



Energy Benchmarking Report for Moss School Metuchen, *NJ*

(for the period: January 2007 through December 2008)

Prepared by:



Background & Findings

The New Jersey Clean Energy Program (NJCEP) developed the *TEACH Program* to support New Jersey K-12 public schools in the pursuit of energy efficiency. The analysis provided by the *TEACH Program* is designed to help you 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.

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

We then compared your school's information against two different sets of school energy data: U.S. EPA's national data and NJCEP's New Jersey data. The results are illustrated in a graph on the following page for each year provided. The seven major *TEACH Program 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 monthly electricity use, electricity demand, and heating fuel 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.

On the last page 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.

Moss School Building Summary

Building Data			
District	Metuchen SD	School Name	Moss School
City	Metuchen	Zip Code	08840
Year Built	1927	Floor Area (sq.ft.)	30,483
Number of Students	154	Number of PCs	32
Weekly Operating Hours	60	Months School Used	10
Cooking?	NO	% AC	20
Pool Size?	N/A	Months Pool Used	0

Utility Data			
Data End Point	12/31/2008	Total Cost (\$)	100,657
Electricity Usage (kWh)	341,680	Electricity Cost (\$)	53,956
Natural Gas Usage (therms)	28,636	Natural Gas Cost (\$)	46,701
Fuel Oil Usage (gal)	0	Fuel Oil Cost (\$)	0
Other Fuel Usage (gal)	0	Other Fuel Cost (\$)	0

Energy Indicators			
EPA Score	1	Electric Usage (kWh/sq.ft.)	11.2
Heating Fuel Usage (kBtu/sq.ft.)	94	Weather Adjusted Heating Usage (Btu/sq.ft./HDD)	20.1
Site Energy (kBtu/sq.ft.)	132	Source Energy (kBtu/sq.ft.)	211

Environmental Impact Indicators			
Carbon Emissions			
Last Year Heating Fuel CO ₂ (tons)	166.8	Last Year Total CO ₂ (tons)	306.7
Last Year Electricity CO ₂ (tons)	139.9	CO ₂ Efficiency Savings Over Previous Year (tons)	26.5
EPA Target Score			
Target Score	75	Site Energy Reduction Needed (kBtu/sq.ft.)	87.7

