

Putting Energy into Profits: ENERGY STAR® Guide for Restaurants



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ACKNOWLEDGEMENT

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Flex Your Power is California's statewide energy efficiency marketing and outreach campaign. Initiated in 2001, Flex Your Power is a partnership of California's utilities, residents, businesses, institutions, government agencies and nonprofit organizations working to save energy. The campaign includes retail promotions, a comprehensive website, an electronic newsletter, educational materials and advertising. Flex Your Power has received national and international recognition, including an ENERGY STAR Award for excellence. For more information, please visit www.flexyourpower.org





Putting Energy into Profits: ENERGY STAR® Guide for Restaurants

Section 1: Getting Started With Energy Efficiency

ENERGY STAR Small Business Network



The U.S. Environmental Protection Agency's [ENERGY STAR Small Business Network](#) offers free information, technical support and public recognition for restaurants that take action to save energy. Energy efficiency is a sound business practice that improves profitability, prevents pollution and conserves resources. This guide is designed to help your restaurant save energy, protect the earth and boost your bottom line.

Cook Up Some Savings

Restaurants are energy-intensive operations, but it is not just the cooking equipment that's to blame—heating, cooling, lighting, and sanitation each account for major portions of the average restaurant's electricity and natural gas consumption.

As you might guess, all that energy use means there's a lot of room to start saving. But here's something you might not have known: saving energy—and thus saving money—is easy. In some cases, it's as simple as changing a few everyday practices.

Take broilers, for example. Cutting out only one hour each day of broiler “on” time can translate to a savings of around \$450 annually. While \$450 might not sound like much at first, it could be huge when you think in terms of your profit margin. Consider this: if your restaurant operates with a profit margin of around 5 percent, you'll need about \$9,000 worth of sales to earn \$450.

Using ENERGY STAR Guidelines for Energy Management

Every dollar saved through energy efficiency is a dollar of additional profit, and even modest improvements to efficiency can lead to major increases in overall profits. EPA offers a proven strategy for superior energy management with tools and resources to help each step of the way. Based on the successful practices of ENERGY STAR partners, ENERGY STAR guidelines for energy management can assist your restaurant in improving its energy and financial performance. Please visit http://www.energystar.gov/index.cfm?c=guidelines.guidelines_index to find out more.

Tips for Buying New Cooking Equipment

In the case of new appliances, it pays to look beyond the sticker price. Make an energy-smart purchase by thinking in terms of life-cycle costs, which include purchase price, annual energy costs, and other long-term costs associated with the equipment.

Thinking in the long term can really pay off. In the case of ENERGY STAR® qualified connectionless steamers, for example, the water and energy savings over a conventional boiler-based steamer could add up to several thousand dollars in just one year! Multiply those annual savings by the entire life of the appliance, and the financial benefits of energy efficiency become truly striking.

Energy Audits—a professional energy audit is a logical first step toward cost-effective energy efficiency and improved profits. Such analysis is a great way to learn about your energy use and to identify custom efficiency options, and potential savings. Depending on your utility provider, both on-site and online options may be available—possibly for free. Join the [ENERGY STAR Small Business Network](#) for the monthly E-Update to stay up on free tools and strategies, especially if your utility does not offer small business energy efficiency support. Other Resources: [The Green Restaurant Association](#)—a great resource for smart restaurateurs; the [National Restaurant Association](#) has all kinds of valuable support for members as well as a link to your state restaurant association; and [Small Business Development Centers](#) who provide management assistance to current and prospective small business owners.

If you're in the market for new equipment, consider the following general tips for minimizing life-cycle costs:

- ▶ Buy [ENERGY STAR qualified products](#) whenever possible, and look for rebates from the manufacturer, your local utility company, and the ENERGY STAR website.
- ▶ Always ask equipment manufacturers and dealers for energy use information.
- ▶ Ask equipment dealers about maintenance. In some cases, energy-efficient equipment may require less upkeep than standard-efficiency equipment.

Find rebates for efficient products

Visit ENERGY STAR for updated [rebate](#) information and the Zip-code based [store locator](#) to find products in your area.

Consider Group Purchasing for lower prices

Upgrading building equipment to energy-efficient models and taking advantage of equipment maintenance services is a proven way to reduce energy usage and therefore costs. However, the initial costs of these upgrades may be more than many restaurants can afford. A solution to making energy-efficient products and services more affordable is group purchasing.

Group purchasing is the process of combining the buying power of many small entities through an organization such as a trade group, business association, or finance provider to improve the economics of purchasing products and services. By aggregating the membership of an organization (such as the National Restaurant Association), members can purchase energy-efficient products and services at reduced costs.

Tips for Tenants and Owners

How much you're willing to invest in energy efficiency will inevitably depend in part on whether you lease/rent or own your restaurant space. In either case, energy efficiency is in the best interest of everyone. Owners can reap the benefits of having a more up-to-date and marketable property, tenants can enjoy lower utility bills, and everyone will benefit from reduced greenhouse gas emissions.

Whether you're a renter or an owner, try taking the first step in the energy efficiency process by listing all of your options for efficiency improvements. Next, highlight those options that would benefit all parties involved. Here, look for the options that both cut energy costs and improve the marketability of the property. Lastly, use this [shortened list of options](#) as a jumping-off point for an energy efficiency conversation between tenants and landlords.

With restaurant appliances and other equipment, energy consumption can vary dramatically from model to model. As a consequence, making equipment purchases without considering energy use is a bit like rolling the dice with your utility bills—you could just as easily end up with equipment that sips energy as equipment that guzzles it.

The tables below help illustrate this point with equipment typically found in either Full Service (Table 1) or Quick Service Restaurant (Table 2) restaurants.

