Pumps provide heating hot water to the air unit ventilators. The pumps currently operate in lead/lag fashion with only one pump operating at a time. The pumps operate at constant speed regardless of the heating demands of the building. Installing a single VFD and premium efficiency motors will save energy when full load operation is not required. As the heating load is reduced and the VFD will slow the motor down to maintain the required system pressure and the energy consumption of the HHW pump motors will be reduced.

The intent is to install two (2) VFDs to control both pumps based on pressure. New VFD ready motors will be required that will replace existing low efficiency motors with premium efficiency motors.

The savings of this measure are calculated from the motor efficiency improvement and the motor speed reduction the results when the HHW system is only partially loaded.

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

ECM-2 Install VFDs & Premium Efficiency Motors

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas				
\$	kW	kWh	Therms	\$	\$	Years	Years
14,216	0.1	6,098	-	828	0.1	930	17.2

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

This measure is not recommended.

5.3 ECM-3 Install Kitchen Hood Controls

Installing a Melink hood control system was evaluated. Upon activation of the Melink system, the hood lights will turn on and the fans reach a preset minimum speed of 10 and 50 percent. When cooking appliances are turned on, the fan speed will increase based on temperature sensed in the exhaust duct. During actual cooking, an optical sensor will sense particulates entering the hood and the speed will increase to 100 percent until smoke and heat are removed.

Energy saving is calculated from reduction of exhaust fan speed and the amount of heated air supplied by the kitchen's make-up air unit (MUA).

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

ECM-3 Install Hood Control

Budgetary Cost	Annual Utility Savings			ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)	
	Electricity		Natural Gas					Total
\$	kW	kWh	Therms	\$		\$	Years	Years
33,250	-	1,117	959	963	(0.6)	90	34.5	34.4

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

This measure is not recommended.

5.4 ECM-4 Replace DHW Heaters with High Efficiency Condensing Units

The existing domestic hot water heating system consists of one (1) natural gas fired DHW heaters with 80 gallons of storage capacity each. The DHW heaters have a thermal efficiency of 80%.

Implementation of this ECM will entail replacing the existing DHW heater with a high efficiency condensing water heaters. The proposed DHW heaters include one (1) high efficiency condensing heaters with 80 gallon capacity each which will operate as high as 96% efficiency.

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

ECM-4 Replace DHW Heaters with High Efficiency Condensing Units

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
12,302	-	-	180	147	(0.8)	300	83.5	81.4

* Does 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 Install Low Flow Plumbing Fixtures

The plumbing fixtures in this building are older high flow fixtures. The water savings associated from replacing existing high flow fixtures with low-flow fixtures was calculated by taking the difference of the annual water usage for the proposed and base case. The basis of this calculation is the estimate usage of each fixture, gallons per use, and number of fixtures. Replacing the existing fixtures in the restrooms with 1.28 Gals/flush toilets, 1.0 gal/flush urinals, and 0.5 gpm faucets will conserve water which will result in lower annual water and sewer charges. Faucets with low-flow push valves were not considered for replacement.

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

ECM-5 Replace High Flow Plumbing Fixtures

Budgetary Cost	Annual Utility Savings					ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Water	Total				
\$	kW	kWh	Therms	kGal	\$		\$	Years	Years
53,378	-	-	23	6	19	(1.0)	-	N/A	N/A

* 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-L1 Lighting Replacements/Upgrades w/ Controls

This measure evaluates replacement/upgrades of the current lighting fixtures to more efficient LED lights and also installing occupancy sensors to control the proposed lights. The interactive effects of installing higher efficiency lights as well as occupancy sensors leads to the energy and cost savings for this measure to not be equivalent to the sum of replacing the lighting fixtures or occupancy sensors separately.

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

ECM-L1 Lighting Replacements/Upgrades w/ Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
130,741	19.9	74,122	0	11,488	0	7,970	11.4	10.7

This measure is recommended.

5.7 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:

- Install window A/C covers in winter
- Purchase Energy Star rated appliances
- Replace filters in air handling equipment and window A/C units regularly
- Add an insulation jacket to domestic water heaters
- Check exhaust fans for backdraft dampers and install dampers if they are not present
- Purchase ENERGY STAR® labeled window air conditioners as they fail

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 District 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. More details can be found at the NJ Clean Energy Program website

(<http://www.njcleanenergy.com/commercial-industrial/home/home>).

6.1.1 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, installed and paid for and then the incentives are reimbursed to the owner.

6.1.2 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 is 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 \$75,000 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 since the peak electric demand during the 12 month evaluated period was less than 200 KW.

6.1.3 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 100 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). Additionally, the overall return on investment (ROI) must exceed 10%. 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 building audits funded by the New Jersey Board of Public Utilities, which receive an initial 75% incentive toward performance of the energy audit, facilities are only eligible for an additional \$0.05 per square foot, up to a maximum of \$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.

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.

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.

Combining Incentives #2 and #3 will provide a total of \$0.18/ kWh and \$1.8/therm not to exceed 50% of total project cost. Additional Incentives for #2 and #3 are increased by \$0.005/kWh and \$0.05/therm for each percentage increase above the 15% minimum target to 20%, calculated with the EPA Portfolio Manager benchmarking tool, not to exceed 50% of total project cost.

For the purpose of demonstrating the eligibility of the ECM's to meet the minimum savings requirement of 15% annual savings and 10% ROI for the Pay for Performance Program, all ECM's identified in this report have been included in the incentive calculations. The results for the building are shown in Appendix C.

6.1.4 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.

6.1.5 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 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 area determines how large of a solar array can be installed on any given space.

Due to existing obstructions on the roof which promote shading, PV is not recommended for this site.

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.

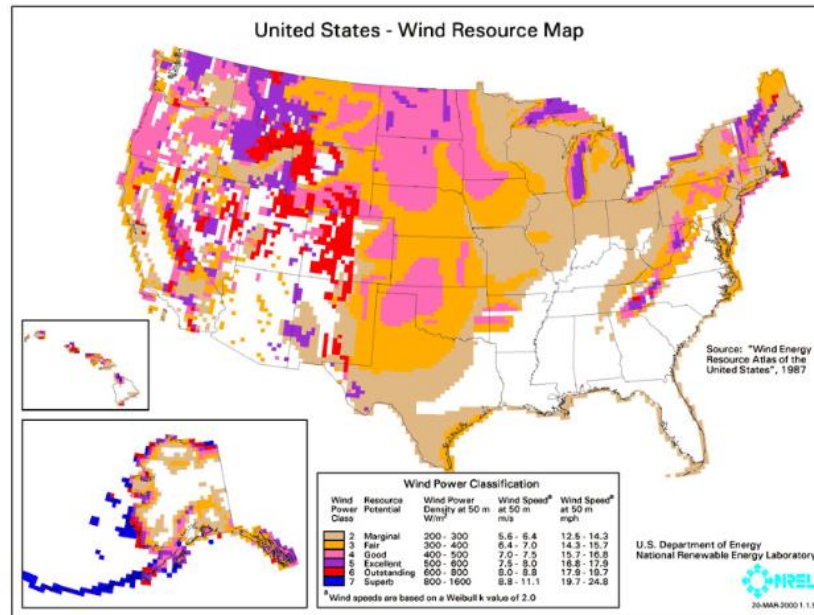
Several options exist for using active solar thermal systems for space heating. The most common method is called a passive solar hot water system involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system described above which requires pumping). 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 school 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 school.

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 school.

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. The 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 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 April 2014 through March 2015 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
148.8	42.4	74.8	N	N

*the demand is estimated from one month bill

This measure is not recommended due to the lack of enough onsite generation.

8.0 CONCLUSIONS & RECOMMENDATIONS

The following section summarizes the LGEA energy audit conducted by CHA for Irwin Elementary High School.

The following projects should be considered for implementation:

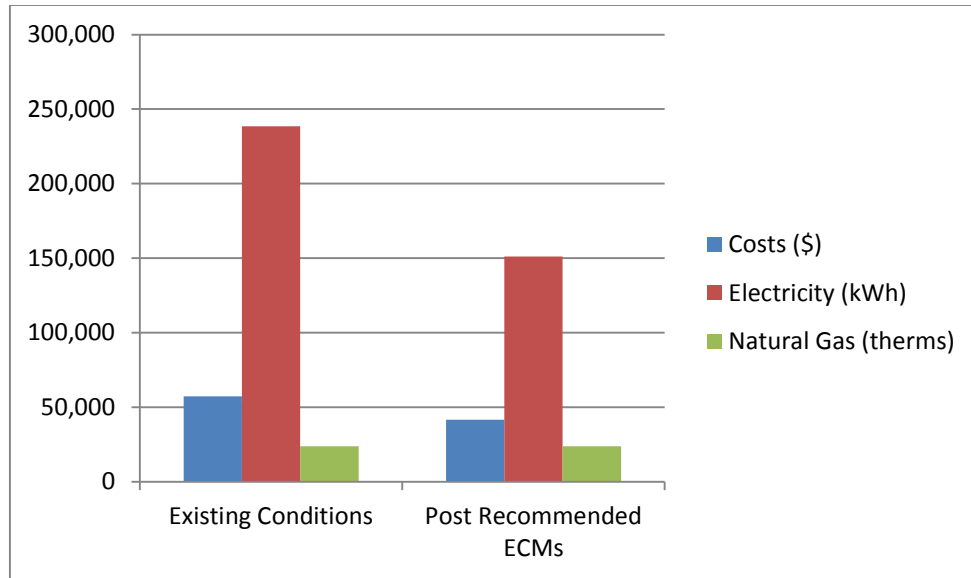
- Replace RTUs with high efficiency units
- Lighting replacements/upgrades W/ Controls

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)
87,586	0	15,678	12.1

If the school implements the recommended ECMs, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	57,284	43,385	24%
Electricity (kWh)	238,560	150,974	37%
Natural Gas (therms)	23,749	23,749	0%
Site EUI (kbtu/SF/Yr)	73.7	66.8	



Next Steps: This energy audit has identified several areas of potential energy savings. East Brunswick Board Of Education can use this information to pursue incentives offered by the NJBPU's NJ Clean Energy Program. A close-out meeting will be scheduled with school staff members to review the ECMs and possible incentive options.

