

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 the retail food industry.

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. In addition, the *NYC WasteLe\$\$* web page will be on-line soon. ■

The Big Chill: Tackling Humidity



New Development Cuts Cost of Lighting Exit Signs

Exit signs — they are everywhere and they are a necessary part of every business. 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.

Overall, LED exit signs are more cost effective, more energy efficient, 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.



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

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“It’s not the heat, it’s the humidity.” — a common sentiment in New York City during the summer months. Besides making us all uncomfortable, high humidity levels may affect the efficiency of air conditioning and refrigeration systems and contribute to poor indoor air quality. Fortunately, technologies are available to help grocery stores to combat humidity, save energy and save money.

Mechanical refrigeration accounts for as much as 50 percent of the total electricity use in supermarkets, making refrigeration a key area for efficiency improvements. Supermarket air conditioning systems are typically designed to maintain temperatures and humidity at desired levels. Moisture is removed from air as it flows across the cooling coils as long as the coil temperatures are below the dew

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Spotlight On: Energy Efficiency

Next Issue Spotlight On:
Recycling

Time Out and Turn Off: Timers and Occupancy Sensors

At night when you look out at the mosaic light pattern of the city, consider that although most of the buildings have closed and are unoccupied, the lights are still on. Some lighting is necessary for security, but many businesses lose a considerable amount of money through overlighting. According to information provided by Noritas, Inc., inventors of occupancy sensors, as much as 45 percent of lighting energy is wasted during normal business hours when spaces are unoccupied. Time-based and occupancy sensor controls for lighting offer ways to prevent wasted energy and money.

"In New York City, timers and occupancy sensors are an important way for small to medium sized businesses to control demand charges."

— Don Giampietro, New York City Department of Business Services

The most basic lighting control strategy is a timer. Timers are useful in both outdoor and indoor settings with predictable operating schedules. Typical outdoor situations include parking lot or security lighting. Indoor situations include lighting in production and manufacturing facilities that have predefined operating hours. Timer-based lighting also applies to indoor security and corridor lighting. Control devices range from simple timers to programmable sweep systems that establish a schedule for turning off lights throughout a floor or entire building.

An occupancy sensor determines if a space is occupied using ultrasonic or infrared sensors. When an occupant moves within a passive infrared occupancy sensor's range a positive occupant signal is generated and the lights turn on. Passive infrared (PIR) sensors require an unobstructed view of the occupant and are sensitive to occupants perpendicular to the line of sight. Because PIR sensors require line of sight, they do not work well where partitions may block direct viewing of occupants. However, they do not require an

TIMER-BASED LIGHTING AVERAGE ENERGY SAVINGS

Applications	Energy Savings (%)
Offices (private)	→ 20-25%
Offices (open spaces)	→ 20-25%
Rest Rooms	→ 30-75%
Corridors	→ 30-40%
Storage Areas	→ 45-65%
Meeting Rooms	→ 45-65%
Conference Rooms	→ 45-65%
Warehouses	→ 50-75%

Source: U.S. Department of Energy, U.S. Environmental Protection Agency, Electric Power Research Institute

Glass doors on refrigerator and freezer cases reduce energy costs by up to 30 percent.



enclosed space and work well outdoors and in high-bay areas.

Ultrasonic controls continually emit high frequency sound waves, which bounce off everything in their range. If there is motion within the space, the lights will turn on. If no motion is detected for a fixed period of time, the sensor will switch area lights off. Ultrasonic controls operate best in enclosed areas with hard floors, walls and ceilings. They do not work well outdoors or in high-bay areas.

A hybrid sensor that incorporates both ultrasonic and infrared technologies is available to cover tricky applications, such as restrooms. In addition, both types of sensors can be set to stay on for any length of time after they are triggered, avoiding problems with lights turning off too often or too quickly.

Energy and cost savings, as well as payback, are dependent on the types of controls used, installation costs and the size of coverage area. Costs can range from \$30 to \$200 per system. Time-based controls are the least expensive control option and PIRs

are usually less expensive than ultrasonic sensors. Monetary and environmental savings are obtainable through light saving control based on individual needs and with some constraints. ■



FOR MORE
INFORMATION:

New York City vendors include:

- Leviton Manufacturing Company
59-25 Little Neck Parkway
Little Neck, NY 11362
(800) 323-8920
Fax: (800) 832-9538
Tech Line: (800) 824-3004
- Superior Lamp & Electrical Supply Co., Inc.
934-936 Broadway
New York, NY
(800) 544-4877
Fax: (212) 529-3307

Supermarkets account for 4% of U.S. electricity consumption. Approximately 50% of supermarket energy is used for refrigeration.

