

SEDAC ENERGY SMART TIPS



Supermarkets



In today's economy, consumers are looking beyond the products they buy when striving to be green - they want a sustainable supply chain, too. In turn, retailers are improving their bottom line by incorporating a green storefront and corporate culture. Supermarkets operate on tight margins and energy costs can represent up to 10 percent of total operating costs.

With energy expenditures on the rise, it is essential for grocers to be proactive when making energy saving decisions for both profitability and sustainability in the marketplace. According to a 2003 U.S. Energy Information Administration survey, supermarkets in the United States use 51 kilowatt-hours (kWh) of electricity annually and 41 cubic feet of natural gas per square foot, which adds up to an annual average of \$5.31 per square foot for electricity and \$0.38 for natural gas.

With an average-size store measuring 40,000 square feet, these numbers equate to approximately \$230,000 spent annually in energy costs and 1,900 tons of CO₂ emitted into the atmosphere. If a store can save 10 percent on this expense, an average-size store could add over \$20,000 to its annual profits!

In a typical grocery store, refrigeration is usually the single largest energy consumer. A reduction in refrigeration use translates to lower heating bills, so improvements made to the refrigeration system (compressors, display cases, coolers, freezers) can generate large savings. Lighting and refrigeration together account for more than 50 percent of a supermarket's total energy use. ENERGY STAR® estimates that one dollar in energy savings is equivalent to a \$59 increase in sales.

Regardless of whether you rent or own your building, there are a number of energy-saving measures you can adopt to provide great returns for your supermarket. By investing in efficient energy use, you can reduce your operating costs, buffer your supermarket from future energy cost increases, lower your environmental impact, and increase your long-term profitability. Conservation measures also enhance the aesthetics of your store, improve comfort and health, and prove a solid commitment to the community you serve.

At SEDAC, we are committed to helping you find the best energy options for your supermarket. This brochure explains the steps to take and the systems to implement so that you may provide your patrons and employees with a comfortable, energy-efficient environment.

The Smart Energy Design Assistance Center performs energy assessments on various building types. Each building type has different energy requirements. SEDAC's Energy Smart Tips help building operators identify energy cost reduction measures.

SMART ENERGY DESIGN ASSISTANCE CENTER

PROVIDING EFFECTIVE ENERGY STRATEGIES FOR PUBLIC AND PRIVATE BUILDINGS IN ILLINOIS

ENERGY STAR®'S 7 STEPS OF ENERGY MANAGEMENT

1 Make a Commitment

Recognize that the economic, environmental and political impacts of energy consumption are sufficient motivation to change our energy use patterns.

2 Assess Performance

Make a personalized accounting of energy use and costs. Benchmark your facility by comparing its energy performance with similar sites.

3 Set Goals

Review your objectives and constraints. Establish priorities and set measurable goals with target dates.

4 Create an Action Plan

Define the technical steps. Apply proven methods to increase energy efficiency or get specialized guidance. Assign roles and resources. Consider rolling savings from earlier efforts into future, more complex initiatives.

5 Implement Action Plan

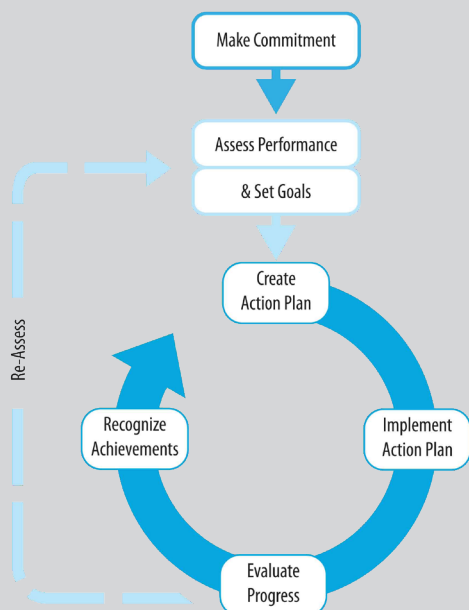
Install equipment and change operational procedures. Establish a maintenance schedule. Train equipment operators and building occupants on the changes. Track and monitor conditions.

6 Evaluate Progress

Compare current performance to established goals. Understand what worked well in order to identify best practices. Adjust procedures and goals, and schedule the next evaluation.

7 Recognize Achievements

Provide internal recognition for the efforts and achievement of individuals, teams, and facilities. Seek external recognition from government agencies, media, or third party organizations.

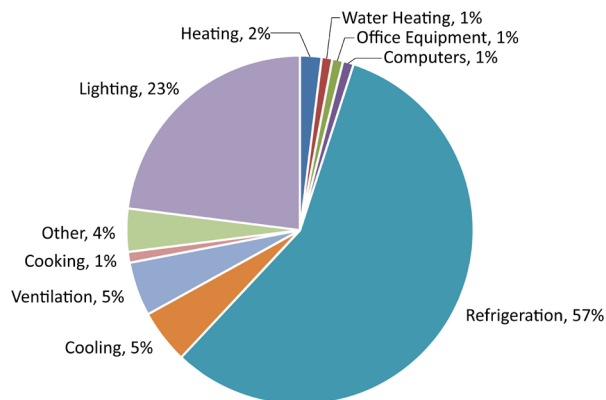


ENERGY STAR®'s steps for energy management.
Descriptions have been modified by SEDAC staff.

