
Food and drink processing

Introducing energy saving
opportunities for business



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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 overview for the food and drink processing industry introduces the main energy saving opportunities for businesses and demonstrates how simple actions save energy, cut costs and increase profit margins.

Energy consumption

The food and drink processing industry is the fourth highest industrial energy user in the UK. In 2010, it consumed nearly 37TWh (enough energy to power 125,000 homes for nearly 15 years) and emitted around 11 million tonnes of carbon dioxide into the atmosphere.

Energy consumption in the sector could be considerably reduced by implementing simple and effective energy saving measures, reducing carbon emissions and cutting the costs for businesses.

Who is this publication for?

This publication is aimed at managers in the food and drink processing industry working in all sub-sectors. Focusing on the low and no-cost measures and actions which will have the quickest payback, this overview demonstrates the best energy saving opportunities in the sector.

Why save energy?

Because it increases profit...

The food and drink processing industry is very energy intensive and many businesses in the sector believe that energy costs are a static overhead.

However, energy costs are controllable. By implementing simple and effective energy saving measures, businesses can cut energy costs, reduce overhead expenditure and consequently increase profit margins.

Because of Climate Change Agreements...

Most of the sub-sectors in the industry have negotiated Climate Change Agreements (CCAs) with the Government to reduce energy use, either through the Food and Drink Federation or through their own trade association.

The agreements state that the sub-sectors will meet challenging targets for improving energy efficiency or reducing carbon emissions. By agreeing a CCA, the Government grants the sub-sector an 65% discount from the Climate Change Levy – the discount will be increased on electricity only, from 65% to 90%, from April 2013.

For more information on the Climate Change Levy or Climate Change Agreements, contact the Carbon Trust on 0800 085 2005. Further information is also available from the DECC website (www.decc.gov.uk).

Because it is good for reputation...

The general public is increasingly aware of the effects of climate change and the impact that it has on the environment. It is important for businesses to demonstrate their commitment to reducing carbon emissions to ensure that they retain consumer confidence and maintain their position in the marketplace.

Because it is good for morale...

Saving energy and reducing environmental impact is good for morale. People like to feel that they are working as a team and making a positive contribution to improving their environment. Many energy saving actions can also improve working conditions and comfort for employees.

Opportunities for energy saving

This sector overview introduces simple and straightforward opportunities for saving energy in the food and drink industry.

The food and drink industry is very diverse with many sub-sectors¹. Each sub-sector employs a range of industrial processes. This guide concentrates on technologies and management techniques that offer the greatest potential for energy saving and that are common to the widest range of sub-sectors. These are:

- Refrigeration.
- Process measurement and control.
- Compressed air.
- Motors and drives.
- Boilers and heat distribution.
- Cooking.
- Distillation, drying and evaporation.
- Energy management.

The relative importance of each area will also depend on the sub-sector. For example, refrigeration cost will make up a large proportion of energy bills in the frozen and chilled foods sub-sector. Equally, for a business that produces confectionery, boilers and heat distribution systems will make the largest contribution.

¹ Industrial dairies, Breweries, Distilling, Sugar manufacture, Confectionery, Bakeries, Slaughterhouses, Meats and meat products, Fish (frozen), Poultry products, Malting, Soft drinks, Animal feeds, Oils and fats, Glucose, Canned foods, Frozen/chilled meals, Ice-creams, Milling, Pet foods, Cereal products, Frozen vegetables, Crisps, Preserves and Spreads.

Refrigeration

The food and drink industry is one of the largest users of refrigeration technology. Many businesses within the sector will find that refrigeration costs make up a significant proportion of their energy bill.

A recent survey* undertaken on behalf of the Carbon Trust, has shown that there are some 2,000 food and drink manufacturing sites where refrigeration forms a vital part of the production process. The majority of refrigeration plants provide freezing and chilling and account for around 50% of all electricity used at the sites. Without refrigeration these companies would not be able to meet customers' specifications on food products.

Around a quarter of the sites also indicated that they were considering a new plant installation in the near future, driven mainly by the need to replace their R22 refrigeration systems.

Refrigeration is essential in the production of many perishable foods as it helps to prevent food spoilage by reducing microbial growth in food products and helps to retain the nutritional content, flavour and texture of the food. Typical applications will range from small, stand-alone refrigerators to large walk-in cold rooms. These may be controlled by integrated technology or by a centralised refrigeration plant.

