# Food preparation and catering

Increase carbon savings without compromising on quality

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# Preface

Reducing energy use makes perfect business sense; it saves money, enhances corporate reputation and helps everyone in the fight against climate change.

The Carbon Trust provides simple, effective advice to help businesses take action to reduce carbon emissions, and the simplest way to do this is to use energy more efficiently.

This technology guide introduces the main energy saving opportunities available in food preparation and catering facilities and demonstrates how simple actions save energy, cut costs and improve quality.

# Contents

# Introduction

The energy used in catering facilities typically accounts for 4-6% of operating costs. Many caterers work on a profit margin that is within this range, so it is obvious that saving energy can directly increase revenue and profitability without the need to increase sales.

The efficient use of equipment in catering facilities will not only save energy and money, but may contribute to a better managed catering operation and a cooler, more pleasant kitchen environment, which can increase staff comfort levels and improve morale. In some instances, better control and management of energy consumption in catering can result in improved quality of food and hygiene standards.

In addition to the financial and staff benefits, there are of course, social and environmental advantages to reducing energy consumption through reduced carbon emissions, which helps to combat climate change. Increasing awareness about these issues has seen customers becoming more discerning about the environmental credentials of the caterers they deal with. Being energy efficient can enhance the reputation of all catering facilities and help to attract customers seeking food which has been produced more sustainably.

## Energy saving opportunities

This guide presents a range of technologies, ideas and actions that offer the best opportunities for energy saving in the areas of:

- Catering apparatus, particularly cooking, washing and refrigeration equipment.
- Kitchen/building services, particularly heating, ventilation and lighting.
- Energy management and people solutions.

## Who is this publication for?

This technology guide is for owners and managers working in food preparation and catering operations.

It includes individual catering businesses and also catering operations within wider organisations, and contains detailed information aimed at those with a real interest in implementation.

### Did you know?

Catering operations both consume and waste large amounts of energy. In some kitchens, as little as 40% of the energy consumed is used for the preparation and storage of food; much of the wasted energy is dispersed into the kitchen as heat. Effective energy management in catering can provide substantial savings, as well as improving working conditions in the kitchen.

# Energy consumption

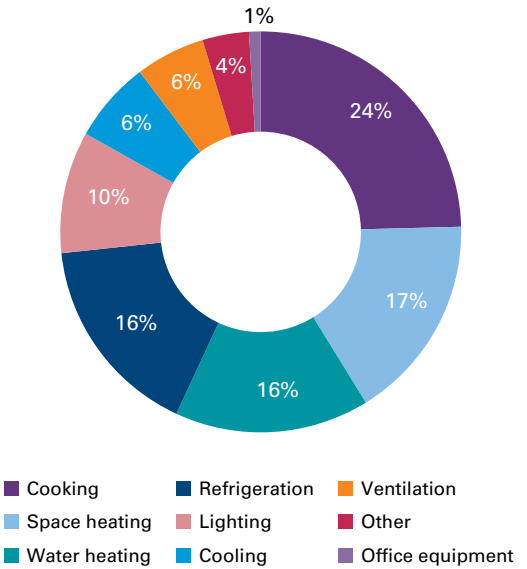
## The total energy consumption of Britain's catering industry is estimated to be around 20,600 million kWh per year.

Over 30% of the energy is used in purely commercial catering establishments and hotel restaurants, and more than 40% in non-commercial catering such as schools, hospitals and Ministry of Defence organisations.

The cost of energy used in catering operations is considerable. For example, the hotel and catering sector spends around £400 million per year on energy. Energy costs in the non-commercial sector are often not charged to a separate catering account, but are estimated at over £400 million per year.

Most of the energy used in food preparation and catering is electricity (60%) with natural gas or oil providing around 40% of energy supplied.

*Figure 1: Catering energy consumption by end use (US EIA data)*




Source: US EIA data for energy consumed in food service buildings. US data used is representative of UK business.

With recent energy cost increases, these figures are set to escalate even higher.

| Average energy costs per cooked meal | |
|---|---|
| Snack bars | 5 pence |
| Coffee shops | Over 9 pence |
| Steak houses | 22 pence |
| Traditional English restaurants | 23 pence |
| High class restaurants | 33 pence |
| Hotel restaurants | Almost 45 pence |
| Non-commercial catering | 12-14 pence (average) |

With moderate improvements in efficiency, and effective use of equipment, savings of up to 20% are achievable, leading to an overall saving of over £80 million per year (reducing national energy consumption by over 1,300 million kWh per year).

# Catering equipment

The efficient use of equipment in the kitchen can save energy and money and even contribute to a better managed catering operation.

It is common in catering establishments for all equipment to be switched on at the beginning of a shift and left running throughout the day. Not only is this extremely wasteful, but equipment left on unnecessarily generates heat, making a kitchen unpleasantly hot and uncomfortable to work in. All catering establishments can save energy by implementing a simple switch-off policy and providing staff with information about preheat times, control settings and good practice.

Due to the high staff turnover in catering operations, an ongoing training programme is necessary. Some organisations have achieved savings in excess of 15% simply by adopting good housekeeping measures, reinforced through effective staff training and regular refresher courses.

