

MILLBURN TOWNSHIP PUBLIC SCHOOLS

DEERFIELD ELEMENTARY SCHOOL

26 Troy Lane, Short Hills, NJ 07078

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

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CHA PROJECT NO. 28330

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY	1
2.0 BUILDING INFORMATION AND EXISTING CONDITIONS.....	4
3.0 UTILITIES	7
4.0 Benchmarking.....	12
5.0 ENERGY CONSERVATION MEASURES.....	13
5.1 ECM-2 Add Attic Insulation	14
5.2 ECM-7 Replace one Boiler with High Efficiency Condensing Boiler.....	14
5.3 ECM-9 Install VFDs and Premium Efficiency Motors on Hot Water Pumps	15
5.5 ECM-12 Retro-Commission Temperature Controls	15
5.6 ECM-18 Install Low Flow Plumbing Fixtures	16
5.7 ECM-L1 Lighting Replacement / Upgrades	17
5.8 ECM-L2 Install Lighting Controls (Occupancy Sensors).....	18
5.9 ECM-L3 Lighting Replacements with Controls (Occupancy Sensors).....	18
5.10 Additional O&M Opportunities.....	19
6.0 PROJECT INCENTIVES	20
6.1 Incentives Overview.....	20
6.1.1 New Jersey Smart Start Program.....	20
6.1.2 Direct Install Program.....	20
6.1.3 New Jersey Pay For Performance Program (P4P).....	21
6.1.4 Energy Savings Improvement Plan	22
6.1.5 Renewable Energy Incentive Program.....	23
7.0 ALTERNATIVE ENERGY SCREENING EVALUATION	24
7.1 Solar	24
7.1.1 ECM-S1 Photovoltaic Rooftop Solar Power Generation.....	24
7.1.1 ECM-S2 Solar Thermal Hot Water Generation	25
7.2 Combined Heat and Power Plant.....	25
7.3 Wind Powered Turbines.....	26
7.4 Demand Response Curtailment	27

8.0 CONCLUSIONS & RECOMMENDATIONS.....	28
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APPENDICES

A	Utility Usage Analysis and List of Third Party Energy Suppliers
B	Equipment Inventory
C	ECM Calculations and Cost Estimates
D	New Jersey BPU Incentive Programs
	i. Smart Start
	ii. Direct Install
	iii. Pay For Performance Incentive Program (P4P)
	iv. Energy Savings Improvement Plan (ESIP)
E	Photovoltaic (PV) Solar Power Generation Analysis
F	Photos
G	EPA Portfolio Manager

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 Millburn Township Public Schools, 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
Deerfield Elementary School	26 Troy Lane, NJ 07078	70,084	1962

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

Building Name	Electric Savings (kWh)	NG Savings (therms)	Total Savings (\$)	Payback (years)
Deerfield Elementary School	79,472	11,521	19,708	12.9

Each individual measure's annual savings are dependent on that measure alone, there are no interactive effects calculated. There are three options shown for Lighting ECM savings; only one option can be chosen. 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 5.0.

Each measure recommended by CHA typically has a simple payback period of 15 years or less to be consistent with the requirements of the Energy Savings Improvement Plan (ESIP) which has a maximum payback period of 15 years. 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
2	Add Attic Insulation	76,800	4,821	15.9	0	15.9	Yes
7	Replace one Boiler with Condensing Boiler	141,809	3,005	47.2	3,031	46.2	No
9	Install VFDs & Premium Efficiency Motors for Pumps	16,984	183	92.6	0	92.6	Yes
12	Retro-Commission Temperature Controls	24,292	4,984	4.9	0	4.9	Yes
18	Low Flow Plumbing Fixtures	16,004	1,219	13.1	0	13.1	Yes
L1**	Lighting Replacements	117,160	7,907	14.8	800	14.7	No
L2**	Lighting Controls	3,591	1,270	2.8	560	2.4	No
L3	Lighting Replacements w/ Controls	120,751	8,501	14.2	1,360	14.0	Yes
Total**		517,391	31,890	16.2	5,751	16.0	
Total (Recommended)		254,831	19,708	12.9	1,360	12.9	

* Incentive shown is per the New Jersey SmartStart Program.

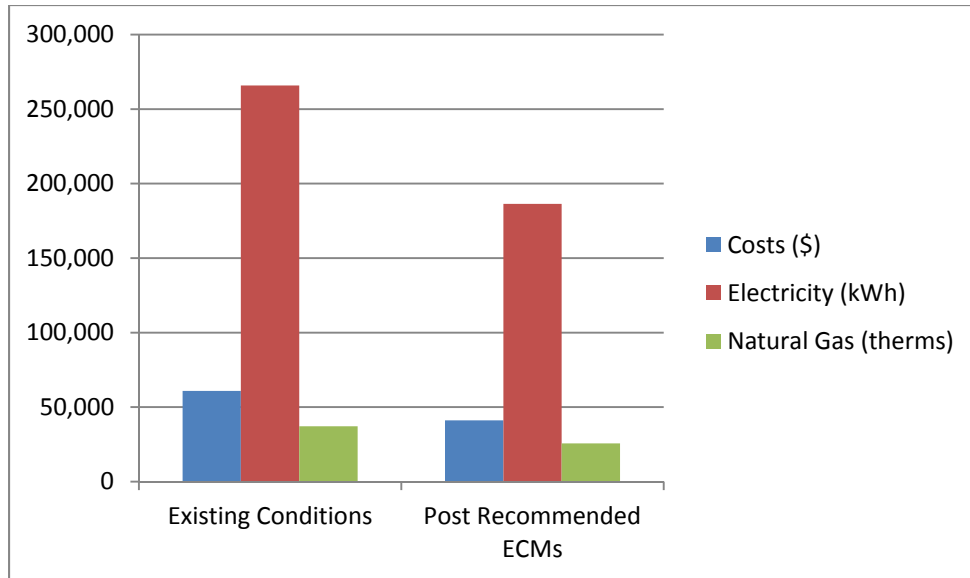
** These ECMs are not included in the Total, as they are alternate measures not recommended.

The following alternative energy measures are also recommended for further study:

- Photovoltaic (PV) Rooftop Solar Power Generation – 70 kW System

If Millburn Township Public Schools implements the recommended ECMs, energy savings would be as follows:

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	60,854	41,146	32%
Electricity (kWh)	265,851	186,359	30%
Natural Gas (therms)	37,189	25,668	31%
Site EUI (kbtu/SF/Yr)	66.0	45.7	



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.

Building Name: Deerfield Elementary School
Address: 26 Troy Lane, Short Hills, NJ 07107
Gross Floor Area: 70,084 sq.ft.
Number of Floors: 2
Year Built: 1962
Additions: 1996, 2008



Description of Spaces: Classrooms, offices, lunchroom, gymnasium, multi-purpose room, library, music/band room, faculty room, storage rooms, toilet rooms and mechanical rooms.

Description of Occupancy: The school serves 700 students from pre-K to 5th grade. There are 65 school faculty and staff members.

Number of Computers: The school has approximately 75 desktop and laptop computers.

Building Usage: Hours of operation are 8:25 AM to 3:00 PM Monday through Friday, with various after-school activities. Custodial staff is on site in two shifts, from 6:30 AM to 3:30 PM, and 2:30 PM to 11:00 PM, 10 months per year.

Construction Materials: Structural steel framing with concrete masonry unit exterior walls, insulation unknown but assumed minimal. Interior walls sheetrock predominantly, and plaster & lathe. Interior and exterior walls are in fair to good condition.

Façade: Brick and aluminum framed/window panels which appear to be in good condition.

Roof: Most of the roof is pitched; a small portion is flat. Roof appears to be covered with an adhered membrane. An ECM that addresses attic insulation is included. Roof color is dark gray.

Windows: Double hung double pane windows with aluminum frames. Windows are in good condition and no ECMs associated with window replacement were evaluated.

Exterior Doors: Most exterior doors are steel jacketed without windows. Main entrance doors are steel framed storefront style. Sweeps and seals are generally in good condition, and no associated ECMs were considered.

Heating Ventilation & Air Conditioning (HVAC) Systems

Heating: Two (2) H.B. Smith cast iron sectional hot water boilers, manufactured in 1996, provide heat for the majority of the school. The boilers have a heating capacity of 3,235 MBH each and a combustion efficiency of approximately 82%. Heating hot water is delivered around the building by three pairs of zone pumps, each operating in a lead/lag manner. The first set are Taco base mounted with 3.0 HP motors that operate at a NEMA nominal efficiency of 90.2%; the second set of pumps (Armstrong) are also 3.0 HP base mounted, efficiency unknown; and the third set are 2.0 HP Super E vertical inline pumps with a NEMA nominal efficiency of 86.9%. The first set of pumps is responsible for the 1962 primary building; the second set is responsible for the 1996 additions; and the vertical inline pumps are responsible for the latest 2008 (3rd grade) addition. None of the pumps are controlled by VFDs. Terminal units include unit ventilators, cabinet heaters, air handling units, unit heaters, and finned radiation. Three heating-only air handling units which previously provided ventilation to the corridors are no longer operational. A fourth heating-only air handling unit serves the gymnasium, the supply air delivered to the space with a 2.0 HP motor operating at 84% NEMA nominal efficiency. An ECM that addresses replacement of one of the H.B. Smith boilers is included; another ECM for pump VFDs is also included.

Cooling: The school does not have a centralized mechanical cooling system. A number of spaces are cooled by Lennox and/or Trane split DX units, most of which appear to be newer and in good condition. The Multi-purpose room, which functions as a cafeteria during lunchtime, is cooled by a 2013 Daikin McQuay RTU installed on a pad outside, and provides 20 tons of DX cooling utilizing R410A refrigerant. In general, cooling equipment is in good condition and no associated ECMs are included.

Ventilation: At one time the building was ventilated with three (3) air handling units installed in mechanical equipment or storage rooms. These units are no longer operational. The gymnasium and the Multi-purpose room are mechanically ventilated with air handling equipment, and every classroom is mechanically ventilated when the unit vents are actually turned on. The gymnasium additionally has two (2) large propeller ceiling fans to help recirculate upper stagnant air. During the site visit several windows were observed open and were providing ventilation. In general, mechanical ventilation systems are adequate and no associated ECMs are included.

Exhaust: Exhaust fans are used to ventilate toilet rooms, the corridors, and the food serving area. Centrifugal exhaust fans, installed on the roof, provide exhaust for toilet rooms. In general building exhaust is adequate and no associated ECMs are included.

Controls Systems

Boiler operation is manual control; with at least one boiler running all day and all night during the colder months. Boiler switching is also performed manually. All of the schools in the Millburn Public School District are under the control of a centralized Siemens controls system. Access to the system is centralized—only one or two individuals can control setpoints on individual pieces of equipment from a head end at the Education Center or from a remote laptop. Despite this

centralized control there are significant over and under-heating issues throughout the Deerfield school. At the time of the field visit, it was noted that a majority of unit ventilators were manually switched off, windows were open, and the boiler was running. Most changes to the Deerfield school, such as changing temperature setpoints, or changing automatic damper or valve positions, etc., must be verbally communicated to, and then performed by, the head end. If this individual is not available, maintenance personnel will do their best to make rudimentary changes on site. Hot water heating pumps are not controlled by VFDs. On the coldest winter-time days, the boiler hot water supply/return temperatures are set for 200°F-180°F; 140°F-120°F for standard winter operation, and 120°F-100°F during shoulder months. An ECM for retro-commissioning of the controls systems is included that will address the cost and savings for these issues.

Domestic Hot Water Systems

One A.O. Smith gas fired water heater, with 80 gallons of capacity and 195 gallons per hour recovery, provides the domestic hot water for this facility. This tank was manufactured in 2013. The domestic hot water is pumped around the school to restrooms and sinks by a fractional horsepower B&G circulator pump. No domestic hot water related ECMs are included.

Kitchen Equipment

The kitchen contains one residential sized electric range/oven and refrigerator, and is used primarily as a serving area. Food that is provided is brought in to the school from an outside vendor—no cooking is done at Deerfield. No kitchen equipment ECMs have been evaluated based on the limited usage.

Plumbing Systems

The building contains low flow fixtures in the 1996 and 2008 wings, and high flow toilet and urinal fixtures in the older 1962 areas. Urinals in newer wings are of the updated variety, while those in the 1962 sections are the older style with drains located on the floor. Most of the lavatory faucets are of the low flow metering type. Water usage is primarily toilet rooms, the kitchen, and lavatories. All fixtures appear to be in good condition. An ECM is included to evaluate the water savings potential of installing low- flow water closet and urinals.

Plug Load

This school has computers, copiers, smart boards, residential appliances (microwave, refrigerator), printers and portable electric heaters (personal) which contribute to the plug load in the building. No ECMs evaluating plug loads was included.

Lighting Systems

About 75% of the lighting within this school consists of T8 linear fluorescent fixtures with electronic ballasts, and in most cases the number of lamps per fixture is one or two. About 20% consists of T12 fluorescent fixtures. The gymnasium is a notable exception with thirty (30) 250 watt metal halide lamps. A few fluorescent CFLs and 60 watt incandescent lamps were also noted. Exterior lighting consists of 150W metal halide wall-pack lamps. Classrooms in the newer sections have occupancy sensors; the remainder are operated by manual switches. Three lighting ECMs have been included which include adding occupancy sensors to the existing lighting, replacement of the T-8 lighting with LED lighting and a third ECM that evaluates the effect of occupancy sensors used with the LED lighting upgrades.

3.0 UTILITIES

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

	Electric	Natural Gas
Deliverer	New Jersey Power & Light	PSEG
Supplier	New Jersey Power & Light	Compass Energy

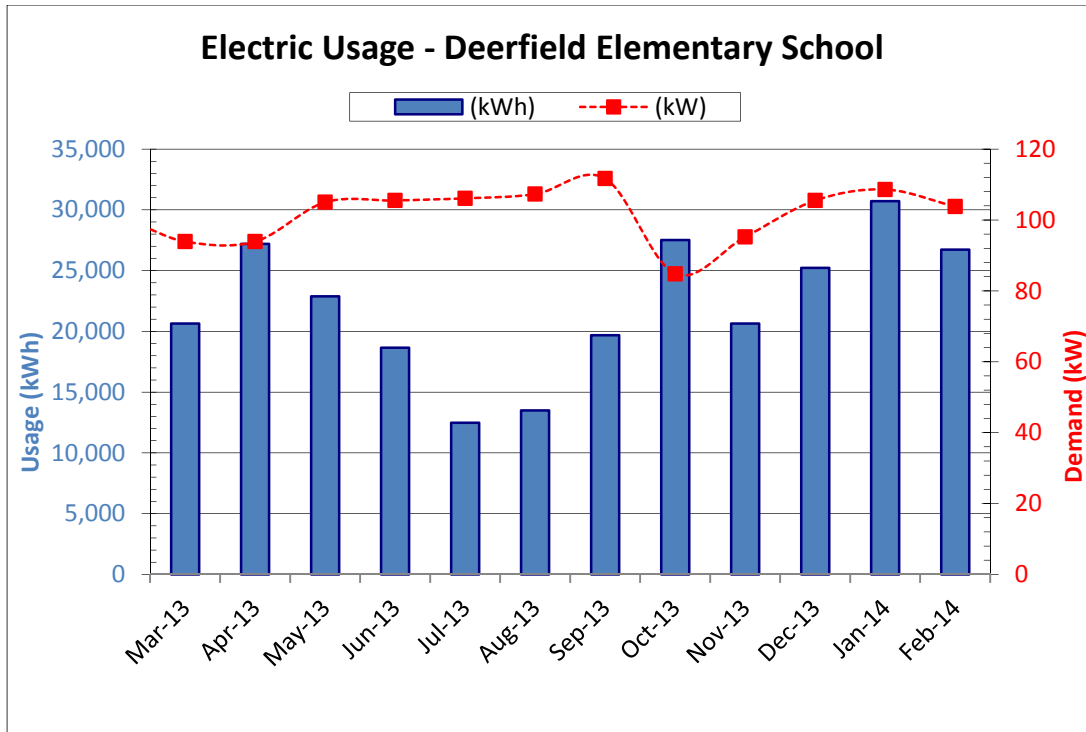
For the 12-month period ending in March 2014, the utilities usages and costs for the building were as follows:

Electric		
Annual Consumption	265,851	kWh
Annual Cost	\$33,047	\$
Blended Unit Rate	\$0.12	\$/kWh
Supply Rate	\$0.097	\$/kWh
Demand Rate	\$5.97	\$/kW
Peak Demand	111.7	kW
Natural Gas		
Annual Consumption	37,189	Therms
Annual Cost	\$27,807	\$
Unit Rate	\$0.75	\$/therm
Water		
Annual Usage	349,000	Gallons/yr
Annual Cost	3,871	\$
Rate	0.011	\$/gallon

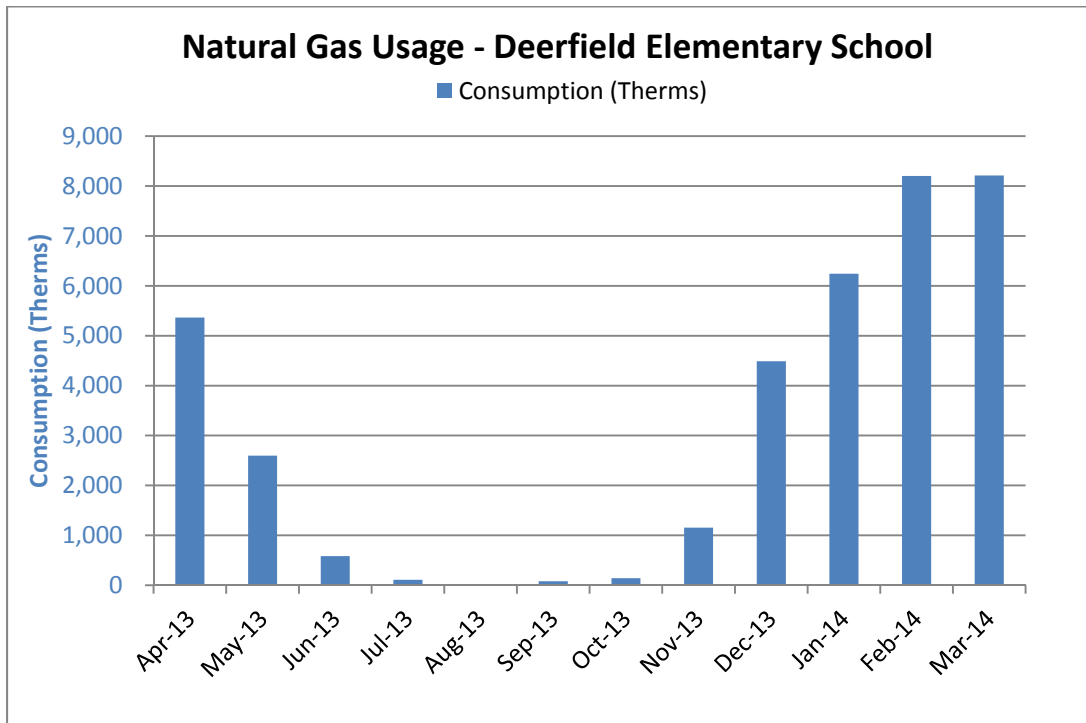
Blended Rate: Average rate charged determined by the annual cost / annual usage

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)

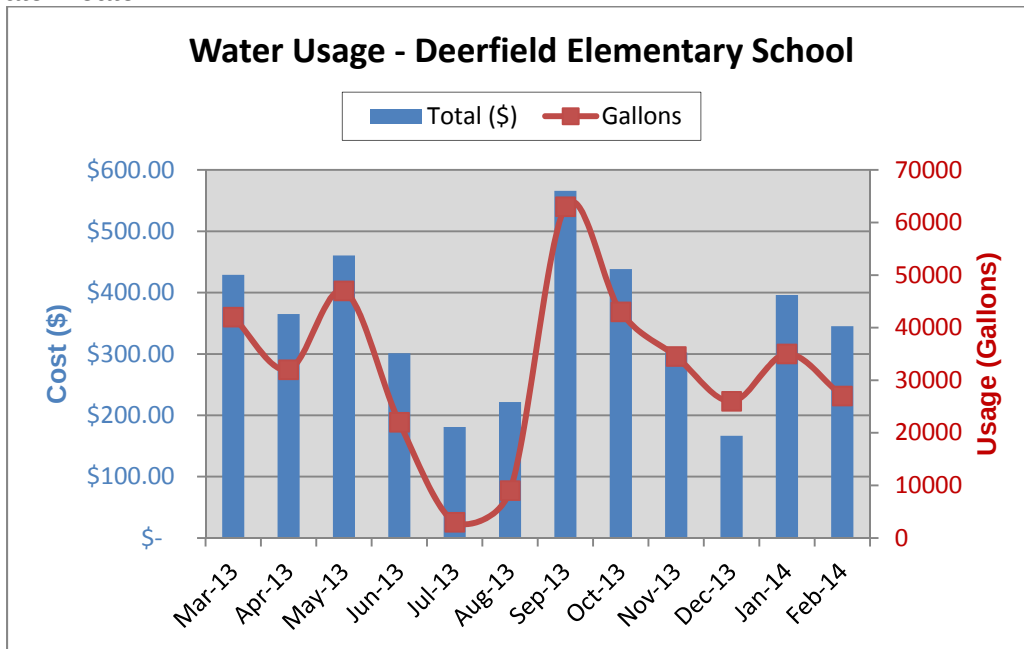


It can be seen from the chart above that electricity usage at Deerfield tends to peak in the spring and the fall, which are times of maximum cooling at high building occupancy. The peak in January appears is probably attributable to high electric pump usage.



Natural gas usage (shown above) is greatest during the winter heating months and is least during the cooling months. This type of load profile is typical when natural gas is

used primarily for heating from the boiler and is used only minimally by the domestic hot water heater.



