

# 5 Star – What to do now and for the future



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# Victoria's building industry – meeting 5 Star



The 5 Star Standard for all new houses\* in Victoria comes into full effect from 1 July 2005, after a 12-month transition period. This means it is compulsory for new houses to have:

- 5 Star energy rating for the building fabric; plus
- A rainwater tank for toilet flushing or a solar hot water system.

Without these required elements, a building permit for a new house will not be issued.

The standard applies to all new houses and apartments (BCA Class 1 and 2 buildings). Apartment buildings need to achieve a 5 Star average for the whole building, and no individual dwelling rating less than 3 Stars.

To enable building industry professionals and homebuyers the opportunity to get used to the 5 Star Standard, a 12-month transition period was introduced on 1 July 2004. During this period, three options have been available to achieve 5 Star. The transition period ends on 30 June 2005.

The transition period has worked successfully, with building professionals in their day-to-day contact with clients informing and educating homebuyers of the benefits of 5 Star and how to achieve it.

As the transition year has shown, achieving 5 Star is straightforward and, with good design, adds little to the cost of building while greatly benefitting the environment.

5 Star is great for the environment and the long-term future of Victoria's energy and water resources. It is also great for homeowners who will enjoy the increased comforts of a 5 Star house as well as cost savings on their energy and water bills.

The building industry is to be congratulated for the important role it is playing in the implementation of 5 Star – which is about creating a sustainable future for all Victorians.

## Benefits of 5 Star houses

**Comfort** – up to 5 degrees warmer in winter and 10 degrees cooler in summer.

**Energy and water savings** – 50% more energy-efficient for heating and cooling and a reduction in water consumption of up to 25%.

**Household budget savings** – energy bills cut by about \$200 and water bills by \$50 each year.



\* The transition period has been extended for houses with a timber sub-floor construction and mudbrick and relocatable houses. See page 7.

## Builders back 5 Star

In February 2005, the Building Commission and the Housing Industry Association commissioned a survey of 600 Victorian builders on their awareness of, and compliance with, energy and water efficiency related building standards. Findings included:

- 74% were either highly or very highly prepared for the current 5 Star arrangements.
- 27% needed to make no changes to the house designs they were building for the introduction of 5 Star.
- 56% felt it was easy or very easy to meet the current standard, while only 10% found it difficult-to-very difficult to meet the current standard.
- 90% were usually meeting the regulatory requirements for 5 Star.



## Flow-on benefits to the industry

Implementation of the 5 Star Standard is having a flow-on benefit to the Victorian building industry. Designers and builders are developing skills and knowledge in environmentally-sustainable house building and design that can be marketed nationally and internationally.



## Does 5 Star cost more?

Feedback from the Building Commission – HIA research suggests that residential building costs have increased by a median in the range of 3% to 5% in order to achieve 5 Star. When a major volume builder upgraded all its project home designs to 5 Star in 2002, it found the extra cost was at the lower end of the range.

Good design, particularly the use of materials and space, will ensure that building cost increases are kept as low as possible. Any increases will be offset by ongoing savings on energy bills for heating and cooling, and lower water bills.

In addition, history shows that any costs of complying with the 5 Star Standard can be expected to reduce rapidly over time. In a submission to a Productivity Commission inquiry into energy-efficiency, the Insulation Council of Australia and New Zealand highlighted how, when insulation regulations were introduced in Victoria in 1990, the price of insulation fell.

### Cost and financial savings

Within five years, 5 Star is expected to deliver annual energy savings in Victoria of up to \$40 million. In the same timeframe, energy-efficient houses will save Victoria more than 600,000 tonnes of greenhouse gases – the equivalent of removing 150,000 cars from our roads or planting 750,000 trees.

Over the next 20 years, 5 Star will mean:

- Increased economic growth in Victoria of up to \$720 million
- 1,800 new jobs in the sustainable product manufacturing sector
- Less money spent in the energy sector and more on energy-efficient building products and services
- Lower energy prices as more than 30,000 houses built each year use half today's energy consumption for heating and cooling.

# Government has listened

## – 5 Star is flexible

While the 5 Star Standard is compulsory, it is a flexible regulation, with a range of options available to achieve the standard. This means designers, builders and homeowners have considerable choice in the design and construction of their houses.

From 1 July 2005, all new houses\* require a 5 Star energy rating for the building fabric, plus a rainwater tank for toilet flushing or a solar hot water service. There is an unlimited range of options available to achieve the 5 Star energy rating. These include simple things such as increasing the level of insulation, draught-proofing, orientation of the house on the block, internal design and better glazing.