Need Help Finding the Right Equipment for your Kitchen? ENERGY STAR and the Consortium for Energy Efficiency (CEE) are teaming to define and promote [High Performance Commercial Kitchens](#). The initiative addresses a suite of commercial kitchen offerings including: electric and gas open deep-fat fryers, commercial ice-cube machines, pre-rinse spray valves, solid-door refrigerators and freezers, and glass-door refrigerators. The initiative defines a package of water- and energy- saving measures to help restaurants reduce costs. ENERGY STAR and CEE both maintain lists of equipment that comply with these high efficiency standards.

Table 1. Full Service Restaurants--Standard vs. Energy Efficient Product Savings Estimates

	Standard Equipment and Use	Energy Efficient Equipment and Use	Savings	Energy Savings
Technology	(\$/yr)	(\$/yr)	(\$/yr)	(%)
Solid Reach-in Refrigerator	210	97	113	54
Under-counter Refrigerator	146	124	22	15
Lighting – Incandescent	26	7	20	75
Lighting – Fluorescent	34	25	9	26
Solid Reach-in Freezer	432	281	151	35
Walk-in Freezer/Cooler	118	39	80	67
Hot-Food Holding Cabinet	767	438	329	43
Fryer	1,169	806	364	31
Steamer	2,700	508	2,191	73
Under-counter Freezer	228	196	32	14
Glass Reach-in Refrigerator	325	163	162	50
Convection Oven	1,051	731	320	30
Prep Table	406	182	223	55
Toaster	964	128	836	87
Broiler	3,539	2,882	657	19
Hot Water Heater	11,354	10,358	996	15
Combination Oven	4,163	2,596	1,567	39
Pre-rinse sprayer	1,973	1,052	921	47
Ware washer	7,657	6,432	1,226	34
Ice Machine	3,650	2,940	710	20
Demand Control Exhaust Hood	7,500	5,000	2,500	33
Griddle	1,117	1,056	61	5

Table 2. Quick Service Restaurants--Standard vs. Energy Efficient Product Savings Estimates

	Standard Equipment and Use	Energy Efficient Equipment and Use	Savings	Energy Savings
Technology	(\$/yr)	(\$/yr)	(\$/yr)	(%)
Fryer	1,559	1,075	485	31
Lighting – Fluorescent	34	25	9	26
Lighting – Incandescent	26	7	20	75
Solid Reach-in Refrigerator	210	97	113	54
Walk-in Freezer/Cooler	118	39	80	67
Engineered Proximity Exhaust Hood	4,000	2,500	1,500	38
Griddle	1,489	1,407	82	5
Ice Machine	3,650	2,940	710	20
Instantaneous Hot Water Heater	3,436	2,972	464	24
Prep Table	406	182	223	55
Pre-rinse sprayer	493	263	230	47

Assumptions: \$ 0.10/kWh, \$1.00/therm, \$2.00/CCF water, \$3.00/CCF sewer. Steamer and spray nozzle savings include consideration of water and sewer costs. Attributes for standard-efficiency appliances and high-efficiency/ENERGY STAR appliances derived from default settings in online calculators. Calculations for lighting assume 100-W incandescent, 27-W CFL, 16 hours of daily use. Calculations for exit signs assume 40-W incandescent sign, 2-W light-emitting diode (LED) sign. Spray nozzle savings assume gas water heating.

Section 2: Appliances and Food Preparation

Saving Energy in the Kitchen

When it comes to saving energy in the kitchen, how you use your appliances can be just as important as what appliances you use. Buying and using an energy-efficient oven, for example, is undoubtedly a good starting point and could trim hundreds of dollars from your annual utility bills—but saving the most energy and money will require something more: good practices.

Cut idle time. Do you need all of your appliances on, all of the time? Probably not. Leaving equipment on standby costs you money, so implement a startup/shutdown plan to make sure you're using only the equipment that you need, when you need it. The savings can be substantial.

Cook wisely. Ovens tend to be more efficient than rotisseries; griddles tend to be more efficient than broilers. Examine your cooking methods and menu and find ways to rely on your more-efficient appliances.

Maintain and repair. Don't let everyday wear and tear drive up your energy bills. While a leaky gasket, clogged burner or loose oven-door hinge may not waste much energy, combine all three and suddenly the waste is significant. Stop waste by staying on top of repairs.

Recalibrate to stay efficient. It's likely that over time the performance of your kitchen appliances will degrade. Thermostats and control systems can fail or fall out of calibration. Take the time to do an occasional thermostat check and recalibrate as necessary to ensure that you're cooking at the right temperature. Repair or replace broken control panels on ovens, steamers, and other appliances that feature control systems.

Check pilot lights. Older gas-burning appliances typically feature pilot lights, which require a constant stream of gas to stay lit. Check pilot flames occasionally to make sure you're using only as much gas as you need. How do you spot an over-fired pilot light? A tall yellow flame is the giveaway. Adjust flames so they are bullet shaped and mostly blue.

Buy energy-efficient appliances. Inefficient appliances make for an expensive double-whammy: in addition to having higher operating costs, inefficient kitchen appliances tend to emit more heat than their efficient counterparts resulting in a hotter kitchen and potentially forcing you to spend more to cool the air in your kitchen.

Buy with capacity in mind. Evaluate your food production needs and try to buy appliances that match your needs on a pounds-per-hour basis. Grossly oversized appliances can hit you in the pocketbook through both higher capital costs and operating costs. Overcapacity is particularly painful, as you pay to heat up the production capacity you will never use.

Steamers



Thanks to good heat transfer, steamers can rank among the more energy-efficient kitchen appliances. But just because steamers are sometimes more efficient than other kitchen appliances doesn't mean they can't use a lot of energy. Here's one reason why: until recently, most steamers were boiler-based water hogs, consuming an average of 40 gallons of water per hour. Bringing so much water to a boil requires a lot of energy—thousands of dollars worth per year for larger restaurants. Fortunately, steamer technology has come a long way in recent years. New "connectionless" steamers operate as a closed system—without a boiler and a drain—so they consume far less water and, ultimately, far less energy. Many of the connectionless steamers are designed with output in mind and they can produce just as much food as traditional boiler-based steamers but at a much lower cost to operate.

