

# Introduction

If you are building, buying or renovating, this Technical Manual has been developed to show you how to design and build a more comfortable home that has less impact on the environment – a home that will also be more economical to run, healthier to live in and adaptable to your changing needs.

This Technical Manual contains specific information and practical solutions that you can adapt to your budget, climate and lifestyle.

The ideas and principles outlined in each fact sheet can be applied to any home. Suggestions cover new or existing homes and include villas, units, apartments and freestanding houses anywhere in Australia.

Always remember that whatever you do – no matter how small – it will contribute to your own health, comfort and lifestyle. It will also contribute to the health and wellbeing of the environment which sustains us now and which will sustain future generations.

Our behaviour and the way we build our environment are interconnected. Well designed homes perform best when used in a way that makes the most of their sustainable features.

Adopt a lifestyle that minimises your use of energy, water and resources.

The most important action you can take now is to make a commitment to do all that you can within your budget. Little things, when done by enough people create enormous change.

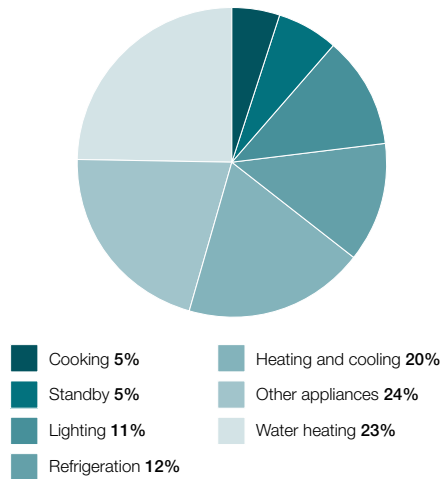
## WHY USE GOOD DESIGN?

### The home front

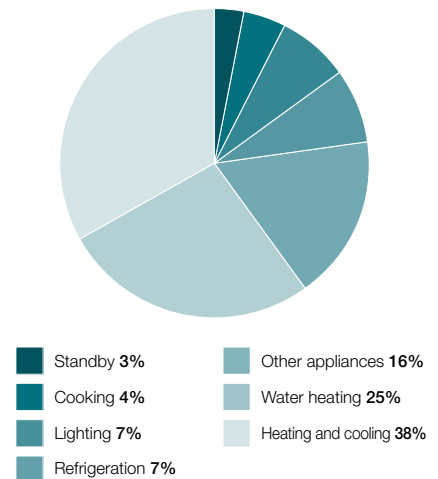
A great majority of Australians live in homes that work against the climate, rather than with it.

These homes are energy inefficient, too cold or too hot and comparatively expensive to run. Most homes use far more water than necessary, and can be made of materials that damage our health and the environment.

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.

Building a home using good design principles can save energy, water and money, while creating a more enjoyable and comfortable home.

The cost of implementing good design ranges from a net saving through to a significant up-front investment that will be repaid throughout the life of the home and increase its value in the future.

### The big picture

Australians currently emit more than 550 million tonnes of greenhouse gases each year. About 20 per cent of this is generated through everyday activities such as heating, cooling, cooking, lighting, driving the car, running appliances, travelling and from household rubbish decaying in landfill. In fact, the average Australian household emits around 14 tonnes of greenhouse gases per home each year.

The 'embodied energy' or energy used to create and transport the materials and furnishings in our homes also generate greenhouse gases.

Other impacts of ill considered building design include a loss of community, reduced natural habitat, increased water pollution and continuing soil erosion.

It now seems likely that the local patterns of our climate will shift and that we will need to adapt our homes and lifestyles to changing conditions.

### One manifestation of climate change is an increasing frequency of extreme weather events such as storms, droughts, floods and bushfires.

Sea levels are also expected to rise. All these risks lead to higher living costs including insurance premiums.

These technical fact sheets can help you respond appropriately to any need for adaptation.

## USING THE FACT SHEETS

The fact sheets in this Technical Manual describe practical ways in which you can implement principles of good design, whether you are a property owner, home buyer, builder, architect, designer or developer. All are important and all will make a difference.

The fact sheets are arranged into broad categories or chapters, each addressing specific aspects of home selection, design, construction and renovation.