APPENDIX A

Utility Usage Analysis and Alternate Utility Suppliers

**Local Government Energy Audit
East Brunswick Board of Education
Irwin Elementary School**

Utility Bills: Account Numbers

<u>Account Number</u>	<u>Building</u>	<u>Type</u>
650365908	Irwin Elementary School	Electric
650365908	Irwin Elementary School	Gas

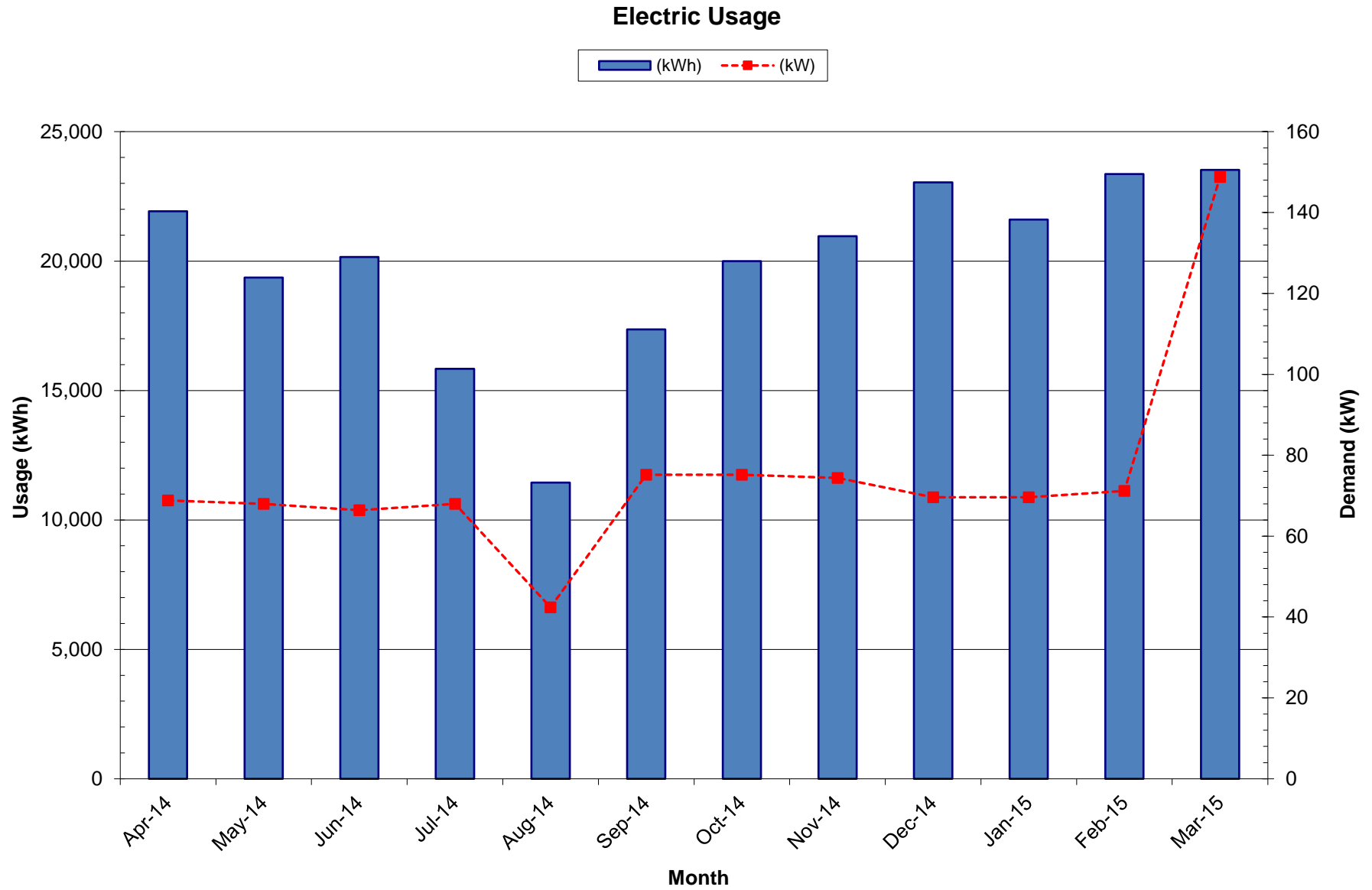
Local Government Energy Audit
East Brunswick Board of Education
Irwin Elementary School

Electric Service
For Service at: Irwin Elementary School
Account No.: 650365908
Meter No.: 728001598

Delivery: PSE&G
Supply: PSE&G

Month	Consumption		Demand		Provider Charges			Unit Costs				
	(kWh)	(\$)	(kW)	(\$)	Delivery (\$)	Supplier (\$)	Total (\$)	Demand (\$/kW)	Consumption (\$/kWh)	Delivery (\$/kWh)	Supplier (\$/kWh)	Blended Rate (\$/kWh)
April-14	21,920	3,016.17	68.8	294.50	1,008.04	2,302.63	3,310.67	4.281	0.138	0.046	0.105	0.151
May-14	19,360	2,658.93	68.0	291.07	921.77	2,028.23	2,950.00	4.280	0.137	0.048	0.105	0.152
June-14	20,160	2,853.62	66.4	810.09	1,587.30	2,076.41	3,663.71	12.200	0.142	0.079	0.103	0.182
July-14	15,840	2,426.16	68.0	831.33	1,425.30	1,832.19	3,257.49	12.225	0.153	0.090	0.116	0.206
August-14	11,440	1,981.44	42.4	525.01	956.64	1,549.81	2,506.45	12.382	0.173	0.084	0.135	0.219
September-14	17,360	2,558.97	75.2	931.15	1,583.95	1,906.17	3,490.12	12.382	0.147	0.091	0.110	0.201
October-14	20,000	2,685.67	75.2	326.04	942.99	2,068.72	3,011.71	4.336	0.134	0.047	0.103	0.151
November-14	20,960	2,706.29	74.4	322.58	962.33	2,066.54	3,028.87	4.336	0.129	0.046	0.099	0.145
December-14	23,040	2,903.42	69.6	301.76	1,004.57	2,200.61	3,205.18	4.336	0.126	0.044	0.096	0.139
January-15	21,600	2,722.45	69.6	301.77	961.31	2,062.91	3,024.22	4.336	0.126	0.045	0.096	0.140
February-15	23,360	2,817.69	71.2	308.70	1,022.66	2,103.73	3,126.39	4.336	0.121	0.044	0.090	0.134
March-15	23,520	2,934.46	148.8	322.71	1,041.57	2,215.60	3,257.17	2.169	0.125	0.044	0.094	0.138
Total (All)	238,560	\$32,265.27	148.8	5,566.71	\$13,418.43	\$24,413.55	\$37,831.98	\$6.202	\$0.135	\$0.056	\$0.102	\$0.159
Total (last 12-months)	238,560	\$32,265.27	148.8	5,567	\$13,418.43	\$24,413.55	\$37,831.98	\$6.202	\$0.135	\$0.056	\$0.102	\$0.159
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)
- 35% of blended rate (fixed portion of the bill that can't be negotiated)
- 65% of blended rate (portion of the bill that can be negotiated)



