

Energy Saving Fact Sheet | **Ventilation**



Making business sense
of climate change

Energy-efficient ventilation can be a breath of fresh air

You need effective ventilation to help your business stay productive and safe – whether it’s providing ‘fresh’ air for staff and visitors, controlling indoor temperatures or removing fumes, smoke or dust. However many businesses have excessive ventilation – so optimising yours is better for your staff and your costs.

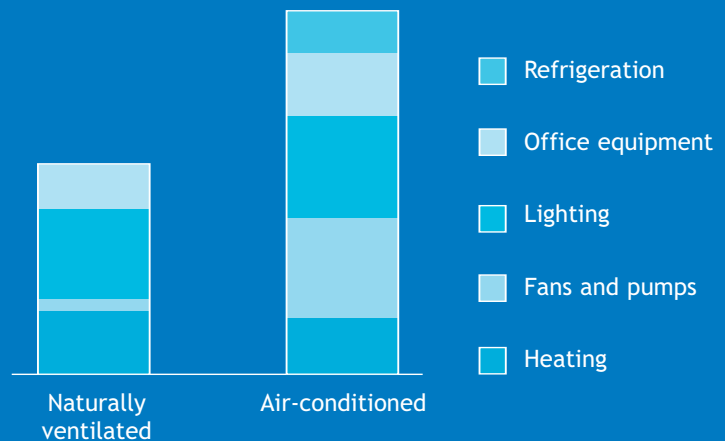
Energy wasting hot spots

Want to know where you can start saving energy? This useful chart gives you a good idea of the cost to your business of the different heat sources in your building. For many more helpful hints, simply call the Carbon Trust Energy Helpline.

Fact!

To save money and increase comfort, it’s better to reduce the amount of heat produced in an area than raise ventilation rates.

Relative energy costs for sources of heat in the average commercial building



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Natural ventilation

A major reason for providing ventilation is to remove unwanted heat from a space. Reducing unnecessary heat gains can make natural ventilation even more effective. Here's how:

- **Shut it out.** When it's hotter outside than in, close windows and doors. Use blinds to block direct sunlight entering a space. Keep them down overnight in areas where sunshine continues to enter throughout the evening. Redirecting sunlight onto the ceiling can still provide enough daylight to avoid the use of electric lighting.
- **Turn it off.** Electrical equipment and lights produce heat as an unwanted by-product. Simply turning off unnecessary equipment during the day and out of hours produces less heat.

Use your building's features

Exploit the construction of your building to increase the effectiveness of natural ventilation:

- **Find an opening.** Natural ventilation relies on natural air flow between openings on opposite sides of a room or building – or rising hot air being replaced with cooler air, sucked in through windows or vents.
- **Let the building take the strain.** Cool down your building at night by keeping windows open – using secure openings; expose walls and floors so that they can absorb daytime heat.
- **Stay in control.** Make sure that your building isn't draughty. Installing draught stripping where necessary around windows, doors and skirtings will help you manage ventilation rates.

Why it's important to keep ventilation low

It's a simple fact. Providing more ventilation than is really required increases costs.

There are two reasons. First, internal 'conditioned' (heated or cooled) air that's removed from a building has to be replaced with the same amount of air from outside. This also needs to be heated or cooled to match the temperature of the building. Second, moving air around mechanically, using fans, uses electricity.

If you are thinking of installing cooling equipment to help you overcome an overheating problem it is a good idea to identify where the excess heat is coming from. You may be able to reduce this to acceptable levels without going to the expense of installing and running equipment. Or reduce the problem to a level which requires a smaller cooling system. Check out the section on natural ventilation for tips on how to do this.

Do note: buildings deeper than 12 metres from wall to wall may need mechanical ventilation. This also applies to buildings with large numbers of people and equipment (including open-plan offices), and those in noisy or polluted locations, such as in many inner-city areas.

Mechanical ventilation

You can cut costs on operating mechanical ventilation systems, however simple or sophisticated:

- **Treat sensibly.** If you have pre-heaters, don't allow them to operate when external temperatures are above 5°C, and ensure that heating and cooling can't occur together.
- **Keep the system clean.** Adhere to manufacturer guidance on replacing and cleaning filters, and make sure dampers can move freely.
- **Give it a rest.** Dampers permanently set to full fresh air or re-circulation can cause premature system failure. Supply and extract fans should not operate out of hours unless the building is 'night cooling'.
- **Reduce the flow.** Lower the ventilation rate to match demand and you'll heat or cool less air.