Because of this, manufacturers might be disinclined to change their systems. However, there are many money-saving opportunities that can be taken without compromising product.

Introduce a good maintenance programme

Refrigeration systems are at their most efficient when they are well maintained. Blocked, dirty and leaking components lead to increased energy demand, raising the costs for the business.

- Establish a programme of regular checks to ensure that equipment is in good working order and that any problems are pointed out to the maintenance contractor.
- Identify scaling and ice-build up on evaporator fins.
- Check evaporators and condensers for damaged vent fins, which make it more difficult to transfer heat.
- Check that bleed/drip pipes are not iced up.

Check for leaks

Most large refrigeration systems have sight glasses where the refrigerant can be seen. If bubbles can be seen in the refrigerant when the system is in a stable operation, it usually indicates that there is a refrigerant leak in the system. As refrigerant levels drop, the system will operate less efficiently, reducing the cooling level.

The most common areas for leaks are joints, seals and other mechanical valves. However, the whole system, including the pipework, should regularly be inspected for leaks.

Many common refrigerants are powerful greenhouse gases. So, one small failure in managing leakage could neutralise any environmental benefit of savings in CO₂ through energy efficiency.

It is illegal to knowingly vent refrigerants. So, as soon as a leak becomes apparent, take action to find and repair it before recharging the system with refrigerant.

* March 2005

Check that insulation is adequate

Ensure that pipe insulation is in a good condition. Check all suction lines and make sure all door seals are in a good state. Good insulation will make equipment more efficient as it minimises the amount of cold air escaping and being replaced by warm air.

Plan loads

To ensure that refrigeration systems are used in the most efficient way, pre-plan production and storage needs. For example, if there are a number of cold storage areas, it is more efficient to have one of them on full-load, rather than two on part-load.

Equally, overfilling the cooled area will reduce the cold airflow around the products, reducing the performance and efficiency of the refrigeration system.

Control lighting

Lights add heat to the cooled space making the refrigeration system work harder.

Ensure that internal lights in refrigerated spaces are switched off when not in use or outside of operating hours.

Where lights are controlled by the opening and shutting of the refrigerator door, ensure that the switch operates properly.

Did you know?

Unblocking and cleaning evaporator and condenser units can save money. A 1°C rise in condenser temperature or a 1°C drop in evaporating temperature can increase running costs by 2-4%.

Don't overcool

Food and drink manufacturers often keep their cooled storerooms at lower temperatures than required due to worries about equipment failure.

Operators believe that the lower temperature will provide a few hours grace to get a contractor to repair any failed components before the perishable goods exceed their storage temperature.

In reality, overcooling a storeroom increases the probability of equipment failure by increasing the duty on the refrigeration plant.

Always ensure that the temperature setting satisfies the product storage requirements.

Increasing frozen food store temperature from -25°C to -20°C saves 10-15% of the refrigeration energy

Minimise the air change rate

Air changes in cooled storerooms can account for up to 30% of the total heat load as cool air escapes and warm air enters. This can be minimised by ensuring that doors remain closed as much as possible. Consider fitting self-closing doors if possible.

Ice build-up on storeroom floors and walls is a good indication that a high level of air change is taking place. When a door is used regularly, install a strip curtain to prevent cool air escaping from the storeroom. Ensure that the curtains are well fitted and stay in good condition. Replace damaged strips as required.

Process measurement and control

Control processes more effectively and cut energy costs by up to 10%.

What is process measurement and control?

Process measurement and control refers to a range of techniques that can be used to improve the performance of processes. The secret of a good and economic operation depends upon reducing process variability and operating close to specification limits. Process measurement and control helps to achieve this by maintaining effective operation and efficient production.

By improving control, companies can certainly reduce energy consumption but can also increase their operational efficiency in many other ways. The benefits include:

- **Energy savings** through operating a well-controlled plant that is energy efficient.
- **Reduced manufacturing costs** by optimising product throughput and yield. Companies often find that they can achieve a greater output from the same levels of throughput, simply by improving the control on operational processes.
- **Consistent product quality** by greatly reducing variation in product quality, hence ensuring that customer specifications are met and wastage is reduced.
- **Safety improvement** by warning of hazardous conditions or safety trips to cease operations if operators fail to respond.
- **Better environmental performance** through early warning of loss of containment and excessive emissions to the environment.
- **Process insight** gained from measurements providing a 'window' on the process parameters that enhance profit opportunities.