Don't wait: Go Connectionless

With [ENERGY STAR qualified steamers](#), good things come to those who don't wait. That's because the savings are substantial. In most cases it makes financial sense to make the switch right away, rather than waiting until your old boiler-based steamer is ready to call it quits.

Invest in connectionless technology. Connectionless steamers require less maintenance than boiler-based steamers and consume far less energy and water. Field testing by the Food Service Technology Center (FSTC) has shown just how

great the savings can be: In one head-to-head challenge between a three-pan connectionless steamer and a traditional, boiler-based steamer, the connectionless steamer slashed annual water bills by \$2,000 and annual electricity bills by \$3,000. Get in on the savings—look for an [ENERGY STAR qualified connectionless steamer](#).

Close the door! Your profits are literally evaporating away if you're operating your steamer with its door open.

Use only as many compartments as you need. With steamers, two—or three or four—compartments are not better than one when it comes to saving energy and money. Shut down unnecessary compartments during slow periods.

Cut standby time. Eliminating an hour of standby time daily on a boiler-based steamer can save from \$50 to \$300 over the course of a year.

Use the timer. If you're not using your steamer's timer, you're probably paying the price for it. Timers save energy by ensuring that the steamer runs at full heat only when needed.

Keep it clean. Flushing out the boilers and removing mineral deposits will help ensure that you're always operating at maximum efficiency.

Fix leaks. When gaskets loosen or tear, don't waste time before replacing them. Steam leaks reduce cooking efficiency and drive up utility bills.

Broilers

Broilers are true kitchen workhorses, but their dependability and usability come at a price: scorching heat requires a great deal of energy—perhaps more than any other appliance in the kitchen. FSTC has reported that one broiler can use as much energy as six fryers! Making matters worse, broilers tend to rank among the least efficient appliances in the kitchen. Fortunately, a few good cooking habits can help trim energy waste and have a direct impact on your bills.

Cut preheat time. Don't start the heat before you need it—you'll waste energy and needlessly heat up your kitchen, forcing your air conditioner to work harder. A typical broiler requires no more than 20 – 30 minutes to preheat.

Reduce the cooking area. Because broilers use so much energy, turning off a section of your broiler can yield noticeable savings.

Eliminate standby time. Don't leave your broiler at full heat during long lulls in activity—turn it down or off whenever possible. If you can manage to cut three hours of standby time every day, you could save upwards of \$1,350 annually.

Rely on your griddle. For some restaurants, griddles may be good alternatives to broilers. Thermostatically controlled griddles tend to use far less energy than broilers, and grooved griddles can be used to sear "grill marks" onto foods so they look broiled.

Align broilers with exhaust hoods. Sometimes appliances get pulled out for cleaning and don't make it all the way back under the exhaust hood. This adds extra heat and smoke to the kitchen. Make sure that your broiler is fully under the hood and pushed as far back to the rear wall as possible.

Pasta Cookers

You might not think that doing something as simple as boiling water could cost thousands of dollars per year, but that's probably the case—especially if you happen to cook enough pasta to require a dedicated pasta cooker.

Dial in minimum settings. Do you boil water with your temperature dials to the max? If so, you might be throwing away more than \$1,000 per year. Find the minimum settings required to maintain a boil—your food will cook just as fast, and you'll slash your energy bills in the process.

Cut the idle time. Shutting down appliances during slow hours is always a good idea. In the case of pasta cookers, you could save \$600 annually simply by cutting two hours of idle time each day. If you can't shut down your pasta cooker, consider at least turning it down—a pasta cooker standing by at less than boiling temperature will use far less energy than a pasta cooker running a constant boil.

Ovens

In terms of energy efficiency, ovens are usually mid-level performers—they're often more efficient than broilers, but less efficient than steamers and pressure cookers. Several energy-efficient convection and combination-style models are available, with some even qualifying for utility-sponsored rebate programs.

Use “combi” mode sparingly. Combination ovens are attractive because of their versatility as a cooking platform and their space-saving ability to mix the duties of ovens and steamers. Unfortunately, this double-duty can come at a cost—combination mode can use double the energy use of convection mode. Worse still, ovens operating in combination mode can use upwards of 40 gallons of water per hour! Typically, it is not necessary to operate these units in the combination mode during an entire cooking cycle. Follow the manufacturer's recommendations—use the oven's built-in programmability and limit the amount of cooking in the combination cycle.

Cut idle time. The bigger the oven, the more energy you're wasting by leaving it idle. The amount of energy wasted can quickly add up, especially with conveyor ovens, which allow heat to escape at both ends. Turn ovens down or off during slow periods, shut down your backup ovens during lulls and shut oven doors all the way when the oven is empty but still on.

Keep it full. It is more efficient to cook in a fully loaded oven than a partially loaded one. If your workload permits it, cook in large batches and then turn off the oven in between loads.

Replace seals and tighten hinges. When seals and gaskets tear, replace them. When oven door hinges loosen, tighten them and re-align the doors.

Ranges

Like broilers, ranges are manually controlled and can be energy guzzlers depending on how you use them.

Maintain and adjust burners. Wavy, uneven or yellow flames are all signs that it's time for a good burner cleaning and adjustment of the air shutter. Loosen the adjustment screw and move the shutter until the flame is bullet shaped and mostly blue, then retighten the screw. Never drill out the burners or the gas orifice to get a bigger flame—you'll end up lowering the efficiency of your burner.

Put a lid on it. Use a lid on stockpots to hold in heat, boost efficiency, and shorten cook times.

Consider induction technology. Induction ranges are a potential alternative to traditional range tops; they are more expensive than traditional gas or electric ranges but offer very high efficiency, rapid heat up, precise controls, and easy maintenance. Induction hobs can be purchased as single units or grouped together and can be set on top of or built into counter tops. Induction cook tops do require magnetic cookware in order to work properly.

