Updated
Energy Benchmarking Report
For
Sample Central School
Sample Town, NY

(for the period: August 2003 through July 2006)

Prepared by:

Background & Findings

The New York State Energy Research and Development Authority (NYSERDA) developed the *Energy Smart Schools Program* to support New York State K-12 public and private schools in the pursuit of energy efficiency and sustainability. The analysis provided by the *Energy Smart Schools Program* is designed to help your school in three ways:

- Understand the energy consumption and cost trends at each of your buildings,
- See how your buildings are doing compared to other schools locally and nationally, and
- Identify opportunities for improving operations and reducing costs.

The analysis is based on the description of your school that you provided — size, number of students, types of heating & cooling, cooking facilities, number of PCs, etc. Your school's utility bills were also used to assess its electricity and heating fuel consumption for the year(s) provided. A summary table of your school building's, use, and cost information is provided on the following page.

Your building's performance is then compared against two different sets of school energy data: U.S. EPA's national data; and NYSERDA's New York State specific data. The results are illustrated in a graph on the following page for each year provided. The seven major *Energy Smart Schools Benchmarks* represented include: U.S. EPA Score, total energy use, electricity use, heating fuel use, and total cost, all of which have been normalized for comparison by either square footage or number of students. These benchmarks are further explained in the rest of the report.

An additional page of graphs tracks your school's monthly electricity use, electricity demand, and heating fuel use figures. Although the monthly usage graphs do not include comparisons with other schools in New York or nationwide, they give you a clear picture of how your school building 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.

On the last page we have included some recommended next steps and a discussion of the applicable NYSERDA programs available to support you, including programs for onsite energy audits.

Sample Central School Building Summary

Building Data			
District	Sample District	School Name	Sample CS
City	Sample Town	Zip Code	12345
Year Built	1957	Floor Area (sq.ft.)	100,000
Number of Students	400	Number of PCs	250
Weekly Operating Hours	60	Months School Used	10
Cooking?	YES	% AC	5
Pool Size?	N/A	Months Pool Used	N/A

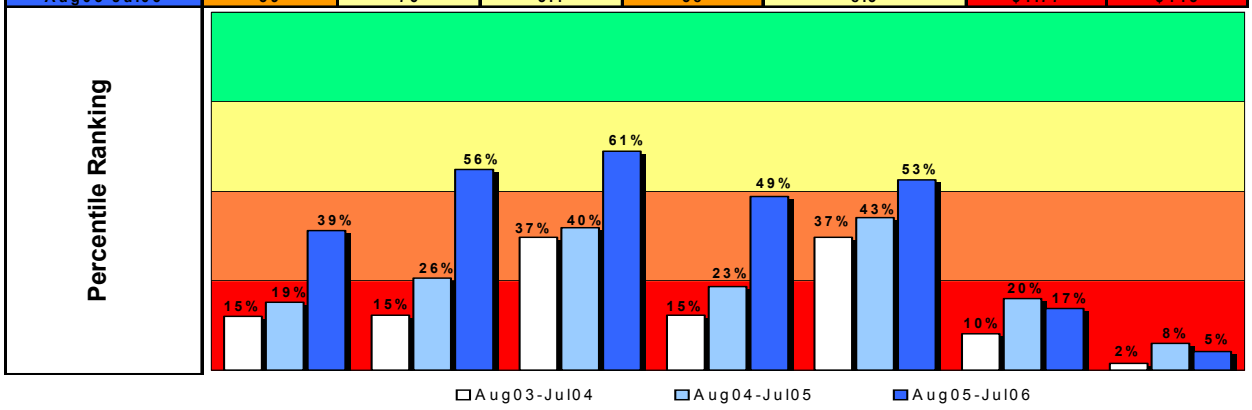
Utility Data			
Data End Point	7/31/2006	Total Cost ($)	177,237
Electricity Usage (kWh)	541,200	Electricity Cost ($)	92,574
Natural Gas Usage (therms)	0	Natural Gas Cost ($)	0
Fuel Oil Usage (gal)	31,567	Fuel Oil Cost ($)	61,602
Other Fuel Usage (gal)	10,419	Other Fuel Cost ($)	23,061