Catering operations use a variety of highly energy intensive equipment to provide food for customers. The energy consumed by this equipment varies considerably, according to how it is used, how regularly it is maintained and how it is set up within the kitchen environment. Selecting the most energy efficient equipment for the job can yield major cost savings.

In addition, a range of technologies exist that can aid efficiency through improved control of the cooking process and the kitchen environment. In most cases, these will pay for themselves in less than three years and will go on to provide significant savings for most organisations.

**Top tip:**

Suppliers should be able to provide information on the expected running costs of their equipment. If they cannot tell you, approach another supplier!

## Cooking equipment

Around 25% of the energy used in catering is expended in the preparation, cooking and serving of food. By far the largest proportion of this energy is consumed by cooking apparatus and much of this is wasted through excessive use and poor utilisation.

Because catering is a relatively labour intensive activity, much of the potential energy savings relate to working practices. The efficient use of equipment in the kitchen will not only save energy and money, but may contribute to a better managed catering operation, a more pleasant environment in the kitchen and, in some instances, better standards of food.

The table below provides a checklist for efficient use of existing catering equipment:

| Cooking equipment savings checklist |
|---|
| ☑ Use the correct equipment for the job – utensils, pots and pans must be of appropriate size for the heating ring or oven. |
| ☑ Avoid over-filling saucepans and kettles and use lids and covers to retain heat, steam and fumes. |
| ☑ Switch off grills, fryers and hobs immediately after use. |
| ☑ Make a note of cooking equipment preheat times and keep these on display. |
| ☑ Keep hot storage of cooked food to a minimum, both to reduce energy use and to retain the quality of the food. |
| ☑ Switch on equipment only when necessary – discourage staff from switching all equipment on at the start of a shift. |
| ☑ When pans come to the boil, turn hobs down to the minimum to simmer (boiling does not speed up the cooking process). |
| ☑ Use microwave ovens to reheat relatively small amounts of food. |
| ☑ Switch off extraction fans when they are not being used. |

**Maintain a healthy setup**

Regular and routine maintenance checks can significantly reduce the energy costs of catering operations. They also improve the lifetime of equipment and are important for maintaining food safety and hygiene standards. Regularly service equipment to ensure heating elements, burner jets, thermostats, seals, valves and switches are in good working order. Equipment should be frequently cleaned to remove deposits, scale and corrosion which affect heat transfer. A regular maintenance programme for all cooking equipment should be developed and implemented.

**Control equipment automatically**

Consider implementing control technology which automatically switches off or turns down cooking equipment that is not being used. Automatic pan sensors are available for gas and electric hobs that turn the hob off or down after pan removal. These can save about 5% of the cooking energy used in a typical kitchen.

**Easy efficiency**

Make it easy for staff to save energy. Gas burners are often left alight when not being used because of the inconvenience of finding a light during busy periods. Fit in-built piezo-electric spark generators to stop this. Similarly, minimise oven door openings by fitting easily visible oven thermometers – this also helps to achieve more accurate cooking times.

## Specifying new equipment

One of the main reasons that catering operations waste energy is because staff are quite rightly concentrating on servicing client demand. Any technology that can therefore be implemented to make the most of energy used by cooking equipment should help to generate savings and improve the kitchen environment. It will also work to provide better control and reduce kitchen temperatures.

**Induction hobs**

These deliver heat to the pan using a magnetic field. The electric current passes through a coil which creates a strong magnetic field under the ceramic plate. This field creates an induction current, which generates heat and is drawn upwards into the ferrous pan. The induction currents heat the pan instantly, which then passes its heat on to the food it contains.

Induction hobs heat up quickly and are therefore capable of reducing cooking times. As almost all of the heat generated is transferred into the food, they use considerably less energy than other hobs. When a pan is lifted off the induction hob, heating stops immediately, automatically turning the hob off and improving safety.

The energy requirement of an induction hob is 15-50% less than that of a conventional gas or electric hob. As less heat is generated, further savings are also achieved through reduced ventilation requirements.

**Combi-steam/convection ovens**

These are suitable for all types of catering operation and can reduce energy costs by around 25-50% when compared to other equivalent cooking appliances e.g. electric hobs.

- When compared to a unit heated indirectly with a heat exchanger, a direct-heated gas combi-oven will reduce gas use by 40%.
- A triple glazed viewing door will save up to 3% of energy compared to a single glazed door.
- Automatic fan switch-off, with a brake initiated when the door is opened will retain hot air within the oven and minimise heat loss. It will also help to maintain a cooler kitchen.
- Some makes of combi-oven utilise their exhaust heat to preheat incoming fresh water for steam generation, saving 16-30% of the energy input.
- A multi-speed fan enables better control and reduces energy consumption.

**Microwave ovens**

Microwave ovens heat food directly, require no warm up or preheat period and consume little electricity when not in use. They are extremely fast in operation which is ideal for small quantities of food, defrosting, primary cooking or reheating. Some commercial models incorporate convection features for combination microwave/convection cooking, whilst others produce a browning effect similar to conventional ovens using ultraviolet and infrared light rather than convective heat. These cook food up to twice as fast and do not use additional time and energy to pre-heat.

