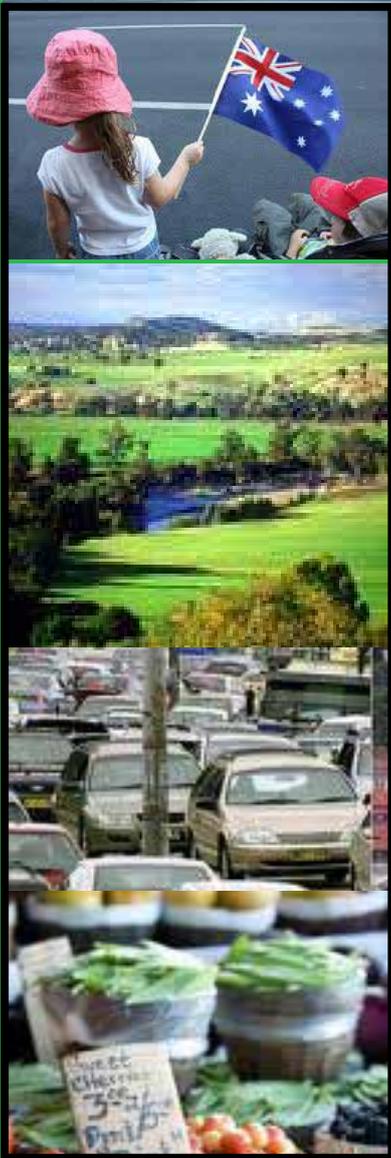


Low Carbon Living ... starts at home



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This resource was originally produced with the assistance of the Queensland Government's Low Carbon Diet initiative. This edition encompasses Australia-wide information.

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About this guide

This simple guide primarily looks at efficient energy and water use options throughout your home that will save you money as well as help reduce your impact on the environment. You can save in all areas: shelter, power, food, transport, water, waste.

No matter what style of housing you live in, there are many ways to save energy and water and reduce waste. You can make smarter choices for your home, even if you're renting. If you're building or renovating, there are even more options available to you.



YOUR GLOBAL FOOTPRINT

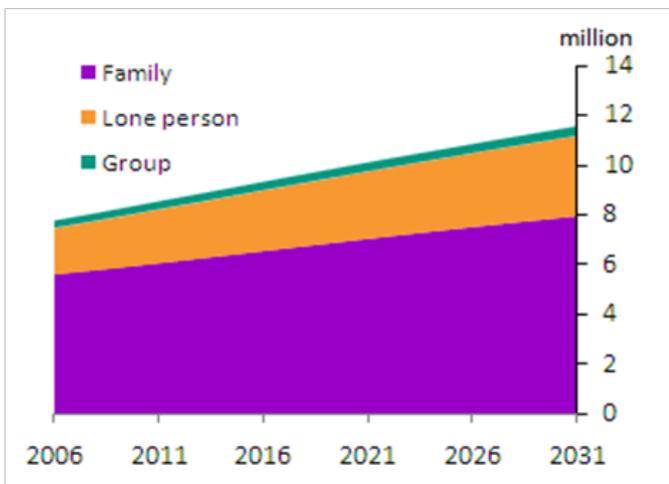
Test out your global footprint here: <http://www.epa.vic.gov.au/ecologicalfootprint/globalfootprint/index.asp>

Test out your water footprint here: <http://www.water-footprint.org/?page=files/home>

Introduction

Some pertinent information: Australia's population was 22,650,982 in June 2012. Australia's population growth remains steady at 1.4% per year. In 2006, there were a total of 7.8 million households in Australia. By 2031, the number of households is projected to grow to between 11.4 and 11.8 million. While the number of households is projected to increase, the average number of people within each household is projected to decline from 2.6 in 2006 to between 2.4 and 2.5 people per household in 2031. The decrease in the average number of people within households means that the number of households is projected to grow faster than the overall population. The projection of an extra 3.8 million households between 2006 and 2031 (Series II) represents growth of 1.6% per year, while the population is projected to grow by an average 1.3% per year over the same period (Source: <http://www.abs.gov.au/>, viewed 22 June 2012).

Fig 1: Projected number of Households (a) - Series II



(a) at 30 June

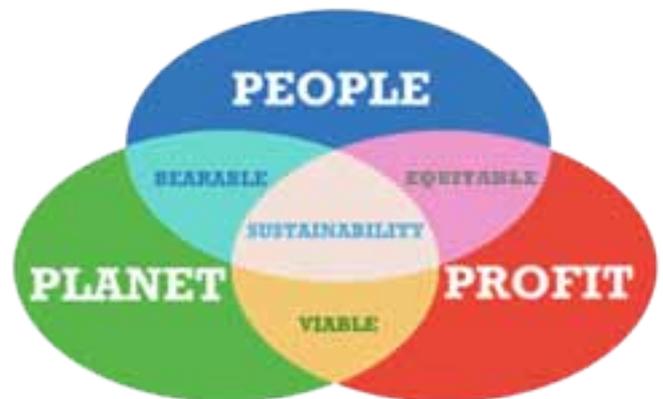
Source: ABS Household and Family Projections, Australia, 2006 to 2031 (cat. no. 3236.0)

For the purposes of low carbon living, this means that each household will need to be more efficient in its use of energy. The graph (figure 2) shows just how important it is that Australian's reduce their carbon emissions. Australians lead the way in having the highest metric tonne emission rate per person.

In this booklet we are talking about sustainability, an idea that goes back to the first farmers. Three critical factors are necessary for sustainability to work. They are, economic, environmental and social factors. When social and environmental factors come together, bearability is achieved. When economic and environmental factors come together, viability is

achieved. When social and economic factors come together, equability is achieved. Only when all three factors come together is true sustainability achieved. Because sustainable living is about making lifestyle choices in the modern world, it is more easily accomplished by breaking down the requirements of living and living in society into six separate categories. These categories represent all of the areas in which sustainable living lifestyle choices must be made. The lifestyle categories for sustainable living include the following: shelter, power, food, transportation, water, and waste. (Source: www.SustainableLiving.com.au, viewed 4 June 2012).

Fig 2: Building a sustainable community



In 2011/12, the NSW government predicted, that based on an average residential customer's annual usage of 7000 kilowatt hours a year, customers expect to pay:

- Energy Australia \$1513
- Integral Energy \$1619
- Country Energy \$2063, a year.

The average Australian household kilowatt usage is similar. Consequently, if sensible use of sustainable energy could be achieved, Australian households can make a considerable saving on electricity use alone. (Source: <http://www.environment.nsw.gov.au/>, viewed 20 June 2012.)