While some of these advantages can be pursued by process operators, others may require specialist knowledge of the control systems.

Process control is highly specific to each site and each business. For more information about which measures will be appropriate for your business, call the Carbon Trust.

Assess the quality of measurements

Effective process control needs to start with accurate measurements of key indicators such as temperatures, pressures, levels, flow rates and energy use. Ask operators for their views on the reliability of different process measurements and investigate areas where readings may be problematic. For example, do operators record data at all? Do the readings look about right? When was the last time that the machinery was calibrated?

Operators should also consider whether measurements are taken at the correct position in the process, as incorrect siting may lead to mis-measurement and erroneous actions.

Other recommended checks include considering how they vary when introducing a known change upstream and, once a problem has been identified, asking what is the likely time delay before corrective action can be taken.

Findings may show that:

- A measuring device is un-calibrated or badly chosen.
- Signals are corrupted.
- Equipment has been poorly installed or maintained.
- Measurements are now inadequate or inappropriate.

Whenever these are found they should be rectified with the help of a qualified technician.

Establish a programme of staff training and preventive maintenance

Process efficiency often deteriorates because of the way that operators respond to faults. Operators make adjustments to control settings to overcome a short-term problem (such as reducing the feed-rate to compensate for a blocked filter) but then fail to readjust settings when the problem is fixed. As a result, systems become inefficient.

To prevent this happening, establish a regular maintenance strategy, train staff to report process faults promptly and ensure that operators are fully aware of the consequences of adjusting control settings.

Consider automating where possible

Manual control can introduce human error. List all areas on the site where manual control is used and consider whether automatic controls could be installed instead.

In the food and drink industry, automatic control can be used for applications such as controlling product moisture levels to eliminate over-drying, or optimising product quality.

Many food and drink manufacturers also use simple sensors to detect when a product is present on a conveyor, meaning that less energy is expended, as the conveyor does not have to operate continually.

Scheduling for energy efficiency

Batch processing and frequent product changeovers are commonplace in the food and drink industry. As a result, there are often marked changes in the requirements placed on the system and this can reduce its overall efficiency.

A product changeover, for example, from baking bread to baking morning goods, will usually result in changes to the temperature and the duration of baking process. The changeover will also result in an increase in energy demand caused by replacing warm with cold baking trays and the reheating of the oven to the required temperature.

Understanding the impact of changeovers can help identify energy savings. Common opportunities include reducing the number and timing of changeovers in a schedule and employing better control to make sure that each is efficient.

Process measurement and control helps to achieve improved product yield and quality, increased plant capacity, reduced wastage or give-away, reduced environmental impact and often very efficient use of manpower, materials and energy.

Case study

What other food and drink manufacturers are doing

A production engineer found that meeting a supermarket's moisture specifications for french fries was proving costly.

The engineer was recording the moisture content in the final product and then adjusting the dryer temperature accordingly. By changing this process and measuring the moisture content in the raw potato, he was able to control the dryer temperature to obtain a more consistent moisture level in the fries. The company was then able to meet the specification for over 90% of the products, compared with the 45% level they had met previously.

Compressed air

Compressed air is used as a power source for many food and drink operations as it is a versatile, safe and flexible way to transmit energy. However, many operators do not actually realise that it can be extremely costly to produce and is sometimes misused.

Compressed air is common in processes requiring conveyors and mixers. Applications include blow moulding plastic bottles in the soft drinks industry and using air knives to lift products off conveyor belts.

Cut down on unnecessary compressed air usage

Identify where compressed air is used on a site and then check to make sure that it is required for the task. For example, industrial sites often use compressed air to clean down machinery purely because the compressed air supply is available for other purposes within the factory. In many cases, using a vacuum cleaner or air blown from a fan would be a far cheaper alternative.

Some equipment can be fitted with an on-demand control unit to supply compressed air as it is required on a conveyor system, for example in the bottle drying process. Such control units can monitor gaps between products and only supply the air at the point of usage.

