



STELLAR

ECOLOGICALLY SUSTAINABLE
DEVELOPMENT

NAVIGATING NatHERS 7 STARS



info@stellarthermal.com



www.stellarthermal.com

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The greatest threat
to our planet is the
belief that someone
else will save it.

Understanding NatHERS Thermal Performance

The Nationwide House Energy Rating Scheme (NatHERS) was initiated in 1993 by the Australian and New Zealand Minerals and Energy Council (later the Ministerial Council on Energy) to provide a standardised approach to rating the thermal performance of Australian homes.

NatHERS thermal performance assessments are the most trusted way to meet the minimum residential energy efficiency requirements of the Australian National Construction Code (NCC).

NatHERS uses a 10-point star system when rating a proposed new residential dwelling. On this scale, the higher the number, the more 'thermally comfortable' a home is, meaning less energy is required to heat and cool the property.

So, in effect, NatHERS assigns a star rating to a dwelling based on its ability, or lack thereof, to maintain a comfortable year-round internal temperature without excessive use of artificial heating or cooling.

The Australian National Construction Code released its most recent triennial edition in 2022 which stipulated that the minimum standards for NatHERS ratings be increased from 6 stars to 7 stars nationwide.

As this change will have a significant impact on builders, designers and homeowners, federal ministers agreed to allow a 12-month transitional period for these changes to come into effect on 1 October 2023.

As a result, the first to adopt the complete suite of new energy efficiency requirements will be the Australian Capital Territory on 15 January 2024.

This will be closely followed by Queensland and Victoria on 1 May 2024. Other jurisdictions will allow the use of the NCC 2022 compliant software during their transition periods.

For further information please watch the below NatHERS video.

Explaining NatHERS - YouTube.



NatHERS - THERMAL PERFORMANCE

Achieving 7 Stars

Building for 7 stars doesn't have to be costly or complicated. Simple design features and material choices make a big difference to energy efficiency and the rating outcome.

The most important first step is to get your NatHERS assessor involved early in the design process. Stellar Thermal's accredited NatHERS assessors are extensively trained to improve ratings and providing solutions to achieve 7 stars and beyond.

1. Engage a NatHERS Accredited Assessor

The most important first step is to get your NatHERS assessor involved early in the design process. Stellar Thermal NatHERS accredited assessors are extensively trained to improve ratings and providing solutions to achieve 7 stars and beyond.

2. Design for Climate

Australia has 8 climate zones as defined by the National Construction Code (NCC). Each of these climate zones has different design and construction requirements.

There are also 69 regional subzones, as defined by NatHERS, which are determined by local geographic features including wind patterns and height above sea level.

Given Australia's geographic size, the 8 climate zones cover vast areas and may contain significant variations within them, so looking at the characteristics of your regional subzone might provide the most useful information.

The climate for your region will determine the most effective design strategies for your home – a cool region such as Launceston in Tasmania will require different strategies from a tropical region such as Cairns or Darwin.

Identifying your climate zone is the first step to designing for climate.

Your climate will
dictate your
heating and
cooling needs.

NatHERS - THERMAL PERFORMANCE

Achieving 7 Stars

3. Orientation is Key

Location is the biggest indicator of a house's orientation. In areas with little light or cooler weather, a house which maximises northern sunlight should be the priority. Alternatively, if you're seeking to build in a warmer climate, the primary goal will be reducing radiant heat.

Orientation impacts the amount of natural light, heat and cross breezes that enter and cool the home.



4. Understand Heating and Cooling Loads

Heating and Cooling loads are referred to as the Thermal Loads within a house.

- The Heating Load is the amount of heat energy that is to be added to a living space to maintain the temperature in an acceptable range.
- The Cooling Load is the amount of heat energy that is to be removed from a living space (cooling) to maintain the temperature in an acceptable range.

NatHERS - THERMAL PERFORMANCE

Achieving 7 Stars

The heating and cooling loads, or "thermal loads", take into account:

The dwelling's type of construction, insulation; including floors, walls, ceilings, and roof; as well as the dwelling's glazing and skylights; based on type, size, performance, shading and overshadowing.