Griddles

Griddles are one of the few pieces of cooking equipment that can be purchased with either manual or thermostatic controls. Typically, thermostatically controlled griddles cost less to operate. Utility rebates may be available for the most efficient thermostatically controlled griddles.

Putting energy use in perspective

Sometimes it's difficult to appreciate just how energy-intensive kitchen equipment can be. Here's some information to help put things in perspective—and to underscore the importance of saving energy in your kitchen: 11,000 kWh is enough energy to power a typical electric open deep fat fryer for about a year, or over \$1,000 annually in electricity costs.

Cut standby time. Chances are that you don't need your griddle ready and waiting all day, every day. Save up to \$250 annually by cutting three hours of griddle standby time per day.

Invest in a double-duty griddle. When the time comes to invest in a new griddle, consider a model that features both grooved and flat cooking surfaces—especially if you do a lot of broiling. As mentioned earlier, griddles tend to be more efficient than broilers, and grooved griddles can achieve broiler-like char marks on food. Shifting cooking duties from a broiler to a grooved griddle will save money.

Fryers



Fryers are one of four classes of kitchen equipment that include ENERGY STAR qualified models. Simply look for the ENERGY STAR label when narrowing down your purchase options; once you're up and running, mix in some of the smart cooking practices below and you'll be on the fast track to lower bills.

Buy an [ENERGY STAR qualified fryer](#). Fryers that have earned the ENERGY STAR label are up to 25 percent more energy-efficient than standard models. With natural gas fryers, the added efficiency can save you about \$350 annually.

Cut idle time. FSTC has observed that kitchen fryers tend to spend upwards of 75 percent of the day idling. Cutting out four hours of idle time each day could save around \$250 annually for a gas fryer and about \$350 for an electric fryer.

Check and adjust thermostats. Are you cooking hotter than you think? It's not uncommon for fryer thermostats (or any other appliance thermostat, for that matter) to lose accuracy over time. Invest in periodic temperature checks and recalibration as necessary.

Efficient cooking appliances: Taking the next step

Make an ENERGY STAR list. EPA's ENERGY STAR program takes the guesswork out of buying efficient appliances. Whether you're in the market for new or used equipment, start your hunt by making a list of the ENERGY STAR qualified models that fit your needs. Focus on these as you start narrowing down your options.

Don't forget your non-cooking energy costs. For your convenience, the ENERGY STAR Small Business restaurant Web page maintains an updated list of all the other [ENERGY STAR qualified products](#) that a restaurant may need, such as lighting, heating/air-conditioning, ceiling fans, office equipment, etc.

See what utility rebates are available. Some energy-efficient cooking and non-cooking equipment qualifies for rebates from utilities. To find out more, call your utility directly or use ENERGY STAR's [rebate finder](#).

Ask questions and check online for reviews. If no ENERGY STAR qualified models exist for the type of equipment you're looking for, don't worry—you've still got options. Ask distributors and manufacturers for energy use information, and check online for equipment reviews. The [Food Service Technology Center](#) is a great place to start.

Braising Pans

Close the lid. FSTC has found that you can use 50 percent less energy simply by closing your braising pan's lid during periods of extended use.

Buy an insulated braising pan. If you're in the market for a braising pan, look for one with insulated walls.

Holding Cabinets



When it comes to saving energy with hot food holding cabinets, the answer is in the insulation. Well-insulated holding cabinets have been shown to be up to 65

percent more efficient than un-insulated models. Expect to save between \$350 and \$450 annually simply by choosing a well-insulated cabinet.

Buy an ENERGY STAR qualified cabinet. Several states are in the process of passing laws requiring that any new holding cabinet you purchase be an insulated [ENERGY STAR qualified cabinet](#) or equivalent. Utility rebates are available in many areas for select models. Each ENERGY STAR qualified hot food holding cabinet can save businesses nearly 3,300 kWh annually, or an average of \$330/year on utility bills.

Shut it off! The U.S. Department of Energy reports that holding cabinets are frequently left on overnight. Don't waste energy by heating empty space—implement a shutdown schedule and make sure your cabinets are part of it. An un-insulated holding cabinet left idling for eight hours every night could wind up costing you around \$500 per year!

Cabinet controls may be manual or electronic; in the latter case, a multiple timer-setting capability is available. On some models, electronic control systems can monitor up to six, independent timers for each compartment, to facilitate “first-in, first-out” product rotation.

Oregon Convention Center

By replacing twenty-eight inefficient hot-food holding cabinets with thirty new, ENERGY STAR qualified units, the Oregon Convention Center will save money, energy, and increase its overall kitchen capacity. In the end, over 200,000 kWh will be saved annually because of the replacement of old and inefficient equipment with new ENERGY STAR qualified commercial food-service equipment. This translates into over \$12,000 per year in savings!

Section 3: Refrigeration Systems

Refrigerators and Freezers



How often do you think about your refrigerator? Refrigerators tend to have tank-like durability, which can make them easy to forget about. But just because your refrigerator is working doesn't mean that it's working well—at least not when it comes to energy efficiency. As with any other mechanical equipment, refrigerator/freezer performance can degrade over time. A few upgrades

and a bit of maintenance can have a positive impact on your electricity bills.

Buy ENERGY STAR. Several states are in the process of passing laws requiring that any new reach-in refrigerator or freezer sold is ENERGY STAR qualified or equivalent. Compared to standard models, [ENERGY STAR labeled commercial solid door refrigerators and freezers](#) can lead to energy savings of as much as 45 percent. In many service areas, utility rebates are available for the most efficient models.

Turn off door heaters. Simply switch off the door heater on your reach-in refrigerator or freezer and you could save up to \$75 annually per door. Turn the switch back on if you notice significant frost around the door or if there is water dripping on the floor from the front of the refrigerator—never do anything that compromises safety or performance.