Produce a compressed air usage policy for employees specifying where and when compressed air should not be used. Ensure that the policy is displayed at appropriate places across the site.

Switch it off

If a compressor is not being used then make sure that it is switched off. An idling compressor can still use up to 40% of its full load.

Make sure maintenance is carried out regularly

Follow the manufacturer's documentation for the recommended maintenance schedule. Maintenance routines should include lubrication, oil changes and filter replacement. A well-maintained compressor can be 10% more efficient than one that has been poorly maintained.

Reduce pressure

Many systems produce compressed air at a higher pressure than required. Ask equipment and tool manufacturers to specify the minimum air pressure necessary to drive the machinery and then ensure that the system meets and does not exceed these requirements.

If one application requires a higher pressure then consider installing a smaller, local generator rather than increasing the pressure of the whole system.

Check frequently for leaks

Industrial sites often have compressed air leakage rates of up to 30%, wasting considerable amounts of energy and money. Establish a systematic and regular leak-detection programme (e.g. every three months) to check for leaks, then make sure that they are repaired as quickly as possible.

There are three main ways to check for leaks:

Listen – run the compressor without using any air tools or equipment. Make sure that there is as little background noise as possible and then walk slowly around the system listening for hissing or rasping sounds. Check all joints, flanges and valves carefully.

Look – make up a simple solution of soapy water. Run the system without using air tools or equipment. Apply the solution to all pipework and then look to see where the soap liquid bubbles up.

Detect – hire or purchase ultrasonic leak detection equipment from a compressed air system supplier. Using ultrasonic equipment is the most accurate way to check for leaks.

Mark all leaks on a plan of the system. Before attempting any repair work, make sure that the system is de-pressurised. Small leaks can be repaired on-site, but contact the equipment supplier before tackling larger leaks. If in any doubt about how to proceed contact the supplier.

Are there parts of the system that aren't needed?

Consider whether there are parts of the compressed air system that are not needed, such as areas of unused pipework. Isolate areas that are not in use. This will increase the efficiency of the system.

If a system requires compressed air at different times in its operation, then consider using isolation valves to divide the system into zones.

Investigate bringing in compressor air from outside

For the purpose of supplying compressed air, it is better to take a cool air feed for the compressor. Cooler air is denser and reduces the load on the compressor. Bringing in cooler intake air from outside can produce substantial savings. Consider measuring the temperature difference between the current air intake point and that outside to see how much could be saved. For every 4°C drop in the temperature of the intake air efficiency improves by 1%.

Re-using waste heat

Up to 90% of heat generated by a compressor can be used to heat water or air. Consider whether the heat generated can be reused to:

- Provide space heating in warehouses or workshops and staffed production lines.
- Keep things dry – placing a compressor in a warehouse could prevent material such as cardboard boxes from becoming damp, thereby reducing spoilage of stored raw materials or products prior to dispatch.

For more sophisticated waste heat recovery schemes, such as heating process water, talk to a contractor or supplier.

Motors and drives

Electric motors drive the vast majority of processes used in the food and drink industry. However, they are often overlooked and as a result, many sites have relatively inefficient motor operations. Improving the efficiency of a plant's motors can deliver significant energy and cost savings.

Switch off motors when they are not required

Identify all systems that use motors and encourage employees to turn them off when they are not needed. Alternatively, consider installing automatic sensors that can stop motors and conveyors when no product is being carried.

Ensure motor systems are well maintained

Carrying out regular maintenance can reduce energy consumption by as much as 10%. Maintenance programmes should consist of lubrication schedules, cleaning, belt tensioning and alignment checks. It is also worth considering using predictive maintenance techniques that can indicate in advance when parts will need replacing. A motor supplier will be able to provide further details.

Check that motors are the correct size

Motors are often larger than they need to be. Compare the details on the motor rating plate with the actual rating required by the equipment that the motor is driving. In many cases, motors are oversized by 20% or more (e.g. an application might require a motor rated at only 7.5kW, but has been supplied with a motor that is 11kW). Consider replacing with smaller, higher efficiency motors where possible. If the motor is very lightly loaded (<40%) and cannot be changed, it may be possible to run the motor continually in a different connection mode that could result in energy savings of between 5 and 10%. Consult a motor supplier for more advice.