The lower the thermal loads indicate that the dwelling has been designed to include the appropriate amounts of insulation, glazing, and shading for the climate zone it is to be built and will require less heating and cooling to maintain comfortable conditions.

Approximately
40% of household
energy is used for
heating and
cooling.



5. Zone Your Home

Zoned living focuses on individual functional areas that are closed off. Main rooms are separated and have a more traditional design aesthetic. Separate structures favour flexibility in function and use and are ideal for families with older children and young adults.

By including more internal doors in the design, mechanical heating and cooling estimates in NatHERS can be applied more accurately. Places to include doors may be at the end of corridors, the bottom of stairs or to close off occasionally used rooms, like media and rumpus rooms.

NatHERS - THERMAL PERFORMANCE

Achieving 7 Stars

6. Colour Me Happy

Improvements to a NatHERS rating can also be achieved by adjusting the colour of the roof and the external walls. For example by moving away from using darker roof colours in warmer climates. Some software can even adjust window frame colours which can make a surprising difference.

Did you Know?

A dark exterior color scheme absorbs over 70 percent of radiant sun energy. This heat accumulates in the structure of the house and raises indoor temperatures. After the sun goes down, it also takes longer to dissipate heat from the house.

To maintain consistent indoor temperatures and compensate for this excess heat gain, your air conditioner runs longer cycles, consuming more electricity and increasing monthly cooling costs.

For the exterior walls of the house, colors that support improved energy efficiency include white, beige, light gray and the lighter variety of other neutral colors. These colors reflect radiant solar heat rather than absorbing and retaining it.

Light colours
reflect radiant
solar heat whilst
darker colours
absorb and retain
heat.

7. Let There Be Light

NatHERS rewards homes with fewer ceiling penetrations with higher ratings. Effective lighting design means putting light where it's wanted and needed within your home and reducing or eliminating light elsewhere.

A goal of all new homes should be to not require any electric lighting during daylight hours. Siting, orientation and size of the home come into play, but every consideration should be given to minimising reliance on electric lighting during daylight hours.

Done correctly, daylighting design can deliver a net saving on energy consumed by the building. Done incorrectly, it most commonly increases the heat load on the home and its cooling energy consumption.

NatHERS - THERMAL PERFORMANCE

Achieving 7 Stars

8. Insulate

Insulation is a key part of any passive design-style home, helping to keep heat inside the home during winter and outside the home in summer.

Depending on the climate, NatHERS thermal ratings may be improved by increasing the R value of both internal and external wall, ceiling and floor insulation. Another option to consider is extending insulation to different areas including slab edge, underneath the slab, the garage wall, especially to unconditioned zones, like laundries and bathrooms.

Tip: Care must be taken to not increase the risk of condensation.

Did you Know?

Insulation acts as a barrier to heat flow and is essential for keeping your home warm in winter and cool in summer.

A well-insulated and well-designed home provides year-round comfort, cutting cooling and heating bills, and reducing greenhouse gas emissions.

Did you Know?

Good insulation that works effectively for your home requires the selection of the correct product for your climate.

A NatHERS Thermal Performance assessment plays a key role in determining the most optimal insulation and glazing for a proposed new development.

Insulation is a material that resists or blocks the flow of heat energy.

9.1 Window Glazing

For many years, the effect of glazing on energy performance, home comfort and safety has been greatly under-utilised in Australia. Poorly designed windows and inefficient glass has made many a home too hot in summer or too cold in winter, increasing demand to use artificial heating and cooling systems. - **Australian Window Association**

It has become more apparent in recent years that regular, single clear glass windows will not be adequate to meet the increased building regulations set by the National Construction Code (NCC) for new and current home designs.

Single clear windows are notorious for unwanted heat gain and heat loss as they only have one 'single' pane of glass allowing heat to enter or escape very quickly.