Maintenance

You can minimise your ventilation system's energy consumption by maintaining it properly:

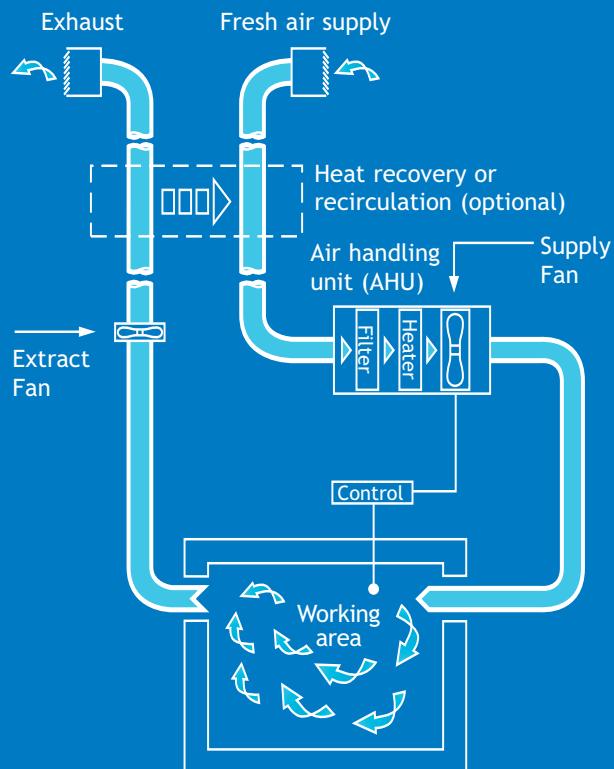
- **Keep things sweet.** Make sure you pay particular attention to damper and valve actuators, fan bearings, control sensors and drive belts. Keep filters clean and replace them when necessary.
- **Don't forget: reset.** You'd be surprised how many systems are running on the wrong settings because an engineer has made a short-term adjustment. The answer: remove temporary overrides and you'll immediately save energy.
- **Don't be afraid to ask.** If you are concerned that your system isn't operating correctly, or if staff complain about draughts from ventilation fans, talk to your maintenance engineer.

Know your ventilation system

Here's how a typical ventilation 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 is drawn in through dedicated openings in the wall or roof. It passes through filters that remove pollutants and is then heated (or, in some cases, cooled). Fans then move this air through ducts to the required working areas.

Separate grilles and ductwork remove stale air from this space and return it to the outside. A number of systems recover some of the heat in the exhaust air to preheat incoming fresh air.



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Recover energy

It's possible to reduce the cost of conditioning incoming air by recovering some energy from warm (or cool) exhaust air to pre-treat incoming fresh air:

- **Re-circulate it.** Partial recirculation is cost-effective if you are heating the air and exhaust air is warmer than incoming fresh air, or cooling and the exhaust is cooler than fresh air. It is only possible if the exhaust air is not contaminated with odours or moisture. Make sure enough fresh air is provided though to meet staff comfort.
- **Other systems.** All other heat recovery systems require specialist equipment and lead to increased fan energy use and maintenance costs which need to be considered when assessing the savings you will make.
- **Ask a specialist.** Get expert guidance before investing in a new or upgraded system.

Control ventilation

Savings can be made by matching flow rates to demand, and controlling operating times. A number of options are available to increase the ventilation rates:

- **CO₂ Sensors.** Levels of CO₂ are monitored and ventilation rates increase as CO₂ levels rise. These are particularly effective in leisure buildings and rooms with varying occupancy e.g. meeting rooms.
- **Temperature.** As temperatures rise inside, ventilation rates should increase which, if the external air is cooler, allows the building to access 'free cooling' as well as increased ventilation.
- **Humidity.** Humidistat controls increase ventilation rates when internal humidity levels rise. Effective in swimming pool areas where increased humidity could lead to condensation.

Take action!

Start saving energy today

Whatever the scale of your system, the principles of reducing ventilation energy costs are essentially the same:

1. **Reduce the need.** Turn unnecessary equipment off during the day, and especially out of hours, to reduce heat build-up in the space.
2. **Take control.** Make your building more airtight to eliminate unwanted air infiltration as this can cause uncomfortable draughts in winter and increase heat gains in summer.
3. **Switch off.** Turn ventilation systems off out of hours, unless the building is 'night-cooling'. Consider installing automatic controls to ensure equipment stays off.
4. **Use dedicated ventilation systems.** Locate specific process plant in a special area so you can use fresh untreated air to ventilate the space. This prevents heated or cooled air being drawn from occupied spaces.
5. **Get more help.** The Carbon Trust has free publications and advice to help manage your ventilation system or any other energy-using equipment in your business.

Call our Helpline for your FREE Energy Awareness pack.

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System changes

With a certain level of investment, you can make further energy savings.

- **Close down.** Fit self-closing shutters to through-the-wall extraction fans. Fit back-draught dampers into air ducts to prevent air flow into the building when the equipment is off. Check regularly that shutters and dampers close when fans are not operating, move readily and are clean. Replace damaged shutters and dampers.
- **Vary the flow.** Ventilation rates may not need to be constant throughout the day, especially if building occupation varies during operating hours. Consider installing variable-speed fans controlled by levels of CO₂ or process pollutants; as the need for ventilation increases, fan speeds increase and more air is brought in. Savings are possible with lower fan speeds as less air requires heating or cooling, and the fans consume less energy. Halve the speed of a variable speed fan and you can reduce its energy consumption to an eighth.



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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?

There are useful energy-saving guides at www.carbontrust.co.uk/energy and through our Helpline – 0800 58 57 94.

GPG237 *Natural ventilation in non-domestic buildings – a guide for designers, developers and owners*

GPG257 *Energy-efficient mechanical ventilation systems*

GPG290 *Ventilation and cooling option appraisal – a client's guide*

We've got many more tips on ventilation that will help you save energy and money. So give our Helpline a call today.

Helpline 0800 58 57 94 www.thecarbontrust.co.uk/energy

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