

7 STAR HOMES USING BRICK

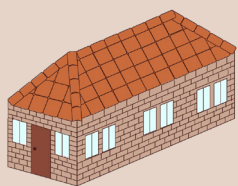
CASE STUDIES ON HOW TO ACHIEVE AN ENERGY EFFICIENT HOME

Midland Brick

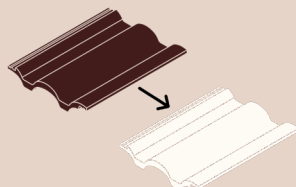
THINK
BRICK
AUSTRALIA

This fact sheet investigates the thermal performance of two single residential dwelling units when constructed in the Perth Metropolitan Area and Mandurah. The thermal performance of two houses have been analysed by Bezant Consulting to determine their compliance with National Construction Code (NCC) 6- and 7-star target requirements. The houses were tested in different climates, orientations, and walling configurations to showcase the benefits of brick systems, in particular cavity brickwork, when reaching 7 star rated homes. **This fact sheet addresses the ability of cavity brick construction to meet 7-star objectives** and includes comparisons to brick veneer construction with alternatives for timber and steel framing.

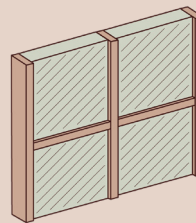
The 7-star compliance options assessed were:



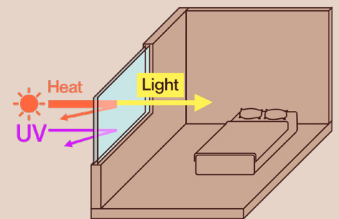
Basic design
– standard specification



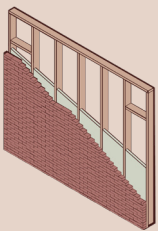
Change roof colour
(dark to light)



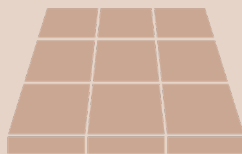
Insulate internal walls to roof



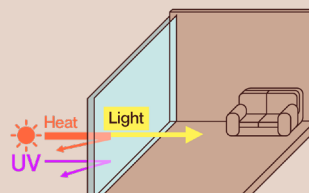
Low-e glass*
to Bedrooms and laundry



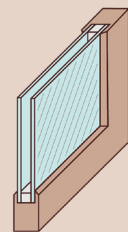
External wall
insulation



Floor tiles to
kitchen/family



Low-e glass*
to Living areas



Double glazing

*Maintains single glazing and standard aluminium frames while improving the thermal performance of the glazing system with the inclusion of low-e glass in lieu of clear glass.

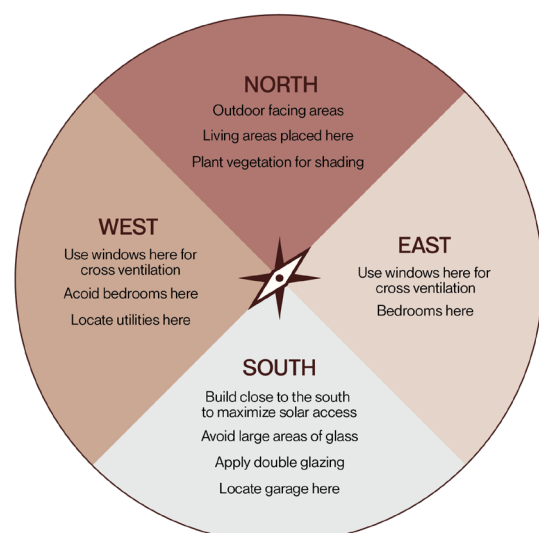
The results for 2 case study homes in NCC Climate Zone 5 are summarised on the pages over. Climate zone 5 includes Sydney, Perth and Adelaide.

