Energy Benchmarking Report for
Wood Elementary School
Millville, NJ

(for the period: **June 1, 2008** through **May 31, 2009**)

Prepared by:

TRC

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.

In the last section 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.

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Wood Elementary School - Building Summary

Building Data			
District	Millville	School Name	Wood Elementary School
City	Millville	Zip Code	08332
Year Built	1915	Floor Area (sq.ft.)	40,000
Number of Students	259	Number of PCs	79
Weekly Operating Hours	50	Months School Used	10
Cooking?	YES	% AC	100
Pool Size?	N/A	Months Pool Used	0
Utility Data			
Data End Point	5/31/2009	Total Cost ($)	74,268
Electricity Usage (kWh)	312,928	Electricity Cost ($)	45,165
Natural Gas Usage (therms)	18,927	Natural Gas Cost ($)	29,103
Fuel Oil Usage (gal)	0	Fuel Oil Cost ($)	0
Other Fuel Usage (gal)	0	Other Fuel Cost ($)	0
Energy Indicators			
EPA Score	65	Electric Usage (kWh/sq.ft.)	7.8
Heating Fuel Usage (kBtu/sq.ft.)	47.3	Weather Adjusted Heating Usage (Btu/sq.ft./HDD)	10.0
Site Energy (kBtu/sq.ft.)	74.0	Source Energy (kBtu/sq.ft.)	129
Environmental Impact Indicators			
Carbon Emissions			
Last Year Heating Fuel CO_2 (tons)	110.0	Last Year Total CO_2 (tons)	281.4
Last Year Electricity CO_2 (tons)	171.4	CO_2 Efficiency Savings Over Previous Year (tons)	N/A (initial benchmark)
EPA Target Score			
Target Score	75	Site Energy Reduction Needed (kBtu/sq.ft.)	7.3

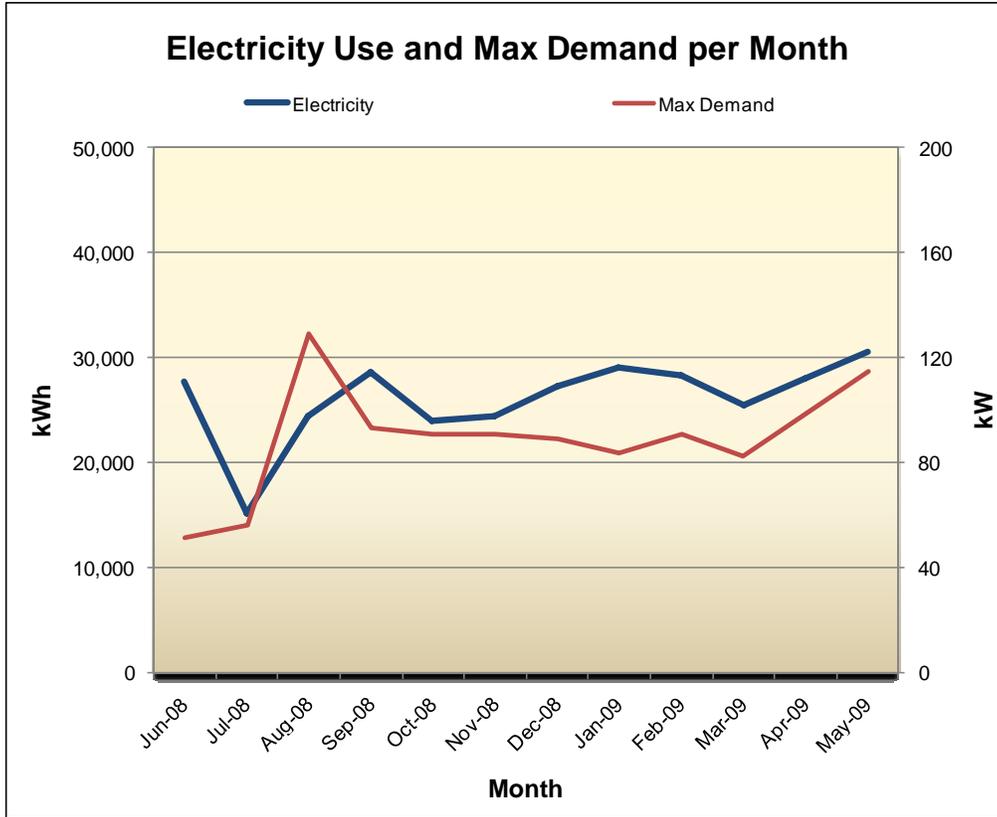# Wood Elementary School - Energy Smart Schools Benchmarks

