

Energy Performance  
Benchmarking Report For:  
**Example NJ Elementary School**  
Woodbridge, New Jersey

(for the period: *October 2011* through *September 2012*)

Prepared by:



TRC Energy Services, NJCEP C&I Marketing Manager

Report Generated December 2012

## Table of Contents

<b>Background &amp; Findings</b> .....	3
<b>Building Energy Use Data</b>	
▪ Building Summary .....	4
▪ EnergySmart Schools Benchmark Graph.....	4
▪ Monthly Electricity Use & Demand Graph.....	5
▪ Monthly Natural Gas Use Graph.....	5
▪ Carbon Emissions Graph.....	6
<b>Analysis Results</b>	
▪ U.S. EPA Portfolio Manager Score.....	6
▪ Total Energy Use.....	7
▪ Electric Use .....	7
▪ Electric Demand.....	7
▪ Heating Fuel (Natural Gas) Use .....	7
▪ Energy Cost .....	8
▪ Recommendations .....	8
<b>Programs &amp; Incentives</b>	
▪ New Jersey's Clean Energy Program .....	10
▪ Applicable Programs By Building Type .....	10
▪ SmartStart Building Program .....	10
▪ Local Government Energy Audit Program (LGEA) .....	11
▪ Direct Install Program .....	12
▪ Pay For Performance Program .....	13

## **Background & Findings:**

New Jersey's Clean Energy Program (NJCEP), administered by the New Jersey Board of Public Utilities, supports building owners and school facility managers in their pursuit of energy efficiency and sustainability.

This benchmarking assessment is designed to help you:

- Understand how energy is consumed and cost trends at each school building.
- See how these school building(s) compare to other similar school buildings within the New Jersey territory.
- Identify opportunities for improving operations, reducing costs, and participating in relevant Clean Energy incentive programs.

The analysis was based on the information provided on the *Building Data Request Form* submitted, which included building descriptions, energy suppliers and other information. The building's utility bills were also used to assess its electricity and heating fuel consumption for the year(s) provided.

The energy performance for your school has been compared to national data for similar school facilities through EPA's ENERGY STAR® Portfolio Manager. Also shown are the five major benchmarks used to analyze building performance, which include: electricity use; heating fuel use; weather-normalized heating fuel use; total cost; and total cost per student, all of which have been normalized for comparison by square footage and weather.

We have also included graphs to track your monthly electricity use, electricity demand and natural gas use figures. Although the monthly usage graphs do not include comparisons with other schools in New Jersey or nationwide, they give you a clear picture of how your school consumes energy over the course of a year. Monthly figures also tend to be useful for anyone who is interested in performing an onsite energy audit.

As part of the Program's focus on sustainability, your school's carbon footprint is also presented.

In the final pages of this report we have included some recommended next steps and a discussion of the applicable NJCEP programs available to support you, including programs for onsite energy audits.

### Building Summary For Example Elementary School

#### Building Data

District	Example Township Schools	School Name	Example NJ Elementary
City	Woodbridge	Zip Code	07470
Year Built	1963	Floor Area (sq.ft.)	44,765
Number of Students	400	Number of PCs	117
Weekly Operating Hours	60	Months School Used	10
Cooking?	Yes	Percent of Building Cooled	100%

#### Utility Data

Data End Point	9/30/2012	Total Cost (\$)	\$80,183
Electricity Usage (kWh)	424,800	Electricity Cost (\$)	\$63,322
Natural Gas Usage (therms)	19,577	Natural Gas Cost (\$)	\$16,861