Energy Indicators			
EPA Score	39	Electric Usage (kWh/sq.ft.)	5.4
Heating Fuel Usage (kBtu/sq.ft.)	58	Weather Adjusted Heating Usage (Btu/sq.ft./HDD)	8.3
Site Energy (kBtu/sq.ft.)	76	Source Energy (kBtu/sq.ft.)	113

Environmental Impact Indicators			
Carbon Emissions			
Last Year Heating Fuel CO_2 (tons)	181	Last Year Total CO_2 (tons)	1078
Last Year Electricity CO_2 (tons)	897	CO_2 Efficiency Savings Over Previous Year (tons)	78
EPA Target Score			
Target Score	75	Site Energy Reduction Needed (kBtu/sq.ft.)	24.1

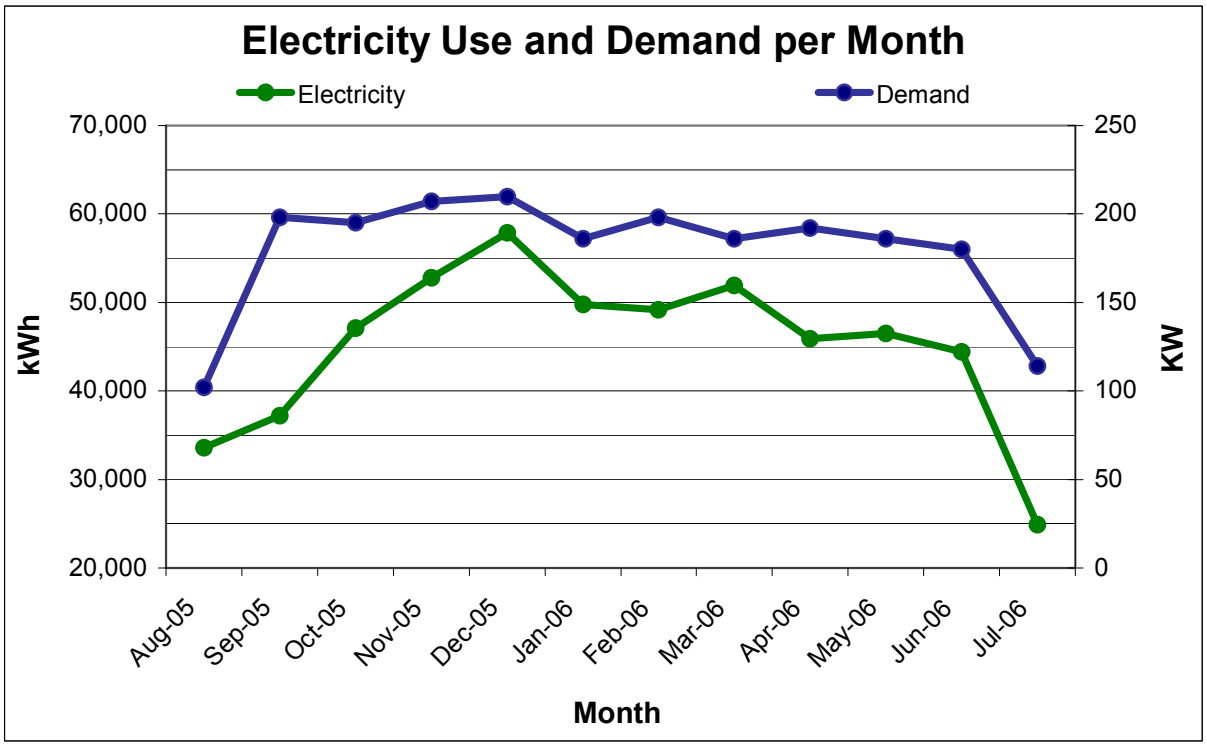
Sample Central School Energy Smart Schools Benchmarks