**Efficient fryers**

Deep fat fryers are a popular cooking method found in most commercial kitchens. There is significant variation between inefficient and efficient models with the latter using up to 50% less energy. Efficient models typically:

- Reach cooking temperature in 10-12 minutes or less.
- Feature submerged tube combustion which provides a quicker heat transfer and improved efficiency (gas fired fryers).
- Allow oil to be easily filtered – good filtration is essential to maintain efficiency and good flavour.
- Require lower oil capacities, have fast recovery times and do not lose heat through combustion discharge. Electric submerged element fryers are more efficient in this respect compared to gas appliances.

**Grills, chargrills and griddles**

These are common in many kitchens and one of the most cost effective improvements that can be implemented is temperature feedback through thermostatic controls. Generally, a griddle is more energy efficient than a standard grill and should be specified wherever possible. A chrome plated, mild steel griddle minimises energy consumption and puts more heat into the food whilst radiating less into the kitchen. This also has benefits in terms of a reduced requirement for kitchen cooling and extraction.

**Ranges and hobs**

These are often thought of as the key appliance in any kitchen so it is important to look for the following efficiency advances when purchasing new models:

- Open top ranges with individual burners can be separately controlled and are more efficient than solid top ranges with a large single burner.
- An automatic shut off valve to each burner will switch it off when the cooking pan is removed and reduce the energy consumption of the range by 30%.

**Top tip:**

Always select controls that do not interfere with the efficient delivery of products and services to customers. Installation of some devices such as blinds on refrigerators and automatic hob switch-off should be implemented as part of an overall catering energy management plan. Ensure staff understand that these will help rather than hinder kitchen operations and are trained to use these effectively to achieve maximum savings.

**Purchase equipment with running costs in mind**

Consider replacing any catering equipment over 15 years old with newer, more efficient models. When purchasing equipment, always consider the costs of the energy used over the lifetime of the product, not just the capital cost.

**Purchasing checklist**

- ✓ Compare the power rating and energy consumption of appliances before purchasing.
- ✓ Establish a purchasing policy – specify gas appliances rather than electric, where possible.
- ✓ Install two smaller items of equipment rather than one large one if demand is likely to be variable.
- ✓ Choose equipment with a clear visible indication that it is switched on and running.
- ✓ Seek equipment with improved heat exchanger design, enhanced controls and high levels of insulation.

## Tax incentives

Enhanced Capital Allowances (ECAs) are a straightforward way for a business to improve its cash flow through accelerated tax relief. The ECA scheme for energy-saving technologies encourages businesses to invest in energy saving plant or machinery specified on the Energy Technology List (ETL) which is managed by the Carbon Trust on behalf of Government.

The ECA scheme provides businesses with 100% first year tax relief on their qualifying capital expenditure. The ETL specifies the energy-saving technologies that are included in the ECA scheme. The scheme allows businesses to write off the whole cost of the equipment against taxable profits in the year of purchase. For further information please visit www.carbontrust.co.uk/eca or call the Carbon Trust on 0800 085 2005.

Many smaller catering establishments rely on domestic sized appliances. This is generally not considered good practice within the industry due to the more stringent food safety requirements of professional catering. However, when purchasing any domestic sized kitchen equipment such as fridges, freezers or dishwashers, always look for the most efficient 'A' rated models using the European A-G efficiency label.

## Did you know?

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## Refrigeration equipment

Compared with cooking equipment, the installed capacity of refrigerators, freezers and preparation equipment is relatively low. However, as refrigeration is used continuously, it can represent a significant energy cost. Inefficient and wasteful use of refrigeration plant can significantly impact on the efficiency and costs of the equipment as well as reducing its longevity. The efficient use of refrigeration equipment will not only save energy and money, but may contribute to a better managed catering operation, and in some instances, improved standards of food safety and hygiene.

| Temperature code | Product temperature | Suitable for |
|---|---|---|
| L1 | Below -15°C/-18°C** | Ice cream and frozen foods |
| L2 | Below -12°C/-18°C** | Frozen foods |
| M0 | Between -1°C & +4°C | Poultry and meat |
| M1 | Between -1°C & +5°C | Meat and dairy products |
| M2 | Between -1°C & +7°C | Processed meat and dairy products |
| H1 | Between +1°C & +10°C | Produce and canned and bottled drinks |
| H2 | Between -1°C & +10°C | Canned and bottled drinks |

Always ensure that the temperature setting satisfies the requirements for safe storage of food (see table above).*

**Location, location, location**

Place refrigeration equipment in the coolest part of the kitchen (not in a mechanically chilled cellar) and do not site next to cookers, grills or any other heat source. Each refrigerated cabinet should have at least 50mm of air-gap around it to allow air to circulate.

**Minimise cold air escaping**

Keep chiller and freezer door openings to a minimum. Try to place all food for one shift into one or more service refrigerators so that temperatures in storage units can be maintained.

**Regular maintenance for optimum performance**

Carry out weekly routine maintenance checks, looking at the seals on refrigerator doors and cold storage to ensure minimal loss of cold air (replace these if damaged). Keep evaporator coils in refrigeration units clean, ice-free and unobstructed. Compressor and condenser fins for refrigeration and air conditioning units should be free from dust and grime and cleaned regularly (every three months as a minimum).