#### Energy Indicators

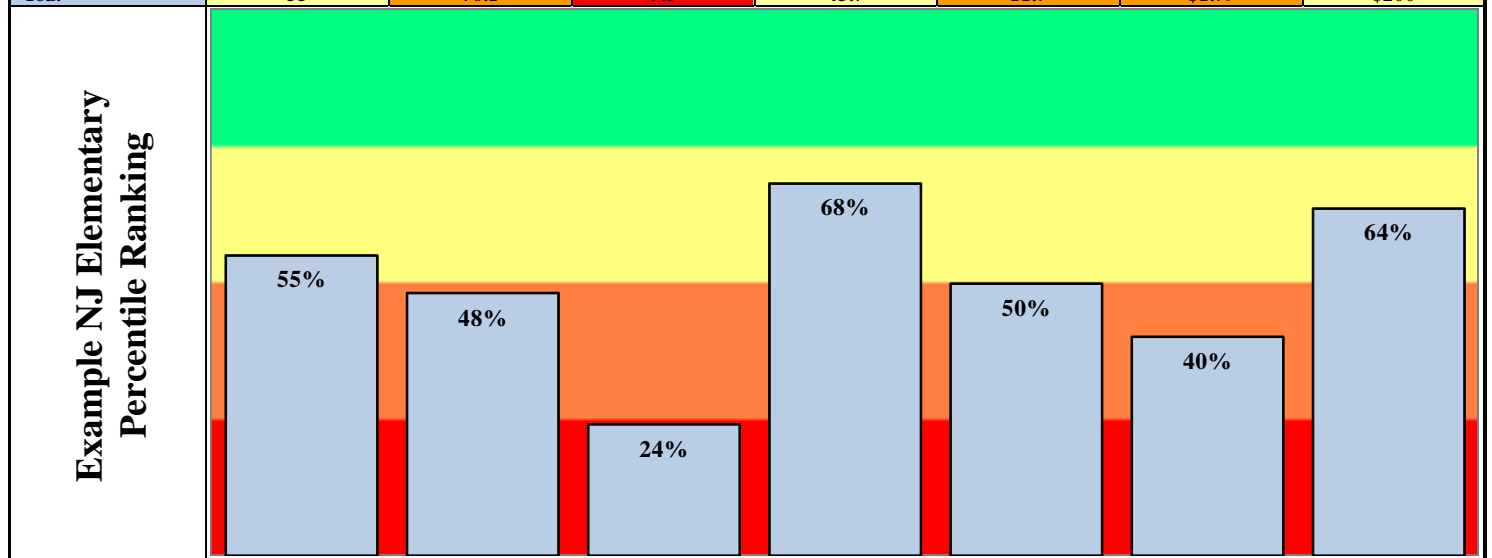
EPA Score	55	Electric Usage (kWh/sq.ft.)	9.5
Natural Gas Usage (kBtu/sq.ft.)	43.7	Weather Adjusted Natural Gas (Btu/sq.ft./HDD)	11.7
Site Energy (kBtu/sq.ft.)	76.1	Source Energy (kBtu/sq.ft.)	153.9

#### Environmental Impact Indicators

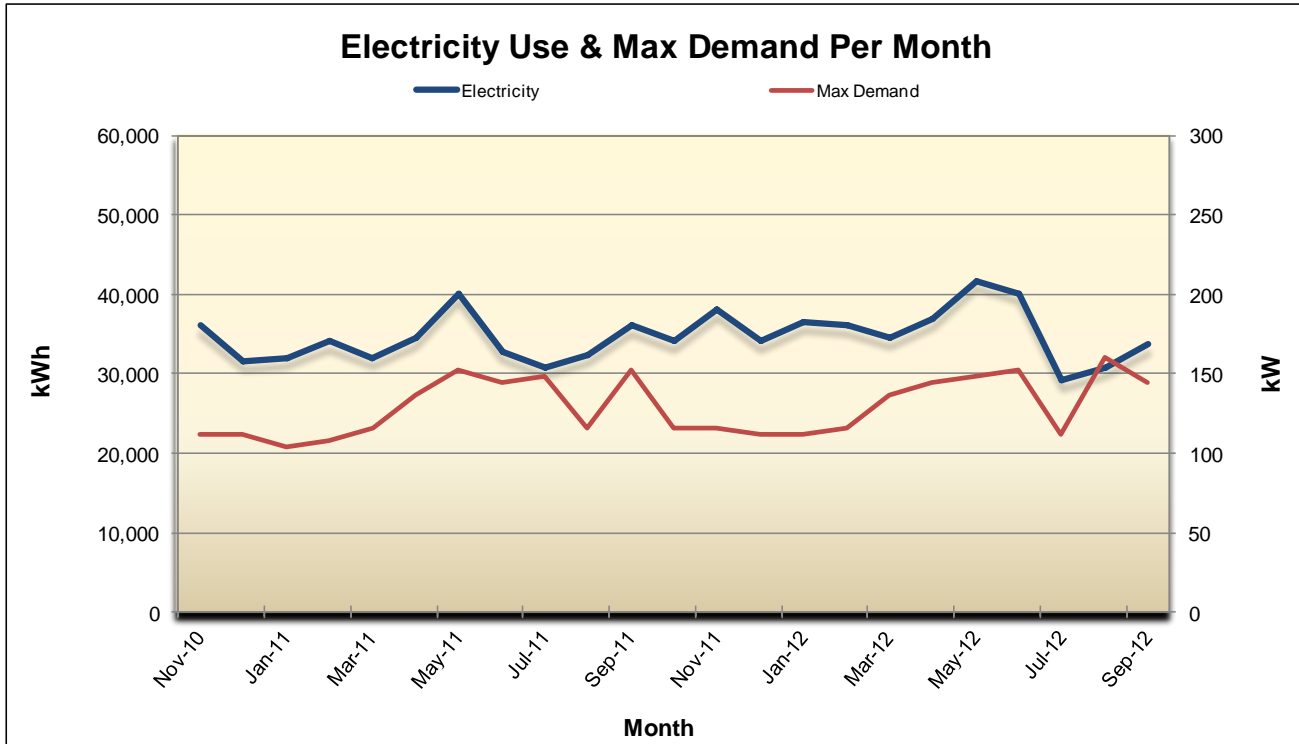
Greenhouse Gas Emissions			
Last Year Natural Gas CO <sub>2</sub> e (Mt)	104	Last Year Total CO <sub>2</sub> e (Mt)	309
Last Year Electricity CO <sub>2</sub> e (Mt)	205	CO <sub>2</sub> e Efficiency Savings Over Baseline Year (Mt)	19
EPA Target Score			
Target Score	75	Site Energy Reduction Needed (kBtu/sq.ft.)	13.4