See Appendix A for a detailed 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*			
Utility	Units	School Average Rate	NJ Average Rate
Electricity	\$/kWh	\$0.12	\$0.12
Natural Gas	\$/Therm	\$0.75	\$0.95
Fuel Oil	\$/Gal	N/A	\$3.62

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

This school on average pays about the same rate for their electricity and a lower rate for natural gas than the average commercial building in New Jersey. It is not recommended that this school shop for a third party utility supplier for both electric and natural gas.

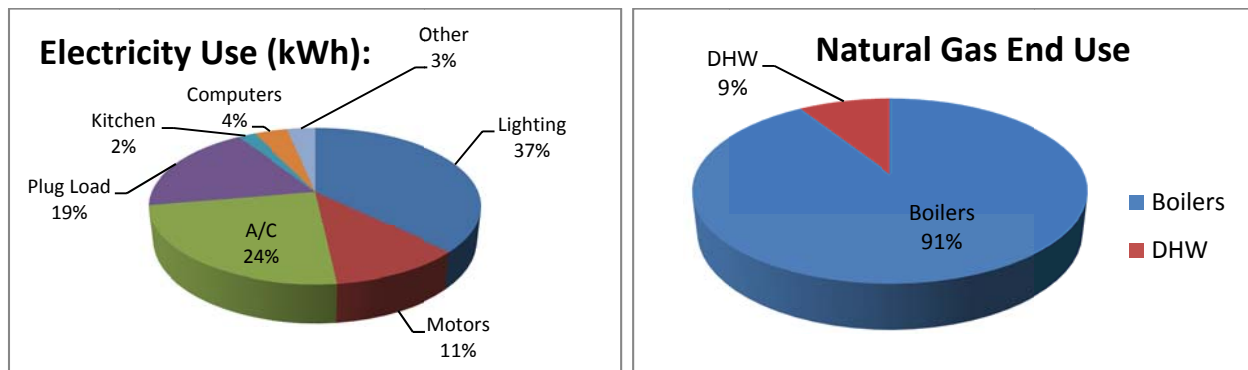
Additional information on selecting a third party energy supplier is available here:

<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.

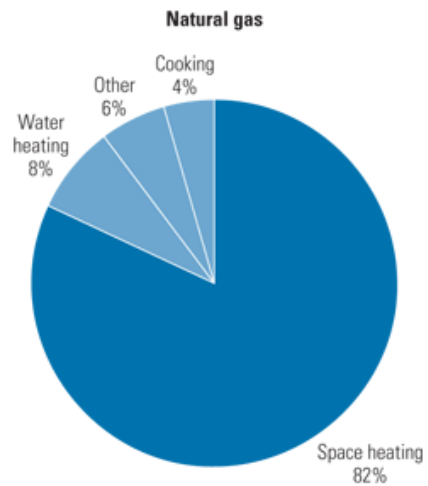
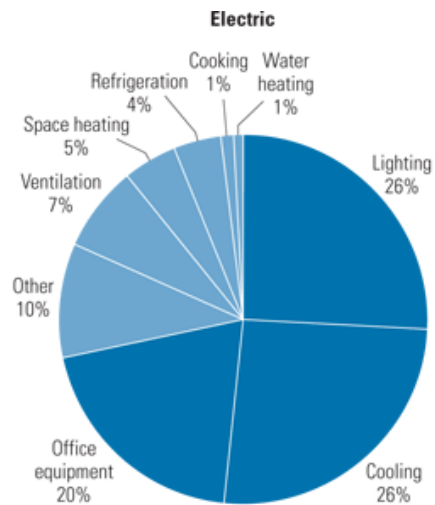
The charts below represent estimated utility end-use utility profiles for the building. The values used within the charts were estimated from a review of the utility analysis and the energy savings calculations.

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. The energy profile for each school is different, and the following charts represent typical utility profiles for K-12 schools per the 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.

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.

Building	Site EUI kBtu/ft ² /yr	Source EUI Btu/ft ² /yr	Energy Star Rating (1-100)
Deerfield Elementary	54.3	84.1	47

The school has an Energy Star Rating Score that is slightly below average (50 being the median score). 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.

The Portfolio Manager account can be accessed by entering the username and password shown below at the login screen of the Portfolio Manager website (<https://www.energystar.gov/istar/pmpam/>).

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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-2 Add Attic Insulation

During the site visit it was observed in some of the areas of the building that have an accessible attic space that the existing insulation has settled and has reduced thermal capacity. This ECM addresses installing additional insulation to these attic spaces to minimize heating and cooling energy losses.

To calculate the savings, the heat losses through the roof assembly of the school was found using the existing roof's R-value of 13.0 and bin weather data for nearby Newark, NJ. The values were totaled to determine the existing annual energy losses. Heating and cooling energy loss values were then determined with a thermal resistance which included the replacement roof R-value of 30.0. The annual energy savings of replacing the roof is detailed in the summary table below.

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

ECM-2 Add Attic Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
76,800	0	0	6,445	4,821	(0.1)	0	15.9	15.9

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

This measure is recommended.

5.2 ECM-7 Replace one Boiler with High Efficiency Condensing Boiler

Two (2) H.B. Smith cast iron sectional hot water boilers, manufactured in 1996, provide heat for the majority of the school. The boilers have a heating capacity of 3,235 MBH each and a combustion efficiency of approximately 82%. Both boilers are in good condition, but are approaching twenty (20) years in age. Furthermore only one boiler is needed approximately 95% of the time to keep the building heated.

It is recommended that one (1) boiler be replaced with a high efficiency natural gas fired condensing hot water boiler. New modulating condensing gas boilers are available that operate at a minimal efficiency of 88%, and can operate as high as 96%, depending upon the outdoor air temperature. The footprint of a new condensing boiler with the same BTUH output capacity is significantly smaller than the footprint of the existing H.B. Smith cast iron boilers- an important consideration for this boiler room. The new boiler could then be used as the primary heating boiler, with the older boiler used as a back-up or when additional heat is needed on the coldest days.

To implement this ECM, one old boiler and venting would be removed and the new hot water boiler installed in its place. Some localized piping and wiring would be needed. New dedicated boiler venting would also need to be installed either through the roof or sidewall. It is possible that asbestos abatement may need to be performed prior to any work and the cost for this is not included in the payback analysis.

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

ECM-7 Replace one Boiler with High Efficiency Condensing Boiler

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
141,809	0	0	4,017	3,005	(0.4)	3,031	47.2	46.2

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

This measure is not recommended due to the high cost and long payback. As long as the boilers are maintained properly they should continue to operate beyond their service life. This ECM should only be pursued if a major portion of the heating system, such as the distribution piping fails in the future.

5.3 ECM-9 Install VFDs and Premium Efficiency Motors on Hot Water Pumps

The existing 2.0 HP and 3.0 HP base mounted Armstrong hot water pumps serving the school are not controlled by variable frequency drives (VFDs). Ideally pumps are perfectly selected to match the needs of a system operating a maximum capacity. Most times 1) pumps are over-sized somewhat for safety, and 2) the system is operating at less than full heating capacity. VFDs allow pumps to run at slower RPMs to better meet the needs of the system and in the process, energy is saved.

To implement this ECM, the existing motors would be removed and new motors and VFDs installed in their place. Piping and wiring modifications would be needed.

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

ECM-9 Install VFDs and Premium Efficiency Motors on Hot Water Pumps

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$		\$	Years	Years
16,984	2.5	1,455	0	183	(0.7)	0	92.6	92.6

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

This measure is recommended.

5.5 ECM-12 Retro-Commission Temperature Controls

The building is prone to uneven heating, with some spaces being over-heated while others are under-heated, although the more common problem is over-heating. At the time of the site visit, many of the classroom unit ventilators had been switched off at the

units themselves, and windows were open, although the outdoor air temperature was only approximately 60°F.

Both controls and components of the heating and cooling systems present saving opportunities during the retro-commissioning process. Over time, temperature sensors or thermostats may drift out of synch. Poorly calibrated sensors can increase heating and cooling loads and lead to occupant discomfort. The following procedure is recommended:

- Calibrate the indoor and outdoor building sensors. Calibration of room thermostats, duct thermostats, humidistats, and pressure and temperature sensors should be in accordance with the original design specifications. Calibrating these controls may require specialized skills or equipment and may require outside expertise.
- Inspect damper and valve controls to verify proper functioning. Check pneumatically controlled dampers for leaks in the compressed-air hoses. Dampers should also be examined for proper opening and closing. Stiff dampers can cause improper modulation of the amount of outside air being used in the supply airstream. In some cases, dampers may be wired in a single position or disconnected, violating minimum outside air requirements.
- Review building operating schedules. HVAC controls must be adjusted to heat and cool the building properly during occupied hours. Occupancy schedules can change frequently over the life of a building, and control schedules should be adjusted accordingly. When the building is unoccupied, the temperature should be set back to save heating or cooling energy; however, minimal heating and cooling may be required when the building is unoccupied. In cold climates, for example, heating may be needed to keep water pipes from freezing.

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

ECM-12 Retro-Commission Temperature Controls

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
24,292	0	9,571	5,076	4,984	1.1	0	4.9	4.9

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

This measure is recommended.

5.6 ECM-18 Install Low Flow Plumbing Fixtures

The building contains older high flow toilets and urinals in older building sections, as well as newer low flow fixtures. Most of the lavatory faucets are of the low flow metering type.

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. Facets 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-18 Install Low 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
16,004	0	0	0	110	1,219	1.3	0	13.1	13.1

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

This measure is recommended.

5.7 ECM-L1 Lighting Replacement / Upgrades

About 75% of the lighting within this school consists of T8 linear fluorescent fixtures with electronic ballasts. About 20% consists of T12 fluorescent fixtures. The gymnasium is a notable exception with thirty (30) 250 watt metal halide lamps. A few compact fluorescent CFLs and 60 watt incandescents were also noted.

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

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

ECM-L1 Lighting Replacement / Upgrades

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
117,160	26	62,342	0	7,907	(0.2)	800	14.8	14.7

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

This measure is not recommended in lieu of ECM L3.

5.8 ECM-L2 Install Lighting Controls (Occupancy Sensors)

Lights in many areas are operated by manual switches.

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

This measure recommends installing occupancy sensors for the current lighting system. Using a process similar to that utilized in Section 5.7.1, the energy savings for this measure was calculated by applying the known fixture wattages in the space to the estimated existing and proposed times of operation for each fixture.

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

ECM-L2 Install Lighting Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
3,591	0	13,094	0	1,270	3.5	560	2.8	2.4

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

This measure is not recommended in lieu of ECM L3.

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

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

ECM-L3 Lighting Replacements with Controls (Occupancy Sensors)

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
\$	kW	kWh	Therms	\$	%	\$	Years	Years
120,751	26	68,466	0	8,501	(0.1)	1,360	14.2	14.0

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

This measure is recommended.

5.10 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 Insulation on Hot Water Piping and Domestic Hot Water Piping
- Install Covers on Window Air Conditioners
- Clean Window AC filters before each season
- Purchase LCD monitors to replace older CRT type monitors
- Set computers monitors to turn off and computers to sleep mode when not in use
- Look for the ENERGY STAR® label when purchasing Window AC units or Kitchen Appliances
- Disconnect unnecessary or unused small appliances and electronics when not in use to reduce phantom loads
- Train custodians to turn off lights and set HVAC temperatures to minimum levels when rooms are unoccupied
- Develop an Energy Master Plan to measure and track energy performance
- Educate students and staff about how their behavior affects energy use. Create student energy patrols to monitor and inform administration when energy is being wasted.
- During the winter, Custodians should ensure all windows are closed as part of cleaning routine

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. Refer to Appendix D for more information on the Smart Start program.

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.

Refer to Appendix D for more information on the Smart Start program.

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

Refer to Appendix D for more information on this program.

6.1.3 New Jersey Pay For Performance Program (P4P)

The 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, along with more detailed program information included in Appendix D.

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. This can be done over a maximum term of 15 years. 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. Refer to Appendix D for more information on this program.

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 ECM-S1 Photovoltaic Rooftop Solar Power Generation

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

Available Roof Area (Ft ²)	Potential PV Array Size (kW)
9,105	70

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

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey Solar Renewable Energy Certificates Program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. Payments that will be received by the PV producer (school) will change from year to year dependent upon supply and demand. There is no definitive way to calculate an exact price that will be received by the PV producer for SREC credits over the next 15 years. Renewable Energy Consultants estimates an average of \$155/SREC for 2013 and this number was utilized in the cash flow for this report.

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

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

Photovoltaic (PV) Rooftop Solar Power Generation – 10 kW System

Budgetary Cost	Annual Utility Savings			Total Savings	New Jersey Renewable SREC	Payback (without SREC)	Payback (with SREC)	Recommended
	Electricity		Natural Gas					
\$	kW	kWh	Therms	\$	\$	Years	Years	
280,000	70.0	91,233	0	13,685	15,966	20.5	9.4	FS

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

7.1.1 ECM-S2 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.

7.2 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

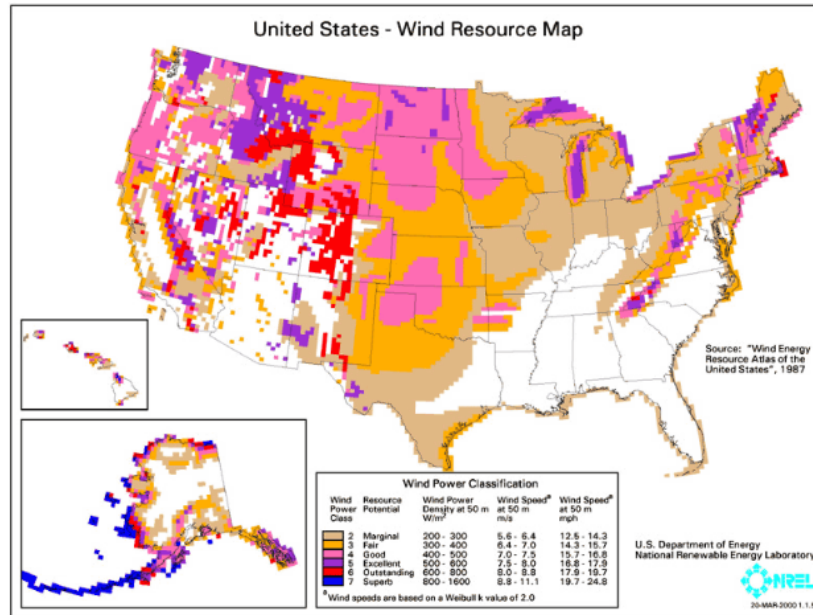
CHP equipment includes reciprocating engine-driven, micro turbines, steam turbines, and fuel cells. Typical CHP customers include industrial, commercial, institutional, educational institutions, and multifamily residential facilities. CHP systems that are commercially viable at the present time are sized 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.

7.3 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, Millburn, NJ is classified as Class 1 at 50m, meaning the city would not be a good candidate for wind power.



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 March 2013 through February 2014 the following table summarizes the electricity load profile for the building.

Building Electric Load Profile

Peak Demand kW	Min Demand kW	Avg Demand kW	Onsite Generation Y/N	Eligible? Y/N
111.7	84.8	98.3	N	N

This measure is not recommended because the building does not have adequate load to meet the required minimum load reduction.

8.0 CONCLUSIONS & RECOMMENDATIONS

The LGEA energy audit conducted by CHA for the building identified potential annual savings of \$19,708/yr with an overall payback of 12.9 years, if the recommended ECMs are implemented.

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

Electric Savings (kWh)	Natural Gas Savings (therms)	Total Savings (\$)	Payback (years)
79,492	11,521	19,708	12.9

The following projects should be considered for implementation:

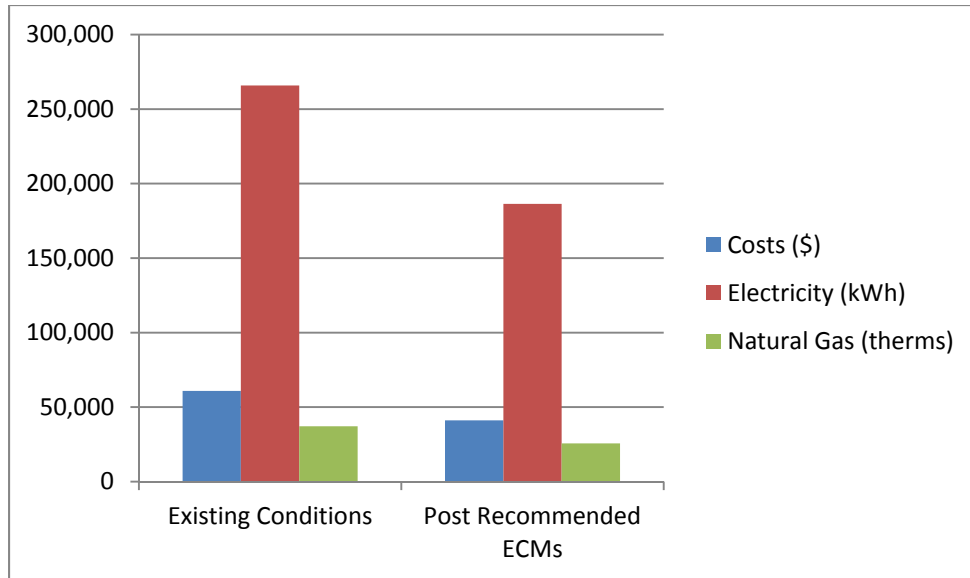
- Add Attic Insulation
- Install VFDs & Premium Efficiency Motors for Pumps
- Retro-Commission Temperature Controls
- Install Low Flow Plumbing Fixtures
- Lighting Replacements with Controls (Occupancy Sensors)

The following alternative energy measures are recommended for further study:

- Photovoltaic (PV) Rooftop Solar Power Generation – 70 kW System

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

	Existing Conditions	Post Recommended ECMs	Percent Savings
Costs (\$)	60,854	41,146	32%
Electricity (kWh)	265,851	186,359	30%
Natural Gas (therms)	37,189	25,668	31%
Site EUI (kbtu/SF/Yr)	66.0	45.7	



APPENDIX A

Utility Usage Analysis and Alternate Utility Suppliers

Millburn Township Public Schools
26 Troy Lane, Short Hills, NJ 07078

Utility Bills: Account Numbers

<u>Account Number</u>	<u>School Building</u>	<u>Location</u>	<u>Type</u>	<u>Notes</u>
100 006 418 923	Deerfield Elementary School	26 Troy Lane, Short Hills, NJ 07078	Electricity	
65 755 939 09	Deerfield Elementary School	26 Troy Lane, Short Hills, NJ 07078	Natural Gas	
	Deerfield Elementary School	26 Troy Lane, Short Hills, NJ 07078	Water	

Millburn Township Public Schools
26 Troy Lane, Short Hills, NJ 07078

For Service at:
Account No.:
Meter No.:
Electric Service

Deerfield Elementary School
100 006 418 923

Delivery -
Supplier -

Jersey Central Power & Light
Jersey Central Power & Light

			Provider Charges			Usage (kWh) vs. Demand (kW) Charges		Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Delivery (\$)	Supplier (\$)	Total (\$)	Consumption (\$)	Demand (\$)	Blended Rate (\$/kWh)	Consumption (\$/kWh)	Demand (\$/kW)
December-12						0.00		#DIV/0!	#DIV/0!	#DIV/0!
January-13	25920	92.6			2780.9	2,246.48	534.42	0.11	0.09	5.77
February-13	27360	100			2950.02	2,367.72	582.3	0.11	0.09	5.82
March-13	20640	93.9			2344.74	1,801.91	542.83	0.11	0.09	5.78
April-13	27200	93.9			2897.07	2,354.24	542.83	0.11	0.09	5.78
May-13	22880	105			2934.04	2,274.74	659.3	0.13	0.10	6.28
June-13	18652	105.5			2609.54	1,947.31	662.23	0.14	0.10	6.28
July-13	12480	106.1			1938.93	1,272.00	666.93	0.16	0.10	6.29
August-13	13496	107.3			2126.66	1,463.88	662.78	0.16	0.11	6.18
September-13	19680	111.7			2619.54	1,961.54	658	0.13	0.10	5.89
October-13	27520	84.8			3204.25	2,720.29	483.96	0.12	0.10	5.71
November-13	20640	95.2			2607.49	2,056.25	551.24	0.13	0.10	5.79
December-13	25223	105.5			2931.67	2,312.83	618.84	0.12	0.09	5.87
January-14	30720	108.6			3622.12	2,984.18	637.94	0.12	0.10	5.87
February-14	26720	103.8			3210.85	2,603.96	606.89	0.12	0.10	5.85
Total (All)	319,131	111.70	\$0.00	\$0.00	\$38,777.82	\$30,367.33	\$8,410.49	\$0.12	\$0.10	\$5.95
Total (last 12-months)	265,851	111.70	\$0.00	\$0.00	\$33,046.90	\$25,753.13	\$7,293.77	\$0.12	\$0.10	\$5.97
Notes	1	2	3	4	5	6	7	8	9	10

- 1.) Number of kWh of electric energy used per month

2.) Number of kW of power measured

3.) Electric charges from Delivery provider

4.) Electric charges from Supply provider

5.) Total charges (Delivery + Supplier)