* The products in the table are only a guide. Refer to the Food Standards Agency or your food supplier for more specific information relating to temperature control and your food storage requirements.

** The maximum temperatures shown are those allowed after defrost.

**Defrost regularly**
Keep fridges and freezers ice-free and defrost regularly (every two months as a minimum or following manufacturers' recommendations).

**Close doors automatically**
Install self closing devices on doors of fridges, freezers and cool rooms. These will ensure that equipment is closed properly every time and takes the onus off the staff.

**Control and optimise**
Consider installing motor optimiser controllers on refrigeration plant. These reduce the motor power input to a level that matches the load and can yield electricity savings of between 15-25%.

**Out of hours savings**
Use 7-day time switches where possible to automatically switch off equipment at the end of shifts, at weekends or during holiday periods. These can be applied to a wide range of equipment such as refrigerated drink vending machines, bar cabinets and display fridges provided no fresh items are stored. Contact your manufacturer for further advice.

**Recover heat**
The condensers used in refrigeration plant give off a considerable amount of heat. This can be captured and utilised to preheat hot water for use in the kitchen or help supplement adjacent space heating demands.

**Cover up**
Install plastic curtains and night blinds across the front of cold storage areas and refrigeration units. These are an effective means of retaining cooled air in open-fronted display cabinets and in chiller rooms that require constant access. Make sure that they are well installed, fit properly and are in good condition, as the heat gains from badly fitting night blinds and strip curtains can be significant.

## Specifying new equipment

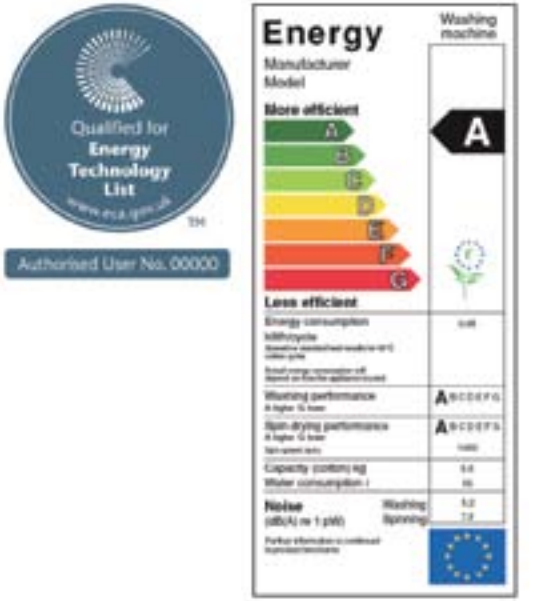
**Running costs outweigh capital costs**
The cost of running a refrigeration system over its lifetime can be several times the capital cost of purchasing it. It pays to give preference to the most efficient, low energy models that will provide savings in the long run. When comparing purchasing options, look at 'total life-cycle' costs to work out the true cost of equipment.

To work out the lifetime cost, multiply the annual running cost i.e. energy and maintenance, by the number of years the appliance will be used for. Then add this amount to the quoted capital purchase and installation costs. Compare models and choose the appliance with the lowest lifetime cost to achieve maximum cost and energy savings. The cost of the equipment itself is usually less than a third of the lifetime cost.

**Select equipment with enhanced controls**
Specify electronic control with an external digital temperature display to help ensure that the correct temperature is maintained. Enhanced features such as defrost on demand controls can assist in maintaining the units effectively.

**Look for the label**
Enhanced Capital Allowances (ECAs) are available to provide businesses with tax relief on investments in energy efficient refrigeration technology. Refer to the ECA Technology List to ensure that the selected system is among the most efficient (see www.eca.gov.uk for more details). When buying commercial equipment also look for the CE mark and EN 441. These do not necessarily indicate greater efficiency but they do show that the product meets safety and quality standards.

When purchasing any domestic sized fridges or freezers, always look for the most efficient models (A+ and A++) using the European A-G efficiency label.




Refrigeration temperatures set 1°C too low can increase running costs by 2-4%.

## Washing equipment

A variety of washing equipment is utilised in any catering operation which can use substantial amounts of energy and water. Savings are achievable through the implementation of best practice working procedures when using washing apparatus. Moreover, a range of energy efficient equipment is available to recover heat from washing procedures and make better use of the energy consumed.

As with cooking equipment, the staff who use washing equipment can have a significant impact on the levels of wastage and energy use. The table below provides a checklist to ensure that cleaning activities are as energy efficient as possible.

| Washing equipment savings checklist |
|---|
| ✓ Maximise dishwasher loads by fully loading and correctly stacking. |
| ✓ Ensure that taps are switched off after use and that food and utensils are not washed under running water. |
| ✓ Keep equipment well maintained – ensure heating elements, jets, sprays, thermostats and drains are clean and unclogged. |
| ✓ Use the economy setting on dishwashers. |
| ✓ Ask staff to report leaking washers or taps. |
| ✓ Consider use of low temperature sanitising liquids. |

### Water treatments

Poor water quality, particularly hard water which is high in dissolved minerals, can lead to scale and build-up on pipe work. This reduces efficiency of the washer system and can cause maintenance issues. Consider using automatic water treatment or adding a water softener to the supply. This will improve overall efficiency as well as deliver a better wash result with less detergent.

