NYCWasteLe$$

Issue # 1

A program sponsored by the City of New York Department of Sanitation, the New York State Energy Research and Development Authority, and the U.S. Environmental Protection Agency Region II

Schools

Premier Issue

This is the premier issue of *NYC WasteLe$$*, your information source on reducing costs through improved efficiency. You can rely on this waste reduction and energy conservation quarterly to keep you informed of important developments and cost saving opportunities for schools.

NYC WasteLe$$* is a non-regulatory waste prevention program initiated by the New York City Department of Sanitation (DOS) with support from the New York State Energy Research and Development Authority (NYSERDA) and the U.S. Environmental Protection Agency (EPA) Region II. *NYC WasteLe$$ supports City waste prevention efforts to help local businesses maintain and enhance their competitiveness.

The *NYC WasteLe$$* program has targeted nine business and institutional sectors, including restaurants; retail food establishments; manufacturers; wholesalers; retailers; schools; airlines/airports; stadiums, arenas and convention centers; and hospitals. The results of the program are showcased in these newsletters and a series of sector-specific seminars. In addition, the *NYC WasteLe$$* web page will be on-line soon. ■

Using One Natural Resource to Save Another

The Brearley School in Manhattan created displays throughout the school to increase awareness of waste prevention and energy efficiency issues.

At the Academy of Environmental Science Secondary School in New York City, classes in Environmental Sciences begin in seventh grade and range from planting your own garden to learning about water pollution and the greenhouse effect. There are hundreds of resources to help bring environmental education into the classroom, ranging from general environmental lessons to specific topics, such as water quality, waste reduction, and indoor air issues.

Some programs focus on energy efficiency and conservation. The New York Power Authority has programs, kits, and literature for all grades. Teachers can even teach energy efficiency using their own classrooms as an example (see page 3 WasteLe$$ In Action feature on The Brearley School).

For those educators short on funds and time, help is available on the Internet and through "off-the-shelf" curriculum packages. A simple Internet search, using keywords and phrases such as "environmental curriculum," "environmental education," "energy conservation," and "teacher resources" yields an abundance of resources. Here are a just a few, many of which focus on or include energy conservation:

Web Sites:

- **The Environmental Education Network (EEN)**
  www.envirolink.org/enviroed/content.html

EEN is a clearinghouse for environmental education materials. A good starting point is the comprehensive index *Environmental Education Resources for Teachers*. Under this heading, select *Energy Education and Resource Guide* and you'll find hundreds of "off-the-shelf" curriculum packages. Most

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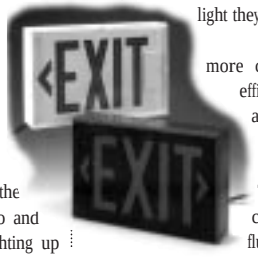
New Development Cuts Cost of Lighting Exit Signs

Exit signs — they are everywhere and they are a necessary part of every school. Depending on the size of your facility, you may have a handful or you may have hundreds.

No matter the number, exit signs must be illuminated 24 hours a day, 365 days a year, providing necessary direction during emergencies, and always using electricity.

LEDs, or light-emitting diodes, are the lights that illuminate your digital clock radio and stereo. They are the wave of the future, lighting up everything from exit signs to traffic lights, while using only a small amount of electricity for the amount of light they emit.



Exitronix Models 600 and 700 are available in both 6" and 8" letters.

Overall, LED exit signs are more cost effective, more energy efficient, and often more visually appealing than incandescent or compact fluorescent alternatives, and they last longer. The following table presents a comparison of incandescent, fluorescent, and LED systems.

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Inside Look:

Spotlight On: Energy Efficiency

Next Issue Spotlight On: Recycling

♻ Printed on recycled paper with 50% post-consumer content.

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Don't Let Your Money Go Out The Window

Less than a decade ago, the energy necessary to offset the heat lost and gained through windows cost the U.S. an astonishing $20 billion dollars per year, according to the U.S. Department of Energy. That is 25 percent of all the energy used to heat or cool schools, homes and businesses in this country. Windows are currently responsible for 15 to 35 percent of all the heat lost or gained in a new school; the percentage can be even greater in older structures, according to the National Center for Appropriate Technology. Another 10 percent of heated or cooled air can be lost through window frames.

