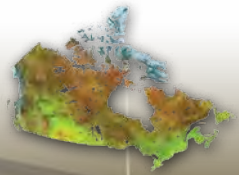




Natural Resources
Canada

Ressources naturelles
Canada



ENERGY STAR® Guide for Commercial Kitchens

Spot the savings opportunities with
ENERGY STAR qualified equipment

Canada

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Introduction to ENERGY STAR®

ENERGY STAR is the international symbol of premium energy efficiency that appears on products that meet strict energy efficiency technical specifications and is administered by governments throughout the world to recognize and promote efficient products.

The ENERGY STAR Initiative in Canada is administered by Natural Resources Canada's (NRCan's) Office of Energy Efficiency (OEE), which promotes and monitors the use of the ENERGY STAR symbol across Canada and encourages retailers, manufacturers and distributors to join the initiative. Only manufacturers whose products meet ENERGY STAR specifications are allowed to display the ENERGY STAR symbol. A company must prove that at least one of its products meets ENERGY STAR technical specifications before it can participate in the initiative. Ongoing testing after qualification ensures products continue to meet ENERGY STAR requirements. More information on ENERGY STAR specifications can be found at oee.nrcan.gc.ca/equipment/manufacturers/specifications/14896.

Purchasing ENERGY STAR qualified products saves money because they use less energy to achieve performance that is equal to or better than that of conventional alternatives. From an environmental perspective, improving energy efficiency reduces air emissions that contribute to smog and climate change. From an economic perspective, improving energy efficiency reduces operating costs and often results in quick payback

on any incremental up-front costs for the purchase of an ENERGY STAR qualified product.

The ENERGY STAR symbol appears on approximately 50 types of products including major appliances; consumer electronics; heating, cooling and ventilating equipment (residential); lighting; office equipment; windows, doors and skylights; and commercial products. To learn about the ENERGY STAR Initiative in Canada and qualified products, visit NRCan's OEE at energystar.gc.ca.

Rebates and Incentives

Stakeholders and provincial, territorial and municipal governments often notify the OEE of rebates and incentives they offer to Canadian individuals and businesses.

oee.nrcan.gc.ca/corporate/1513

This list, however, is not exhaustive. Be sure to investigate potential opportunities to subsidize your kitchen retrofit by contacting your local or regional utilities or visiting their Web sites.

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What is an ENERGY STAR® commercial kitchen?

The ENERGY STAR qualification has been embraced by commercial equipment manufacturers and is found on many appliances and products common to commercial kitchens and food service areas.

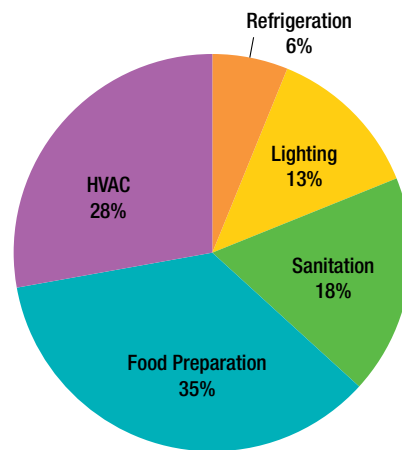
Commercial kitchens use about 2.5 times more energy per square metre than other commercial spaces. Commercial kitchen equipment can be operated for hours at a time and is often very energy-intensive. For example, an electric fryer could cost more than \$1,000 per year in electricity.¹ Approximately 50 percent of a restaurant's water bill is for water use in the kitchen area,² and reducing water use often results in savings on both water and energy bills, if the water is heated.

If you are in the market for new equipment, consider ENERGY STAR qualified appliances. Although the up-front cost may be higher in some cases, these appliances can provide rapid payback and significant ongoing energy and water savings opportunities over the product's life cycle.

Figure 1 gives an approximate breakdown of energy costs by kitchen functional area.

Proper maintenance and use of your equipment can also contribute to significant savings. Reducing idle time, using the appropriate type and size of appliance for your food load, and conducting regular maintenance and recalibration of your equipment are all worth the time and expense in the long run.³

Figure 1 Breakdown of energy costs by kitchen functional area



Source: U.S. EPA. (2010). *ENERGY STAR® Guide for Restaurants - Putting Energy into Profit*. (Figure reproduced)

This guide will help purchasers and operators of food services equipment make well-informed decisions to achieve lower energy and water bills. It was written with the following sectors in mind:

- Hospitality: hotels, restaurants
- Institutions: health care facilities, schools, colleges and universities, correctional facilities
- Retail: supermarkets, cafeterias, other prepared food vendors

Table 1 outlines the product types featured in this guide and gives the average energy and water savings that can be expected from ENERGY STAR qualified products compared to more conventional alternatives.