Consider replacing failed motors with Higher Efficiency Motors (HEMs)

HEMs are between 3 and 4% more efficient than other motors due to their improved design and materials. Energy efficiency improvements of up to 5% are possible if failed motors are replaced with higher efficiency models. It is usually more cost-effective to replace smaller motors (<15kW) than to rewind them.

Look at the possibility of installing Variable Speed Drives (VSDs)

A VSD is an electronic device that can vary the speed of motor-driven equipment such as a compressor, fan or pump. The VSD converts the incoming electrical supply of fixed frequency into a variable frequency output to control the motor – a low frequency for a slow speed and a higher frequency for a faster speed.

VSDs are commonly used within the food and drink industry, for example, to drive beet slicers to produce sugar for use in chocolate, cake and soft drink processing. VSDs are also often used to drive extractor fans to control the temperature in ovens, for example for biscuit production. They can be very effective in a variety of processes, particularly those that use pumps and fans. Talk to the Carbon Trust for more information on VSDs.

For further advice please download our [Motors and drives technology overview \(CTV048\)](#).

Did you know?

- A fully loaded motor consumes its own purchase cost in electricity in 30 to 40 days of continuous running. Always consider the whole life-cycle costs before buying a new motor. Make sure that calculations take into account the commissioning, installing and purchase costs, plus running costs such as energy and maintenance.
- Lowering the speed of a motor by just 20% can produce an energy saving of up to 50%.
- Installing a VSD can save up to 30% of running costs.

Boilers and heat distribution

By ensuring efficient steam generation and distribution, energy costs can be reduced by 10-30%.

Almost all of the sub-sectors in the food and drink processing industry need some form of process heating. This is often supplied by on-site boilers. The boilers may be installed to supply hot water or steam (at various temperatures and pressures) depending on the process requirements.

Inspect and maintain boilers

Make sure that boilers are checked weekly between services. A poorly maintained industrial boiler can consume 10% more energy than one that has been well maintained. Common signs of boiler inefficiency are warning lights, pressure drops, and damage, such as burn marks and increased noise levels. Every time a warning sign is ignored, energy is being wasted.

Gas leaks are a serious safety issue and should be reported immediately.

Boilers should be serviced at least once a year by a qualified technician. If in heavy use then servicing should be carried out more often, for example, boilers used to provide a base heat load on a continuous basis. The engineer should replace worn parts and clean the burners and any heat exchangers to remove the build-up of deposits. The service should also include a combustion and/or flue gas test and an adjustment to the fuel/air mix so that the boiler burns fuel efficiently.

Match boiler outputs to process and/or site requirements

Before product changeover or scheduled stoppage, make sure that the boiler operatives know about the step changes in output capacity of steam or hot water. Matching supply to demands will help to save boiler fuel.

Fit insulation and inspect it regularly

Make sure that all distribution networks (such as pipes, valves, flanges) are suitably insulated and that the insulation is in good condition. Reducing heat loss will cut running costs.

Around 10% of the heat produced in steam boilers can be lost through insufficient or ineffective insulation on the distribution system.

Do not lose heat on standby

When a boiler is on standby, the heat loss through the flue can be significant. Installing an isolation damper can eliminate this heat loss and fuel savings of up to 12% are possible. There is also the added benefit of reducing harmful emissions. Contact a service technician for more information.

Look at water quality

Poor water quality can lead to scale, deposition and corrosion, which all reduce boiler efficiency. Consider using automatic water treatment and analysis. Generally treatment consists of adding chemicals to the water. An automatic water treatment system can save 2% of the fuel requirement. A service engineer will be able to advise on this.

Investigate the potential for recovering waste heat

Waste heat from boiler flue gases can be used to preheat the combustion air for boilers or the boiler feedwater, therefore reducing the overall amount of energy required in the process. These measures can save between 2 and 5% of fuel in sectors such as breweries, distilling, soft drinks, canned foods and confectionery manufacture.

Investigate installing automatic controls and use isolation procedures

Boilers are at their most efficient at the maximum firing rate. If a site needs varying rates of heat for different processes, it might be worth considering having several smaller boilers.