1. **Introduction** includes this description of the Technical Manual. It then gives an overview of the issues including some of the history and myths associated with sustainability, and introduces some key concepts and tools.
2. **Sustainable Communities** covers ways to deal with a range of issues that are site related, such as streetscape, community, landscape and biodiversity. It highlights ways to minimise your home's impact on its building site and the impact of your site on the broader environment, as well as how to deal with transport, noise, sediment control and the problems of challenging sites.
3. **Design for Life** is about how to make your home safe, secure, protected from fire, and able to adapt to your changing needs.
4. **Passive Design** deals with design or modification of a home to make it more comfortable and reduce energy consumption in all climates by taking advantage of natural heating and cooling methods.
5. **Material Use** explains the environmental and health impacts of the materials used to build and furnish a home. Choosing environmentally preferred materials can reduce harmful health effects, minimise waste, reduce embodied energy consumption and minimise or eliminate other off-site issues.
6. **Energy Use** will show you how to reduce power consumption in your home and how to take advantage of renewable energy systems.
7. **Water Use** shows how to reduce the water you use inside and outside your home through improved water use efficiency, by using rainwater and wastewater and by designing your garden to need less water.
- 8-11. **Case Studies** presents real life examples of homes from all over Australia where good design principles have been applied. The studies are arranged in four categories:

- > **New Homes** from remote islands to inner-city townhouses.
  - > **Medium Density** includes a range of building types that deliver sustainable solutions.
  - > **High Density** shows that even the most compact inner-city apartments can be sustainable.
  - > **Renovations** demonstrates that almost any existing home can be upgraded to deliver more sustainable, efficient and comfortable lifestyles.
12. **Your Home Checklist** covers the main points that need to be addressed in the search for a more sustainable home.

**Use the *Your Home* checklist as a guide to make a list of the things you most want to achieve. Then find out more about them and how to implement them in these fact sheets.**

## BUILDING A NEW HOME

The fact sheets will help inform your decisions about where you want to live, how you should orient your home and other important design features. The decisions you make at this stage will determine everything else about your home.

Look at the issues covered by all the fact sheets and think about which are important to you. Make a list of priorities to take to an architect or designer for discussion.

**Your choice of architect or designer is important. Make sure their views are compatible with your own.**

Once you have agreed on an initial house design, use the fact sheets to take an imaginary walk through your home. Think about being in the kitchen and apply the fact sheets to water use and energy use. Can further improvements be made to the plans? Going through this process for all facets of your design will help you create a comfortable, economic and environmentally sustainable home.



Renovation of a suburban house in Marion, SA has achieved lower water and energy use, natural lighting and high occupant satisfaction.

## BUYING AN EXISTING HOME

Look at the property and how the home sits on the block.

- > Do the main living areas of the house face north?
- > Is your potential purchase close to the facilities you want and need such as shops and schools, or will it force you to drive more and therefore cost you more over time?
- > Does it look like it could be passively heated and/or cooled?
- > Does it have potential for improvement?

Use the fact sheets to assess whether there is scope for enhancements using good design.



## PLANNING A RENOVATION

Prioritise the things you want to achieve with the renovation, such as more space, a better kitchen, more sunlight, reduced energy and water consumption.

Read the fact sheets to find out about what materials might be suitable, what type of glass would be best in your windows, what sort of lighting you will require and how you might reduce your energy bills with better design.

Think creatively. Do you need to extend or could you achieve what you want just by modifying what you already have? A simple deletion (such as opening up a wall) rather than an addition can often provide the solution you're looking for.

## HOME IMPROVEMENTS

These fact sheets contain plenty of information that will help you improve an existing home. Use the fact sheets to find ways to reduce water and energy consumption.

- > Would a different garden use less water?
- > How can the energy bills be reduced?
- > Can you fit solar panels or replace inefficient appliances with better ones?
- > Is the home well insulated?
- > Can passive cooling or heating be improved?

This process will give you many great ideas about making your home more comfortable, cheaper to run and better for the environment.

## PRIORITISING YOUR CHOICES

Cost is usually the main consideration when choosing what to include and what to leave out. The fact sheets contain advice to suit all budgets and lifestyles.

Creating the perfect sustainable home is beyond many budgets but there are effective options that are free or actually save money. Some low cost actions will rapidly repay a small initial extra investment.

*Your Home* does not prioritise one action or strategy over another. Each is important and can increase comfort or reduce the environmental impact of a home.

We can never be sure what the future may bring, but an adaptable home will be able to accommodate changes in lifestyle as your circumstances change.

Energy efficient, sustainable homes are rapidly increasing in value due to their greater comfort levels and lower running costs. Your home will be in existence for at least 50 years. Its re-sale value will be increasingly linked to the features described in this Technical Manual.

The following considerations are helpful when faced with the many decisions that must be made when designing, buying, building or renovating a home:

- > Reducing energy consumption is an urgent priority. Climate change is already becoming apparent. This will inevitably lead to rising prices for energy from non-renewable sources. [\[See: 4.0 Passive Design; 6.0 Energy Use\]](#)
- > Water is in critically short supply in Australia. Rising demand for household water supply is competing with the needs of agriculture

and both are reducing the environmental flow required to keep our rivers and waterways healthy. [\[See: 7.0 Water Use\]](#)

- > Australian soils are fragile. Soil loss and degradation from inappropriate vegetation clearing and excavation is accelerating. [\[See: 2.1 Sustainable Communities\]](#)
- > Air quality is essential for health. Outdoor air quality is declining rapidly in most cities. Indoor air quality is dependent on outdoor air but has the added burden of toxins and gases emitted from the materials and furnishings in our homes. [\[See: 3.3 The Healthy Home\]](#)
- > Conservation of biodiversity is essential to maintain the ecological systems that sustain us now and into the future. These systems produce the food we eat and purify the air and water we need to survive. [\[See: 2.5 Biodiversity On-site; 5.4 Biodiversity Off-site\]](#)
- > Waste is an unnecessary consumer of precious resources and can poison our environment when disposed of. It can easily be avoided or minimised. [\[See: 5.2 Waste Minimisation\]](#)

## SUSTAINABILITY & THE BUILDING SECTOR

The generally accepted definition of sustainable development is 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987, Brundtland Report).