Schools	U.S. EPA Portfolio Manager Score	NJ 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)
2009 NJ Average:	50	81.0	6.2	53.7	11.5	$1.91	$237
You:	65	74.0	7.8	47.3	10.0	$1.86	$287

Wood Elementary School Percentile Ranking

65% 59% 35% 68% 74% 59% 33%

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Wood Elementary School - Monthly Electricity Use & Maximum Demand:

Electricity Use and Max Demand per Month

Wood Elementary School - Monthly Heating Fuel Use:
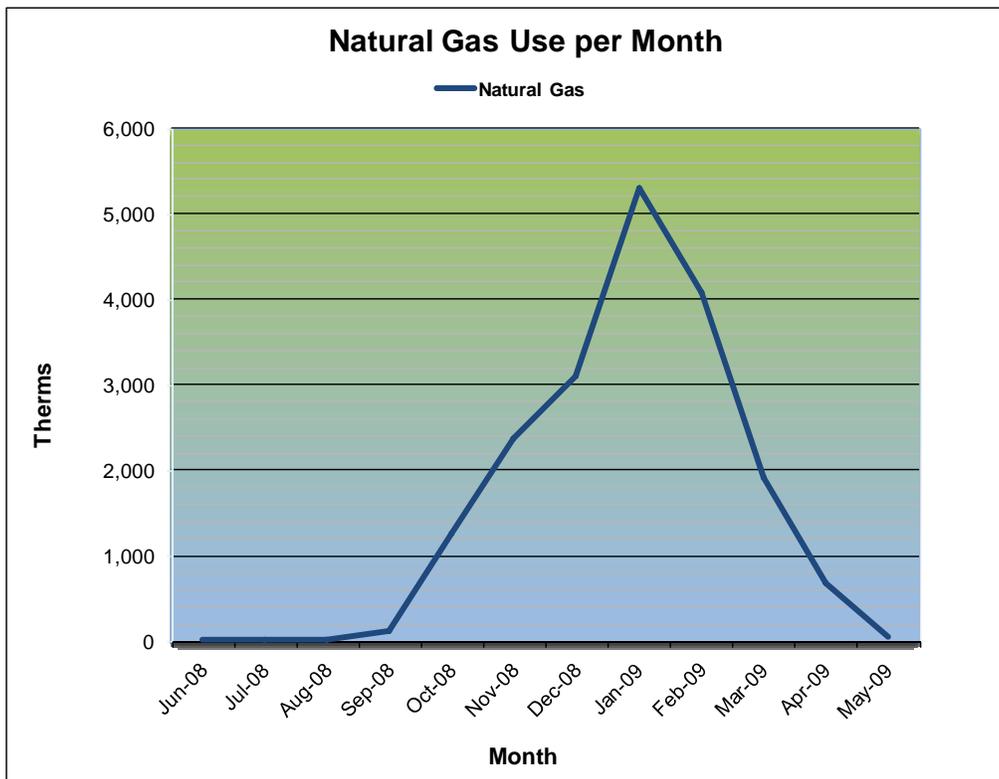
Natural Gas Use per Month

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Wood Elementary School - Monthly Carbon Emissions:

Carbon Footprint (emissions in tons)