Boiler replacement

Where boilers are coming up for major refurbishment or replacement, due to their age being in excess of 15 years, it is worth looking at the possible investment in a combined heat and power (CHP) scheme. Such a scheme helps to reduce the overall energy consumption but project feasibility is advised to check that the investment has acceptable payback.

For further advice please download the following publications:

[Low temperature hot water boilers overview \(CTV051\).](#)

[Steam and high temperature hot water boilers overview \(CTV052\).](#)

Cooking

Cooking consumes a significant proportion of the total energy used in food and drink processing and, in sub-sectors such as baking, it is the main energy consumer.

If a site employs cooking processes then there may well be simple opportunities to make considerable savings.

Baking

The vast majority of cooking processes use ovens for baking. There are two main types of oven: batch and continuous. In continuous ovens, conveyor belts are used to carry products continually through the oven while batch ovens tend to be loaded with trays of product. At each product changeover, the oven needs cooling and heating up to the required temperature. Energy efficiency can be improved by product planning so as to reduce the number of product changes. Baking also offers good opportunities to improve process control (see below and [page 7](#)).

Frying

Energy savings can be achieved through the steam generated during the frying process being condensed and the released energy being used to heat water.

Steaming

Steam is used for heat in a variety of cooking applications, and is particularly important within the food canning process. Here a great deal of heat is used to steam cook or sterilise the product, which is then cooled. This process presents opportunities to recover heat for reuse. Waste heat recovery is discussed on [page 10](#).

Inspect and maintain equipment

Ensure that cooking equipment is regularly inspected. Check for worn or broken oven seals or damaged insulation, both of which lead to wasted heat energy. If damage is found then repairs should be made promptly.

Encourage employees to look out for signs of inefficient processes such as uneven baking. Instances should be reported straight away and maintenance checks made.

Check process schedules

Ovens are at their most efficient when they are full. Check process schedules and make sure that they make full use of oven capacity and that whole ovens are not being heated and then only half-filled with product.

Improve process control

Bringing cooking equipment up to temperature uses considerable heat energy. Identify the minimum time required to heat equipment and then optimise this period by installing automatic process control. This will ensure that heating only takes place for as long as is necessary, avoiding wasting energy.

Distillation, drying and evaporation

Distillation, drying and evaporation are all separation techniques common to many of the sub-sectors within the food and drink industry.

For example, separation by distillation is the main area of energy consumption in the whisky industry. It is also often used to convert waste products into saleable by-products.

There are a number of general energy saving opportunities to consider with these techniques.

Check that equipment is well insulated and maintained

Regularly check for damaged, missing or wet insulation indicating unnecessary loss of energy. Distilling, drying and separation equipment is often susceptible to these kinds of problems. Repair insulation promptly.

Investigate whether waste heat from separation equipment could be used elsewhere on the site

All of these processes generate waste heat. Consider where waste heat can be recovered and reused elsewhere on-site, for example, as space heating in a warehouse or workshop.

In addition, more specific actions for distillation and drying are below.

Distillation

Regularly check and record product yield against energy use

Use this data to identify anomalies in energy use that may suggest that the system is working inefficiently. Contact an equipment supplier if energy use rises above the expected parameters.

Consider an alternative process or operating regime such as reduced pressure distillation

Reduced pressure distillation allows separation to be carried out at lower temperatures, also reducing the heat load. A supplier or a distillation consultant will be able to advise on the suitability of alternative designs and operation regimes. Reduced pressure distillation is a process which could generate energy savings within whisky distilleries.

Drying

Consider using less water in the initial product mixture

Drying is widely used in the food and drink industry to remove water from the product mixture. If less water can be used in the initial mixture, then the process will require less energy for drying. Check how much water is actually needed in a process.

Investigate mechanical water removal Water can often be removed by mechanical means earlier in the process, resulting in the use of less energy for drying. The suitability of mechanical extraction is dependent on the water content of the mixture and therefore it is advisable to contact the product's quality manager for further guidance.

A range of mechanical filtration techniques are possible such as micro and ultra filtration, and centrifugation. For example, these techniques are used in soft cheese making to separate out the liquid milk or whey, or to separate out water in the milk-drying process.

Energy management

For a business to be energy efficient, its processes need to be monitored and managed effectively. To achieve this, it is essential to have an energy management policy that demonstrates both a strategic approach and commitment from the top of the business.

