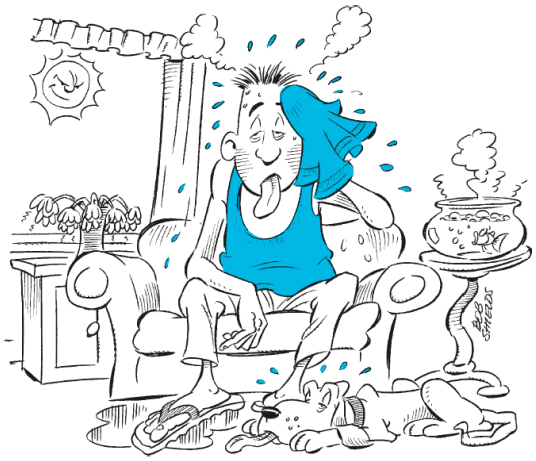
CHOOSING A COOLING SYSTEM

FACT: A well designed home has no need for air conditioning

If your home is hot in summer there are many things that you can do to cool it down without resorting to an energy-consuming cooling system. Some alternatives include: installing adequate insulation, appropriate shading, using a pedestal or ceiling fan, landscaping and stopping draughts. These changes can be made to existing homes, and need to be considered in the planning of a new house or extension. Not only will these changes make your home cooler in summer and warmer in winter, they will also save you money on your energy bills. For more information talk to us and/or see our Fact Sheet "Tips for Staying Cool".



If after making these changes your house is still hot, you may need to install a a cooling system.

Fans, Evaporative or Refrigerative?

There is a close relationship between the level of cooling comfort and the cost of setting up and running cooling appliances Ranging from the cheap and reasonably effective fans, up to the very effective but also very expensive refrigerative cooling systems such as air-conditioners.

Fans

Ceiling, pedestal and desktop fans cool by moving air past your skin, which increases the evaporation rate of water from your skin's surface, cooling your body. Research has shown that the moving air generated by fans can lower the apparent temperature (the temperature feels like, not the actual air temperature) of a room by up to 4°C. In most Canberra homes, that is sufficient to feel comfortable most of the time. Ceiling fans typically use 50W - 100W, and pedestal/desktop fans up to 60W, so they can be very cheap to run.

Ceiling exhaust fans can be used in conjunction with open windows/doors to draw cool night air into the house where the house design or outside breeze does not naturally do that for your house. Note that such fans should be fitted with draft-stopping devices so that they do not become chimneys drawing the warm air from your house in winter.

Evaporative Cooling

The cooling effect of evaporative cooling is created by fanning air through a wet filter fabric. Evaporative cooling units push large volumes of water-cooled air into your house, and work best when windows or doors are ajar at the far corners of the house to allow the hot, dry air in the house to be pushed outside by the cool moistened air from the cooler. The effectiveness of evaporative cooling declines in humid conditions, but Canberra has a dry climate, so these systems are ideal here. Central ducted evaporative cooling systems are relatively cheap to run – even the largest ducted units typically draw less than 300W at full power.

Refrigerative

Refrigerative cooling is often referred to as 'air-conditioning', and it works on the same principle as your refrigerator. It provides a high standard of comfort by cooling and dehumidifying the air. It

consumes a lot of electricity and is consequently expensive to run, and it can also be noise nuisance to you and/or your neighbours. A typically sized ducted air-conditioner (5kW) in an average house turned on for 8 hours a day (but only running half the time) for 90 days in summer will consume around 1,800kWh, or about $270 and produces about 1.8 tonnes of greenhouse gas emissions.

Reverse cycle

A reverse cycle air-conditioner (RCAC) is a heat pump that can both heat and cool your home by reversing its refrigeration cycle. RCACs are efficient in that they produce more heating/cooling output than the electricity input, By drawing heat from their surroundings (for more detailed information, research 'coefficient of performance' or COP). The heating cycle however becomes less efficient when the outside air temperature falls. RCACs still consume a lot of electricity, and electricity is an inefficient way to deliver energy. Typical RCACs designed to heat/cool one room vary from 0.8 - 2kW, while central ducted units consume 3-10kW depending on the size and heating/cooling requirements of the house in question.

Airconditioning System Types:

Window/Wall Cooler, Split Systems and Ducted Systems

Window/wall coolers are the cheapest option and are generally designed to cool one room, but they can be noisy.

Split systems have separate internal cooling units connected by pairs of insulated pipes carrying the refrigerant as a gas one way and a liquid the other to an external heat dissipation unit housing most of the machinery, which keeps the noise outside where it may impact upon your neighbours. Ducted systems have a central cooling unit (usually in the roof) with ducts to each room requiring cooling. Their efficiency can be impacted by heat gains through the ducting (which is surrounded by the hot air in the ceiling cavity), and by cooling rooms that do not need cooling. The first problem can partly be addressed by insulated ducting (R1 insulated ducting is now standard, but R0.6 or less used to be common), and the second problem by zoning the ducted system.

Star rating

Most air conditioners (whether refrigerative or reverse cycle) must have an Energy Efficiency Rating (EER) before they can be sold in Australia. The EER is displayed on a 'star sticker' similar to those used for refrigerators, white goods, etc. In general, the more stars, the higher the efficiency of the unit. For example, given identical cooling loads, a 6-star air conditioner will use about 30% less electricity than a 2-star equivalent, so careful selection can save you a lot of money on electricity bills over time.

Peak electricity demand and electricity pricing

The simultaneous use of air-conditioners by multitudes of consumers on very hot summer afternoons causes extreme spikes in demand for electricity. During these periods, the most expensive electricity generators are brought into operation to meet the extra demand, which means that at times of high demand electricity is extremely expensive (60c/kWh+, and getting more expensive every year as more people buy and use air-conditioners during the aforementioned peaks).

These electricity price spikes are currently included in the cost-average price you pay for electricity, however utilities are now rolling out flexible metering devices which will be able to record electricity consumption during different periods of the day. In the medium-term future, when these new meters have been distributed to all customers, utilities will begin to charge different prices for electricity at different times of day, which is called time-of-use metering. Consequently, utilities will soon be able to directly charge extreme prices for electricity to consumers who use electricity during the peak times. This should be considered in any decision to install an air-conditioner.

Expected Costs

Annual running costs depend on the house and the system chosen.

Cooler Type	Average Annual Electricity Use (6 hours/day, 60 days)	Average Annual Cost (15c/kWh)
Fan (50W)	18 kWh	$ 2.70
Evaporative Cooler (200W)	72 kWh	$ 10.80
Refrigerative Cooler (6☆) (3.2kW)	1152 kWh	$ 172.80
Refrigerative Cooler (2☆) (4.5kW)	1620 kWh	$ 243.00

More Information

This fact sheet has been produced by the Home Energy Advice Team (HEAT) to provide you with some basic information on cooling systems.

If you would like to find out more information about this or any other topic to do with saving energy in your home, please contact us for a FREE technical consultation.