An information campaign about 5 Star for industry professionals commenced in late 2003. Since then, the Building Commission, the Sustainable Energy Authority Victoria, the Plumbing Industry Commission, the Housing Industry Association and the Master Builders Association Victoria, have all been involved in a strategic program of training and awareness seminars on 5 Star to around 9,000 designers, builders and plumbers across the state. Many other industry organisations have also undertaken training programs.

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\* See page 7.



## Timber sub-floor, mud brick and relocatable sectors

The timber sub-floor, mud brick and relocatable house sectors raised concerns about their ability to meet the 1 July 2005 deadline. After considering these concerns, the government recognised the specific issues facing the sectors and extended the transition period until May 2006 for these types of construction only. May 2006 is when the Australian Building Codes Board is expected to bring in 5 Star nationally through the Building Code of Australia.

This means that until 30 April 2006, houses built with timber sub-floor construction and mud brick houses can meet the requirements of the standard by having:

- 5 Star energy rating for the building fabric; or
- 4 Star energy rating for the building plus either a rainwater tank for toilet flushing or a solar hot water system.

Relocatable houses will remain exempt from the requirements of the 5 Star Standard until 30 April 2006.



### Underfloor insulation

The approach to successfully designing an energy efficient lightweight house with timber sub-floor construction will be different to the approach that works best for a design with high thermal mass, such as double brick on a slab floor.

The Australian Greenhouse Office estimates that up to 20% of heat (and subsequently energy) can be lost through a floor in winter.

There is an increasing range of underfloor insulation products on the market, including bulk insulation, foam board, foil and bubble-foil blankets. However, underfloor insulation may be unnecessary if other aspects of building envelope design, such as windows, wall and ceiling insulation and orientation are addressed.

# Complying with 5 Star from 1 July 2005

As the Building Commission-HIA survey of builders found, more than a quarter of respondents believed that they would not have to make any changes to the houses they were building to achieve the 5 Star Standard when it comes into full effect on 1 July 2005.

Most of the other respondents believed they could achieve the standard with a few simple adjustments to design and construction, and by including a combination of the many options to improve energy-efficiency, such as:

- Insulation
- Draught-proofing
- Better designed windows (including size, quality of frames and double-glazing)
- Shading
- Better building fabric (including selection of cladding materials, flooring etc)
- Orientation on the block.

To achieve the 5 Star Standard, a house must also have either a rainwater tank for toilet flushing or a solar hot water system. It is possible to have both, but the addition of one will ensure achievement of the 5 Star Standard. Where a reticulated water supply is unavailable, a solar hot water system is not mandatory for a house installed with a rainwater tank. However, the installation of a solar hot water system is recommended as it greatly reduces running costs.

## Natural light & windows

Choose a northerly aspect for daytime living areas because north-facing rooms get more sun in winter and can be easily protected in summer. This can be achieved by shading from wide eaves, verandahs, pergolas or shutters.

In addition to providing views and allowing natural light and fresh air to enter, windows also allow heat to enter and leave a home quickly. How windows are oriented, their size and type all have an impact on the energy-efficiency and comfort of the house.

Use thermally improved windows for some or all windows – this includes choice of window frames and/or type of glass, such as double glazing, which can dramatically reduce winter heat loss. Double glazing also overcomes the need to reduce window sizes – particularly on south-facing windows.



## Having a house rated

5 Star houses must be formally certified by a House Energy Rater (HER) who is accredited by the Sustainable Energy Authority Victoria (SEAV) and who has completed a computer assessment of house plans using rating software. Accredited raters can also provide advice on achieving a 5 Star energy rating.

The Victorian Appendices to the Building Code of Australia references two software products for rating a house – FirstRate (developed by the SEAV) and NatHERS. Once an assessment has been completed and the house meets the criteria, a rating report is issued by the accredited rater, certifying that it meets 5 Star energy-efficiency rating for the building fabric.

FirstRate takes the guesswork out of energy-efficient design and can be used by builders, designers, architects or anyone interested in energy efficient house design. Details on how to gain accreditation in its use and a list of accredited raters is available from SEAV or through its website [www.seav.vic.gov.au](http://www.seav.vic.gov.au).

House energy ratings must include details of existing adjacent buildings and structures that overshadow the windows of the building being rated.

Applicants must provide evidence separately that the proposed building will include either a rainwater tank or a solar hot water system and that the other water requirements will be met.