### EnergySmart Schools Benchmark For Example Elementary School

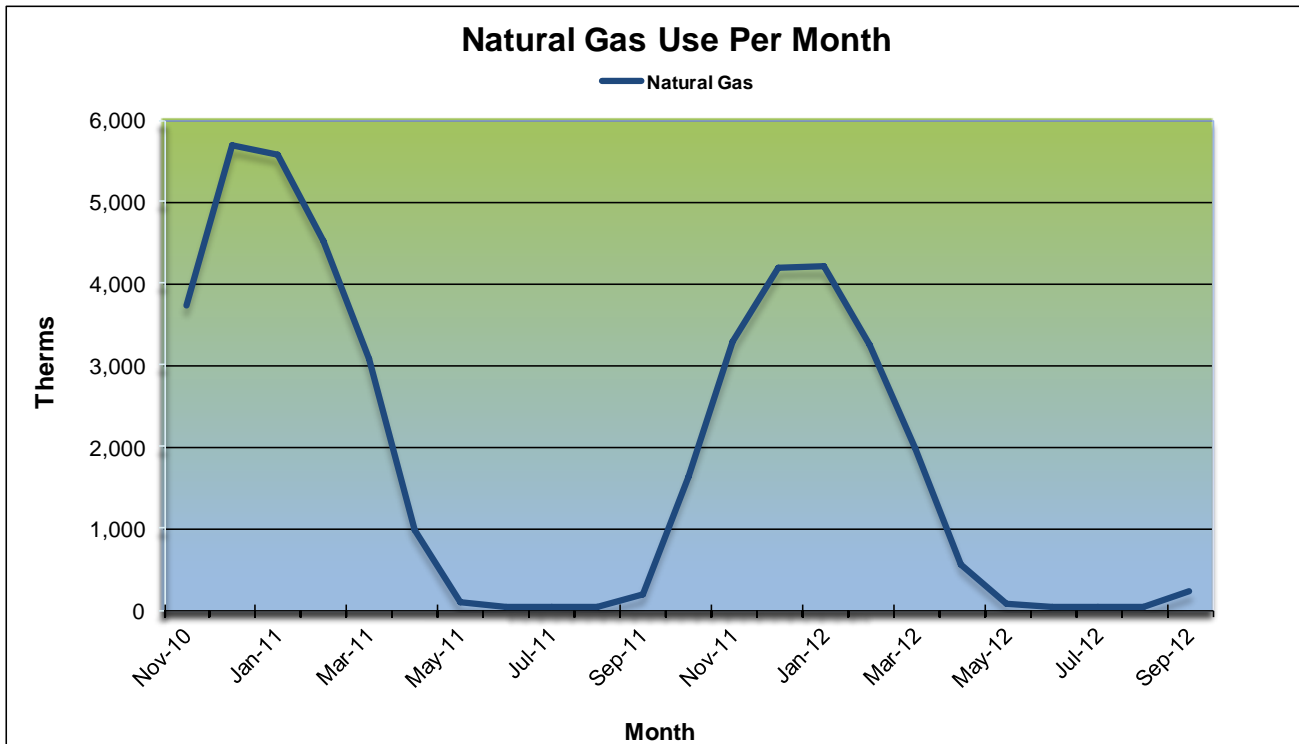
Schools	U.S. EPA Portfolio Manager Score	NJ State Schools (Annual Data)					
		Total Energy Use (kBtu/sq.ft.)	Electric Use (kWh/sq.ft.)	Natural Gas Use (kBtu/sq.ft.)	Weather Adjusted Natural Gas Use (Btu/sq.ft./HDD)	Total Energy Cost (\$/sq.ft.)	Total Energy Cost (\$/student)
NJ Average:	50	74.9	6.5	51.6	11.6	\$1.67	\$237
You:	55	76.1	9.5	43.7	11.7	\$1.79	\$200



