Merri Creek House | WOWOWA
Photography | Shannon McGrath

ENERGY EFFICIENCY

Improving Your Home with Brickwork

Midland Brick

THINK BRICK

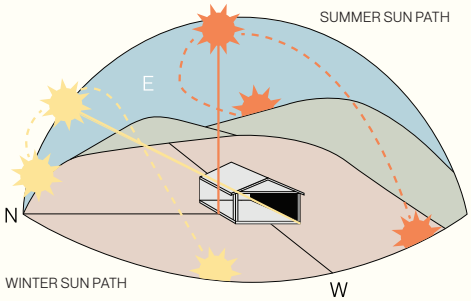
7 STEPS TO 7 STARS

1. CLIMATE

Design your home to suit the climate you're in to maximise your own thermal comfort and passive lighting. Australia has 8 climate zones (NCC 2022) and 69 sub-zones (NatHERs). Knowing the climate you're building in can help determine how you could passively heat, cool and light your home.

2. ORIENTATION - LIGHTING AND SHADING

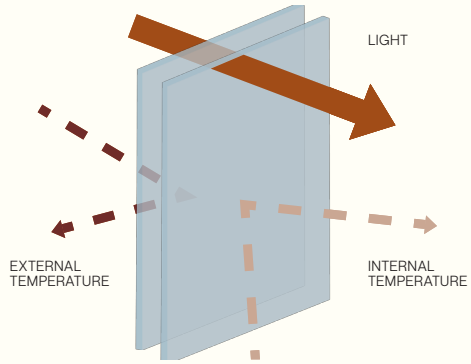
You can orientate your home so that your most lived in areas are north facing. Doing so maximises the amount of sunlight entering these rooms. This will passively heat the room during winter and will create shading with awnings during summer. Orientation also helps determine which rooms get the best airflow. This is notably vital for homes in warm, humid climates as it passively cools and improves the air quality inside the house.



Summer and Winter Sun Paths

3. GLAZING, SKYLIGHTS AND WINDOWS

Skylights and windows are a great way to help passively light your home. Where it fails is its lack of thermal mass allowing for heat to transmit into your home. To help minimise this, opt for double or triple glazed glass or add furnishings, like curtains, to improve your glazing's thermal performance.

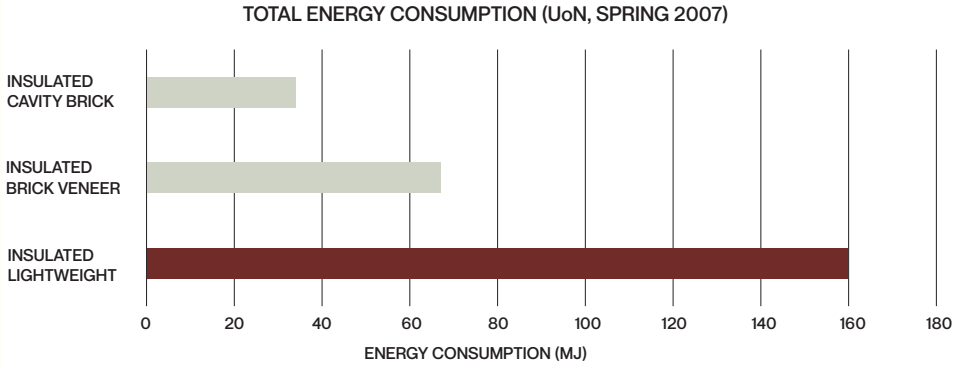


Double Glazed Windows

4. THERMAL MASS

Thermal mass refers to the construction system's ability to absorb, store and release heat. In passive design, the aim is to increase thermal mass for a larger thermal lag, the rate at which the material releases heat, so that it reduces the influx of internal temperature by prolonging the release of heat. Heavyweight building materials, like bricks, have a higher thermal mass, allowing for a more thermally comfortable environment.

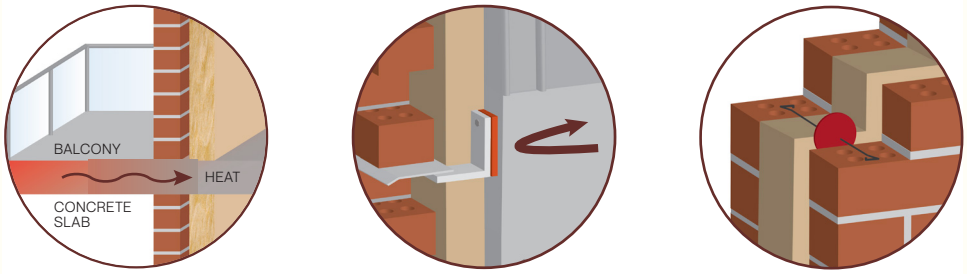
Insulated Cavity Brick > Insulated Reverse Brick Veneer ≈ Insulated Brick Veneer



5. INSULATION AND THERMAL BRIDGES

Adding insulation provides extra thermal mass to your walls, increasing the construction systems overall thermal performance. Thermal bridges are pathways of heat transfer which negate the thermal performance of your wall. An example includes balconies, which can absorb outdoor heat and transfer it to internal slabs, raising internal temperatures.

