

FOOD RETAIL ENERGY EFFICIENCY GUIDE



Fresh County Market, a Self-Help borrower in Gary, Indiana, installed LED lighting in their refrigerated cases.

Over the years, Self-Help and our borrowers have reduced operating costs and made our buildings sustainable by using efficient lights, refrigeration, heating and air conditioning.

We hope that our partners and borrowers in food retail will take these opportunities, too. In our Food Retail Energy Efficiency Guide, we present a compilation of relevant materials from our partner, the Mountain Association for Community Economic Development (MACED).

Your loan officer is ready to work with you on incorporating energy efficiency and renewable energy investments into your project.

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Is the Cost of Refrigeration Freezing Your Grocery's Profits?

Refrigeration accounts for at least 60% of the average grocery's energy use. Below are refrigeration system improvements that can reduce energy use by as much as 24%.



Evaporator-fan Motors

Replacing existing shaded pole motors on evaporator fans with electrically commutated motors will reduce the energy consumption of refrigerator and freezer cases by 40 to 70 percent. Drop-in replacement designs have made this retrofit relatively simple for a technician to perform. Additionally, most evaporator-fan motors in walk-ins run continuously even though full airflow is usually required only about half the time. Consider introducing advanced controls that slow the fans when full-speed operation is unnecessary.

Anti-sweat Heaters

The latest anti-sweat heater controls sense humidity in the store's ambient air and reduce the operation of the anti-sweat heaters in low-humidity conditions. They promise significant savings and quick payback, and they are relatively easy to install.



Smart Defrost Controllers

When installed in walk-in freezers, a smart defrost controller monitors several variables and optimizes the number of daily defrost cycles. Adding these kits to walk-in freezers can save hundreds of dollars a year, depending on the size of the freezer.

Floating Head Pressure

Taking advantage of lower ambient temperatures to reduce refrigerant temperatures is a form of free cooling. One approach is to allow the pressure of the vapor coming out of the compressor (the head pressure) to float—that is, to drop with reduced ambient temperatures. This requires an expansion valve capable of operating at lower pressures and flow rates. Such valves are now commercially available. In addition, refrigerant pressures must be kept high enough to avoid flashing—the unwanted vaporization of refrigerant. In one field test, operating a system with floating head pressure reduced annual electricity costs by 4.9 percent relative to operating with fixed head pressure.

Ambient and Mechanical Subcooling

Reducing the temperature of the liquid refrigerant below its condensation temperature is called subcooling. This can be done either by using ambient air or water to remove heat from the liquid refrigerant (ambient subcooling) or by using an additional refrigeration system (mechanical subcooling). Colder refrigerant means either more cooling per pound of refrigerant delivered to the display case or shorter compressor run times because less refrigerant is needed, both of which can decrease energy use. Ambient subcooling is often more cost-effective than mechanical subcooling because it requires less equipment.

Heat-recovery Systems

Heat-recovery systems are available that capture waste heat from refrigerators to make hot water for use in the store. A 7.5-horsepower compressor can heat all of the hot water a midsize supermarket would use in its kitchen cleanup and bathroom sinks. Usually, enough waste heat is also available to supply hot water coils for space heating in cold weather.



Display Case Shields

Aluminum display-case shields can reduce refrigeration load by 8 percent when applied overnight and by 40 percent when applied over a 24-hour holiday, relative to the load required without the shield. Products are kept colder when the shields are attached and remain colder for several hours after the shields are removed.

Consider Desiccant Dehumidification

In humid climates, much of the energy used in air conditioning goes to removing moisture from the air. Desiccant dehumidification can be a cost-effective solution for removing this moisture because it uses natural gas instead of electricity. In some cases, air-conditioning equipment can be sized smaller when desiccant dehumidification is in place because the A/C is only used to cool dry air.



Heat and Cool Your Grocery Efficiently

Space heating and cooling make up a significant portion of a grocery's energy bill. Below are tips to minimize energy waste and cost related to Heating, Ventilating and Air Conditioning (HVAC).

Turn Things Down

Some equipment cannot be turned off entirely, but turning units down to minimum levels can save energy. Examples are computers, soda machines and vending machines.

Set Back HVAC Temperatures

During hours when the store is closed, turn temperature settings down in warming seasons and up in cooling seasons. Check special-use rooms, like warehouses, stockrooms, offices, and other work areas, to make sure that HVAC settings are at minimum settings as well.

Check the Economizer

The linkage on the damper, if not regularly checked, can seize up or break. An economizer that's stuck in the fully open position can add as much as 50 percent to a building's annual energy bill by allowing hot air in during the air-conditioning season and cold air in during the heating season.

Have a licensed HVAC mechanical contractor calibrate the controls; check, clean, and lubricate your economizer's linkage about once a year; and make repairs if necessary.

Check Air-conditioning Temperatures

With a thermometer, check the temperature of the return air going to your air conditioner. Then check the temperature of the air coming out of the register nearest the air-conditioning unit. If the temperature difference is less than 14° Fahrenheit (F) or more than 22°F, have a licensed HVAC mechanical contractor inspect your air-conditioning unit.

