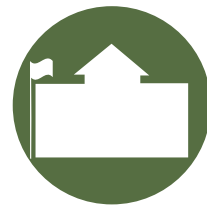
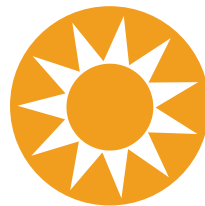




ROOSEVELT ELEMENTARY SCHOOL

AN ANALYSIS OF ENERGY PERFORMANCE



PREPARED BY:

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RLW ANALYTICS

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PREPARED FOR:

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OBJECTIVE

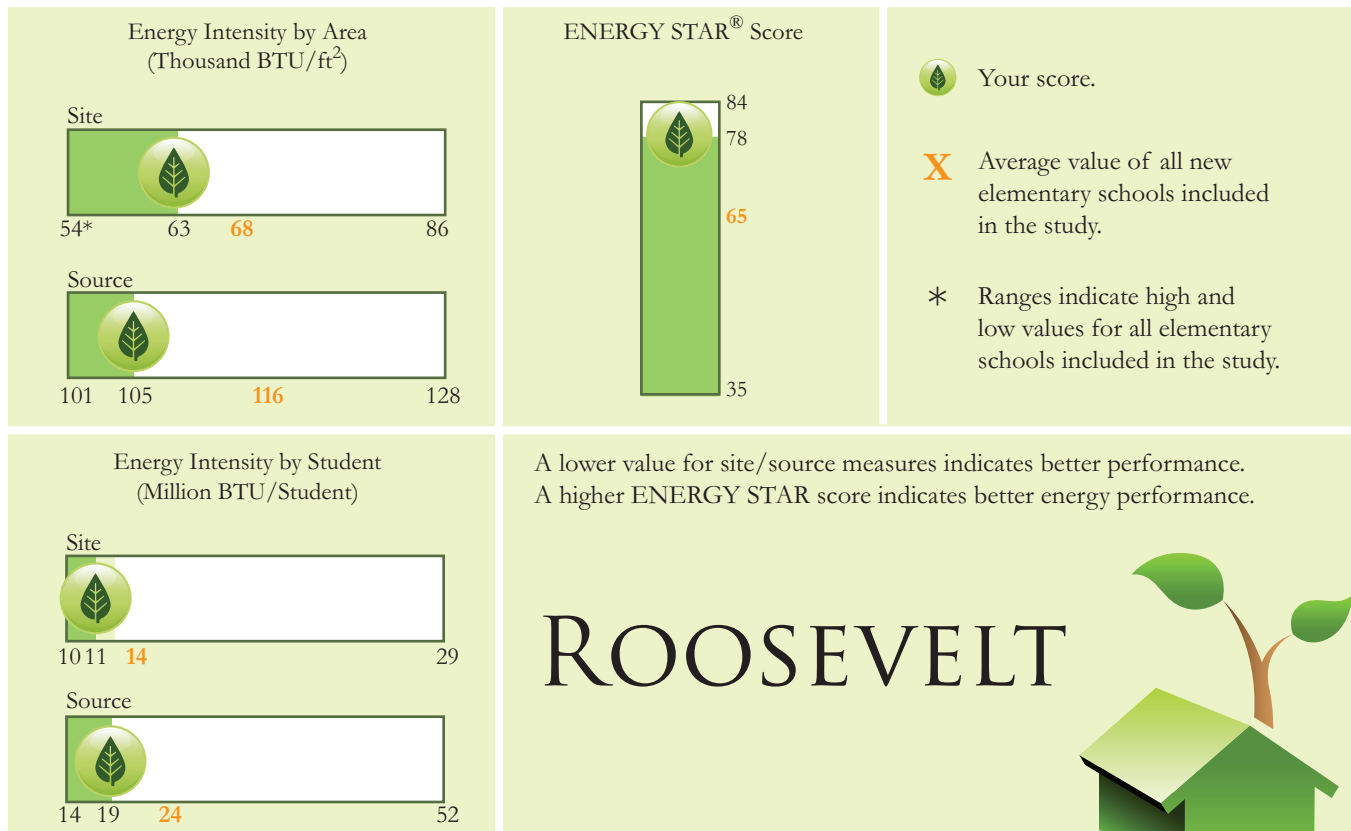
This report describes the findings from our analysis of Roosevelt Elementary School (RES), located in Melrose, MA and offers recommendations for improving the school's energy performance. This section is written primarily for the benefit of the school. RES is listed as S-15 in the full school report. Please reference the figures in the full report for more information.

SUMMARY

Based on energy use during the period July 2006 – June 2007, RES's energy intensity is better than average when considered among the 10 elementary schools included in this study. RES's ENERGY STAR® score is also above the average. These results are shown in Figure 1, which compares annual energy use at RES with annual energy use at other new elementary schools built in Massachusetts. All of the schools in this study were constructed between 2001- 2006.



FIGURE 1. HOW DOES YOUR SCHOOL COMPARE TO OTHER NEW MASSACHUSETTS ELEMENTARY SCHOOLS?



ROOSEVELT



DEFINITIONS



British thermal unit (BTU): A standard unit for measuring the quantity of heat needed to raise the temperature of 1 pound of water by 1 degree Fahrenheit at or near 39.2 degrees Fahrenheit.

