

Energy Saving Fact Sheet | **Air conditioning**



Making business sense
of climate change

Get your air conditioning into better shape

Everyone wants air conditioning. But don't let your existing system, or one that you're considering installing, burn a hole in your pocket. This practical fact sheet looks at the different types of system to show how you can reduce your energy use and save money.

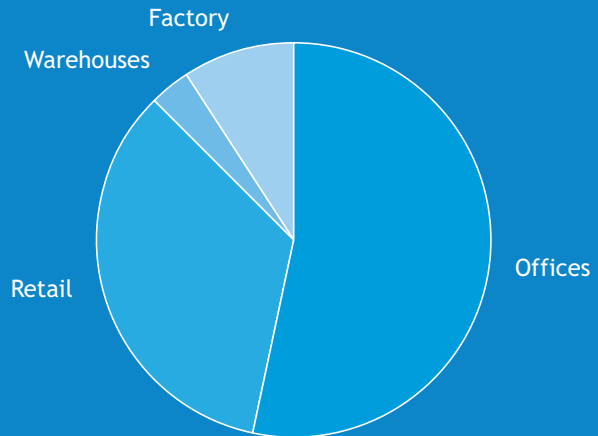
Energy wasting hot spots

Want to know how you can save energy? On the following pages you'll find simple actions that you can take to reduce your energy use. For many more helpful hints, simply call the Carbon Trust on 0800 085 2005.

fact:

Worryingly, air conditioning can double your energy bill – without providing the staff comfort for which it's intended.

Sectors of UK business with the highest air conditioning installations (by floor area)



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Localised systems

Sometimes called packaged, split or cassette air conditioning systems, these are generally retro-fitted in response to local overheating and consist of indoor and outdoor elements.

- ▶ **Think twice.** If a space is overheating, you may be considering air conditioning. But is it really necessary? Staff in hot, uncomfortable offices are often keen to have air conditioning; however, there may be other options.
- ▶ **Cool off.** Limit the time that equipment is on and use 'power-down' facilities on copiers, faxes, printers and computers. Switch lighting off if there's sufficient daylight and use as little as possible at night. Direct sunlight away from workstations with blinds and keep them down overnight in areas exposed to evening sun.

If you have reduced heat gains and still need air conditioning, consider the following:

- ▶ **Buy to minimise.** Ask suppliers for running-cost information; if units also provide heating, ensure they have separate temperature controls.
- ▶ **Control it.** Keep operation to a minimum by adjusting the time and temperature controls. If the system also provides heating, 'synchronise' all the temperature settings to prevent different units heating and cooling in the same space.
- ▶ **Maintain it.** Thorough and regular maintenance and cleaning will help keep your localised system at peak efficiency.
- ▶ **Don't overwork it.** Keep windows and doors shut when units are operating. If you open windows in a space you are cooling, the unit will try to cool down the outside air!

Some home truths about air conditioning

Air conditioning in business is growing, due mainly to the increasing use of IT equipment and a higher concentration of staff. Both these factors significantly raise the 'heat gain' in offices and other spaces.

This heat gain has to be removed — at a cost — to provide adequate comfort. You'll notice from the rest of this fact sheet that using air conditioning exclusively isn't always the most effective answer. Careful design and operation can dramatically reduce the additional expense.

Here are two 'myths' about air conditioning to illustrate the point:

Myth 1: Turning air conditioning thermostats down cools the building more quickly.

Result: The temperature drops at the same rate, but then overshoots and reaches the heating system switch on temperature. Both systems then operate at the same time.

Remedy: Set thermostats correctly and, where possible, protect them to prevent tampering.

Myth 2: Leaving air conditioning on overnight reduces energy costs as the system stays at the required temperature.

Result: Much higher energy consumption than necessary.

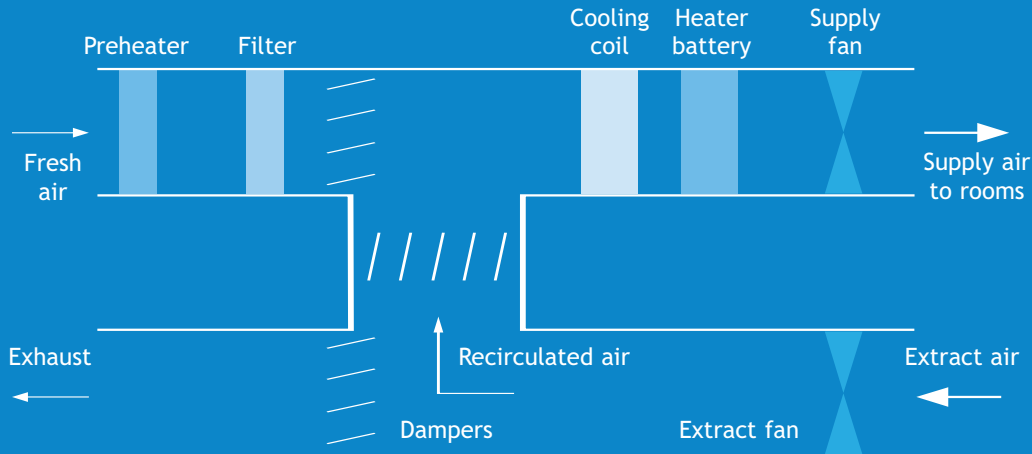
Remedy: The building only needs a fraction of overnight energy to reach adequate temperatures for the start of the day. It may not need air conditioning at the beginning of the day at all if 'night cooling' is used.