What technologies can reduce this energy cost? Today a wide range of practical and cost-effective solutions are available to make windows more energy efficient, including tints, coatings, gas fills and improved window frames. These and many other "window technologies" can be used in combinations to yield increased energy efficiency and lower heating and cooling bills.

With all these options offering significant energy saving benefits, why let your money go out the window? Vendors, manufacturers, and energy efficiency consultants include:

Low-e, high performance glass improves the efficiency of this school's windows. The fixed casement and awning units, installed by Andersen Windows, also open to let in fresh air.

Window Technologies at NRDC Headquarters

The Natural Resources Defense Council renovated a loft space in New York City's Flatiron district as its new headquarters. Walls and ceilings were insulated three to five times the industry norm, and the double paned windows were equipped with a reflective, transparent low-e film, called a "heat mirror," which reflects heat generated by sunlight in the summer, yet retains it in the winter. All of these improvements save the NRDC $45,900 annually, or 54% of its total energy costs.

Source: Architectural Record

FOR MORE INFORMATION:

Assistance:

- Efficient Windows Collaborative
  U.S. Department of Energy
  Windows and Glazing Program
  www.efficientwindows.org
- Energy Efficiency and Renewable Energy Clearinghouse
  P.O. Box 3048
  Merrifield, VA 22116
  (800) 363-3732
- Energy Efficiency and Renewable Energy Network
  www.eren.doe.gov
- EnerAction Inc.
  4559 4th Street
  La Mesa, CA 91941-5501
  (619) 698-8101
  www.eneraction.com
- National Fenestration Rating Council
  1300 Spring Street, Suite 500
  Silver Spring, MD 20910
  (301) 589-6372
  www.nfrc.org

Vendors servicing New York City:

- Brooklyn Window and Door Corporation
  1889 McDonald Avenue
  Brooklyn, NY 11223
  (718) 627-6400
- E-Z Tilt Window Ltd.
  701 Avenue U
  Brooklyn, NY 11223
  (718) 627-0001
- Capris & Capri Window Corporation
  316 Onderdonk Avenue
  Ridgewood, NY 11385
  (718) 386-1652
- Reeb Millwork
  600 Brighton Street
  Bethlehem, PA 18015
  (610) 867-6160

Manufacturers:

- AFG Industry Inc.
  1400 Lincoln St., P.O. Box 929
  Kingsport, TN 37662
  www.afg.com
- Andersen Corporation
  100 N. 4th Avenue
  Bayport, MN 55003
  www.andersenwindows.com
- Insulate L.L.C
  5001 D Street
  Auburn, WA 98001
  www.insulate.com
- Marvin Windows and Doors
  P.O. Box 100
  Warroad, MN 56763
  www.marvin.com
- Pella Corporation
  102 Main Street
  Pella, IA 50219
  www.pella.com
- Viking Industries, Inc.
  P.O. Box 20518
  Portland, OR 97294-0518
  www.vikingindustries.com

WINDOW TECHNOLOGIES

Technology	What Is It?	Benefits	Drawbacks
Low-emissivity (low-e) replacement windows	Windows have a thin layer of silver sandwiched between layers of anti-reflective metal oxide that allows the sunlight to pass through while blocking the heat radiation. The glass is optically invisible. Multi-functional in that it also can be applied to the inner pane of glass in colder climates to reflect heat back indoors.	Can reflect 40% to 70% of the heat normally transmitted through a clear glass window. Offers higher performance than other coatings, with a reduction in damaging UV rays of 60% to 90%. Provides a higher level of light compared to the amount of heat reduction, making it more suitable for climates that require more air conditioning than heating.	Can add 10% to 15% to the price of a double glazed window.
Reflective glass	Reflective material is bonded with glass panes in new windows to reduce light entry. Most commonly used in new construction and window replacement.	The reflective film can block from 16% to 80% of all the solar energy entering the room, depending on the type of coating and the climate. Helps control heat gain in the summer. Reflective nature creates visual barrier from the outside.	Reduces the amount of light entering the room.
Reflective film	Reflective film is placed on new or existing windows to reduce light entry. Most commonly used on existing windows.	The reflective film can block 16% to 80% of solar energy entering the room, depending on type of coating and climate. Helps control heat gain in the summer. Reflective nature creates visual barrier from the outside.	Reduces the amount of light entering the room.
Tinted glass	Tints, such as bronze tint, are applied to glass to reduce solar heat gain. Provides better energy performance on larger windows, making them more suitable for commercial use.	Can survive the elements while reflecting glare and heat and saving up to 40% on air conditioning costs. Tinted glass can eliminate as much as 90% of the incoming solar radiation and light making it ideal for warm regions.	Does not allow as much heat in from sunlight if temperature is cooler. Reduces visible light entering the room.
Tinted coatings	Various shades of coatings applied to glass in new or existing windows to reduce solar heat gain.	The spectrally selective combination coatings can allow various amounts of heat and light in or out and are perfect for climates with both hot and cold seasons.	More susceptible to the elements than other coatings.
Gas-filled windows	Two or more panes of glass with argon or krypton gas sandwiched between them to reduce heat transfer through the glass.	Reduces convection heat loss and can increase the efficiency of a low-e coated window by an additional 15% to 20%. Gas-filled windows reduce heat loss and are, therefore, best for colder climates. Krypton is more effective, although more expensive, than argon.	More expensive than traditional windows. A mixture of argon and krypton is used as a compromise between thermal performance and cost.

