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Introduction: Energy Efficiency and Our Schools

Schools in the United States face tremendous pressure to improve the learning environment for the nation's children, and to do so within a tight budget. Yet U.S. schools spend more money on energy to run their buildings than on textbooks and computers **combined**. Typically one-third of this energy use goes to waste! But this can be corrected. Energy costs are an expense that can be reduced through smart energy management.

The least energy-efficient schools use nearly four times as much energy per square foot as the schools with the best energy performance, creating a huge opportunity for savings in the schools that may need it most. Schools that make energy-efficiency improvements cut their energy costs by 25 to 30 percent on average. These savings become a source of funding to be tapped. Because of this unique opportunity with energy savings, schools can redirect dollars saved from operating efficiencies to capital investments in infrastructure repairs.

Schools that are well lit, well ventilated, and in good repair create a healthy, comfortable learning and teaching environment. A better physical environment is among the many factors that contribute to learning and productivity in the classroom, which in turn affect performance and achievement.

School officials can now turn to **ENERGY STAR®** when they want to know how their buildings measure up in terms of energy efficiency. ENERGY STAR offers the only national energy performance rating system for school buildings. This rating tool, which compares data from schools across the country, is accessible at www.epa.gov/buildings by clicking on ENERGY STAR Label for Buildings.

Developed by the U.S. Environmental Protection Agency (EPA) and Department of Energy (DOE) (www.doe.gov), the online rating system evaluates a school's energy performance on a scale of 0 to 100. Schools use this online benchmarking tool to find out their energy rating, which in turn helps them select buildings for retrofits and set whole-building performance goals. ENERGY STAR offers a strategy for achieving those goals. It guides schools through the planning and upgrade process so that they can improve their energy performance rating over time and aim for excellence—the ENERGY STAR label.

Schools that have a performance rating of 75 or better and meet indoor air quality targets (www.epa.gov/iaq/schools) are considered top performers. They can apply for an ENERGY STAR label, the mark of excellence in energy and environmental performance. The ENERGY STAR on a school building tells everyone in the community that the school is a leader—one that is environmentally friendly and efficient in its use of energy and taxpayers' money.

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A Better Learning and Teaching Environment with ENERGY STAR

Money saved by reducing energy waste can be spent on enhancing the educational experience

- More and more school districts are realizing that they can control their energy costs. They can tap into the dollars wasted on inefficient use of energy to fix their buildings and pay for educational resources.
- A school does not have to be rebuilt from the ground up to take advantage of major energy savings opportunities. Today, cleaner, more energy-efficient technologies for lighting, heating, and air conditioning equipment can be installed in place of outdated equipment.
- Schools in some areas are in dire need of capital improvements. Switching to more energy-efficient technologies and equipment makes it possible to achieve much needed improvements for no additional cost—because the energy savings not only pay for the technologies, but also free up resources for future investments.
- Money not spent on wasted energy can be redirected to a school's primary mission—education.

The ENERGY STAR rating system helps schools evaluate their energy performance so they can plan future energy upgrades and reap more savings

- ENERGY STAR offers schools the only national rating system for energy performance in buildings.
- Schools can access the online rating tool to evaluate their energy performance, set targets for efficiency upgrades, and compare their performance against other schools across the country.

Schools that benchmark their energy use and earn the ENERGY STAR label lead by example

- Earning the ENERGY STAR label demonstrates a school's dedication to managing budgets wisely and investing in the learning environment.
- Earning the ENERGY STAR label sends a message to the community that it is possible to improve energy efficiency without increasing taxes.
- Displaying an ENERGY STAR label shows the school's commitment to sensible use of energy resources and the link between good energy performance, responsible financial management, and environmental stewardship.
- If the energy performance of the nation's schools were improved to the ENERGY STAR level wherever cost effective, we could reduce carbon emissions by more than 7 million metric tons of carbon equivalent (MMTCE), which is equivalent to eliminating emissions from 6 million cars each year.



School Facts

School Facts: The Need

- Nearly 55 million people, or 20% of the U.S. population, spend their days in elementary or secondary schools.
- A 1995 U.S. General Accounting Office (GAO) report estimates that 40% of K-12 schools need repair or replacement of one or more physical systems; 60% need at least one major building feature replaced; and over 50% have indoor environmental problems.
- GAO estimates that it would take \$112 billion to bring U.S. schools into good condition. This does not include funding for construction of the estimated 5,000 new schools needed between now and 2005.
- The least energy-efficient schools use almost four times as much energy per square foot as the most energy-efficient ones. This indicates a huge potential for savings in the schools that may need it most.