### Consider water saving devices

All catering facilities could benefit from the installation of water conserving devices such as:

- **Tap controls** – These switch taps off after a certain time and are useful in communal facilities such as toilets and hand washing basins.
- **Water efficient flow restrictors and aerators** – These reduce the volume of water coming out of a tap and can reduce consumption without diminishing the service to staff, provided the water pressure is adequate.
- **Automatic shutoff valves for spray washers** – these supply water for pre-rinsing operations only when required by the user (see picture left).

**Consider heat recovery from the wash cycle**
Heat recovery condenser devices can be installed in larger machines to reduce energy consumption by 25%. Further energy reductions can be achieved cost effectively by the incorporation of a heat pump in the exhaust system. This can increase energy savings by 50% compared to a standard set up. Both approaches can minimise exhaust vapour discharge into the kitchen, reducing ventilation and extraction costs and improving working conditions.

## Specifying new equipment

**Two can be better than one**
If demand is likely to be variable for glass washers or dishwashers, it can pay to install two smaller items of equipment rather than one large one. It is more efficient to run a small washer with a full load, leaving the other switched off, than to run a large, half empty washer.

**Procuring energy savings**
Develop and implement an energy efficient catering equipment procurement policy, specifying low energy models in preference to others. When specifying new equipment, consider models with the following added features:

- Well insulated dishwashers that retain heat within the unit.
- Low water-use dishwashers with efficient filtration and recirculation of rinse water which can save on both water and the energy used to heat it.
- Washing equipment with preinstalled heat recovery.
- Machines that are capable of taking a hot water supply (preferably from a central gas boiler) and do not rely on expensive hot water generated within the machine from electricity.

Heat recovery condenser devices can be installed in larger machines to reduce energy consumption by 25%.

# Kitchen services

In some kitchens, as little as 40% of the energy consumed is used for the preparation and storage of food; heating and cooling, lighting, ventilation, and hot water for cleaning accounts for the rest.

## Ventilation and kitchen extract

Adequate kitchen ventilation is critical in creating a safe and comfortable working environment. The cooking process produces heat, smoke and other pollutants which need to be removed and discharged to a safe external location. However, the kitchen ventilation system is one of the largest single energy users in catering operations, amounting to as much as 11% of overall electricity use, or 6% of total energy consumed.

Careful design and operation of the extraction canopy can help to reduce energy loss, but for maximum efficiency and a productive working environment, kitchen ventilation should incorporate a number of features, including:

- Smoke capture.
- Grease extraction and disposal
- Fire protection.
- Maintenance of acceptable kitchen air quality and temperature.
- Control of external emissions.
- Heat recovery.

### Note

It is particularly important that the ventilation system provides adequate air for combustion by gas-fired appliances. The lack of an adequate air supply could lead to incomplete combustion and a build up of dangerous carbon monoxide. For more information, visit **www.hse.gov.uk**

**Ensure ventilation controls are set correctly and reflect demand**

Main kitchen ventilation plant and toilet extractor fans should be switched off outside occupancy hours. In restaurants and dining areas, consider switching ventilation in customer areas down or off outside core business hours.

**Ensure that kitchen fans are switched off when no cooking is taking place**

Full ventilation is only required when energy is being used for cooking which can produce pollutants and excess heat. At other times, it may be suitable to turn ventilation down or off, such as when preparatory work prior to cooking is being carried out.

**Maintain kitchen extract ventilation**
Ventilation units and extractor hood grease filters should be cleaned at regular intervals, as recommended by the manufacturer. Regular cleaning of ventilation systems can increase efficiency by as much as 50% compared with systems that are not maintained. Annually review the performance of the whole system and replace parts as necessary. This also has other benefits such as reduced risk of breakdown and improved hygiene. Energy consumption can increase by up to 60% if regular maintenance is not undertaken. Dirty or faulty fans, air ducts and components directly affect system efficiency and will increase running costs and risk of breakdown.


**Variable speed drives (VSDs)**
Kitchen ventilation does not need to operate at full speed all of the time and VSDs can help to reduce costs by enabling the output speed of the fans to match requirements at different service times. This technology can be fitted to both the exhaust air and combustion air intakes, thus achieving considerable savings. More information can be found in the Carbon Trust Motors and drives technology overview (CTV048).

**The importance of air movement**
To prevent odours escaping into places where they would be unwelcome, such as dining rooms and restaurant areas, air should always follow a path from adjacent areas towards the kitchen. To achieve this, mechanical exhaust air rates should be only slightly higher than air input rates, thus creating negative pressure in the kitchen. Ensure that this does not draw in excessive air from dining areas, however, especially if it has been heated or air-conditioned.

**Consider specialised ventilation controls**
Consideration should be given to the use of air quality and temperature sensors to automate ventilation control. These devices match ventilation rates to preset requirements, lowering rates when the kitchen is not being fully utilised and raising them as smoke, heat and pollutants increase. This ensures closer control and enhances the kitchen environment as well as providing substantial savings.