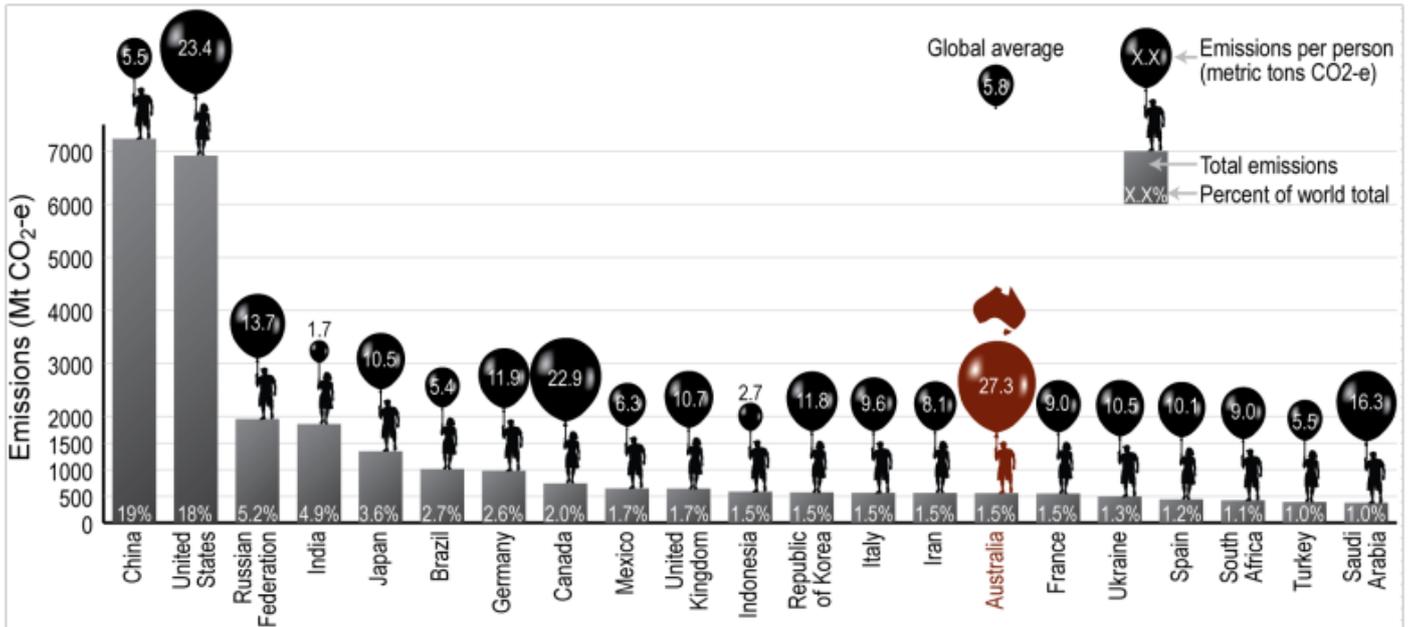
CARBON NEUTRAL

Our lifestyles and homes have a significant impact on the environment. To balance and reduce this trend there is a growing interest in carbon neutral, zero energy and carbon positive homes.

Steps for moving towards a carbon neutral home:

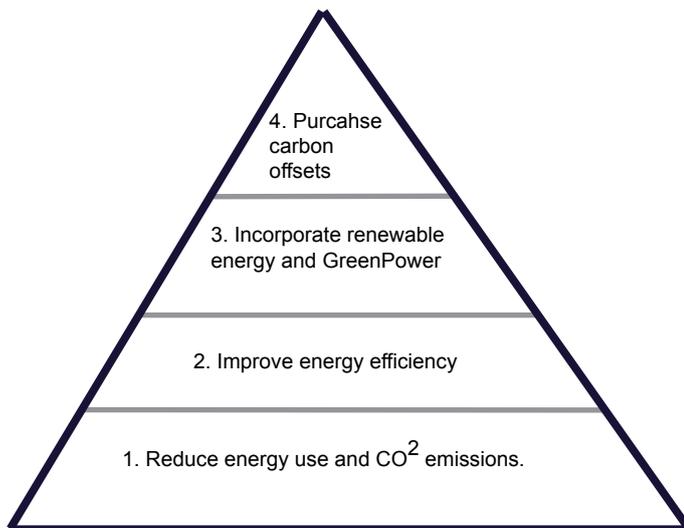
- Calculate the amount of emissions and energy being used.
- Reduce the demand for energy and activities that produce greenhouse gas emissions.
- Improve energy efficiency technologies.
- Incorporate renewable energy and use Green Power.
- Offset the equivalent amount of emissions in other areas and activities.

Fig. 3: Global Comparison - (Overall and per person CO2 emissions in 2005)



Note: Land use change is excluded. | Source: Climate Analysis Indicators Tool, Version 8.0 (World Resources Institute, 2010).

Fig. 4: Pyramid of steps towards a carbon neutral home



WHAT IS CARBON NEUTRAL?

The term 'carbon neutral' aims to balance the overall amount of CO₂ being emitted into the atmosphere, by calculating how much CO₂ is being emitted from an activity and reducing the equivalent amount of CO₂ in another activity.

Carbon dioxide (CO₂) is a naturally occurring gas in the atmosphere. Before the industrial revolution CO₂ levels in the atmosphere were consistently between 260 and 280 parts per million (ppm). Since the industrial revolution human society has become increasingly dependent on burning the fossil fuels of coal and oil and as a result human activities have increased the concentration of CO₂ in the atmosphere to more than 380ppm.

SHELTER

Building and renovating: Being Climate Smart at home starts with design. Even existing dwellings can be modified and adapted to use fewer resources and cost less to run. The best source of help when building or renovating homes that are energy smart is Your Home, a co-operative enterprise between the building industry and the Australian government. Go to <http://yourhome.gov.au/> to see the detailed explanations and suggestions to help you.

INSULATION

One of the best ways to ensure that your home is energy efficient is to put insulation into your home. Insulation is a permanent way to make your home more energy efficient. Roofs and ceilings work in conjunction when it comes to insulation.

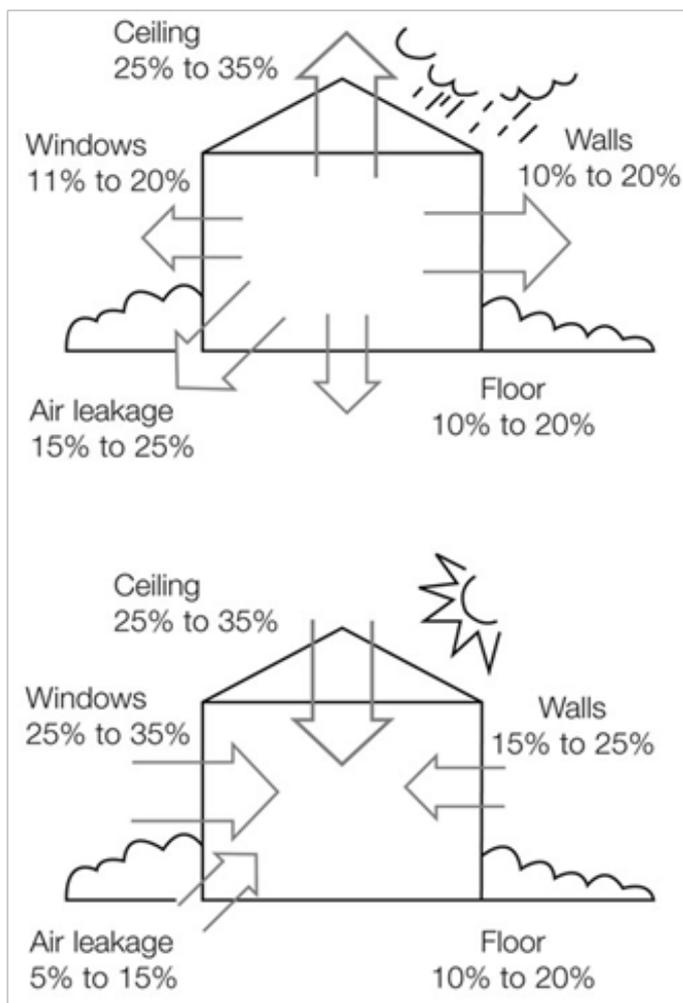
- Install insulation under the roofing material to reduce radiant heat gain.
- Install insulation in the ceiling to reduce heat gain and loss. In most cases ceiling insulation is installed between the joists. [See: Technical Guide]

Verandah roofs should be insulated in hot climates where outdoor living spaces are used extensively, to reduce radiant heat gain. Heat build up under verandahs not only affects the space below but can affect conditions inside the house.