School Energy Dollars: The Opportunity

- The annual energy bill for the nation's 115,000 K-12 schools is about \$6 billion. Schools spend more money on energy than on computers and textbooks combined.
- In a typical U.S. school, nearly one-third of the energy used goes to waste. This is due to the use of outdated technology (lighting systems), old and poorly functioning equipment, and poor insulation in the building.
- Schools do not have to be rebuilt from the ground up to take advantage of major energy savings opportunities. Cost-effective energy performance improvements can reduce energy bills by 25% to 30% on average, representing a yearly savings of \$1.5 billion nationwide.
- ENERGY STAR offers schools the only national rating system for energy performance. The rating helps schools evaluate their energy performance and plan future energy upgrades to reap savings.

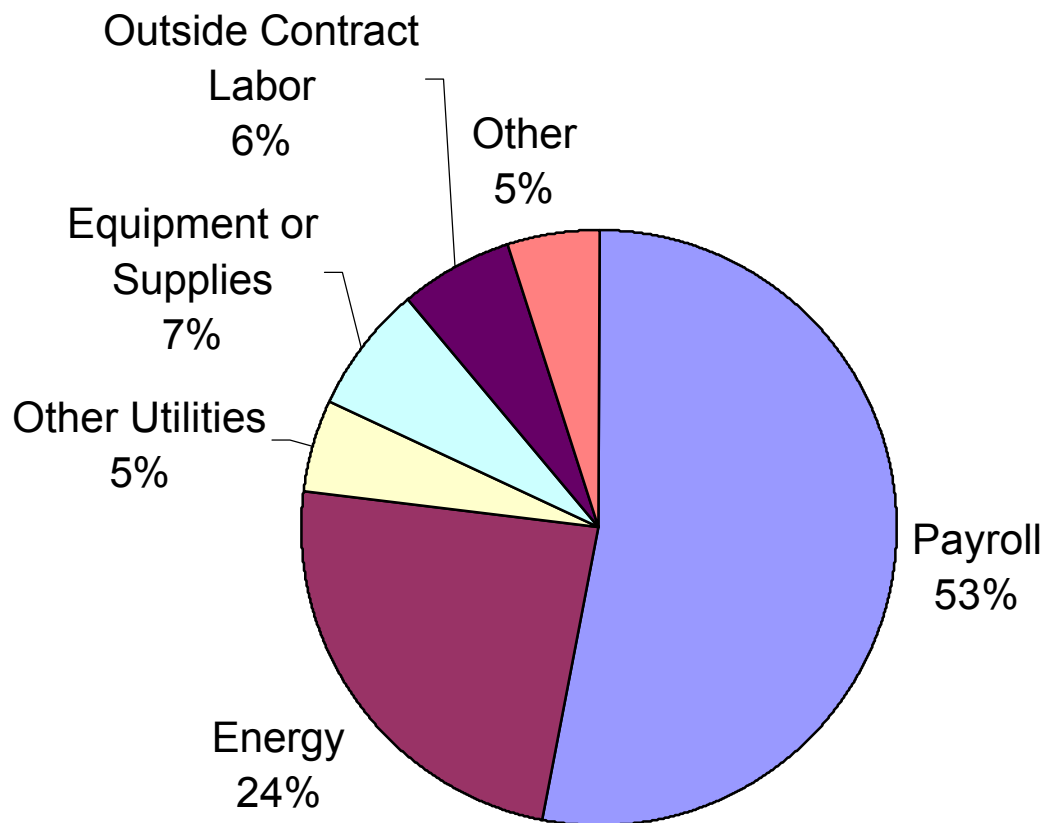
ENERGY STAR: The Solution

- By the end of 1998, educational institutions in EPA's ENERGY STAR had invested nearly \$300 million in energy-efficiency building upgrades, saving \$1.3 billion over the life of the investments, almost a four to one ratio.
- Savings generated from reducing energy waste can be used to repair and renovate schools. Cost-effective energy performance improvements in the nation's schools represent a \$7 billion investment opportunity with the potential to return \$28 billion over the life of the investments. Thus, one-quarter of the renovation needs identified by GAO could be met through energy performance improvements.
- If the energy performance of the nation's schools were improved to the ENERGY STAR level wherever cost effective, we could reduce annual carbon emissions by more than 7 million metric tons of carbon equivalent (MMTCE), equivalent to eliminating emissions from 6 million cars.



For the 1999-00 school year, operations and maintenance (O&M) accounts for slightly more than 9 percent of the total current expenditures of U.S. K-12 schools, down from 11 percent in 1990. The pie chart below represents only the O&M portion of K-12 schools' current expenditures.

**National Median O&M Expenditures
for K-12 School Districts from 1990-1999**



Note: "Other utilities" represents water and telephone. "Energy" represents gas, electricity, and other fuels such as oil and coal. "Other" represents clerical costs, trash removal, travel, insurance, and equipment repair and rental.