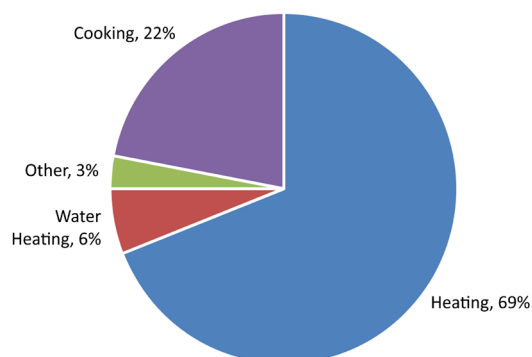
SUPERMARKET ENERGY USE

As illustrated by the two figures below, lighting and refrigeration in an average-size supermarket account for about 80 percent of total electricity consumption, and space heating is responsible for 69 percent of natural gas use. Adopting energy efficient measures in these categories is crucial in reducing your supermarket's costs.

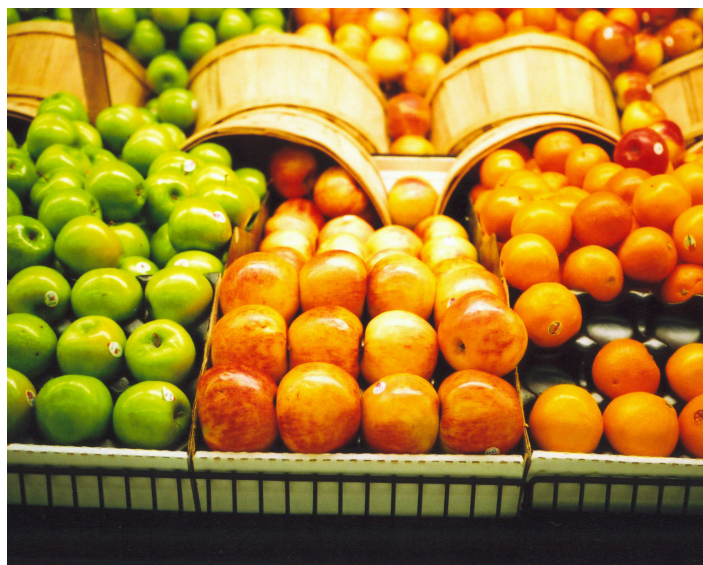
FIGURE 1: ENERGY CONSUMPTION BY END USE
Data from the U.S. Energy Information Administration



A. Electricity Consumption



B. Natural Gas Consumption





ENERGY EFFICIENT LIGHTING SOLUTIONS

Harvest daylight by installing skylights over the sales floor to provide natural light and to be used in conjunction with an automatic dimming lighting system.

Install **occupancy sensors** in storerooms, office areas, bathrooms, and maintenance closets to turn off lights when these spaces are unoccupied.

Replace old fluorescent T12 lamps and magnetic ballasts with **T8 lamps and electronic ballasts**. Use **compact fluorescents** (CFLs) in place of incandescent lamps. CFLs that work in coolers are now available too, as well as LEDs for display cases. Stores with high ceilings may consider metal

halide lamps with **bi-level ballasts** that allow wattage and lighting levels to be reduced when less light is necessary. To save even more energy, consider replacing metal halides with **high-bay fluorescent** fixtures.

Supermarkets can use **accent lighting** to draw attention to a particular display while also saving energy since adequately lighting one area is more efficient than brightly lighting the entire store. CFLs, ceramic metal halide with electronic ballasts, and LEDs can be used for spot lighting.

Replace signage that uses incandescents or CFLs with new **light emitting diode** (LED) signs.

LOW- AND NO-COST ENERGY TIPS

- ✓ **TURN THINGS OFF:** assuming electricity costs \$0.10/kWh, every 1000 kWh saved is equal to \$100 off your utility bill. Shut off cash registers, computers, and deli cooking equipment when not in use. Train staff to turn off lights when they are not necessary.
- ✓ **TURN THINGS DOWN:** for equipment that cannot be turned off, consider turning it down to the lowest level possible.
- ✓ **CHECK TEMPERATURE SETTINGS:** energy is lost when settings are lower than needed. Common settings are between -14° and -8°F for freezers and between 35° and 38°F for refrigerators.
- ✓ **KEEP DOORS SHUT:** repeated fluctuations in temperature use more energy, damage food quality, and cost money.
- ✓ **SCHEDULE REGULAR CLEANING AND MAINTENANCE:** ensure that equipment is clean for proper performance. Change air filters every month, inspect and replace gaskets around refrigerated-case doors quarterly, clean condenser coils quarterly to remove debris and grime, clean HVAC cooling coils at the beginning and end of cooling season, and tune up your furnace or boiler burner annually.