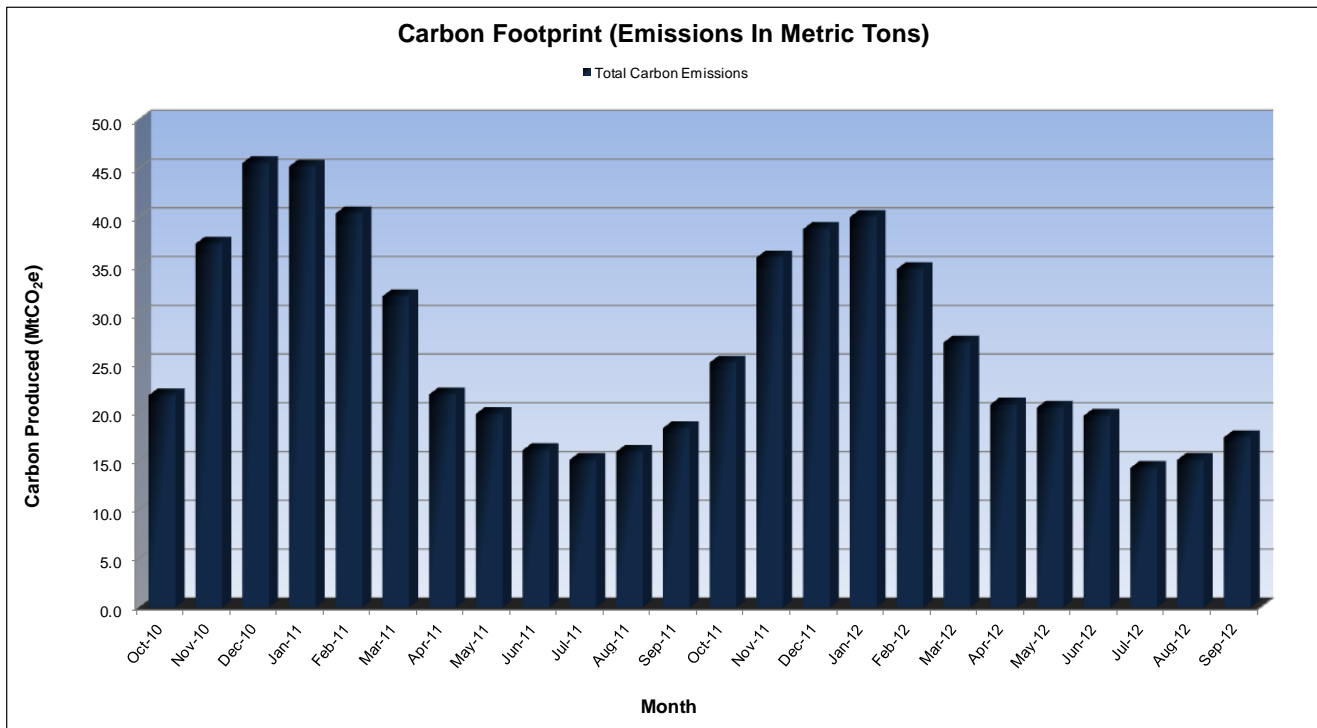
**Monthly Electricity Use & Max Demand For Example Elementary School**



**Monthly Natural Gas Use For Example Elementary School**



### Monthly Greenhouse Gas Emissions For Example Elementary School



### U.S. EPA Portfolio Manager Score:

*Portfolio Manager* is a benchmarking model based on a national set of data from K-12 schools. It is provided by the U.S. Environmental Protection Agency’s ENERGY STAR® Program. The impact of factors outside of your control (such as location, occupancy, and operating hours) are removed, providing a 1-100 ranking of a school’s energy performance relative to the national school building market. A score of 50 represents the national average, and a score of 100 is best. Schools that achieve a score of 75 or higher are eligible for EPA’s ENERGY STAR® Building Label, the national symbol for protecting the environment through energy efficiency.