**Local Government Energy Audit
East Brunswick Board of Education
Irwin Elementary School**

Natural Gas Service

For Service at: Irwin Elementary School

Account No.: 650365908

Meter No: 2523017

Delivery: PSE&G

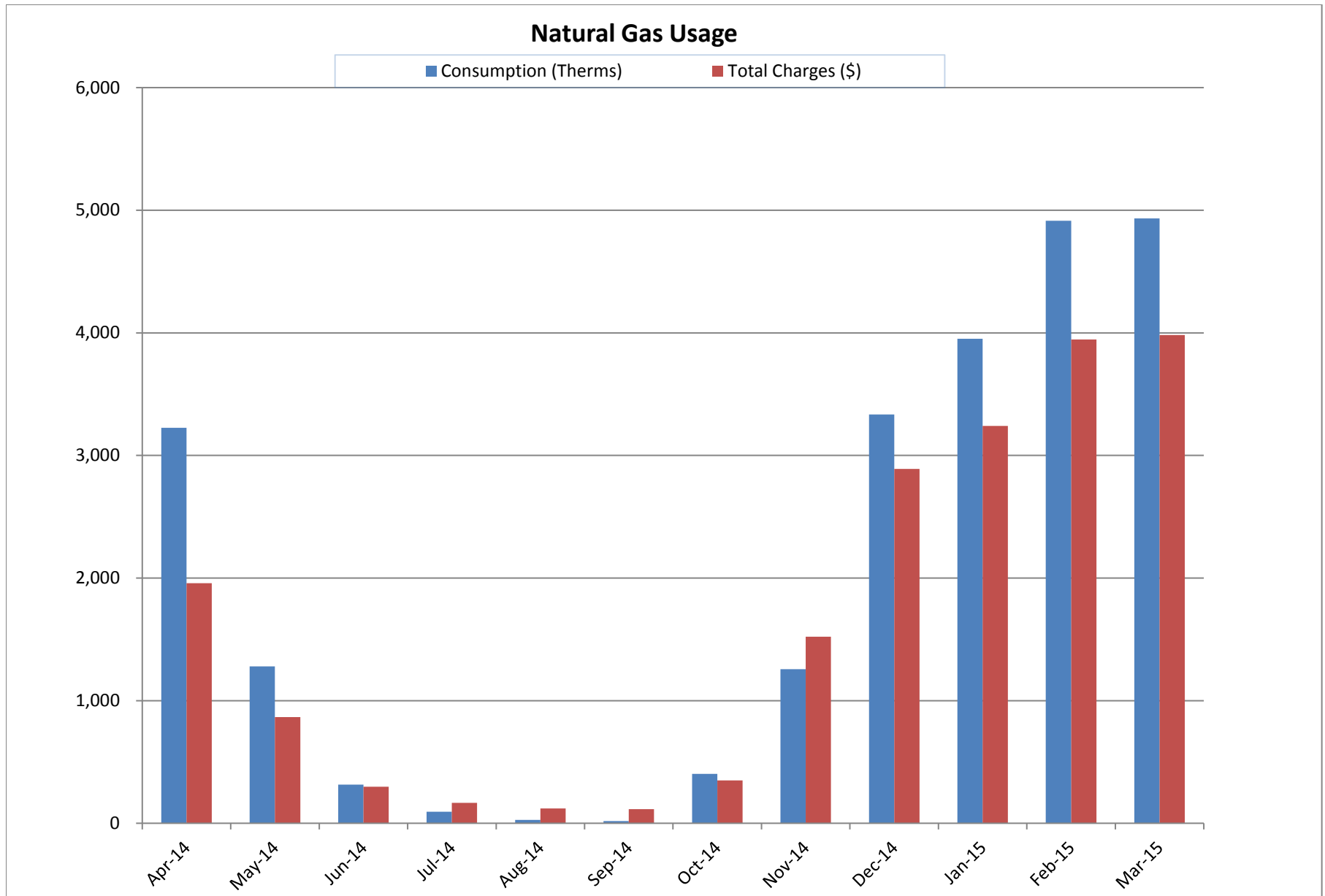
Supply: Direct Energy

Month	Consumption (Therms)	Supply Charge (\$)	Delivery Charge (\$)	Total Charges (\$)	Supply Rate (\$/Therm)	Delivery Rate (\$/Therm)	Total Rate (\$/Therm)
April-14	3,226.2	1,525.32	432.40	1,957.72	0.473	0.134	0.607
May-14	1,278.9	612.73	252.55	865.28	0.479	0.197	0.677
June-14	314.3	157.80	140.32	298.12	0.502	0.446	0.949
July-14	93.2	53.04	112.72	165.76	0.569	1.210	1.779
August-14	27.8	14.89	106.11	121.00	0.535	3.814	4.349
September-14	18.2	9.07	105.14	114.21	0.497	5.763	6.260
October-14	403.6	205.50	143.64	349.14	0.509	0.356	0.865
November-14	1,256.2	639.64	881.12	1,520.76	0.509	0.701	1.211
December-14	3,334.3	1,697.82	1,192.56	2,890.38	0.509	0.358	0.867
January-15	3,951.1	2,011.89	1,229.54	3,241.43	0.509	0.311	0.820
February-15	4,913.4	2,501.81	1,444.64	3,946.45	0.509	0.294	0.803
March-15	4,932.1	2,511.39	1,470.08	3,981.47	0.509	0.298	0.807
Total (All)	23,749.4	\$11,940.90	\$7,510.82	\$19,451.72	0.503	0.316	0.819
Total (last 12-months)	23,749.4	\$11,940.90	\$7,510.82	\$19,451.72	0.503	0.316	0.819

61.4%

38.6%

100.0%



PSE&G ELECTRIC SERVICE TERRITORY
Last Updated: 10/24/12

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

Supplier	Telephone & Web Site	*Customer Class
AEP Energy, Inc. 309 Fellowship Road, Fl. 2 Mount Laurel, NJ 08054	(866) 258-3782 www.aepenergy.com	C/I ACTIVE
Alpha Gas and Electric, LLC 641 5 th 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, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com	C ACTIVE
Amerigreen Energy, Inc. 1463 Lamberton Road Trenton, NJ 08611	888-423-8357 www.amerigreen.com	R/C ACTIVE
AP Gas & Electric, LLC 10 North Park Place, Suite 420 Morristown, NJ 07960	(855) 544-4895 www.apge.com	R/C/I ACTIVE
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	(201) 384-5552 www.astralenergylc.com	R/C/I ACTIVE
Barclays Capital Services, Inc. 70 Hudson Street Jersey City, NJ 07302-4585	(888) 978-9974 www.group.barclays.com	C 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
Champion Energy Services, LLC 72 Avenue L Newark, NJ 07105	(877) 653-5090 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
Clearview Electric, Inc. 505 Park Drive Woodbury, NJ 08096	(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 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
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(866) 237-7693 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
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com	C ACTIVE
Direct Energy Business, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(888) 925-9115 www.directenergybusiness.com	C/I ACTIVE
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 348-4193 www.directenergy.com	R ACTIVE
Discount Energy Group, LLC 811 Church Road, Suite 149 Cherry Hill, New Jersey 08002	(800) 282-3331 www.discountenergygroup.com	R/C ACTIVE
Dominion Retail, Inc. d/b/a Dominion Energy Solutions 395 Route #70 West Suite 125 Lakewood, NJ 08701	(866) 275-4240 www.dom.com/products	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.me Midwest LLC 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270 www.energy.me	R/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
Ethical Electric Benefit Co. d/b/a Ethical Electric 100 Overlook Center, 2 nd Fl. Princeton, NJ 08540	(888) 444-9452 www.ethicalelectric.com	R/C ACTIVE
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 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 Sixth Floor Edison, NJ 08837	(866) 999-8374 www.gdfsuezenergyresources.com	C/I ACTIVE
Glacial Energy of New Jersey, Inc. 75 Route 15 Building E Lafayette, NJ 07848	(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
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
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908 www.hikoenergy.com	R/C ACTIVE
HOP Energy, LLC d/b/a Metro Energy, HOP Fleet Fueling, HOP Energy Fleet Fueling 1011 Hudson Avenue Ridgefield, NJ 07657	(877) 390-7155 www.hopenergy.com	R/C/I ACTIVE
Hudson Energy Services, LLC 7 Cedar Street Ramsey, New Jersey 07446	(877) Hudson 9 www.hudsonenergyservices.com	C ACTIVE
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	(877) 887-6866 www.idtenergy.com	R/C ACTIVE
Independence Energy Group, LLC 3711 Market Street, 10 th Fl. Philadelphia, PA 19104	(877) 235-6708 www.chooseindependence.com	R/C ACTIVE
Integrus Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrusenergy.com	C/I ACTIVE
Keil & Sons, Inc. d/b/a Systrum Energy 1 Bergen Blvd. Fairview, NJ 07022	(877) 797-8786 www.systrumenergy.com	R/C/I ACTIVE
Liberty Power Delaware, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	C/I ACTIVE
Liberty Power Holdings, LLC 1973 Highway 34, Suite 211 Wall, NJ 07719	(866) 769-3799 www.libertypowercorp.com	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
MXenergy Electric Inc. 900 Lake Street Ramsey, NJ 07446	(800) 785-4374 www.mxenergy.com	R/C/I ACTIVE
NATGASCO, Inc. 532 Freeman St. Orange, NJ 07050	(973) 678-1800 x. 251 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 1 Bridge Plaza fl. 2 Fort Lee, NJ 07024	(866) 568-0290 www.NJGandE.com	R/C 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
North American Power and Gas, LLC 222 Ridgedale Avenue Cedar Knolls, NJ 07927	(888) 313-9086 www.napower.com	R/C/I 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
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com	C/I ACTIVE
Plymouth Rock Energy, LLC 338 Maitland Avenue Teaneck, NJ 07666	(855) 32-POWER (76937) www.plymouthenergy.com	R/C/I ACTIVE

PPL Energy Plus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com	C/I ACTIVE
Public Power & Utility of New Jersey, LLC 39 Old Ridgebury Rd. Suite 14 Danbury, CT 06810	(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/pjm	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
Respond Power LLC 10 Regency CT Lakewood, NJ 08701	(877) 973-7763 www.respondpower.com	R/C/I ACTIVE
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 266-6020 www.southjerseyenergy.com	C/I ACTIVE
Sperian Energy Corp. 1200 Route 22 East, Suite 2000 Bridgewater, NJ 08807	(888) 682-8082	R/C/I ACTIVE
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, N.J. 08007	(800) 695-0666 www.sjnaturalgas.com	R/C ACTIVE
Spark Energy, L.P. 2105 CityWest Blvd., Ste 100 Houston, Texas 77042	(800) 441-7514 www.sparkenergy.com	R/C/I ACTIVE
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com	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 309 Fellowship Rd., Suite 200 Mt. Laurel, NJ 08054	(877) 39-8150 www.streamenergy.net	R 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
Verde Energy USA, Inc. 50 East Palisades Avenue Englewood, NJ 07631	(800) 388-3862 www.lowcostpower.com	R/C/I 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 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

[Back to the main supplier page](#)

PSE&G GAS SERVICE TERRITORY
Last Updated: 12/11/14

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

Supplier	Telephone & Web Site	*Customer Class
Ambit Northeast, LLC d/b/a Ambit Energy 103 Carnegie Center Suite 300 Princeton, NJ 08540	877-282-6284 www.ambitenergy.com	R/C ACTIVE
Amerigreen Energy, Inc. 333 Sylvan Avenue Suite 206 Englewood Cliffs, NJ 07632	(888)559-4567 www.amerigreen.com	R/C/I ACTIVE
Astral Energy LLC 16 Tyson Place Bergenfield, NJ 07621	888-850-1872 www.AstralEnergyLLC.com	R/C/I ACTIVE
BBPC, LLC 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, 610 Iselin, NJ 08830	866-867-8328 www.compassenergy.net	C/I ACTIVE

Compass Energy Gas Services, LLC 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 Energy, Inc. d/b/a Con Edison Solutions 535 State Highway 38, Suite 140 Cherry Hill, NJ 08002	888-686-1383 x2130 www.conedenergy.com	
Consolidated Edison Solutions, Inc. Cherry Tree Corporate Center 535 State Highway 38, Suite 140 Cherry Hill, NJ 08002	888-665-0955 www.conedsolutions.com	C/I 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, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	888-925-9115 http://www.business.directenergy.com/	R ACTIVE
Direct Energy Business Marketing, LLC (fka Hess Energy Marketing) 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	(888) 925-9115 www.directenergy.com	R ACTIVE

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
Gateway Energy Services Corp. 120 Wood Avenue Suite 611 Iselin, NJ 08830	(866) 348-4193 www.gesc.com	R/C 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	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 Hoboken, NJ 07030	718-204-7467 www.greenlightenergy.us	C ACTIVE
Harborside Energy LLC 101 Hudson Street, Suite 2100 Jersey City, NJ 07302	877-940-3835 www.harborsideenergynj.com	R/C 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
Hudson Energy Services, LLC 7 Cedar Street Ramsey, NJ 07446	877- Hudson 9 www.hudsonenergyservices.com	C ACTIVE
IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	877-887-6866 www.idtenergy.com	R/C 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
Integrays Energy Services-Natural Gas, LLC 101 Eisenhower Parkway Suite 300 Roseland, NJ 07068	(800) 536-0151 www.integraysenergy.com	C/I ACTIVE
Jsynergy LLC 445 Cental Ave. Suite 204 Cedarhurst, NY 11516	(516) 331-2020 www.Jsnergylc.com	R/C/I ACTIVE
Major Energy Services, LLC 1001 East Lawn Drive Teaneck NJ 07666	888-625-6760 www.majorenergy.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
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	888-53-Metro www.metroenergy.com	R/C ACTIVE
MPower Energy NJ LLC One University Plaza, Suite 507 Hackensack, NJ 07601	877-286-7693 www.mpowerenergy.com	R/C/I ACTIVE
NATGASCO (Supreme Energy, Inc.) 532 Freeman Street Orange, NJ 07050	800-840-4427 www.supremeenergyinc.com	R/C/I ACTIVE
New Energy Services LLC 101 Neptune Avenue Deal, New Jersey 07723	800-660-3643 www.newenergyservicesllc.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 ACTIVE

Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095	877-273-6772 www.noblesolutions.com	C/I ACTIVE
North American Power & Gas, LLC d/b/a North American Power 197 Route 18 South Ste. 300 New Brunswick, NJ 08816	888- 313-8086 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 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
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
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

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
Save on Energy, LLC 1101 Red Ventures Drive Fort Mill, SC 29707	1 (877) 658-3183 www.saveonenergy.com	R/C ACTIVE
SFE Energy One Gateway Center Suite 2600 Newark, NJ 07012	1 (877) 316-6344 www.sfeenergy.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
South Jersey Energy Company 1 South Jersey Plaza, Route 54 Folsom, NJ 08037	800-266-6020 www.southjerseyenergy.com	R/C/I ACTIVE
SouthStar Energy d/b/a New Jersey Energy 1085 Morris Avenue, Suite 155 Union, NJ 07083	(866) 477-8823 www.newjerseyenergy.com	R/C ACTIVE
Spark Energy Gas, LP/ Spark Energy 2105 City West Blvd. Suite 100 Houston, TX 77042	(713)600-2600 www.sparkenergy.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
Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	800-640-6457 www.stuyfuel.com	C 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
Systrum Energy 1 Bergen Blvd. Fairview, NJ 07022	877-797-8786 www.systrumenergy.com	R/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
UGI Energy Services, Inc. d/b/a GASMARK 224 Strawbridge Drive, Suite 107 Moorestown, NJ 08057	856-273-9995 www.ugienergylink.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 PA LLC 2001 Route 46, Waterview Plaza Suite 230 Parsippany, NJ 07054	866-663-2508 www.viridian.com	R/C 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 Street, 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

[Back to main supplier information page](#)

APPENDIX B

Equipment Inventory

CHA Project# 31007

Estimated

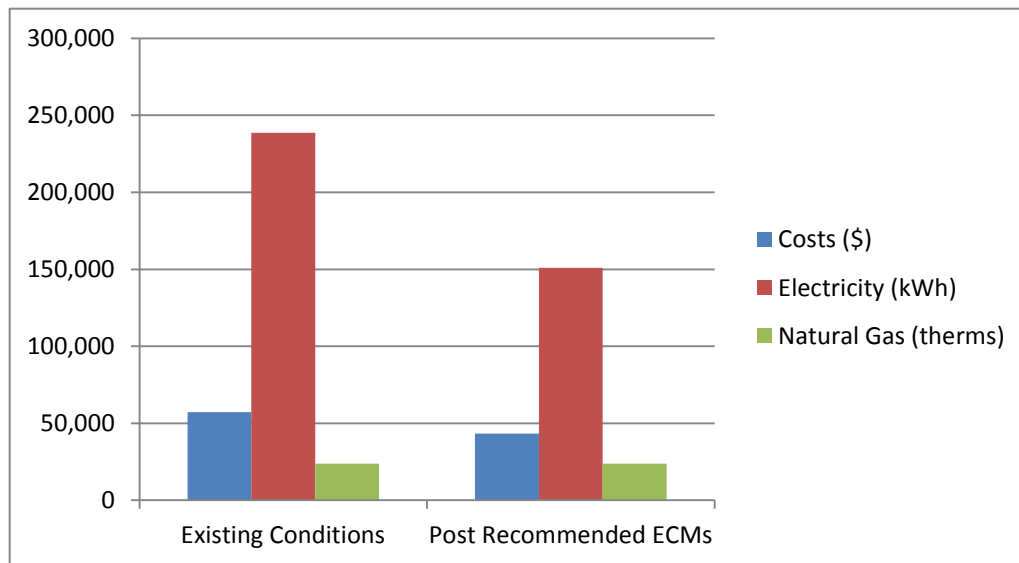
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APPENDIX C

ECM Calculations

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

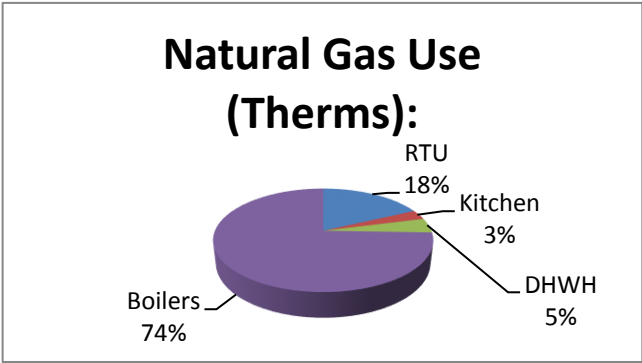
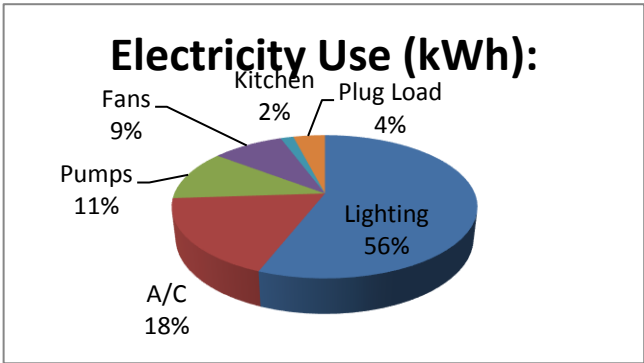
	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	57,284	43,385	24%
Electricity (kWh)	238,560	150,974	37%
Natural Gas (therms)	23,749	23,749	0%
Site EUI (kbtu/SF/Yr)	73.7	66.8	



Utility End Use Analysis		
Electricity Use (kWh):		Notes/Comments:
238,560	Total	Based on utility analysis
133,442	Lighting	From Lighting Calculations
42,941	A/C	Estimated
27,295	Pumps	From ECM
21,470	Fans	Estimated
3,869	Kitchen	Estimated
9,542	Plug Load	Estimated
Natural Gas Use (Therms):		Notes/Comments:
23,749	Total	Based on utility analysis
4,275	RTU	Estimated
712	Kitchen	Estimated
1,080	DHWH	Estimated
17,682	Boilers	Estimated

56%
 18%
 11%
 9%
 2%
 4%
 100%

18%
 3%
 5%
 74%
 100%



East Brunswick BOE
CHA Project Number: 31007

Rate of Discount (used for NPV) 3.0%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
\$ 0.159	\$/kWh blended		0.000420205	43,279	Electric	Natural Gas	Fuel Oil
\$ 0.135	\$/kWh supply	238,560	0.000420205		\$ 37,832	\$ 19,452	
\$ 6.20	\$/kW	148.8	0				
\$ 0.82	\$/Therm	23,749	0.00533471				
	\$/kgals		0				
	\$/Gal						

Irwin Elementary School																								
Recommend?		Item	Savings					Cost	Simple Payback	Life Expectancy	Equivalent CO ₂ (Metric tons)	NJ Smart Start Incentives	Direct Install Eligible (Y/N)	Payback w/ Incentives	Simple Projected Lifetime Savings					ROI	NPV	IRR		
Y or N			kW	kWh	therms	No. 2 Oil gal	Water kgal	\$								kW	kWh	therms	kgal/yr	\$				
Y		ECM-1	Replace RTU with High Efficiency Units	8.0	13,464	0	0	0	2,411	\$ 69,400	28.8	15	5.7	\$ 1,840	N	28.0	119.6	201,964	0	0	\$ 41,017	(0.4)	(\$38,774)	-7.0%
N		ECM-2	Install VFD for HHW Pumps	0.1	6,098	0	0	0	828	\$ 14,216	17.2	15.0	2.6	\$ 930	N	16.0	1.0	91,474	0	0	\$ 14,622	0.0	(\$3,396)	-0.8%
N		ECM-3	Install Kitchen Hood Controls	0.0	1,117	959	0	0	963	\$ 33,250	34.5	15.0	5.6	\$ 90	N	34.4	0.0	16,751	14,382	0	\$ 14,442	(0.6)	(\$21,666)	-9.0%
N		ECM-4	Replace DHW Heater with Condensing Heater	0.0	0	180	0	0	147	\$ 12,302	83.5	15.0	1.0	\$ 300	N	81.4	0.0	0	2,700	0	\$ 2,211	(0.8)	(\$10,242)	-16.2%
N		ECM-5	Install Low Flow Plumbing Fixtures	0.0	0	23	0	6	19	\$ 53,378	2,871.7	30.0	0.1	\$ -	N	2,871.7	0.0	0	681	174	\$ 558	(1.0)	(\$53,014)	#NUM!
Y		ECM-L1	Lighting Replacement With Controls	19.9	74,122	0	0	0	11,488	\$ 130,741	11.4	10.0	31.1	\$ 7,970	N	10.7	199.0	741,220	0	0	\$132,664	0.0	(\$24,780)	-1.2%
Total				27.9	94,801	1,161	0	6	\$ 15,856	\$ 313,287	19.8	16.7	46	\$ 11,130		19.1	320	1,051,410	17,762	174	\$205,514	(0.3)	(\$102,988)	-2.0%
Recommended Measures (highlighted green above)				27.9	87,586	0	0	0	\$ 13,899	\$ 200,141	14.4	12.5	37	\$ 9,810	0	13.7	319	943,184	-	-	\$173,681	(0.1)	(\$51,982)	-2.0%
% of Existing				19%	36.71%	0.00%	#DIV/0!	#DIV/0!																