Table 1 Kitchen Equipment by Functional Area

	Equipment	Typical energy savings	Typical water savings	ENERGY STAR qualified
Refrigeration	Commercial refrigerators and freezers	35%	-	Yes
	Commercial ice machines	15%	10%	Yes
Sanitation	Commercial dishwashers	25%	25%	Yes
	Pre-rinse spray valves	Varies	55 - 65%	No
	Water heaters	5%	-	Yes
Food preparation	Commercial fryers	30 - 35%	-	Yes
	Commercial griddles	10%	-	Yes
	Commercial hot food holding cabinets	65%	-	Yes
	Commercial ovens	20%	-	Yes
	Commercial steamers	50%	90%	Yes
HVAC	Kitchen ventilation	60 - 75%	-	No
	Heating and cooling	6 -15%	-	Yes
Lighting	Lighting	75%	-	Yes

Table 2 Annual Operating Cost of Comparison between Standard and Energy Star Qualified Equipment

Equipment	Annual operating cost		
	Standard equipment	ENERGY STAR qualified equipment	Typical annual cost savings
Commercial refrigerators	\$229	\$151	\$78
Commercial freezers	\$601	\$490	\$111
Commercial ice machines	\$1,609	\$1,422	\$187
Commercial dishwashers	\$6,638	\$4,462	\$2,176
Commercial fryers (gas)	\$1,548	\$1,067	\$481
Commercial griddles (electric)	\$2,162	\$1,833	\$329
Commercial hot food holding cabinets	\$1,563	\$500	\$1,063
Commercial ovens (electric)	\$1,546	\$1,308	\$238
Commercial steamers (gas)	\$978	\$412	\$566
Total	\$16,874	\$11,645	\$5,229

Note: These calculations assume only one unit per equipment type (per row). These calculations rely on values and assumptions found within the ENERGY STAR Simple Savings Calculator. More detailed savings calculations can be found on individual product pages within this guide and on the ENERGY STAR Web site at energystar.gc.ca.

Read on to discover how choosing ENERGY STAR qualified commercial products can help you save energy while meeting your operational requirements.

ENERGY STAR Simple Savings Calculator

Most of the product categories in this guide contain tables that outline the cost, energy and water savings (as applicable) that you can expect by purchasing ENERGY STAR qualified kitchen equipment. These savings were calculated by using the publicly available ENERGY STAR Simple Savings Calculator, available online at

oee.nrcan.gc.ca/residential/business/energystar/procurement/calculator.cfm

You can use this calculator which includes national, and where available, regional, average utility prices and product usage assumptions or input your own data for more accurate results.



Food Preparation

Commercial Ovens

Commercial ovens are appliances that use conduction, convection, radiation and/or electromagnetic energy to heat, roast or bake food within an insulated enclosure. Convection ovens cook food by forcing hot dry air over the surface of the food product. The rapidly moving hot air strips away the layer of cooler air next to the food and enables the food to absorb the heat energy.⁴

At this time, only commercial, full-size gas and half- and full-size electric convection ovens may qualify for the ENERGY STAR symbol. ENERGY STAR qualified ovens save energy by employing convection cooking technology, higher insulation levels and tighter-fitting door gaskets and hinges.



ENERGY STAR qualified ovens are typically about 20 percent more energy-efficient than standard models.⁵ Combination ovens are currently under consideration to become part of this product category.

TIPS:

- Ensure the oven door seal is tight – a loose seal will leak heat and waste energy.⁶
- Only preheat the oven when required (depends on the item being cooked).⁷
- Use the oven window to check on cooking progress whenever possible; an oven loses approximately 20 percent of its heat when opened.⁸

Table 3 Energy and Cost Savings of ENERGY STAR Qualified Ovens

Product Type	Gas Oven	Electric Oven
Baseline unit	111 GJ/yr	12,193 kWh/yr
High-efficiency unit	79 GJ/yr	10,314 kWh/yr
Energy savings	32 GJ/yr	183 kWh/yr
Operating cost for a baseline unit	\$1,001/yr	\$1,546/yr
Operating cost for a high-efficiency unit	\$710/yr	\$1,308/yr
Cost savings	\$291/yr	\$238/yr
Baseline unit cost	\$1,500	\$850
High-efficiency unit cost	\$1,550	\$850
Cost differential	\$50	\$0
Payback period	0.2 yr	0.0 yr

Assumptions: 45.4 kg (100 lb.) daily food load; natural gas at \$9.02/GJ; electricity at \$0.12/kWh
 Legend: GJ = gigajoule, kg = kilogram, kWh = kilowatt-hour, lb. = pound, yr = year

Commercial Griddles

Griddles are appliances designed for cooking food in oil or in its own juices by direct contact with either a flat, smooth, hot surface (e.g. polished steel or chrome plate) or a hot channelled cooking surface (e.g. polished steel or chrome 1.27 centimetres (cm) (½-inch [in.]) grooved plate). Double-sided griddles differ from single-sided griddles, in that they have hinged upper griddle plates (platens) that swing down over the food, thereby cooking the food from both sides at once.