### 'R' value

The 'R' value is the most important aspect of choosing insulation. It is the measure of the product's resistance to heat transfer and is a guide to its performance as a heat insulator. The higher the 'R' value, the more effective the insulation in reducing heat flow in or out of the house. For houses in Melbourne the minimum recommended 'R' level is R2.5 to R3.0 for ceilings and R1.5 for walls.





## Working with a relevant building surveyor

A building permit applicant must provide the relevant building surveyor (RBS) with evidence that the proposed building design will achieve the 5 Star Standard. Information provided must include details of water tanks or solar hot water systems, including size and location, so the RBS can ensure that any possible effects on the structure have been considered. The RBS must also see all the relevant plumbing Compliance Certificates before an Occupancy Permit can be issued.

**Occupancy Permit stage** – During building works, the RBS may want to make additional inspections in line with the requirements of the approved HER report. If necessary, the RBS can request that the builder provide a statement of compliance regarding energy and water-efficiency features. FirstRate will automatically produce a statement that lists all the energy features and has sections for the builder to detail any changes made.

### **Minimise stairwells and high ceilings**

Hot air rises, which means high ceilings and large stairwells can increase a house's heating requirements by up to 40%.

## The role of plumbers

Plumbers have an important part to play in implementing the 5 Star Standard. The standard can only be achieved if, in addition to a 5 Star energy rating for the building fabric, a rainwater tank is connected for toilet flushing or a solar hot water system is installed. In these cases:

- The rainwater tank must have a minimum capacity of 2,000 litres and a minimum roof catchment area of 50m<sup>2</sup>. It must be connected to the sanitary flushing system.
- Solar hot water systems must achieve a minimum energy performance of 60% solar gain after 1 July 2005. Where reticulated gas is available, then any solar hot water system incorporating a booster must use reticulated gas as the energy source for boosting.

Flow rates play an important part in meeting water saving goals under the 5 Star Standard, with the use of water-efficient showerheads and taps. The *Plumbing Regulations 1998* specify minimum and maximum flow rates from new showerheads and outlets to basins, kitchen sinks and laundry troughs.

### Plumbing pointers

- Efficient water use is an important part of the 5 Star Standard. Shower head, basin, kitchen sink and laundry trough tap flow rates cannot be more than 9 l/min or less than 7.5 l/min.
- Maximum outlet pressures within a building where there is a reticulated water supply installed must not exceed 500 kPa static pressure.
- Flow and return pipes for solar water heaters must be insulated to achieve a minimum 'R' value of 0.3.



# Where to from here?

For many builders and homebuyers, 5 Star is just the beginning. In Europe and North America, houses with energy ratings in excess of 5 Star are already commonplace.

The FirstRate software already rates houses up to 6 Stars, and the principles for designing a 6 Star house are similar to those for a 5 Star house.

At several new estates in Victoria, such as the Commonwealth Games Village in Parkville, and VicUrban's Aurora in Melbourne's north, 6 Star houses are already being built or are on the drawing board. The design guidelines for Aurora emphasise the importance of orientation and taking a holistic approach to planning both individual houses and the estate as a whole.

With increasing awareness and interest in designing, building and living in sustainable, energy-efficient houses, builders and consumers who wish to go further than 5 Star have plenty of choices. This can include using grey water for gardening, car washing and toilet flushing, and consideration is being given to the use of rainwater for hot water.

Houses can offer high-tech IT systems that can run energy smart features such as sensor lights that switch off when a room empties and hybrid domestic systems that allow for the air-conditioning to automatically switch off if a window is opened. Another option, "smart glass" for the windows, can be lightened and darkened in response to different light conditions. These features do not contribute to the energy rating but are available as energy-efficiency features.

There are many ways to achieve the 5 Star Standard and beyond. Through their knowledge of the design and building process and the way they work with clients, building professionals have an important role to play in helping to build a sustainable future for all Victorians.

## Great places to live

People who are already living in 5 Star houses are the best advertisements for the new regulations:

**Richard Ferris** (Melbourne) – "We put in a split system air conditioner as a back-up but in two years have hardly used it. When we come home and it's been 39 degrees outside, it's 24 degrees inside and that's without turning on the air conditioner."

**Tim Flint** (Melbourne) – "In winter, my house never drops below 15 degrees. Ever. Building to a 5 Star energy rating has given my home a real quality feel. You know how some houses are cold. Not this one. It's warm and it's quiet."

**Chris Dickinson** (Melbourne) – "There's definitely been cost savings. We have a bigger, more open house than before and we note that our gas and electricity bills would be a lot more if we weren't living in a 5 Star home."