NatHERS - THERMAL PERFORMANCE

Achieving 7 Stars

9.2 Window Performance

Windows let in light and fresh air whilst offering views that connect interior living spaces with the outdoors. However, inappropriate or poorly designed glazing can be a major source of unwanted heat gain in summer and significant heat loss and condensation in winter.

Did you Know?

Up to 87% of a home's heating energy can be gained and up to 40% lost through windows. Improving your glazing's thermal performance will reduce energy consumption, therefore lowering costs and greenhouse gas emissions.

Glazing Choices

There are thousands of types of glass and frames to choose from. Choosing the right ones is important to improving the energy efficiency of your home.

Specific products have been designed to keep heat in or out and have varying impacts on daytime lighting, noise control, maintenance and security.

Windows let in
light and fresh air
whilst offering
views that
connect interior
living spaces with
the outdoors.



Glazing and Thermal Performance Principles

The choice and design of glazing is of critical importance to the thermal performance, comfort, and economy of your home. The impact of glazing on the thermal performance of a building is complex. It involves the interaction of the following:

- Climatic conditions in your location — temperature, humidity, sunshine, and wind
- Building design — the orientation, form, and layout of the building
- Building materials — the amount of thermal mass and insulation
- The size and location of glazing assemblies and shading
- Thermal properties of the glazing system.



Your Home

Glazing and NatHERS

As windows alter the energy efficiency of a home's design through two heat transfer mechanisms: conduction and solar heat gain, it is essential to use NatHERs Thermal Performance to achieve the most optimal glazing for a 7 star residential home.



NatHERS - WHOLE OF HOME

Achieving Compliance

The NatHERS Whole of Home assessment builds on the existing NatHERS thermal performance assessment that is used to verify compliance with the energy efficiency performance requirements of the NCC.

NatHERS Whole of Home assessments use the **energy value** of a dwelling to determine its performance and assign a rating from 0 to 100. Higher ratings correspond to a lower energy value, and better Whole of Home performance.

Higher ratings correspond to a lower energy value, and better Whole of Home performance.

NatHERS Thermal Performance Rating and Whole of Home Rating

The relationship between the NatHERS thermal rating and the Whole of Home performance rating means that increasing thermal performance will increase the Whole of Home performance rating.

This is because the heating and cooling energy requirements will be lower in a dwelling with a higher thermal star rating.

Three key aspects are included in a Whole of Home assessment, these are:

- **Heating, cooling and hot water** – specifying appliances that are more energy efficient will reduce energy use and result in a higher Whole of Home performance rating.
- **Spas and pools** – having a pool or spa in a dwelling will reduce the Whole of Home performance rating because pumping and cleaning increases energy use.
- **Onsite energy production and storage** – including onsite energy production and storage systems will offset energy use, thereby helping to achieve the required Whole of Home performance rating.

NatHERS - WHOLE OF HOME

Achieving Compliance

From 1 October 2022, there will be 2 energy efficiency performance requirements for residential buildings under the NCC:

- The thermal performance and,
- The energy usage performance.

A NatHERS assessment will verify compliance with both of these requirements:

- The thermal assessment and star rating will address thermal performance.
- The Whole of Home performance rating will address energy usage.

However, there are other options for demonstrating compliance with the NCC energy efficiency provisions: an elemental method is also available in the NCC, and in New South Wales the BASIX tool is used in place of the NatHERS Whole of Home assessment.

Whole of Home Rating Software

Currently, Accurate is the only fully accredited software tool that can be used to produce ratings and certificates for all new dwellings, including apartments, town houses and detached homes. It can be used for regulatory purposes for both thermal (building shell) and Whole of Home assessments.

View the Benchmark Tool Demonstration here:



Whole of Home
performance
rating addresses
energy usage.

NatHERS - THERMAL PERFORMANCE

Cold Climate Design Tips

Australia is the world's largest island and the sixth largest nation. The climate ranges from wet, humid tropics to the arid outback with just about everything in between.