Your school’s *Portfolio Manager* score of 55 places it higher than 55% of K-12 schools nationwide.

### New Jersey Schools (Annual Data):

The second data set is made up solely of New Jersey K-12 schools for which NJCEP has obtained building characteristics and at least one-year of energy consumption data. Within this data set, we compared your school’s annual energy use with others based on the four main categories listed below. These comparisons allow you to see how you’re doing relative to other buildings designed and constructed to the same New Jersey code standards, operating under the same New Jersey Education Department regulations and schedules, and operating under similar weather conditions - in other words, comparing ‘apples-to-apples’. The indicators are calculated on a per square foot or per student basis, so you can compare yourself to different sized schools.

**Total Energy Use - New Jersey Average is 74.9 kBtu/sq.ft.:**

This indicator shows how much total energy - heating, cooling (if any), lights, cooking, computers, etc. - your school consumes each year.

Your school's total energy use of 76.1 kBtu per square foot per year is higher than 52% of New Jersey K-12 schools. This is a good indicator of how well, overall, your school is performing. However, it doesn't help you find **where** in your building to look for improvement opportunities. The factors below can help with that.

**Electric Use - New Jersey Average is 6.5 kWh/sq.ft.:**

When looking solely at electric consumption, you eliminate the effects of your heating plant. You're now seeing how well the building does with its lights, cooling and cafeteria systems (if any), and what's referred to as "plug load". Plug load is just that - anything that plugs into a socket. In schools, the major plug loads are generally computers (including monitors, printers and copiers), refrigerators, coffee machines, fans, shop equipment, and projectors. If electric consumption is much higher than average, but heating fuel use (see below) is average or better, then you can focus your efforts on the electric-powered elements listed above.

Your school's electric consumption of 9.5 kWh per square foot per year is higher than 76% of New Jersey schools.

**Electric Demand - New Jersey Average is 2.7 Watts/sq.ft.:**

When it comes to electricity, most electric rate structures use two factors to determine what your bill will be. The first factor we discussed above and that is the building's usage. The second factor is known as demand. Demand is the maximum amount of draw that your plug load places on the grid. To give an analogy; if electricity usage is the amount of water going through a hose in gallons, demand would be the pressure of that water in pounds per square inch. There are a number of different ways an electric utility may measure demand. The most common one is that they add up the kW draw that your building places on the electric grid for a 15 minute period. Whichever 15 minute period during your billing cycle places the highest kW demand on the grid that will be the demand factor applied to your bill. The best way to improve this demand factor is to stagger the times when your electrical systems draw at their maximum or reduce unnecessary plug load altogether. In this way you can reduce the maximum draw of your building and reduce the demand factor applied to your bill.

Your school's electric demand of 3.5 Watts per square foot is higher than 78% of New Jersey Schools.

**Heating Fuel Use - New Jersey Average is 51.6 kBtu/sq.ft. or 11.6 Btu/sq.ft./HDD:**

Reviewing these indicators is relatively straightforward. If your school's heating fuel use is much higher than average, an audit of your heating system along with your building envelope - doors, windows, roof - is recommended. This factor is 'fuel-neutral'. That is, it works for either fuel oil or natural gas heating systems.

Your heating fuel use of 43.7 kBtu per square foot per year is lower than 68% of other New Jersey schools in the database. Your weather adjusted heating fuel use of 11.7 Btu per square foot per total annual heating degree days is average compared to other New Jersey schools.

### **Energy Cost - New Jersey Average is \$1.67/sq.ft. and \$237/student:**

Cost is the bottom line. These numbers help you understand how much - in terms of budget - that you have to gain through energy efficiency improvements.

Your annual energy cost of \$1.79 per square foot is higher than 60% of other New Jersey schools. Your cost expressed on a per student basis of \$200 is lower than 64% of other New Jersey schools.