Allow for air circulation. Refrigerators remove heat from inside the box and reject that heat out through the coils on the top or bottom of the unit. Don't push your reach-ins into tight spaces where that heat will build up or the unit will end up working harder and using more energy.

Clean condenser and evaporator coils. If you take a look at your refrigerator's condenser you'll see that the fins are virtual magnets for dust and grime. Debris like this builds up on the fins, blocks air flow across the coils and drags down refrigeration efficiency. Dirty coils can also lead to early equipment failure and are sited by one manufacturer as the

number one reason for service calls. Check and clean evaporator fins; you'll find them behind the evaporative fans in your walk-in.

Close the lid on your food wells. Leaving the lid up on your prep table could increase electricity consumption by up to 50 percent.

Check and set defrost cycles. Defrosting is an energy-intensive process that can vary dramatically from restaurant to restaurant, so it's important to take some time to figure out which defrost settings are right for you. The key is to only defrost for as long as you need, which in most cases is no more than 15 minutes, four times daily. Find your defrost time clock: Use the pins on the outside ring to set the number of defrost cycles, and use the center dial to set how long each defrost cycle lasts. One restaurant owner saved more than \$800 annually by shortening the length of each defrost cycle from 70 minutes to 15 minutes.

Replace old gaskets. Add new door gaskets to any refrigerator that has torn or loose door gaskets. In some areas, utility rebates are available for gasket replacements, and there are service companies that will "turnkey" replace all the worn gaskets in a restaurant.

Upgrade your walk-in. Strip curtains and automatic door closers are inexpensive, easy-to-install upgrades suitable for just about any walk-in. By some estimates, strip curtains alone can cut outside-air infiltration by 75 percent. Utility rebates that cover a big chunk of the upfront costs to purchase a strip curtain are often available. With a rebate, the payback on a strip curtain is usually well under one year.

Use efficient lights. Swapping out incandescent lights for low-temperature CFLs in your walk-in is a smart move. Incandescent lighting gives off much more heat than CFLs, forcing your refrigerator to work harder.

Shade remote condensers. Direct sunlight can really put a dent in the efficiency of a remote condenser. (Remote condensers are usually associated with walk-ins and can often be found on rooftops.) Use a few strategically placed panels to shade the condenser from direct sun during the hottest part of the day, while still allowing for good airflow into and around the condenser unit.

Insulate suction lines. On refrigeration systems with remote condensers, suction lines transport refrigerant from the evaporator to the compressor. Adding inexpensive insulation to suction lines can help keep them from absorbing heat during the transfer process, ultimately making the entire refrigeration process more efficient. Check with your utility—rebates may be available to offset the cost of the insulation. If not, it may still be a good business decision.

Add night curtains to display cases. Open-case refrigerators may be a great way to put products at the customer's fingertips, but they're typically not a top choice when it comes to energy efficiency. Cut down on energy waste by installing night curtains, which will help trap cold air inside the refrigerator case while you're closed. The curtains are relatively inexpensive, and utility rebates may be available in your area.

Recharge low refrigerant. Operating a walk-in with too little refrigerant puts extra strain on the compressor, driving energy costs up and increasing the risk of equipment failure. Fortunately, it's fairly simple to keep track of your refrigerant level; simply look for the sight glass—the small window into the refrigerant line—on the condenser. If you see bubbles while the system is running, then it's probably time to arrange for a recharge. Be sure to identify and repair any leaks before recharging.

Switch to efficient fan motors. Installing efficient fan motors—specifically, the "electronically commutated" (ECM) variety—on a small, two-fan walk-in freezer has been shown to save about \$200 a year per fan. Naturally, the bigger the

Tripp's Grill & Six Pack

Michael and Susan Tripp had an energy audit conducted on their 1,400 square foot restaurant and grill. One of the key recommendations was to invest in a six-door walk-in cooler to replace four inefficient beverage coolers in the dining area. Seals on the older coolers were allowing chilled air to escape, and even worse, the compressors were pumping heat into the room, making it harder and more expensive to cool the space in summer. The change resulted in a \$150 savings in the first month alone, while also improving employee and customer comfort in the summer months. Annually, Tripp's Grill & Six Pack is saving more than \$1,900 in electricity costs.

refrigerator and the greater the number of fan motors replaced, the greater the electricity savings will be. If you're in the market for a new walk-in, then some states have laws requiring you to install efficient fan motors. If you have an existing walk-in, consider swapping out the old fan motors for newer ECM models. Don't wait until your old fan motors fail: it's actually cheaper to plan ahead and upgrade to ECMs early rather than waiting for an emergency service call. Rebates are available in many parts of the state for ECM motors; check with your utility to see if you are eligible.

Ice Machines

If your ice machine is working during the afternoon hours, there is a strong possibility that it is driving up your restaurant's "demand charge." If that machine is a packaged unit (meaning the condenser is mounted on top of the icemaker instead of outside the building), it is also generating a lot of heat in your kitchen.

Shift your ice production time. Cut down on your daytime electricity demand by installing a timer and shifting ice production to nighttime off-peak hours. Most restaurants pay less for electricity at night and you'll be turning off a hot, noisy piece of equipment during normal kitchen hours.

Shop for efficiency. Ice machine manufacturers voluntarily list the water and energy-use numbers for their ice-cube machines with the [Air Conditioning and Refrigeration Institute](#). With this list in hand, you can comparison shop for the most efficient ice machine and save yourself hundreds of dollars a year in water and electricity bills. Many utilities offer rebates for purchasing efficient ice machines, so check with your energy provider or ice machine dealer to see if you qualify.