Change Filters

Change air-conditioner filters every month—more often if you're located next to a highway or construction site where the air is much dirtier.

Check Cabinet Panels

On a quarterly basis, make sure that the panels to your rooftop air-conditioning unit are fully attached, screws are in place, and gaskets are intact so no chilled air leaks out of the cabinet.

Clean Condenser Coils

Remove debris that may have collected around condenser coils. At the beginning and end of the cooling season, thoroughly wash the coils.

Clean Evaporator Coils

Remove any dirt and ice that builds up on evaporator coils. Buildup slows down the rate of heat transfer and causes the refrigeration system to use more energy to maintain the same temperature.

Check for Airflow

Hold your hand up to air registers to ensure that airflow is adequate. If there is little airflow, or dirt and dust are found at the register, have a licensed HVAC mechanical contractor inspect your unit and duct work.

Cleaning and Maintenance

Follow this schedule for checking the following equipment.

Monthly	Change A/C filters
Quarterly	Check that rooftop A/C cabinet panels are tightly closed Clean condenser coils Check registers to ensure adequate airflow Clean evaporator coils
Seasonally	Inspect A/C unit prior to start of hot weather Have a licensed HVAC mechanical contractor check your economizer in spring and fall



Brighten Your Grocery's Profit Margin

Use Less Energy For Store Lighting

High-quality lighting design can create the right atmosphere, boost sales and reduce energy bills.

Use 35% Less Energy with Highly Efficient Overhead Lighting

Step 1: Look at your existing lighting fixtures. Many stores have T-12 fluorescent lamps in fixtures with magnetic ballasts. Often these fixtures can be retrofitted to high performance T-8 fluorescent lamps with electronic ballasts to save 30 to 40 percent in energy.

Step 2: Ask your lighting professional for advice about occupancy sensors. Keeping lights off when no one needs them can help you save more energy and money.

Which Kind Do You Have?



When you switch to T-8 lamps, be sure to change to electronic ballasts for optimal energy efficiency.



Use 40% Less Energy with LED Refrigerator Display Case Lighting

Below are benefits of light-emitting diode (LED) light strips:

- 40 percent more efficient than T-8 lamps when used in cool temperature settings and constant 24-hour use.
- Provide a more-even light distribution.
- Can be dimmable.
- Can last up to 100,000 hours.
- Lower wattage lighting inside the case lowers demands on refrigeration.
- In 24-hour stores, can be tied to occupancy sensors for increased efficiency.

Use Smart Lighting Design in Parking Lots

Most parking lots have far more lighting than the Illuminating Engineering Society of North America's *Lighting Handbook* (2000) recommends. You can save money and energy by following these suggestions.

For existing lights: Reduce lighting by using lower-wattage bulbs that can actually increase driver safety.

For new lighting: Consider pulse start metal halide lamps or LED lamps in fixtures that direct the light downward. Metal halide puts out more light in the blue part of the spectrum, which creates better visibility in low-light conditions.



Refrigerant Leaks

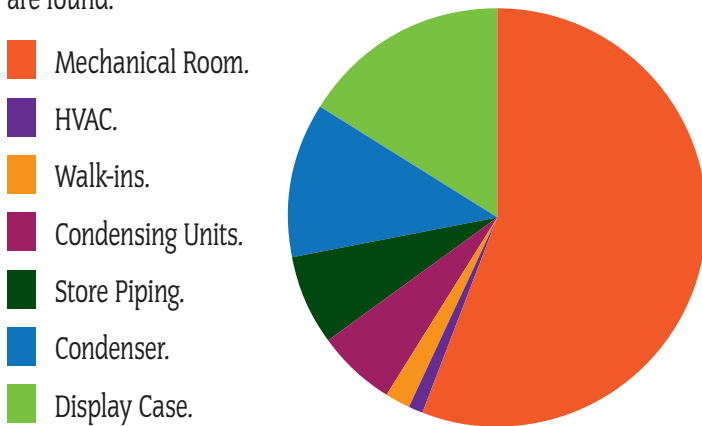
Costly to Your Energy Bill, Costly to the Environment



Refrigerant is expensive to buy, and no one wants to waste it. Yet tiny leaks can hurt whole systems, forcing them to run more often, use more energy and lead to higher energy bills. Have your systems tested to find and fix leaks.

Where Leaks Happen

Below is a pie chart showing where most refrigerant leaks are found:



Information provided by the Food Marketing Institute.

What Causes Leaks?

Mechanical wear and vibration account for 86 percent of refrigerant leaks at grocery stores, according to the Food Marketing Institute. Here's what you can do to reduce leaks from both:

- Tighten loose fittings.
- Replace damaged fittings.
- Replace worn gaskets.
- Install gaskets where they are missing.
- Install caps where they are missing.

For more information contact MACED Energy Efficient Enterprises at 859-986-2373 or e3@maced.org.