ENERGY EFFICIENT TIPS FOR GROCERS

HVAC SYSTEM

Install **economizers** that allow filtered outside air into the building when conditions are appropriate.

Apply a **reflective surface** to the roof to reduce the cooling capacity required to condition the store in the summer months.

Reclaim heat rejected from refrigerators and other equipment and redirect to heat sales floor and water used in restrooms and kitchens.

Install **ceiling fans**. In the summer, a downward breeze increases comfort throughout the store which allows the temperature to be set a little warmer to save cooling costs. In the winter, ceiling fans move warm air that rises back down the walls and to the sales floor to make people more comfortable with less heat.

KITCHEN

Replace or install appliances with **ENERGY STAR®** rated ones (hot holding cabinets, fryers, ovens, ice makers, etc.).

Turn off **exhaust hoods** in idle kitchens and install **hood controllers** to adjust the exhaust fan speed in response to changes in temperature, smoke, or vapor.

WATER HEATING

Replace old water heaters with high efficiency heaters. Consider tankless heaters which produce hot water on demand and only use energy when hot water is needed, thereby saving energy and reducing cost.

Install a **heat exchanger** to capture the wasted heat of a store's refrigeration rack system and use it to heat water for restrooms and kitchen use.

EFFICIENT REFRIGERATION FOR SUPERMARKETS

Refrigeration accounts for over 50 percent of total electric energy use in the average supermarket, so it is crucial to explore energy efficient opportunities for its systems.

Floating head pressure controls: with these controls, the compressor uses less energy during cooler weather.

Heat recovery: heat rejected by the refrigeration rack can be redirected to heat sales floor and water used in restrooms and preparation areas.

Vending machines and merchandisers: grocers can use ENERGY STAR® qualified vending machines and efficient refrigerated merchandisers to save up to 35 percent energy over standard models. Install specialized occupancy sensors to power down machines when not needed.

Strip curtains: these curtains are installed on walk-in refrigerators to allow the door to remain open for convenience while minimizing cooling loss.

Anti-sweat heat controllers: avoid ice buildup and fogging of freezer doors by installing controls that automatically turn on heaters only when fogging or ice buildup occur.

Ambient sub-cooling: use an oversized condenser and an additional heat-exchanger to sub-cool the liquid refrigerant and save 1 to 9 percent of cooling costs.

Mechanical sub-cooling: use extra cooling capacity from the medium temperature rack system to pre-cool the refrigerant used by low-temperature coolers.

High-efficiency motors: upgrade to Electronically Commutated Motors (ECM) inside display cases, freezers, and coolers to increase efficiency.

DISPLAY CASE SHIELDS

As previously mentioned, refrigeration is the single largest electricity user in supermarkets. To reduce heat gains, we recommend using low emissivity display case shields that reduce power use while simultaneously maintaining food product temperature. These aluminum shields reduce infiltration and radiation heat transfer into the display case.



Display case shields can be used during closed hours or during times of lower occupancy if necessary. Studies have shown that use of display case shields over night can reduce the refrigeration load by 8.5 percent and reduce compressor power by 9 percent during nighttime hours. The shields also help maintain lower product temperatures up to 15 hours after they have been rolled up.

Additional information and research regarding display case shields can be found in a report written by Southern California Edison (SCE). The research presented in this report applies specifically to display case shields used in supermarkets.

SEDAC

WHO WE ARE

SEDAC is sponsored by the Illinois Department of Commerce and Economic Opportunity in partnership with investor-owned utilities to achieve energy efficiency savings in buildings.

SEDAC is an applied research unit of the School of Architecture at the University of Illinois at Urbana-Champaign.

The 360 Energy Group is a collaborative partner working with SEDAC. Support is also provided by the Energy Resources Center at the University of Illinois at Chicago.

SEDAC PROGRAMS

- Energy Assessment
- Public Sector Retro-Commissioning
- New Construction Design Assistance
- Public Sector New Construction Incentive Review
- Public Housing Efficient Living
- Training and Outreach
- Energy Incentive Guidance



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ENERGY SMART RESOURCES FOR SUPERMARKETS

www.sce.com

ENERGY STAR Food Service Equipment Incentive Finder

Search by zip code or by product for rebates on ENERGY STAR qualified equipment.
www.energystar.gov/CFSrebate_locator

ENERGY STAR Building Manual for Supermarkets and Grocery Stores

www.energystar.gov/ia/business/EPA BUM_CH11_Supermarkets.pdf

Managing Energy Costs in Grocery Stores

Quick tips and long-term solutions for energy efficiency in grocery stores.
www.mge.com/Images/PDF/Brochures/Business/ManagingEnergyCostsInGroceryStores.pdf

Food Service Technology Center

Promoting energy efficiency and performance in commercial food service since 1987.
www.fishnick.com

www.SEDAC.org | 1-800-214-7954 | info@SEDAC.org

Smart Energy Design Assistance Center
1 Saint Mary's Road, Champaign, IL 61820