Bulkheads (wall sections between ceilings of different heights) must be insulated to the same level as the ceiling, as they are subjected to the same temperature extremes.

- Overall you can save up to 45 per cent on heating and cooling energy with roof and ceiling insulation.
- Save up to an additional 20 per cent of heating and cooling energy with wall insulation.
- Save up to 5 per cent on winter energy costs with appropriate floor insulation.

Fig 4: Typical heat gains and losses in a temperate climate



Source: 2010 Australia's guide to environmentally sustainable homes.

Did you know?
 Insulation is measured on an R-rating scale: i.e. how resistant to temperature change it is. The higher the R value the better. An R-rating of 2.5 can reduce your home energy bills by up to 50%.

GETTING THE MOST OUT OF INSULATION

- Insulation can be installed in roofs, wall cavities and under the floor. When renovating, take advantage of the opportunity to install insulation. If you have to choose where to insulate first, start with the roof.
- Use a combination of thin heat reflecting insulation and bulky heat transfer insulation.
- Consider whether it will interfere with wiring, and whether it will be exposed to water.
- Consider double glazing on windows, or direct coating systems that reflect substantial amounts of heat from the glass.

For information on the insulation levels for your climate zone, please see the website: <http://www.yourhome.gov.au/technical/fs47.html#levels>

GLAZING

Glazing is a key element of your home's design providing, light, ventilation, noise control and security. The impact of glazing on the thermal performance of a building is complex!

There are several aspects to consider:

- Climatic conditions in your location.
- Building design – the form and layout of the building.
- Building materials – the amount of mass and insulation.
- The size and location of windows and shading.
- Thermal properties of glazing units.

The impact of glazing is the result of the interaction of each of these aspects. For example, hot and cold climates benefit from different types of glazing. High mass buildings can benefit from larger areas of glazing than would be optimum for a lightweight building. Double glazing is beneficial for almost all orientations. High performance toned, double or low-e glazing will be more beneficial in specific orientations of the building.

Because of the complex interaction of many variables, the best way to accurately assess the impact of glazing on your home's thermal performance is to model it with one of the sophisticated computer programs now available. AccuRate, BERS Pro and FirstRate calculate a home's heat gains and losses, hour by hour, and the resulting levels of thermal comfort achieved. They consider all aspects of the building's design and construction as well as local climatic conditions such as temperature, humidity, sunshine and wind. These programs allow options for each window to be compared to ensure that the best performance is achieved without unnecessary expense.

Note: Software assessment of building thermal performance is governed by the Nationwide House

Energy Rating Scheme. [See 1.5 Rating Tools in the Technical Manual for more information - <http://www.yourhome.gov.au/technical/index.html>]

MATERIALS

Buildings consume 32 percent of the world's resources, including 12 percent of its fresh water and 40 percent of its energy.

You can choose "greener" renovation or building materials, for example, by:

- Selecting sustainable construction materials based on reused and recycled content, zero or low off-gassing of harmful air emissions, zero or low toxicity, sustainably harvested materials, high recyclability, durability, longevity, and local production.
- Using materials that reduce energy costs both during construction and in service.
- Using recycled construction and demolition materials, for example, using demolition materials as a base for foundations.

REGULATIONS

In all states changes have been made to building codes that require new houses in Australia to be more water and energy efficient. In 2010 the Australian Government in conjunction with the Design and Construction Industry produced a book called *Your Home: Design for Lifestyle and the Future*, which includes a *Technical Manual* that is extremely useful on the design of new houses and the renovation of houses to help home owners in their choice of sustainable living requirements. As part of these laws, all new houses must have:

- Water efficient 3-star-rated shower roses
- Dual-flush toilets
- Energy efficient lighting in at least 40 per cent of the house
- Greenhouse efficient hot water systems such as solar, heat pump or gas hot water
- Water tanks*
- Insulation

Note: * Not in all States

See Guidance on the use of rainwater tanks from the your home website.

Did you know? A good decision about where a house is placed on a block of land can save its occupants thousands of dollars over the lifetime of the dwelling.

ORIENTATION

Orientation of Rooms (when building a new home): It makes sense and saves heating/cooling money to site 'living' or day rooms to the north and 'night' rooms to the south. Putting the garage against the west wall provides a buffer from heat.

In hot climates aim to exclude the sun and maximise exposure to cooling breezes by:

- Facing the long axis of a house east-west, to minimise wall areas receiving hot morning and afternoon sun.
- Placing large windows only on the northern sides. Windows to the south will cause heat loss in winter. Windows on the eastern and western sides will cause overheating in summer.
- Having eaves set at an angle on the north side that shades windows in summer when the sun is at a high angle, but allows sunlight in during winter when the sun is lower in the sky.
- Orientating the building and windows for ventilation by cooling breezes.
- Utilising effective shading: plant trees to shade the house; use blinds or screens on verandas to block sunlight but allow ventilation; use heavy curtains or blinds to reduce heat transfer through windows.
- Choosing high thermal mass construction materials in regions with large day and night temperature ranges (and low thermal mass construction in regions with small temperature ranges).
- Using light-coloured roof and wall finishes to reflect more solar radiation and reduce heat gain.

Sites running north-south are ideal because they receive good access to winter (northern) sun with minimum overshadowing by neighbouring houses. In summer, neighbouring houses provide protection from east and west sun.

North-south sites on the north side of the street allow north facing living areas and gardens to be located at the rear of the house for privacy. Sites on the south side of the street should be wide enough to accommodate an entry at the front as well as private north-facing living areas. Set the house back far enough to accommodate a north-facing garden or trees that won't interfere with winter sun.

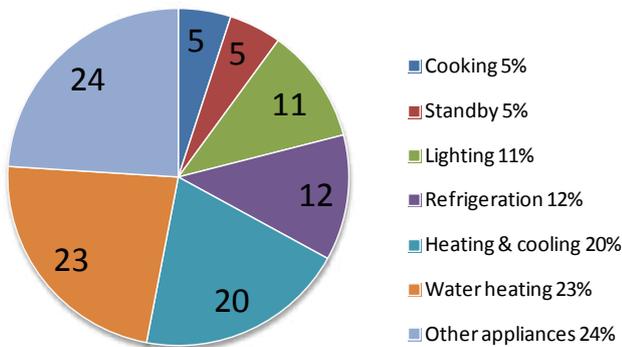
POWER

LIGHTING

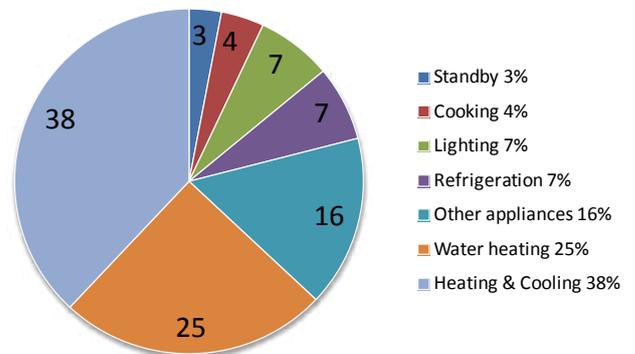
Since older style light bulbs waste up to 90% of electricity used, switching to better choices is an easy way to save, particularly with energy costs on the rise. The Australian government began to phase out the use of incandescent bulbs in 2009 and by the end of 2012 it will be impossible to buy some of the old bulbs and halogen bulbs over 25 watts. Moreover, recent building code amendments reduced artificial lighting allowances in new homes from 25 to 5 watts per square metre, making good lighting choices more important than ever. The replacement globes are CFLs (compact fluorescent lamps) and LEDs (light emitting diodes).