IMPORTANCE OF PASSIVE DESIGN

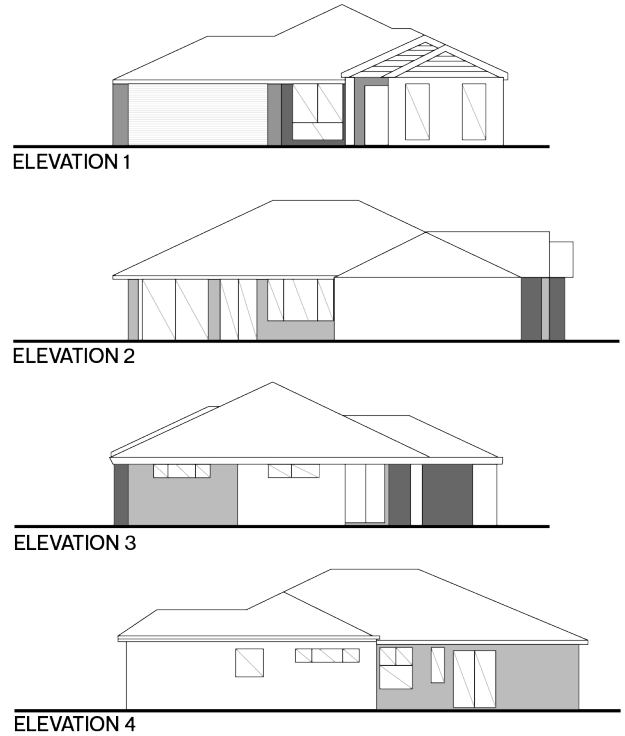
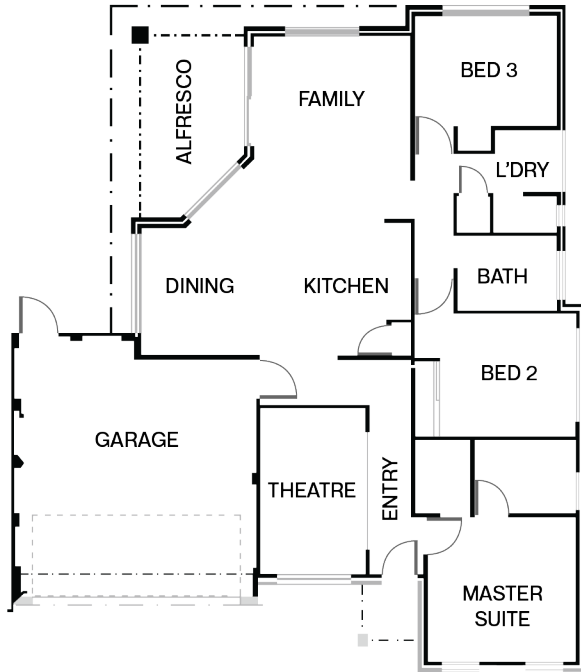
'Passive design' is design that works with the local climate to maintain a comfortable temperature in the home. A passively designed home can deliver a lifetime of thermal comfort, low energy bills, and low greenhouse gas emissions. With passive design, building features such as orientation, thermal mass, insulation and glazing work together to take advantage of natural sources of heating and cooling, such as sun and breezes, and to minimise unwanted heat gain and loss.

Utilising materials which have high thermal mass can assist in passive design. The thermal mass of bricks allows them to store heat in winter and absorb excess heat in summer, resulting in energy efficient temperature regulation that can significantly reduce artificial heating and cooling costs.