To reduce thermal bridging in masonry walls, strategies include using alternative materials such as stainless steel or basalt wall ties, along with thermal breaks to maintain insulation continuity.



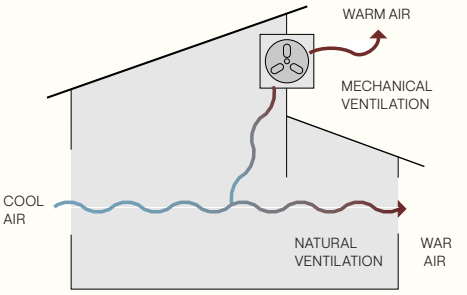
Thermal Bridge | Thermal Break | Basalt Wall Tie

7 STEPS TO 7 STARS

6. VENTILATION AND AIRTIGHTNESS

Airtightness is avoiding unwanted introduction of outside air or the loss of inside air to the outside. Improving airtightness improves the homes overall thermal performance by reducing influx of the internal temperature. As airtightness improves, ventilation must improve to prevent condensation.

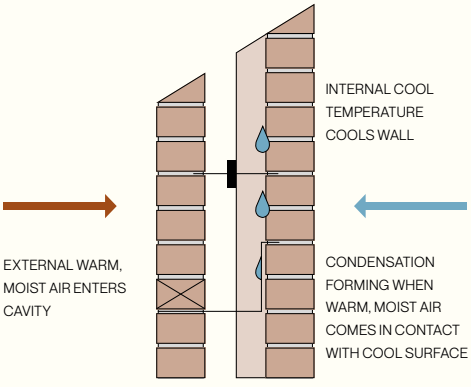
Ventilation is the intentional introduction of airflow. It is used to maintain good air quality as well as passively cool the building. This can be done naturally (windows) or mechanically (fans).



Ventilated Air Pathways

7. CONDENSATION

Condensation is when water vapour turns into liquid and occurs when humid air comes in contact with a cold surface. Condensation can lead to damp, mould and rot. To minimise this risk, proper ventilation and removal of thermal bridges is required.



How Condensation forms in Cavity Brick

DEEMED-TO-SATISFY PATHWAYS

There are three compliance pathways to meet the energy efficiency performance requirements. Option 1 is through your home's energy rating, by applying NCC 2022 Specification 42 to achieve an energy efficient home. Option 2 is to compare the new building to an existing reference building to verify that the performance requirements can be met based on having met the targets for energy efficiency with the existing reference building. Option 3 involves satisfying the Elemental Provisions in Section 13 of the ABCB Housing Provisions to achieve an energy efficient home.

1A. ENERGY RATING - NATIONWIDE HOUSE ENERGY RATING SCHEME (NATHERS)

NCC 2022 Specification 42, Part S42C2 (1)(a), prescribes a building must achieve an energy rating of greater that or equal to 7 stars, with exception to buildings in climate zones 1 and 2. It details that the house energy rating software used must be accredited under NatHERS.

The house energy rating software monitors an hour-by-hour energy use, accounting for:

- Building size
- Materials
- Insulation levels
- Type and placement of windows
- Orientation
- Climate zone

To carry out the energy rating assessment, you will need:

- Full plans, sections, and elevations of the building
- Building materials, including the walling system and glazing types intended to be used

The four software tools accredited to conduct NatHERS ratings include:

- AccuRate
- BERS Pro
- HERO
- FirstRate5

1B. BASIX - BUILT SUSTAINABILITY INDEX

BASIX is a compulsory energy efficiency house rating tool used for all residential dwellings in NSW and it accepts the NatHERS software results. It's aimed to reduce greenhouse gases and deliver fair and effective water reductions.

BASIX identifies design features that will affect the likely level of thermal comfort, water use and energy use per household. Some features include location, building size, orientation, construction type, landscaping and fixtures.

In NSW, a BASIX certification is mandatory for the construction of:

- New houses, townhouses, villas
- Renovations with a cost greater than or equal to $50k
- Conversions of an existing building from non-residential to residential

2. VERIFICATION USING A REFERENCE BUILDING

A proposed building can satisfy energy efficiency requirements if it complies with Section H6V2 of NCC 2022 Volume Two. Compared to the reference building, the proposed building must have:

- In climate zone 1, a smaller (or equal) cooling load
- In climate zone 8, a smaller (or equal) heating load
- In climate zones 2-7, a smaller (or equal) heating and cooling load