6.) Charges based on the number of kWh of electric energy used

7.) Charges based on the number of kW of power measured

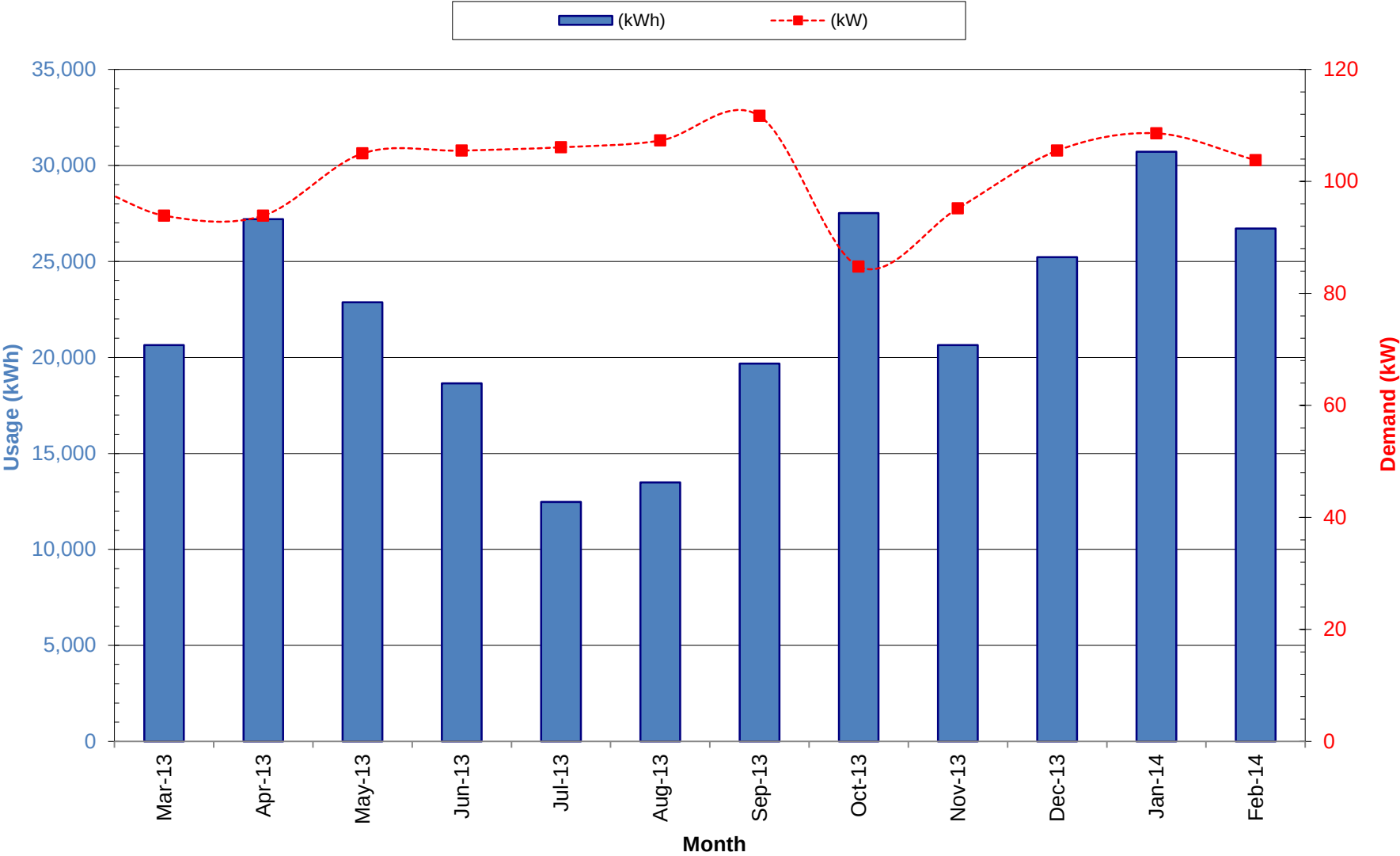
8.) Total Charges (\$) / Consumption (kWh)

9.) Consumption Charges (\$) / Consumption (kWh)

10.) Demand Charges (\$) / Demand (kW)
- No data provided, most recent rate used

No data provided, interpolated value

Electric Usage - Deerfield Elementary School

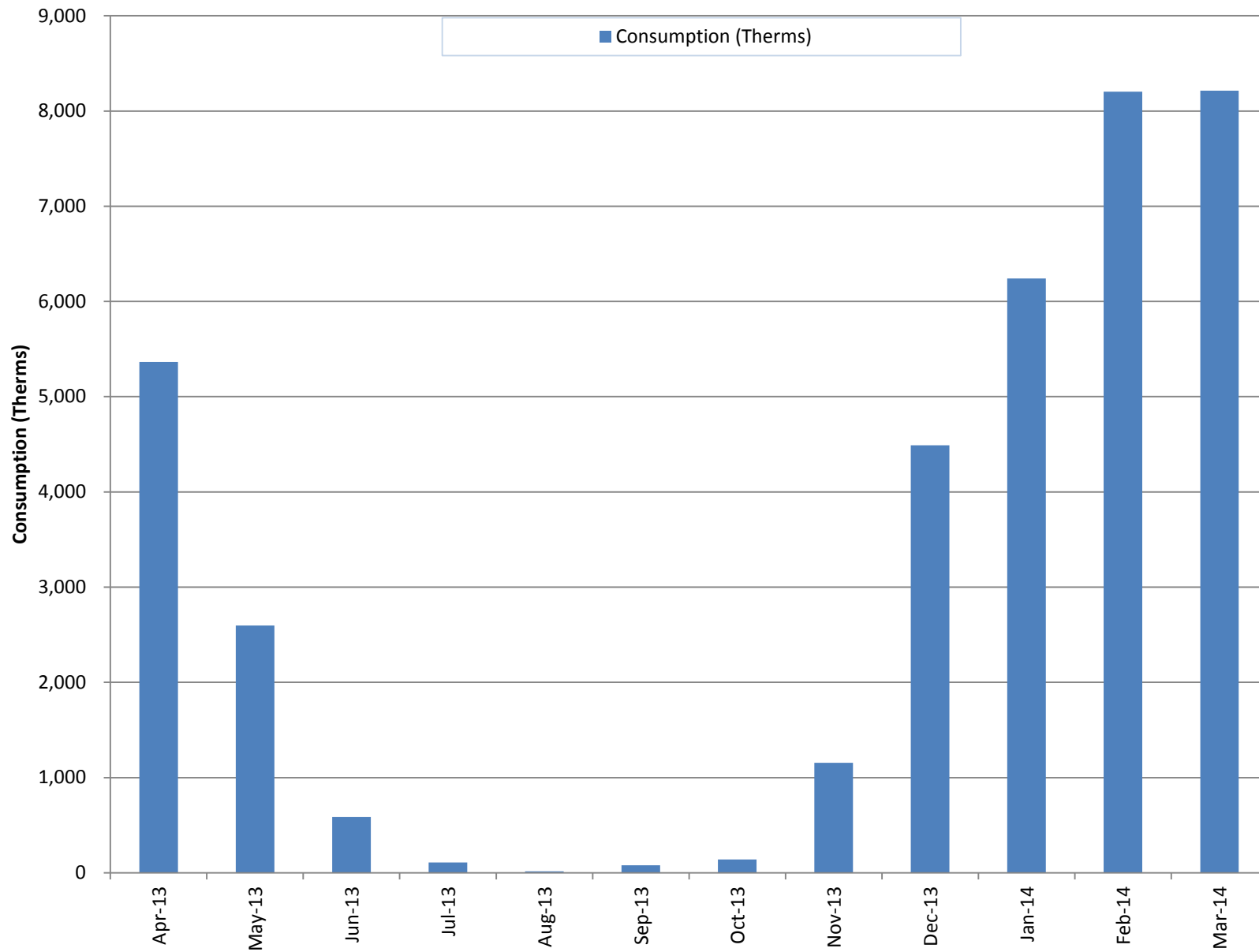


Millburn Township Public Schools
26 Troy Lane, Short Hills, NJ 07078

For Service at:	Deerfield Elementary School		
Account No.:	65 755 939 09		
Meter No:	2413292		
Natural Gas Service	Delivery -	PSE&G	
	Supplier -	Compass	

		Charges			Unit Costs		
Month	Consumption (Therms)	Delivery (\$)	Supply (\$)	Total (\$)	Delivery (\$/Therm)	Supply (\$/Therm)	Total (\$/Therm)
April-13	5,364	\$ 709.28	\$ 2,934.35	\$ 3,643.63	\$ 0.132	\$ 0.547	\$ 0.679
May-13	2,597	\$ 414.66	\$ 1,420.90	\$ 1,835.56	\$ 0.160	\$ 0.547	\$ 0.707
June-13	585	\$ 186.59	\$ 321.20	\$ 507.79	\$ 0.319	\$ 0.549	\$ 0.868
July-13	108	\$ 119.85	\$ 59.88	\$ 179.73	\$ 1.110	\$ 0.554	\$ 1.664
August-13	15	\$ 106.53	\$ 13.06	\$ 119.59	\$ 7.102	\$ 0.870	\$ 7.972
September-13	79	\$ 115.70	\$ 8.71	\$ 124.41	\$ 1.465	\$ 0.110	\$ 1.575
October-13	140	\$ 124.35	\$ 36.13	\$ 160.48	\$ 0.888	\$ 0.258	\$ 1.146
November-13	1,155	\$ 1,208.34	\$ 0.00	\$ 1,208.34	\$ 1.046	\$ 0.000	\$ 1.046
December-13	4,489	\$ 1,918.77	\$ 514.48	\$ 2,433.25	\$ 0.427	\$ 0.115	\$ 0.542
January-14	6,242	\$ 2,294.59	\$ 2,094.88	\$ 4,389.47	\$ 0.368	\$ 0.336	\$ 0.703
February-14	8,202	\$ 2,666.19	\$ 3,150.14	\$ 5,816.33	\$ 0.325	\$ 0.384	\$ 0.709
March-14	8,213	\$ 2,640.29	\$ 4,747.89	\$ 7,388.18	\$ 0.321	\$ 0.578	\$ 0.900
Total	37,189			\$ 27,806.76			\$ 0.748

Natural Gas Usage - Deerfield Elementary School

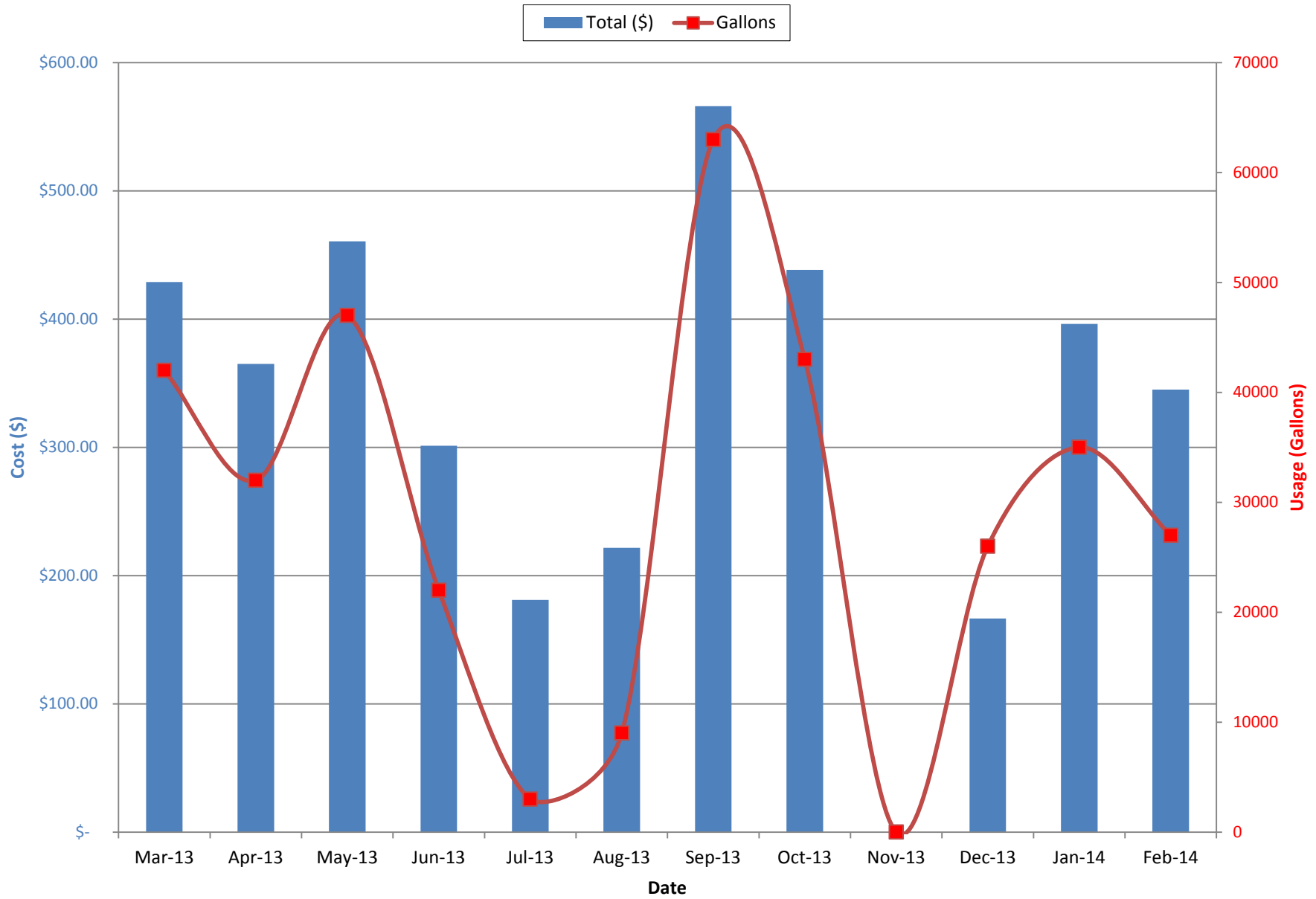


Millburn Township Public Schools
 26 Troy Lane, Short Hills, NJ 07078

For Service at: Deerfield Elementary School
 Account No.: 1018-210027043526
 Meter No.: 86119630
 Water Service Delivery - New Jersey American Water
 Supplier -

Month	Total (\$)	Gallons	\$/Gallon
Mar-13	\$ 428.94	42000	\$ 0.010
Apr-13	\$ 365.00	32000	\$ 0.011
May-13	\$ 460.65	47000	\$ 0.010
Jun-13	\$ 301.22	22000	\$ 0.014
Jul-13	\$ 180.99	3000	\$ 0.060
Aug-13	\$ 221.61	9000	\$ 0.025
Sep-13	\$ 565.99	63000	\$ 0.009
Oct-13	\$ 438.44	43000	\$ 0.010
Nov-13	\$ -	0	#DIV/0!
Dec-13	\$ 166.57	26000	\$ 0.006
Jan-14	\$ 396.16	35000	\$ 0.011
Feb-14	\$ 345.13	27000	\$ 0.013
Total	\$ 3,870.70	349000	0.011

Water Usage - Deerfield Elementary School



Millburn Township Public Schools
26 Troy Lane, Short Hills, NJ 07078

Utility Bills: Account Numbers

<u>Account Number</u>	<u>School Building</u>	<u>Location</u>	<u>Type</u>	<u>Notes</u>
100 006 418 923	Deerfield Elementary School	26 Troy Lane, Short Hills, NJ 07078	Electricity	
65 755 939 09	Deerfield Elementary School	26 Troy Lane, Short Hills, NJ 07078	Natural Gas	
	Deerfield Elementary School	26 Troy Lane, Short Hills, NJ 07078	Water	

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

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

Supplier	Telephone & Web Site	*Customer Class
Ambit Northeast, LLC 103 Carnegie Center Suite 300 Princeton, NJ 08540	(877)-30-AMBIT (877) 302-6248 www.ambitenergy.com	R/C 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/I ACTIVE
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. 1085 Morris Avenue, Suite 150 Union, NJ 07083	866-867-8328 908-638-6605 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 900A Lake Street, Suite 2 Ramsey, NJ 07466	(800) 900-1982 www.constellation.com	C/I ACTIVE
Direct Energy Business, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	888-925-9115 www.directenergy.com	C/I ACTIVE
Direct Energy Services, LLP 120 Wood Avenue, Suite 611 Iselin, NJ 08830	866-348-4193 www.directenergy.com	R ACTIVE
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	800-805-8586 www.gesc.com	R/C/I 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
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
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095	800-437-7872 www.hess.com	C/I ACTIVE
Hess Small Business Services, LLC One Hess Plaza Woodbridge, NJ 07095	888-494-4377 www.hessenergy.com	C/I ACTIVE
HIKO Energy, LLC 655 Suffern Road Teaneck, NJ 07666	(888) 264-4908 www.hikoenergy.com	R/C 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
Integrus Energy Services – Natural Gas, LLC 99 Wood Avenue South Suite #802 Iselin, NJ 08830	800-536-0151 www.integrusenergy.com	C/I ACTIVE
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	800-927-9794 www.intelligentenergy.org	R/C/I ACTIVE
Keil & Sons, Inc. d/b/a Systrum Energy 1 Bergen Blvd. Fairview, NJ 07022	1-877-797-8786 www.systrumenergy.com	R/C/I ACTIVE
Major Energy Services, LLC 10 Regency CT Lakewood, NJ 08701	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	800-828-9427 www.metromediaenergy.com	C ACTIVE
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	888-53-Metro www.metroenergy.com	R/C ACTIVE
MxEnergy, Inc. 900 Lake Street Ramsey, NJ 07446	800-758-4374 www.mxenergy.com	R/C/I ACTIVE
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	800-840-4GAS www.natgasco.com	C 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 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 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. 3000 East Brunswick, NJ 08816	(888) 313-9086 www.napower.com	R/C/I ACTIVE
Palmco Energy NJ, LLC One Greentree Centre 10,000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	877-726-5862 www.PalmcoEnergy.com	R/C/I ACTIVE
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	800-363-7499 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 EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002	800-281-2000 www.pplenergyplus.com	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
S.J. Energy Partners, Inc. 208 White Horse Pike, Suite 4 Barrington, NJ 08007	800-695-0666 www.sjnaturalgas.com	R/C ACTIVE
Spark Energy Gas, L.P. 2105 CityWest Blvd, Ste 100 Houston, Texas 77042	800-411-7514 www.sparkenergy.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	(973) 494-8097 www.streamenergy.net	R/C ACTIVE
Systrum Energy 1 Bergen Blvd. Fairview, NJ 07022	877-797-8786 www.systrumenergy.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 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](#)

JCP&L 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 5th Street Lakewood, NJ 08701	(855) 553-6374 www.alphagasandelectric.com	R/C ACTIVE
Ambit Northeast, LLC 103 Carnegie Center Suite 300 Princeton, NJ 08540	(877) 30-AMBIT (877) 302-6248 www.ambitenergy.com	R/C ACTIVE
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.astralenergyllc.com	R/C/I ACTIVE
BBPC, LLC d/b/a Great Eastern Energy 116 Village Blvd. Suite 200 Princeton, NJ 08540	(888) 651-4121 www.greateasternenergy.com	C/I ACTIVE
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
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) 547-2722 www.directenergy.com	C/I ACTIVE
Discount Energy Group, LLC 811 Church Road, Suite 149 Cherry Hill, NJ 08002	(800) 282-3331 www.discountenergygroup.com	R/C ACTIVE
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 Plus Holdings LLC 309 Fellowship Road East Gate Center, Suite 200 Mt. Laurel, NJ 08054	(877) 866-9193 www.energypluscompany.com	R/C ACTIVE
Energy.me Midwest LLC 90 Washington Blvd Bedminster, NJ 07921	(855) 243-7270 www.energy.me	R/C/I ACTIVE
Ethical Electric Benefit Co. d/b/a Ethical Electric 100 Overlook Center, 2nd Fl. Princeton, NJ 08540	(888) 444-9452 www.ethicalelectric.com	R/C ACTIVE
FirstEnergy Solutions Corp. 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 08819	(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
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.hopenenergy.com	R/C/I ACTIVE

IDT Energy, Inc. 550 Broad Street Newark, NJ 07102	(973) 438-4380 www.idtenergy.com	R/C ACTIVE
Independence Energy Group, LLC 211 Carnegie Center Princeton, NJ 08540	(877) 235-6708 www.chooseindependence.com	R/C ACTIVE
Integritys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integritysenergy.com	C/I ACTIVE
Liberty Power Delaware, LLC 3000 Atrium Way Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	R/C/I ACTIVE
Liberty Power Holdings, LLC 3000 Atrium Way Suite 273 Mt. Laurel, NJ 08054	(866) 769-3799 www.libertypowercorp.com	R/C/I ACTIVE
Linde Energy Services 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.linde.com	C/I ACTIVE
Marathon Power LLC 302 Main Street Paterson, NJ 07505	(888) 779-7255 www.mecny.com	R/C/I ACTIVE
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
NJ Gas & Electric 1 Bridge Plaza fl.2 Fort Lee, NJ 07024	(866) 568-0290 www.NJGandE.com	R/C/I ACTIVE
Noble Americas Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.noblesolutions.com	C/I ACTIVE
North American Power and Gas, LLC 222 Ridgedale Ave. 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	R/C 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 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) 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
Starion Energy PA Inc. 101 Warburton Avenue Hawthorne, NJ 07506	(800) 600-3040 www.starionenergy.com	R/C/I ACTIVE
Stream Energy 309 Fellowship Road Suite 200 Mt. Laurel, NJ 08054	(877) 369-8150 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