Moss School Energy Smart Schools Benchmarks

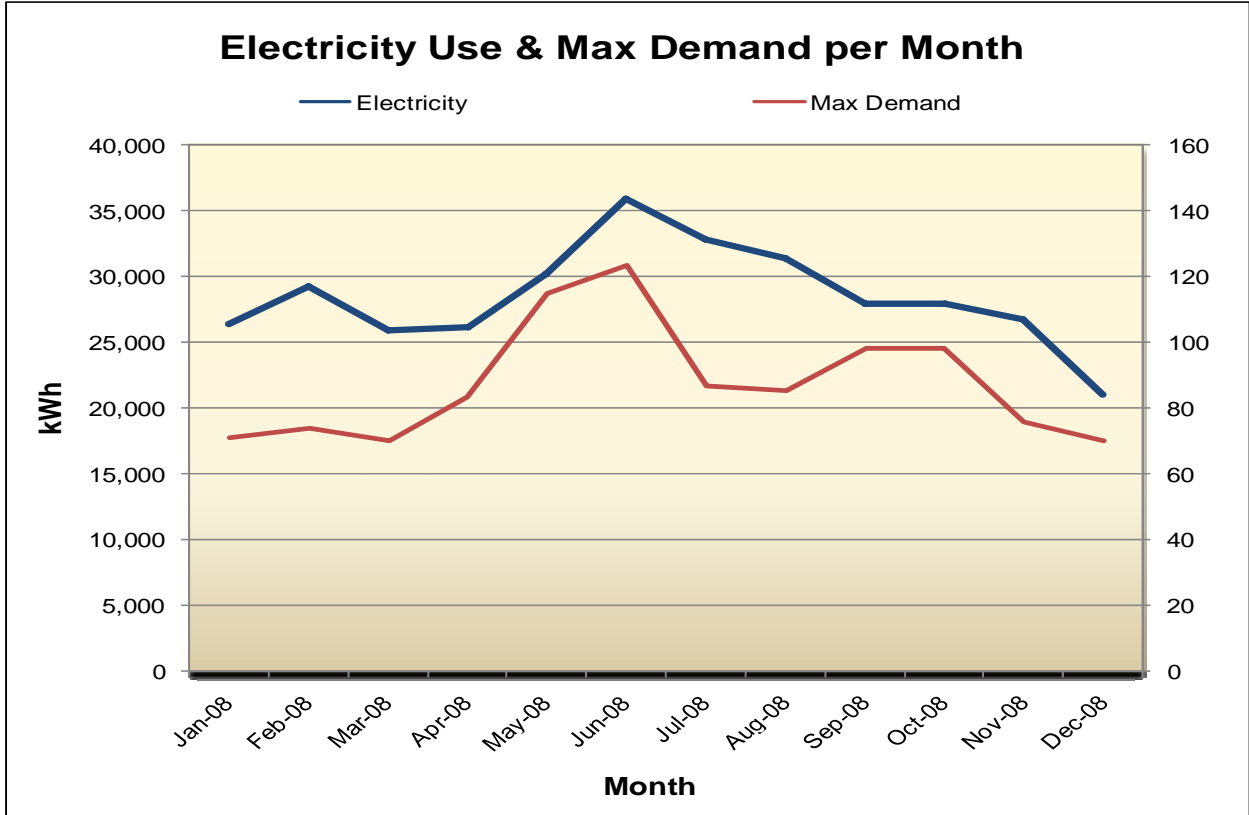
Schools	U.S. EPA Portfolio Manager Score	New Jersey State Schools (annual data)					
		Total Energy Use (kBtu/sq.ft.)	Electric Use (kWh/sq.ft.)	Heating Fuel Use (kBtu/sq.ft.)	Weather Adjusted Heating Fuel Use (Btu/sq.ft./HDD)	Total Energy Cost (\$/sq.ft.)	Total Energy Cost (\$/student)