Schools	U.S. EPA Portfolio Manager Score	New York State Schools (annual data)					
		Total Energy Use (kBtu/sq.ft.)	Electric Use (kWh/sq.ft.)	Heating Fuel Use (kBtu/sq.ft.)	Weather Adjusted Heating Fuel Use (Btu/sq.ft./HDD)	Total Energy Cost ($/sq.ft.)	Total Energy Cost ($/student)
03-04 NY Average	*50*	*81*	*5.9*	*58*	*9.1*	*$1.23*	*$200*
04-05 NY Average	*50*	*80*	*5.8*	*57*	*8.5*	*$1.38*	*$227*
05-06 NY Average	*50*	*80*	*5.8*	*57*	*8.5*	*$1.38*	*$227*
Aug03-Jul04	15	102	6.6	79	10.1	$1.65	$412
Aug04-Jul05	19	92	6.4	70	9.1	$1.71	$428
Aug05-Jul06	39	76	5.4	58	8.3	$1.77	$443

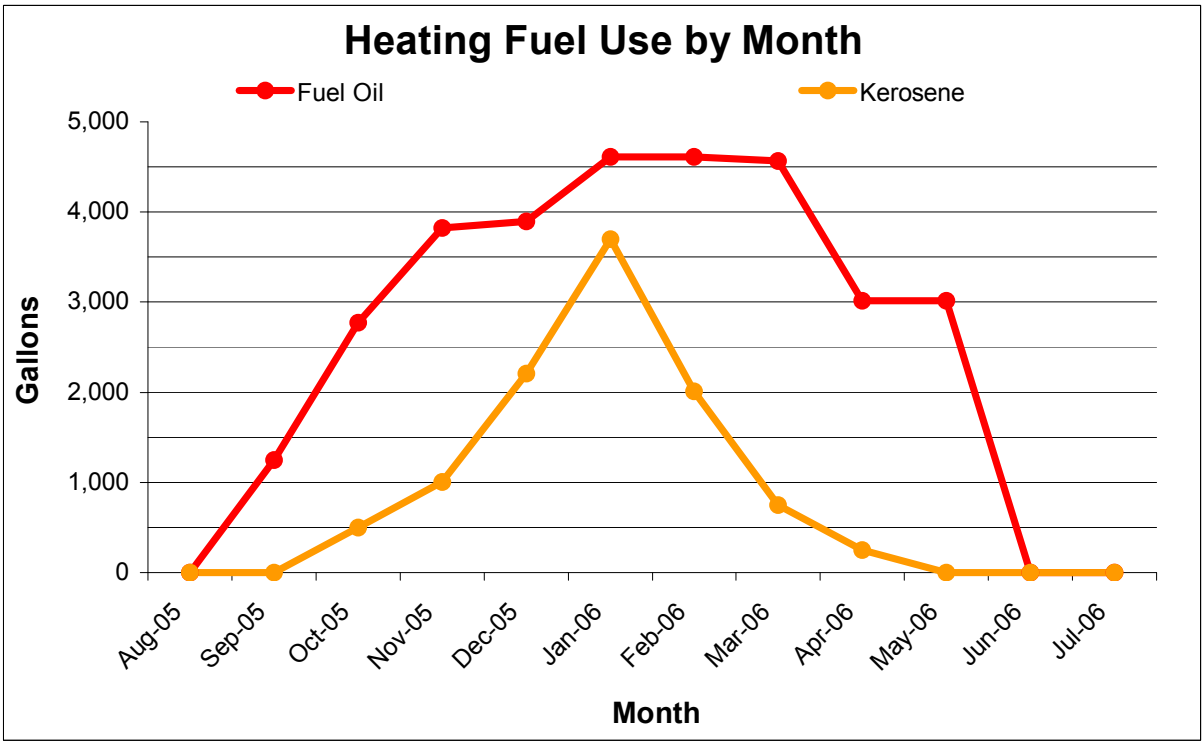


TRC Energy Services is under contract to NYSERDA to manage its Energy Smart Schools Program