Source: American School and University, "29th Annual Maintenance and Operations Cost Study" prepared by Joe Agron, published April 2000 and available on line at <http://www.asumag.com/research/Maint-School2000.html>.



Profiles of Energy-Efficient Schools

The **School District of Philadelphia** (www.phila.k12.pa.us) is the fifth largest in the country, with 262 schools, over 300 buildings, and an enrollment of about 213,000 students. Each year, the District consumes an enormous amount of electricity, gas, oil, and steam at a total annual cost of \$27 million. Some of this money can be saved through energy efficiency and applied instead to educational needs.

With that in mind, the School District of Philadelphia launched the Save Energy Campaign in 1982–83, one of the most successful revolving funds in the United States. In a revolving fund, some of the energy savings go back into the general budget, which reduces the budgeted cost of energy. Any surplus savings in excess of costs are divided among the operating budget, the energy program, and incentives to the schools. In short, the more energy a school saves, the more incentives it earns.

Begun with no money at all, the Save Energy Campaign has saved more than \$150 million in the past 16 years. As an incentive to each school, the District shares the energy savings between its operating budget and the individual schools that generate the savings. Dollar savings have been dramatic, allowing the school system to do its number one job better—helping students achieve at high levels. Money has been redirected from wasted lighting and heating to books, teachers, and computers. The School District of Philadelphia is an ENERGY STAR Partner.

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In 1997, **Sachem Central School District** (www.sachem.k12.ny.us) joined ENERGY STAR, committing to upgrade 800,000 square feet of building space within 7 years. With the help of New York Power Authority (NYPA) and Johnson Controls, Inc., the District actually completed upgrades to 1.3 million square feet within 18 months. Located in suburban Long Island, Sachem Central became the first school district in the state of New York to fulfill all ENERGY STAR upgrade commitments.

By implementing upgrades in 18 school buildings, Sachem reduced energy costs by \$500,000 per year while providing a better learning and working environment for students, faculty, and staff. The savings will pay for the project over the next 10 years. By replacing boilers with energy-efficient models and installing energy-efficient lighting fixtures and a new energy management system, Sachem is saving nearly 300,000 gallons of oil and 3 million kWh annually. The resulting pollution prevention is the equivalent of planting 645 acres of trees.

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By mid-June 2000, the **San Diego Unified School District** (SDUSD) (www.sdcs.k12.ca.us) achieved the distinction of qualifying 106 of its schools for the ENERGY STAR label. They are among the first schools in the nation to earn this mark of excellence in energy performance. These top performing San Diego schools now proudly display the bronze ENERGY STAR plaque, symbolizing their commitment to energy, financial, and environmental performance.



The District also received national recognition in EPA's Pollution Prevention Review (January 1998) for its substantial and comprehensive energy-efficiency upgrades. Upon completion, the upgrades are expected to save the SDUSD \$5.5 million in annual utility and maintenance costs, a reduction of 34 percent. Lighting retrofits alone have saved the system over \$3 million per year.

San Diego schools are notable for involving students in the upgrade process, for taking advantage of innovative finance opportunities, and for superb technical performance. As a tribute to the District's leadership, the Energy Coordinator, J. William Naish, was named Energy Manager of the Year by Energy User Magazine. The District's financing options include the use of tradable Certificates of Participation (COPs), which are debt instruments paid for by the energy savings themselves. SDUSD used this to raise \$43 million from COP investors, providing enough capital to fund all its projects. It also took advantage of rebates of more than \$3 million through San Diego Gas and Electric (SDG&E).

An ENERGY STAR Partner, the San Diego Unified School District has actively promoted the message of energy efficiency in the classroom with window decals and giveaways for students and in the print and broadcast media at large. The District has already realized a cumulative reduction in electricity use of over 26 million kWh annually. This reduction has had a positive environmental impact, saving emissions 19,500 tons (39 million pounds) of carbon dioxide per year, equivalent to eliminating the pollution from 3,900 cars annually.

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The second largest school system in North Carolina, the **Wake County Public School System** (WCPSS) (www.wcpss.net) faces the special challenges of a sunbelt school district. Community population growth and the growth of summer programs have placed stress on all school facilities. Wake County has made energy savings an intrinsic part of handling growth efficiently and keeping resources focused on education for its more than 90,000 students.

An ENERGY STAR Partner, the Wake County schools have achieved energy savings of more than \$600,000 per year. Much of this success is due to an emphasis on training and involvement of employees and students to make energy efficiency a team effort. System-wide efforts also include an incentive rebate program that allows facilities and schools to keep 10 percent of all savings for purchases of educational resources, such as computers and playground equipment. A quarterly award carrying a bonus is given to the custodian most deserving of recognition for energy-efficiency progress.