### **Recommendations:**

As you know, energy efficiency is becoming an increasingly large concern in schools as utility prices continue to rise. Since 2003, the price of natural gas has increased by 137%, the price of fuel oil has increased by 93%, and the price of electricity has increased by 12%. NJCEP's programs are designed to help New Jersey tackle these issues with financial and personal support. Accordingly, schools that have participated in similar benchmarking programs in other states have shown a decrease in overall energy use of nearly 20% by using these reports to take proactive and pointed steps to reduce their energy consumption. We hope the following recommendations will help you reduce your energy consumption as well.

Example Elementary School is performing close to average when compared to similar schools nationwide through the EPA's *Portfolio Manager* building rating system and when compared to other schools in the New Jersey utilities territory. While focusing more on energy conservation through electric use, we recommend pursuing a program to identify measures that can be taken to reduce the usage of both heating fuel and electricity.

Suggestions you may find useful in reducing the amount of *electricity* used by this facility with little or no cost to the district:

- Activating the power saving features on office equipment such as copiers, printers and fax machines and ensure that they are turned off at the end of the day.
- Educate students and staff to turn off lights when rooms are unoccupied.
- Reducing set point temperatures for periods when the building will be unoccupied, such as nights weekends and holidays will reduce energy consumption, thus reducing cost. Typically for each degree setback 1-3% energy savings are realized, 8 to 10 degrees is the recommended set-back for unoccupied periods.
- The EPA offers free computer power management software which has saved some districts as much as \$75 per computer per year, the software can be found at [http://www.energystar.gov/index.cfm?c=power\\_mgt.pr\\_power\\_mgt\\_low\\_carbon\\_join](http://www.energystar.gov/index.cfm?c=power_mgt.pr_power_mgt_low_carbon_join).



The next step in reducing electrical consumption is to look at the lighting and HVAC systems of this facility which typically consume 67% of a buildings total energy. Adding occupancy and photo sensors ensures that the lights are never left on when they are not needed. Occupancy sensors can reduce lighting runtime by 2/3's which also leads to significant savings. If this building still uses T12 fluorescent lighting, you should consider a lighting retro-fit.

We recommend ensuring that your HVAC system is properly tuned. A poorly tuned HVAC system can cause over-ventilation of the building. Introducing such measures as Demand Control Ventilation and Economizers cause the HVAC system to run only when building occupancy and indoor air quality levels require ventilation, reducing both electric and heating loads. If these measures are already being used in this facility it is important that they are routinely maintained to ensure proper operation of these systems.

If this hasn't already been done, we recommend air sealing the building to prevent thermal losses through the building envelop. Air sealing is typically the most cost effective way to reduce heating and cooling costs. Typically, corrections are minor and inexpensive to make, such as applying caulk, expandable spray foam, extra insulation, installing gaskets in electrical outlets, doors and windows or adding sheathing in areas where thermal leakage has been identified. The payback on air sealing retrofits is typically well within five years and many times the investment pays for itself in less than a year through reduced utility costs. We recommend contacting a contractor certified by the Building Performance Institute (BPI) to study and seal the sources of air infiltration. Upon identifying sources of thermal leakage, the contractor can provide corrective measures where these issues are identified. A BPI certified contractor can be found through the BPI website: [www.BPI.org](http://www.BPI.org).

In addition to the recommendations covered on the previous page, if the school is interested in any equipment retrofits, the **Pay For Performance Program** would be a good fit. Sometimes, the biggest challenge to improving energy efficiency is knowing where to start and how to get through the process. The Pay for Performance Program helps building owners and facility managers take a comprehensive, whole-building approach to saving energy and earn incentives that are directly linked to savings.

Recommended NJ Clean Energy Program	Systems & Equipment Covered
<p><b>Pay for Performance Program</b></p>	<ul style="list-style-type: none"> <li>• HVAC &amp; Boiler Upgrades</li> <li>• Lighting Upgrades</li> <li>• Lighting Controls</li> <li>• Water Heater Upgrades</li> <li>• Variable Frequency Drives (VFDs) &amp; Controls</li> </ul>

We hope you will find these indicators helpful in making informed decisions on how to proceed with improvements to your building(s). If you could conservatively reduce your total energy use by 10%, Example Elementary could save up to **\$8,000** each year. Several NJCEP programs are available to support your conservation efforts. Please call us at **1-866-NJSMART** and choose option 4 to find out how these programs can help your school.