How to orient your home for passive design



SAMPLE HOUSE 1



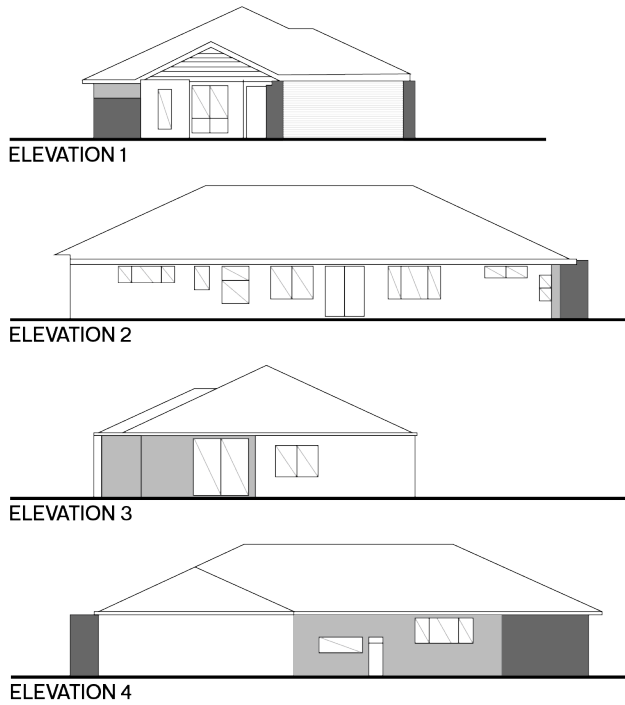
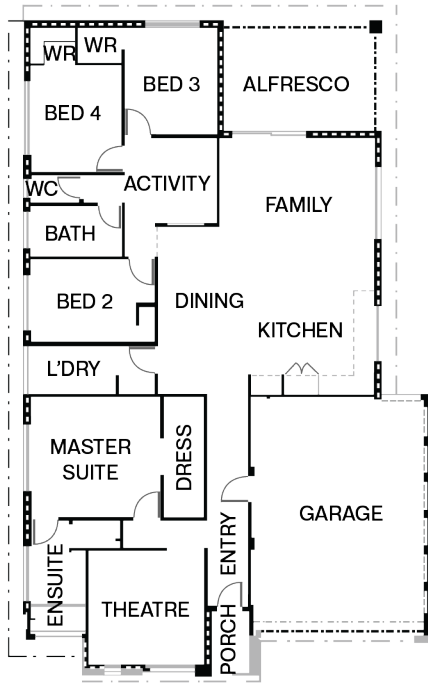
PERTH SAMPLE HOUSE 1 STAR RATINGS	Cavity Brick				Timber Frame Brick Veneer				Steel Frame Brick Veneer			
	Orientation				Orientation				Orientation			
	0°	90°	180°	270°	0°	90°	180°	270°	0°	90°	180°	270°
Base design	4.6	4.9	5.4	5.2	4.2	4.3	4.4	4.4	3.6	3.9	4.1	4.2
External wall insulation	5.4	6.1	6.6	6.4	4.4	4.6	4.8	4.8	3.8	4	4.2	4.4
Change roof colour dark to light	5.5	6.1	6.6	6.4	4.6	4.8	4.9	4.9	3.9	4.4	4.5	4.7
Floor tiles to kitchen/family	5.9	6.3	6.7	6.6	5.1	5.4	5.5	5.4	4.4	4.8	4.9	5.1
Insulate internal walls to roof	6.1	6.4	6.9	6.7	5.4	5.6	5.6	5.7	4.7	5.1	5.1	5.3
Low-e glass to living areas	6.4	6.7	7.3	7.2	5.9	6	6.2	6.3	5.1	5.3	5.4	5.8
Low-e glass to bedrooms	6.6	6.9	7.4	7.2	6.1	6.2	6.3	6.4	5.2	5.7	5.8	5.9
Double glazing	7.3	7.6	7.9	7.9	7.1	7.1	7.3	7.4	6.2	6.5	6.6	7.1

MANDURAH SAMPLE HOUSE 1 STAR RATINGS	Cavity Brick				Timber Frame Brick Veneer				Steel Frame Brick Veneer			
	Orientation				Orientation				Orientation			
	0°	90°	180°	270°	0°	90°	180°	270°	0°	90°	180°	270°
Base design	3.9	4.7	5.3	5.3	3.6	4.8	4.2	4.3	3.6	3.8	4.2	4.3
External wall insulation	5	6	6.4	6.4	3.9	4.1	4.6	4.8	3.8	4.1	4.5	4.7
Change roof colour dark to light	5.1	6	6.6	6.4	4	4.6	4.9	5.1	3.9	4.5	4.9	4.9
Floor tiles to kitchen/family	5.6	6.1	6.7	6.6	4.9	5.3	5.5	5.4	4.8	5.2	5.4	5.4
Insulate internal walls to roof	5.8	6.3	6.8	6.7	5.3	5.7	5.7	5.8	5.2	5.5	5.5	5.7
Low-e glass to living areas	6.3	6.7	7.2	7.2	5.8	5.9	6.1	6.3	5.6	5.8	6	6.2
Low-e glass to bedrooms	6.4	6.9	7.3	7.2	5.9	6.3	6.3	6.4	5.8	6.2	6.2	6.4
Double glazing	7.2	7.6	8	7.9	6.9	7	7.2	7.4	6.8	6.9	7.1	7.3