In practice this means living in harmony with the natural environment, considering the social, environmental and economic aspects of decisions, and reducing our footprint through a less energy, water and material intensive lifestyle. Social sustainability is also important and working towards a healthy and safe community is often interconnected with economic and environmental endeavours.

The building sector which comprises consumers, builders, architects, designers, manufacturers, government regulators, marketing agents and developers all face the challenge of developing sustainability in the built environment.

The built environment has in the past and in some cases continues to:

- > Consume significant amounts of the earth's resources (especially energy).
- > Generate polluting toxins and waste.
- > Create conditions leading to a loss of soils and biodiversity.
- > Interfere with life support systems (eg. the water cycle, soil systems and air quality).
- > Exacerbate urban sprawl, traffic pollution, social inequities and alienation.

The building sector is working to identify and implement avenues of reform that will reduce its environmental impact and improve social cohesion.

If economic and social development is to continue without destroying the environment that sustains us, each and every member in the building sector must play their part in finding new pathways to sustainable futures.

### Consumers

Consumer demand for housing has a significant influence on the market and the finished product provided by architects, designers, builders and developers.

Consumers are usually the building operators. Many adverse environmental impacts of housing arise during operation. This is particularly true of energy consumption and waste generation.

A clear understanding of how to operate a home and adopt the lifestyle options recommended in this Technical Manual will significantly reduce the operational impacts of a home whilst improving comfort, health and finances.

Consumers have a major role in making housing more sustainable. Awareness of environmentally sustainable design principles and expressing these preferences to marketers, architects, designers and builders will create great change.

### Builders

Australian builders and trades people have demonstrated time and again their ability to adapt to new trends, regulations and technology. Building more sustainable houses is but one more challenge to which many builders have already risen.

Building is a very cost competitive industry. A 'level playing field' is essential to support the builder's role in creating more sustainable housing. Quotations should itemise things such as insulation levels, shading details, window performance and durability of materials and appliances – these are essential elements of a home just like the roof and walls and should not be treated as optional extras.

### Architects and designers

Architects and designers of buildings bear much responsibility for the sustainable performance of the whole industry. They are the first link in the construction chain. The majority of important decisions affecting lifetime performance of buildings are made during the design stages.

Architects and designers have a leadership role in implementing sustainable reform. This Technical Manual provides guidance and tools to create practical, affordable and sustainable solutions.

### Manufacturers

Manufacturers, like builders, provide products to meet regulatory standards or demand driven by consumer preferences.

Many manufacturers are discovering that they gain a distinct market advantage over their competitors by developing and marketing more sustainable products. The same is true for designers, builders and developers.

## Governments and regulators

All levels of Government are working hard to implement sustainable reform. In our democratic society, elected representatives require clear mandates and support from the community to achieve this effectively.

By raising awareness and providing solutions, this Technical Manual will help create the platform for such mandates and encourage community support for reform agendas.

## Marketing agents and developers

Marketing agents and developers respond to market needs. Their success depends on their ability to gauge the needs and wants of consumers and meet them with cost competitive products.

Experience with Newington Olympic Village and many other similar ventures across Australia have shown that the market is more than ready to embrace sustainable housing and that developers and marketers can supply it.

Developers and marketers also have a strong leadership role in implementing sustainable reform in the industry.

The *Your Home* Technical Manual will support this role by raising consumer awareness and demand and providing guidelines and technical information on implementation for architects, designers, builders, and you the consumer.

### ADDITIONAL READING

Contact your State / Territory government or local council for further information on building sustainability and energy efficiency, including what rebates are available.  
[www.gov.au](http://www.gov.au)

Australian Council of Built Environment Design Professionals. *Environment Design Guide*.  
[www.environmentdesignguide.net.au](http://www.environmentdesignguide.net.au)

Australian Greenhouse Office (2005), *National Greenhouse Gas Inventory 2005*.  
[www.greenhouse.gov.au/inventory/2005/pubs/inventory2005.pdf](http://www.greenhouse.gov.au/inventory/2005/pubs/inventory2005.pdf)

Department of the Environment, Water, Heritage and the Arts (2008), *Australian Residential Sector Baseline Energy Estimates 1990 – 2020*.

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