Throughout the house: Milne (2010) says that household lighting energy use in Australia has been rapidly increasing in recent years due to the construction of larger homes and the installation of more light fittings per home. Most homes could reduce the amount of energy they use for lighting by 50 per cent or more by making smarter lighting choices and moving to more efficient technologies.

Greenhouse gas emissions from home energy use (Baseline Energy Estimates 2008)



Home energy use (Baseline Energy Estimates 2008)



The percentage of greenhouse gas emissions from home energy use depends on the carbon intensity of the energy source. For example, the carbon intensity of electricity is much higher than that of natural gas or wood per unit of delivered energy. Therefore, although heating and cooling is the highest energy use in the home, as natural gas is typically used for heating, it is not the highest greenhouse gas emitter. (Source: www.yourhome.gov.au, viewed 21 May 2012)

Lighting:

- Incandescent light bulbs use about 90% of their energy generating heat, not light!
- Energy-efficient lighting will help you save on your power bill and help our environment. Compact fluorescent lights (CFLs) and fluorescent tubes are the most energy and cost-effective lighting for your home.
- CFLs last 6 to 15 times longer than incandescent light bulbs and use about one fifth of the energy.
- Get into the habit of turning off the light whenever you leave the room. This will reduce unnecessary usage.
- Replace your globes gradually to avoid budget blowout starting in high-use areas like the kitchen.

- Use floor lamps fitted with CFLs instead of overhead lights in rooms with lots of halogens.
- Use times or sensor lights and solar lighting outdoors.

Many people have hesitated to buy the new globes because of the expense. However, if you do the sums it works out to your advantage. To save \$720 in energy bills over three years, Philips (philips.com.au) suggest replacing ten 100 watt incandescent globes, which burn for 5.5 hours a day at 15c per kilowatt hour of electricity, with 10 equivalent 20 watt CFLs costing \$60. CFLs use up to 80% less power and can last 20 times longer than incandescent bulbs.

Online store Todae (todae.com.au) has calculated halogens vs LEDs. If 25 halogen bulbs of 50 watts are replaced by six watt LEDs, and used for six hours a day at 18c per kilowatt hours, the LEDs cost \$59.13 a year to run compared to \$492.13 a year for halogens. Since LEDs last 15 to 20 times longer than halogens the long term financial benefits are significant.

TIPS:

1. Rapid switching can shorten the life span of CFLs. It is better to install them in areas where lights are on for longer.
2. Never put used CFLs in your regular recycling bin; contact the state environment department to find an approved recycler.
3. If a CFL bulb breaks, ventilate the room for at least 30 minutes; use rubber gloves to pick up the pieces; clean the area using damp paper towels; seal it all in a plastic bag and dispose in the waste bin. Why? Because CFLs have a small amount of mercury in them.

Did you know?
 Insulating, shading and weatherproofing your house can save you up to 45 per cent on your current energy bills while increasing the comfort and value of your home. Minimising the need to heat and cool your home from the extremes of our summer and winter weather will also reduce your contribution to global warming.

Heating

Most Australian homes need heating or cooling at some point of the year. This can account for up to 40% of an energy bill. Good passive design of your house will improve your energy bill and choosing the right mechanical heating and cooling systems will also help. The most effective way of keeping your house warm in winter is to stop as much heat as possible from escaping.

(Source: <http://www.livinggreener.gov.au/energy/heating-cooling/improve-heating-cooling>)

To keep your house warm:

- Install insulation.
- Where possible, keep your windows closed overnight to stop heat escaping.
- Close your curtains or blinds at night. Thick curtains with pelmets are most effective at preventing heat escaping from your home.
- Double glaze your windows to stop heat from entering or leaving a room.

Other tips for heating:

- The most energy-efficient and cost-effective way of heating is simply to put on additional layers of clothing or bedding.
- If you are going to use an air conditioner select one with a high star rating. When heating, air conditioners and heaters should be set to 18 - 20 degrees.
- Keep filters clean.
- Close doors to areas that don't need to be heated and close curtains/blinds.
- Electric blankets can be used efficiently by turning them on only half an hour before going to sleep. Make sure the bed is well made to slow escaping heat.

Did you know? A clogged air-conditioning filter can use 5 per cent more energy than a clean one. So clean it regularly!

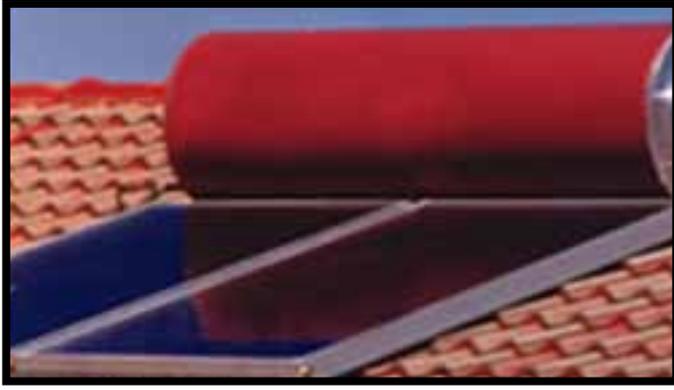
Cooling

To stop heat entering your home:

- Install insulation in your roof and walls.
- Close your windows and curtains during the day. Open them in the evening to let warm air escape.
- Choose light coloured curtains and blinds, interior paints and roof colours as they reflect heat.
- Plant trees on the western, northern and eastern sides of your house. Use deciduous trees on the northern side to allow winter sun in.
- Consider double glazing your windows.

Other tips for cooling your home:

- Pedestal and ceiling fans are an energy efficient way of cooling your house. Bear in mind that they



cool you only by moving air over your skin, so switch them off if you leave the room.

- If you are going to use an air conditioner, select one with a high energy star rating.

Hot water systems

An average Australian household can use around a quarter of its total energy on heating water. Every 15L of hot water used from an electric water heater generates about 1 kg of greenhouse gas. Heating water represents anywhere from 20% to 30% of your home's CO2 emissions and is the biggest single source of energy consumption in homes.

Hot water alternatives:

- Solar hot water systems are a great investment – saving you money and adding value to your property.

Did you know? If every Australian household installed an electric boosted solar hot water system or heat pump, the average household would cut greenhouse gas emissions by about 34 tonnes over a 20 year period. This jumps to a saving of over 100 tonnes over a 20 year period for a gas boosted system. Your household hot water bills will be reduced by more than 60% each year - you would save around \$300 each year (so thousands of dollars over the life of the system).

- Direct-heat gas systems deliver hot water as it's required.
- Having the thermostat reset to 55°C on electric systems will save energy and money.
- Heat pump hot water systems are significantly more efficient than standard electrical systems.

Efficient hot water use:

- Showering in four minutes or less greatly reduces power consumption.
- In many cases, hot water tanks are oversized to avoid running out of water. Match your hot water system to the number of people in the house and

the number of bathrooms and fixtures.

- Wrap hot water pipes with insulation. This practice means you run less water through the tap before it reaches the temperature you need.
- Turn your hot water system to "off" or "pilot" if you're going away for more than a weekend.
- Opt for a shower - baths generally use more hot water.
- Repair leaks in taps and shower heads and install low-flow fixtures like a sink aerator.

Saving on energy use throughout the house

Bedroom: We spend around a third of our lives in the bedroom. While bedroom comfort is important, there are ways to save energy.