— Department of Energy and Oak Ridge National Laboratory

According to the Food Marketing Institute, 30 percent of energy use powers compressors, while 16 percent operates refrigerated display cases. This energy intensive equipment can be targeted to increase energy efficiency and reduce costs. The Electric Power Research Institute suggests that you:

- Install high-efficiency compressors to save five to seven percent on refrigeration bills.

Retail Food

- Use floating head pressure in all compressor systems.
- Try multiplexing. Mount several compressors on the same rack, using common refrigerant suction and discharge headers, to save two to five percent on refrigeration bills.
- Allow the compressor rack suction pressure to rise; each 1°F improves rack efficiency by one percent.
- Install split-capacity fan motors for payback in just a few months.
- Wire cyclable, antisweat heaters on

a separate circuit controlled by a humidistat. The heaters should not run in winter months, when absolute humidity is low. They will pay for themselves in a few months (for new installations) to a year (for retrofits).

- Reduce cooling costs with economizer cycle control. If outdoor air is below a preset temperature and humidity limit, the return, exhaust, and outdoor air dampers adjust to use supplemental outdoor air,

Big Chill: Humidity ►► continued from page 1

point temperature of the air. The traditional approach to controlling humidity in supermarkets is to overcool the air to extract more moisture, then to reheat it to a comfortable temperature before delivering it to the conditioned space. Waste heat recovered from the supermarket's refrigeration system is frequently used to reheat cool, dehumidified air. This approach is no longer the most energy efficient.

Humidity control is especially important in supermarkets because it affects the performance of display case refrigeration systems. If humidity levels are too high, frost or sweat forms on products, degrading their presentation and shortening their display life. Loads imposed on the refrigeration systems rise and more defrost periods are required, increasing operating costs. Several techniques have been developed to make the dehumidification process more efficient.

Desiccant Dehumidification

Over the past decade, manufacturers have introduced packaged desiccant dehumidification systems designed for commercial applications. Desiccant systems combined with conventional vapor-compression air conditioning can be a cost-effective solution to humidity control problems in supermarkets.

Desiccant dehumidification systems dry air with liquid or solid moisture-absorbing (desiccant) materials. In a typical desiccant dehumidification cycle, moist process air passes across a slowly rotating desiccant wheel that adsorbs large quantities of water vapor. The moisture-laden portion of the desiccant wheel rotates into a hot regeneration air stream that drives off the water vapor. The dried desiccant continues to rotate back into the process air stream where the cycle is repeated. In a supermarket application, the process air stream may be outside or return air.

Gas-fired boilers are often used to provide both process air heating and desiccant regeneration. Generally, any source of low-grade heat, including waste heat from another process, can be used to regenerate the desiccant.

Utilities and research organizations have successfully demonstrated desiccant systems in supermarkets. The technology is proven and reliable, and is

specified for new construction or as an add-on to existing air conditioning systems.

In addition to economic benefits, desiccant systems may improve occupant comfort and indoor air quality by eliminating excessive moisture that can support the growth of mold, mildew and bacteria. These contaminants can produce objectionable odors and possibly lead to health problems.

With the addition of a desiccant cooling system, First National Supermarket in Islandia, NY, cut its air conditioning needs by 60 percent, according to the American Gas Cooling Center. Their desiccant system offers customers better looking frozen foods and maintains higher comfort levels. With a rebate from Long Island Lighting, First National's payback period on the \$85,000 project was only 1.5 years.

"Supermarkets are ideal locations for desiccant systems. Here on Long Island, humidity levels during prime cooling months are as high as they are in Houston and Miami."

— Tom Vanderputten, major account engineer for Long Island Lighting, the Islandia area's energy utility company

Heat Pipes

A heat pipe heat exchanger offers a passive energy recovery option, which means that it does not use additional energy, as desiccants and other systems do. Heat pipes contain a fluid, usually a conventional refrigerant, which transfers heat from one point to another. An array of heat pipes are placed before the cooling coil to absorb heat from the incoming air stream, providing a free precooling effect. As the pipes absorb the heat, the fluid inside vaporizes and flows to the condenser section of the device where it condenses back to a liquid as it gives up heat. The liquid condensate flows or is wicked back to the evaporator, completing the cycle. The cycle continues as long as a temperature difference exists.