Purchase with capacity in mind. Bigger ice machines are typically more efficient than smaller ones in the sizes used by most restaurants. For instance, a 520 pound-per-day machine will make ice using as little as half the energy per pound of ice produced as needed by a smaller 200 pound-per-day machine. The best part is that the bigger 520-pound machine does not cost twice as much as the 200-pound unit. So, choose wisely and you could get twice the ice capacity at half the energy cost per pound of ice. The larger machine also makes it easier to shift all of your ice making to nighttime hours.

Section 4: Lamps and Lighting Fixtures

Save With Lighting



Options for efficient lighting have exploded in recent years—great news for restaurants, where lights are typically on for 16 to 20 hours a day. Remember this general rule as you sort through your options: For many lighted areas in your restaurant, high-efficiency fluorescent lamps—in particular, compact fluorescent lamps (CFLs)—are your ticket to savings.

Replace incandescent bulbs with CFLs. If you have a lot of incandescent lamps, you're paying the price for them. Compact fluorescent lamps (CFLs) last far longer and use only a fraction of the energy. As with occupancy sensors, low-temperature models are available for refrigerators and freezers. Quality can vary from manufacturer to manufacturer, so always look for [ENERGY STAR qualified CFLs](#). Making the switch to CFLs can get tricky in rooms that require subdued light, in part because not all CFLs are dimmable, so check with a lighting supplier to find the best options for dining areas or other spaces that require more nuanced lighting.

Use a shutdown schedule. Take stock of all the lights—indoors and out—that are not necessary at night; implement a shutdown schedule to make sure each unnecessary light gets shut off at the end of the workday. And take stock of all the lights that are not necessary for routine operations and turn them off whenever you can.

Milton Stirm, Subway franchise owner

Business owner Milton Stirm re-energized his three Subway franchises with a handful of energy efficiency upgrades. Thanks in part to assistance from his local utility, which supplied both financial incentives and expertise throughout the upgrade process, Stirm made the jump from inefficient four-lamp T12 fixtures to energy-efficient two-lamp T8 fixtures. "It's just as bright as before, with half as many lights," reported Stirm. Utility rebates for the lighting and other upgrades ranged from \$250 to \$750.

Install occupancy sensors. Closets, storage rooms, break rooms, restrooms, and even walk-in refrigerators are great candidates for occupancy sensors. The sensors help you save energy by automatically shutting off lights when no activity is detected in a room. Look for low-temperature sensors for refrigerated environments.

Swap out your T12s. Does your restaurant feature tubular fluorescent lighting with two or four long tubes arranged parallel to each other? If so, and if you haven't done a lighting upgrade recently, there's a good chance that you're getting your light from what are called T12 lamps, which is an inefficient technology from the 1940s. Modernize your lighting by switching to newer, more efficient T8 or T5 lamps and fixtures. Utility rebates for lighting upgrades may be available in certain areas.

Use LED Exit signs. Signs that use light-emitting diodes (LEDs) are a great alternative to incandescent-based signs. [ENERGY STAR Qualified Exit signs](#) use far less energy, and the "bulbs" typically last 10 years or more (compared to less than one year for incandescent signs). Electricity savings can sometimes exceed 80 percent. Don't forget to check with your utility provider—rebates for LED exit signs are available in many service areas and can sometimes cover most of the purchase price.

Compact fluorescent vs. incandescent

If each of the over 850,000 of America's restaurants replaced only *one* incandescent light bulb with a CFL, 500 million pounds of CO₂ emissions could be avoided each year, and the restaurant industry could save about \$40 million annually. Here's how much you could save in your own restaurant by switching eight incandescent lamps with eight CFLs:

Eight 100-W incandescent lamps	Eight 27-W CFLs
Used 16 hours daily	Used 16 hours daily
At \$0.10 per kWh	At \$0.10 per kWh
Cost per year: \$468	Cost per year: \$126
Annual Savings with CFL: \$342	

The right look, the right light

Never before have there been so many options on the market for energy-efficient lamps and fixtures. This is great news for restaurant owners looking for the perfect mix of energy efficiency, quality of light and elegance of lighting fixture. Today, energy-efficient options are available for nearly every type of fixture, from wall sconces to chandeliers.

Section 5: Heating, Cooling and Ventilation

Heating and Cooling Systems



When it comes to annual energy use in restaurants, heating and cooling systems account for a big piece of the pie. In fact, for most restaurants, heating and cooling is second only to food preparation in terms of annual energy consumption.

Buy [ENERGY STAR Heating and Cooling equipment](#). ENERGY STAR qualified light commercial equipment uses 7-10% less energy than standard equipment. These products can save your business approximately \$3-4 per square foot over the life of the equipment. For example, a 12,000 square foot building using ENERGY STAR qualified heating and cooling products could save \$36,000 to \$48,000 over the life of the equipment.

Rely more on fans, less on air conditioning. Air conditioners and central cooling systems require a tremendous amount of energy; most fans, on the other hand, do not. Research indicates that energy use falls by 4 to 5 percent for every degree that you raise your cooling thermostat. Easing back on central cooling by only 3 degrees Fahrenheit could trim air conditioning costs by 12 – 15 percent. One way to improve customer comfort is to compensate for the difference in air temperature by using an efficient ENERGY STAR qualified ceiling fan.



Inspect, clean, and maintain equipment. Dirty heat-transfer coils (the winding metal coils on the back of an air conditioner) and torn or misaligned ducts can both drag down the efficiency of your climate control equipment. Clean and mend where you can and consider a service contract with a local repair shop.

Replace dirty air filters. Don't let your air filter get too dirty—a grimy filter will impede airflow, forcing your heating and cooling motors to work harder. Air quality for customers and employees will suffer as well. As a general rule, check and change filters at least once every three months, or every month during cooling and heating seasons.

Install an ENERGY STAR qualified programmable thermostat. Still setting your thermostat by hand? Consider adding some precision to the process by adding an ENERGY STAR programmable thermostat and using its “night setback” mode. With automatic setback, never again will you have to remember to turn off the heat or air conditioning at the end of the workday. According to ENERGY STAR estimates, proper use of a programmable thermostat could save you up to \$100 annually on heating and cooling costs.