Australia is famous for its wild landscapes, pristine beaches, tropical islands, and rugged outback.

Cold Climate Design Tips

In cooler climate zones such as those located in the southern regions of Australia, it is expected that the heating load (*the amount of heat energy that is needed to be added to a living space to maintain the temperature in an acceptable range*) will be much higher than the cooling load.

Therefore, it is imperative the below options are considered during the design stages:

- Dark colours attract and retain more heat than lighter colours therefore opt for darker colours for both the external walls and roof.
- Insulation is a relatively cost-effective way to minimise energy transfer and thus improve thermal performance. Therefore, increasing bulk insulation in the walls, ceiling and roof will improve the overall thermal rating.
- Another option is to insulate the slab edge as well as adding under-slab insulation.
- Opt for waffle pod slab as opposed to a concrete slab.
- Use soft floor coverings such as carpet, cork, vinyl, and floating timber to help to insulate the floor.
- Decrease the width of shading devices such as eaves to allow more heat from the sun in during winter.
- Use glazing units with a low U value (less than 4.0) and high solar heat gain coefficient (SHGC; more than 0.5); always use the best glazing the budget allows.



The climate for your region will determine the most effective design strategies for your home.

NatHERS - THERMAL PERFORMANCE

Hot Climate Design Tips

The Hot Zone

In hotter climate zones, it is commonly understood that the summer season impacts the cooling load more so than the winter season impacts the heating load.

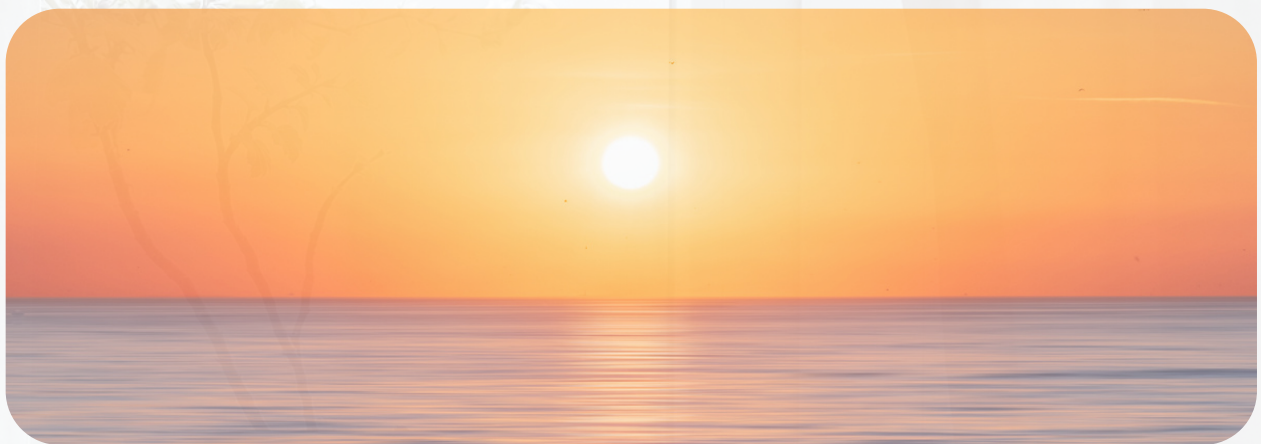
Therefore, it is imperative the below options are considered during the design stages to reduce the cooling load of a residential building, improving the overall thermal shell:

As lighter colours reflect the sun, as opposed to absorbing it, it is more desirable to select light colours for the roof and external walls.

Reflecting the heat away from the dwelling reduces the amount of energy available for transfer through the building elements. Therefore, using reflective insulation, such as sarking in the walls and roof will make a significant difference.

Sarking provides many advantages including:

- **Moisture Control** – All sarking reduces the risk of mould growing in your roof cavity. Many sarking products also act as a vapour barrier, reducing and effectively managing condensation and preventing water damage.
- **Wind and Dust Barrier** – Acting like a protective second skin, sarking reduces the amount of dust and wind draughts that can enter the roof cavity.
- **Increased Thermal Performance** – Reflective sarking shields the house from radiant heat from the sun, improving comfort and energy efficiency.