Centralised systems

Often built into the structure of a new or refurbished building, these have air ducts or a chilled water network, or a combination of both. You can contain costs with some straightforward measures:

- ▶ **Match and minimise.** Meet comfort and process requirements, but keep operation to a minimum by checking time and temperature controls.
- ▶ **Maintain it.** Make sure maintenance contracts include filters, fans and refrigeration equipment. Filters should be replaced in accordance with manufacturer's guidance. Blocked filters can prevent cooled air reaching the workspace at all.
- ▶ **Stay safe.** Heat exchangers and cooling tower water treatment processes should be spotless. This saves energy and prevents health problems.
- ▶ **Not too dry.** You can often achieve comfort without controlling humidity. This is very energy-intensive and can produce large savings if eliminated. Of course, some processes do require control. If this applies in your business, keep the minimum and maximum acceptable humidity levels (the control band) as far apart as possible to reduce usage.
- ▶ **Don't encourage failure.** Make sure dampers move freely and are not permanently set to full fresh air or full recirculation. This could lead to premature system failure.

Know your air conditioning system



Here's how a typical air conditioning system works. It's useful to understand the process and be aware of the components, so that you can see where energy savings can be made.

Fresh air enters through dedicated openings in the building fabric. If it is very cold, the air is preheated to protect the rest of the system from frost damage.

Air then passes through filters that safeguard the system and the building's occupants from

a build-up of dust, dirt and pollutants. Depending on the internal demand, heating or cooling takes place and fans move the 'treated' air through ducts to where it's needed.

Separate ducts draw exhaust air from these areas to the extract system. Dampers within the system restrict or redirect the air flow. They can also control the proportion of fresh and recirculated air. To reduce heating or cooling, some exhaust air can be redirected into the incoming air stream.

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Control algorithms

Tell your air conditioning how to operate with the minimum energy. Use the following logic, based on outside air temperatures:

- ▶ **<10°C.** System dampers allow minimum fresh air into the building. Heating is provided if the recirculated air temperature drops below the heating threshold.
- ▶ **12-22°C.** Heating supply reduced. As the building reaches a desirable temperature, the system dampers open to maximise free cooling using outside air. The system provides any additional cooling required.
- ▶ **>24°C.** External air temperature is warmer than exhaust air. Dampers reset to minimum fresh air. The system then only cools the minimum amount of warm fresh air.

Improving component efficiency

There are several ways to make all parts of the system operate better:

- ▶ **Preheat – set to low.** Make sure the preheater does not operate when external temperatures are above 5°C.
- ▶ **Don't heat and cool.** Heating and cooling shouldn't occur at the same time, except when you need precise humidity control. Find out how these elements are controlled and make a note of the control settings.
- ▶ **Give them a rest.** Check that supply and extract fans aren't operating out of hours unless the building is 'night cooling'.

Take action!

Start saving energy today

1. **Find out what's going on.** Walk around your site at different times of the day and during different seasons to see how and when heaters and coolers are working.
2. **Check temperatures and times.** Ask staff whether they are comfortable and how they control the heating and cooling. Compare this with how your facilities or maintenance engineers think the systems are controlled.
3. **Take advantage of free cooling.** Where external temperatures are colder than the required internal temperature, you can simply ventilate the building with fresh air. 'Night cooling' is especially valuable for cooling the building efficiently in summer.
4. **Set higher switch-on temperatures.** Set a gap or 'dead band' between heating and air conditioning control temperatures of about 4°C. This improves staff comfort, cuts operating costs and reduces wear and tear on both systems.
5. **Get more help.** The Carbon Trust can give you further guidance and support – whether on overcoming overheating problems, running air-conditioning systems or improving energy use throughout your company.

Call the Carbon Trust today for your FREE Energy Awareness Pack.

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General housekeeping – top tips

Air conditioning is more expensive and damaging to the environment than heating. Raising staff awareness can dramatically improve energy use.

- ▶ **Check operating times.** Ideally set timers so that there is no cooling when the building is unoccupied. When using 'night cooling', only operate ventilation fans and control temperatures to prevent overcooling. Time-control each unit in localised cooling systems to avoid out-of-hours operation.
- ▶ **Check temperature settings.** Find out the temperature at which your air conditioning switches on and your heating system switches off. The greater the temperature gap the better. Check and compare temperature settings for each unit in localised air conditioning systems: it's quite common to see one unit heating and another cooling in the same space.
- ▶ **Keep everything fresh.** Clean ductwork, fans and grilles regularly, and ensure furniture doesn't obstruct air pathways – any blockage can increase energy consumption and maintenance costs.



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The Carbon Trust helps businesses and public sector organisations cut their energy costs to combat climate change through the provision of free, professional advice and assistance.

Want to find out more?

Below are some useful energy saving guides available at www.carbontrust.co.uk/energy or by contacting the Carbon Trust on 0800 085 2005.

GPG118 Managing energy use – minimising running costs of office equipment and related air conditioning

GPG290 Ventilation and cooling options appraisal – a client's guide

GIL130 Ventilation factsheet

We've got many more tips on air conditioning that will help you save energy and money. So give the Carbon Trust a call today.

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