APPENDIX B

Equipment Inventory

Newark Public Schools
CHA Project# 28330
Deerfield Elementary School

Description	QTY	Manufacturer Name	Model No.	Serial No.	Equipment Type / Utility	Capacity/Size /Efficiency	Location	Areas/Equipment Served	Date Installed	Remaining Useful Life (years)
B-1	1	H.B. Smith	28A-12	N96-681	HW Boiler	3031 MBH / 82%	Boiler Rm	Building	1996	2
B-2	1	H.B. Smith	28A-13	N96-682	HW Boiler	3031 MBH / 82%	Boiler Rm	Building	1996	2
P-1	1	Baldor	EM3211T	36G548T862	Base mtd pump	3.0 HP / 90.2% efficiency	Boiler Rm	Building	1996	-4
P-2	1	Baldor	EM3211T	36G548T862	Base mtd pump	3.0 HP / 90.2% efficiency	Boiler Rm	Building	1996	-4
P-3	1	Baldor	YEJMM515TY	55E422T666E7	Vertical inline pump	2.0 HP / 86.5%	Boiler Rm	Building	1996	-4
P-X	1	Baldor	YEJMM515TY	55E422T666E7	Vertical inline pump	2.0 HP / 86.5%	Boiler Rm	Building	1996	-4
P-4	1	Marathon	3VC182TTDR4027BE	N/A	Base mtd pump	3.0 HP / 86.5%	Boiler Rm	Building	N/A	N/A
P-X	1	A.O.Smith	N/A	N/A	Base mtd pump	N/A	Boiler Rm	Building	N/A	N/A
P-X	1	B&G	N/A	N/A	circ. pump	N/A	Boiler Rm	Building	N/A	N/A
P-X	1	B&G	N/A	N/A	circ. pump	N/A	Boiler Rm	Building	N/A	N/A
DHW-1	1	A.O.Smith	BTP-199-104	1341M000736	Domestic Hot Water heater	80 gallons / 81% thermal efficiency	Storage Rm	Building	2013	14
UH-X	1	Sterling	N/A	N/A	hydronic unit heaters	N/A	Storage Rm	Building	N/A	N/A
CU-1	1	York	H2RAo36S06E	WGKM013079	condensing unit	3 tons / 8.45 EER	Back of bldg Ext.	Building	N/A	N/A
CU-2	1	Friedrich	MR18C3E-A	03600	condensing unit	1.5 tons / 12.5 EER	Back of bldg Ext.	Building	N/A	N/A
CU-3	1	Lennox	HS26-513-1Y	5896G37796	condensing unit	2 tons / 12.3 EER	Back of bldg Ext.	Building	N/A	N/A
CU-4	1	Lennox	HS26-513-1Y	5896G37819	condensing unit	2 tons / 12.3 EER	Back of bldg Ext.	Building	N/A	N/A
CU-5	1	Trane	2TTB2030A100AA	42356K04F	condensing unit	2.5 tons / 11.55 EER	Back of bldg Ext.	Building	2004	5
CU-6	1	Trane	2TTB2030A100AA	42356K14F	condensing unit	2.5 tons / 11.55 EER	Back of bldg Ext.	Building	2004	5
CU-7	1	Coleman	ERCS0601BBB	W0E7857218	condensing unit	N/A	Back of bldg Ext.	Building	2005	6
CH-X	multiple	Nesbitt	N/A	N/A	wall mtd cab htrs	N/A	Building	Building	N/A	N/A
UV-X	multiple	Herman Nelson	N/A	N/A	floor mtd unit ventilator	N/A	Classrooms	Building	N/A	N/A
RTU-1	1	Daikin McQuay	MPS020GY2DC1CYRY	FBOU130800972	Packaged RTU	20 tons / 11.1 EER	Exterior on pad	Multi-Purpose Rm	2013	19
AHU-1	1	Kennard Nelson	H2150HV	N/A	Air handling unit	N/A	Mechanical Equip. Rm	Gymnasium	N/A	N/A

Cost of Electricity:

\$0.097 \$/kWh

\$5.97 \$/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
46LED5	Multi-purpose Rm	Gymnasium	32	W 32 C F 2 (ELE)	F42LL	60	1.92	SW	2000	3,840	none	
	Corridor	corridor	5	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.30	Breaker	2125	638	none	
4LED	Boys Rm	Restroom w/ OCC	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.14	sw	1000	144	none	
4LED	Girls Rm	Restroom w/ OCC	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.14	sw	1000	144	none	
46LED	Corridor	corridor	5	W 32 C F 2 (ELE)	F42LL	60	0.30	Breaker	2125	638	none	
35LED	Music Rm	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	sw	2400	2,592	occ	
X4	Music Rm	Classrooms	4	CF26W	CF26/4-L	108	0.43	sw	2400	1,037	occ	
228	Copy Rm	Copy Room	2	W60CF1	F81EL	60	0.12	sw	2125	255	none	
228	Main Office	Offices	3	W60CF1	F81EL	60	0.18	sw	2400	432	none	
105LED	Office	Offices	3	W 32 F 1	F41LL	32	0.10	sw	2400	230	none	
228	Principal	Offices	2	W60CF1	F81EL	60	0.12	SW	2400	288	none	
233	Custodial Closet	Storage/Janitor	1	R 100 C 1 1	i100/1	100	0.10	sw	500	50	none	
228	Nurse	Offices	4	W60CF1	F81EL	60	0.24	sw	2400	576	none	
7LED	Corridor	corridor	9	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.54	Breaker	2125	1,148	none	
7LED	SGI 1	Offices	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.24	sw	2400	576	none	
261LED	1 par spotlight in SGI 1	Offices	1	PAR 38 SP	H100/1	100	0.10	sw	2400	240	none	
7LED	SGI 2	Offices	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.24	sw	2400	576	none	
7LED	SGI 3	Offices	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.24	sw	2400	576	none	
7LED	SGI 4	Offices	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.24	sw	2400	576	none	
46LED	Corridor	corridor	4	W 32 C F 2 (ELE)	F42LL	60	0.24	Breaker	2125	510	none	
46LED	Corridor	corridor	10	W 32 C F 2 (ELE)	F42LL	60	0.60	Breaker	2125	1,275	none	
35LED	Classroom 126	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	sw	2400	1,944	occ	
35LED	Stairway	Stairway	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	Breaker	3200	864	none	
46LED	Corridor	corridor	6	W 32 C F 2 (ELE)	F42LL	60	0.36	Breaker	2125	765	none	
46LED	Corridor	corridor	8	W 32 C F 2 (ELE)	F42LL	60	0.48	Breaker	2125	1,020	none	
35LED	Classroom 121	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	sw	2400	1,944	occ	
35LED	Classroom 122	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	sw	2400	1,944	occ	
35LED	Classroom 123	Classrooms	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.81	sw	2400	1,944	occ	
46LED	Corridor	corridor	13	W 32 C F 2 (ELE)	F42LL	60	0.78	Breaker	2125	1,658	none	
35LED	Classroom 113	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	sw	2400	2,592	occ	
35LED	Classroom 114	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	2400	2,592	occ	
35LED	Classroom 115	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	2400	2,592	occ	
35LED	Classroom 116	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	2400	2,592	occ	
35LED	Classroom 117	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	2400	2,592	occ	
35LED	Classroom 118	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	2400	2,592	occ	
35LED	Classroom 119	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	2400	2,592	occ	
35LED	Classroom 120	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	2400	2,592	occ	
35LED	Classroom 121	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	SW	2400	2,592	occ	
35LED	Classroom 112	Classrooms	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.35	SW	2400	3,240	occ	
35LED	Classroom 111	Classrooms	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.35	SW	2400	3,240	occ	
35LED	Classroom 110	Classrooms	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.35	SW	2400	3,240	occ	
35LED	Classroom 109	Classrooms	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.35	SW	2400	3,240	occ	
7LED	Teachers Work room	Offices	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.18	SW	2400	432	none	
35LED	Classroom 105	Classrooms	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.35	SW	2400	3,240	none	
121	Media Center	Classrooms	38	W 34 P F 4	F44EE	144	5.47	sw	2400	13,133	occ	
35LED	Media Center	Classrooms	8	T 32 R F 3 (ELE)	F43ILL/2	90	0.72	SW	2400	1,728	occ	
57	Media Center	Classrooms	7	S 34 C F 1 (MAG)	F41EE	43	0.30	SW	2400	722	occ	
20LED	Media Center	Classrooms	2	S 32 C F 1 (ELE)	F41LL	32	0.06	sw	2400	154	occ	
5	Corridor	corridor	8	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.48	Breaker	2125	1,020	none	
6LED	Computer Rm	Classrooms	15	T 34 R F 4 (MAG)	F44EE	144	2.16	sw	2400	5,184	occ	
20LED	Computer Rm	Classrooms	3	S 32 C F 1 (ELE)	F41LL	32	0.10	sw	2400	230	occ	
35LED	Classroom 102	Classrooms	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.35	sw	2400	3,240	occ	
35LED	Classroom 101	Classrooms	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.35	sw	2400	3,240	occ	
35LED	Classroom 103	Classrooms	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.35	sw	2400	3,240	occ	
5	Corridor	corridor	11	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.66	Breaker	2125	1,403	none	
35LED	Kindergarten 1	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	occ	2400	2,592	none	
35LED	Kindergarten 2	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	occ	2400	2,592	none	
35LED	Kindergarten 3	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	occ	2400	2,592	none	
35LED	Kindergarten 4	Classrooms	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.08	occ	2400	2,592	none	
35LED	Stairway	Stairway	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.27	Breaker	3200	864	none	
46LED	Gymnasium	Gymnasium	20	W 32 C F 2 (ELE)	F42LL	60	1.20	sw	2000	2,400	none	
227LED	Exterior wall pack	Outdoor Lighting	5	70 W MH Wall Pack	MH70/1	95	0.48	Breaker	4368	2,075	none	
142LED	Exterior MH 100	Outdoor Lighting	3	MH 100	MH100/1	128	0.38	Breaker	4368	1,677	none	

APPENDIX C

ECM Calculations

Millburn Township Public Schools
CHA Project Number: 28330

Rate of Discount (used for NPV) 3.0%

Utility Costs		Yearly Usage	Metric Ton Carbon Dioxide Equivalent	Building Area	Annual Utility Cost		
\$	0.124	\$/kWh blended	0.000420205	70,084	Electric	Natural Gas	Fuel Oil
\$	0.097	\$/kWh supply	265,851		\$ 33,047	\$ 27,807	
\$	5.97	\$/kW	111.7				
\$	0.748	\$/Therm	37,189	0.00533471			
\$	11.09	\$/kgals	349	0			
\$	0.011	\$/Gal	349,000				

Deerfield Elementary School																							
Recommend?		Item	Savings					Cost	Simple	Life	Equivalent CO ₂	NJ Smart Start	Direct Install	Payback w/	Simple Projected Lifetime Savings					ROI	NPV	IRR	
Y or N			kW	kWh	therms	No. 2 Oil gal	Water kgal	\$	Payback	Expectancy	(Metric tons)	Incentives	Eligible (Y/N)	Incentives	kW	kWh	therms	kgal/yr	\$				
Y	ECM-1	Add Attic Insulation	0.0	0	6,445	0	0	4,821	\$ 76,800	15.9	15	34.4		N	15.9	0.0	0	96,676	0	\$ 72,314	(0.1)	(\$19,248)	-0.7%
N	ECM-7	Replace one Boiler with High Efficiency Condensing Boiler	0.0	0	4,017	0	0	3,005	\$ 141,809	47.2	30	21.4	\$ 3,031	N	46.2	0.0	0	120,504	0	\$ 90,137	(0.4)	(\$79,887)	-2.6%
Y	ECM-9	Install VFDs & Premium Efficiency Motors for Hot Water Pumps	2.5	1,455	0	0	0	183	\$ 16,984	92.6	15	0.6		N	92.6	37.1	21,828	0	0	\$ 5,367	(0.7)	(\$14,796)	-17.2%
Y	ECM-12	Retro-Commission Temperature Controls	0.0	9,571	5,076	0	0	4,984	\$ 24,292	4.9	10.0	31.1		N	4.9	0.0	95,706	50,763	0	\$ 49,838	1.1	\$18,221	15.8%
Y	ECM-18	Install Low Flow Plumbing Fixtures	0.0	0	0	0	110	1,219	\$ 16,004	13.1	30.0	0.0		N	13.1	0.0	0	0	3,298	\$ 36,576	1.3	\$7,894	6.5%
N	ECM-L1	Lighting Replacements / Upgrades	26.0	62,342	0	0	0	7,907	\$ 117,160	14.8	10.0	26.2	\$ 800	N	14.7	260.0	623,420	0	0	\$ 95,930	(0.2)	(\$48,912)	-6.5%
N	ECM-L2	Install Lighting Controls (Add Occupancy Sensors)	0.0	13,094	0	0	0	1,270	\$ 3,591	2.8	10.0	5.5	\$ 560	N	2.4	0.0	130,940	0	0	\$ 16,237	3.5	\$7,802	40.5%
Y	ECM-L3	Lighting Replacements with Controls (Occupancy Sensors)	26.0	68,466	0	0	0	8,501	\$ 120,751	14.2	10.0	28.8	\$ 1,360	N	14.0	260.0	684,660	0	0	\$ 103,524	(0.1)	(\$46,876)	-5.7%
Total (Does Not Include ECM-7, ECM-L1 & ECM-L2)			28.5	79,492	11,521	0	110	\$ 19,708	\$ 254,831	12.9	16.0	95	\$ 1,360		12.9	297	802,195	147,439	3,298	\$ 267,620	0.1	(\$5,913)	2.7%
Recommended Measures (highlighted green above)			28.5	79,492	11,521	0	110	\$ 19,708	\$ 254,831	12.9	16.0	95	\$ 1,360	0	12.9	297	802,195	147,439	3,298	\$ 267,620	0.1	(\$5,913)	2.7%
% of Existing			25%	30%	31%	0	31%																

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

Multipliers	
Material:	1.027
Labor:	1.246
Equipment:	1.124

Heating System Efficiency	82%
Cooling Eff (kW/ton)	1.2

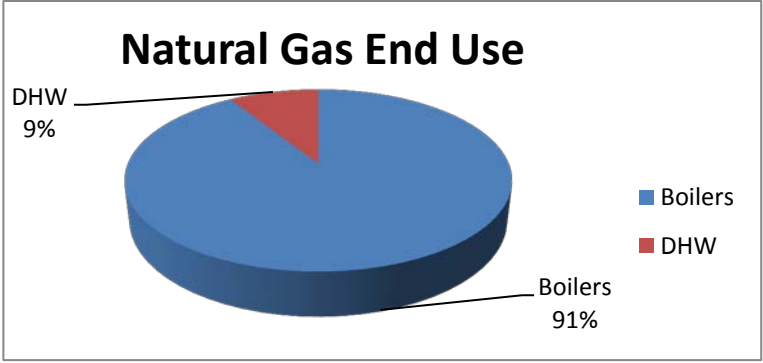
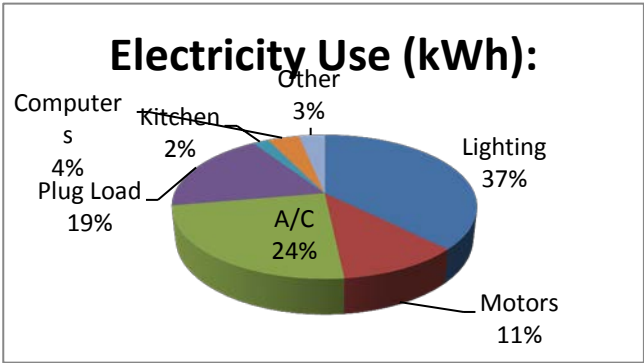
Heating	
Hours	4,427 Hrs
Weighted Avg	40 F
Avg	28 F

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

Utility End Use Analysis		
Electricity Use (kWh):		Notes/Comments:
265,851	Total	Based on utility analysis
99,098	Lighting	From Lighting Calculations
29,244	Motors	Estimated
63,804	A/C	Estimated
49,059	Plug Load	Estimated
5,317	Kitchen	Estimated
10,634	Computers	Estimated
8,695	Other	Remaining
Natural Gas Use (Therms):		Notes/Comments:
37,189	Total	Based on utility analysis
33,842	Boilers	Therms/SF x Square Feet Served
3,347	DHW	Based on utility analysis

37%
0.11
0.24
0.18
0.02
0.04
0.03

0.91
0.09



Millburn Township Public Schools
CHA Project Number: 28330
Deerfield Elementary School

ECM-2 Add Attic Insulation

Area of Attic	60,000 SF	Cooling System Efficiency	0 kW/ton	Heating System Efficiency	82%
Existing Infiltration Factor	0.05 cfm/SF	Ex Occupied Cng Temp.	74 °F	Heating On Point	55 °F
Proposed Infiltration Factor	0.02 cfm/SF	Ex Unoccupied Cng Temp.	85 °F	Ex Occupied Htg Temp.	72 °F
Existing U Value	0.077 Btuh/SF/°F	Cooling Occ Enthalpy Setpoint	26.5 Btu/lb	Ex Unoccupied Htg Temp.	60 °F
Proposed U Value	0.033 Btuh/SF/°F	Cooling Unocc Enthalpy Setpoint	26.5 Btu/lb	Electricity	\$ 0.124 \$/kWh
				Natural Gas	\$ 0.75 \$/Therm

					EXISTING LOADS		PROPOSED LOADS		COOLING ENERGY		HEATING ENERGY	
					Occupied	Unoccupied	Occupied	Unoccupied				
Avg Outdoor Air Temp. Bins °F	Avg Outdoor Air Enthalpy	Existing Equipment Bin Hours	Occupied Equipment Bin Hours	Unoccupied Equipment Bin Hours	Roof Infiltration & Heat Load BTUH	Roof Infiltration & Heat Load BTUH	Roof Infiltration & Heat Load BTUH	Roof Infiltration & Heat Load BTUH	Existing Cooling Energy kWh	Proposed Cooling Energy kWh	Existing Heating Energy therms	Proposed Heating Energy therms
A		B	C	D	E	F	G	H	I	J	K	L
97.5	55.7	9	3	6	-502,662	-451,892	-204,680	-182,680	0	0	0	0
92.5	49.1	69	25	44	-390,485	-339,715	-159,040	-137,040	0	0	0	0
87.5	42.5	132	47	85	-278,308	-227,538	-113,400	-91,400	0	0	0	0
82.5	39.5	344	123	221	-214,731	0	-87,200	0	0	0	0	0
77.5	36.6	566	202	364	-152,504	0	-61,540	0	0	0	0	0
72.5	34.0	755	270	485	0	0	0	0	0	0	0	0
67.5	31.6	780	279	501	0	0	0	0	0	0	0	0
62.5	29.2	889	318	572	0	0	0	0	0	0	0	0
57.5	27.0	742	265	477	0	0	0	0	0	0	0	0
52.5	24.5	627	224	403	153,180	58,915	64,272	24,720	0	0	708	297
47.5	21.4	725	259	466	192,457	98,192	80,752	41,200	0	0	1,166	489
42.5	18.7	795	284	511	231,734	137,469	97,232	57,680	0	0	1,659	696
37.5	16.2	784	280	504	271,011	176,746	113,712	74,160	0	0	2,012	844
32.5	14.4	682	244	438	310,288	216,023	130,192	90,640	0	0	2,077	871
27.5	12.6	345	123	222	349,565	255,300	146,672	107,120	0	0	1,216	510
22.5	10.7	229	82	147	388,842	294,577	163,152	123,600	0	0	917	385
17.5	8.6	189	68	122	428,118	333,854	179,632	140,080	0	0	847	355
12.5	6.8	70	25	45	467,395	373,131	196,112	156,560	0	0	347	146
7.5	5.5	20	7	13	506,672	412,408	212,592	173,040	0	0	109	46
2.5	4.1	8	3	5	545,949	451,685	229,072	189,520	0	0	47	20
TOTALS		8,760	3,129	5,631					0	0	11,104	4,659

Existing Ceiling Infiltration	3,000 cfm	Savings	6,445 Therms	\$ 4,821
Existing Ceiling Heat Transfer	4,615 Btuh/°F		0 kWh	\$ -
Proposed Ceiling Infiltration	1,200 cfm			\$ 4,821
Proposed Ceiling Heat Transfer	2,000 Btuh/°F			

Millburn Township Public Schools
CHA Project Number: 28330
Deerfield Elementary School

ECM-2 Attic Insulation - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

Description	Sq. FT	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
Blown-In Attic Insulation (9" thick)	60,000	sq. ft.	\$ 0.47	\$ 0.33	\$ 0.13	\$ 28,961	\$ 24,651	\$ 7,800	\$ 61,412	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	

Note : Cost estimates are for energy calculations only- do not use for procurement

\$ 61,412	Subtotal
\$ 15,353	25% Contingency
\$ 76,800	Total

Millburn Township Public Schools
CHA Project Number: 28330
Deerfield Elementary School

ECM-7: Boiler Replacement

Description: This ECM evaluates the replacement of an existing hot water boiler with a high efficiency condensing gas boiler. The existing boiler efficiency is 80% (per NJBPU protocols) and the proposed boiler efficiency is 90% (average seasonal efficiency). Electrical power consumption due to pumps is considered to be the same for both the proposed system and the baseline system.