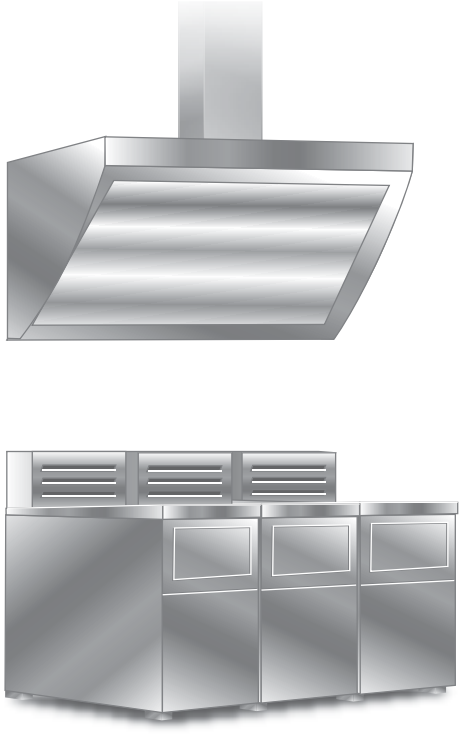
**Consider heat recovery**

Large volumes of warm air are expelled from catering facilities. Over 50% of this 'waste' heat can be recovered using heat recovery devices which can significantly reduce energy costs. An air-to-water recovery device is often the most effective method of recovering heat because it can then pre-heat hot water, providing a year-round use. Even small catering facilities can make effective use of this technology – contact the Carbon Trust to find out more.

**Seek specialist help**

Intelligent design of kitchen extract systems and canopies is crucial to health and safety requirements as well as energy savings. If conditions in the kitchen are far from optimal, consider seeking specialist design help to investigate whether a fully functioning and efficient canopy system can be provided. Kitchen extract hoods should be designed to take away cooking odours and combustion fumes as close to the source as possible.

Effective design



Ineffective design

## Heating and hot water

**Use catering equipment for cooking meals, not heating staff**
Avoid using equipment such as hobs and ovens to warm the kitchen when staff arrive – the building's heating system should do this effectively. If it doesn't, find out why and rectify the problem.

**Set appropriate hot water temperatures**
Excessive heating of hot water is wasteful and could scald staff or customers. The optimum temperature for stored hot water is at or just above 60°C which is adequate to kill Legionella bacteria and is sufficiently warm for staff and customers to use.

**Set appropriate kitchen temperatures**
Catering is very labour intensive and catering staff can be extremely active, therefore, a suitable temperature in a kitchen is usually between 16-18°C. In order to keep staff working productively, a thermostat should be installed to ensure that heating is only on if the temperature drops below the recommended minimum (16°C). Some catering managers use separate room thermometers to double check that thermostats are turning the heating on and off when required. If heating is on above these temperatures, check thermostats and adjust accordingly. If they are already set correctly and the heating is still on, ask a qualified heating technician to check or replace them.

**Consider fitting thermostatic radiator valves (TRVs) to radiators to provide more localised control**
A TRV is a simple control valve with an air temperature sensor, used to control the heat output from a radiator by adjusting water flow. Correctly fitted and operated TRVs can provide efficient control. In a large catering operation with several radiators and a variety of activities and heat gains, control of individual radiators can provide the correct level of localised heating. TRVs will reduce the amount of heat output from radiators as the kitchen fills with heat from staff and food preparation activities. It is therefore important to check settings regularly and adjust appropriately to provide optimum comfort conditions.

## Lighting

Lighting accounts for more than 10% of the total energy consumption in catering and represents a significant cost to most businesses. Good levels of illumination in kitchens must be maintained for efficient working practices and health and safety requirements, so light must be well distributed to avoid shadow. In addition, the visual appearance of food is an essential part of producing an appetising meal so catering operations require lighting with good colour rendering properties. For these reasons, fluorescent tubes would be the optimum choice to produce good colour reproduction and light output with reasonably high efficiency.

**'Switch off' policy – involve staff and increase awareness**

Light switches should be set up and labelled to control specific areas separately. This will help employees to select only those lights they need for the work being carried out (for example, when cleaning after service). Lights in unoccupied areas should be switched off when not required. Involve staff in making savings by conducting regular meetings, placing stickers above light switches and placing posters around the building (available from the Carbon Trust website).

### Top tip:

Always ensure that switch off policies do not interfere with emergency lighting or the provision of adequate lighting to maintain health and safety standards.

### Further information

**Technology overviews**

Low temperature hot water boilers (CTV051)

Lighting (CTV049)

**Low voltage spot lighting**

Tungsten halogen spot lighting is commonly found in catering operations with restaurants and dining areas. It is typically used to provide 'sparkle' to lighting arrangements. If these lights are on a low voltage circuit then savings can be achieved by using 35W bulbs with an infrared reflective coating (IRC) instead of the standard 50W bulbs. The IRC reduces the power required to light the lamp but gives the same equivalent light output as a standard 50W bulb whilst achieving a 30% energy saving and a 60% heat reduction.

**Maintenance**

Lighting is essential for providing a safe working environment in the kitchen so it is important to keep windows, skylights and light fittings clean. Without regular maintenance, light levels can fall by up to 30% in 2-3 years. Failing lamps should be reported by staff and replaced. Establishing a basic lighting maintenance schedule can reduce costs by up to 15%.