Good housekeeping

It is important that management and employees are aware of the benefits that energy efficiency can bring to a site. Ensure that the whole workforce is involved and committed to an energy efficiency programme. Remind everyone that effective energy management means:

- Cost savings.
- Healthier and more productive working conditions.
- An enhanced corporate image that can be promoted to both customers and suppliers.

Take responsibility and show commitment

Commitment to energy efficiency needs to come from senior managers who should agree and implement an energy policy. The policy should clearly identify the formal roles and responsibilities of the management team. Make one person responsible for implementing energy saving initiatives and allocate enough resources, in terms of time and money, to the role.

Have an action plan and implement it

Devise an action plan that lists the improvements that need to be made, when they will be made and who will be responsible for making them. Prioritise improvements according to the potential energy savings and the time taken to recoup the cost (payback period). This guide will help to identify energy saving opportunities. The Action Plan Tool on the Carbon Trust website will also be a helpful starting point.

Conduct a walk-round

Review energy use and procedures regularly by carrying out a walk-round. Use a checklist to identify new sources of waste energy or new ways of saving energy. It is often useful to do this at different times of the day. Feed the results into the action plan.

Set targets

Setting realistic targets for energy savings will help to keep the momentum going and to maintain employee awareness and interest. Set deadlines for the completion of each improvement detailed on the action plan and check to ensure that each has been completed.

Most businesses in the UK could reduce their energy consumption by 10-40%. However, it is important to be realistic: many companies start with savings of 5% per year.

For further advice please download the following publications:

[Introduction to energy management \(CTV045\).](#)

[Energy management guide \(CTG054\).](#)

[Energy surveys \(CTG055\).](#)

Monitor and understand energy consumption

Monitor energy consumption by reviewing the bills received over the last year to build a picture of the business' monthly energy performance.

More detailed analysis is possible with half-hourly metering. Larger sites will often have meters recording half-hourly electricity consumption and this data should be available from the energy supplier. With this type of information it is possible to see where energy is being used through the day. It is also advisable to check and record monthly gas consumption in the same way.

As well as being a check on how the business is performing, energy use data can be useful when compared with production or output levels. A graph can be plotted to compare energy consumption against production or output, such as the one shown here.

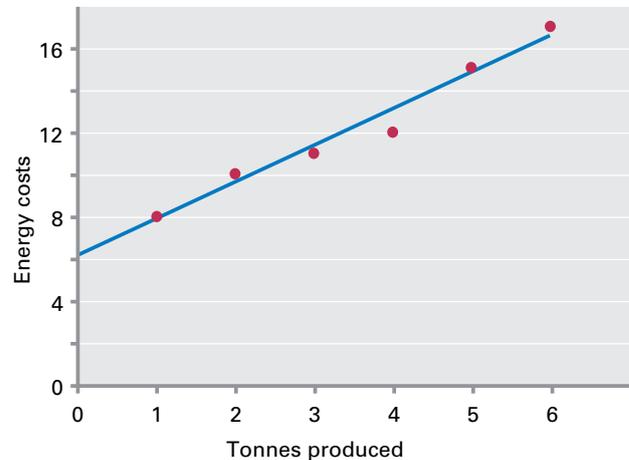
This graph demonstrates that even when production levels are at zero, there are still energy costs incurred. To reduce these costs check that machinery is switched off when not required and that lighting and heating are only used as and when necessary.

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.

Figure 1 Production related energy use.



The slope of the graph shows production-related energy use. Try to reduce the slope of this graph by using equipment more effectively – this is particularly relevant to industrial sectors such as the food and drink industry. As energy saving measures in this guide are implemented there should be a reduction in both the gradient and the intercept on the energy cost axis.

Comparing energy use and performance data month on month, year on year can also show where energy saving measures have had an impact.

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

Next steps

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

- **Step 1.** Understand your energy use

Look at your operations 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 your opportunities

Compile an energy checklist. Walk round your building and complete the checklist at different times of day (including after hours) to identify where energy savings can be made. An example checklist can be found in the Carbon Trust's publication [Assessing the energy use at your industrial site \(CTL172\)](#).

- **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.

- **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 your 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 business for energy efficiency

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

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.

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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.

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