ENERGY STAR qualified griddles are typically about 10 percent more efficient than standard models⁹ and include thermostatically-controlled, gas and electric, single- and double-sided models. ENERGY STAR qualified griddles may also save



energy by employing higher insulation levels, and/or energy saving features such as infrared burners; heat pipes and thermal fluid or steam in gas griddles; or induction heating in electric griddles.¹⁰

Food Preparation

Table 4 Energy and Cost Savings of ENERGY STAR Qualified Griddles

Product Type	Gas Griddle	Electric Griddle
Baseline unit	128 GJ/yr	17,056 kWh/yr
High-efficiency unit	112 GJ/yr	14,460 kWh/yr
Energy savings	16 GJ/yr	2,595 kWh/yr
Operating cost for a baseline unit	\$1,154/yr	\$2,162/yr
Operating cost for a high-efficiency unit	\$1,012/yr	\$1,833/yr
Cost savings	\$141/yr	\$329/yr
Baseline unit cost	\$1,500	\$850
High-efficiency unit cost	\$1,560	\$850
Cost differential	\$60	\$0
Payback period	0.4 yr	0.0 yr

Assumptions: 45.4 kg (100 lb.) daily food load; natural gas at \$9.02/GJ; electricity at \$0.12/kWh
 Legend: GJ = gigajoule, kg = kilogram, kWh = kilowatt-hour, lb. = pound, yr = year

TIPS:

- Purchase a griddle that is the correct size to match typical food loads for your operations.
- Turn off the griddle when it is not in use (most griddles take less than 15 minutes to preheat. Similarly, if the griddle has multiple sections, unused sections should be turned off.¹¹
- Double-sided griddles should be closed when not in use to retain heat.¹²
- Steam griddles tend to have faster recovery times and lower idle energy rates.¹³
- Griddles with chrome finishes tend to retain heat better than those with other finishes.¹⁴
- Solid state or electronic controls also tend to have faster recovery times.¹⁵

Commercial Hot Food Holding Cabinets

Hot food holding cabinets hold already-prepared hot food at a specified temperature.¹⁶ ENERGY STAR qualified cabinets are 65 percent more energy-efficient compared with standard models,¹⁷ meaning they use less energy than conventional models to maintain food at the same temperature.

ENERGY STAR qualified cabinets may reduce heat loss by incorporating better insulation (which can also contribute to better temperature uniformity throughout the cabinet) and/or additional energy saving devices such as magnetic door gaskets, auto-door closures or Dutch doors.¹⁸



Table 5 Energy and Cost Savings of Energy Star Qualified Hot Food Holding Cabinets

Product Type	Hot Food Holding Cabinet, Electricity
Baseline unit	12,326 kWh/yr
High-efficiency unit	3,944 kWh/yr
Energy savings	8,382 kWh/yr
Operating cost for a baseline unit	\$1,563/yr
Operating cost of a high efficiency unit	\$500/yr
Cost savings	\$1,062/yr
Baseline unit cost	\$2,069
High-efficiency unit cost	\$3,569
Cost differential	\$1,500
Payback period	1.4 yr

Assumptions: 510 L capacity; natural gas at \$9.02/GJ; electricity at \$0.12/kWh
 Legend: GJ = gigajoule, kWh = kilowatt-hour, L = litre, yr = year

TIPS:

- Buy insulated hot food holding cabinets because insulation helps decrease heat loss and wasted energy.¹⁹
- Cabinets should be turned off when not in use, especially overnight. Consider implementing a shutdown schedule to ensure this happens every night.²⁰
- Ensure that door gaskets and automatic door closers are maintained in good operating condition and seal properly.

Commercial Fryers

Fryers consist of a reservoir filled with cooking oil, which is heated to a sufficient temperature to cook food items suspended in the oil. In models powered by natural gas, the oil may be heated by atmospheric or infrared gas burners that are underneath the fry pot (or vat) or in tubes that pass through the fry pot. In electric fryers, elements are immersed in cooking oil within the pot.²¹

ENERGY STAR® efficiency specifications currently cover standard size, open-pot fryers and large vat fryers.²² Standard-size fryers that have earned the ENERGY STAR designation are up to 30 percent more energy-efficient than non-qualified models, and ENERGY STAR qualified large vat commercial fryers are up to 35 percent more energy-efficient.²³



Table 6 Energy and Cost Savings of ENERGY STAR Qualified Fryers

Product Type	Gas Fryer	Electric Fryer
Baseline unit	172 GJ/yr	18,189 kWh/yr
High-efficiency unit	118 GJ/yr	17,011 kWh/yr
Energy savings	53 GJ/yr	1,179 kWh/yr
Operating cost for a baseline unit	\$1,548/yr	\$2,306/yr
Operating cost for a high-efficiency unit	\$1,067/yr	\$2,156/yr
Cost savings	\$480/yr	\$149/yr
Baseline unit cost	\$2,894	\$2,894
High-efficiency unit cost	\$2,944	\$3,154
Cost differential	\$50	\$260
Payback period	0.1 yr	1.7 yr

Assumptions: 68 kg (150 lb.) daily food load; natural gas at \$9.02/GJ; electricity at \$0.12/kWh
 Legend: GJ = gigajoule, kg = kilogram, kWh = kilowatt-hour, lb. = pound, yr = year

TIPS:

- Fryers spend much of their time idling, and gas fryers may use upwards of three times more energy than electric models during this time. Advanced atmospheric burners, pulse combustion, modulating burners or other features may help mitigate heat losses from natural gas fryers.²⁴
- Higher insulation levels can save energy for any type of fryer.²⁵
- Turn off backup fryers during slow periods.²⁶
- Verify that your equipment and integrated thermostat are working properly by testing with a reliable commercial thermometer. Oil should be heated to between 162°C and 176°C (325°F and 350°F). Too hot, and the fryer can be damaged.²⁷
- Avoid overfilling the fryer because this only prolongs the cooking time.²⁸
- Monitor recovery times; if they get longer, you may need to replace the fryer soon.²⁹
- Regularly degrease the fryer, and clean the heating element to keep it efficient and long-lasting.³⁰

Commercial Steam Cookers

Steam cookers are sealed enclosures where food is cooked by circulating hot steam. ENERGY STAR qualified steam cookers are up to 50 percent more energy-efficient than standard models and offer shorter cook times, higher production rates and reduced heat loss due to better insulation and a more efficient steam delivery system. They also reduce water use by 90 percent or more compared with standard models.³¹



Table 7 Energy, Water and Cost Savings of ENERGY STAR Qualified Steam Cookers

Product Type	Gas Steam Cooker	Electric Steam Cooker
Baseline unit	89 GJ/yr	9,241 kWh/yr
High-efficiency unit	39 GJ/yr	4,393 kWh/yr
Energy savings	50 GJ/yr	4,848 kWh/yr
Operating cost for a baseline unit	\$978/yr	\$1,345/yr
Operating cost for a high-efficiency unit	\$412/yr	\$617/yr
Energy cost savings	\$452/yr	\$614/yr
Water cost savings	\$113/yr	\$113/yr
Baseline unit cost	\$6,836	\$3,400
High-efficiency unit cost	\$7,256	\$4,900
Cost differential	\$420	\$1,500
Payback period	0.7 yr	2.1 yr

Assumptions: 45.4 kg (100 lb.) food load; 3-pan unit; natural gas at \$9.02/GJ; electricity at \$0.12/kWh; water at \$2.20/m³
 Legend: GJ = gigajoule, kg = kilogram, kWh = kilowatt-hour, lb. = pound, m³ = cubic metre, yr = year

TIPS:

- Ensure the door is firmly shut while the steamer is operating.³²
- Use only as many compartments as you need.³³
- Reduce the standby time. An hour of standby time on a boiler-based steamer can cost between \$50 and \$300 per year.³⁴
- Ensure the steamer returns to idle when the cooking is finished.³⁵
- Fix leaks and repair the steamer as soon as problems occur.³⁶
- On boiler-based models, keep the boiler clean by removing deposits.³⁷
- Boiler steamers are best for cook-to-order, high-production operations, but use more water and energy than connectionless steamers. If a boiler steamer is necessary, select one that uses less than 57 litres (L) (15 gallons) (gal.) per hour.³⁸
- Connectionless steam cookers condense steam into a reservoir rather than immediately draining it, saving water normally needed for cooling drained waste water.³⁹



Ventilation and HVAC

Kitchen Ventilation

Kitchen ventilation is often the single largest user of energy in commercial kitchens. Poorly balanced or designed kitchen ventilation may allow smoke and heat to contaminate your cooking area (also known as “spillage”), leading to employee discomfort and higher cooling bills.⁴⁰ Fans draw exhaust fumes and heat from cooking and sanitation functions out of the kitchen environment, in exchange for outside air (also known as makeup air [MUA]).⁴¹ A balanced kitchen ventilation system requires that exhaust and MUA flow rates be in equilibrium. Smaller kitchens may be able to use existing heating, ventilating and

air-conditioning (HVAC) equipment and infrastructure for exhaust and MUA, but larger applications will usually require dedicated systems.⁴²

Selecting the correct size, design and flow rate, as well as correctly positioning and installing kitchen exhaust ventilation fans for maximum efficiency depend on many factors. These include the number of heat zones, types of foods being cooked and the size and layout of the available space. Visit www.fishnick.com/ventilation/designguides/ for in-depth guidance on how to more efficiently select, position and install exhaust ventilation fans.

TIPS:

- Installing side panels to ventilation hoods can cut down on spillage at a low cost.⁴³
- Maximize the ventilation hood overhang by pushing cooking appliances as close to the wall as possible.⁴⁴
- Install variable speed, demand-based exhaust and MUA controls to monitor your cooking and adjust your ventilation needs appropriately to reduce energy use.⁴⁵
- Exhaust rates (and therefore energy use) during peak operating times will be minimized if the exhaust fan is appropriately engineered for the specific purpose, accounting for design, hood type and features, and if the MUA system is also appropriate.⁴⁶
- During non-peak operating times, a demand control ventilation (DCV) system can automatically adjust exhaust rates based on your exhaust needs.⁴⁷ DCV can reduce exhaust system costs by 30 to 50 percent and can be retrofitted to existing hoods or installed with new equipment.⁴⁸



Heating and Air Conditioning

Heating and cooling in commercial kitchens is typically handled by a central system that connects commercial HVAC equipment to central ductwork for common airflow and thermostatic controls.