By analysing the data, it is clear to see the ability of Cavity Brick construction to meet 7-star objectives is much greater than Timber Frame Brick Veneer and Steel Frame Brick Veneer. Alternative orientation plays a big role in regards to energy rating where some variations in one house design may have a positive impact, where as in the other house design it may have a negative outcome. houses designed for passive solar exposure to the north elevation simple do not perform well at all when rotated 90 degrees. Similarly, a house that included living areas facing north would often perform poorly when rotated

180 degrees so that they face south. We also see the addition of external wall insulation provides a big increase in energy efficiency rating due to its properties to mitigate heat energy transfer. With passive design, building features such as orientation, thermal mass, insulation and glazing work together to take advantage of natural sources of heating and cooling, such as sun and breezes, and to minimise unwanted heat gain and loss provide the greatest increase in energy ratings.

SAMPLE HOUSE 2



PERTH SAMPLE HOUSE 2 STAR RATINGS	Cavity Brick				Timber Frame Brick Veneer				Steel Frame Brick Veneer			
	Orientation				Orientation				Orientation			
	0°	90°	180°	270°	0°	90°	180°	270°	0°	90°	180°	270°
Base design	5.4	5.9	5.9	5.7	4.6	4.8	4.7	4.7	4.7	4.9	4.7	4.7
External wall insulation	6.6	6.9	6.9	6.9	5.1	5.3	5.2	5.2	4.9	5.2	4.9	4.9
Change roof colour dark to light	6.4	6.9	6.9	6.8	5.3	5.4	5.4	5.4	5.3	5.7	5.4	5.4
Floor tiles to kitchen/family	6.7	7.1	7	6.9	5.3	5.4	5.7	5.6	5.7	5.9	6	5.9
Insulate internal walls to roof	7.1	7.4	7.4	7.4	6	6.2	6.3	6.2	6.4	6.6	6.6	6.6
Low-e glass to living areas	7.2	7.6	7.5	7.4	6.2	6.4	6.5	6.4	6.7	7	6.9	6.9
Low-e glass to bedrooms	7.2	7.6	7.5	7.5	6.3	6.4	6.6	6.5	6.9	7.2	7.1	7.1
Double glazing	7.7	7.9	7.9	7.9	6.9	7.2	7.3	7.2	7.5	7.8	7.7	7.7

MANDURAH SAMPLE HOUSE 2 STAR RATINGS	Cavity Brick				Timber Frame Brick Veneer				Steel Frame Brick Veneer			
	Orientation				Orientation				Orientation			
	0°	90°	180°	270°	0°	90°	180°	270°	0°	90°	180°	270°
Base design	5.3	5.9	5.8	5.8	4.6	4.8	4.5	4.7	4.6	4.8	4.5	4.7
External wall insulation	6.5	6.8	7	7.1	5.2	5.1	5	5.2	5.1	5	4.9	5.1
Change roof colour dark to light	6.4	6.9	7.1	6.9	5.6	5.8	5.5	5.7	5.4	5.7	5.1	5.6
Floor tiles to kitchen/family	6.6	6.7	7.1	7.1	6	5.9	6.2	6.2	5.9	6.8	6.1	6.1
Insulate internal walls to roof	6.9	7.3	7.4	7.4	6.7	6.8	6.7	6.8	6.4	6.6	6.6	6.7
Low-e glass to living areas	7.1	7.4	7.6	7.4	6.9	7.1	7.1	7.1	6.8	7	7.1	7
Low-e glass to bedrooms	7.1	7.4	7.6	7.6	7.1	7.3	7.3	7.3	6.9	7.2	7.2	7.2
Double glazing	7.6	7.9	8.1	8.1	7.7	7.8	7.9	7.9	7.5	7.7	7.9	7.8

By observing Sample house 2 we again see the superiority of Cavity Brick design in achieving 7-star energy efficiency ratings and again we see how different orientations can affect energy ratings. A key observation to note however is the drop in energy rating by changing the roof colour from dark

to light (marked in red). The benefit of using a light-coloured roof is that they reflect radiant heat, reducing heat transfer inside. However, in some design situations changing to lighter coloured roofs may have adverse effects where heat transfer is desired within the home, lowering the energy rating.