<i>2008 NJ Average</i>	50	77	5.7	53	11.6	\$1.86	\$225
2007	1	148	11.0	110	23.0	\$3.45	\$682
2008	1	132	11.2	94	20.1	\$3.30	\$654

Percentile Ranking	2008

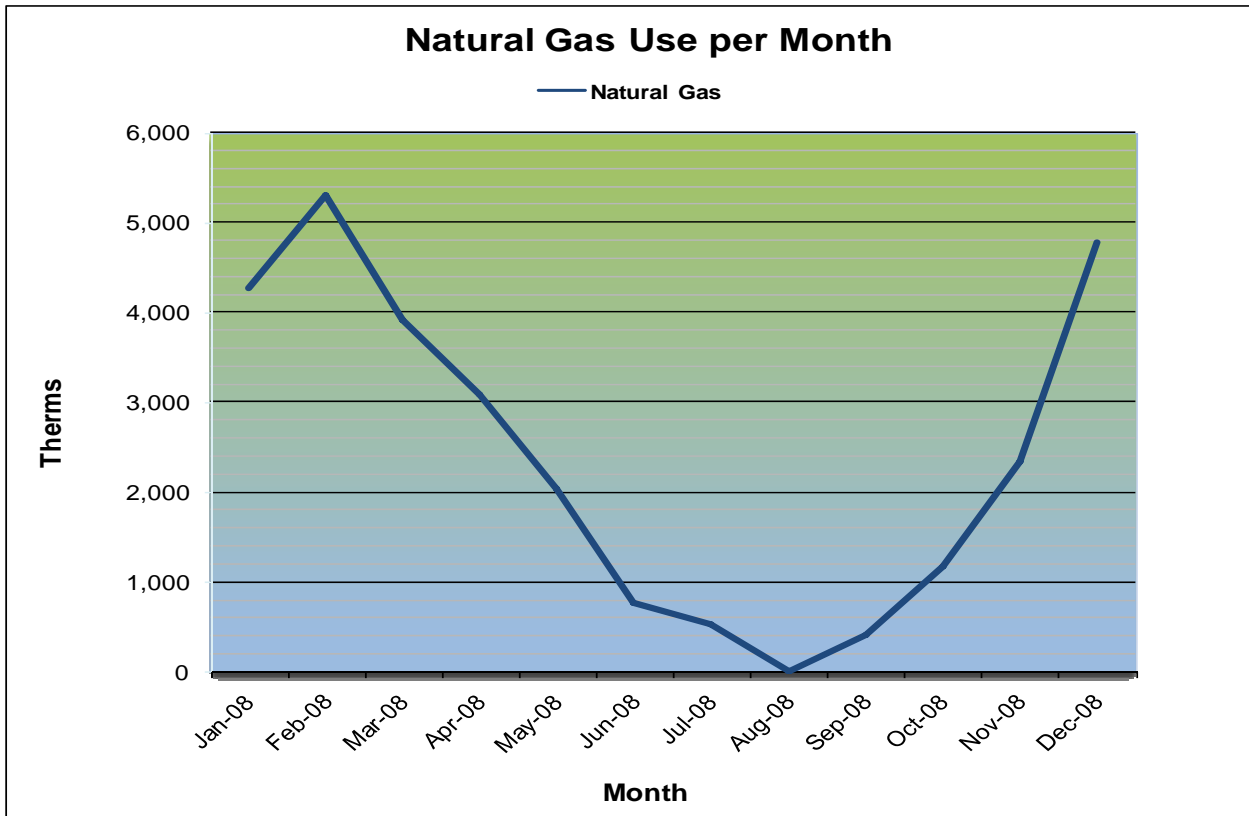
TRC Energy Services is under contract to NJCEP as the Market Manager for the TEACH Program.