Item	Value	Units	Formula/Comments
Baseline Fuel Cost	\$ 0.75	/ Therm	Natural Gas
Baseline Fuel Cost		/ Gal	No. 2 Oil
FORMULA CONSTANTS			
Oversize Factor	0.8		
Hours per Day	24		
Design Outdoor Temp	14	F	
Infrared Conversion Factor	1.0		1.0 if Boiler, 0.8 if Infrared Heater
EXISTING			
Capacity	3,031,000	btu/hr	
Heating Combustion Efficiency	80%		
Heating Degree-Day	2,783	Degree-day	
Design Temperature Difference	56	F	
Fuel Conversion	100,000	btu/therm	
PROPOSED			
Capacity	3,031,000	btu/hr	
Efficiency	90%		
SAVINGS			
Fuel Savings	4,017	Therms	NJ Protocols Calculation
Fuel Cost Savings	\$ 3,005		

Savings calculation formulas are taken from NJ Protocols document for Occupancy Controlled Thermostats

Algorithms

Gas Savings (Therms)

$$= \frac{OF \times ((CAPY_{Bi} \times EFF_Q) - (CAPY_{Qi} \times EFF_B \times ICF)) \times HDD_{mod} \times 24}{\Delta T \times HC_{fuel} \times EFF_B \times ICF \times EFF_Q}$$

Definition of Variables

OF = Oversize factor of standard boiler or furnace (OF=0.8)

CAPY_{Bi} = Total input capacity of the baseline furnace, boiler or heater in Btu/hour

CAPY_{Qi} = Total input capacity of the qualifying furnace, boiler or heater in Btu/hour

HDD_{mod} = HDD by zone and building type

24 = Hours/Day

ΔT = design temperature difference

HC_{fuel} = Conversion from Btu to therms of gas or gallons of oil or propane (100,000 btu/therm; 138,700 btu/gal of #2 oil; 92,000 btu/gal of propane)

EFF_Q = Efficiency of qualifying heater(s) (AFUE %)

EFF_B = Efficiency of baseline heaters (AFUE %)

ICF = Infrared Compensation Factor (ICF = 0.8 for IR Heaters, 1.0 for furnaces/boilers)²

Furnaces and Boilers

Component	Type	Value	Source
AFUE _q	Variable		Application
AFUE _b	Fixed	Furnaces: 78% Boilers: 80% Infrared: 78%	EPACT Standard for furnaces and boilers
CAPY _{in}	Variable		Application
ΔT	Variable	See Table Below	1
HDD _{mod}	Fixed	See Table Below	1

Sources:

1. KEMA, *Smartstart Program Protocol Review*. 2009.
2. http://www.spaceray.com/1_space-ray_faqs.php

Adjusted Heating Degree Days by Building Type

Building Type	Heating Energy Density (kBtu/sf)	Degree Day Adjustment Factor	Atlantic City (HDD)	Newark (HDD)	Philadelphia (HDD)	Monticello (HDD)
Education	29.5	0.55	2792	2783	2655	3886
Food Sales	35.6	0.66	3369	3359	3204	4689
Food Service	39.0	0.73	3691	3680	3510	5137
Health Care	53.6	1.00	5073	5057	4824	7060
Lodging	15.0	0.28	1420	1415	1350	1976
Retail	29.3	0.55	2773	2764	2637	3859
Office	28.1	0.52	2660	2651	2529	3701
Public Assembly	33.8	0.63	3199	3189	3042	4452
Public Order/Safety	24.1	0.45	2281	2274	2169	3174
Religious Worship	29.1	0.54	2754	2745	2619	3833
Service	47.8	0.89	4524	4510	4302	6296
Warehouse/Storage	20.2	0.38	1912	1906	1818	2661

Heating Degree Days and Outdoor Design Temperature by Zone

Weather Station	HDD	Outdoor Design Temperature (F)
Atlantic City	5073	13
Newark	5057	14
Philadelphia, PA	4824	15
Monticello, NY	7060	8

Millburn Township Public Schools

CHA Project Number: 28330

Deerfield Elementary School

ECM-7: Boiler Replacement - Cost

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.		
3,000 MBH NG Condensing Boiler	1	EA	\$ 87,700	\$ 13,100		\$ 90,068	\$ 16,323	\$ -	\$ 106,391	Vendor Estimate
Flue Installation	25	LF	\$ 75.0	\$ 15.00		\$ 1,926	\$ 467	\$ -	\$ 2,393	Vendor Estimate
Reprogram DDC system	1	EA	\$ 100.0	\$ 350.00		\$ 103	\$ 436	\$ -	\$ 539	RS Means 2012
Miscellaneous Electrical	1	LS	\$ 500	\$ 250		\$ 514	\$ 312	\$ -	\$ 825	RS Means 2012
Miscellaneous HW Piping	1	LS	\$ 2,000	\$ 1,000		\$ 2,054	\$ 1,246	\$ -	\$ 3,300	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

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

\$ 113,447	Subtotal
\$ 28,362	25% Contingency
\$ 141,809	Total

Millburn Township Public Schools
CHA Project Number: 28330
Deerfield Elementary School

ECM-9: Upgrade to Premium Efficiency Motors and Install Variable Speed Drives

Description: This ECM evaluates the energy (electrical) savings associated with replacing existing motors with high efficiency motors (based on ASHRAE 2010 NEMA ratings) and adding variable frequency drives to control motor speed based on actual load verses constant volume / constant flow.

Variable Inputs

Electric Rate \$0.12 \$/kWh
Demand Rate \$0.10 \$/kW

MOTOR SCHEDULE										Savings Factor		Existing Motor Energy		Proposed Motor Energy		Energy Savings	
Motor ID	Motor Type	Qty	HP	Total HP	Upgrade Motor	Load Factor	Existing Motor Eff.	New Motor Eff.	Annual Hours	Demand Savings Factor	Energy Savings Factor	Demand Energy (kW)	Electrical Energy (kWh)	Demand Energy (kW)	Electrical Energy (kWh)	Peak Demand Savings (kW)	Annual Energy Savings (kWh)
	HW	1	2.0	2.0	Y	0.75	86.5%	87.5%	4,427	0.216	0.240	1.3	5,726	0.3	5,095	1.0	632
	HW	1	3.0	3.0	Y	0.75	90.2%	90.2%	4,427	0.216	0.240	1.9	8,237	0.4	7,413	1.5	824
Total:																2.5	1,455.2
																\$ 3	\$ 180
																	\$ 183

Savings calculation formulas are taken from NJ Protocols document for VFDs

Millburn Township Public Schools
CHA Project Number: 28330
Deerfield Elementary School

ECM-9: Premium Efficiency Motors & VFDs - Cost

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.00

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						\$ -	\$ -	\$ -	\$ -	
VFD	4	ea	\$ 1,575	\$ 431		\$ 6,470	\$ 2,148	\$ -	\$ 8,618	RS Means 2012
Motor 2.0 HP premium efficiency	2	ea	\$ 295	\$ 79		\$ 606	\$ 197	\$ -	\$ 803	RS Means 2012
Motor 3.0 HP premium efficiency	2	ea	\$ 326	\$ 79		\$ 670	\$ 197	\$ -	\$ 866	RS Means 2012
Electrical - misc.	4	ls	\$ 500	\$ 250		\$ 2,054	\$ 1,246	\$ -	\$ 3,300	RS Means 2012
						\$ -	\$ -	\$ -	\$ -	
						\$ -	\$ -	\$ -	\$ -	

\$ 13,587	Subtotal
\$ 3,397	25% Contingency
\$ 16,984	Total

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

ECM-12: Retro-Commission Building Controls System

Summary: The controls for the building are a combination of both DDC and stand-alone, with major pieces of equipment tied in to the Siemens BAS head end, but smaller pieces of equipment not connected to the BAS and thus individually controlled. Retro-commissioning should address such issues as simultaneous heating and cooling, damper operation and leakage, and equipment scheduling.

Building Information:

70,084	Sq Footage	\$0.12	\$/kWh Blended
		\$0.75	\$/Therm

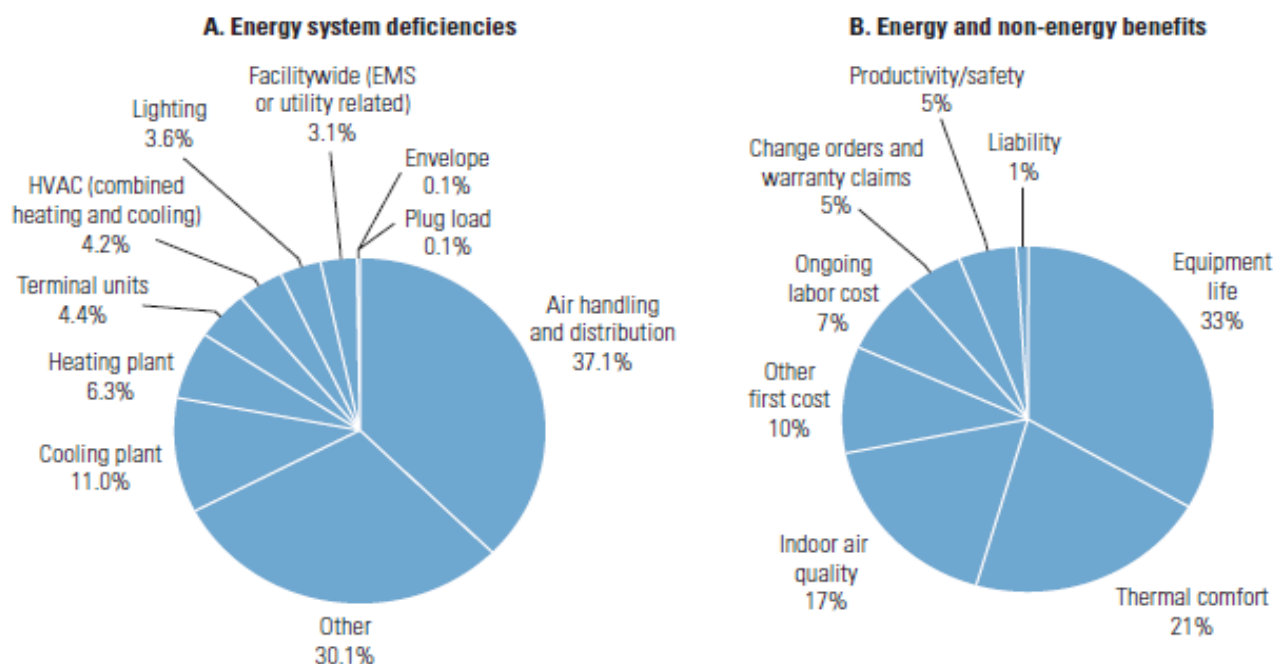
EXISTING CONDITIONS		
Existing Facility Total Electric usage	265,851	kWh
Existing Facility Total Gas usage	37,189	Therms
Existing Facility Cooling Electric usage	63,804	kWh ¹
Existing Facility Heating Natural Gas usage	33841.99	Therms ²
PROPOSED CONDITIONS		
Proposed Facility Cooling Electric Savings	9,571	kWh
Proposed Facility Natural Gas Savings	5076.2985	Therms
SAVINGS		
Retro-Commissioning Electric Savings	9,571	kWh
Retro-Commissioning Natural Gas Savings	5,076	Therms
Total cost savings	\$ 4,983.83	

Assumptions

- 1 24% of facility total electricity dedicated to Cooling based on Building Utility Analysis
- 2 91% of facility total natural gas dedicated to Heating based on Building Utility Analysis
- 3 15% Typical Savings associated with Retro-Commissioning of controls based on EPA Energy Star Report (CH 5 - Retrocommissioning)

Figure 5.2: Retrocommissioning results

Building energy system deficiencies: A recent study of retrocommissioning revealed a wide variety of problems—those related to the overall HVAC system were the most common type (A). **Energy and non-energy benefits:** Retrocommissioning provided both energy and non-energy benefits—the most common of these, noted in one-third of the buildings surveyed, was the extension of equipment life (B).



Note: EMS = energy management system.

Courtesy: E SOURCE; data from Lawrence Berkeley National Laboratory, Portland Energy Conservation Inc., and Energy Systems Laboratory, Texas A&M University

Millburn Township Public Schools
CHA Project Number: 28330
Deerfield Elementary School

Multipliers	
Material:	1.03
Labor:	1.25
Equipment:	1.12

ECM-12: Retro-Commission Building Controls System - Cost

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
									\$ -	
Controls and Sensors Retro-Commissioning	70084	SF	\$ 0.27	INC	INC	\$ 19,434	INC	INC	\$ 19,434	EPA Estimate
						\$ -	\$ -	\$ -	\$ -	

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

\$ 19,434	Subtotal
\$ 4,858	25% Contingency
\$ 24,292	Total

Millburn Township Public Schools
CHA Project Number: 28330
Deerfield Elementary School

ECM-18: 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	\$11.09	\$ / kGal
Urinals in Building to be replaced	3	
Average Flushes / Urinal (per Day)	82	
Average Gallons / Flush	1.5	Gal

PROPOSED CONDITIONS		
Proposed Urinals to be Replaced	3	
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	107.94	kGal / year
Proposed Urinal Water Use	11.24	kGal / year
Water Savings	96.69	kGal / year
Cost Savings	\$1,072	/ year

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

Millburn Township Public Schools
CHA Project Number: 28330
Deerfield Elementary School

ECM-18: 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	\$11.09	\$ / kGal
Toilets in Building	2	
Average Flushes / Toilet (per Day)	57	
Average Gallons / Flush	1.6	Gal

PROPOSED CONDITIONS		
Proposed Toilets to be Replaced	2	
Proposed Gallons / Flush	1.28	Gal

SAVINGS		
Current Toilet Water Use	66.19	kGal / year
Proposed Toilet Water Use	52.95	kGal / year
Water Savings	13.24	kGal / year
Cost Savings	\$147	/ year

Millburn Township Public Schools
CHA Project Number: 28330
Deerfield 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	3	EA	\$ 1,200	\$ 1,000	\$ -	\$ 3,697	\$ 3,738	\$ -	\$ 7,435	Vendor Estimate
Low-Flow Toilet	2	EA	\$ 1,400	\$ 1,000	\$ -	\$ 2,876	\$ 2,492	\$ -	\$ 5,368	Vendor Estimate
						\$ -	\$ -	\$ -	\$ -	

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

\$ 12,803	Subtotal
\$ 3,201	25% Contingency
\$ 16,004	Total

Millburn Township Public Schools
CHA Project Number: 28330
Deerfield 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, 2012. Building must have a minimum average electric demand of 100 kW. This minimum is waived for buildings owned by local governments or non-profit organizations. Values used in this calculation are for ALL identified measures except for alternate ECMs, regardless of payback or IRR. P4P estimated incentives represent a best case scenario, and will likely be lower depending on which measures are included. The savings displayed here are not guaranteed to qualify for P4P incentives if IRR or payback requirements are not met.

Total Building Area (Square Feet)	70,084
Is this audit funded by NJ BPU (Y/N)	Yes

Board of Public Utilities (BPU)

Incentive #1		
Audit is funded by NJ BPU	\$0.10	\$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	\$33,047	\$27,807
Existing Usage (from utility)	265,851	37,189
Proposed Savings	79,492	11,521
Existing Total MMBtus	4,626	
Proposed Savings MMBtus	1,423	
% Energy Reduction	30.8%	
Proposed Annual Savings	\$19,708	

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

	Incentives \$		
	Elec	Gas	Total
Incentive #1	\$0	\$0	\$7,008
Incentive #2	\$8,744	\$14,402	\$23,146
Incentive #3	\$8,744	\$14,402	\$23,146
Total All Incentives	\$17,488	\$28,803	\$53,300

Total Project Cost	\$254,831
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		Allowable Incentive
% Incentives #1 of Utility Cost*	11.5%	\$7,008
% Incentives #2 of Project Cost**	9.1%	\$23,146
% Incentives #3 of Project Cost**	9.1%	\$23,146
Total Eligible Incentives***	\$53,300	
Project Cost w/ Incentives	\$201,531	

Project Payback (years)	
w/o Incentives	w/ Incentives
12.9	10.2

* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if it is.

** Maximum allowable amount of Incentive #2 is 25% of total project cost.

Maximum allowable amount of Incentive #3 is 25% of total project cost.

*** Maximum allowable amount of Incentive #1 is \$50,000 if not funded by NJ BPU, and \$25,000 if it is.

Maximum allowable amount of Incentive #2 & #3 is \$1 million per gas account and \$1 million per electric account; maximum 2 million per project

**Energy Audit of Deerfield
CHA Project No. 28330**

ECM-L1 Lighting Replacements

Budgetary	Annual Utility Savings				Estimated	Total	New Jersey	Payback	Payback
Cost					Maintenance	Savings	Incentive	(without incentive)	(with incentive)
					Savings				
\$	kW	kWh	therms	\$	\$	\$	\$	Years	Years
\$117,160	26.0	62,342	0	\$7,907	0	\$7,907	\$800	14.8	14.7

*Incentive based on New Jersey Smart Start Prescriptive Lighting Measures

ECM-L2 Install Occupancy Sensors

Budgetary	Annual Utility Savings				Estimated	Total	New Jersey	Payback	Payback
Cost					Maintenance	Savings	Incentive	(without incentive)	(with incentive)
					Savings				
\$	kW	kWh	therms	\$	\$	\$	\$	Years	Years
\$3,591	0.0	13,094	0	\$1,270	0	\$1,270	\$560	2.8	2.4

*Incentive based on New Jersey Smart Start Prescriptive Lighting Measures

ECM-L3 Lighting Replacements with Occupancy Sensors

Budgetary	Annual Utility Savings				Estimated	Total	New Jersey	Payback	Payback
Cost					Maintenance	Savings	Incentive	(without incentive)	(with incentive)
					Savings				
\$	kW	kWh	therms	\$	\$	\$	\$	Years	Years
\$120,751	26.0	68,466	0	\$8,501	0	\$8,501	\$1,360	14.2	14.0

*Incentive based on New Jersey Smart Start Prescriptive Lighting Measures

			EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS						
Field Code	Area Description	No. of Fixtures before the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Pre-inst. control device	Annual Hours	Annual kWh	No. of fixtures after the retrofit	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit control device	Annual Hours	Annual kWh	Annual kWh Saved	Annual kW Saved	Annual \$ Saved	Retrofit Cost	NJ Smart Start Incentive	Simple Payback	Simple Payback					
	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	(Watts/Fixt) * (Fixt No.)		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	(Watts/Fixt) * (Number of Fixtures)		Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kW) - (Retrofit Annual kW)	(kWh Saved) * (\$/kWh)	Cost for renovations to lighting system	Prescriptive Lighting Measures	Length of time for renovations cost to be recovered	Length of time for renovations cost to be recovered					
46LED	Multi-purpose Rm	32	W 32 C F 2 (ELE)	F42LL	60	1.9	SW	2000	3,840	32	4 ft LED Tube	200732x2	30	1.0	none	2,000	1,920	1,920	1.0	\$ 255.01	\$ 5,227.20	-	20.5	20.5					
5	Corridor	5	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.3	Breaker	2125	638	5	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.3	none	2,125	638	-	0.0	\$ -	\$ -	\$ -	-	-					
4LED	Boys Rm	2	28 34 R F 2 (u) (MAG)	FU2EE	72	0.1	sw	1000	144	2	2T 25 R LED	2RTLED	25	0.1	none	1,000	50	94	0.1	\$ 15.85	\$ 405.00	\$ -	25.5	25.5					
4LED	Girls Rm	2	28 34 R F 2 (u) (MAG)	FU2EE	72	0.1	sw	1000	144	2	2T 25 R LED	2RTLED	25	0.1	none	1,000	50	94	0.1	\$ 15.85	\$ 405.00	\$ -	25.5	25.5					
46LED	Corridor	5	W 32 C F 2 (ELE)	F42LL	60	0.3	Breaker	2125	638	5	4 ft LED Tube	200732x2	30	0.2	none	2,125	319	319	0.2	\$ 41.66	\$ 816.75	\$ -	19.6	19.6					
35LED	Music Rm	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	sw	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	occ	2,000	912	1,680	0.6	\$ 207.66	\$ 2,963.25	\$ 20	14.3	14.2					
X4	Music Rm	4	CF26W	CF26/4-L	108	0.4	sw	2400	1,037	4	CF26W	CF26/4-L	108	0.4	occ	2,000	864	173	0.0	\$ 16.76	\$ 128.25	\$ 20	7.7	6.5					
228	Copy Rm	2	W60CF1	F81EL	60	0.1	sw	2125	255	2	W60CF1	F81EL	60	0.1	none	2,125	255	-	0.0	\$ -	\$ -	\$ -	-	-					
228	Main Office	3	W60CF1	F81EL	60	0.2	sw	2400	432	3	W60CF1	F81EL	60	0.2	none	2,400	432	-	0.0	\$ -	\$ -	\$ -	-	-					
105LED	Office	3	W 32 F 1	F41LL	32	0.1	sw	2400	230	3	4 ft LED Tube	200732x1	15	0.0	none	2,400	108	122	0.1	\$ 15.53	\$ 245.03	\$ -	15.8	15.8					
228	Principal	2	W60CF1	F81EL	60	0.1	SW	2400	288	2	W60CF1	F81EL	60	0.1	none	2,400	288	-	0.0	\$ -	\$ -	\$ -	-	-					
233	Custodial Closet	1	R 100 C 1 I	I100/1	100	0.1	sw	500	50	1	CF 26	CFQ26/1-L	27	0.0	none	500	14	37	0.1	\$ 8.77	\$ 20.25	\$ -	2.3	2.3					
228	Nurse	4	W60CF1	F81EL	60	0.2	sw	2400	576	4	W60CF1	F81EL	60	0.2	none	2,400	576	-	0.0	\$ -	\$ -	\$ -	-	-					
7LED	Corridor	9	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.5	Breaker	2125	1,148	9	2T 25 R LED	2RTLED	25	0.2	none	2,125	478	669	0.3	\$ 87.50	\$ 1,822.50	\$ -	20.8	20.8					
7LED	SGI 1	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576	4	2T 25 R LED	2RTLED	25	0.1	none	2,400	240	336	0.1	\$ 42.62	\$ 810.00	\$ -	19.0	19.0					
261LED	1 par spotlight in SGI 1	1	PAR 38 SP	H100/1	100	0.1	sw	2400	240	1	EVO35/10	EVO35/10	39	0.0	none	2,400	94	146	0.1	\$ 18.57	\$ 438.75	\$ -	23.6	23.6					
7LED	SGI 2	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576	4	2T 25 R LED	2RTLED	25	0.1	none	2,400	240	336	0.1	\$ 42.62	\$ 810.00	\$ -	19.0	19.0					
7LED	SGI 3	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576	4	2T 25 R LED	2RTLED	25	0.1	none	2,400	240	336	0.1	\$ 42.62	\$ 810.00	\$ -	19.0	19.0					
7LED	SGI 4	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576	4	2T 25 R LED	2RTLED	25	0.1	none	2,400	240	336	0.1	\$ 42.62	\$ 810.00	\$ -	19.0	19.0					
46LED	Corridor	4	W 32 C F 2 (ELE)	F42LL	60	0.2	Breaker	2125	510	4	4 ft LED Tube	200732x2	30	0.1	none	2,125	255	255	0.1	\$ 33.33	\$ 653.40	\$ -	19.6	19.6					
46LED	Corridor	10	W 32 C F 2 (ELE)	F42LL	60	0.6	Breaker	2125	1,275	10	4 ft LED Tube	200732x2	30	0.3	none	2,125	638	638	0.3	\$ 83.33	\$ 1,633.50	\$ -	19.6	19.6					
35LED	Classroom 126	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	sw	2400	1,944	9	T 38 R LED	RTLED38	38	0.3	occ	2,000	684	1,260	0.5	\$ 155.75	\$ 2,254.50	\$ 20	14.5	14.3					
35LED	Stairway	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	Breaker	3200	864	3	T 38 R LED	RTLED38	38	0.1	none	3,200	365	499	0.2	\$ 59.60	\$ 708.75	\$ -	11.9	11.9					
46LED	Corridor	6	W 32 C F 2 (ELE)	F42LL	60	0.4	Breaker	2125	765	6	4 ft LED Tube	200732x2	30	0.2	none	2,125	383	383	0.2	\$ 50.00	\$ 980.10	\$ -	19.6	19.6					
46LED	Corridor	8	W 32 C F 2 (ELE)	F42LL	60	0.5	Breaker	2125	1,020	8	4 ft LED Tube	200732x2	30	0.2	none	2,125	510	510	0.2	\$ 66.66	\$ 1,306.80	\$ -	19.6	19.6					
35LED	Classroom 121	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	sw	2400	1,944	9	T 38 R LED	RTLED38	38	0.3	occ	2,000	684	1,260	0.5	\$ 155.75	\$ 2,254.50	\$ 20	14.5	14.3					
35LED	Classroom 122	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	sw	2400	1,944	9	T 38 R LED	RTLED38	38	0.3	occ	2,000	684	1,260	0.5	\$ 155.75	\$ 2,254.50	\$ 20	14.5	14.3					
35LED	Classroom 123	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	sw	2400	1,944	9	T 38 R LED	RTLED38	38	0.3	occ	2,000	684	1,260	0.5	\$ 155.75	\$ 2,254.50	\$ 20	14.5	14.3					
46LED	Corridor	13	W 32 C F 2 (ELE)	F42LL	60	0.8	Breaker	2125	1,658	13	4 ft LED Tube	200732x2	30	0.4	none	2,125	829	829	0.4	\$ 108.33	\$ 2,123.55	\$ -	19.6	19.6					
35LED	Classroom 113	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	sw	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	occ	2,000	912	1,680	0.6	\$ 207.66	\$ 2,963.25	\$ 20	14.3	14.2					
35LED	Classroom 114	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	occ	2,000	912	1,680	0.6	\$ 207.66	\$ 2,963.25	\$ 20	14.3	14.2					
35LED	Classroom 115	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	occ	2,000	912	1,680	0.6	\$ 207.66	\$ 2,963.25	\$ 20	14.3	14.2					
35LED	Classroom 116	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	occ	2,000	912	1,680	0.6	\$ 207.66	\$ 2,963.25	\$ 20	14.3	14.2					
35LED	Classroom 117	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	occ	2,000	912	1,680	0.6	\$ 207.66	\$ 2,963.25	\$ 20	14.3	14.2					
35LED	Classroom 118	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	occ	2,000	912	1,680	0.6	\$ 207.66	\$ 2,963.25	\$ 20	14.3	14.2					
35LED	Classroom 119	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	occ	2,000	912	1,680	0.6	\$ 207.66	\$ 2,963.25	\$ 20	14.3	14.2					
35LED	Classroom 120	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	occ	2,000	912	1,680	0.6	\$ 207.66	\$ 2,963.25	\$ 20	14.3	14.2					
35LED	Classroom 121	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	occ	2,000	912	1,680	0.6	\$ 207.66	\$ 2,963.25	\$ 20	14.3	14.2					
35LED	Classroom 112	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240	15	T 38 R LED	RTLED38	38	0.6	occ	2,000	1,140	2,100	0.8	\$ 259.58	\$ 3,672.00	\$ 20	14.1	14.1					
35LED	Classroom 111	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240	15	T 38 R LED	RTLED38	38	0.6	occ	2,000	1,140	2,100	0.8	\$ 259.58	\$ 3,672.00	\$ 20	14.1	14.1					
35LED	Classroom 110	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240	15	T 38 R LED	RTLED38	38	0.6	occ	2,000	1,140	2,100	0.8	\$ 259.58	\$ 3,672.00	\$ 20	14.1	14.1					
35LED	Classroom 109	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240	15	T 38 R LED	RTLED38	38	0.6	occ	2,000	1,140	2,100	0.8	\$ 259.58	\$ 3,672.00	\$ 20	14.1	14.1					
7LED	Teachers Work room	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	SW	2400	432	3	2T 25 R LED	2RTLED	25	0.1	none	2,400	180	252	0.1	\$ 31.97	\$ 607.50	\$ -	19.0	19.0					
35LED	Classroom																												

			EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS						
Field Code	Area Description Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of Fixtures before the retrofit	Standard Fixture Code "Lighting Fixture Code" Example 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Fixt No.)	Exist Control [Pre-inst. control device	Annual Hours Estimated daily hours for the usage group	Annual kWh (kW/Space) * (Annual Hours)	Number of Fixtures after the retrofit	Standard Fixture Code" Example 2T 40 R F(U) = 2'x2' Troff 40 w Recess. Floor 2 lamps U shape	Fixture Code Code from Table of Standard Fixture Wattages	Watts per Fixture Value from Table of Standard Fixture Wattages	kW/Space (Watts/Fixt) * (Number of Fixtures)	Retrofit control device	Annual Hours Estimated annual hours for the usage group	Annual kWh (kW/Space) * (Annual Hours)	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 Cost for renovations to lighting system	NJ Smart Start Lighting Incentive Prescriptive Lighting Measures	Simple Payback With Out Incentive Length of time for renovations cost to be recovered	Simple Payback Length of time for renovations cost to be recovered					
46LED	Multi-purpose Rm	32	W 32 C F 2 (ELE)	F42LL	60	1.9	SW	2000	3,840	32	4 f LED Tube	200732x2	30	1.0	SW	2,000	1,920	1,920	1.0	\$	\$ 255.01	\$ 5,227.20	\$0	20.5	20.5				
5	Corridor	5	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.3	Breaker	2125	638	5	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.3	Breaker	2,125	638	-	0.0	\$	\$ -	\$ -	\$0		#DIV/0!				
4LED	Boys Rm	2	28 34 R F 2 (u) (MAG)	FU2EE	72	0.1	sw	1000	144	2	2T 25 R LED	2RTLED	25	0.1	sw	1,000	50	94	0.1	\$	\$ 15.85	\$ 405.00	\$0	25.5	25.5				
4LED	Girls Rm	2	28 34 R F 2 (u) (MAG)	FU2EE	72	0.1	sw	1000	144	2	2T 25 R LED	2RTLED	25	0.1	sw	1,000	50	94	0.1	\$	\$ 15.85	\$ 405.00	\$0	25.5	25.5				
46LED	Corridor	5	W 32 C F 2 (ELE)	F42LL	60	0.3	Breaker	2125	638	5	4 f LED Tube	200732x2	30	0.2	Breaker	2,125	319	319	0.2	\$	\$ 41.66	\$ 816.75	\$0	19.6	19.6				
35LED	Music Rm	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	sw	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	sw	2,400	1,094	1,498	0.6	\$	\$ 189.97	\$ 2,835.00	\$0	14.9	14.9				
X4	Music Rm	4	CF26W	CF26/4-L	108	0.4	sw	2400	1,037	4	CF26W	CF26/4-L	108	0.4	sw	2,400	1,037	-	0.0	\$	\$ -	\$ -	\$0		#DIV/0!				
228	Copy Rm	2	W60CF1	F81EL	60	0.1	sw	2125	255	2	W60CF1	F81EL	60	0.1	sw	2,125	255	-	0.0	\$	\$ -	\$ -	\$0		#DIV/0!				
3	Main Office	3	W60CF1	F81EL	60	0.2	sw	2400	432	3	W60CF1	F81EL	60	0.2	sw	2,400	432	-	0.0	\$	\$ -	\$ -	\$0		#DIV/0!				
105LED	Office	3	W 32 F 1	F41LL	32	0.1	sw	2400	230	3	4 f LED Tube	200732x1	15	0.0	sw	2,400	108	122	0.1	\$	\$ 15.53	\$ 245.03	\$0	15.8	15.8				
228	Principal	2	W60CF1	F81EL	60	0.1	SW	2400	288	2	W60CF1	F81EL	60	0.1	SW	2,400	288	-	0.0	\$	\$ -	\$ -	\$0		#DIV/0!				
223	Custodial Closet	1	R 100 C 1 1	i100/1	100	0.1	sw	500	50	1	CF 26	CFQ26/1-L	27	0.0	sw	500	14	37	0.1	\$	\$ 8.77	\$ 20.25	\$0	2.3	2.3				
228	Nurse	4	W60CF1	F81EL	60	0.2	sw	2400	576	4	W60CF1	F81EL	60	0.2	sw	2,400	576	-	0.0	\$	\$ -	\$ -	\$0		#DIV/0!				
7LED	Corridor	9	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.5	Breaker	2125	1,148	9	2T 25 R LED	2RTLED	25	0.2	Breaker	2,125	478	669	0.3	\$	\$ 87.50	\$ 1,822.50	\$0	20.8	20.8				
7LED	SGI 1	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576	4	2T 25 R LED	2RTLED	25	0.1	sw	2,400	240	336	0.1	\$	\$ 42.62	\$ 810.00	\$0	19.0	19.0				
261LED	1 par spotlight in SGI 1	1	PAR 38 SP	H100/1	100	0.1	sw	2400	240	1	EV035/10	EVO35/10	39	0.0	sw	2,400	94	146	0.1	\$	\$ 18.57	\$ 438.75	\$0	23.6	23.6				
7LED	SGI 2	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576	4	2T 25 R LED	2RTLED	25	0.1	sw	2,400	240	336	0.1	\$	\$ 42.62	\$ 810.00	\$0	19.0	19.0				
7LED	SGI 3	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576	4	2T 25 R LED	2RTLED	25	0.1	sw	2,400	240	336	0.1	\$	\$ 42.62	\$ 810.00	\$0	19.0	19.0				
7LED	SGI 4	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576	4	2T 25 R LED	2RTLED	25	0.1	sw	2,400	240	336	0.1	\$	\$ 42.62	\$ 810.00	\$0	19.0	19.0				
46LED	Corridor	4	W 32 C F 2 (ELE)	F42LL	60	0.2	Breaker	2125	510	4	4 f LED Tube	200732x2	30	0.1	Breaker	2,125	255	255	0.1	\$	\$ 33.33	\$ 653.40	\$0	19.6	19.6				
46LED	Corridor	10	W 32 C F 2 (ELE)	F42LL	60	0.6	Breaker	2125	1,275	10	4 f LED Tube	200732x2	30	0.3	Breaker	2,125	638	638	0.3	\$	\$ 83.33	\$ 1,633.50	\$0	19.6	19.6				
35LED	Classroom 126	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	sw	2400	1,944	9	T 38 R LED	RTLED38	38	0.3	sw	2,400	821	1,123	0.5	\$	\$ 142.48	\$ 2,126.25	\$0	14.9	14.9				
35LED	Stairway	3	T 32 R F 3 (ELE)	F43ILL/2	90	0.3	Breaker	3200	864	3	T 38 R LED	RTLED38	38	0.1	Breaker	3,200	365	499	0.2	\$	\$ 59.60	\$ 708.75	\$0	11.9	11.9				
46LED	Corridor	6	W 32 C F 2 (ELE)	F42LL	60	0.4	Breaker	2125	765	6	4 f LED Tube	200732x2	30	0.2	Breaker	2,125	383	383	0.2	\$	\$ 50.00	\$ 980.10	\$0	19.6	19.6				
46LED	Corridor	8	W 32 C F 2 (ELE)	F42LL	60	0.5	Breaker	2125	1,020	8	4 f LED Tube	200732x2	30	0.2	Breaker	2,125	510	510	0.2	\$	\$ 66.66	\$ 1,306.80	\$0	19.6	19.6				
35LED	Classroom 121	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	sw	2400	1,944	9	T 38 R LED	RTLED38	38	0.3	sw	2,400	821	1,123	0.5	\$	\$ 142.48	\$ 2,126.25	\$0	14.9	14.9				
35LED	Classroom 122	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	sw	2400	1,944	9	T 38 R LED	RTLED38	38	0.3	sw	2,400	821	1,123	0.5	\$	\$ 142.48	\$ 2,126.25	\$0	14.9	14.9				
35LED	Classroom 123	9	T 32 R F 3 (ELE)	F43ILL/2	90	0.8	sw	2400	1,944	9	T 38 R LED	RTLED38	38	0.3	sw	2,400	821	1,123	0.5	\$	\$ 142.48	\$ 2,126.25	\$0	14.9	14.9				
46LED	Corridor	13	W 32 C F 2 (ELE)	F42LL	60	0.8	Breaker	2125	1,658	13	4 f LED Tube	200732x2	30	0.4	Breaker	2,125	829	829	0.4	\$	\$ 108.33	\$ 2,123.55	\$0	19.6	19.6				
35LED	Classroom 113	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	sw	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	sw	2,400	1,094	1,498	0.6	\$	\$ 189.97	\$ 2,835.00	\$0	14.9	14.9				
35LED	Classroom 114	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	SW	2,400	1,094	1,498	0.6	\$	\$ 189.97	\$ 2,835.00	\$0	14.9	14.9				
35LED	Classroom 115	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	SW	2,400	1,094	1,498	0.6	\$	\$ 189.97	\$ 2,835.00	\$0	14.9	14.9				
35LED	Classroom 116	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	SW	2,400	1,094	1,498	0.6	\$	\$ 189.97	\$ 2,835.00	\$0	14.9	14.9				
35LED	Classroom 117	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	SW	2,400	1,094	1,498	0.6	\$	\$ 189.97	\$ 2,835.00	\$0	14.9	14.9				
35LED	Classroom 118	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	SW	2,400	1,094	1,498	0.6	\$	\$ 189.97	\$ 2,835.00	\$0	14.9	14.9				
35LED	Classroom 119	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	SW	2,400	1,094	1,498	0.6	\$	\$ 189.97	\$ 2,835.00	\$0	14.9	14.9				
35LED	Classroom 120	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	SW	2,400	1,094	1,498	0.6	\$	\$ 189.97	\$ 2,835.00	\$0	14.9	14.9				
35LED	Classroom 121	12	T 32 R F 3 (ELE)	F43ILL/2	90	1.1	SW	2400	2,592	12	T 38 R LED	RTLED38	38	0.5	SW	2,400	1,094	1,498	0.6	\$	\$ 189.97	\$ 2,835.00	\$0	14.9	14.9				
35LED	Classroom 112	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240	15	T 38 R LED	RTLED38	38	0.6	SW	2,400	1,368	1,872	0.8	\$	\$ 237.46	\$ 3,543.75	\$0	14.9	14.9				
35LED	Classroom 111	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240	15	T 38 R LED	RTLED38	38	0.6	SW	2,400	1,368	1,872	0.8	\$	\$ 237.46	\$ 3,543.75	\$0	14.9	14.9				
35LED	Classroom 110	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240	15	T 38 R LED	RTLED38	38	0.6	SW	2,400	1,368	1,872	0.8	\$	\$ 237.46	\$ 3,543.75	\$0	14.9	14.9				
35LED	Classroom 109	15	T 32 R F 3 (ELE)	F43ILL/2	90	1.4	SW	2400	3,240	15	T 38 R LED	RTLED38	38	0.6	SW	2,400	1,368	1,872	0.8	\$	\$ 237.46	\$ 3,543.75	\$0	14.9	14.9				
7LED																													

		EXISTING CONDITIONS										RETROFIT CONDITIONS										COST & SAVINGS ANALYSIS									
	Area Description	No. of Fixtures	Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Exist Control	Annual Hours	Annual kWh		Standard Fixture Code	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Annual Hours	Annual kWh	Annual kWh Saved	Annual kWh Saved	Annual \$ Saved	Retrofit Cost	NJ Smart Start Lighting Incentive	Simple Payback								
Field Code	Unique description of the location - Room number/Room name: Floor number (if applicable)	No. of fixtures before the retrofit	Lighting Fixture Code	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Fixt No.)	Pre-Inst. control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	No. of fixtures after the retrofit	"Lighting Fixture Code" Example 2T 40 R F(U) = 2x2' Troff 40 w Recess. Floor 2 lamps U shape	Code from Table of Standard Fixture Wattages	Value from Table of Standard Fixture Wattages	(Watts/Fixt) * (Number of Fixtures)	Retrofit Control device	Estimated annual hours for the usage group	(kW/Space) * (Annual Hours)	(Original Annual kWh) - (Retrofit Annual kWh)	(Original Annual kWh) - (Retrofit Annual kWh)	(kW Saved) * (\$/kWh)	Cost for renovations to lighting system		Length of time for renovations cost to be recovered	Simple Payback							
46LED	Multi-purpose Rm	32	W 32 C F 2 (ELE)	F42LL	60	1.9	SW	2000	3,840.0	32	W 32 C F 2 (ELE)	F42LL	60	1.9	none	2000	3,840.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
5	Corridor	5	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.3	Breaker	2125	637.5	5	2T 32 R F 2 (u) (ELE)	FU2LL	60	0.3	none	2125	637.5	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
4LED	Boys Rm	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	sw	1000	144.0	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	none	1000	144.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
4LED	Girls Rm	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	sw	1000	144.0	2	2B 34 R F 2 (u) (MAG)	FU2EE	72	0.1	none	1000	144.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
46LED	Corridor	5	W 32 C F 2 (ELE)	F42LL	60	0.3	Breaker	2125	637.5	5	W 32 C F 2 (ELE)	F42LL	60	0.3	none	2125	637.5	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
35LED	Music Rm	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	sw	2400	2,592.0	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	occ	2000	2,160.0	432.0	0.0	\$41.90	\$128.25	\$20.00	3.1	2.6							
X4	Music Rm	4	CF26W	CF26/4-L	108	0.4	sw	2400	1,036.8	4	CF26W	CF26/4-L	108	0.4	occ	2000	864.0	172.8	0.0	\$16.76	\$128.25	\$20.00	7.7	6.5							
228	Copy Rm	2	W60CF1	F81EL	60	0.1	sw	2125	255.0	2	W60CF1	F81EL	60	0.1	none	2125	255.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
228	Main Office	3	W60CF1	F81EL	60	0.2	sw	2400	432.0	3	W60CF1	F81EL	60	0.2	none	2400	432.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
105LED	Office	3	W 32 F 1	F41LL	32	0.1	sw	2400	230.4	3	W 32 F 1	F41LL	32	0.1	none	2400	230.4	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
228	Principal	2	W60CF1	F81EL	60	0.1	SW	2400	288.0	2	W60CF1	F81EL	60	0.1	none	2400	288.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
233	Custodial Closet	1	R 100 C 1 I	i100/1	100	0.1	sw	500	50.0	1	R 100 C 1 I	i100/1	100	0.1	none	500	50.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
228	Nurse	4	W60CF1	F81EL	60	0.2	sw	2400	576.0	4	W60CF1	F81EL	60	0.2	none	2400	576.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
7LED	Corridor	9	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.5	Breaker	2125	1,147.5	9	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.5	none	2125	1,147.5	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
7LED	SGI 1	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576.0	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	none	2400	576.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
261LED	1 per spotlight in SGI 1	1	PAR 38 SP	H100/1	100	0.1	sw	2400	240.0	1	PAR 38 SP	H100/1	100	0.1	none	2400	240.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
7LED	SGI 2	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576.0	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	none	2400	576.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
7LED	SGI 3	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576.0	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	none	2400	576.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
7LED	SGI 4	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	sw	2400	576.0	4	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	none	2400	576.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
46LED	Corridor	4	W 32 C F 2 (ELE)	F42LL	60	0.2	Breaker	2125	510.0	4	W 32 C F 2 (ELE)	F42LL	60	0.2	none	2125	510.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
46LED	Corridor	10	W 32 C F 2 (ELE)	F42LL	60	0.6	Breaker	2125	1,275.0	10	W 32 C F 2 (ELE)	F42LL	60	0.6	none	2125	1,275.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
35LED	Classroom 126	9	T 32 R F 3 (ELE)	F43LL/2	90	0.8	sw	2400	1,944.0	9	T 32 R F 3 (ELE)	F43LL/2	90	0.8	occ	2000	1,620.0	324.0	0.0	\$31.43	\$128.25	\$20.00	4.1	3.4							
35LED	Stairway	3	T 32 R F 3 (ELE)	F43LL/2	90	0.3	Breaker	3200	864.0	3	T 32 R F 3 (ELE)	F43LL/2	90	0.3	none	3200	864.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
46LED	Corridor	6	W 32 C F 2 (ELE)	F42LL	60	0.4	Breaker	2125	765.0	6	W 32 C F 2 (ELE)	F42LL	60	0.4	none	2125	765.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
46LED	Corridor	8	W 32 C F 2 (ELE)	F42LL	60	0.5	Breaker	2125	1,020.0	8	W 32 C F 2 (ELE)	F42LL	60	0.5	none	2125	1,020.0	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
35LED	Classroom 121	9	T 32 R F 3 (ELE)	F43LL/2	90	0.8	sw	2400	1,944.0	9	T 32 R F 3 (ELE)	F43LL/2	90	0.8	occ	2000	1,620.0	324.0	0.0	\$31.43	\$128.25	\$20.00	4.1	3.4							
35LED	Classroom 122	9	T 32 R F 3 (ELE)	F43LL/2	90	0.8	sw	2400	1,944.0	9	T 32 R F 3 (ELE)	F43LL/2	90	0.8	occ	2000	1,620.0	324.0	0.0	\$31.43	\$128.25	\$20.00	4.1	3.4							
35LED	Classroom 123	9	T 32 R F 3 (ELE)	F43LL/2	90	0.8	sw	2400	1,944.0	9	T 32 R F 3 (ELE)	F43LL/2	90	0.8	occ	2000	1,620.0	324.0	0.0	\$31.43	\$128.25	\$20.00	4.1	3.4							
46LED	Corridor	13	W 32 C F 2 (ELE)	F42LL	60	0.8	Breaker	2125	1,657.5	13	W 32 C F 2 (ELE)	F42LL	60	0.8	none	2125	1,657.5	0.0	0.0	\$0.00	\$0.00			#DIV/0!							
35LED	Classroom 113	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	sw	2400	2,592.0	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	occ	2000	2,160.0	432.0	0.0	\$41.90	\$128.25	\$20.00	3.1	2.6							
35LED	Classroom 114	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	SW	2400	2,592.0	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	occ	2000	2,160.0	432.0	0.0	\$41.90	\$128.25	\$20.00	3.1	2.6							
35LED	Classroom 115	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	SW	2400	2,592.0	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	occ	2000	2,160.0	432.0	0.0	\$41.90	\$128.25	\$20.00	3.1	2.6							
35LED	Classroom 116	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	SW	2400	2,592.0	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	occ	2000	2,160.0	432.0	0.0	\$41.90	\$128.25	\$20.00	3.1	2.6							
35LED	Classroom 117	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	SW	2400	2,592.0	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	occ	2000	2,160.0	432.0	0.0	\$41.90	\$128.25	\$20.00	3.1	2.6							
35LED	Classroom 118	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	SW	2400	2,592.0	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	occ	2000	2,160.0	432.0	0.0	\$41.90	\$128.25	\$20.00	3.1	2.6							
35LED	Classroom 119	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	SW	2400	2,592.0	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	occ	2000	2,160.0	432.0	0.0	\$41.90	\$128.25	\$20.00	3.1	2.6							
35LED	Classroom 120	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	SW	2400	2,592.0	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	occ	2000	2,160.0	432.0	0.0	\$41.90	\$128.25	\$20.00	3.1	2.6							
35LED	Classroom 121	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	SW	2400	2,592.0	12	T 32 R F 3 (ELE)	F43LL/2	90	1.1	occ	2000	2,160.0	432.0	0.0	\$41.90	\$128.25	\$20.00	3.1	2.6							
35LED	Classroom 112	15	T 32 R F 3 (ELE)	F43LL/2	90	1.4	SW	2400	3,240.0	15	T 32 R F 3 (ELE)	F43LL/2	90	1.4	occ	2000	2,700.0	540.0	0.0	\$52.38	\$128.25	\$20.00	2.4	2.1							
35LED	Classroom 111	15	T 32 R F 3 (ELE)	F43LL/2	90	1.4	SW	2400	3,240.0	15	T 32 R F 3 (ELE)	F43LL/2	90	1.4	occ	2000	2,700.0	540.0	0.0	\$52.38	\$128.25	\$20.00	2.4	2.1							
35LED	Classroom 110	15	T 32 R F 3 (ELE)	F43LL/2	90	1.4	SW	2400	3,240.0	15	T 32 R F 3 (ELE)	F43LL/2	90	1.4	occ	2000	2,700.0	540.0	0.0	\$52.38	\$128.25	\$20.00	2.4	2.1							
35LED	Classroom 109	15	T 32 R F 3 (ELE)	F43LL/2	90	1.4	SW	2400	3,240.0	15	T 32 R F 3 (ELE)	F43LL/2	90	1.4	occ	2000	2,700.0	540.0	0.0	\$52.38	\$128.25	\$20.00	2.4	2.1							
7LED	Teachers Work room	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	SW	2400	432.0	3	2T 32 R F 2 (u) (ELE) Thin Tube	FU2LL	60	0.2	none	2400	432.0	0.0	0.0</												