With the aid of the heat pipe precooling effect, the air conditioning system now has more power to condense moisture. In a supermarket with 50 percent relative humidity, the typical air conditioning system spends about 80 percent of its capacity to cool and only

20 percent to dehumidify. Heat pipes allow the air conditioning system to increase dehumidification efforts to 40 percent of its capacity, condensing twice as much moisture from the air, according to Heat Pipe Technology, Inc. The heat pipes usually decrease energy requirements while improving dehumidification capabilities.

The Electric Power Research Institute (EPRI) has demonstrated heat pipe assisted air conditioning in supermarkets. Additional information on heat pipes and desiccant dehumidification can be obtained by contacting your local utility, EPRI, manufacturers, or an energy efficiency consultant. ■



FOR MORE INFORMATION:

Utilities and Research Organizations:

- Brooklyn Union
One Metrotech Center
Brooklyn, NY 11201
(718) 403-2000
- Consolidated Edison
4 Irving Place
New York, NY 10003
(800) 343-4646
- Electric Power Research Institute
3412 Hillview Avenue
Palo Alto, CA 94304
(605) 855-2000

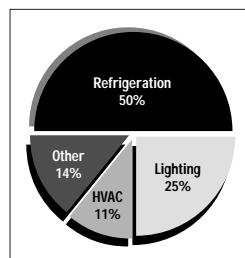
Partial Listing of Desiccant Dehumidification and Heat Pipe System Providers:

- Engelhard/ECC (desiccant)
441 North Fifth Street
Philadelphia, PA 19123
(215) 625-0700
- Fresh Air Solutions (both)
330 Warminster Road
Hatboro, PA 19040
(215) 682-6600
- Heat Pipe Technology, Inc. (heat pipe)
15803 Northwest 140th Street
Alachua, FL
(904) 462-3464
- Munters Cargocaire (both)
79 Monroe Street
Amesbury, MA 01913
(978) 241-1100
- Munters DryCool (both)
16900 Jordan Street
Selma, TX 78154
(210) 651-5018
- Octagon Air Systems (heat pipe)
1723 Koppers Road
Conley, GA 30027
(404) 608-8881
- Seasons 4, Inc. (heat pipe)
4500 Industrial Access Road
Douglasville, GA 30134
(770) 489-0716
- Semco, Inc. (desiccant)
1800 East Pointe Drive
Columbia, MO 65201
(573) 443-1481

Energy Use

- reducing the compressor load.
- Group foods by temperature requirement; check refrigerator case temperature regularly.
- Install glass doors on open refrigerator cases to reduce energy costs by as much as 30%. Reducing unwanted cooling of the store is a bonus.
- If you already have enclosed refrigerator cases, save additional energy with anti-condensate heaters in the door glass. ■

TYPICAL ENERGY USE IN SUPERMARKETS



Source: Electric Power Research Institute

Foster-Miller Associates, Inc., of Waltham, Massachusetts, (an engineering research and development firm) recently developed a Northern Climate Evaporative Condenser, which involves the use of evaporatively cooled condensing for refrigeration systems. The system can result in a significant reduction in energy consumption and electric demand when compared to the use of air-cooled condensing. Currently, this type of system is rarely used for commercial refrigeration applications, but if the unit is sized properly it will generate energy savings that offset the cost of water and maintenance. Testing of the system took place at an A&P grocery store in Greenburgh, NY. The test showed that the use of the evaporative condenser reduced annual energy consumption for refrigeration by 5.6% and was able to lower peak demand during the summer months by as much as 13.9%. The value of these savings was estimated at \$2,958, which also took into account the cost of water consumed by the condenser. Field testing also demonstrated successful use of the evaporative condenser in the dry mode during winter months. Since the water flow to the condenser can be turned off and satisfactory heat rejection is obtained, the potential for freeze-up of the unit is eliminated, reducing maintenance costs.

Cut Costs of Exit Signs continued from page 1

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

¹Two 20 W bulbs. ²One 9 W bulb with 3 W adapter. ³One 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.

A facility in New York City with 100 exit signs can save more than \$5,500 annually in electricity and labor costs by investing in LED exit signs.

Source: Energy Star® Exit Sign Calculator

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.

Fratallones Ace Hardware retrofitted its five exit signs to LEDs, saving \$165 during the first year. This is a 97% cost savings and includes the avoided purchase and disposal costs of replacement lamps and avoided labor costs.

Source: Minnesota Office of Environmental Assistance

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 business or perform hours of research to identify the "brightest" energy efficient lighting and equipment. But, if you want to make simple changes that will save you money and improve the efficiency of your business, 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

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 Bowling Green Station
 New York, NY 10274-0156

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