ENERGY STAR qualified light commercial HVAC products typically use 7 to 10 percent less energy than standard models.⁴⁹ For air conditioners, significant improvements to design and efficiency have resulted in savings of 30 to 50 percent compared to models from the 1970s and approximately 20 percent compared to units produced 10 years ago.⁵⁰ Air-source central air conditioners and air-source heat pumps may be eligible for ENERGY STAR qualification.⁵¹ The efficiency of any HVAC system can be enhanced by upgrading building insulation, sealing air leaks, installing high-efficiency windows and retrofitting other aspects of the building envelope and HVAC infrastructure.⁵²

TIPS:

- Inspect for and clean or repair dirty heat transfer surfaces, damaged or misaligned ductwork and missing insulation.⁵³
- At least 25 percent of rooftop HVAC units in the United States are oversized. Properly sizing HVAC equipment to your space reduces energy costs and pollution and extends product lifetime.⁵⁴
- Keep louvers, grilles and diffusers unobstructed.⁵⁵
- Have your equipment regularly maintained by a qualified contractor to ensure it runs at peak efficiency.⁵⁶
- Consider installing an energy management system (EMS) because automatically controlling lights, heating, cooling and other equipment can be more efficient than relying on manual controls.⁵⁷ For heating and cooling alone, a programmable thermostat can keep temperatures slightly out of the comfortable range during unoccupied hours to save additional energy.⁵⁸



Refrigeration

Commercial Refrigerators and Freezers

Refrigerators are insulated cabinets that store contents at higher than 0°C (32°F) but no higher than 4.4°C (40°F) so the contents do not freeze. Freezers are also insulated but store their contents at -17.8°C (0°F).⁵⁹ The ENERGY STAR specification applies to mixed solid/glass door cabinets, glass and solid door cabinets.⁶⁰

ENERGY STAR qualified commercial refrigerators and freezers are more energy-efficient because they have components such as electronically commutated motors (ECMs), evaporator and condenser fan motors, hot gas antisweat heaters or high-efficiency compressors. Each of these technologies significantly reduces energy consumption and utility costs. Compared to standard models, ENERGY STAR qualified commercial refrigerators and freezers can reduce energy costs by as much as 35 percent.⁶¹



TIPS:

- Keep refrigerators and freezers full but do not overload refrigerators because a lack of airflow can increase cooling times and lead to product deterioration.⁶² Keep a 2.5-cm (1-in.) gap or more between packages and the sides and the back of the refrigerator to allow for air flow, which will also cool food more evenly and keep it fresher.⁶³
- Refill the cabinet with cooled or frozen products. Placing warm products into a refrigerated cabinet makes the condenser work harder, which wastes energy.⁶⁴ You can also defrost frozen goods in the refrigerator to save refrigerator operating costs.⁶⁵
- Keep the condenser and fan clear and free of dust and debris, and defrost the unit at least once per year.⁶⁶
- Locate refrigerated appliances away from direct sunlight or other sources of warmth (i.e. ovens, fryers, stoves, etc.).⁶⁷ Ensure that there is at least 10 cm (4 in.) of space at the rear of the cabinet, and 2.5 cm (1 in.) on either side to allow free air flow. A restricted flow of cooling air reduces the life of the compressor and requires more energy to operate.⁶⁸
- Adjust the interior temperature to the proper setting (see the beginning of this section) for storing food products and verify the temperature periodically.⁶⁹
- Keep the door closed as much as possible, and ensure the door seals properly. Repair or replace gaskets that are not functioning properly.⁷⁰
- If practical, keep the interior lights off, or replace display light fixtures with more efficient models to save electricity and reduce heat emissions into the unit, including walk-in refrigerators and freezers. In the case of compact fluorescent lamps, check the packaging for the lighting product's "minimum start temperature."⁷¹
- Install strip curtains and automatic door closers on walk-in refrigerators to reduce air infiltration by approximately 75 percent.⁷²
- Reduce condenser fan energy consumption by two-thirds by installing ECMs on the evaporator and condenser fans.⁷³

Table 8 Energy and Cost Savings of ENERGY STAR Qualified Commercial Refrigerators and Freezers

Product Type	Commercial Refrigerator	Commercial Freezer
Baseline unit	1,803 kWh/yr	4,738 kWh/yr
High-efficiency unit	1,195 kWh/yr	3,869 kWh/yr
Energy savings	608 kWh/yr	869 kWh/yr
Operating cost of a baseline unit	\$229/yr	\$601/yr
Operating cost of a high-efficiency unit	\$151/yr	\$490 /yr
Cost savings	\$77/yr	\$110/yr
Baseline unit cost	\$2,122	\$2,122
High-efficiency unit cost	\$2,182	\$2,372
Cost differential	\$60	\$250
Payback period	0.8 yr	2.3 yr

Assumptions: vertical, solid-door units; electricity at \$0.12/kWh

Legend: kWh = kilowatt-hour, yr = year

Commercial Ice Machines

Ice machines consist of a condensing unit and ice-making section operating as an integrated unit. It also may have the capacity to store and/or dispense ice.⁷⁴

Air-cooled, cube-type ice machines are eligible for ENERGY STAR qualification, including ice-making head, self-contained and remote condensing units.⁷⁵ Water-cooled ice machines do not currently qualify for ENERGY STAR designation because they have a high water cost.⁷⁶ Future plans include adding continuous type ice makers to the product scope. Commercial ice machines that have earned the ENERGY STAR designation are on average 15 percent more energy-efficient and 10 percent more water-efficient than standard



models.⁷⁷ Improved energy and water efficiency are achieved through air-cooling, more efficient rinse cycles⁷⁸ and other features.

