CHAPTER 1

BENEFITS OF ENERGY SMART HOUSING

The contents of this chapter outline what is meant by energy smart housing. While bringing a range of other benefits to householders, designers, builders and the community, energy smart housing can also help save energy.

Energy smart design

Energy smart design is synonymous with good house design. Energy smart homes can be up to 5°C warmer in winter and up to 10°C cooler in summer, making the home brighter and more comfortable to live in throughout the year. Energy smart design enables substantial savings to be made on the running costs of heating, cooling and lighting, and will minimise greenhouse gas emissions and pollution from the use of fossil fuels.

Household energy use can be reduced by 60–70% if energy smart design and energy saving appliances are used. Energy savings can total over $800 each year, or more than $20 000 over the average 25-year home mortgage.

'Energy smart design' is a broader concept than what is sometimes labelled 'passive solar' or 'solar efficient design'. Energy smart housing minimises the use of non-renewable energy (coal, oil and natural gas), and provides year-round comfort and energy savings, without any adverse impact on the aesthetics of the home.

Overall energy savings depend on a combination of the three factors listed below.

1. **Energy smart house design:** for example, appropriate siting, correctly orientated and sized windows, incorporation of thermal mass, correct levels of insulation, ventilation and draught proofing.
2. **Selection and correct installation of energy smart services and appliances:** for example, heating, cooling, hot water, lighting and whitegoods.
3. **Responsive and responsible user behaviour:** for example, appropriate thermostat settings for heating/cooling systems and refrigerators, closing doors and windows to heated areas, closing curtains when heating rooms, switching off appliances when they are not in use and maximising appliance operating capacity.

Benefits of energy smart design

ADVANTAGES TO HOUSEHOLDS AND THE COMMUNITY

Energy smart design benefits householders with year-round comfort and substantial savings on energy bills. The community benefits from reduced greenhouse gas emissions which protects the environment, conserves our precious non-renewable natural resources, and reduces the need for further power stations to be built.

ADVANTAGES TO DESIGNERS AND BUILDERS

Designers and builders who build energy smart homes benefit from having clients who are satisfied with the comfort of their new home, and from recognition of their commitment to energy efficiency. Major building awards now have categories where energy smart design is recognised.

Market research undertaken by the Sustainable Energy Authority confirms that first home buyers are interested in potential dollar/cost savings on their energy bills when living in an energy smart house. The research also showed that second and subsequent home buyers are also seeking the improved comfort and lifestyle that an energy smart house provides.

Overall, it is clear that designers and builders of energy smart homes can give their business a marketing edge by being recognised for commitment to energy efficiency while providing client satisfaction in the comfort of their new home.

BUILDING COSTS

Many people think that the higher costs that may be associated with building an energy smart house will amount to more than the cost of higher energy bills. In most cases, careful consideration at the design stage can add energy smart features at no additional cost.
Such features include correct orientation and room layout of the home, appropriate sizing and placement of windows, provision of natural ventilation, and, where possible, use of heavyweight building materials to provide thermal mass, such as concrete slab floors.

Other aspects such as insulation and energy smart heating systems, hot water systems and appliances are available that add a small amount to the initial cost of building or renovating, but will quickly pay for themselves with reduced running costs.

The principles of energy smart house design are simple, practical and cost little or nothing to put into practice while they add value to any home.

Energy consumption

CURRENT ENERGY USE

The residential sector in Victoria uses approximately 28% of all natural gas and 29% of the total electricity consumed in the state. Home heating and cooling accounts for half of the energy used, and water heating accounts for approximately one quarter. Figure 1.1 gives a breakdown of energy use in a typical Victorian household.

FUTURE ENERGY USE

The trend for household energy consumption levels is that they will continue to increase. This is due, in part, to greater use of central heating and air conditioning which is often installed in homes where energy smart means of maintaining comfort levels have not been sufficiently explored. This makes it even more vital to maximise the level of energy efficiency in new homes and renovations.