- Keep windows closed and curtains/blinds shut during the hottest part of the day to help keep your bedroom cool in summer.
- Put on an extra blanket instead of turning on the heater or air-conditioner in winter.
- Ditch the electric blanket. Use a hot water bottle to pre-warm your bed instead. You can save the cooled water to use in your garden the next day!
- Replace incandescent light bulbs with compact fluorescent lights.
- Plant deciduous plants outside your bedroom windows to shade them in summer yet allow sunshine through in winter.
- Install a ceiling fan – they use less energy than air-conditioners and aid natural air flow.

Kitchen: The kitchen is one of the most visited areas in a home so it should especially have energy efficient lighting and be well ventilated to avoid overheating in summer.

Every time you run your **dishwasher** you use enough electricity to release nearly 1 kg of CO2. If you use it just once less a week, that's a saving of around 52 kg! Here are some tips for using dishwashers:

- Use only when it's full. If you only have a few dishes, wash them by hand.
- Wash large items by hand. This will leave more room in the dishwasher for other items.
- If you have to rinse, use cold water and use a plug in the sink.
- Clean the filter of your dishwasher regularly to keep it working at maximum capacity.
- Use the most economical program with the lowest temperature or shortest running time.
- Eliminate power drying (most machines have this setting). Open the door after the final rinse cycle is completed to assist with air drying while the load is still hot.

Tips for using refrigerators:

- Place your fridge away from direct sunlight or other heat sources.

- Allow at least 5cm space above and behind your fridge. Restricting ventilation can add about 15% to your energy bill. Never put your fridge in an unventilated cupboard!
- Allow hot food to cool before putting it in the fridge.
- Ensure door seals are clean and in good condition.
- Run one large refrigerator rather than two small ones.

Did you know? The refrigerator is one of the largest users of energy in the home. Roughly a third of Australian homes have two of them. Turning off your second fridge and only using it when it is really needed can cut your yearly electricity bill by up to \$100.

Did you know? Running a six star 360L fridge will produce almost half a tonne less greenhouse gas each year than a three star model. Upright units with one door above the other are generally more efficient than units with side by side doors.

Saving energy when cooking:

- Microwaves use less power and cook faster than electric stoves and ovens. Gas or induction stove tops are also more efficient.

Did you know? Every cup of water you boil represents about 25 cups of CO₂ released. So, only boil the amount of water you need.

- Putting lids on pots to boil water or using a pressure cooker can halve energy use.
- Only ever boil as much water as you need using an electric kettle or gas stove top.
- Use pots and pans that match the size of the element or gas flame.
- Thaw food before cooking.
- Avoid opening the oven door unnecessarily and consider cooking several things at once.
- Cooking in bulk, freezing the food, then reheating in a microwave oven uses less energy and saves time.

Laundry: Tips for reducing water and energy use in your laundry:

- Wash in cold water using cold-water detergents. It

can save 90 percent of your energy consumption! Warm water is only needed for a few items, like killing dust mites in bedding or removing grease stains.

- Only wash full loads. If you must wash a small load, use the appropriate water-level setting.
- Front loader machines are better for the environment as they use less water, less energy and less detergent.
- Use the sun where possible to dry clothes. Clothes dryers are most efficient at drying full loads since they use the same amount of energy for small or large loads.
- Separate your wet clothes into heavy items and light items. Drying your light items takes less time, and you can use the existing heat in the drying drum to help dry your heavier items.
- Clean the lint filter in the dryer after every load to improve air circulation.
- Gas clothes dryers, although more expensive to buy and install, are cheaper to run, dry faster and have lower greenhouse gas emissions.
- Consider using phosphate-free and biodegradable detergents, especially if you are using your rinse water as grey water.

Did you know? Using an electric clothes dryer can cost about \$100 a year in energy bills and creates nearly half a tonne of greenhouse gas. Sun drying costs nothing...

Saving energy in the office

Every tonne of paper recycled saves 13 trees. But there are other ways to save energy in your home office or study:

- Make the most of natural lighting – arrange furniture so your work area is well lit and paint internal walls a light colour.
- Turn off lights when you leave the room
- Use a desk lamp instead of lighting the whole room.
- Switch off your computer monitor when not in use for longer than 10 minutes. A monitor in standby mode uses more energy than a computer processor.
- Recycle any waste paper and reuse paper for draft printing or making note pads. Also use paper with recycled content.
- Refill printer cartridges rather than replacing them.



THE APPLIANCE ENERGY RATING SCHEME

The Energy Rating Scheme is a mandatory national labelling scheme for:

- Refrigerators.
- Freezers.
- Clothes washers.
- Clothes dryers.
- Dishwashers.
- Air conditioners.

Look for the Energy Rating Label that shows the star rating and other useful information about energy consumption. Choose an appliance with a high star rating. Choose an appliance with a low standby energy rating.

Add the purchase cost and the lifetime running cost to get a more accurate picture of the total cost of an appliance

Televisions, game consoles, set-top boxes, video, CD and DVD players and recorders do not carry energy rating labels in Australia, neither do computers, scanners or printers. Nevertheless the collective energy demand of these appliances in a modern household is significant. Taken together, the electrical power use of these commonly used appliances may outweigh that consumed by traditional white goods.

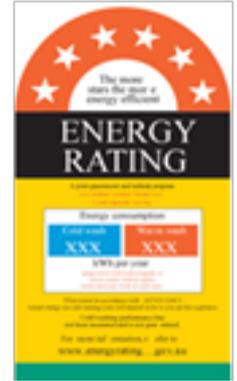
Digital technologies have led to the emergence of 'convergence' in which previously unrelated devices operate interactively with one another. As an example, CD players, radios, cameras and telephones used to be quite separate devices but now consumers can buy mobile phones that play music, email and take photographs. In the home, this phenomenon of convergence has led to such things as refrigerators that contain a computer, and the increasingly popular home theatre.

Turn off appliances not in use where possible, although this is not always as easy as it sounds. A continual power draw is becoming the default condition for many appliances. As electronic devices have become more sophisticated they have become more and more likely to have sleep or standby modes rather than a hard off switch that disconnects the mains from all electrical circuits in the appliance.

Very few home entertainment products for example have an off switch. This means that significant power is wasted even when the device is put into passive standby mode by the remote control. Even more power is wasted when devices such as DVDs, set-top boxes and CD players are left active standby after use. In this mode they can use twice as much energy as they do when powered down to passive standby mode.

STAR RATINGS

The energy used by major appliances will impact significantly on your electricity bill for years to come, so consider energy efficiency before you buy. The Energy Rating label for electrical and gas appliances shows the appliance efficiency and how much energy or gas it uses each year (or each hour, in the case of air conditioners).



WATER RATING LABELS

Choosing a 3-star item over a 2-star item will save:

- Washing machine: 40 litres per load.
- Dishwashers: 15% water.

STANDBY POWER

- The Greenhouse Energy Group reported (2002, p. 3) that standby power consumption generally accounts for over ten percent of Australia's household electricity usage. It costs more than \$500 million and generates more than 5 million tonnes of carbon dioxide per annum. This is equivalent to the greenhouse impact of more than 1 million cars.
- Over a year, this can all add up to 10 per cent of your power bill. Just think about it: if your yearly electricity bill is \$1,000 you're paying \$100 on powering appliances that you're not even using!
- In 2010 the Commonwealth Government reported that Standby power emits 5% greenhouse gas emissions a year. If you turned off your machines at the wall instead of using standby power you would be saving 3% energy use a year.
- The discrepancies in the reported rates of emission are the result of two things: better performance of new technologies; and the unknown use of linked technologies such as game consoles, set top boxes, video, CD, and DVD players and recorders.

