be energy smart

Heating and Cooling

Choosing energy efficient heating and cooling appliances will help reduce your energy costs and related greenhouse gas emissions

Your combined household heating and cooling energy use may well contribute over 25% of your yearly energy use.

Whilst heating and cooling your home can therefore be expensive, with appropriate passive energy efficiency actions and selection and use of energy efficient appliances you will be surprised how much you can save.

In general, your choice of heating appliances should be a greater priority than cooling appliances.

For most South Australians the need for heating can cover up to six months eg April - September. In some years even longer. The need for cooling may be as little as 10 to 15 days a year.

Consider your heating and cooling needs together, as the most efficient and effective use needs to be evaluated at the same time.

As your likely priority is the choice of heating appliances it makes sense to also consider complementary energy efficient cooling appliances at the same time.

Your overall choices can then be influenced by comfort, availability of fuel sources, initial capital cost, and ongoing running & maintenance costs.

Before you look to make decisions on the most appropriate heating and cooling appliances consider carefully the energy efficiency of your home and where possible implement changes.

A home which incorporates passive energy efficiency design and actions will minimise the need, and use of heating and cooling appliances.

This will,

- reduce the need for expensive heating & cooling ducted systems,
- reduce appliance running costs, and
- reduce energy related greenhouse gas emissions

Some key passive energy efficiency actions are:

Insulation

Insulation is the material that is used to reduce the rate of heat transfer through external surfaces in the home.

Basically, when you insulate your home you are wrapping it in a “protective blanket” which in winter reduces the rate at which heat is lost from your home, and in summer the rate at which heat enters your home.

The level or performance of an insulation product is measured by its Thermal Resistance or “R-value”. This is a measurement of the materials resistance to heat transfer. The greater the R-value the more effective is the insulation at resisting conducted heat flow out of your home during winter, and into it during summer.

The recommended R-value for a home on the Adelaide plains is R3.0 in the ceiling and R1.5 in walls. Please check our Insulation brochure for recommended R-values in other areas of South Australia.

Zoning

Zoning refers to the physical division of a house into smaller areas. This can be achieved by doors that can be closed between rooms. Lower energy use heating and cooling appliances are required to heat and cool an area rather than the entire home.

Draught Proofing

Draughts can account for up to 25% of heating and cooling losses. Particular attention should be paid to draught proofing doors and windows, sealing up cracks, gaps and unused fireplaces. Satisfactory draught proofing will also reduce the rate at which

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the outside temperature penetrates into your home, meaning thermostats can be adjusted to be more energy efficient without any loss in comfort.

Shading

Shading your windows with outside blinds or trees on the eastern, northern and western aspects of your home will reduce your need for cooling.

Every square metre of unshaded glass can let in as much radiant heat as a single bar electric radiator ie around 1000 Watts.

If you can provide external shading, this heat will not enter and your home will remain significantly more comfortable.

Energy Rating Labels

Where heating and cooling appliances have Energy Rating labels the more stars the more energy efficient is the appliance.

And remember, it's quite possible that the more expensive appliance to buy could turn out to be cheaper in the long term, once lower running costs are considered.

Types of Heaters

There are two main ways to heat - radiant and convection heating.

Radiant heaters use infrared radiation to create a region of comfort in front of the heater.

People within this beam can feel comfortable even if the air is cold or there are draughts.

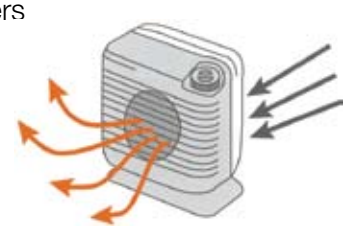
Radiant heaters do not heat the air directly, rather they heat a person or object in the beam's path.

Some radiant heaters have a visible source of heat that glows bright red, producing short wave infrared radiation that is intense and can be focused into a beam using a reflector.

Radiant heaters are best used for heating poorly insulated or draughty buildings which have high ceilings, particularly where there is a large area and only a few people at fixed locations.

Convection heaters directly heat the air. Cool air enters the bottom of the heater, is heated, and rises out of the top of the heater.

The heated air tends to rise up to ceiling level, so natural convection heaters will heat a room slowly from the top down, unless a ceiling fan is used to circulate the room air.



Types of convection heaters include natural convection heaters such as panel heaters, oil-filled column heaters and some slow combustion stoves; and fan forced convection heaters such as fan heaters, gas space heaters, reverse cycle air conditioners, and slow combustion (convection) heaters. Many types of convection heaters can be controlled by a thermostat.

Fan forced convection heaters blow warm air out of the bottom of the heater. These are generally more effective, as they deliver the heated air at floor level where it is most useful.

Convection heaters are best used for heating well insulated rooms or open plan areas which are not draughty, have relatively low ceilings, and where people are moving about or fairly evenly distributed throughout an area.

Note: Some heaters combine the effects of radiant and convection heating. Hydronic radiator panels, wood heaters, storage fan heaters and many gas heaters function in this way.