Table 9 Energy and Cost Savings of ENERGY STAR Qualified Ice Machines

Product Type	Remote Condensing Unit with a Remote Compressor, Electric
Baseline unit	12,695 kWh/yr
High-efficiency unit	11,219 kWh/yr
Energy savings	1,476 kWh/yr
Operating cost for a baseline unit	\$1,609/yr
Operating cost for a high-efficiency unit	\$1,422 /yr
Energy cost savings	\$187/yr
Baseline unit cost	\$2,600
High-efficiency unit cost	\$2,600
Cost differential	\$0
Payback period	0.0 yr

Assumptions: Ice harvest rate at 227 kg/day, 365 day/yr
 Legend: kg = kilogram, kWh = kilowatt-hour, yr = year

TIPS:

- Operate ice machines with storage overnight to take advantage of lower electricity and water rates.
- Larger ice machines are typically more efficient than smaller ones. The difference in the purchase price is often small and may be worth the extra capacity because the energy cost per pound of ice is only half of the cost for a small machine.⁷⁹
- Close the lid to trap cold air inside the unit, improving its ability to keep ice cool and reducing its impact on room heating requirements.⁸⁰
- Perform regular maintenance and coil cleaning to maintain efficiency.⁸¹
- Creating clear, “high quality” ice typically requires more water than frosty ice cubes.⁸²

Sanitation

Commercial Dishwashers

Commercial dishwashers clean and sanitize large quantities of kitchen wares in a very short time by utilizing hot water, soap and rinse chemicals. They are also one of the most expensive pieces of commercial kitchen equipment to operate.⁸³ The four main types of commercial dishwashing machines are undercounter, door type, conveyor and flight. All commercial dishwashing machines have wash, rinse and sanitizing cycles.

When a dishwasher uses less water, energy is also saved by heating less water at the building and booster heater levels.⁸⁴ More than 75 percent of dishwasher operating costs are for heating water with central and booster heaters.⁸⁵



ENERGY STAR qualified commercial dishwashers use approximately 25 percent less energy and water than standard models.⁸⁶

Sanitation



Table 10 Energy, Water and Cost Savings of ENERGY STAR Qualified Commercial Dishwashers

Product Type	Multitank, High-Heat Dishwasher, Electric	Door Type, High-Heat Dishwasher, Electric
Baseline unit	79,992 kWh/yr	42,817 kWh/yr
High-efficiency unit	45,605 kWh/yr	28,896 kWh/yr
Energy savings	34,387 kWh/yr	13,921 kWh/yr
Operating cost for a baseline unit	\$12,122/yr	\$6,638/yr
Operating cost for a high-efficiency unit	\$6,733/yr	\$4,462/yr
Energy cost savings	\$4,359/yr	\$1,764/yr
Water cost savings	\$1,029 /yr	\$411/yr
Baseline unit cost	\$20,000	\$6,900
High-efficiency unit cost	\$20,000	\$7,400
Cost differential	\$0	\$500
Payback period	0.0 yr	0.2 yr

Assumptions: electricity at \$0.12/kWh
 Legend: kWh = kilowatt-hour, yr = year

TIPS:

- Check the calibrations of the machine regularly. Verify that the rinse cycle times are set at the manufacturer's minimum recommended settings and that the rinse pressure is maintained per the manufacturer's specifications.⁸⁷
- For a conveyor-type dishwasher, ensure the rinse bypass drain is adjusted to prevent excessive water from draining into the wash tank.⁸⁸
- Inspect rinse nozzles for wear and tear. Nozzles with too large an opening can result in greater water consumption than necessary during the rinse cycle.⁸⁹
- Commercial dishwashers use the same amount of water and energy regardless of how full they are. Washing full racks of dishes will make the dishwasher more efficient with the water it is already using.⁹⁰
- For moderate to high hot water needs, consider a refrigerant heat recovery system, which recovers heat from walk-in refrigerators and freezers for kitchen use.⁹¹
- Booster heaters will usually pay for themselves in one year if the water heater temperatures are lowered in response.⁹²
- If you have a high-temperature dishwasher, turn it off at night. Otherwise the booster heater will consume energy keeping the hot water tank at temperature.⁹³
- Add extra insulation to reduce standby losses in hot water storage tanks.⁹⁴
- Do not over-dry dishes. Adjust power dryers to operate just long enough to dry the load.⁹⁵
- Check rinse water temperature regularly to ensure proper operation of the booster heaters.⁹⁶
- Regularly clean lime deposits from hot water tanks and heater coils.⁹⁷
- Set the water heater thermostat to the minimum acceptable temperature, depending on whether the dishwasher is a high- or low-temperature unit.⁹⁸
- Consider grey water heat recovery in which high-temperature drain water is used to preheat the supply water.⁹⁹

Pre-Rinse Spray Valves

Pre-rinse spray valves are handheld devices that are used to remove food particles from dishes with a spray of water, prior to cleaning in a commercial dishwasher. Pre-rinse spray valves consist of a spray nozzle, a squeeze lever to control water flow and a dish guard bumper.¹⁰⁰

Often, nearly half of the water used for washing dishes in a commercial kitchen is consumed during the pre-rinse,¹⁰¹ making low flow pre-rinse spray valves an attractive opportunity to save water, water heating energy and sewer charges while maintaining equivalent cleaning performance compared to standard spray valves.