Did you know? A large screen television used 6 hours a day, can generate around half a tonne of greenhouse gases a year - more than that of a family fridge.

Switch off at the power point!

- Turn off at the wall those items that don't need power continuously.
- For multiple appliances (e.g. TV, Stereo, DVD player), move them to the one power board, and you can turn them all off with one switch.
- Whenever you leave the house or get ready for

bed, remember to switch off all your standby power.

- Make use of the various State governments' Power Action Savings Plans where an assessment can be made of your power usage and suggestions given on how to save energy. In most cases you will be given a Power Savings Kit which consists of:
 - stand-by saver power board
 - 4 energy efficient light bulbs
 - low flow shower head
 - shower timer
 - tap aerator
 - draught-proof strips around the door
 - door snakes.

A visit from a power consultant will take about an hour of your time. And spending just a couple of seconds of your time to switch off at the wall can save you money and reduce your impact on the environment!

Did you know? Mobile phone and other chargers, if left plugged in, use power even if they're not connected to your phone or equipment? In fact, a microwave oven can use more power and generate more carbon pollution running the digital clock than cooking food.

Your Global Footprint:
Test your global footprint at:
<http://www.epa.vic.gov.au/ecologicalfootprint/globalfootprint/index.asp>
Test your personal footprint here:
<http://www.epa.vic.gov.au/ecologicalfootprint/calculators/personal/page1.asp>
Test your water footprint:
<http://www.waterfootprint.org/?page=files/home>

WATER

Bathroom: We use more water in the bathroom than anywhere else in the house. Tips for more climate smart bathrooms include:

- Fix dripping taps – it's easy!
- Use a sink plug instead of running the water.
- Install tap nozzle aerators and flow restrictors.
- Make your own simple bathroom cleaners that send fewer chemicals down the drain.
- Open a window to cool the bathroom rather than using an exhaust fan.
- Only switch on heat-emitting bulbs when standing directly beneath them as they don't warm a whole room effectively.
- Never use heaters and the extractor fan at the same time.
- Seal gaps under doors and around windows with rubber or foam strips to minimise heat loss in winter.

Showers: Long showers consume huge amounts of expensive hot water. You really can do everything in four minutes! Use a shower timer to remind you, or try showering for the time it takes to sing your favourite song.

Did you know? Normal shower heads use 13 – 20L of water per minute. Replacing your old shower head with a 3-star rated model will reduce water consumption to less than 9L per minute.

Toilets: Many of us flush around 40,000 to 50,000 litres of drinking water down our toilets each year. That's more than enough to fill a large backyard pool.

Replace your single flush toilet with a WELS 3 or 4 Star rated dual flush model. The 4 Star models are in the 4.5/3 litre category, while 3 Star is the 6/3 litre category. All WELS labelled toilets have an average flush of 5.5L or less.



Install appropriate taps everywhere in the house. Mixer taps in showers can reduce the potential for scalding and save large quantities of hot water. Single lever flick mixer models of mixer taps over basins and sinks, however, waste hot water because they tend to be left in the middle position. Mixer taps with separate

controls for hot and cold water are preferable in these locations.

The environmental benefits include:

- Lower water extraction from the environment
- Decreased sewage volume.
- Reduced CO2 emissions.

Rainwater tanks: Rainwater tanks can be a great way to save even more water, once you already have a water efficient house and garden. In most areas rebates are available on the cost of rainwater systems (unless they're already required by law).

Rebates and other incentives are available from various state governments and/or local councils. Not all States continue to support this rebate scheme, so check locally. Contact your State / Territory government or local council for further information on using water wisely, including what rebates are available. You can also gather more information from these sites:

- Savewater.com.au
- [Rainwater Tanks Direct.com.au](http://RainwaterTanksDirect.com.au)
- Moderngroup.com.au
- Technical manual

Always ask your local council if any regulations apply. Not all States/councils allow rainwater to be used for drinking water. However, if you're collecting water from an old roof and will use the rainwater for drinking, your builder will need to check for lead flashing and seal it. You may also need special gutter treatments such as screens to keep out debris.

If you're collecting rainwater from a new roof, choose a compatible roof material (steel is ideal, most tiles are also fine).

To get the most out of your system, firstly make sure you have a decent roof area from which you can collect water. You can maximise the area by using underground tanks, or above ground tanks that use a 'wet down pipe' system. Secondly, make sure you have a decent tank capacity - 3,000 litres or more is recommended if you have room.

You may have to install a minimum-sized tank to qualify for rebates. If space is tight, many innovative solutions are available, such as under-floor bladders and interconnecting plastic tanks that double as fences.

Make sure you're connected to at least one indoor use like toilet flushing or the washing machine.

Tank size will depend on local rainfall patterns, roof catchment area and number of people in your house.

As a general rule, a 3000-litre tank is recommended for external uses, and a minimum of 5000 litres for toilet flushing and laundry.

Pool: A backyard pool can lose up to 350 litres a day — 51,000 litres between October and March — just through evaporation. A backyard pool remains a luxury item and inevitably compromises any household's attempts to reduce its ecological footprint. But with careful selection of pool equipment, supplementary water supplies and regular maintenance, a pool need not be an endless drain on resources.

- Cartridge filters can save about 15,000 litres of water a year over sand filters, which need to be back washed.
- Thermal covers reduce evaporation and keep your pool warm in winter.
- Use a rain water tank to top up the pool instead of using mains water.
- Shade structures over the pool reduce leaf and dirt contamination, slow evaporation rates, and give sun protection for swimmers.
- Careful pool chemical monitoring and regular filter cleaning can maintain healthy water and reduce the need to frequently replace the water.
- In winter, with cool conditions and pool covers, pool pumps can be effective if run for as little as 4 hours a day.

Did you know?
Using a swimming pool cover can reduce evaporation by up to 75 percent.

Outdoor water use: Up to 60 per cent of household water is used outdoors. Using water conservation techniques in the garden will ultimately save you money, time and effort.

1. Minimise lawn areas. In most gardens, lawns consume up to 90 per cent of outdoor water and most of the energy used outdoors. To reduce outdoor water use replace lawns with ground cover plants or mulched garden beds.
2. Mulching around plants conserves water by preventing evaporation and reducing run-off.
3. Plant drought tolerant species. Australian natives, succulents, cacti, olive trees and some exotic ornamentals are suitable. Native plants are particularly water-thrifty. Native plants also improve the ecosystem by providing food and shelter for native animals. A list of water wise plants can be found at any of these sites:
 - <http://www.nrw.qld.gov.au/water/waterwise/pdf/plants.pdf>
 - <http://www.menofthetrees.com.au>
 - <http://www.sgaonline.org.au>
 - <http://www.treesforlife.org.au>

• <http://www.permaculture.org.au>

4. Improve soil. The addition of organic matter, gypsum, sand and other compounds can improve soil condition, water retention and drainage. Hardy, deep-rooted plants can help break up poor soils.
5. Protect existing natural areas, such as woodlands and wetlands, and stream corridors.
6. Raise the cutting level of your lawn mower to between five and eight centimetres. This causes less stress on the grass and encourages deep root growth.
7. Use lawn clippings as mulch around plants. This will retain moisture and require less watering.
8. Water at night when plants absorb water best and there is less evaporation.
9. Position plants to block or filter summer sun but permit winter sun through to living areas.
10. Grow vines on walls or trellises to reduce absorption of heat from the sun.
11. Consider creating a permaculture food garden. This will support your family with fruit and vegetables year round as well as supporting a vast array of natural flora and fauna.