IMPACTS OF INCREASING ENERGY USE

Increased energy consumption means faster use of non-renewable resources, bringing forward the time at which additional power generation plants will be required, and an increase in the emission of greenhouse gases associated with energy use. For the householder, the most noticeable impact will be higher energy costs. An inefficient home can use two to three times more energy than an energy smart house design, costing over $1000 more in energy bills per year.

GREENHOUSE IMPACTS AND ENERGY USE

The gas most responsible for the greenhouse effect is carbon dioxide (CO_2). In 1999, Victorians contributed 112.8 million tonnes of carbon dioxide to the atmosphere. Figure 1.2 shows the total annual Victorian energy consumption and greenhouse gas emissions by economic sector. The domestic sector uses 12% of the total energy consumed in Victoria and accounts for around 15% of carbon dioxide emissions.

The choice of fuel for heating, hot water and cooking has significant greenhouse impacts, with gas and renewable energies having much lower greenhouse gas emissions than brown coal derived electricity. Electricity produced by hydro, wind or solar systems produces no greenhouse gases.

By selecting fuels with low greenhouse impact and by reducing our energy consumption, we can move toward meeting Australia's commitment to the international greenhouse gas emission targets.

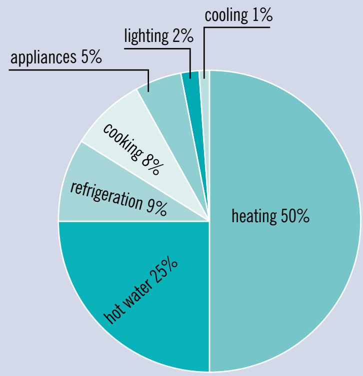

Figure 1.1: Energy use in a typical Victorian household

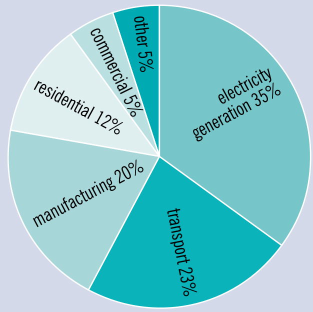

Figure 1.2: Energy consumption for economic sectors in Victoria 1999–2000

LIFECYCLE GREENHOUSE IMPACTS

House siting and design, and the selection of efficient heating, cooking and lighting appliances have a lifecycle impact which can outweigh the impact of decisions regarding the choice of building materials and construction type.

Table 1.1 compares the lifecycle greenhouse impacts of a range of measures that affect energy consumption. It demonstrates the significance of looking at both annual and lifetime impacts and highlights the importance of fuel type, solar access (unobstructed winter sun) and orientation.

Table 1.1: Lifecycle greenhouse impacts (tonnes CO_2 equivalent)

MEASURE	ANNUAL IMPACT[1]	LIFECYCLE IMPACT[1]
INFRASTRUCTURE (150 YEAR LIFE)		
Energy use due to indiscriminate lot orientation, fair solar access, detached house	3.1	465
Energy use due to solar lot orientation, good solar access, apartment	1.7	255
HOUSE CONSTRUCTION (40 YEAR LIFE)		
(Energy in manufacture of material)		
Brick veneer with concrete slab	<0.75	<30
All timber house[2] (energy use trade-offs may occur as mass varies)	<0.25	<10
APPLIANCES (15 YEAR LIFE)		
Hot water systems		
Electric	5.6	84
Solar electric[3]	2.2	33
Electric heat pump	1.5	23
Gas hot water (2 star rating)	1.5	23
Gas hot water (5 star rating)	1.1	16
Solar gas[3]	0.6	9
Heating		
Electric slab heating	22.6	225
Ducted reverse cycle air conditioning	9.2	138
Gas ducted heating	4.5	68
Gas space heater	1.4	21
Lighting		
Ten 100W incandescent globes	1.9	28
Ten 20W fluorescent globes	0.4	6
Cooking		
Electric cooker	1.4	21
Gas cooker	0.4	6

1 Based on greenhouse coefficients of 1.3 kg CO_2/kWh for electricity and 0.06 kg CO_2/MJ for natural gas.
2 Excludes energy content of wood as potential fuel source.
3 Assumes solar contribution of 65%, typical for southern Victoria.