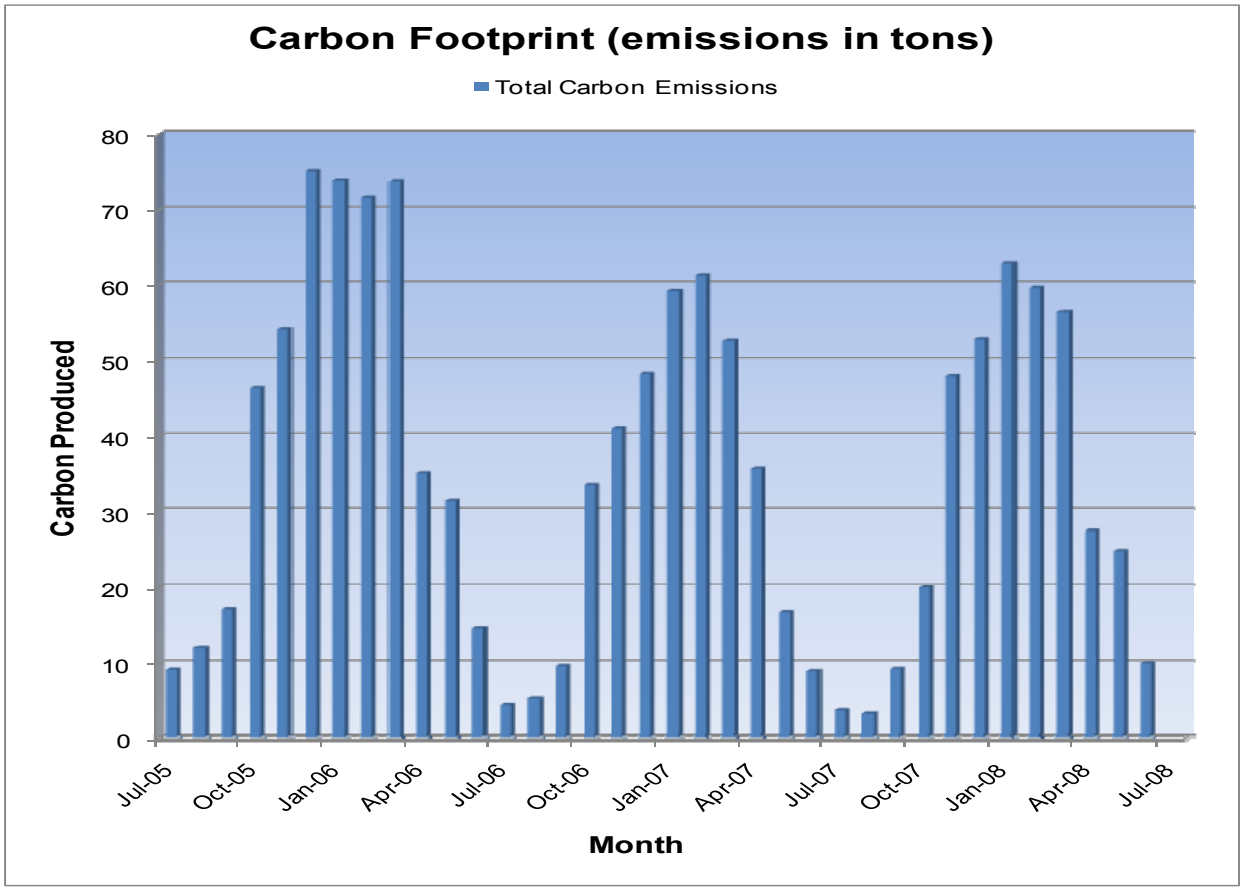
Sample Central School Monthly Electricity Use & Demand



Sample Central School Monthly Heating Fuel Use



Sample Central School Carbon Emissions



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. Districts can achieve ENERGY STAR® Leader Awards in recognition if their buildings, on average, improve by 10 or more points from one year to the next.