Site Energy: The energy consumed at a building location or other end-use site.

Source Energy: The total amount of raw fuel that is burned to create heat and electricity to operate the building. This incorporates all transmission, delivery, and production losses. For more information visit: http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_benchmark_comm_bldgs.

TABLE 1. SCHOOL DESCRIPTION

BENCHMARKING REPORT CARD	
School	Roosevelt Elementary School
Location	253 Vinton Street Melrose, MA 02176
SPACE ATTRIBUTES	
Floor Area (ft ²)	65,000
Number of Students	364
Number of PCs	120
Operating Hours/Week	91
METRICS BASED ON UTILITY BILLS JULY 2006 – JUNE 2007	
Total kWh/year	408,900
Total therms/year	27,255
Water Use (cubic feet)/year	89,940
Square feet/student	179
Annual kWh/student	1123
Annual therms/student	74.9
Annual Site BTU/student (million)	11
Annual Source BTU/student (million)	19
ANNUAL ENERGY INTENSITY METRICS	
Portfolio Manager ENERGY STAR benchmarking rating	78
Site Energy Intensity (Thousand BTU/ft ²)	63
Source Energy Intensity (Thousand BTU/ft ²)	105
ANNUAL UTILITY RATES 2006 – 2007	
Electric: (\$/kWh)	0.15
Gas: (\$/therm)	1.55
Water: (\$/cf)	0.05

This report compares RES’s energy use, derived primarily from the school’s energy bills, to the energy performance of six other standard elementary schools and three other elementary schools that achieved relatively high scores on the Massachusetts Collaborative for High Performing Schools (MA-CHPS) building standard. CHPS is the criteria used to establish school building designs that qualify as “green buildings” in Massachusetts. Improved operational practices, discussed in the Conclusions and Recommendations section, could offer additional electrical savings. Ongoing operational tracking using the existing Energy Management System (EMS) could yield additional natural gas savings. Table 1 highlights school building characteristics, as well as energy metrics based on RES utility bills.

METHODOLOGY

The first step in this study was to conduct a high-level review of the school’s as-built plans and briefly inspect the school during a site visit. While we did not intend for our inspection to function as a comprehensive energy audit, we did discover several patterns across all schools in the study that might yield additional savings. The methodology used to analyze and compare each school is consistent with the methodology used in the full post-occupancy report and can be found there in section 2.

ENERGY STAR PORTFOLIO MANAGER SCORE

The U.S. Environmental Protection Agency (EPA) ENERGY STAR Portfolio Manager Tool we used to benchmark the school yielded a score of 78, higher than the median score of 50 and the 75 required for ENERGY STAR recognition. It is important to note that the benchmarking tool is an approximate fit of a national database and doesn’t take into account a school’s precise operation and equipment.

CONCLUSIONS AND RECOMMENDATIONS

1. RES could save over 9,840 kWh of electricity a year, yielding an annual cost savings of greater than \$1,476 based on a rate of \$0.15 kWh. A portion of this savings would come from addressing the nighttime plug load. Though RES electricity use is better than the average electricity use at other elementary schools included in this study, there is some nighttime plug load to address. Higher than necessary nighttime plug load is a trend across all schools included in this study. We recognize that some of the following recommendations may have been implemented since the on-site visit. These recommendations address savings opportunities specific to RES, but also useful for all schools:

- Most computers in the school were managed well during non-use; however, a few computers were not set to shutdown during the evening. Plug load power management is a low- or no-cost measure that can provide potential savings. Free help is available from the EPA at <http://www.energystar.gov/powermanagement>. EPA contractors can answer technical questions about implementing these settings and about various options for keeping sleeping PCs up to date with security and other software patches. By contacting EPA, a quick conference call can be arranged that can save time researching various solutions and provide lessons learned from dozens of information technology departments.
- Additional savings could be achieved by turning off or reducing the use of kitchen equipment otherwise unnecessarily left on. This recommendation is applicable to all schools.
- The 2007 lighting retrofit in the gym included installing T5 High Output fluorescents and occupancy sensors, which are contributing to electrical savings. Electricity savings at RES accrue from the

use of T8 lamps, occupancy sensors that control lighting in classrooms, electronic lighting ballasts, and limited overnight parking lot lighting.

2. The following observations and recommendations address EMS settings at RES:
- Our experience studying schools across the state and elsewhere shows that optimizing outdoor air damper settings and ventilation schedules can provide additional savings. Roosevelt Elementary School is currently operated well in terms of energy use, however, using EMS trending data could help the staff recognize potential energy savings opportunities and adjust building operations to realize those savings. The trending data shows energy use over a period of time, and high periods of energy use can be identified and addressed. Similarly, utility interval data is available from utility companies by special request. Accessing this information can also provide insight on active loads during unoccupied hours.
 - RES gas usage is slightly better than average compared to other elementary schools. Optimizing the EMS even further to control set points, scheduling, outdoor air dampers, and ventilation could yield additional natural gas savings.

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The full report **Massachusetts Green Schools: Post-occupancy Study of Energy Efficiency** can be found at www.masstech.org/greenschools.