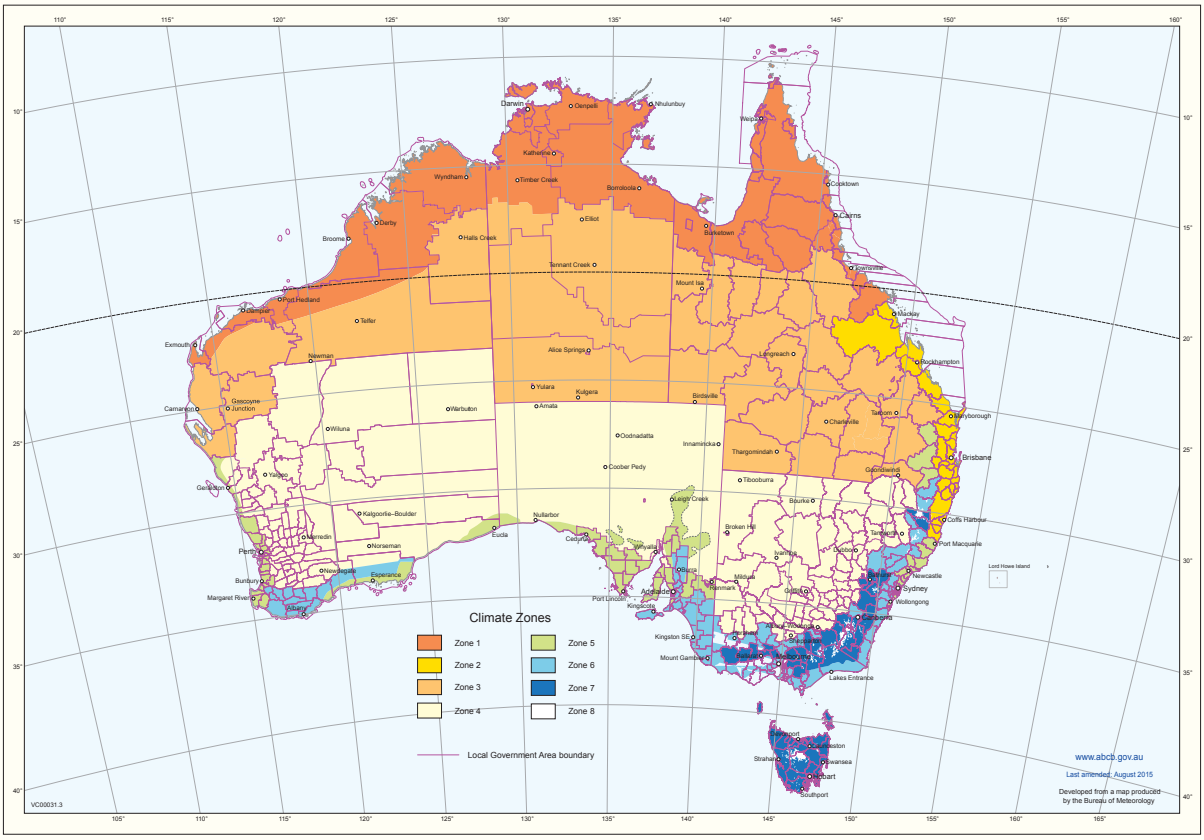
The proposed building must also comply with certain parts of Section 13 of the ABCB Housing Provisions (detailed on the following page).

3. ELEMENTAL PROVISIONS - ABCB HOUSING PROVISIONS STANDARD SECTION 13 & NCC REQUIREMENTS

NCC 2022 Volume Two Part H6D2 prescribes that the detailed provisions in Section 13 in the ABCB Housing Provisions be followed so that your home is Deemed-to-Satisfy with the energy efficiency performance requirements.

These requirements are detailed on the next page.

CONTINUING ELEMENTAL PROVISIONS



Design Element	Elemental Provisions
Climate Zone	Australian climate zones are outlined in the NCC Volume 2 Definitions section. The definition also includes a list of specific locations and their climate zones.
Glazing and Shading	Use ABCB Housing Provisions Part 13.3 to satisfy the external glazing and shading thermal performance.
Construction Systems – Brick Masonry Walls	Use ABCB Housing Provisions Part 13.2 to satisfy the building fabric thermal performance. Part 13.2.5 provides the minimum R-values for each type of walling system in each climate zone.
Insulation	Use ABCB Housing Provisions Part 13.2 to satisfy the building fabric thermal performance. Part 13.2.2 13.2.2 provides the R-value and installation requirements for insulation.
Thermal Bridges	ABCB Housing Provisions Sections 13.2.5 (4) is used to account for thermal bridges in the total R-value calculation of your chosen walling system.
Thermal Breaks	ABCB Housing Provisions Section 13.2.5 (5) is used to account for thermal bridges in the total R-value calculation of your chosen walling system.
Ventilation and Airtightness	ABCB Housing Provisions Section 13.3.3 accounts for external glazing during summer and uses the percentage of ventilation opening area to calculate solar heat gain and Part 13.4 accounts for building sealing.
Condensation	Use ABCB Housing Provisions Part 10.8 for Condensation management provisions. Part 10.8.1 details condensation management for external wall construction.