NatHERS - THERMAL PERFORMANCE

Hot Climate Design Tips

- Ensure the glazing to floor area ratio is moderate, for example, a value between 20% and 35%.
- Opt for vinyl or tiled floor coverings and avoid using carpet which only increases heat mass in summer..



- Add shading devices to the north, east and west areas to reduce solar heat gain from sunlight. Retractable awnings are a popular option as they allow full shading in summer and maximum sunlight in the winter.
- Locate doors and other openings to maximise cross ventilation paths from one side of the dwelling to the other.
- Install ceiling fans to mechanically circulate and move air inside the dwelling.
- Increase roof ventilation using whirly birds and eave vents, or a heat extraction fan.

NatHERS - THERMAL PERFORMANCE 7 STAR CASE STUDY - WARM CLIMATE

The GADUY House - Nambucca Heads, NSW

This custom design features a one-storey, four-bedroom family home with an abundance of natural light to the main living areas. This will provide welcomed solar warmth during winter, which can be easily shaded from the direct sun in summer.



Design Features

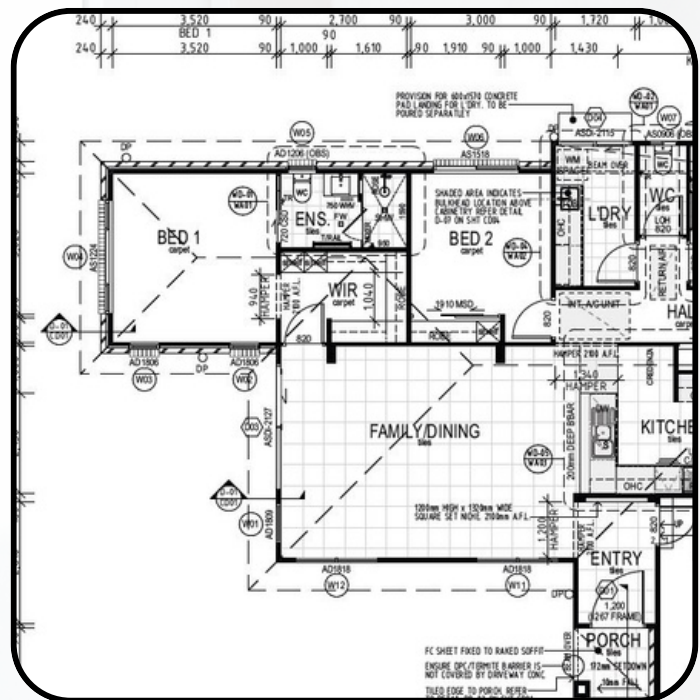
The GADUY house is set on a 499m² corner block in the warm-temperate area of Nambucca Heads, with the main living areas located on the north-eastern side.

The bedrooms are all predominantly south-east to south-west facing.

Eaves along the north-eastern side are all 600mm, whilst the south-western eaves are 450mm optimising summer shade and welcoming the winter sun.

The design encompasses windows that are positioned and sized for optimal natural light and cross-flow ventilation.

The design also includes an open plan kitchen, family and dining area.



The GADUY house also includes doors to separate rooms, creating zoned internal spaces, allowing occupants to heat or cool specific, in-use areas, as opposed to the entire house.

Ceiling fans were also added to reduce the cooling load within the family / dining area, which had a substantial impact on the overall NatHERS thermal performance rating, taking it from 6.3 stars to 7.0 stars. In addition, when also adding ceiling fans to all four bedrooms, the dwelling achieved a rating of 7.3 stars.