Currently there is no ENERGY STAR qualification for pre-rinse spray valves. As of January 1, 2006, all pre-rinse spray valves in the United States must meet

a maximum flow rating of 6.1 L/min (1.6 gal./min).¹⁰² To harmonize with the U.S. regulations, Canada is proposing to regulate pre-rinse spray valves in an upcoming amendment to Canada's *Energy Efficiency Regulations*.¹⁰³

Energy and cost savings of pre-rinse spray valves

The flow rate of standard pre-rinse spray valves is 11 to 15 L/min, while energy-efficient “low-flow” valves use less than 5 l/min (a water savings of 55 to 65 percent).¹⁰⁴ These savings also apply to any energy required to heat the water being used by the spray valve. With the valves used for less than two hours a day, approximately \$560 per year in water consumption and \$500 per year in energy costs can be saved by using a low-flow valve.¹⁰⁵ Many options are available – look for valves that have high velocity spray patterns for better cleaning efficiency.¹⁰⁶

TIPS:

- Disassemble the valve, if possible, to clean scale build-up as needed.¹⁰⁷
- In more severe cases of scale clogging, it is more cost effective to replace the valve, thus avoiding reduced cleaning effectiveness and increased in washing times, which lead to more water and energy consumption.¹⁰⁸

Water Heaters

Storage water heaters typically heat and store water in a storage tank, whereas tankless water heaters hang on the wall, heating water only as it is demanded and freeing up floor space. Other types include heat pump water heaters and solar water heaters.

High-efficiency storage water heaters may incorporate

- Better heat exchangers (such as condensing heat exchangers in gas models)
- Extra tank insulation
- Factory-installed heat traps
- Electronic ignition



- Powered exhaust
- Improved flue baffle and damper controls
- State-of-the-art burners for gas models

Tankless water heaters save energy by heating water only when it is demanded, meaning it is unnecessary to maintain stored water at a high

temperature, which can cut water heating expenses by 30 percent.¹⁰⁹ ENERGY STAR qualified water heaters use at least 5 percent less energy than conventional models.¹¹⁰ ENERGY STAR qualified heat pump water heaters run on electricity but consume only half as much electricity as standard electric water heaters.

Table 11 Energy and Cost Savings of ENERGY STAR Qualified Water Heaters

Product Type	Gas Storage Tank Water Heater (227 L to 283 L)	Gas Tankless Water Heater
Baseline unit	33 GJ/yr	24 GJ/yr
High-efficiency unit	28 GJ/yr	23 GJ/yr
Energy savings	5 GJ/yr	1 GJ/yr
Operating cost for a baseline unit	\$298/yr	\$212/yr
Operating cost for a high-efficiency unit	\$252/yr	\$206/yr
Energy cost savings	\$46/yr	\$7/yr
Baseline unit cost	\$900	\$1,800
High-efficiency unit cost	\$900	\$1,800
Cost differential	\$0	\$0
Payback period	0.0 yr	0.0 yr

Assumptions: hot water demand of 243 L/day; natural gas at \$9.02/GJ

Legend: GJ = gigajoule, L = litre, yr = year

TIPS:

- For normal hot water use, the temperature does not need to be warmer than 54°C (130°F).¹¹¹
- Check the insulation levels on hot water heating systems to minimize standby losses.¹¹²
- Follow manufacturer specifications and perform regular maintenance to maximize the useful life of your water heater.
- Insulate hot water pipes to reduce heat loss.¹¹³
- Tankless hot water heaters have a 20-year lifespan, longer than typical storage water heaters.¹¹⁴



Lighting

The typical restaurant has lights on for 16 to 20 hours every business day.¹¹⁵ Consequently, installing high-efficiency fixtures and bulbs can result in large savings in electricity costs. The following high-performance lighting product categories are eligible for ENERGY STAR qualification.¹¹⁶

- Accent lights, including line-voltage directional track lights
- Downlights: recessed, pendant, surface mount
- Under cabinet shelf-mounted task lighting

ENERGY STAR qualified lighting products use at least 75 percent less energy and last between 10 and 50 times longer than incandescent lighting. Replace T12 lamps and magnetic ballasts by upgrading to more efficient T8 or T5 lamps with electronic ballasts. Electronic ballasts do not hum or flicker and turn on faster.¹¹⁷ Qualified light-emitting diode (LED) lighting produces very little heat and provides optimal light color for any exterior or interior environment.¹¹⁸

TIPS:

- Turn off lights manually in seldom-used rooms and/or install motion detector switches to ensure electricity is not used to light unoccupied spaces such as closets, storage or break rooms, restrooms and even walk-in refrigerators. For refrigerators, look for low-temperature-specific, sealed sensors.¹¹⁹
- Inspect lenses and reflectors for dust, rust or damage that could cause inefficient transmission or reflection of light.¹²⁰
- Save up to 80 percent on your Open/Closed and EXIT signs by upgrading to LED technology.¹²¹ LED EXIT signs will typically pay for themselves in less than 2 years.¹²²
- Install ENERGY STAR qualified fixtures or bulbs (fluorescent or LED) in your dining area to reduce electricity consumption.