Types of Heating Systems

Portable Heaters

Generally small heaters are designed either as people heaters (ie radiators) or to heat relatively small rooms. Includes portable bar radiators, fan heaters, oil-filled column heaters and radiant heating panels.

Best used for short periods where intermittent heat is required, or as people heaters where heating a large area would be expensive.

Space Heaters

Designed to heat larger rooms or open plan areas. Includes fixed electric fan heaters eg heat banks/

storage heaters, reverse cycle air conditioners, flued and unflued gas heaters, ceiling radiant heating, in-floor heating, and slow combustion wood heating.

Using a combination of space and portable heaters can give more flexibility than central (ducted) heating, allowing you the opportunity to heat the smallest necessary area.

Ducted Heating

Ducted heating systems can heat large areas of your home, or even the whole of the house. Central heating can be either ducted reverse cycle or gas systems.

Dividing your home into at least two zones - a day zone and a night zone - is recommended, as this reduces the size of the heating system you need to install, and can significantly reduce running costs.

Home	Heater output required per m^2 of floor area		
Uninsulated home	130 watts	or	0.47MJ/h
Insulated ceiling only	100 watts	or	0.36 MJ/h
Insulated ceiling and walls	80 watts	or	0.29 MJ/h
Energy-efficient home	60 watts	or	0.22 MJ/h

Figures are a guideline only and based on rooms with 2.4m ceilings. Your heating retailer will be able to size heaters for your particular situation. The heater output required may differ from the input power needed, depending upon the heater's efficiency.

Types of Cooling Systems

There are three main types of cooling systems:

Fans, evaporative coolers and refrigerative air conditioners.

Fans

Fans are cheapest to buy and run. They do not cool the air but create air movement, evaporating moisture from your skin and carrying heat away from your body.

Ceiling fans are now very popular in South Australian homes as they can circulate large volumes of air gently. The good news is the majority of these fans cost less than a 100 watt light bulb to operate (around 2 cent/hr).

Single ceiling fans are suitable for room sizes ranging from 10m^2 up to 30m^2. A number of ceiling fans can be used for larger rooms.

Evaporative Coolers

Evaporative coolers draw hot outside air through wet filter pads, evaporating some of the moisture, cooling the air and increasing its humidity, and washing out dust and pollen. The cooled air is blown into the house and passes out open windows and doors, creating comfort conditions by cooling the air and by creating air movement. It is important to remember that adequate openings must be provided so that the cooled air passes freely through the house.

Evaporative air conditioners produce a cooling breeze rather than the refrigerative coldness of reverse cycle air conditioners.

This type of air conditioning is particularly well suited to South Australian homes because of our relatively dry climate. The outside air will be cooled by around 10°C to 13°C and the running costs are generally significantly less than for refrigerative air conditioners.

The amount of water your evaporative cooler will use depends on a number of factors including the size of the system, how it is used, the temperature and the humidity. A 140m^2 house in South Australia will probably consume around 50-60 litres per hour in 35% humidity.

During periods of high humidity, the water can be turned off and the unit used as a large fan circulating air throughout the home.

Refrigerative Air Conditioners

Refrigerative air conditioners remove heat from the room, and cool the air to achieve a set temperature - we suggest around 25°C. A reverse cycle air conditioner uses the refrigerative principle to produce cooling. It is called reverse cycle (or Heat Pump) because it can also produce energy efficient heat.

Portable systems are generally small units with separate indoor and outdoor sections connected by flexible hoses or ducts through open windows. These units can be used from room to room and plugged into a standard power outlet.

Window/Wall Units are single box type units mounted through external walls or windows. Small units can be plugged into standard power outlets, larger units may need to be `wired-in'.

Split System air conditioners are units where the compressor is located outside and a console unit mounted internally. Split systems are available as:

- ducted systems (for central heating/cooling) or
- as multi-split systems for heating/cooling several rooms.
- single split systems for heating/cooling only one room.

If you choose a whole home ducted system, from a running cost perspective we recommend you choose a system that can be zoned.

Inverters

Conventional air conditioners operate their compressors at a fixed speed and therefore deliver a fixed amount of cooling power.

As a result the compressor must continually stop and start to maintain the desired room temperature.

Inverter driven air conditioners, on the other hand, vary the speed of the compressors, delivering cooling power at a rate proportional to what is required.

The result is a system that runs all the time, but at a reduced rate of energy consumption.

Overall, inverter technology may result in some energy savings when compared to similar size and energy rated fixed-speed compressor systems.

Running Costs

Evaporative coolers have an energy efficiency ratio of around 10.0, decreasing as humidity increases, whilst refrigerative air conditioning, when cooling, has an energy efficiency ratio of around 2.5.

As such evaporative cooling running costs are generally significantly less than for refrigerative air conditioners seeking to cool the same area.

For further energy advice:

www.dtei.sa.gov.au/energy

8204 1888 or
1800 671 907 Freecall™ for country callers

energy.sa@saugov.sa.gov.au

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