# Where to go for more information on 5 Star



The following organisations are key sources of information on the 5 Star Standard in Victoria:

## **Building Commission**

Tel 1300 360 380

[www.buildingcommission.com.au](http://www.buildingcommission.com.au) – Click on the “5 Star” logo, then look under “Further Information” for 5 Star Practice Notes – Residential Sustainability Measures Practice Note 2005-55, 5 Star Technical Sheet and 5 Star FAQs.

## **Plumbing Industry Commission**

Tel 1800 015 129

[www.pic.vic.gov.au](http://www.pic.vic.gov.au) – Click on “5 Star Plumbing” and read “Stop Press”. Click on “Technical Solutions” and search rain water tanks, cold water plumbing, hot water plumbing, and grey or recycled water.

## **Sustainable Energy Authority Victoria**

Tel 1300 363 744

[www.seav.vic.gov.au](http://www.seav.vic.gov.au) – Click on “Building” then go to “5 Star Homes” (information about the 5 Star Standard) and FirstRate (information on the rating software, its cost, how to obtain a demonstration version and a list of Accredited Raters). Also under “Building” check out the Energy Smart Housing Manual, which is designed to enable builders, designers and homeowners maximise the energy-saving potential of any property or house design. Available online and is downloadable.

## **5 Star House**

[www.5starhouse.vic.gov.au](http://www.5starhouse.vic.gov.au) – An online consumer brochure about 5 Star. It includes frequently asked questions and information about the 5 Star “partners” – the Building Commission, the Plumbing Industry Commission and Sustainable Energy Authority Victoria.



### **Housing Industry Association**

Tel 9280 8200

[www.buildingonline.com.au](http://www.buildingonline.com.au) – Click on “Victoria”, then go to “Technical Sheets”. Click on “What is the Window Energy Rating Scheme, Building a Water Efficient Home”. Go to “Related Sites” and click on link to HIA Greensmart page.

### **Master Builders Association of Victoria**

Tel 9411 4555

[www.mbav.com.au](http://www.mbav.com.au) – Click on Building Services. Members click on “Members” and follow the prompts.

### **Master Plumbers and Mechanical Services Association**

Tel 9329 9622 or 1800 133 871

[www.plumbers.com.au](http://www.plumbers.com.au) – MPMSAA has established GreenPlumbers® as an initiative for plumbers wishing to learn and build their knowledge and skills about environmental consideration in their work. Click on “Green Plumbers”, which takes you to [www.greenplumbers.com.au](http://www.greenplumbers.com.au), for a range of information on environmental issues relating to plumbing.

### **Your Home**

[www.greenhouse.gov.au/yourhome](http://www.greenhouse.gov.au/yourhome) – Your Home is a suite of consumer and technical guide materials and tools to encourage the design, construction or renovation of comfortable, healthy and environmentally sustainable houses. It also contains practical solutions for common design problems. It is available as a colour magazine with a CD ROM. Phone 1300 130 606 for a free copy. The Your Home Technical Manual is written by designers and builders and contains more than 60 fact sheets. It can be purchased from a range of industry and community organisations, or ordered online.

**Builders can see examples of 5 Star houses and products that contribute to 5 Star at the following trade and information display centres and villages:**

### **Building Display Centre**

332 Albert Street, East Melbourne.

Tel 9419 7488.

Three floors of building products and fittings, plus brochures, technical advice, library and bookshop and a regular program of seminars.

[www.buildingdisplaycentre.com.au](http://www.buildingdisplaycentre.com.au)

### **HIA Greensmart Village**

Innisfail Estate, Dunnings Road, Point Cook.

Tel 9395 2155.

Nineteen homes built to the 5 Star Standard highlight the many options available to achieve the standard.

### **VicUrban EcoHome**

Cairnlea Estate, 69 Furlong Road, Cairnlea.

Tel 9363 2800.

A joint project between Metricon Homes, RMIT and Deakin universities and industry stakeholders, including the Building Commission. Showcases energy and water efficiency features.

### **Sharland Estate – Ecohouse in Geelong**

7 Lomandra Ave, Hamlyn Heights, Geelong.

Tel 1300 656 007.

The Sharland Oasis in Geelong has been developed by Barwon Water as the region’s first ecologically-sustainable display home. Its tank-to-toilet rainwater systems, solar energy and environmentally-friendly construction materials show how average residential water and energy costs can be cut by up to 80 per cent.

# Notes





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