APPENDIX D

New Jersey Board of Public Utilities Incentives

- i. Smart Start**
 - ii. Direct Install**
 - iii. Pay for Performance (P4P)**
 - iv. Energy Savings Improvement Plan (ESIP)**
-

I. SMART START



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[About Us](#) | [Press Room](#) | [Library](#)

HOME

RESIDENTIAL

COMMERCIAL, INDUSTRIAL
AND LOCAL GOVERNMENT



[Home](#) » [Commercial & Industrial](#) » [Programs](#)

NJ SmartStart Buildings

Program Overview

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

EQUIPMENT INCENTIVES

FOOD SERVICE EQUIPMENT

APPLICATION FORMS

TOOLS AND RESOURCES

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND
FUEL CELLS

LOCAL GOVERNMENT ENERGY
AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT
PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL
ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM



With New Jersey SmartStart Buildings ...

... A smart start now means better performance later! Whether you're starting a commercial or industrial project from the ground up, renovating existing space, or upgrading equipment, there are unique opportunities to upgrade the energy efficiency of the project.

Special Notice

Enhanced incentives are available for NJ SmartStart Building upgrades in buildings impacted by Hurricane Sandy. Eligible projects receive an additional 50% and new incentives have been added for high efficiency food service equipment.

Visit the Sandy web page for details and important links.

New Jersey SmartStart Buildings can provide a range of support — at no cost to you — for substantial energy savings, both now and for the future. Learn more about:

[Project Categories](#)

[Custom Measures](#)

[Incentives for Qualifying Equipment and Projects](#)

[Program Terms and Conditions](#)

[Find a Trade Ally](#)

Please note: pre-approval is required for almost all energy efficiency incentives. To receive an incentive, you must submit an application form (and applicable worksheets) and receive an approval letter from the program before any equipment is installed (click here for complete Terms and Conditions). Upon receipt of an approval letter, you may proceed to install the equipment listed on your approved application. Equipment installed prior to the date of the approval letter is not eligible for an incentive. **Any customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Getting Started

Submit your project application form as soon as you know you will be doing a construction project or replacing/adding equipment.

PAST PROGRAMS**TOOLS AND RESOURCES****PROGRAM UPDATES****CONTACT US**

Apply for pre-approval by submitting an application for the type of equipment you have or plan to install. The application should be accompanied by a related worksheet, where applicable, manufacturer's specification sheet (refer to the specific program requirements on the background application for specs needed for your project) for the equipment you are planning to install. (Program representatives will review your application package and approve it, reject it, or advise you of upgrades in equipment that will save energy costs and/or increase your incentive.)

Support for Custom Energy-Efficiency Measures

Custom measures allows program participants the opportunity to receive an incentive for energy-efficiency measures that are not on the prescriptive equipment Incentive list, but are project/facility specific.

Incentives for Qualifying Equipment and Projects

Financial incentives are available for large and small projects. These incentives offset some or maybe even all! — of the added cost to purchase qualifying energy-efficient equipment, and provides significant long-term energy savings. Ranges of incentives are available for qualifying equipment (depending on type, size, and efficiency) in several categories.

Find out more about equipment incentives

For specific details on equipment requirements and financial incentives, including incentives for equipment not listed here, contact a program representative. Fiscal year financial incentives will be limited to a maximum of \$500,000 per customer utility account and are available as long as permits are obtained.

[Home](#) | [Residential](#) | [Commercial & Industrial](#) | [Renewable Energy](#)
[About Us](#) | [Press Room](#) | [Library](#) | [FAQs](#) | [Calendar](#) | [Newsletters](#) | [Contact Us](#) | [Site](#)



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At Home, for Business, and for the Future

[About Us](#) | [Press Room](#) | [Library](#)

HOME

RESIDENTIAL

COMMERCIAL, INDUSTRIAL
AND LOCAL GOVERNMENT



COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

EQUIPMENT INCENTIVES

FOOD SERVICE EQUIPMENT

APPLICATION FORMS

TOOLS AND RESOURCES

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND
FUEL CELLS

LOCAL GOVERNMENT ENERGY
AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT
PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL
ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

[Home](#) » [Commercial & Industrial](#) » [Programs](#) » [NJ SmartStart Buildings](#)

Equipment Incentives

Special Notice

Enhanced incentives are available for NJ SmartStart Building upgrades in buildings impacted by Hurricane Sandy. Eligible projects receive an additional 50% and new incentives have been added for high efficiency food service equipment.

Visit the Sandy web page for details and important links.

More reasons for a smart start on your next project!

New Jersey SmartStart Buildings provides **financial incentives for qualifying equipment**. These incentives were developed to help our customers offset some of the added cost to purchase qualifying energy-efficient equipment, which provides significant long-term energy savings. A wide range of incentives are available for qualifying equipment (depending on type, size and efficiency).

Listed below are the types of qualifying equipment and ranges of incentives. For details on equipment requirements and full listings of incentives, refer to the **online application forms**.

Please note that almost all equipment incentives require pre-approval before equipment is installed. (click for exceptions) To start the pre-approval process, submit an Equipment Application, and appropriate Equipment Worksheets, for the type and types of equipment you are planning to install along with equipment specification sheets (refer to the specific program requirements on the back of the application for specific details needed for your project) and a current utility bill(s).

In order to be eligible to receive financial incentives under this Program, Applicants must receive electric and/or gas service from one of the regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.



Electric Chillers

Water-cooled chillers (\$12 - \$170 per ton)

Air-cooled chillers (\$8 - \$52 per ton)

Gas Cooling

Gas absorption chillers (\$185-\$450 per ton)

Gas Engine-Driven Chillers (Calculated through Custom Measure F)

PAST PROGRAMS

TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

Desiccant Systems (\$1.00 per cfm - gas or electric)**Electric Unitary HVAC**

Unitary AC and split systems (\$73 - \$92 per ton)
 Air-to-air heat pumps (\$73 - \$92 per ton)
 Water-source heat pumps (\$81 per ton)
 Packaged terminal AC & HP (\$65 per ton)
 Central DX AC Systems (\$40 - \$72 per ton)
 Dual Enthalpy Economizer Controls (\$250)
 Occupancy Controlled Thermostats (\$75 each)
 A/C Economizing Controls (\$85 - \$170 each)

Ground Source Heat Pumps

Closed Loop (\$450-750 per ton)

Gas Heating

Gas-fired boilers < 300 MBH (\$300 per unit)
 Gas-fired boilers ≥ 300 MBH - 1500 MBH (\$1.75 per MBH)
 Gas-fired boilers ≥ 1500 MBH - ≤ 4000 MBH (\$1.00 per MBH)
 Gas-fired boilers > 4000 MBH (Calculated through Custom Measure)
 Gas furnaces (\$300-\$400 per unit)
 Gas infrared heaters - indoor only (\$300 - \$500 per unit)
 Boiler economizing controls (\$1,200 - \$2,700 per unit)

Variable Frequency Drives

Variable air volume (\$65 - \$155 per hp)
 Chilled-water pumps (\$60 per hp)
 Compressors (\$5,250 to \$12,500 per drive)

Natural Gas Water Heating

Gas water heaters ≤ 50 gallons (\$50 per unit)
 Gas-fired water heaters > 50 gallons (\$1.00 - \$2.00 per MBH)
 Tankless water heaters replacing a free standing water heater > 82 energy factor (\$300 per heater)
 Gas-fired booster water heaters (\$17 - \$35 per MBH)

Premium Motors

Three-phase motors (\$45 - \$700 per motor) (**Incentive was discontinued effective March 1, 2013 except for buildings impacted by Hurricane Sandy. Approved applications will have the standard timeframe from the program commitment date to complete the installation.**)

Refrigerator/Freezer Case Premium Efficiency Motors (ECM)

Fractional (< 1 HP) Electronic Commutated Motors (ECM) (\$40 per for replacement of existing shaded-pole motor in refrigerated/freezer case)

Prescriptive Lighting

New Linear Fluorescent

T-12, HID and Incandescent to T-5 and T-8 (\$25 - \$200 per fixture) (**Note: T12 replacements are only available for buildings impacted by Hurricane Sandy**)

New Induction (\$70 per replaced HID fixture)

New LED

Screw-in/Plug-in (\$10 - \$20 per lamp)

Refrigerator/Freezer Case (\$30 - \$65 per fixture)

Outdoor pole/arm/wall-mounted luminaires (\$100 - \$175 per fixture)

Display case (\$30 per case)

Shelf-mounted display and task (\$15 per linear foot)

Wall-wash, desk, recessed (\$20 - \$35 per fixture)

Parking garage luminaires (\$100 per fixture)

Track or Mono-Point directional (\$50 per fixture)

Stairwell and Passageway luminaires (\$40 per fixture)

High-Bay, Low-Bay (\$150 per fixture)

Bollard (\$50 per fixture)

luminaires for Ambient Lighting of Interior Commercial Space
Linear panels (\$50 per fixture)

Fuel pump canopy (\$100 per fixture)

LED retrofit kits (custom measures)

New Pulse-Start Metal Halide (\$25 per fixture)

Linear Fluorescent Retrofit (\$10 - \$20 per fixture)

Induction Retrofit (\$50 per retrofitted HID fixture)

New Construction/Complete Renovation (performance-based)

Note: Incentives for T-12 to T-5 and T-8 lamps with electronic ballast in facilities (\$10 per fixture, 1-4 lamps) and T-5/T-8 high bay fixtures (\$16 - per fixture) were discontinued effective March 1, 2013 for T-12 retrofits replacements except for buildings impacted by Hurricane Sandy. Approved applications will have the standard timeframe of one year from the project commitment date to complete the installation

Lighting Controls

Occupancy Sensors

Wall mounted (\$20 per control)

Remote mounted (\$35 per control)

Daylight dimmers (\$25 per fixture controlled, \$50 per fixture for office applications only)

Occupancy controlled hi-low fluorescent controls (\$25 per fixture controlled)

HID or Fluorescent Hi-Bay Controls

Occupancy hi-low (\$35 per fixture controlled)

Daylight dimming (\$45 per fixture controlled)

Refrigeration

Covers and Doors

Energy-Efficient doors for open refrigerated doors/covers (\$100 per door)

Aluminum Night Curtains for open refrigerated cases (\$3.50 per linear foot)

Controls

Door Heater Control (\$50 per control)

Electric Defrost Control (\$50 per control)

Evaporator Fan Control (\$75 per control)

Novelty Cooler Shutoff (\$50 per control)

Food Service Equipment

Cooking

Combination Electric Oven/Steamer (\$1,000 per oven)
 Combination Gas Oven/Steamer (\$750 per oven)
 Electric Convection Oven (\$350 per oven)
 Gas Convection Oven (\$500 per oven)
 Gas Rack Oven (\$1,000 single, \$2,000 double)
 Gas Conveyor Oven (\$500 small deck, \$750 large deck)
 Electric Fryer (\$200 per vat)
 Gas Fryer (\$749 per vat)
 Electric Large Vat Fryer (\$200 per vat)
 Gas Large Vat Fryer (\$500 per vat)
 Electric Griddle (\$300 per griddle)
 Gas Griddle (\$125 per griddle)
 Electric Steam Cooker (\$1,250 per steamer)
 Gas Steam Cooker (\$2,000 per steamer)

Holding

Full Size Insulated Cabinets (\$300 per cabinet)
 Three Quarter Size Insulated Cabinets (\$250 per cabinet)
 Half Size Insulated Cabinets (\$200 per cabinet)

Cooling

Glass Door Refrigerators (\$75 - \$150 per unit)
 Solid Door Refrigerators (\$50 - \$200 per unit)
 Glass Door Freezers (\$200 - \$1,000 per unit)
 Solid Door Freezers (\$100 - \$600 per unit)
 Ice Machines (\$50 - \$500 per unit)

Cleaning

Dishwashers (\$400 - \$1,500 per unit)

Other Equipment Incentives*

Performance Lighting (\$1.00 per watt per square foot below program incentive threshold, currently 5% more energy efficient than ASHRAE 2007 for New Construction only.)

Custom electric and gas equipment incentives (not prescriptive)

*Equipment incentives are calculated based on type, efficiency, size, and application and are evaluated on a case-by-case basis. Contact us for details.

Home | Residential | Commercial & Industrial | Renewable Energy
 About Us | Press Room | Library | FAQs | Calendar | Newsletters | Contact Us | Site

II. DIRECT INSTALL



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At Home, for Business, and for the Future

[About Us](#) | [Press Room](#) | [Library](#)

HOME

RESIDENTIAL

COMMERCIAL, INDUSTRIAL
AND LOCAL GOVERNMENT

Home » Commercial & Industrial » Programs

Direct Install

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND
FUEL CELLSLOCAL GOVERNMENT ENERGY
AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT
PROGRAM

DIRECT INSTALL

PARTICIPATION STEPS

PARTICIPATING
CONTRACTORS

SUSTAINABLE JERSEY

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL
ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

NEW JERSEY'S CLEAN ENERGY PROGRAM

DIRECT Install

Let us pay up to 70% of your energy efficiency upgrade.

Sometimes, the biggest challenge to improving energy efficiency is knowing where to and how to get through the process. Created specifically for existing small to medium facilities, Direct Install is a turnkey solution that makes it easy and affordable to upgrade high efficiency equipment. Direct Install is designed to cut your facility's energy costs replacing lighting, HVAC and other outdated operational equipment with energy efficient alternatives. The program pays up to 70% of retrofit costs, dramatically improving your payback on the project. There is a \$125,000 incentive cap on each project.

ELIGIBILITY



Existing small to mid-sized commercial and industrial facilities with a peak electric demand that did not exceed 200 kW in any of the preceding 12 months are eligible to participate in Direct Install. Applicants will submit the last 12 months of electric utility bills indicating that they are below the demand threshold and have occupied the building during that time. Buildings must be located in New Jersey and served by the state's public, regulated electric or natural gas utility companies.

SYSTEMS & EQUIPMENT ADDRESSED BY THE PROGRAM

Lighting
Heating, Cooling & Ventilation (HVAC)
Refrigeration
Motors
Natural Gas
Variable Frequency Drives



Measures eligible for Direct Install are limited to specific equipment categories, types and capacities. Boilers may not exceed 500,000 Btuh and furnaces may not exceed 140,

III. PAY FOR PERFORMANCE (P4P)



Your Power to Save

At Home, for Business, and for the Future

[About Us](#) | [Press Room](#) | [Library](#)

HOME

RESIDENTIAL

COMMERCIAL, INDUSTRIAL
AND LOCAL GOVERNMENT



COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

EXISTING BUILDINGS

PARTICIPATION STEPS

APPLICATIONS AND
FORMS

APPROVED PARTNERS

NEW CONSTRUCTION

FAQS

BECOME A PARTNER

COMBINED HEAT & POWER AND
FUEL CELLS

LOCAL GOVERNMENT ENERGY
AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT
PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

[Home](#) » [Commercial & Industrial](#) » [Programs](#) » [Pay for Performance](#)

Pay for Performance - Existing Buildings

Download program applications and incentive forms.

The Greater the Savings, the Greater Your Incentives

Take a comprehensive, whole-building approach to saving energy in your existing facility. Earn incentives that are directly linked to your savings. Pay for Performance relies on a



program partners who provide technical services under direct contract to you. Acting as your energy expert, your partner will develop a whole-building energy reduction plan for each project with a whole-building technical component of a traditional energy audit, a financial plan for full implementation of energy efficient measures and a construction schedule for installation.

Eligibility

Existing commercial, industrial and institutional buildings with a peak demand over 100 kW for any of the preceding twelve months are eligible to participate including hotels and casinos, large office buildings, family buildings, supermarkets, manufacturing facilities, schools, shopping malls and restaurants. Buildings that fall into the following customer classes are not required to meet the 100 kW demand threshold to participate in the program: hospitals, public colleges and universities, 501(c)(3) non-profit organizations, affordable multifamily housing, and local governmental entities. Your energy reduction plan defines a comprehensive package of measures capable of reducing the existing energy consumption of your building by 15% or more.

Exceptions to the 15% threshold requirement may be made for certain industrial, manufacturing, water treatment and datacenter building types whose annual energy consumption is heavily weighted on process loads. Details are available in the high energy intensity section of this page.

ENERGY STAR Portfolio Manager

Pay for Performance takes advantage of the ENERGY STAR Program with Portfolio Manager, EPA's interactive tool that allows facility managers to track and evaluate energy and water consumption across all of their buildings. The tool provides the opportunity to load in the characteristics and energy usage of your buildings and determine an energy performance benchmark score. You can then assess energy management goals over time, identify strategic opportunities for savings, and receive EPA recognition for superior energy performance.



This rating system assesses building performance by tracking and scoring energy use in your facilities and comparing it to similar buildings. That can be a big help in locating opportunities for cost-justified energy efficiency upgrades. And, based on our findings, you may be invited to participate in the Building Performance with ENERGY STAR initiative and receive special recognition as an industry leader in energy efficiency.

Incentives

**OIL, PROPANE & MUNICIPAL
ELECTRIC CUSTOMERS**

Pay for Performance incentives are awarded upon the satisfactory completion of three p milestones:

EDA PROGRAMS

Incentive #1 - Submittal of complete energy reduction plan prepared by an app program partner - Contingent on moving forward, incentives will be between \$5 \$50,000 based on approximately \$.10 per square foot, not to exceed 50% of th annual energy expense.

SBC CREDIT PROGRAM

Incentive #2 - Installation of recommended measures - Incentives are based on the projected level of electricity and natural gas savings resulting from the installation of comprehensive energy-efficiency measures.

PAST PROGRAMS

TOOLS AND RESOURCES

Incentive #3 - Completion of Post-Construction Benchmarking Report - A completed report verifying energy reductions based on one year of post-

PROGRAM UPDATES

implementation results. Incentives for electricity and natural gas savings will be based on actual savings, provided that the minimum performance threshold of savings has been achieved.

CONTACT US



A detailed Incentive Structure document is available on the applications and form

Steps to Participation

[Click here](#) for a step-by-step description of the program.