Sources: U.S. Department of Energy's Energy Efficiency and Renewable Energy Network, and Efficient Windows Collaborative; Environmental Building News.

One Natural Resource Saves Another

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offerings have been field-tested and the catalogue format provides useful screening information including: a descriptive abstract, discussion of strengths and weaknesses, publication date, targeted grade level, applicability (i.e., regional vs. national issues), and cost. Ordering information and a point of contact also are provided.

- **Kids! Renew America Youth Programs**
  www.crest.org/sustainable/renew_america/yprogkids.html

This web site catalogues hundreds of successful environmental conservation programs and curricula. To promote information exchange, each entry includes a point of contact.

- **EnviroNet: Network to Improve Environmental Science Education in New England**
  www.earth.simmons.edu

EnviroNet is a network of teachers, scientists, and environmental educators who use the Internet to enhance environmental science learning in the K-12 community in New England. The EnviroNet web site also can be viewed in Spanish.

- **Environmental Education Link**
  http://eelink.net

EE Link guides teachers to Internet resources on environmental education topics, lesson plans, and conferences.

- **The Northeast Energy Education Network**
  www.eren.doe.gov/brso/energed/index.html

The Northeast Energy Education Network has energy-related ideas and links for educators of all grade levels.

- **The Academy of Environmental Science Secondary School in East Harlem**
  www.csd4.k12.ny.us/AES/

Classes in environmental science begin at the junior high school level. In eleventh grade, the students use their environmental knowledge to study New York City and its history. The students then create research projects to examine how New Yorkers impact worldwide environmental problems. Visit this web site to view some of their projects.

Other Resources

For teachers without Internet access, here is a list of educational resources related to energy conservation:

All Ages:
Compendium for Energy Resources
This bibliography lists energy education materials from various sources, evaluating the material on its content, presentation, and organization.
Contact: Susanne Garfield
California Energy Commission
(916) 653-0390
Ask for publication number P180-98-001.
Electronic copies can be downloaded from:
www.energy.ca.gov/education/newstuff.html

Early Elementary Students:
Living Lightly in the City: An Urban Environmental Education Guidebook - Volume I
This offering is filled with action-oriented activities to stimulate kids to explore the environment.
For more information, contact: Marilyn Hauer
Schlitz Audubon Center
(414) 352-2880

Middle Elementary Students:
Living Lightly in the City: An Urban Environmental Education Guidebook - Volume II
Covering a broad range of environmental topics, these materials help teachers infuse environmental studies into existing curricula.
Contact: Marilyn Hauer
Schlitz Audubon Center
(414) 352-2880

Late Elementary and Middle School Students:
Environmental Management Power (EM*Power)
Based on the "issues investigation model," EM*Power is an action-oriented environmental management curriculum that focuses on affecting environmental conservation in students' communities.
Contact: David Mitchell
State 4-H Office, University of Idaho
(208) 885-7182
Email: davidm@uidaho.edu

High School Students:
Living Lightly on the Planet
Designed to give students an awareness of environmental impacts, this resource is easily incorporated into science and social studies classes.
Contact: Marilyn Hauer
Schlitz Audubon Center
(414) 352-2880 ■

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Schools Save Money Through Energy Efficiency Improvements

Schools across the country have been saving money by increasing their energy efficiency. Here are just a few examples from the Northeast.