Replace blackened, flickering, dim or failed fluorescent tubes with triphosphor coated ones (this is stated on the packaging). Triphosphor coating provides a more natural, brighter light which provides more accurate colour rendering of food than standard tubes. If the tubes are 38mm (1.5 inch), they should be replaced with slimmer 26mm (1 inch) tubes.

**Reflect the energy savings**
When upgrading lighting, choose lamp fittings with reflectors that have mirrored or reflective white surfaces. This focuses light coming out of the fitting and increases lumen output. By using reflectors, overall wattage and the number of lamps can be reduced by a quarter with no depreciation in light levels.

**Specify high-frequency fittings**
High-frequency fittings for fluorescent lighting reduce energy use and heat output which can make a catering operation more comfortable for staff. They have an additional benefit of removing the stroboscopic effect sometimes experienced with conventional fluorescent lamps when viewing rotating machinery, such as food slicers.

Always consult a qualified lighting technician before upgrading lighting systems and specify lighting that appears on the 'Energy Technology List' to ensure it is efficient.

## Case study
### Catering firm

A catering operation cleaned their diffusers and reflectors and replaced all their 38mm fluorescent tubes with slimline 26mm tubes. This enabled it to reduce the number of lamps used by 25% whilst still achieving the same light output. The capital cost of refurbishment was £900, but it provided ongoing savings of more than £2,000 per year.

## Energy Efficiency Financing

Investing in energy efficient equipment makes sound business and environmental sense, especially with the easy, affordable and flexible Energy Efficiency Financing scheme brought to you by Carbon Trust Implementation and Siemens Financial Services. To find out more visit **www.energyefficiencyfinancing.co.uk**

## Did you know?

Fluorescent tubes use only a few seconds worth of power in start up, therefore, energy is always saved by switching them off when they are not required.

# Energy management and people solutions

As catering is a relatively labour intensive activity, a significant part of potential energy savings relate to working practices. The efficient use of equipment in the kitchen can save energy and money and even contribute to a better managed catering operation.

Catering establishments are notorious for switching all equipment on at the beginning of a shift and leaving it running throughout the day. Not only is this extremely wasteful, but equipment left on unnecessarily generates heat, making a kitchen unpleasantly hot and uncomfortable to work in. All catering establishments can save energy by implementing a simple switch-off policy and providing staff with information about preheat times, control settings and good practice.

**Staff training**

An ongoing training programme is necessary due to the high staff turnover in catering operations. Some organisations have achieved savings in excess of 15% simply through the adoption of good housekeeping measures, reinforced through effective staff training and regular refresher courses.

**Submetering**

Many catering organisations may not be responsible for the energy used on site, nor have access to reliable energy and utility information for the kitchen. In most instances where energy costs are likely to be in excess of several thousand pounds, the installation of submetering should be pursued. Submeters will help identify cost savings and justify any investmentsrequired in order to lower running costs. If catering is provided by a separate company, there is also the additional benefit of allowing for budget allocation and charging to take place. This acts as an incentive for kitchen managers to reduce energy costs by providing some financial reward for doing so.

Submetering may be negotiated at the building owner's expense and should be promoted to them as a way of increasing value for money of the catering operation.

In large catering establishments, submetering of particular pieces of equipment may be worthwhile (such as electricity used for refrigeration or gas used for cooking). This information can be used for monitoring and targeting purposes.

- By monitoring consumption, staff will be made aware of the amount of energy used either in the business as a whole or in their particular department.
- Involving staff in agreeing and setting a realistic target for saving energy can enhance motivation.
- High periods of demand should coincide with busy working times and any disparity between this can pinpoint malfunctioning equipment.
- Recording reduced energy consumption can allow further justification of investment in energy saving technologies and behaviours.

**Develop a plan**

Catering organisations are typically run as independently managed units either in their own right or as part of larger organisations (for instance a canteen service provided for a major PLC).

Many catering units have management structures independent of the organisation that they are catering for, and in some instances, the head chef will oversee the day-to-day kitchen management.

The caterer is not always responsible for the energy consumed in the kitchen and may not even be aware of how much energy is consumed in the process of providing catering services. For this reason, companies should develop and implement a documented catering energy management plan incorporating the steps right.

Although the creation of an energy management plan does not in itself provide any energy savings until the implementation stage, it is reasonable to expect a 5-10% reduction of the total energy bill. Unless such a plan is in place, any other energy and cost savings may be limited and difficult to measure.

**1. Make someone responsible –** a member of staff should be appointed as energy champion in the catering organisation who has direct responsibility for the energy used on site.

**2. Establish the facts –** with the co-operation of management, the energy champion should determine how much energy is currently being consumed and what the areas of greatest use and wastage are.

**3. Compare performance –** energy performance should be compared to appropriate benchmarks for the industry and against past operation where historical energy data is available.

**4. Plan and organise** – under the guidance of the energy champion, and with the full support of management, staff should be involved in the preparation of an action plan for making the company more energy efficient and competitive.

**5. Use less energy –** areas of obvious wastage should be identified by addressing individual items of equipment and user behaviour. Following a detailed survey, a list of remedial actions and investment priorities should be drawn up and actioned accordingly.