■ Total Carbon Emissions
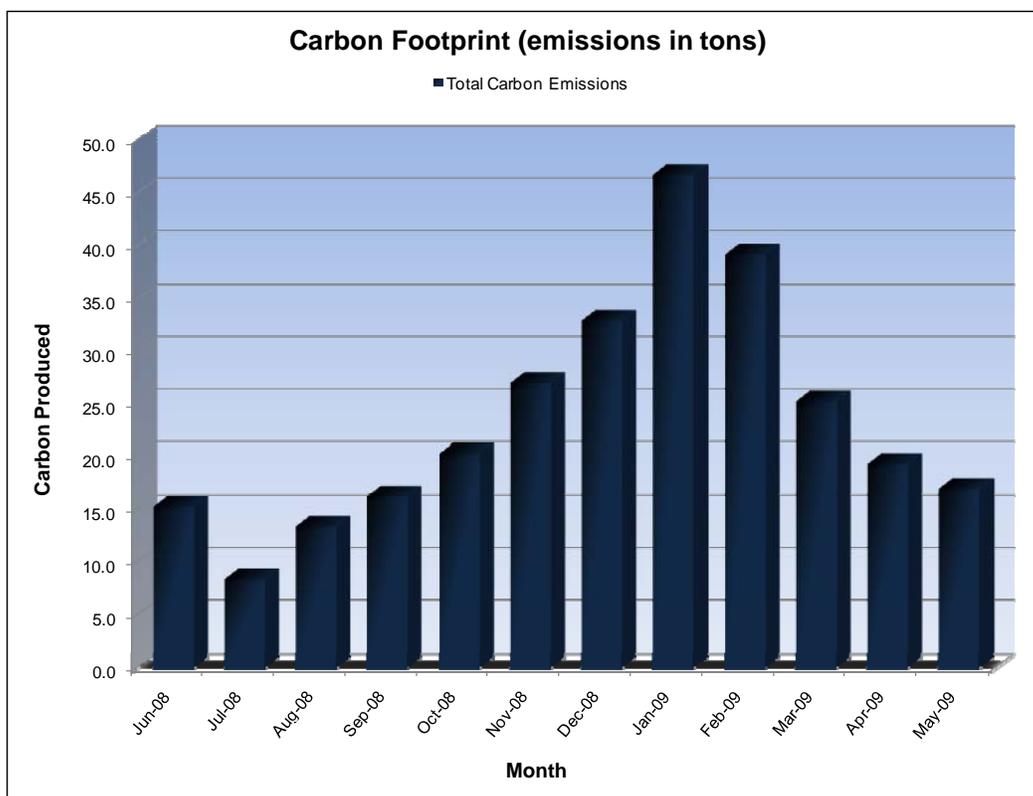
U.S. EPA *Portfolio Manager* Score:

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 65 places it higher than 65% 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: 81 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 74 kBtu per square foot per year is lower than 59% 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 two factors below can help with that.

Electric Use - New Jersey Average: 6.2 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 7.8 kWh per square foot per year is lower than 35% of New Jersey schools.

Electric Demand - New Jersey Average: 2.6 W/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 3.22 Watts per square foot is higher than 76% of New Jersey Schools.

Heating Fuel Use - New Jersey Average: 54 kBtu/sq.ft. or 11.5 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 heating fuel use of 47.3 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 10.0 Btu per square foot per total annual heating degree days is lower than 74% of other New Jersey schools.

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Energy Cost - New Jersey Averages: $1.91/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 $1.86 per square foot is lower than 59% of other New Jersey schools. Your cost expressed on a per student basis of $287 is lower than 33% 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.

The EPA Portfolio Manager model indicates that Wood Elementary School is performing better than the national average of similar schools nationwide. A reduction of the site energy usage at this facility of 7.3 kBtu/square foot would earn this school ENERGY STAR® Building Label recognition.

Electric use at this facility is higher than the average of other schools benchmarked within the New Jersey utilities territory. We recommend looking at you electrical usage and practices as the most likely area to reduce this schools energy usage and earn ENERGY STAR® recognition. The first step to reducing electrical usage is identifying low cost steps that can be taken. Some low cost or even no cost opportunities that you may wish to investigate include:

- 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.

- Install vending machine occupancy sensors, which reduce vending machine energy consumption up to 46% and can save up to $150 per machine per year. The cost of a vending miser is in the $150-$200 and some models simply plug into the back of the vending machine.

- 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 www.epa.gov/itprogrm/ezenglish.html.

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. If this building still uses T12 fluorescent lighting, you should consider lighting retro-fit to high efficiency T8's with electronic ballasts. These retro-fits can typically be done in-house if your district employs an electrician and the retro-fit will often have a simple payback of less than 2 years through reduced energy costs. 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.

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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. Following through with an onsite energy audit of the building, covering all systems, plus plug load and the building envelope may help building staff in identifying potential low-cost/no-cost opportunities for improvement. If you could conservatively reduce your total energy use by 10%, Wood Elementary School could save up to $7,400 each year.

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.

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 100% of the cost of the audit upon an approval of the audit report with a commitment from the applicant to install a specified level of recommended measures.

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.

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