Moss School Monthly Electricity Use & Maximum Demand

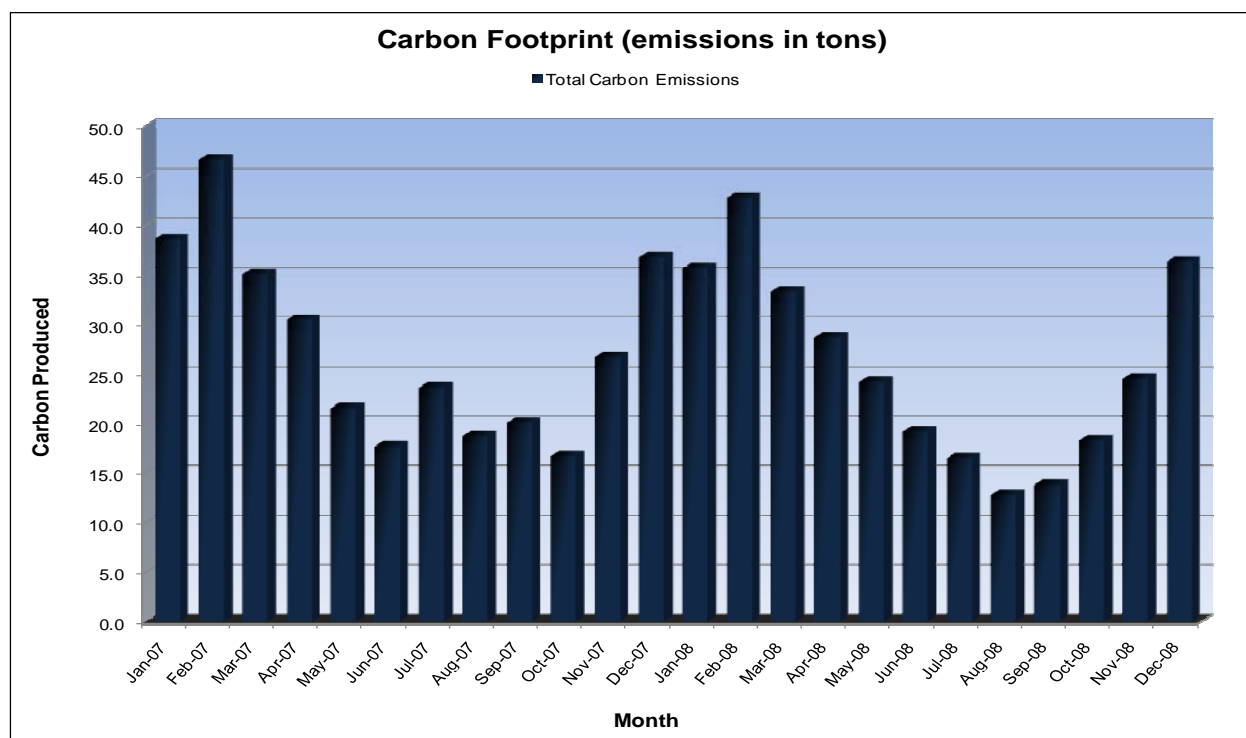


Moss School Monthly Heating Fuel Use



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Moss School Monthly 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 recognition as an ENERGY STAR® Leader if their buildings on average improve by 10 percent or more from one year to the next.

Your school's *Portfolio Manager* score of 1 places it higher than 1% 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 codes 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.

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Total energy use — New Jersey Average: 77 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 132 kBtu per square foot per year is among the highest of all 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 two factors below can help with that.

Electric use — New Jersey Average: 5.7 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 11.2 kWh per square foot per year is higher than 94% of New Jersey schools.

Electric Demand — New Jersey Average: 2.6 W/sq.ft.

When it comes to electricity, most electric rate structures use 2 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 4.04 Watts per square foot is higher than 94% of New Jersey K-12 schools.

Heating fuel use — New Jersey Average: 53 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 94 kBtu per square foot per year is among the highest of all New Jersey schools in the database. Your weather adjusted heating fuel use of 20.1 Btu per square foot per total annual heating degree days is among the highest of all New Jersey schools benchmarked.

Energy cost — New Jersey Averages: \$1.86/sq.ft. and \$225/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 \$3.30 per square foot is among the highest of all New Jersey schools benchmarked. Your cost expressed on a per student basis of \$654 is among the highest of all New Jersey schools benchmarked.

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.

Each of the major energy use parameters presents significant opportunities for improvement and savings throughout the Moss School. We strongly recommend following through with an onsite energy audit. Energy conservation studies covering all systems, plus plug load and the building envelope may help building staff in identifying potential low-cost/no-cost opportunities for improvement. Such improvements may include building heating system schedules, night set-backs, and set points; as well as window seals plus door closers and sweeps. As far as improving electric use, savings could be realized through low-cost measures such as occupancy sensors and no-cost measures such as ensuring that computers and other office equipment is shut down at the end of the day. The EPA offers computer power management software for download at no cost. While 70% of computer monitors use power saving software only 5% of computers utilize this feature, schools that have implemented the use of the EPA computer power management tool have realized savings as high as \$75 per computer annually. The EPA EZ GPO tool can be found at:

http://www.energystar.gov/index.cfm?c=power_mgt.pr_power_management

A 15%-20% improvement to this school's total annual energy consumption could save the district \$15,000-\$20,000 per year. We also recommend providing a copy of this report to your auditing firm which will allow them to provide the most cost-effective service to you.

We hope you will find these indicators helpful in making informed decisions on how to proceed with improvements to your building. Nevertheless, remote benchmarking analysis is not a substitute for onsite, building energy auditing. Several NJCEP programs available to support your efforts, including energy audits, are described on the following page.

Please call us at 1-866-NJSMART and choose option 4 to find out how these programs can help you save money and improve school conditions.

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NJCEP Smart Start Buildings Programs:

The **New Jersey SmartStart Buildings Program** offers different ways to obtain financial incentives for energy-efficiency projects:

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.

The **Local Government Energy Audit Program** provides incentives for investment grade energy audits to schools and local governments. The program pays 75% of the cost of the audit upon completion, and the remaining 25% of the cost of the audit if efficiency measures are implemented, up to \$100,000 per calendar year.

The **Direct Install Program** is a comprehensive approach that enables a customer to identify and replace inefficient equipment. Systems and equipment eligible for incentives include lighting, controls, refrigeration, HVAC, motors, variable speed drives, natural gas and food service. Delivered through pre-qualified contractors, Direct Install will pay up to 80% of the installed cost of energy efficient upgrades.

The **Pay for Performance Program** is directed at large existing facilities. Customers contract directly with a prequalified program partner. Customers can then earn incentives based on development of an energy reduction plan, installation of efficient measures, and proven energy reduction subject to measurement and verification.