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[About Us](#) | [Press Room](#) | [Library](#) | [FAQs](#) | [Calendar](#) | [Newsletters](#) | [Contact Us](#) | [Site](#)



PAY FOR PERFORMANCE APPLICATION FORM

July 1, 2013 - June 30, 2014

Utility Serving Applicant: ☐ Atlantic City Electric ☐ Jersey Central Power & Light ☐ PSE&G
☐ New Jersey Natural Gas ☐ Elizabethtown Gas ☐ Rockland Electric Co. ☐ South Jersey Gas
☐ Other Electric Service Provider (please specify): _____
☐ Other Fuel Provider: _____ ☐ Oil: _____ ☐ Other (Please specify): _____

Instructions

1. Read the program material to determine project qualification.
2. Read the Participation Agreement and sign where indicated.
3. Fill out all applicable spaces on this form.
4. Provide a copy of the customer's company W-9 form.
5. Provide the most recent consecutive 12 month period of utility bills for the project.

6. Provide brief description of facility.
7. Partner must submit the application package via e-mail, mail or fax **DIRECTLY** to the Market Manager – see back of this form.

Approval of this Application is not an approval of the project's scope of work. Scope of work is only approved upon approval of the Energy Reduction Plan. See application and program guidelines for more information.

Customer/Owner Information (payment will be made to entity entered here)

Company Name		Project Contact/Title	
Company Address		City	State Zip
Phone/Fax	E-mail	Federal ID/SSN	

Partner Information

Company Name		Project Contact/Title	
Company Address		City	State Zip
Phone	Fax	E-mail	

Project Information

Project Name			
Building Address		City	State Zip
Utility Account Number(s): Electric		Gas	
* Note: Please use the back of this page for additional utility accounts if quantity exceeds space allotment.			
Annual Peak kW Demand	Building Type		Number of Buildings
Size of Building(s) (gross sq/ft)		Direct, Master or Sub Metered	

Funding

☐ Check the box if an Energy Savings Improvement Program (ESIP) will be a source of funding. ESIP allows government agencies to pay for energy related improvements using the value of the resulting energy savings.

Do you expect to receive funding under any other efficiency programs? ☐ No ☐ Yes If Yes, please specify below:

Utility Program #1 – Utility: _____	Program Name: _____
Utility Program #2 – Utility: _____	Program Name: _____
Federal Program #1 – Organization: _____	Program Name: _____
Federal Program #2 – Organization: _____	Program Name: _____
Other Program – Organization: _____	Program Name: _____

Additional Project information

Additional Utility Account(s)

Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number
Account type	Account number

Additional Comments:

Complete this application form and send it directly to the Commercial/Industrial Market Manager by e-mail, mail or fax.

New Jersey's Clean Energy Program
c/o TRC Energy Services-P4P
900 Route 9 North, Suite 404 • Woodbridge, NJ 07095

Phone: 866-657-6278 • Fax: 732-855-0422
E-mail: P4P@NJCleanEnergy.com

Visit our website: NJCleanEnergy.com/P4P

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*Incentives/Requirements subject to change.



002-FY14-04/14

Pay For Performance-Existing Buildings

Participation Agreement

Definitions:

Design Incentives – Incentives that may be offered to design professionals by the Program.

Design Services – Services that may be offered to design professionals under the Program.

Energy-Efficient Measures – Any device eligible to receive a Program Incentive payment through the NJ Clean Energy Commercial and Industrial Program (New Jersey SmartStart Buildings).

New Jersey Utilities – The regulated electric and/or gas utilities in the State of New Jersey. They are: Atlantic City Electric, Jersey Central Power & Light, Rockland Electric Company, New Jersey Natural Gas, Elizabethtown Gas, PSE&G, and South Jersey Gas.

Administrator – New Jersey Board of Public Utilities, Office of Clean Energy

Participating Customers – Those non-residential electric and/or gas service customers of the New Jersey Utilities who participate in this Program.

Product Installation or Equipment Installation – Installation of the Energy-Efficient Measures.

Projects with a contract threshold of \$14,187 (increasing to \$15,444 effective July 1, 2014) are required to pay no less than prevailing wage rate to workers employed in the performance of any construction undertaken in connection with Board of Public Utilities financial assistance, or undertaken to fulfill any condition of receiving Board of Public Utilities financial assistance, including the performance of any contract to construct, renovate or otherwise prepare a facility, the operations of which are necessary for the receipt of Board of Public Utilities financial assistance. By submitting an application, or accepting program incentives, applicant agrees to adhere to New Jersey Prevailing Wage requirements, as applicable.

Program – The Commercial and Industrial Energy-Efficient Construction Program (New Jersey SmartStart Buildings) offered herein by the New Jersey Board of Public Utilities, Office of Clean Energy pursuant to state regulatory approval under the New Jersey Electric Discount and Energy Competition Act, NJSA 48:3-49, et seq.

Program Incentives – Refers to the amount or level of incentive that the Program provides to Participating Customers pursuant to the Program offered herein (see description under "Incentive Amount" heading).

Program Offer – Program Incentives are available to non-residential retail electric and/or gas service customers of the New Jersey Utilities identified above.

Program Manager – TRC Energy Services.

Application and Eligibility Process – The Program pays incentives after the installation of qualified energy-efficient

measures that were pre-approved (for exceptions to this condition, please refer to "Exceptions for Approval".) In order to be eligible for Program Incentives, a Customer, or an agent (contractor/vendor) authorized by a Customer, must submit a properly completed application package. The package must include an application signed by the customer; a complete (current) utility bill; and technology worksheet and manufacturer's cut sheets (where appropriate). This information must be submitted to the Program Manager before equipment is installed. Applications for measures that are self installed by customers must be submitted by the customer and not the sales vendor of the measure, however, the customer may elect to assign payment of the incentive to the sales vendor. This application package must be received by the Program Manager on or before June 30, 2014 in order to be eligible for the fiscal year July 1, 2013-June 30, 2014 incentives. The Program Manager will review the application package to determine if the project is eligible for a Program Incentive. If eligible, the Customer will receive an approval letter with the estimated authorized incentive amount and the date by which the equipment must be installed in order for the approval to remain in effect. Upon receipt of an approval letter, the Customer may then proceed to install the equipment listed on the approved application. Equipment installed prior to the date of the Program Manager's approval letter is not eligible for an incentive. The Program Manager reserves the right to conduct a pre-inspection of the facility prior to the installation of equipment. This will be done prior to the issuance of the approval letter. All equipment must be purchased within 12 months of date of application. **Any Customer and/or agent who purchases equipment prior to the receipt of an incentive approval letter does so at his/her own risk.**

Exceptions for Approval – The Application and Eligibility Process pertains to all projects except for those involving either Gas Heating, Unitary HVAC or Motors having an incentive amount less than \$5,000 that were installed within 12 months of receipt of the application. These measures, at this incentive level, may be installed without prior approval. In addition, but at the sole discretion of the Program Manager, emergency replacement of equipment may not require a prior approval determination and letter. **In such cases, please notify the Program Manager of such emergencies as early as possible, that an application will soon be sent in that was not pre-approved.**

Post-Installation Approval – After installation is completed, the Customer, or an agent authorized by the Customer, must finalize and submit an invoice for the purchase of the equipment (material cost must be broken out from labor costs), and any other required documentation as specified on the equipment application or in the Program Manager's initial approval letter.

Please refer to the program guide on the NJCleanEnergy.com/ssb website for the complete Application and Eligibility Process.

The Program Manager reserves the right to verify sales transactions and to have reasonable access to Participating Customer's facility to inspect both pre-existing product or equipment (if applicable) and the Energy-Efficient Measures

installed under this Program, either prior to issuing incentives or at a later time.

Energy-Efficient Measures must be installed in buildings located within a New Jersey Utilities' service territory and designated on the Participating Customer's incentive application. Program Incentives are available for qualified Energy-Efficient Measures as listed and described in the Program materials and incentive applications. The Participating Customer must ultimately own the equipment, either through an up-front purchase or at the end of a short-term lease. Design Incentives are available to design professionals as described in the Program materials and applications. A different and separate agreement must be executed by participating design professionals to be eligible for this type of incentive. The design professional does not need to be based in New Jersey.

Equipment procured by Participating Customers through another program offered by New Jersey's Clean Energy Program or the New Jersey Utilities, as applicable, is not eligible for incentives through this program. Customers who have not contributed to the Societal Benefits Charge of the applicable New Jersey Utility are not be eligible for incentives offered through this program.

Incentive Amount – Program Incentives will equal either: a) the approved Program Incentive amount, or b) the actual equipment cost of the Energy-Efficient Measure, whichever is less, as determined by the Program Manager. Products offered at no direct cost to the customer are ineligible. Incomplete application submissions, applications requiring inspections and unanticipated high volume of activities may cause processing delays. Program Incentives are limited to \$500,000 per utility account in a calendar year. Contact the Program Manager regarding any questions.

Tax Liability – The Program Manager will not be responsible for any tax liability that may be imposed on any Participating Customer as a result of the payment of Program Incentives. All Participating Customers must supply their federal tax identification number or social security number to the Program Manager on the application form in order to receive a Program Incentive. In addition, Participating Customers must also provide a Tax Clearance Form (entitled "Business Assistance or Incentive Clearance Certificate") that is dated within 90 days of equipment installation.

Endorsement – The Program Manager and Administrator do not endorse, support or recommend any particular manufacturer, product or system design in promoting this Program.

Warranties – THE PROGRAM MANAGER AND ADMINISTRATOR DO NOT WARRANT THE PERFORMANCE OF INSTALLED EQUIPMENT, AND/OR SERVICES RENDERED AS PART OF THIS PROGRAM, EITHER EXPRESSLY OR IMPLICITLY. NO WARRANTIES OR REPRESENTATIONS OF ANY KIND, WHETHER STATUTORY, EXPRESSED, OR IMPLIED, INCLUDING, WITHOUT LIMITATIONS, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING EQUIPMENT OR SERVICES PROVIDED BY A MANUFACTURER OR VENDOR. CONTACT YOUR VENDOR/SERVICES PROVIDER FOR DETAILS REGARDING PERFORMANCE AND WARRANTIES.

Limitation of Liability – By virtue of participating in this Program, Participating Customers agree to waive any and all claims or damages against the Program Manager or the Administrator, except the receipt of the Program Incentive. Participating Customers agree that the Program Manager's and Administrator's liability, in connection with this Program, is limited to paying the Program Incentive specified. Under no circumstances shall the Program Manager, its representatives, or subcontractors, or the Administrator, be liable for any lost profits, special, punitive, consequential or incidental damages or for any other damages or claims connected with or resulting from participation in this Program. Further, any liability attributed to the Program Manager under this Program shall be individual, and not joint and/or several.

Assignment – The Participating Customer may assign Program Incentive payments to a specified vendor.

Participating Customer's Certification – Participating Customer certifies that he/she purchased and installed the equipment listed in their application at their defined New Jersey location. Participating Customer agrees that all information is true and that he/she has conformed to all of the Program and equipment requirements listed in the application.

Termination – The New Jersey Board of Public Utilities reserves the right to extend, modify (this includes modification of Program Incentive levels) or terminate this Program without prior or further notice.

Acknowledgement – I have read, understood and am in compliance with all rules and regulations concerning this incentive program. I certify that all information provided is correct to the best of my knowledge, and I give the Program Manager permission to share my records with the New Jersey Board of Public Utilities, and contractors it selects to manage, coordinate or evaluate the NJ SmartStart Buildings Program. Additionally, I allow reasonable access to my property to inspect the installation and performance of the technologies and installations that are eligible for incentives under the guidelines of New Jersey's Clean Energy Program.

CUSTOMER'S SIGNATURE
PARTNER SIGNATURE
By signing, I certify that I have read, understand and agree to the Participation Agreement listed above.

IV. ENERGY SAVINGS IMPROVEMENT PLAN (ESIP)



Your Power to Save

At Home, for Business, and for the Future

[About Us](#) | [Press Room](#) | [Library](#)

HOME

RESIDENTIAL

COMMERCIAL, INDUSTRIAL
AND LOCAL GOVERNMENT

COMMERCIAL, INDUSTRIAL AND LOCAL GOVERNMENT

HURRICANE SANDY

PROGRAMS

NJ SMARTSTART BUILDINGS

PAY FOR PERFORMANCE

COMBINED HEAT & POWER AND
FUEL CELLSLOCAL GOVERNMENT ENERGY
AUDIT

LARGE ENERGY USERS PROGRAM

ENERGY SAVINGS IMPROVEMENT
PROGRAM

DIRECT INSTALL

ENERGY BENCHMARKING

OIL, PROPANE & MUNICIPAL
ELECTRIC CUSTOMERS

EDA PROGRAMS

SBC CREDIT PROGRAM

PAST PROGRAMS

TOOLS AND RESOURCES

PROGRAM UPDATES

CONTACT US

Home » Commercial & Industrial » Programs

Energy Savings Improvement Program

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

This Local Finance Notice outlines how local governments can develop and implement an ESIP for their facilities. Below are two sample RFPs:

Local Government
School Districts (K-12)

All RFPs must be submitted to the Board for approval at ESIP@bpu.state.nj.us.

The Board also adopted protocols to measure energy savings:

Measuring Energy Savings
Procedures for Implementation

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. Local units considering an ESIP should carefully review the Local Finance Notice, the law, and consult with qualified professionals to determine how they should approach the task.

The NJ Board of Public Utilities sponsored Sustainable Jersey in the creation of an ESIP Guidebook that explains how to implement the program. The guidebook also includes a list of successful projects and a list of helpful resources.

FIRST STEP – ENERGY AUDIT

For local governments interested in pursuing an ESIP, the first step is to perform an energy audit as prescribed in P.L.2012 c.55.

ENERGY REDUCTION PLANS

If you have an ESIP plan that needs to be submitted to the Board of Public Utilities, please email it to ESIP@bpu.state.nj.us. Please limit the file size to 3MB (or break it into smaller files).

Frankford Township School District
Northern Hunterdon-Voorhees Regional High School
Manalapan Township (**180 MB** - Right Click, Save As)

ESIP PROGRAM

Final version 42413

BPU RULES

1. Public Entity must decide if they will use an ESCO or DIY method or Hybrid thereof prior to issuing the RFP and the RFP must state the intended method. A change in the project procurement model after the RFP closing date will be cause for immediate rejection and disqualification of potential Clean Energy program incentives.
2. RFP procedures shall be adhered to as per the legislation, including the use of BPU approved forms. Any alteration of the forms, without prior approval from the BPU shall be grounds for rejection.
3. RFP must include copy of an audit (ASHRAE Level II w/Level III for lighting) and audit must be prepared by a firm classified by DPMC in the 036 discipline.
4. All firms, including professional services, whether using ESCO or DIY model, must be DPMC classified.
5. If an Architect is engaged by the public entity, the architectural fees are the responsibility of the public entity and must be paid directly to the firm. These fees may be included in the energy cost savings analysis and payback.

ESCO's may contract directly with an architectural firm, in which case the architectural firm serves as a subcontractor to the ESCO and the project related service costs may be included within the project's economic model.

6. Public entity shall conduct pre-bid meetings and site visits per existing statutes.

In the interest of open public bidding transparency, it is a requirement of the BPU that all proposers must attend the pre-proposal bid meeting.

7. There shall be no negative cash flow in any year of the program.
section 7 (1)(a)
"the energy savings resulting from the program will be sufficient to cover the cost of the program's energy conservation measures."
8. SREC values are not permitted to be used in the energy cost savings calculations.
9. Capital cost avoidance values are not to be used in the energy savings calculations.
10. Operational and Maintenance (O&M) cost savings may be permitted in the cost savings calculations, but only with supporting documentation.
11. Blended utility rates shall not be permitted. Use the actual utility tariff or local contracted rates if there is a third party supplier.

For the RFP proposals, the public entity shall define the utility rates in the RFP

12. Contracted third party utility rates may only be used for the term of the contract (5 yr. maximum)
Subsequent years are to be projected at the utility tariff rates plus the annual BPU escalation rates.
13. Public entity shall conduct M&V (measurement and verification) at the one (1) year operational date and shall provide a copy of the M&V report to the Board of Public Utilities.

For the RFP proposals, the ESCO shall provide the cost for the one (1) year M&V only. For comparative purposes, the one year M&V pricing shall be indicated on the proposal Form VI, under the "Annual Service Costs" column. Additional M&V costs are at the discretion of the local unit and are not to be included in the proposal.

14. The decisions made by BPU staff regarding compliance or other issues that arise in connection with the RFP procurement process shall be considered a final decision of the BPU. Any appeal will need to be through the New Jersey Superior Court, Appellate Division.
15. For the RFP proposals only, Demand Response (DR) revenues claimed by ESCO's can only be projected for a maximum period of three (3) years. DR revenue projections beyond three years will not be permitted. DR revenues must be included and presented under the "Energy Rebates/Incentives" column of FORM VI.
16. ESCO "fees" proposed during the RFP phase of the project cannot increase post-award. ESCO's are required to maintain the fee percentages through final contract negotiations and construction of the Board approved Energy Savings Plan
17. Public Bid openings shall be held on the due date of the proposal submissions. The public entity shall announce the name of the bidder and the total dollar amount. After award of a contract, all proposals received will be made available by the owner for public inspection
18. Rejection of bids by the public entity shall be conducted in accordance with the appropriate sections of the applicable legislation, as stated in Title 40A:11-13.2. Additionally all proposals must be returned to the respective ESCO's upon rejection.
19. Field changes that exceed 5% of the project cost require BPU approval.
20. Energy Savings Plans (ESP) that is dependent upon incentives from the Clean Energy Program must review the current program requirements, at the time of application, for each incentive to insure eligibility. If any program incentive is denied, resubmission of all ESIP related forms will be necessary to remain ESIP qualified.

APPENDIX E

Photovoltaic Analysis

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Millburn Township Public School District
Deerfield Elementary School

Cost of Electricity	\$0.150	/kWh
Electricity Usage	265,851	kWh/yr
System Unit Cost	\$4,000	/kW

Photovoltaic (PV) Solar Power Generation - Screening Assessment

Budgetary	Annual Utility Savings				Estimated	Total		New Jersey Renewable	Payback	Payback
Cost					Maintenance	Savings	Federal Tax Credit	** SREC	(without incentive)	(with incentive)
					Savings					
\$	kW	kWh	therms	\$	\$	\$	\$	\$	Years	Years
\$280,000	70.0	91,233	0	\$13,685	0	\$13,685	\$0	\$15,966	20.5	9.4

** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= \$175 /1000kwh

Area Output*
1,935 m2
20,824 ft2

Perimeter Output*
308 m
1,011 ft

Available Roof Space for PV:
(Area Output - 10 ft x Perimeter) x 85%
9,105 ft2

Approximate System Size: Is the roof flat? (Yes/No) Yes
8 watt/ft2
72,844 DC watts
70 kW Enter into PV Watts

PV Watts Inputs***
Array Tilt Angle 20 Enter into PV Watts (always 20 if flat, if pitched - enter estimated roof angle)
Array Azimuth 180 Enter into PV Watts (default)
Zip Code 07041 Enter into PV Watts
DC/AC Derate Factor 0.83 Enter info PV Watts

PV Watts Output
91,233 annual kWh calculated in PV Watts program

% Offset Calc
Usage 265,851 (from utilities)
PV Generation 91,233 (generated using PV Watts)
% offset 34%



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



AC Energy & Cost Savings



(Type comments here to appear on printout; maximum 1 row of 90 characters.)

Station Identification		Results			
Cell ID:	0268370	Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
State:	New Jersey				
Latitude:	40.9 ° N				
Longitude:	74.2 ° W				
PV System Specifications		1	2.65	4890	733.50
DC Rating:	70.0 kW	2	3.47	5792	868.80
DC to AC Derate Factor:	0.830	3	4.83	8595	1289.25
AC Rating:	58.1 kW	4	5.28	8810	1321.50
Array Type:	Fixed Tilt	5	5.93	10052	1507.80
Array Tilt:	20.0 °	6	6.32	10093	1513.95
Array Azimuth:	180.0 °	7	5.87	9500	1425.00
Energy Specifications		8	5.55	9044	1356.60
Cost of Electricity:	15.0 ¢/kWh	9	5.04	8096	1214.40
		10	4.14	7119	1067.85
		11	2.82	4781	717.15
		12	2.46	4460	669.00
		Year	4.54	91233	13684.95
Output Hourly Performance Data		Output Results as Text			
(Gridded data is monthly, hourly output not available.)		Saving Text from a Browser			
Run PVWATTS v.2 for another location		Run PVWATTS v.1			

Please send questions and comments to [Webmaster](#)

[Disclaimer and copyright notice.](#)



RReDC home page (<http://rredc.nrel.gov>)

APPENDIX F

Photos



1: Hot water boiler



2: Hot water system pumps w/o VFDs



3: Classroom unit ventilator manually turned off



4: T-12 and T-8 fluorescent replacement lamps

APPENDIX G

EPA Portfolio Manager



ENERGY STAR® Statement of Energy Performance

47

ENERGY STAR®
Score¹

Deerfield School

Primary Property Function: K-12 School
Gross Floor Area (ft²): 70,084
Built: 1962

For Year Ending: February 28, 2014
Date Generated: May 22, 2014

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

Deerfield School
26 Troy Lane
Short Hills, New Jersey 07078

Property Owner

Millburn Township Public Schools
434 Millburn Avenue
Millburn, NJ 07041
() -

Primary Contact

,
() -

Property ID: 4057367

Energy Consumption and Energy Use Intensity (EUI)

Site EUI

54.3 kBtu/ft²

Annual Energy by Fuel

Electric - Grid (kBtu)	907,084 (24%)
Natural Gas (kBtu)	2,897,600 (76%)

National Median Comparison

National Median Site EUI (kBtu/ft²)	53
National Median Source EUI (kBtu/ft²)	82.1
% Diff from National Median Source EUI	2%

Source EUI

84.1 kBtu/ft²

Annual Emissions

Greenhouse Gas Emissions (Metric Tons CO2e/year)	269
--	-----

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)**