Congratulations, this year's *Portfolio Manager* Score of 39 is 20 points higher than last year and 24 points higher than two years ago.

New York State Schools (Annual Data)

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

Total energy use — New York State Average: 80 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 most recent year's total energy use of 76 kBtu per square foot per year is slightly better than average for New York State K-12 schools. This figure is 17% lower than last year and 25% lower than it was two years ago.

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 multiple factors below can help with that.

Electric use — New York State Average: 5.8 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 5.4 kWh per square foot this year is lower than 61% of New York State schools and is 16% lower than it was last year.

Electric Demand — New York State Average: 2.0 kW/sq.ft.

Most electric utilities use two factors to determine what your bill will be. The first factor, discussed above, is the building's usage in kilowatt hours. The second factor is known as demand expressed in kilowatts. Demand is the maximum amount of draw that your building places on the grid. To give an analogy; if electricity usage is the amount of water going through a hose in gallons, electric demand would be how fast that water flows expressed in gallons per minute. An electric utility generally measures demand by adding up the kW draw that your building places on the electric grid for a 15 minute period. Whichever 15 minute period during your monthly billing cycle places the highest kW demand on the grid 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 electric load altogether.

Your school's electric demand of 1.72 kW/sq.ft. is lower than 76% of New York State Schools.

Heating fuel use — New York State Average: 57 kBtu/sq.ft. or 8.5 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 school's heating fuel use of 58 kBtu per square foot this year is average for New York schools. This year's heating fuel use is 17% lower than it was during the 2004-2005 school year and 27% lower than during the 2003-2004 school year. Your school's weather adjusted heating fuel use of 8.3 Btu per square foot per total annual heating degree days this year is also about average for New York schools. This figure is 9% lower than last year and 18% lower than it was two years ago.

Energy cost — New York State Averages: $1.38/sq.ft. and $227/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.

This year's energy cost of $1.77 per square foot ranks among the bottom fifth of New York schools. Furthermore this year's cost expressed on a per student basis of $443 is higher than 95% of New York schools. However, your school's low student density per square foot – approximately just two thirds of the state average – is largely responsible for your high student cost figure. Due to the building's reduced energy consumption, your school has maintained a spending increase of less than 10% over the course of the past three years despite extreme increases in the price of electricity and heating fuels.

Recommendations

As you know, energy efficiency is becoming an increasingly large concern in schools as utility prices continue to rise. Since the inception of the Energy Smart Schools Benchmarking Program in 2003, the price of natural gas has increased by 123%, the price of fuel oil has increased by 107%, and the price of electricity has increased by 32%. NYSERDA's programs are designed to help New York State tackle these issues with financial and personal support. Accordingly, schools that have participated in NYSERDA's Energy Benchmarking Program have shown a decrease in overall energy use of approximately 22%. We hope the following recommendations will help you reduce your energy consumption as well.

A 25% total energy use reduction confirms that Sample CS is moving in the right direction. Your consumption figures are about average for New York State. These **indicators** should be helpful in making informed decisions on how to proceed with improvements to your building(s). Nevertheless, remote benchmarking analysis is not a substitute for on-site, building energy auditing. Furthermore, if you could reduce your total energy use by an additional 10%, you could save up to *$20,000 more each year*. Several NYSERDA programs available to support your efforts, including energy audits, are described on the following page. Please call us at 1-877-442-9181 to find out how these programs can help you save money and improve school conditions.

NYSERDA Programs:

The **Existing Facilities Program** offers incentives for a variety of energy projects including: Pre-Qualified Measures and Performance-Based Incentives for Electric Efficiency, Natural Gas Efficiency, Demand Response, Combined Heat and Power, and Industrial Process Efficiency projects.