Worcester Public Schools, in Worcester, MA, reduced utility costs by more than 20 percent for a benefit of $500,000 annually.
They did it through:
- installing a high efficiency 200 horsepower, steam boiler system;
- installing energy management systems to control heating, ventilation and air conditioning systems;
- installing energy efficiency lighting systems;
- testing and repairing steam traps;
- installing new storm windows to prevent heat loss; and
- cleaning, adjusting and testing of existing boiler systems and burners.

Boston School Department, Boston, MA is exceeding $3 million per year savings
on a consistent, long-term basis by:
- retrofitting all fluorescent fixtures to T8 lamps and electronic ballasts;
- redesigning lighting systems and installing of new metal halide fixtures in gyms, auditoriums, and pool areas;
- installing a 3,000 point centralized Energy Management System for all buildings; and
- many more improvements.

Source: NORESCO, Framingham, MA

NYCWasteLe$$ In Action

The Brearley School Surveys Its Lighting

The Brearley School in Manhattan, a NYCWasteLe$$ partner, participated in a week of waste and energy assessment activities. Students in grades 5, 6, and 7 gained valuable hands-on experience conducting a survey of the lighting throughout the school.

Faculty at the school used the opportunity to teach students how to develop survey tools, conduct a survey and prepare the results. Students recorded the type and wattage of every light in the school building, then estimated the number of hours that each bulb was on each day.

Using this information, the students calculated the energy used daily to light the school. Through this exercise students discussed lighting choices and identified opportunities to exchange incandescent bulbs for more energy efficient fluorescents or compact fluorescents.

Students also pointed out areas where lights did not need to be on all the time, where timers or sensors might be appropriate, and where fewer or lower wattage bulbs could be used. Seeing the dramatic differences in kWh usage among different types of lighting by performing calculations themselves, students learned a valuable lesson. The information gathered by the students will be used by Karyn Weiss, Director of Facilities, to develop an energy efficient lighting plan for the school.

According to Ms. Weiss, "Our students have provided us with an invaluable tool to assist in reviewing and specifying newly engineered lighting products. Our goal over the next few years is to upgrade the quality of lighting, and develop a preventative maintenance program based on the life expectancy of the energy saving bulbs and ballasts installed."

Cut Costs of Exit Signs

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EXIT SIGN LIGHTING

Type of Lighting	Electricity Cost to Operate One Sign for One Year	Average Unit Lifespan	Annual Maintenance Cost
Incandescent[1]	$35.04	6 mos. – 1 yr.	$24.33
Compact Fluorescent[2]	$10.51	3 – 5 years	$8.33
LED[3]	$2.45	10+ years	$1.04

[1]Two 20 W bulbs. [2]One 9 W bulb with 3 W adapter. [3]One 2.8 W lamp.
Note: This comparison assumes an energy cost of 10 cents per kWh. Maintenance costs are based on 25 minutes to replace bulbs at $25/hour. This analysis does not take into consideration the cost of initial installation or replacement bulbs or lamps. Based on information by AstraLite, Inc.

When converting to LED signs, you can either replace your exit signs with new LED signs or you can retrofit your existing signs with LED retrofit kits. A typical retrofit kit costs $25 to $35, while the cost of a new LED sign ranges from $30 to $115 for a single-face sign, or $50 to $130 for a standard double-side commercial grade product.

Syracuse University and Penn State both retrofitted and replaced existing exit signs throughout their facilities, saving $175,325 and $70,000 respectively. Savings were realized through reduced electricity, purchasing, and labor costs, and the payback period was less than one year for both schools.

Source: Astralite, Inc.

The estimated 100 million exit signs in the U.S. consume up to 35 billion kWh of energy annually (the power generated by five large nuclear power plants). Illuminating these signs costs businesses and organizations about $1 billion annually.

Source: U.S. EPA ENERGY STAR® Exit Sign Program

In the future, and especially in New York City, the retrofit kit may not be a practical option. Underwriters Laboratory may require that the entire sign be UL listed, virtually eliminating retrofit kits. In addition, New York City's exit sign requirements state that signs must have 8-inch letters, while elsewhere in the U.S. laws and codes specify only 6-inch letters. Virtually no retrofit kits are made with 8-inch letters.