General Tips and Recommendations

Buy the appropriate size and number of products for the expected volume of food or level of use. Larger appliances are more efficient for larger volumes and vice-versa.

Perform regular maintenance and cleaning of equipment to keep it working efficiently and extend its lifespan.

Check with the local electricity, natural gas and water utilities for local prices, further savings guidance and retrofit incentives.

General Energy Tips

Turn off equipment when it is not in use, wherever possible (especially overnight).

Test the door seals on ovens, refrigerators, freezers and other sealed cabinets by placing a lit flashlight in the (non-heated) space, with the light facing the seal. After closing the door, if light is visible through the seal, it is leaking air and wasting energy.¹²³

Consider installing an EMS. An EMS can automatically control lighting, fans, pumps and other equipment to operate only when needed and often uses setback and economizer strategies to minimize energy use.¹²⁴

General Water Tips

Repair leaks as soon as they are detected. A slow leak can actually waste more than 50 000 L of water in a year, and if the leaking water is hot, the leak will waste energy as well.¹²⁵

Install aerators on faucets to greatly reduce water flow rates, as low as 1.9 L/min (0.5 gal/min).

Install tamper-proof varieties and/or dedicated pot filler or add-on faucets to prevent employees from removing the aerators when higher volumes of water are needed.¹²⁶



Sample Procurement Language

You may want to use the following procurement language in contracts to ensure you receive ENERGY STAR qualified products. As with all purchases, be sure to ask the appropriate questions to ensure that you get exactly what you want.

The vendor must:

- Verify that the model has been qualified to bear the ENERGY STAR symbol and that the manufacturer is a Participant in the ENERGY STAR Initiative
- Provide products that earn the ENERGY STAR qualification and meet the ENERGY STAR specifications for energy efficiency
- Ensure that ENERGY STAR qualified products meet user requirements for performance, reliability and cost-effectiveness

For bulk purchases and/or lease and maintenance agreements, include the provisions that – where applicable – the vendor must:

- Deliver all qualified products properly configured for current ENERGY STAR specifications
- Ensure that installation services include the full activation and proper configuration of any automatic energy-saving, power-down and/or power management features to maximize energy efficiency
- Ensure that maintenance services include the full re-activation and proper reconfiguration of any automatic energy-saving, power-down and/or power management features to the terms of the current ENERGY STAR specifications at the time of service
- Customize sites and train users to maximize the energy efficiency of installed products
- Not disable power-management features except at the specific request of site staff
- Provide on-going customer support on all energy-saving, power-down and power management features

Canadian ENERGY STAR® and energy efficiency resources

Canadian ENERGY STAR initiative:
oee.nrcan.gc.ca/energystar

Natural Resources Canada's Office of Energy Efficiency: oee.nrcan.gc.ca

United States ENERGY STAR® and energy efficiency resources

United States ENERGY STAR program:
www.energystar.gov/index.cfm?c=home.index

ENERGY STAR Guide for Restaurants
(United States EPA):
www.energystar.gov/ia/business/small_business/restaurants_guide.pdf

US Department of Energy, Energy Efficiency & Renewable Energy:
www.eere.energy.gov/

Flex Your Power, Boosting Restaurant Profits with Energy Efficiency – A Guide for Restaurant Owners and Managers:
www.fypower.org/pdf/BPG_RestaurantEnergyEfficiency.pdf

Water Efficiency Resources

New Mexico Office of the State Engineer, *A Water Conservation Guide for Commercial, Institutional and Industrial Users:*
www.ose.state.nm.us/water-info/conservation/pdf-manuals/cii-users-guide.pdf

US Environmental Protection Agency WaterSense Program:

www.epa.gov/watersense

Best Practices — How to Achieve the Most Efficient Use of Water in Commercial Food Service Facilities:
www.energystar.gov/index.cfm?c=healthcare_fisher_nickel_feb_2005

Other Online Resources

Food Service Technology Center:
www.fishnick.com

Food Service Equipment & Supplies:
www.fesmag.com

International Facility Management Association, Food Operations:
www.ifma.org/resources/sustainability/kb/food-operations.htm

Consortium for Energy Efficiency, Commercial Kitchens Initiative:
www.cee1.org/com/com-kit/com-kit-main.php3

Food Service Warehouse:
www.foodservicewarehouse.com/education/going-green/

Sustainable Kitchen:
www.sustainablefoodequipment.com/water-savings/learn-best-practices/articles/reducing-water-consumption-in-a-commercial-kitchen/

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