City:		Newark, NJ				
Occupied Hours/Week		65	70	70	70	50
		Building	Auditorium	Gymnasium	Library	Classrooms
Temp	Enthalpy h (Btu/lb)	Bin Hours	Operating Hours	Occupied Hours	Occupied Hours	Occupied Hours
102.5						
97.5	35.4	6	2	3	3	2
92.5	37.4	31	12	13	13	9
87.5	35.0	131	51	55	55	39
82.5	33.0	500	193	208	208	149
77.5	31.5	620	240	258	258	185
72.5	29.9	664	257	277	277	198
67.5	27.2	854	330	356	356	254
62.5	24.0	927	359	386	386	276
57.5	20.3	600	232	250	250	179
52.5	18.2	730	282	304	304	217
47.5	16.0	491	190	205	205	146
42.5	14.5	656	254	273	273	195
37.5	12.5	1,023	396	426	426	304
32.5	10.5	734	284	306	306	218
27.5	8.7	334	129	139	139	99
22.5	7.0	252	98	105	105	75
17.5	5.4	125	48	52	52	37
12.5	3.7	47	18	20	20	14
7.5	2.1	34	13	14	14	10
2.5	1.3	1	0	0	0	0
-2.5						
-7.5						

Multipliers	
Material:	1.027
Labor:	1.246
Equipment:	1.124

Heating System Efficiency	92%
Cooling Eff (kW/ton)	1.3

Heating	
Hours	4,427 Hrs
Weighted Avg	40 F
Avg	28 F

Cooling	
Hours	4,333 Hrs
Weighted Avg	68 F
Avg	78 F

ECM-1: Replace Unitary HVAC Equipment With More Efficient Unitary Equipment

Description: This ECM evaluates the energy savings associated with replacing older less efficient heating and cooling equipment with modern high efficiency unitary equipment having the same capacity

	Quantity	Capacity (Tons)	Equipment Description	General Type	Total Cooling Capacity (Btu/h)	Heating Capacity (Btu/h)	EER
	5	5	RTU	HVAC	300,000	480,000	9
Total	5	5			300000	480000	9

Item	Value	Units	Formula/Comments	
Demand Rate	\$ 6.20	/ kW		
Electricity Rate	\$ 0.14	/kWh		
FORMULA CONSTANTS				
Coincidence Factor	0.67		NJ Protocols	
Conversion	3.412	btu/kW		
COOLING - HVAC				
Cooling Capacity	300,000	btu/hr		btuh
Baseline EER	9.0		See Table Below	EERb
Proposed EER	14.0		Equipment	EERq
Equivalent Full Load Hours	1,131	hrs	NJ Protocols	
Demand Savings	7.98	kW		
Energy Savings	13,464	kWh		
HEATING - Heat Pump				
Heating Capacity	-	btu/h		
Baseline Heating EER	9.0		See Table Below	
Proposed Heating EER	14.0		Equipment	
Equivalent Full Load Hours		hrs	NJ Protocols	
Heating Savings	-	kWh		
COOLING - Heat Pump				
Cooling Capacity	-	btu/h		
Baseline Cooling EER	9.0		See Table Below	
Proposed Cooling EER	14.0		Equipment	
Equivalent Full Load Hours		hrs	NJ Protocols	
Cooling Savings	-	kWh		
SAVINGS				
Demand Savings	7.98	kW		
Energy Savings	13,464	kWh		

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

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-1: Replace Unitary HVAC Equipment With More
Efficient Unitary Equipment - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Demolition	5	EA		\$ 250	\$ 1,200	\$ -	\$ 1,558	\$ 6,744	\$ 8,302	Eng Est
5.0 ton DX unit w/ Gas heat	5	EA	\$ 4,325	\$ 1,375		\$ 22,209	\$ 8,566	\$ -	\$ 30,775	RS Means
Duct adapters	5	EA	\$ 500	\$ 500		\$ 2,568	\$ 3,115	\$ -	\$ 5,683	Eng Est
Controls	5	EA	\$ 75	\$ 300		\$ 385	\$ 1,869	\$ -	\$ 2,254	Eng Est
Electrical - misc.	5	EA	\$ 250	\$ 500		\$ 1,284	\$ 3,115	\$ -	\$ 4,399	Eng Est

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

\$ 51,412	Subtotal
\$ 17,994	35% Contingency
\$ 69,400	Total

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

ECM-2: Install Variable Speed Drives - HW Pumps

Variable Inputs

Blended Electric Rate	\$0.16
Heating System "On" Point	55
VFD Efficiency	98.5%

ECM Description Summary

Two Hot Water Pumps provide heating hot water to the system at constant flow. This ECM evaluates the energy savings for replacing hte two pump motors with higher efficiency motors and installing variabel speed drives . The pumps currently operate in lead/lag fashion with only one pump operating at a time, therefore the savings is for only one pump. Pressure differential sensors will need to be installed to control the VFDs

PUMP SCHEDULE							
Pump ID	Qty	HP	Total HP	Existing Motor Motor Eff.	New Motor Motor Eff.	Exist. Motor kW Note 1	New Motor kW Note 2
	1	3.0	3.0	86.5%	89.5%	2.07	2.00
		3.0	0.0				
					Total:	2.07	2.00

SAVINGS ANALYSIS								
OAT - DB Avg Temp F	Annual Hours in Bin	Heating Hours Bin	Pump Load %	Existing Pump kWh	Proposed Pump kW	Speed efficiency %	Proposed Pump kWh	Proposed Savings kWh
(A)	(B)	(C) =IF(A>TP,0,C)	(D) =0.5+0.5* (50-A)/(50-10)) See Note 4	(E) =D*AA	(F) =BB*E^2.5/CC See Note 5	(G)	(H) =C*F/G	(I) =E-H
See Note 3	See Note 3							
97.5	6	0	0%	0	0.0	0.0%	0	0
92.5	31	0	0%	0	0.0	0.0%	0	0
87.5	131	0	0%	0	0.0	0.0%	0	0
82.5	500	0	0%	0	0.0	0.0%	0	0
77.5	620	0	0%	0	0.0	0.0%	0	0
72.5	664	0	0%	0	0.0	0.0%	0	0
67.5	854	0	0%	0	0.0	0.0%	0	0
62.5	927	0	0%	0	0.0	0.0%	0	0
57.5	600	0	0%	0	0.0	0.0%	0	0
52.5	730	730	48%	1,511	0.3	78.9%	292	1,219
47.5	491	491	53%	1,016	0.4	83.9%	237	779
42.5	656	656	58%	1,358	0.5	88.2%	379	979
37.5	1,023	1,023	63%	2,117	0.6	91.8%	699	1,419
32.5	734	734	68%	1,519	0.8	94.9%	588	931
27.5	334	334	73%	691	0.9	97.2%	312	379
22.5	252	252	78%	522	1.1	99.0%	273	248
17.5	125	125	83%	259	1.3	100.0%	157	102
12.5	47	47	88%	97	1.5	100.0%	68	29
7.5	34	34	93%	70	1.7	100.0%	57	14
2.5	1	1	98%	2	1.9	99.7%	2	0
-2.5	0	0	0%	0	0.0	0.0%	0	0
	8,760	4,427		9,163			3,065	6,098

2800

Notes:

- 1) Existing motor power was determined using motor nameplate data. Formula: Motor HP x 0.746 x 0.8 / Exist. Motor Eff.
- 2) New motor power is the same as existing motor power adjusted for the new efficiency, if a new motor is proposed.
- 3) Weather data from Newark, NJ
- 4) The pump load is estimated at 100% at X deg. OAT and 50% at X deg. OAT and varies linearly in between.
- 5) The required VFD motor draw is based on a 2.5 power relationship to load.

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

ECM-2: Install Variable Speed Drives - HW Pumps

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
VFD	2	ea	\$ 1,700	\$ 545		\$ 3,492	\$ 1,358	\$ -	\$ 4,850	RS Means
Motor	2	ea	\$ 560	\$ 97		\$ 1,150	\$ 242	\$ -	\$ 1,392	RS Means
Differential Pressure Switch and wiring	2	ls	\$ 350	\$ 1,200		\$ 719	\$ 2,990	\$ -	\$ 3,709	Est
Misc	2	ea	\$ 100	\$ 150		\$ 205	\$ 374	\$ -	\$ 579	Est
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

\$ 10,530	Subtotal
\$ 3,686	35% Contingency
\$ 14,216 Total	

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

ECM-3: Kitchen Hood Control

Description: This ECM evaluates the thermal and electrical energy savings associated with the implementation of a variable flow controlled exhaust hood (Fan) and make-up air unit. The Hood controller uses infrared heat sensors to detect the level of smoke produced by the cooking operations and automatically adjusts the

Item	Value	Units	Formula/Comments
Fuel Cost	\$ 0.82	/ Therm	
Electricity Cost	\$ 0.16	/kWh	
FORMULA CONSTANTS			
Conversion	0.746	HP/kW	
Constant	24	hrs/day	
Constant	1.08	(btu/hr)/CFM-F	
Conversion	3,412	btu/kWh	
ELECTRIC FAN SAVINGS			
Facility Type	School		
Quantity of Kitchen Hood Fan Motors	1		
Kitchen Hood Fan Motor HP	0.3	HP	
Motor Load Factor	0.90		NJ Protocols
Efficiency of Fan Motor(s)	86.5%		
Kitchen Hood Fan Run Hours	7,392		
Fan Motor Power Reduction (From VFD)	0.584		
Fan Electricity Savings	1,117	kWh	
HEATING SAVINGS			
Kitchen is Heated?	Y		
Square Footage of Kitchen	350	ft²	Estimated
Code Required Ventilation Rate	0.70	CFM/ft²	NJ Protocols
Ventilation Oversize Factor	1.40		NJ Protocols
Flow Reductuion (from VFD/Control)	0.310		
Heating Degree Day	2,783		NJ Protocols Table
Heating System Efficiency	80%		AFUE (%)
Heating Savings	96	MMbtu	
Heating Savings	959	Therms	
COOLING SAVINGS			
Kitchen is Cooled?	N		
Cooling Degree Day	-		NJ Protocols Table
Cooling System Efficiency	-		COP
Cooling Savings	-	kWh	
TOTAL SAVINGS			
Electricity Savings	1,117	kWh	
Fuel Savings	959	Therms	
Cost Savings	\$ 963		

Q
HP
LF
FEFF
RH
PR

SF
CFM/SF
OF
FR
HDD
HEFF

CDD
CEFF

Savings calculation formulas are taken from NJ Protocols document for Kitchen Hood

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

ECM-3: Kitchen Hood Control

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Me-Link Kitchen Hood Control System	1	ea	\$ 15,000	\$ 2,000		\$ 15,405	\$ 2,492	\$ -	\$ 17,897	Vendor Estimation
1/3 HP VFDs (1-exhaust fan)	1	ea	\$ 1,485	\$ 490		\$ 1,525	\$ 611	\$ -	\$ 2,136	RS Means 2012
1/3 HP Motor	1	ea	\$ 525	\$ 85		\$ 539	\$ 106	\$ -	\$ 645	RS Means 2012
Reprogram DDC system	1	ea	\$ 100	\$ 1,200		\$ 103	\$ 1,495	\$ -	\$ 1,598	RS Means 2012
Electrical - misc.	1	ls	\$ 200	\$ 500		\$ 205	\$ 623	\$ -	\$ 828	RS Means 2012
Remote bulb thermostat	2	ea	\$ 500	\$ 200		\$ 1,027	\$ 498	\$ -	\$ 1,525	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

\$ 24,629	Subtotal
\$ 8,620	35% Contingency
\$ 33,250	Total

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

ECM-4: Replace Gas-Fired DHW Heater with Condensing Gas-Fired DHW Heater

Description: This ECM evaluates the energy savings associated with replacing a gas fired tank type water heater with an equivalent capacity tank type condensing gas fired water heater.