Find out if an energy management system (EMS) is right for you. If your restaurant has a centralized heating and cooling system, an EMS may be able to cut your energy costs dramatically. Finding out if an EMS is right for you might take some footwork—you'll need the help of an energy expert on this one. But the extra effort may be worth it since an EMS can also control other systems like lighting and kitchen exhaust fans.

Kitchen Ventilation

An unbalanced or poorly designed kitchen exhaust system can spell trouble both for your restaurant's air quality and for your utility bills. Get ahead of the game by enlisting the help of an expert to design an optimized exhaust setup that works.

Catch all that you can. At least in principle, kitchen ventilation is a straightforward art with a simple goal: capture and contain as much cooking effluent—the combination of grease, smoke and heat that emanates from each appliance—as possible. In practice, however, the task is much more challenging. Cross drafts and misaligned appliances can allow heat and smoke to spill into the kitchen. Spillage leads to a hot, uncomfortable working environment and higher energy bills if you air-condition your kitchen. Cut down on spillage by adding inexpensive side panels to hoods that are failing to capture waste, and push each appliance as far back against the wall as possible to maximize hood overhang and close the air gap between the appliance and the wall.

Rebalance your act. If you have not performed an air balance recently, it's time to call your contractor. Time, maintenance, broken belts, and poor commissioning all lead to kitchen exhaust systems that are out of balance, potentially moving too much or too little air, spilling cooking effluent, and costing you money. This tip applies to your dining room heating, ventilation, and air conditioning (HVAC) system as well; outside doors that are hard to open because of suction or that blow open by themselves are a sure sign that it's time to order an air balance.

Consider variable-speed exhaust. Typically, kitchen exhaust hoods have two settings: “off” and “on”. Naturally, “off” is ideal for when the kitchen is empty, and “on” may be great for the frenzied dinner rush—but neither is quite right for the afternoon lull, the post-dinner wind down, or any other situation when the kitchen isn't operating at full capacity. Variable-speed, demand-based exhaust controls get around this problem by using sensors to monitor your cooking and varying the exhaust fan speed to match your ventilation needs. Demand ventilation controls typically reduce the cost to operate an exhaust system by anywhere from 30 to 50 percent and can be installed on either new installations or retrofitted to existing hoods.

Maximize overhang. A 4-foot deep hood is somewhat typical for restaurant exhaust, but you'll capture more smoke and heat with a 5- or 6-foot deep hood.

Group heavy-duty appliances together. If you're designing a new kitchen, try to group your heavy-duty appliances (e.g., broilers, wok ranges, salamanders) together in the middle of your appliance lineup. You might also consider placing the broiler under a separate dedicated exhaust hood with a higher exhaust rate and leaving the light-duty equipment under the original hood at a lower rate.

Learning more about kitchen ventilation

If you're getting ready to design a new kitchen or renovate an old one, check out “Improving Commercial Kitchen Ventilation System Performance,” a two-part kitchen ventilation design guide written by the experts at the [Food Service Technology Center](#).

Around the Building

Investigate more efficient windows and window glazes. ENERGY STAR-qualified windows, doors, and skylights can save you energy and money and protect furniture from sun damage. If your restaurant gets a lot of sun through south and west-facing windows, applying a clear, heat rejecting, window film will help cut your cooling costs while making your dining room more comfortable. A quality film will be applied by a professional and should include a warranty. Window film that is properly designed into new construction can dramatically reduce your need for mechanical cooling, which helps to offset the cost of the film. Window films also block the damaging ultra-violet light that fades your carpets, chairs, and other fixtures. Curtains, awnings, and overhangs are other good alternatives for keeping heat out of the building. Check with your utility—rebates are often available.

Patio Heaters

Cut back on heaters and heat time. Without a doubt, the best approach to saving money with patio heaters is to cut back—both on the hours of operation and on the number of patio heaters running at any given time. Consider that three 50,000-Btu heaters operating an average of three hours daily could cost you upwards of \$1,600 per year.

Design with efficiency in mind. Keep in mind that moving air can disperse the heat that radiates from patio heaters. Be smart with your patio layout; block cross drafts and consider how to use the fewest heaters so you can get the most bang for your energy buck.

Section 6: Sanitation and Water Use

Save Water to Save Energy

For restaurants, saving water—especially hot water—makes great economic sense. By conserving hot water you trim not one but two bills: one for the water, and another for the electricity or natural gas used to heat it. In fact, your wastewater or sewer bill may be based on water consumption, so may also be reduced.

Don't ignore leaks. A leaky faucet or dish machine, or a stuck solenoid valve, that loses one-tenth of a gallon per minute will waste more than 50,000 gallons over the course of a year. If that same leak just happened to be hot water—you'd be spending hundreds of dollars heating water only to send it right down the drain!

Check your water temperature. Use a thermometer to make sure your water heater isn't working any harder than it has to; hot water should be around 140 degrees at the faucet of the pot sink closest to the dish machine. There is no benefit to paying to heat water beyond health and safety requirements.

Add aerators. Hand-sink faucets can use as much as 10 gallons of water per minute when not equipped with efficient water aerators. Outfit the hand sinks in your kitchen and bathrooms with low-flow aerators—you'll cut water use and ultimately save on water-heating costs.

Add insulation. Heating water is a significant expense for most restaurants. Fortunately, it's relatively easy to reduce that expense by adding insulation to your hot-water system. Start saving by simply wrapping the first 3 feet of your hot-water "out" pipe with inexpensive insulated "sleeve" covers available at most hardware stores. If your heater is older than 7 years, you could save by wrapping the entire storage tank, carefully avoiding gas and electric connection points.