**6. Control and monitor –** recording and monitoring systems should be set up to check that targets are being met and to identify further cost reduction opportunities.

## Further information

**Fact sheets**

Assessing the energy use of your building (CTL172)

**Technology guides**

Creating an awareness campaign (CTG056)

# Action checklist

Many actions detailed in this guide often cannot be recorded on a checklist – they simply need to be carried out on day to day basis. However, the checklist below shows those actions which can be ticked off and recorded to help save on costs and reduce energy use.

| Food storage | Complete? | Action/Comment |
|---|---|---|
| Locate refrigerators and freezers away from heat sources | | |
| Make sure equipment is set to the manufacturer's recommended temperature | | |
| Adopt a planned defrosting programme | | |
| Check door/lid seals and replace as necessary | | |
| Replace old equipment with new efficient models | | |
| **Food cooking and serving** | **Complete?** | **Action/Comment** |
| Keep hot plates and gas burners clean | | |
| Introduce regular servicing of cooking appliances including thermostats and automatic timers | | |
| Install microwave ovens to cook and reheat meals | | |

| Dishwashing and hot water | Complete? | Action/Comment |
|---|---|---|
| Clean and maintain machines regularly | | |
| Install efficient dishwasher units incorporating economy wash cycles and/or heat recovery | | |
| Install spray taps for hand-washing facilities and repair leaking taps | | |
| **Heating** | **Complete?** | **Action/Comment** |
| Ensure kitchen extract ventilation does not draw excessive air from dining areas | | |
| Consider a heat recovery system for mechanical ventilation | | |
| Install kitchens with local thermostatic controls (e.g. radiators with TRVs) and do not use cooking appliances to heat kitchen areas | | |
| **Ventilation and air extraction** | **Complete?** | **Action/Comment** |
| Clean filters, grilles and fan blades regularly to prevent build up of grease | | |
| Install energy efficient ventilation hoods and locate these directly over ovens, fryers, grills which need air extraction | | |
| **Lighting** | **Complete?** | **Action/Comment** |
| Keep lamps and luminaires clean | | |
| Install efficient lighting and switch off when not required | | |

# Next Steps

There are many easy low and no-cost options to help save money and improve the efficient operation of your food preparation and catering business.

## Step 1 Understand your energy use

Look at your catering set up and identify the major areas of energy consumption. Check the condition and operation of equipment and monitor the power consumption over say, one week to obtain a base figure against which energy efficiency improvements can be measured.

## Step 2 Identify opportunities

Compile an energy checklist. Walk round the catering facility and complete the checklist at different times of day (including after hours) to identify where energy savings can be made. An example checklist is available from the Carbon Trust: Assessing the energy use in your building (CTL172).

## Step 3 Prioritise your actions

Draw up an action plan detailing a schedule of improvements that need to be made and when, along with who will be responsible for them. Where funding is limited, focus on energy intensive areas or those that are performing badly first.

## Step 4 Seek specialist help

It may be possible to implement some energy saving measures in-house but others may require specialist assistance. Discuss the more complex or expensive options with a qualified technician.

## Step 5 Make the changes and measure the savings

Implement these energy saving actions and measure against original consumption figures. This will assist future management decisions regarding your energy priorities.

## Step 6 Continue to manage your energy use at your site

Enforce policies, systems and procedures to ensure that your business operates efficiently and that savings are maintained in the future.

### Further information

**Sector overviews**

Further and higher education (CTV060)

Hospitality (CTV058)

Hospitals (CTV024)

Schools (CTV019)

Sports and leisure (CTV006)

# Further services from the Carbon Trust

The Carbon Trust advises businesses and public sector organisations on their opportunities in a sustainable, low carbon world. We offer a range of information, tools and services including:

**Website –** Visit us at www.carbontrust.com for our full range of advice and services.

↘ www.carbontrust.com

**Publications –** We have a library of publications detailing energy saving techniques for a range of sectors and technologies.

↘ www.carbontrust.co.uk/publications

**Case Studies –** Our case studies show that it's often easier and less expensive than you might think to bring about real change.

↘ www.carbontrust.co.uk/casestudies

**Carbon Trust Advisory –** Delivers strategic and operational advice on sustainable business value to large organisations.

↘ www.carbontrust.co.uk/advisory

**Carbon Trust Certification –** Delivers certification and verification services to companies and runs the Carbon Trust Standard and Carbon Reduction Label.

↘ www.carbontrust.co.uk/certification

**Carbon Trust Implementation –** Delivers services to business in support of implementation of energy efficient equipment and energy efficiency financing.

↘ www.carbontrust.co.uk/implementation

The Carbon Trust is a not-for-profit company with the mission to accelerate the move to a low carbon economy. We provide specialist support to business and the public sector to help cut carbon emissions, save energy and commercialise low carbon technologies. By stimulating low carbon action we contribute to key UK goals of lower carbon emissions, the development of low carbon businesses, increased energy security and associated jobs.

**We help to cut carbon emissions now by:**

- providing specialist advice and finance to help organisations cut carbon
- setting standards for carbon reduction.

**We reduce potential future carbon emissions by:**

- opening markets for low carbon technologies
- leading industry collaborations to commercialise technologies
- investing in early-stage low carbon companies.

## www.carbontrust.com

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