Did you know?
Smart landscaping your yard could change the microclimate around your home by 1-2°C, saving up to 30 percent of your heating bills, and reducing air conditioning costs by 50 percent.

This type of garden is low maintenance once established and creates a natural ecosystem that removes the need to use pesticides or artificial fertilisers. Your local library will have books on how to get started.

Composting & Mulching: Composting reduces the amount of rubbish we throw away and provides a chemical-free fertilizer for gardens. It not only returns nutrients to the soil that would otherwise be lost, but also improves soil structure and increases the water holding capacity of the soil.

Mulching prevents moisture loss, reduces soil temperature, returns nutrients to the soil and inhibits weeds. It can be any garden waste – lawn and plant clippings, leaves and shredded bark – or purchased materials like sugar cane, hay straw and wood chips. When applying mulch:

- It should be applied so that it is about 10 centimetres deep and topped up to maintain thickness.
- If installing drip irrigation, put it under the mulch.
- Mulch can be applied at any time, but is best applied in mid-spring or early summer.
- Don't pile mulch up against the stems of plants as this can lead to stem rot.

WAYS TO MINIMISE WATER USE AROUND THE HOME AND GARDEN

- Reduce indoor water use by choosing water efficient showers, toilets, taps and appliances.
- Minimise outdoor water use through reducing grassy areas and planting native species.
- Minimise paving of outdoor areas as this increases heat radiation and water run-off from the site.
- Wash cars and bikes on the lawn so that the grass is watered at the same time.
- Install a dual-flush toilet or simply put a house brick into the toilet cistern.
- Set up a grey water or tank water system to flush the toilet.
- Fix leaking toilet cisterns, which can waste more than 60,000 litres a year.
- Use toilet paper made from recycled paper.
- Sweep your paths and drives instead of hosing them down.
- Re-use water where possible.

CHECK FOR LEAKS

Before you go to bed, make sure all your taps are turned off then check the reading on your water meter. When you get up in the morning, check the meter again. If the numbers have increased, you probably have a leaking pipe, dripping tap or faulty toilet. Locate and have the problem fixed.

TRANSPORT

By choosing a greener vehicle you can make a real difference to CO₂ emissions. Check how much money you will save if you buy a vehicle that has a high fuel economy rating. But which car to buy? You can do some research here.

However the best solution for Australians is that we all spend more energy taking public transport or using our bicycles rather than driving our own cars.

Think about these facts:

1. Road congestion costs the Australian economy more than \$21 billion per year.
2. Road vehicle crashes cost us more than \$18 billion every year, kill over 1,600 Australians and seriously injure 30,000 more.
3. Road building is the most expensive option per passenger kilometre travelled. Dual carriageways cost about 1½ to 6 times more than two track railways per passenger kilometre travelled.
4. Commonwealth Government spending on roads

has been 12 times more than on rail. From 2004 - 2009 Auslink allocated \$14 billion to roads but only \$1.2 billion to rail – over a tenfold difference in spending allocations.

5. Physical inactivity costs over \$10 billion per year in direct health costs.
6. The fringe benefits tax concession for private use of company cars will cost the government \$1.18 billion in 2008-09 and is effectively a subsidy that encourages driving.
7. Reduced car ownership would result in wealthier families through lower transport costs.
8. Building more roads induces traffic growth and results in more carbon, air, water and noise pollution.
9. Australian bike ownership is among the highest in the world, but usage remains very low by international standards due to inadequate infrastructure.
10. Urban sprawl increases the demand for travel. There needs to be a redesign of our urban centres using Transit Oriented Development to reduce travel demand.
11. Roads and parking account for one third of urban land use.
12. Petrol costs will rise and it is the disadvantaged who will pay the most. They often live in areas distant from jobs and services which are poorly serviced by public transport and rely more on increasingly expensive private motorised transport than wealthier people living closer to town centres.
13. Greenhouse gas emissions from road freight haulage are projected to grow by more than 27 per cent in the next 10 years.

Within the next three years - we can urge the appropriate government agencies to upgrade and innovate:

1. Increase dedicated bus lanes on multi-lane roads and invest in bus rapid transit systems;
2. Introduce low cost measures to increase patronage on existing public transport including improving and extending existing network capacity;
3. Make cycling part of the system – provide safe, dedicated cycling paths and separated on-road bicycle lanes; ensure there is cycle parking at both ends of a trip including end-of-trip facilities at major destinations where riders can store their bikes and shower on their way to work; and cycle park'n'ride at train stations;
4. Integrate well planned feeder services with the rail network – including coordinated bus and tram/light rail routes and timetables, as well as bicycle routes servicing train stations and minibuses services; and
5. Introduce bike hire systems in our major cities

to encourage sustainable, healthy transport solutions for short trips.

Within the next 10 years - we need to start investing now to achieve better cities:

1. Extend rail systems – help make rail an option for rapidly developing parts of Australian cities that currently do not have easy access to the rail network;
2. Fund high quality public transport links for high visitation venues such as sporting facilities and universities;
3. Provide funding to local government to develop plans for sustainable transport and Transit Oriented Development and to invest in walking and cycling infrastructure; and create walkable streets - ensure urban environments are designed and consolidated to provide street networks with direct, safe and convenient pedestrian access to local destinations, including public transport.

(Source: http://www.acfonline.org.au/sites/default/files/resources/Investing-in-Sustainable-Transport_Report_0.pdf; viewed 22 June 2012)

Food

Green eating tips one: Eat less animal products - Try to eat one less serve of meat and animal products a week. You don't need to give up meat and dairy if they're among your favourite foods, but many Australians eat much more than is recommended for a healthy lifestyle, and consuming less of these products eases the pressure on our environment.

For example, if you reduce your dairy intake by just 2 cups of milk per week, you will save 13,000 litres of water and 250kg of greenhouse pollution in a year.

When you do buy meat, choose pasture or grass-fed sources over grain-fed ones. And be sure to support hardworking families in your community by buying from local farmers.

Green eating tips two: Choose fresh over processed - Buy fresh fruits and vegetables rather than dried or canned ones. When it comes to legumes (beans, lentils), buy ones that you soak overnight rather than canned versions.

In particular, try to avoid highly processed and overpackaged foods like chocolate bars, chips and individually wrapped lollies.

It may not always be possible, but buy organic when you can. While it can be more expensive, organic farming practices avoid using synthetic pesticides and fertilisers, and often use less fossil fuels in the process. And as more people buy organic, the prices will come down.

Green eating tips three: Buy locally produced food - Food that's grown closer to home uses less energy for transportation. Buy your food from local markets or, at a minimum, look for a 'Product of Australia' label.

You can't get any more local than your own backyard! By growing your own food, you reduce the transportation energy cost to zero, and ensure the use of greenhouse friendly techniques like composting waste as opposed to dangerous (and energy-intensive) chemicals.

You can even swap homegrown food with your friends and neighbours, especially if you have a prolific fruit tree or seasonal vegetables ripe for harvest all at once. See if your local community has a food swap meet.

Green eating tips four: Eating seasonal fruits and vegetables maximises your nutritional intake, reduces energy used to grow and transport foods and can support the local economy.



Green eating tips five: Buy organic products. Does organic labelling bamboozle you? The only way to ensure something is organic – unless you produce it yourself – is to seek and rely on a certification mark...Australia's organic certification program was set up in the 1980s to ensure that what was claimed to be organic could be verified as being so. A certification mark will confirm that it has been independently certified to truly national and international standards for organic production.

Organic versus partly organic products. All of the following products are permitted under the National Organic Standard in Australia:

- 100% organic.
- Organic (which means products have at least 95% of their ingredients derived from organic production methods).

