



Presented by



## Fact Sheet #6

# Air Conditioning

In this fact sheet you will discover:

- *The opportunity for energy efficiency*
- *How air conditioning works*
- *Low cost actions to reduce energy usage now*
- *Investments to reduce costs over the longer-term*



# The air conditioning opportunity

Air Conditioning or more broadly, *Heating, Ventilation and Air Conditioning* (HVAC) presents a sizeable opportunity for improved energy efficiency.

- It accounts for about 40% of the energy consumption in most businesses (although this figure varies significantly between businesses).
- It accounts for about 70% of building owner's (common area) energy bills.
- It is the key contributor to peak demand charges (see Fact Sheet #2).

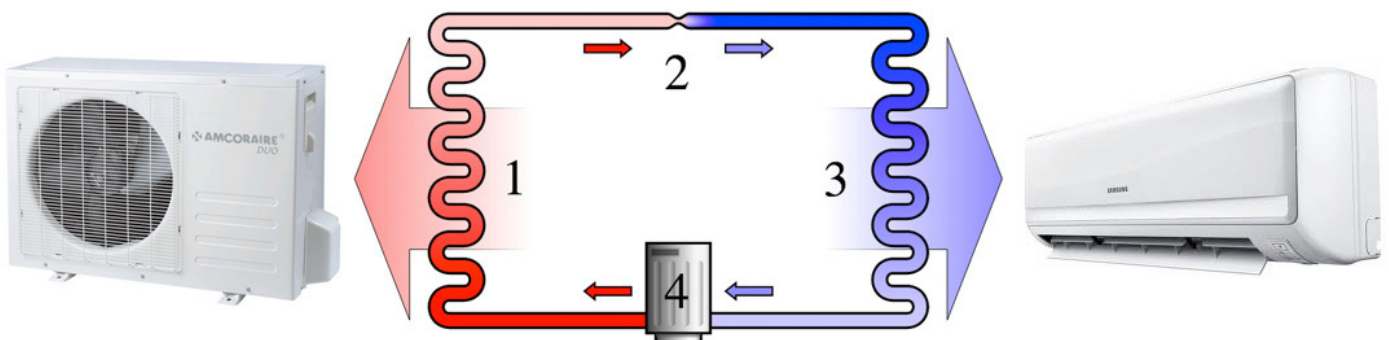
It estimated that non-residential HVAC systems in Australia create more than **55 per cent of electrical peak demand** in commercial business district (CBD) buildings.

Source: Department of Resources, Energy and Tourism [www.ee.ret.gov.au](http://www.ee.ret.gov.au)

## How air conditioning works

The following is a brief description of how air conditioning 'heat pump' systems work. The process can also be reversed to heat indoors in 'reverse cycle' systems:

1. **Condenser** - A refrigerant gas is pumped through a condenser outside. Heat is ejected and the refrigerant cools down and turns into a liquid.
2. **Expansion Valve** - The refrigerant then flows through an expansion valve that lowers its pressure and temperature.
3. **Evaporator** - A fan draws indoor air over the cold refrigerant, which cools the air.
4. **Compressor** - The evaporated refrigerant flows into a compressor, which compresses it into a high-pressure, high temperature gas.



# Low cost actions

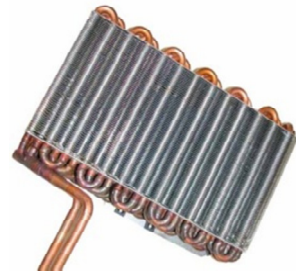
## 1. Keep systems clean and well maintained

The following simple actions will help to keep your air conditioning system running efficiently and should be completed at least once per year:

- Remove and clean the internal air filters,
- Keep the external unit clean and free of debris,
- In ducted systems, if accessible, check for gaps and leaks in the duct-work.

An air conditioning contractor should conduct more involved maintenance work, including:

- Keeping fans and coils clean (both internal and external units)
- Maintenance of refrigerant levels
- Checking compressor performance
- Ensuring pipe-work and duct-work is appropriately insulated



## 2. Reduce the amount of heat created indoors

All electrical equipment generates heat, which works against air conditioners when they are cooling. For example, leaving a computer on overnight will generate about 1 kWh of heat, causing the air conditioner to run for a little longer in the morning.

Switching off any unused equipment will save on cooling costs, as will relocating office equipment, refrigerators, vending machines, water coolers etc to rooms that are naturally cooled.

## 3. Adjust the thermostat setting

Every one-degree change in the air conditioner's set point will affect energy consumption by about 10%. To reduce energy costs the set-point temperature should be increased when cooling (summer) and decreased when heating (winter). Settings should be maintained around 24°C when cooling and around 20°C when heating.



## 4. Use fans to reduce costs

A fan uses about 50 Watts whereas an air conditioning system for a small shop will use around 5,000 Watts. When the weather is mild, consider ceiling or portable fans instead of the air conditioner.



Fans can also be used while the air conditioner is operating. They can help improve circulation of the cooled air, which will allow you to raise the thermostat setting without reducing the comfort levels of staff or customers.

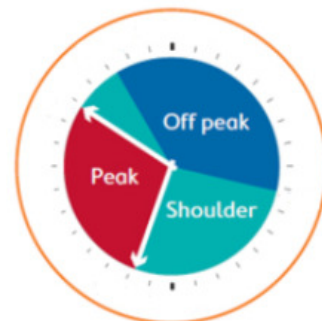
## 5. Switch off in low usage areas

Switch off air conditioning systems in low-usage areas or reduce airflow to these areas by installing zone switches or by closing the air vents (if ducted).

Timer switches can also be used to reduce consumption. For example, an air conditioner could be programmed to switch off at 5pm when people start to leave, rather than 6pm when the last person leaves.

## 6. Avoid peak demand times

Refer to Fact Sheet #2 on energy bills to see if your business pays 'peak demand' charges or a higher tariff during certain times of the day. If your business is subject to these charges it makes sense to minimise air conditioning usage during these times.



## 7. Minimise air leakage

Air leakage is a significant contributing factor to air conditioning usage and running costs. Seal off any air gaps to outside with door seals and weather stripping. Ensure that external or automatic doors are used in such a way to minimise the amount of time they are left open. If an external door must be left open, consider using an 'air curtain' to exclude outside air.

## More Ways to Save

### 8. Control direct sunlight

Every square metre of direct sunlight that enters your building can add up to 1,000 Watts of additional heat load. This can cause internal areas to over heat and air conditioning systems to work much harder than necessary.



Install window tinting or external shading (such as louvers or trees) to block out direct sunlight. Solar tinting film and external shading can reduce heat gain through windows by up to 80%, which will reduce the need for air conditioning.

### 9. Insulate roofs, walls, floors and ducts

Insulation will reduce heat gain in summer and heat loss in winter, which will reduce the need for heating and cooling systems. Insulation around ducts will minimise heat leakage.

### 10. Choose an efficient system when upgrading

The energy star rating system now applies to most air conditioning systems ([www.energyrating.gov.au](http://www.energyrating.gov.au)). As a rule of thumb, inverter-style systems will use less energy as they respond more efficiently to temperature changes than regular models.

### 11. Recover waste heat

Heat recovered from process equipment like oven flues, hot water systems, and exhausts can be re-used to heat offices and work areas where appropriate.

### 12. Seek professional advice

An energy audit can determine which of the ideas outlined above (and others) are suitable for your business. An energy audit report should clearly indicate which actions would be the most profitable for your business.