Experts warn that although LEDs offer tremendous savings opportunities, there are some factors to consider when purchasing LED exit signs or retrofit kits. For example, some LEDs, particularly commodity-grade LEDs, as opposed to premium LEDs, have been known to fade over time.

"Make sure that the LED you purchase is a high-quality bulb and check to make sure that it carries a minimum warranty of five years, with a guarantee that light levels will meet code requirements for the full five years," says Jennifer Dolin, director of U.S. EPA's ENERGY STAR® Exit Sign program. Also, surge protection should be an integral part of the sign, according to energy consultant Doug Sheppard of Advanced Energy and Lighting, Inc.

Unisys Corporation, the information management company, retrofitted or completely replaced 400 exit signs with LED exit signs and saved nearly $21,000 in energy, purchasing, and labor costs during 1996. Approximately $10,000 of savings was from reduced electricity costs, while $6,000 was from reduced labor costs. The remaining savings were realized by reducing a large inventory of incandescent lamps. The payback period was just over nine months.

Source: Astralite, Inc.

Several companies offer LED exit sign products, including new signs, custom signs, and retrofit kits. LED exit signs are available in matrix, edge-lit, and stencil designs. U.S. EPA has established an ENERGY STAR® Exit Sign program. Exit sign manufacturers who meet the ENERGY STAR® guidelines for new exit signs (the program does not include retrofit kits) can use the ENERGY STAR® label to identify products that are energy efficient and meet visibility and luminance criteria.

Currently, 33 manufacturers have signed up for the program. Access the ENERGY STAR® Exit Sign program at www.epa.gov/exitsigns.html or call 1-888-STAR-YES to receive information about ENERGY STAR® partners. All of the exit signs listed on the Web site meet the ENERGY STAR® guidelines, and some of the manufacturers also produce retrofit kits.

The ENERGY STAR® Web site also offers a useful savings calculation sheet and tips for buying ENERGY STAR® compliant exit signs. Check your local phone book or contact manufacturers to identify LED exit sign vendors in the New York City area. ■

Energy Efficiency Technical Assistance Programs

Technical assistance programs for improving your energy efficiency are available from a variety of sources. Most programs are easy to access and offer free information. You may not have time to develop an energy audit plan for your school or perform hours of research to identify the brightest energy efficient lighting and equipment. However, if you want to make simple changes that will save you money and improve the efficiency of your school, consider relying on one or more of the following available resources.

Publications:

- ENERGY STAR® Buildings Upgrade Manual, U.S. EPA, publication number #EPA 430-B-97-024B, July 1997. Call (800) 490-9198 to request a copy.
- Lighting Research Center, Publications, Rensselaer Polytechnic Institute, 110 8th Street, Troy, NY, 12180. For more information: (518) 276-8716.

Hands-On Assistance:

- New York State Energy Research and Development Authority, FlexTech Program. Contact Mark Watson at (518) 862-1090 x3314.
- Energy Cost Savings Program, NYC Department of Business Services, (212) 513-6345/6415.
- Community Environmental Center 43-10 11th Street, Long Island City, NY 11101. Contact Lynn Grace, Director of Administrative Services, at (718) 784-1444.
- Advanced Energy & Lighting, Inc. 23 East 10th Street, Suite 615, New York, NY 10003. Contact Doug Sheppard at (212) 475-5774.

Internet Resources:

Green Lights Program:
www.epa.gov/greenlights
ENERGY STAR® Program:
www.epa.gov/energystar
ENERGY STAR® Buildings:
www.epa.gov/buildings
ENERGY STAR® Buildings Upgrade Manual:
www.epa.gov/appdstar/buildings/manual
Energy User News:
www.energyusernews.com
National Lighting Bureau:
www.nlb.org
Business Energy Checkup:
www.solstice.crest.org
UCLA School of Arts & Architecture:
www.aud.ucla.edu/energy-design-tools
Today's Facility Manager:
www.tfmgr.com
NYSERDA Systems Benefit Charge programs:
www.nyserda.org/sbc.html

NYC WasteLe$$ Program
P.O. Box 156
Bowling Green Station
New York, NY 10274-0156

Bulk Rate
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