- Made with organic ingredients (at least 70% of ingredients derived from organic production methods).

Products containing less than 70% organic ingredients cannot use the term organic on the display panel, but can make reference to the ingredients being derived from organic production methods in the list of ingredients.

Green eating tips six: Become a locavore and put local food on your table. Have you ever thought about the food miles clocked up in your fruit bowl? There are so many benefits from eating local, seasonal food.

Just one basket of food can clock up an astronomical amount of food miles. Tally up the carbon emissions of grapes from the US, garlic from China, asparagus from New Zealand, carrots from Belgium, oranges from Brazil, Kiwi fruit from Italy...

Actually, the distance from paddock to plate has huge implications and hidden costs:

Environmental Locally grown food uses less packaging and there is no need for shipping, airfreight or cold storage. The fewer kilometres food travels, the lower the greenhouse emissions.

Freshness Supermarket produce can sit in transit or cold storage for days or even months; whereas local food from a farmer's market is often picked within 24 hours. As fresh produce ages, its nutritional value declines.

Taste Have you ever tasted asparagus that was picked just this morning? Fresh, local food simply tastes better.

Seasonal Fruit and veggies in season are cheaper and tastier. Winter supermarket tomatoes are grown to be stored and stacked, not for their taste or texture.

Variety Local produce doesn't need to withstand the rigours of shipping, so farmers can grow smaller yields and more fragile varieties. Supermarkets favour branded fruit and veg like Russet potatoes, Broccolini and Romano Lettuce. They rarely stock fresh figs or ripe heirloom peaches.

Economic Local food generates income for your local economy. It avoids the separation of consumer and producer though the global chain of processors/transporters/retailers.

(Source: <http://www2.acfonline.org.au/category/green-eating>; viewed 24 June 2012)

WASTE

The reason why waste is so important in Australia is because Australians produce so much of it. A study done by the University of Melbourne shows that approximately 21 million tonnes of waste go into Australian landfills every year. This is over 1 tonne per person per year in Australia, making the country the second-highest producer of waste per capita in the world.

RECYCLING

Recycling in the office: Find your closest recycling collection agent at www.recyclingnearyou.com.au.



Battery recycling:

Rechargeable batteries can be used up to 1000 times, making them a cheaper alternative to single-use batteries, and better for the environment. In general, only batteries that can be recharged are suitable for recycling. This includes your car batteries. Service stations will accept car batteries as a trade-in, or you can take the old battery to a metal or battery recycler.

Mobile phones: Over 90 percent of the plastics and metals used in mobile phones, batteries and accessories can be recycled to create new products. Organisations such as the Cerebral Palsy League of Queensland recycle or reuse functional handsets by donating to third world countries.

Printer cartridges: Throughout Australia more than 18 million print cartridges are thrown out every year, amounting to more than 5000 tonnes of waste. Empty print cartridges can be either refilled or recycled. There are specially marked boxes in any Australia Post, Harvey Norman, Officeworks, Dick Smith Electronics or Tandy for recycling.

Computers/Printers: Manufacturing one desktop computer and monitor uses the same amount of chemicals (22kg), water (1500kg) and fossil fuels (240kg) as a mid-size car. You could consider upgrading your existing computer rather than buying a new one, look after your existing computer a little better, or re-use the machine by donating it to friends, family or a charity. Planet Ark has a comprehensive list of approved businesses for recycling.

CLEANING

Spring clean your home. The two essential products you need in your home are vinegar and bicarb soda.

Tips for your bathroom and laundry: If you haven't used it in the last 6 months, dispose of it responsibly. Using products, especially medicines past their use-by date is dangerous, not to mention they take up space and clutter your cupboards.

Keeping products for 'special occasions' means they will never get used. Use, recycle, or dispose of responsibly.

Remove the random items from laundry, old sponges, mop heads.

Tips for your kitchen: Take everything out of your cupboards, pantry and fridge. Dispose of anything past its use by date and empty and clean almost empty jars.

Sort into categories and put opened items at the front to use first.

Consolidate the last bits of pasta, rice, into one of your empty jars so you will use them.

Clearing dust improves circulation and energy efficiency, especially for fridges and ventilation.

Tips for your wardrobe: Take everything out of your wardrobe and sort into three piles: keep, donate and toss.

If you haven't worn it in the last 12 months put it in the donate pile!

For the donate pile use the three F's. Does it fit? Does it flatter? Is it fashionable? Don't keep clothes just because you might fit into it again one day. If you're not wearing it, someone else will and they probably need it more than you.

Get rid of the donate and toss piles straight away to remove the temptation to revisit your good work.

Visit some of these pages for more green cleaning advice:

- www.neco.com.au
- www.todae.com.au

HOME MADE CLEANING SUPPLIES

You can make effective cleaners for just a few cents, using ingredients you probably already have around the home.

Bathtub, sink and tile cleaner: Mix 1.5 cups bicarbonate of soda and half a cup of pure soap powder in a spray bottle. Add half cup of water and 2

tablespoons of white vinegar; stir until all ingredients are dissolved. Shake well before use.

Toilet cleaner: Mix half cup bicarbonate of soda and 1 cup white vinegar in a spray bottle. Spray onto the porcelain, leave for a few minutes then scrub off.

Spray deodoriser: Fill up a spray bottle with 1/2 water and 1/2 vinegar, add a few drops of your favourite essential oil and shake well before use.

Floor cleaner: Mix 1 cup white vinegar and 5 litres of hot water in a 10-litre bucket. Add a few drops of essential oil. Mop floor.

Other natural cleaning ideas:

- Drains can be kept clean using a mix of bicarbonate of soda and salt.
- A wad of newspaper dipped in a little eucalyptus oil will clean the bathroom mirror without leaving streaks, and will keep it fog-free.

(Source: <http://www2.acfonline.org.au/category/reduce-waste>; viewed, 25 June 2012)

FERTILISER AND PESTICIDE

Householders use 20 times more pesticides and fertilisers than farmers. Pesticides and fertilisers used in urban areas can be washed into storm water drains which can end up polluting natural areas and contaminating our food and water. Artificial fertilisers and manufactured pesticides disrupt the natural ecosystem. Provide your own fertilisers by growing green manures and creating compost. And avoid growing rows or blocks of the same vegetable. The following tips will also help:

- Do not over-use products. Follow the manufacturer's instructions regarding amount and frequency of application.
- Look for organic alternatives.
- Plant water wise Australian plants as they are more resistant to pests and disease.
- Visit a car wash that recycles detergent and water. If this is not an option wash your car on the lawn rather than washing it on a hard surface like your driveway or the road.

Did you know? Only about a quarter of the electricity used by a vacuum cleaner sucks up dust. The rest becomes heat and noise. A common misconception is that higher wattage equals a more powerful vacuum cleaner; but it only means it uses more electricity!

THE HOPE CHARTER

HOPE encourages people to take responsibility for their relationship with the environment in their daily lives.

HOPE members have the following aims:

1. To use a little as possible of energy and resources.
2. To create minimal pollution, both directly and indirectly.
3. To prefer, in general, renewable to non-renewable, natural to manufactured, and local to imported.
4. To support and promote 'best practice' natural resource management and landcare activities.

HOPE encourages people:

1. To view environmental problems in their local, economic and global context.
2. To use what is already there, making the most of existing resources, technology and community networks.
3. To create, communicate and celebrate lifestyles which reduce consumption and improve quality of life.

While HOPE endorses individual action, it also encourages people to act together in their local community, and in society as a whole, to further these aims.

HOPE is a non-profit organization and is not affiliated with any political party.

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