— **Pre-Qualified Incentives:** provides a straightforward process to receive incentives for purchasing and installing more energy-efficient equipment. Eligible equipment incentives include: lighting, HVAC, Chillers, motors, variable frequency drives, refrigeration, commercial kitchen equipment and washers, and interval meters. For electric projects, facilities must pay into the Systems Benefits Charge (SBC). Projects can receive a maximum of $30,000 through pre-qualified incentives.

— **Performance-Based Incentives:** New York State K-12 Schools are eligible to participate in both Electrical Efficiency incentives and Gas Efficiency (National Fuel Gas & Con Edison customers only) incentives.
  - **Electric Incentives** are available to customers working on energy efficiency projects that deliver verifiable annual electric energy savings. Actual incentives are determined by the product of annual energy savings and pre-assigned rates ($ / kWh & $ / kW). The total incentives can not exceed 50% of the project cost and are capped at $2,000,000 per facility.
  - **Gas Incentives** are offered to National Fuel Gas and Con Edison customers (or their energy service company) who install natural gas efficiency projects that deliver verifiable annual energy savings. The dollar amount of Gas Efficiency incentives is decided by multiplying annual energy savings by the pre-set rate ($ / Mcf & $ / Therm). Qualifying energy-efficient equipment includes furnaces, boilers, water heaters and process heating equipment. Funding for Con Edison and National Fuel gas customers expires September 30, 2009 and November 30, 2009 respectively.

Technical Assistance (two programs): The **Flexible Technical Assistance (FlexTech)** Program provides technical assistance using 42 pre-selected engineering firms Statewide. Newly added to the FlexTech Program, **Energy Advisor** offers the option of hiring one of NYSERDA's pre-qualified FlexTech consultants to provide cost-shared in-house energy management. Some of the available responsibilities the Energy Manager for Hire will undertake are:

- Identifying no-cost / low-cost energy saving options;
- Identifying cost-effective opportunities for increasing energy efficiency;
- Acting as the owner's representative for energy efficiency projects;
- Developing RFPs / review proposals for energy commodity, products, or services;
- Developing a district-wide energy policy; and
- Coordinating energy management activities and plans;

The **Technical Assistance** Program, works nearly the same except it allows schools to select their own engineering firm to perform the work they need. Both programs provide on a 50/50 cost-share up to a maximum NYSERDA share of $500,000. Under either program, schools can choose from among a variety of the following services to best meet their needs:

- Strategic energy planning;
- Energy use analysis and energy audits;
- Energy supply rate analysis and load aggregation;
- Energy operations and maintenance assessment; and
- Facility recommissioning.

The **Energy Audit Program** provides outreach and technical assistance, including very low cost energy audits, to schools with less than $75,000 in annual electric bills. This assistance is designed to help schools find simple energy upgrade projects.

The **New Construction Program** offers financial incentives to promote energy-efficient design practices for both new buildings and for substantial renovations. Project energy modeling provides estimates of costs and energy savings, and can also include a Green Building analysis.

The **School Power…Naturally** program is aimed at educating students in the use and advantages of renewable sources of energy, particularly solar electric power – photovoltaics or PV. Schools interested in installing a photovoltaic system at their facilities can seek assistance and funding through NYSERDA's PON 1050 – **Solar Electric Incentive Program**. Some of the general program rules and incentives are as follows:

- Incentives are only eligible for PV systems installed by an Eligible Installer;
- Incentives are paid directly to Eligible Installers, but must be passed on in the full amount to the customer;
- Incentives are available for systems installed for qualified customers. Qualified customers are those who pay the Renewable Portfolio Standard (RPS)/Systems Benefits Charge (SBC) as part of their electricity bill.
- Incentives are only available for new equipment and PV Systems that have not been installed (partially or completely) prior to NYSERDA approval of an incentive application submitted in accordance with the terms and conditions of this Program.

The **Energy Smart Students** program seeks to educate teachers, students, and their families about energy saving methods that can be implemented into their day-to-day routines. The Program provides opportunities to learn about energy and its impact on the environment and the economy. It offers support for classroom lessons in energy and energy efficiency.