Merkl's Deli & BBQ

Merkl's Deli & BBQ was designed with energy efficiency in mind. Among other features, the deli is outfitted with low-flow spray valves, which perform as well as standard valves but save vast amounts of water and cut water-heating costs. "They work great," reports Steve Wilson, one of the deli's co-owners. "I've actually been able to turn the water pressure down with them."

Activate the automatic flue damper. Many commercial water heaters have an automatic flue damper that closes when the burners are off. This damper saves energy by blocking heat from escaping up the flue. Make sure that the damper motor's switch is in the "on" position so that the damper will operate properly.

Control the recirculation pump. If your hot water system includes a recirculation pump, install a timer that turns the pump off when your kitchen is closed. You'll reduce the heat loss from your hot water pipes, potentially saving hundreds of dollars on energy costs.

Switch to low-flow pre-rinse spray valves. Depending on the size and workload of your restaurant, a low-flow spray valve could save you more than \$1,000 annually. The secret to the low-flow valve's success is its ability to save in three ways at once. By lowering your water consumption, the sprayer simultaneously slashes your water, wastewater-disposal and energy bills. And don't worry, low-flow doesn't mean slow—low-flow spray valves are engineered to work as well as or better than standard valves. Several states are in the process of passing laws that any new pre-rinse spray valves purchased are required by law to be low-flow models; however, thousands of old sprayers are still out there wasting water and energy. You may be able to replace your old valves for free by taking advantage of a give-away program through your local utility or water district.

Dishwashers

From an operational standpoint, dishwashers are one of the most expensive pieces of equipment in your kitchen. Every rack of dishes you wash can include as many as eleven separate cost items within the three main categories of water, water heating and chemicals. Smart purchasing, operations, and maintenance can save you thousands of dollars in the dishroom.

Don't waste the space! You'll pay the same amount to run a half loaded dish rack as a fully load one, so make sure you only run fully loaded dish racks through the dish machine. Cutting wash cycles could save you hundreds of dollars annually.

Turn it off. High-temp dishwashers typically feature internal tank heaters. If you've got one of these dishwashers and you're not turning it off at night, you're wasting energy by heating water that you don't need. The same holds true for booster heaters and dishwasher exhaust hoods: turn them off at night to save.

Check rinse pressure. Pay attention to your dishwasher's pressure gauge—if it's showing pressure above 25 psi, there's a good chance you're using much more water than is necessary. Most dishwashers require only around 20 psi.

Check water temperature. Follow manufacturer specifications for tank temperature and rinse temperature.

Operate conveyors in auto mode. If you have a conveyor-style dishwasher, make sure you're using it in auto mode, which saves electricity by running the conveyor motor only when needed.

Add or maintain wash curtains. Wash curtains—the plastic strips that hang on both sides of conveyor dishwashers—improve washing efficiency by trapping heat. Replace curtains when the old ones begin to deteriorate.

Design your new dishwashing system with both energy and water efficiency in mind. If you're in the market for a new dishwashing system, it'll pay to look into energy-efficient gas booster heaters. Compared to a standard electric booster heater, a gas booster heater could trim energy costs significantly due to the relative lower cost of natural gas as a fuel (though keep in mind that a gas booster heater could have a higher first cost and installation cost than the electric unit). Also, look for dishwashing systems that use one gallon or less of water per rack washed—typically, the less water required per rack, the less you'll pay in energy costs.

Consider heat recovery. Refrigerant heat-recovery systems use waste heat from the walk-in refrigerators and freezers to preheat water that can be used in the kitchen. These systems are relatively simple and have reasonable payback periods when installed in kitchens with moderate to high hot-water needs.

Section 7: Demand Control

Do you have high energy bills? Think about Demand Control.

Digital demand controllers (DDCs) are small, relatively inexpensive energy-management devices that can simultaneously control the operation of a large number of equipment items, preventing all or most of them from operating simultaneously. The objective is to avoid the creation of power-demand “spikes” (i.e., short periods when power demand is unusually high), which often leads to high monthly demand charges.

The operation of some electrical loads in a facility (such as internal lighting) cannot be interrupted without causing a disruption. But many others—typically those that have some thermal-energy storage associated with them, such as water heating, air-conditioning, electric space-heating units, or refrigeration equipment—can be interrupted for periods of 10 to 30 minutes without occupants being aware of the interruption. These are the loads selected for peak-demand-limiting controls via a DDC.

Restaurants and food stores are ideal candidates because they typically have refrigeration and air-conditioning loads, and also may have electric water heaters. DDC units can also be used to reduce electrical demand during periods when the utility grid is challenged and in danger of overloading, or when electricity prices are unusually high. Many utilities offer financial incentives to customers who install DDC units or other equipment that enable the utility to reduce the customer's load at these times.

Section 8: Begin The Process, Learn More and Save!

Now it is time for you to take steps to start saving energy and money. The best first step is to have an energy audit performed on your facility by a trained professional. Once you have identified the areas of potential energy savings, decide which energy-efficiency upgrades you want to install and practices to put in place. If your finances and operating schedule make it unpractical to perform all the upgrades at once, you can take a staged approach and install them as time and money allow.

For more information on energy technologies please consult the resources in the following list.

ENERGY STAR www.energystar.gov

EPA's WasteWise www.epa.gov/wastewise

EPA's WaterSense www.epa.gov/owm/water-efficiency/index.htm

EPA's Green Buildings www.epa.gov/greenbuilding

Food Service Technology Center www.fishnick.com

Green Restaurant Association www.dinegreen.com

National Restaurant Association (NRA) www.restaurant.org

North American Association of Food Equipment Manufacturers (NAFEM) www.nafem.org

Pacific Gas and Electric Company's Energy Reduction Action Plan for Restaurants

www.pge.com/rebates/123_reduction_plans/restaurants

Consortium for Energy Efficiency (CEE) www.cee1.org Air-Conditioning and Refrigeration Institute (ARI) www.ari.org

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) www.ashrae.org