## New Jersey's Clean Energy Program:

New Jersey's Clean Energy Program (NJCEP) promotes increased energy efficiency and the use of clean, renewable sources of energy including solar, wind, geothermal, and sustainable biomass. The results for New Jersey are a stronger economy, less pollution, lower costs, and reduced demand for electricity. NJCEP offers financial incentives, programs, and services for residential, commercial, and municipal customers. The following pages contain current options available under the program.

## New Jersey's Applicable Programs By Building Type:

Program				
C&I Building Type	NJ SmartStart Buildings	LGEA	Pay for Performance	Direct Install
Small Business	✓			✓
Large Business	✓		✓	
K-12 Education	✓	✓	✓	✓
Higher Education	✓	✓	✓	✓
Small Industrial	✓			✓
Large Industrial	✓		✓	
Hospital/Healthcare	✓		✓	✓
Multifamily	✓		✓	✓
Hospitality	✓		✓	✓
Local Government	✓	✓	✓	✓

## New Jersey's SmartStart Buildings Programs:

NJ SmartStart Buildings provides generous and easy to access financial incentives, for energy efficient measures including high-efficiency lighting and lighting controls, heating and cooling equipment, water heating, motors and variable frequency drives. The program is available to address the new construction and renovation needs of businesses, schools, municipalities, multifamily buildings, and other commercial and industrial facilities.



For large projects (over 50,000 sq. ft.) that are in the conceptual stage, a program representative will work with your design engineering team to implement an integrated approach that maximizes facility quality and energy efficiency.

This three-step process incorporates design incentives to offset project engineering fees related to the analysis of premium-efficiency alternatives.

**Incentives:** Financial incentives for qualifying equipment are available through NJ SmartStart Buildings in either *Prescriptive Incentives* or *Custom Incentives*. 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.

- **Prescriptive Incentives** - Provides preset incentives to install energy-efficient equipment. Eligible gas and electric equipment incentives include: lighting and controls, Unitary HVAC, differential enthalpy economizer controls, motors, variable speed drives, furnaces and hot water heaters, and more.
- **Custom Incentives** - Custom measures allows program participants the opportunity to receive technical assistance to qualify and receive an incentive for unique energy-efficiency measures that are not on the Prescriptive Equipment Incentive list, but are project/facility specific.

Qualifying equipment (depending on type, size and efficiency) include: electric chillers, gas cooling, HVAC, ground source heat pumps, gas heating, variable frequency drives, natural gas water heating, premium motors, prescriptive and performance lighting, and custom gas and electric projects.

For additional information on the SmartStart Building program visit [www.NJCleanEnergy.com/SSB](http://www.NJCleanEnergy.com/SSB), email [NJSSB@njcleanenergy.com](mailto:NJSSB@njcleanenergy.com), or call 1-866-NJSMART.

### **New Jersey's Local Government Energy Audit Program:**

All across New Jersey, residents and business owners are looking for ways to save energy and the environment. Now local governments, as well as NJ State Colleges and Universities, and certain non-profit agencies can take a leadership role by participating in the **Local Government Energy Audit (LGEA) Program** offered as part of New Jersey's Clean Energy Program.



**Eligibility:** The LGEA Program targets municipal and local government owned facilities including, but not limited to, offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. All municipalities and other local governments located in New Jersey are eligible as well as 501 (c)(3) non-profit agencies. The Program requires that participating local government agencies pass a resolution enabling submittal of the program application. Facilities as described above, with a peak electric demand higher than 150 kW in any of the preceding twelve months are eligible to participate in LGEA.

**Incentives:** The Program will subsidize 100% of the audit cost, subject to an annual \$100,000 incentive cap. When your audit is complete, you'll have a list of recommended, cost-effective energy efficiency measures and facility upgrades that will reduce operating expenses and, in many cases, improve the health and productivity of the buildings' occupants. Of course, most of those measures will be eligible for additional incentives available through the NJ SmartStart Buildings Program, Direct Install or Pay for Performance.

For additional information on the LGEA program visit [www.NJCleanEnergy.com/LGEA](http://www.NJCleanEnergy.com/LGEA), email [LGEA@njcleanenergy.com](mailto:LGEA@njcleanenergy.com), or call 1-866-NJSMART.

## **New Jersey's Direct Install Program:**

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



The benefits of the Direct Install Program include: **Minimal Cost**, your share of the project's cost will be approximately 30%, the program pays the remaining 70%. With incentives so dramatic, your upgrade project can very quickly pay for itself. **Fast Turnaround Time**, project installations are typically completed within 90 days from the time of scheduling your energy assessment. **Ongoing Savings**, your new energy-efficient equipment will provide savings for years to come through reduced energy costs on your monthly utility bills.