These efforts to increase awareness of energy issues are combined with rigorous data collection so that a variety of management decisions enhance the energy efficiency of the Wake County schools. For example, summer school programs are located in buildings with the most efficient air-conditioning systems. A 4-day work week in the summer not only saves energy within the school buildings, but also reduces fuel usage and pollution by the bus fleet.

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Tips for Creating an Energy-Efficient School

Students and Teachers

- Use the ENERGY STAR power saver feature on all your school's computers.
- Ask for ENERGY STAR products when buying copiers, computers, videos and TVs, light fixtures, appliances, and other equipment for your school.
- Turn off the lights when classrooms are unoccupied, or ask to have occupancy sensors installed.
- Shut outside doors behind you. Letting heated or cooled air escape wastes energy.
- Encourage your school to join ENERGY STAR (www.epa.gov/buildings). The Partnership offers a proven path for improving building performance, assistance in identifying funding options, and tools for communicating success.
- Educate yourselves and your community about the link between energy use and environmental protection. For ideas, visit the [Alliance to Save Energy](#).

Building Engineers, Maintenance Staff, Administrators

- Replace all exit signs with light emitting diode (LED) exit signs.
- Use an energy management system (EMS) to coordinate air handling units; heating, ventilating, and air conditioning (HVAC); and lighting when rooms are in use.
- Install window film, which lowers heating and cooling loads and reduces glare.
- Use proper insulation and reflective roof coverings.
- Replace incandescent lamps with ENERGY STAR labeled compact fluorescent lamps (CFLs).
- Profile your school's energy performance with the new, online ENERGY STAR performance rating system. Visit www.epa.gov/buildings and click on ENERGY STAR Label for Buildings.
- Encourage your school to join EPA's ENERGY STAR (www.epa.gov/buildings). The Partnership offers a proven path for improving building performance, assistance in identifying funding options, and tools for communicating success.



Paying for It: Financing Energy Upgrades in Schools

School districts can finance energy-efficiency projects in a variety of ways, ranging from the obvious (loans, bonds, and existing cash flow) to the less obvious (tax-exempt lease purchase agreements, performance contracts, and even traditional leasing). However, if low interest rate, speed, and flexibility are primary concerns, then school decision makers should take a good look at ***tax-exempt lease purchase agreements***.

Most public school districts have ready access to the funding needed to carry out projects that improve energy performance while maintaining good indoor air quality. In fact, commercial lenders stand ready to provide low-cost, tax-exempt funds for qualifying projects, without having to issue bonds. And the actual funding can occur as quickly as you can get the documents to the lender.

A school district's ability to issue debt is determined by state and local statutes. The creation of debt is a capital budget event that typically requires voter approval. Certain financing agreements, however, may avoid this capital budget process by tying the repayment of the obligation to the annual operating budget. A ***tax-exempt lease purchase agreement*** can be specifically structured to do so.

Tax-exempt lease purchase agreements, also known as municipal leases, are practical financial alternatives to paying cash for capital expenditures. These contracts allow state and local government units (including schools) to acquire assets through installment payments. Because the lessor's (lender's) profit is considered tax-exempt income, tax-exempt lease purchase agreement rates are typically lower than those for a similar commercial transaction.

Tax-exempt lease purchase financing is closer to installment purchases than rental agreements. Typically, the lessee's (school district's) payment obligation terminates if the lessee fails to appropriate funds to make lease payments. Because of this provision, neither the lease nor the lease payments are considered debt. Unlike bond issues, tax-exempt lease purchase financing usually does not require a voter referendum because it is considered an operating rather than a capital expenditure. However, lenders will want to know that the assets being financed are considered of ***essential use***, which will minimize the risk of non-appropriation.

Performance contracting also may provide a way to fund energy performance improvements, especially when energy savings can be realized. Energy service companies (ESCOs) can assume the performance risk of the technologies installed and guarantee a certain level of energy cost savings. In addition, an ESCO can arrange funding to replace, repair, and maintain HVAC, control, and lighting systems as part of an energy performance contract. It is not uncommon for ESCOs to guarantee utility bill cost savings—savings that can be used to pay for new equipment and address deferred maintenance. However, to capture lower, tax-exempt interest rates, the school district should examine the financing vehicle and be sure it is for a tax-exempt entity.

Remember, statutes vary from state to state, so check with your tax advisor to ensure legislative and tax compliance. For more information, contact EPA by email at ENERGYSTARBuildings@epa.gov or call 1-888-STAR-YES (782-7937).



Other Online Resources

For more information about energy efficiency and improving energy performance in schools, visit . . .

- Rebuild America
www.eren.doe.gov/buildings/rebuild
- Energy Smart Schools
www.eren.doe.gov/energysmartschools
- Alliance to Save Energy
www.ase.org/green_schools
- American Council for an Energy-Efficient Economy
www.aceee.org