<u>Item</u>	<u>Value</u>	<u>Units</u>	<u>Formula/Comments</u>
Avg. Monthly Utility Demand by Water Heater	90	Therms/month	Calculated from utility bill
Total Annual Utility Demand by Water Heater	108,000	MBTU/yr	1therm = 100 MBTU
Existing DHW Heater Efficiency	80%		Per manufacturer nameplate
Total Annual Hot Water Demand (w/ standby losses)	86,400	MBTU/yr	
Existing Tank Size	80	Gallons	Per manufacturer nameplate
Hot Water Piping System Capacity	5	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	°F	Per building personnel
Room Temperature	72	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	1.2	MBH	
Annual Standby Hot Water Load	10,549	MBTU/yr	
New Tank Size	80	Gallons	
Hot Water Piping System Capacity	5	Gallons	Estimated Per existing system (includes HWR piping)
Hot Water Temperature	140	°F	
Room Temperature	72	°F	
Standby Losses (% by Volume)	2.5%		(2.5% of stored capacity per hour, per U.S. Department of Energy)
Standby Losses (Heat Loss)	1.2	MBH	
Annual Standby Hot Water Load	10,549	MBTU/yr	
Total Annual Hot Water Demand	86,400	MBTU/yr	
Proposed Avg. Hot water heater efficiency	96%		AO Smith Cyclone
Proposed Fuel Use	900	Therms	Standby Losses and inefficient DHW heater eliminated

Savings Summary:

Utility	Energy Savings
Therms/yr	180

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-4: Replace Gas-Fired DHW Heater with Condensing Gas-Fired DHW Heater

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
80 GAL Condensing Gas-Fired DHW Heater	1	EA	\$ 6,000	\$ 1,000		\$ 6,162	\$ 1,246	\$ -	\$ 7,408	Internet price
piping and valves	1	LS	\$ 500	\$ 500		\$ 514	\$ 623	\$ -	\$ 1,137	RS Means
electric	1	EA	\$ 250	\$ 250		\$ 257	\$ 312	\$ -	\$ 568	RS Means

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

\$ 9,113	Subtotal
\$ 3,189	35% Contingency
\$ 12,302	Total

East Brunswick BOE
 CHA Project Number: 31007
 Irwin Elementary School

ECM-5A: Replace urinals and flush valves with low flow

Description: This ECM evaluates the water savings associated with replacing/ upgrading urinals with 0.125 GPF urinals and or flush valves.

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$0.00	\$ / kGal
Urinals in Building to be replaced	2	
Average Flushes / Urinal (per Day)	8	Based on # of occupants
Average Gallons / Flush	1.0	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	2	
Proposed Gallons / Flush	0.125	Gal
Proposed Material Cost of new urinal & valve	\$1,200	RS Means 2012
Proposed Installation Cost of new urinal & valve	\$1,000	RS Means 2012
Total cost of new urinals & valves		

SAVINGS		
Current Urinal Water Use	3.88	kGal / year
Proposed Urinal Water Use	0.48	kGal / year
Water Savings	3.39	kGal / year

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

ECM-5B: Replace toilets and flush valves with low flow

Description: This ECM evaluates the water savings associated with repalcing/ upgrading toilets to 1.28 GPF fixtures and/or flush valves.

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$0.00	\$ / kGal
Toilets in Building	8	
Average Flushes / Toilet (per Day)	10	Based on # of occupants
Average Gallons / Flush	1.6	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	8	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	31.00	kGal / year
Proposed Toilet Water Use	24.80	kGal / year
Water Savings	6.20	kGal / year

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

ECM-5C: Replace faucets with low flow

Description; This ECM evaluates the water savings resulting from replacing/ upgrading faucets to 0.5 gallon per minute flow

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	\$0.00	\$ / kGal
Faucets in Building	12	
Average Uses / Faucet (per day)	8	Based on # of occupants
Average Time of Use	10.0	seconds
Average Flowrate	2.0	gpm

PROPOSED CONDITIONS		
Proposed Faucets to be Replaced	12	
Proposed Flowrate	0.5	gpm

HEATING SAVINGS		
Fuel Cost	\$ 0.82	/therm
Number of Faucets	12	
Hours per Day of Usage	0.3	hrs
Days per Year of Facility Usage	250	days
Average Flowrate	2.0	gpm
Proposed Flowrate	0.5	gpm
Heat Content of Water	8.33	Btu/gal/F
Temperature Difference (Intake and Output)	75	F
Water Heating Equipment Efficiency	80%	
Conversion Factor	100,000	Btu/Therm
SAVINGS		
Current Faucet Water Use	7.75	kGal / year
Proposed Faucet Water Use	1.94	kGal / year
Water Savings	5.81	kGal / year
Heating Savings	23	Therms

Savings calculation formulas are taken from NJ Protocols document for Faucet

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

Replace Plumbing Fixtures with Low-Flow Equivalents - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Low-Flow Urinal	2	EA	\$ 1,200	\$ 1,000	\$ -	\$ 2,465	\$ 2,492	\$ -	\$ 4,957	Vendor Estimate
Low-Flow Toilet	8	EA	\$ 1,400	\$ 1,000	\$ -	\$ 11,502	\$ 9,968	\$ -	\$ 21,470	Vendor Estimate
Low-Flow Faucet	12	EA	\$ 700	\$ 300	\$ -	\$ 8,627	\$ 4,486	\$ -	\$ 13,112	Vendor Estimate
						\$ -	\$ -	\$ -	\$ -	

**Cost Estimates are for Energy Savings calculations only, do not use for procurement

\$ 39,540	Subtotal
\$ 13,839	35% Contingency
\$ 53,378	Total

East Brunswick BOE
CHA Project Number: 31007
Irwin Elementary School

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per April, 2015.
Building must have a minimum average electric demand of 200 kW and minimum area of building is 50,000 ft to be most cost-effective for commercial and industrial buildings. However, multifamily buildings with peak demand over 100kW are still eligible. Market manager has the discretion to approve applications that fall below 200kW minimum.

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
- up to 70% of lighting savings may be considered but performance target will increase by 1% for each percent over 50%
- Scope should includes two or more unique measures
- 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)

Incentive #1		
Total Building Area (Square Feet)	43,279	
Is this audit funded by NJ BPU (Y/N)	Yes	

Board of Public Utilities (BPU)

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	\$37,832	\$19,452
Existing Usage (from utility)	238,560	23,749
Proposed Savings	87,586	0
Existing Total MMBtus	3,307	
Proposed Savings MMBtus	299	
% Energy Reduction	9.0%	
Proposed Annual Savings	\$15,856	

	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	\$0.00	\$0.00
Incentive #3	\$0.09	\$0.90	\$0.005	\$0.05	\$0.11	\$1.25	\$0.00	\$0.00

	Incentives \$		
	Elec	Gas	Total
Incentive #1	\$0	\$0	\$0
Incentive #2	\$0	\$0	\$0
Incentive #3	\$0	\$0	\$0
Total All Incentives	\$0	\$0	\$0

Total Project Cost	\$200,141
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		Allowable Incentive
% Incentives #1 of Utility Cost*	0.0%	\$0
% Incentives #2 of Project Cost**	0.0%	\$0
% Incentives #3 of Project Cost**	0.0%	\$0
Total Eligible Incentives***	\$0	
Project Cost w/ Incentives	\$200,141	

Project Payback (years)	
w/o Incentives	w/ Incentives
12.6	12.6

* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if LGEA is funded by NJBPU.
** Maximum allowable amount of Incentive #2 is 50% of total project cost.
***Maximum allowable amount of Incentive #3 is 50% 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

	Source to S
Electric Grid	3.14
Electric Onsite	1
Natural Gas	1.05
Fuel Oil/Propane	1.01
District Steam/HHW	1.2
District CHW	1
Other	1

Cost of Electricity:

\$0.135	\$/kWh
\$6.20	\$/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	Main Office	Offices	6	T 32 R F 3 (ELE)	F43ILL/2	90	0.54	SW	3450	1,863	OCC	
35LED	Main Office	Offices	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	SW	3450	932	OCC	
71LED	Storage / Office	Storage	1	I 60	I 60/1	60	0.06	SW	1840	110	OCC	
18LED	Faculty	Break/Lunch Rooms	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	2300	1,030	OCC	
18LED	Faculty Bathroom	Bathroom	1	T 32 R F 4 (ELE)	F44ILL	112	0.11	SW	1820	204	OCC	
133	Faculty Bathroom	Bathroom	1	CF 26	CFQ26/1-L	27	0.03	SW	1820	49	OCC	
274	Gym	Gymnasium	12	22" Aluminum High Bay Induction	19300-AL-UNV	315	3.78	SW	2300	8,694	None	
7LED	Storage / Office	Office	2	2T 32 R F 2 (u)	FU2LL	60	0.12	SW	3000	360	OCC	
34LED	7	Classrooms	18	1T 32 C F 2 (ELE)	F42ILL	59	1.06	SW	3450	3,664	OCC	
34LED	7	Classrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	SW	3450	204	OCC	
34LED	6	Classrooms	18	1T 32 C F 2 (ELE)	F42ILL	59	1.06	SW	3450	3,664	OCC	
34LED	6	Classrooms	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	SW	3450	204	OCC	
34LED	5	Classrooms	13	1T 32 C F 2 (ELE)	F42ILL	59	0.77	SW	3450	2,646	OCC	
34LED	4	Classrooms	13	1T 32 C F 2 (ELE)	F42ILL	59	0.77	SW	3450	2,646	OCC	
34LED	Hall	Hallway	10	1T 32 C F 2 (ELE)	F42ILL	59	0.59	SW	2300	1,357	None	
34LED	3	Classrooms	13	1T 32 C F 2 (ELE)	F42ILL	59	0.77	SW	3450	2,646	OCC	
34LED	2	Classrooms	13	1T 32 C F 2 (ELE)	F42ILL	59	0.77	SW	3450	2,646	OCC	
34LED	1	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	SW	3450	2,443	OCC	
35LED	Nurse	Offices	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	3450	621	OCC	
7LED	Hall	Hallway	4	2T 32 R F 2 (u)	FU2LL	60	0.24	SW	2300	552	None	
18LED	Music	Classrooms	8	T 32 R F 4 (ELE)	F44ILL	112	0.90	SW	3450	3,091	OCC	
34LED	Hall	Hallway	6	1T 32 C F 2 (ELE)	F42ILL	59	0.35	SW	2300	814	None	
18LED	ESL	Classrooms	12	T 32 R F 4 (ELE)	F44ILL	112	1.34	SW	3450	4,637	OCC	
18LED	Resource	Offices	12	T 32 R F 4 (ELE)	F44ILL	112	1.34	SW	3450	4,637	OCC	
35LED	Resource	Offices	2	T 32 R F 3 (ELE)	F43ILL/2	90	0.18	SW	3450	621	OCC	
34LED	Library	Classrooms	25	1T 32 C F 2 (ELE)	F42ILL	59	1.48	SW	3450	5,089	OCC	
34LED	MED	Offices	27	1T 32 C F 2 (ELE)	F42ILL	59	1.59	SW	3450	5,496	OCC	
18LED	27	Classrooms	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	3450	1,546	OCC	
18LED	28	Classrooms	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	3450	1,546	OCC	
34LED	29	Classrooms	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	SW	3450	407	OCC	
35LED	Hall	Hallway	5	T 32 R F 3 (ELE)	F43ILL/2	90	0.45	SW	2300	1,035	None	
34LED	43+44	Classrooms	16	1T 32 C F 2 (ELE)	F42ILL	59	0.94	SW	3450	3,257	OCC	
34LED	45	Classrooms	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	3450	1,628	OCC	
272LED	Outdoor	Outdoor Lighting	5	1T 32 P F 6	F46ILL	175	0.88	SW	4368	3,822	OCC	
34LED	Boiler Room	Mechanical Room	5	1T 32 C F 2 (ELE)	F42ILL	59	0.30	SW	1840	543	None	
34LED	Server Room	Telecommunications	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	SW	1840	326	OCC	
34LED	Hallway	Hallway	8	1T 32 C F 2 (ELE)	F42ILL	59	0.47	SW	2300	1,086	None	
18LED	23	Classrooms	8	T 32 R F 4 (ELE)	F44ILL	112	0.90	OCC	3450	3,091	None	
18LED	25	Classrooms	8	T 32 R F 4 (ELE)	F44ILL	112	0.90	OCC	3450	3,091	None	
18LED	24	Classrooms	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	3450	1,546	OCC	
18LED	21	Classrooms	8	T 32 R F 4 (ELE)	F44ILL	112	0.90	OCC	3450	3,091	None	
18LED	22	Classrooms	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	3450	1,546	OCC	
18LED	20	Classrooms	4	T 32 R F 4 (ELE)	F44ILL	112	0.45	SW	3450	1,546	OCC	
35LED	Storage	Storage	1	T 32 R F 3 (ELE)	F43ILL/2	90	0.09	SW	1840	166	OCC	
34LED	girls Rm	Restroom	6	1T 32 C F 2 (ELE)	F42ILL	59	0.35	SW	2300	814	OCC	
34LED	Boys RM	Restroom	6	1T 32 C F 2 (ELE)	F42ILL	59	0.35	SW	2300	814	OCC	
18LED	19	Classrooms	8	T 32 R F 4 (ELE)	F44ILL	112	0.90	OCC	3450	3,091	None	
18LED	Art Room	Classrooms	11	T 32 R F 4 (ELE)	F44ILL	112	1.23	OCC	3450	4,250	None	
34LED	Storage	Storage	4	1T 32 C F 2 (ELE)	F42ILL	59	0.24	SW	1840	434	OCC	
34LED	Hallway	Hallway	3	1T 32 C F 2 (ELE)	F42ILL	59	0.18	SW	2300	407	None	
34LED	17	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	SW	3450	2,443	OCC	
34LED	18	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	OCC	3450	2,443	None	
34LED	16	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	SW	3450	2,443	OCC	
34LED	15	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	SW	3450	2,443	OCC	
35LED	Hallway	Hallway	21	T 32 R F 3 (ELE)	F43ILL/2	90	1.89	SW	2300	4,347	None	
34LED	13	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	OCC	3450	2,443	None	
34LED	14	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	SW	3450	2,443	OCC	
34LED	11	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	OCC	3450	2,443	None	
34LED	12	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	OCC	3450	2,443	None	
34LED	9	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	OCC	3450	2,443	None	
34LED	10	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	OCC	3450	2,443	None	
133	Utility Room	Utility	1	CF 26	CFQ26/1-L	27	0.03	OCC	3000	81	None	
34LED	8	Classrooms	12	1T 32 C F 2 (ELE)	F42ILL	59	0.71	OCC	3450	2,443	None	
34LED	Boys RM	Restroom	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	2300	271	None	
34LED	girls Rm	Restroom	2	1T 32 C F 2 (ELE)	F42ILL	59	0.12	OCC	2300	271	None	
34LED	Kitchen	Kitchen	5	1T 32 C F 2 (ELE)	F42ILL	59	0.30	SW	3000	885	OCC	
71LED	Kitchen	Kitchen	3	I 60	I 60/1	60	0.18	SW	3000	540	OCC	
34LED	Kitchen	Kitchen	1	1T 32 C F 2 (ELE)	F42ILL	59	0.06	SW	3000	177	OCC	

Cost of Electricity:

\$0.135	\$/kWh
\$6.20	\$/kW

EXISTING CONDITIONS												Retrofit Control
Field Code	Area Description	Usage	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		
	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
	Total		542				42.12			133,442		

		EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS									
	Area Description	No. of Fixtures before the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space (Watts/Fixt) (Fixt No.)	Pre-Inst. control device	Annual Hours	Annual kWh	No. of fixtures after the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space (Watts/Fixt) (Number of Fixtures)	Retrofit Control device	Annual Hours	Annual kWh	Annual kWh Saved (Original Annual kWh) - (Retrofit Annual kWh)	Annual kW Saved (Original Annual kW) - (Retrofit Annual kW)	Annual \$ Saved (kWh Saved) * (\$/kWh)	Retrofit Cost	Prescriptive Lighting Measures	Simple Payback With Out Incentive	Simple Payback							
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)		Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages			Estimated daily hours for the usage group	(kW/Space) * (Annual Hours)		Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages			Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)			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	Main Office	6	T 32 R F 3 (ELE)	F431LL/2		90	0.5	SW	3450	1,863	6	T 59 R LED	RTLED38	38	0.2	OCC	2,588	590	1,273	0.3	\$ 195.07	\$ 1,545.75	\$ 110	7.9	7.4						
35LED	Main Office	3	T 32 R F 3 (ELE)	F431LL/2		90	0.3	SW	3450	932	3	T 59 R LED	RTLED38	38	0.1	OCC	2,588	295	637	0.2	\$ 97.54	\$ 837.00	\$ 65	8.6	7.9						
71LED	Storage / Office	1	I 60/1			60	0.1	SW	1840	110	1	A19LED	A19LED	15	0.0	OCC	1,390	21	90	0.0	\$ 15.46	\$ 141.75	\$ 30	9.2	7.2						
18LED	Faculty	4	T 32 R F 4 (ELE)	F441LL		112	0.4	SW	2300	1,030	4	T 74 R LED	RTLED50	50	0.2	OCC	1,725	345	685	0.2	\$ 110.98	\$ 1,073.25	\$ 120	9.7	8.6						
18LED	Faculty Bathroom	1	T 32 R F 4 (ELE)	F441LL		112	0.1	SW	1820	204	1	T 74 R LED	RTLED50	50	0.1	OCC	1,395	68	136	0.1	\$ 22.92	\$ 964.50	\$ 45	15.9	13.9						
133	Faculty Bathroom	1	CF 26	CFQ26/1-L		27	0.0	SW	1820	49	1	CF 26	CFQ26/1-L	27	0.0	OCC	1,365	37	12	0.0	\$ 1.66	\$ 128.25	\$ 20	77.3	65.3						
274	Gym	12	22' Aluminum High Bay Induction	19300-AL-UNV		315	3.8	SW	2300	8,694	12	22' Aluminum High Bay Induction	19300-AL-UNV	315	3.8	None	2,300	8,694	-	0.0	\$ -	\$ -	\$ -	-	-						
7LED	Storage / Office	2	2T 32 R F 2 (u)	FU2LL		60	0.1	SW	3000	360	2	2T 25 R LED	2RTLED	25	0.1	OCC	1,500	75	285	0.1	\$ 43.68	\$ 533.25	\$ 60	12.2	10.8						
34LED	7	18	1T 32 C F 2 (ELE)	F421LL		59	1.1	SW	3450	3,664	18	4 ft LED Tube	200732x2	30	0.5	OCC	2,588	1,397	2,267	0.5	\$ 344.83	\$ 4,334.85	\$ 200	12.6	12.0						
34LED	7	1	1T 32 C F 2 (ELE)	F421LL		59	0.1	SW	3450	204	1	4 ft LED Tube	200732x2	30	0.0	OCC	2,588	78	126	0.0	\$ 19.16	\$ 361.95	\$ 30	18.9	17.3						
34LED	6	1	1T 32 C F 2 (ELE)	F421LL		59	0.1	SW	3450	204	1	4 ft LED Tube	200732x2	30	0.0	OCC	2,588	78	126	0.0	\$ 19.16	\$ 361.95	\$ 30	18.9	17.3						
34LED	5	13	1T 32 C F 2 (ELE)	F421LL		59	0.8	SW	3450	2,646	13	4 ft LED Tube	200732x2	30	0.4	OCC	2,588	1,009	1,637	0.4	\$ 249.05	\$ 3,166.35	\$ 150	12.7	12.1						
34LED	4	13	1T 32 C F 2 (ELE)	F421LL		59	0.8	SW	3450	2,646	13	4 ft LED Tube	200732x2	30	0.4	OCC	2,588	1,009	1,637	0.4	\$ 249.05	\$ 3,166.35	\$ 150	12.7	12.1						
34LED	Hall	10	1T 32 C F 2 (ELE)	F421LL		59	0.6	SW	2300	1,357	10	4 ft LED Tube	200732x2	30	0.3	None	2,300	690	667	0.3	\$ 111.62	\$ 2,337.00	\$ 100	20.9	20.0						
34LED	3	13	1T 32 C F 2 (ELE)	F421LL		59	0.8	SW	3450	2,646	13	4 ft LED Tube	200732x2	30	0.4	OCC	2,588	1,009	1,637	0.4	\$ 249.05	\$ 3,166.35	\$ 150	12.7	12.1						
34LED	2	13	1T 32 C F 2 (ELE)	F421LL		59	0.8	SW	3450	2,646	13	4 ft LED Tube	200732x2	30	0.4	OCC	2,588	1,009	1,637	0.4	\$ 249.05	\$ 3,166.35	\$ 150	12.7	12.1						
34LED	2	12	1T 32 C F 2 (ELE)	F421LL		59	0.7	SW	3450	2,443	12	4 ft LED Tube	200732x2	30	0.4	OCC	2,588	932	1,511	0.3	\$ 229.89	\$ 2,932.65	\$ 140	12.8	12.1						
35LED	Nurse	2	T 32 R F 3 (ELE)	F431LL/2		90	0.2	SW	3450	621	2	T 59 R LED	RTLED38	38	0.1	OCC	2,588	197	424	0.1	\$ 65.02	\$ 630.75	\$ 50	9.2	8.5						
7LED	Hall	4	2T 32 R F 2 (u)	FU2LL		60	0.2	SW	2300	552	4	2T 25 R LED	2RTLED	25	0.1	None	2,300	230	322	0.1	\$ 53.89	\$ 810.00	\$ 80	15.0	13.5						
18LED	Music	8	T 32 R F 4 (ELE)	F441LL		112	0.9	SW	3450	3,091	8	T 74 R LED	RTLED50	50	0.4	OCC	2,588	1,035	2,056	0.5	\$ 314.49	\$ 2,018.25	\$ 220	6.4	5.7						
34LED	Hall	6	1T 32 C F 2 (ELE)	F421LL		59	0.4	SW	2300	814	6	4 ft LED Tube	200732x2	30	0.2	None	2,300	414	400	0.2	\$ 66.97	\$ 1,402.20	\$ 60	20.9	20.0						
18LED	ESL	12	T 32 R F 4 (ELE)	F441LL		112	1.3	SW	3450	4,637	12	T 74 R LED	RTLED50	50	0.6	OCC	2,588	1,553	3,084	0.7	\$ 471.73	\$ 2,963.25	\$ 320	6.3	5.6						
18LED	Resource	12	T 32 R F 4 (ELE)	F441LL		112	1.3	SW	3450	4,637	12	T 74 R LED	RTLED50	50	0.6	OCC	2,588	1,553	3,084	0.7	\$ 471.73	\$ 2,963.25	\$ 320	6.3	5.6						
35LED	Resource	2	T 32 R F 3 (ELE)	F431LL/2		90	0.2	SW	3450	621	2	T 59 R LED	RTLED38	38	0.1	OCC	2,588	197	424	0.1	\$ 65.02	\$ 600.75	\$ 50	9.2	8.5						
34LED	Library	25	1T 32 C F 2 (ELE)	F421LL		59	1.5	SW	3450	5,089	25	4 ft LED Tube	200732x2	30	0.8	OCC	2,588	1,941	3,148	0.7	\$ 478.94	\$ 5,970.75	\$ 270	12.5	11.9						
34LED	MED	27	1T 32 C F 2 (ELE)	F421LL		59	1.6	SW	3450	5,496	27	4 ft LED Tube	200732x2	30	0.8	OCC	2,588	2,096	3,400	0.8	\$ 517.25	\$ 6,438.15	\$ 290	12.4	11.9						
18LED	27	4	T 32 R F 4 (ELE)	F441LL		112	0.4	SW	3450	1,546	4	T 74 R LED	RTLED50	50	0.2	OCC	2,588	518	1,028	0.2	\$ 157.24	\$ 1,073.25	\$ 120	6.8	6.1						
18LED	26	4	T 32 R F 4 (ELE)	F441LL		112	0.4	SW	3450	1,546	4	T 74 R LED	RTLED50	50	0.2	OCC	2,588	518	1,028	0.2	\$ 157.24	\$ 1,073.25	\$ 120	6.8	6.1						
34LED	29	2	1T 32 C F 2 (ELE)	F421LL		59	0.1	SW	3450	407	2	4 ft LED Tube	200732x2	30	0.1	OCC	2,588	155	252	0.1	\$ 38.31	\$ 595.65	\$ 40	15.5	14.5						
35LED	Hall	5	T 32 R F 3 (ELE)	F431LL/2		90	0.5	SW	2300	1,035	5	T 59 R LED	RTLED38	38	0.2	None	2,300	437	598	0.3	\$ 100.07	\$ 1,181.25	\$ 75	11.8	11.1						
34LED	43+44	16	1T 32 C F 2 (ELE)	F421LL		59	0.9	SW	3450	3,257	16	4 ft LED Tube	200732x2	30	0.5	OCC	2,588	1,242	2,015	0.5	\$ 306.52	\$ 3,867.45	\$ 180	12.6	12.0						
34LED	45	8	1T 32 C F 2 (ELE)	F421LL		59	0.5	SW	3450	1,628	8	4 ft LED Tube	200732x2	30	0.2	OCC	2,588	621	1,007	0.2	\$ 153.26	\$ 1,997.85	\$ 100	13.0	12.4						
274LED	Outdoor	5	1T 32 P F 6	F461LL		175	0.9	SW	4388	3,922	5	1T 15 P LED 6	200732x6	90	0.5	OCC	4,308	1,966	2,822	0.3	\$ 282.23	\$ 3,712.50	\$ 120	13.2	12.7						
34LED	Boiler Room	5	1T 32 C F 2 (ELE)	F421LL		59	0.3	SW	1840	543	5	4 ft LED Tube	200732x2	30	0.2	None	1,840	276	267	0.1	\$ 46.81	\$ 1,168.50	\$ 50	25.0	23.9						
34LED	Server Room	3	1T 32 C F 2 (ELE)	F421LL		59	0.2	SW	1840	326	3	4 ft LED Tube	200732x2	30	0.1	OCC	1,390	124	201	0.1	\$ 33.67	\$ 829.35	\$ 50	24.6	23.1						
34LED	Hallway	8	1T 32 C F 2 (ELE)	F421LL		59	0.5	SW	2300	1,086	8	4 ft LED Tube	200732x2	30	0.2	None	2,300	552	534	0.2	\$ 89.30	\$ 1,869.60	\$ 80	20.9	20.0						
18LED	23	8	T 32 R F 4 (ELE)	F441LL		112	0.9	OCC	3450	3,091	8	T 74 R LED	RTLED50	50	0.4	None	3,450	1,380	1,711	0.5	\$ 267.91	\$ 1,890.00	\$ 200	7.1	6.3						
18LED	25	8	T 32 R F 4 (ELE)	F441LL		112	0.9	OCC	3450	3,091	8	T 74 R LED	RTLED50	50	0.4	None	3,450	1,380	1,711	0.5	\$ 267.91	\$ 1,890.00	\$ 200	7.1	6.3						
18LED	24	4	T 32 R F 4 (ELE)	F441LL		112	0.4	SW	3450	1,546	4	T 74 R LED	RTLED50	50	0.2	OCC	2,588	518	1,028	0.2	\$ 157.24	\$ 1,073.25	\$ 120	6.8	6.1						
18LED	21	8	T 32 R F 4 (ELE)	F441LL		112	0.9	OCC	3450	3,091	8	T 74 R LED	RTLED50	50	0.4	None	3,450	1,380	1,711	0.5	\$ 267.91	\$ 1,890.00	\$ 200	7.1	6.3						
18LED	22	4	T 32 R F 4 (ELE)	F441LL		112	0.4	SW	3450	1,546	4	T 74 R LED	RTLED50	50	0.2	OCC	2,588	518	1,028	0.2	\$ 157.24	\$ 1,073.25	\$ 120	6.8	6.1						
18LED	20	4	T 32 R F 4 (ELE)	F441LL		112	0.4	SW	3450	1,546	4	T 74 R LED	RTLED50	50	0.2	OCC	2,588	5													

APPENDIX D

Photos



Irwin Elementary School



Boilers



DHW Heater



Pumps



RTU



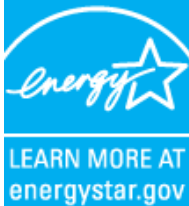
Windows

APPENDIX E

Photovoltaic Analysis (Not Applicable For This Building)

APPENDIX F

EPA Benchmarking Report



ENERGY STAR[®] Statement of Energy Performance

73

ENERGY STAR[®]
Score¹

Irwin Elementary School

Primary Property Function: K-12 School
Gross Floor Area (ft²): 43,279
Built: 1958

For Year Ending: March 31, 2015
Date Generated: February 05, 2016

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

Irwin Elementary School
71 Race Track road
East Brunswick, New Jersey 08816

Property Owner

,
(____)____-____

Primary Contact

,
(____)____-____

Property ID: 4795027

Energy Consumption and Energy Use Intensity (EUI)

Site EUI

73.7 kBtu/ft²

Annual Energy by Fuel

Natural Gas (kBtu)	2,374,900 (74%)
Electric - Grid (kBtu)	813,967 (26%)

National Median Comparison

National Median Site EUI (kBtu/ft ²)	93
National Median Source EUI (kBtu/ft ²)	147.2
% Diff from National Median Source EUI	-21%

Source EUI

116.7 kBtu/ft²

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO ₂ e/year)	235
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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)