**Eligibility:** Facilities with a peak electric demand that did not exceed 150 kW in any of the preceding twelve months are eligible to participate in Direct Install. Facilities must be located in New Jersey and served by one of the state's public, regulated electric or natural gas utility companies. Equipment categories eligible for incentives include: lighting, HVAC, natural gas, refrigeration and variable frequency drives. Specific equipment eligible in these categories must be listed on the program's eligible measure lists and also qualify based on the cost-effectiveness of energy savings versus cost as determined by the energy assessment. Boilers may not exceed 500,000 Btuh and furnaces may not exceed 140,000 Btuh. Limitations on packaged HVAC, motors and other equipment also apply. Larger capacity equipment may be eligible for financial incentives through NJ SmartStart Buildings.

**Incentives:** Contractors will perform energy assessments and equipment inventories using program software to identify energy efficiency measures eligible for incentives and will then install qualifying measures according to an installation agreement signed by you, the customer. The program pays up to 70% of retrofit costs. There is a \$75,000 incentive cap on each project.

A limited number of participating contractors have been selected through a competitive bidding process and specially trained and equipped to provide turn-key, start-to-finish program services, which include helping you complete the application/agreement, performing the energy assessment to identify eligible equipment replacements, and then replacing the equipment. A list of these contractors located within your area can be found on the New Jersey Clean Energy website.

For additional information on the Direct Install program visit [www.NJCleanEnergy.com/DI](http://www.NJCleanEnergy.com/DI), email [DirectInstall@njcleanenergy.com](mailto:DirectInstall@njcleanenergy.com), or call 1-866-NJSMART.

## **New Jersey's Pay For Performance Program:**

The **Pay for Performance Program** helps building owners and facility managers take a comprehensive, whole-building approach to saving energy and earn incentives that are directly linked to savings. The Pay for Performance Program is supported by a network of Partners, under direct contract with you. Acting as your energy expert, your Partner will develop an Energy Reduction Plan for each project with a whole-building technical component of a traditional energy audit, a financial plan for funding the energy efficient measures and an installation schedule.



**Eligibility:** Existing commercial, industrial and institutional buildings with an average annual peak demand over 100 kW are eligible to participate including schools, hospitals, hotels and casinos, large office buildings, multi-family buildings, supermarkets, manufacturing facilities, shopping malls and restaurants, and 501(c)(3) non-profits of any size can participate. Your energy reduction plan must define a comprehensive package of measures capable of reducing the energy consumption of your existing building by 15% or more. The New Construction component is designed for new commercial, industrial and multifamily buildings with 50,000 square feet or more of planned space. Construct your building to achieve energy costs 15% below the current energy code with the help of our approved partners and receive incentives.

**Incentives:** Pay for Performance incentives for existing buildings are awarded upon completion of three program milestones and may cover up to 50% of total project cost, or \$2 million, whichever is less. Incentive 1 - Submittal of a complete Energy Reduction Plan prepared by an approved program partner contingent on moving forward. Incentive 2 - Installation of all recommended measures. Incentive 3 - Completion of post-construction benchmarking report. Pay for Performance incentives for new construction projects include Incentive 1 - Submittal of a complete draft Energy Reduction Plan prepared by an approved program partner. Incentive 2 - Submittal of a complete proposed Energy Reduction Plan. Incentive 3 - Submittal of complete as-built Energy Reduction Plan. Incentives cover up to 75% of total project incremental cost or \$2 million, whichever is less.

**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. You can then assess energy management goals over time, identify strategic opportunities for savings and receive EPA recognition for superior energy performance.

**Energy Efficiency Revolving Loan Fund (EE RLF):** New Jersey-based entities (including 501(c)(3) organizations) that have received an approved energy reduction plan under Pay for Performance may be eligible for supplemental financing through the EE RLF. The financing, in the form of low-interest loans, can be used to support up to 80% of total eligible project costs, not to exceed \$2.5 million or 100% of total eligible project costs from all public state funding sources.

For additional information on the Pay for Performance program visit [www.NJCleanEnergy.com/P4P](http://www.NJCleanEnergy.com/P4P), email [P4P@trcsolutions.com](mailto:P4P@trcsolutions.com), or call 1-866-NJSMART.