NatHERS - THERMAL PERFORMANCE 7 STAR CASE STUDY - WARM CLIMATE

The GADUY House - Nambucca Heads, NSW

Building Specifications

Ceiling	10mm plasterboard on timber frame with R3.5 insulation batts
Roof	Metal sheet roof on timber frame with R1.3 anti-con blanket and reflective foil laminate.
Floor	85mm concrete slab with 300mm waffle pod, no slab insulation.
External Walls	Brick veneer, R2.0 insulation batts, reflective foil membrane (vapour permeable), 10mm plasterboard
	Light weight 90mm stud framing with James Hardie Sycon Stria 325 cladding system with R2.0 insulation batts.
Internal Walls	10mm plasterboard on timber frame, no insulation
	Walls adjoining the garage: 10mm plasterboard on timber frame, R2.0 insulation batts.
Glazing	All single clear with aluminium frame
Draught Sealing	Weather strips to all windows and sliding doors. Seals and weather-strips to hinged external doors. Sealed exhaust fans to bathroom, ensuite and kitchen rangehood.
Roof Colour	Evening Haze (0.43 Solar Absorptance)
Ext Wall Colour	Dover White (0.23 Solar Absorptance)
Ceiling Fans	1 x 1200mm to main kitchen, family and dining area

NatHERS - THERMAL PERFORMANCE 7 STAR CASE STUDY - COLDER CLIMATE

The ATLAS House - North Tamworth, NSW

The ATLAS is described as being a house that 'ticks all the boxes for modern families, with three living spaces plus alfresco, four bedrooms all with built in robes, main bathroom plus ensuite to main bedroom and a double garage'.

Design Features

The ATLAS house is set on a long, yet narrow 603m² block in North Tamworth, with the main living areas located on the eastern side.

Beds 2 and 3 are east facing, whilst Bed 4 is west facing, and the Master Bed is on northern side.

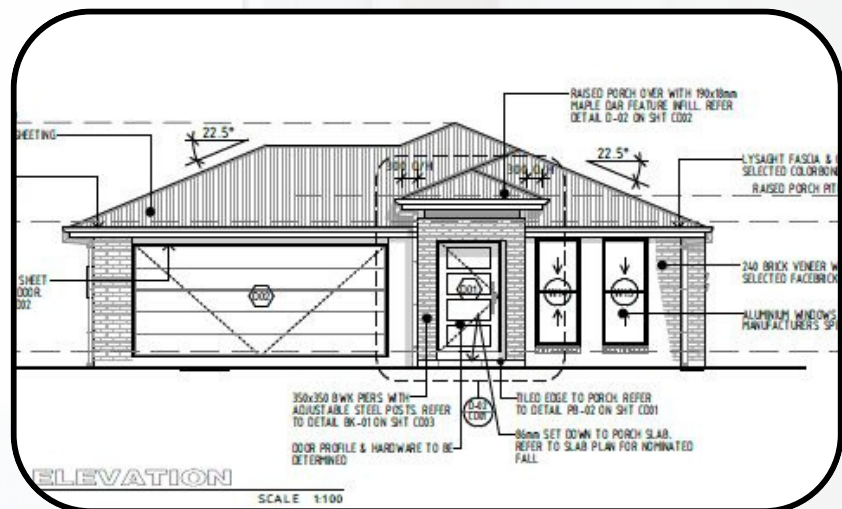
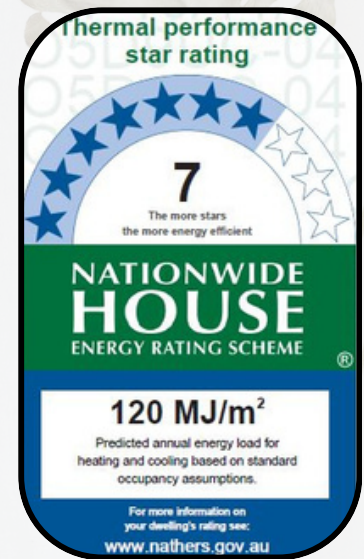
450mm eaves surround the entire dwelling, except for the eastern side of the extended living area.

All areas have large windows that welcome natural light and cross-flow ventilation.

Similar to the GADUY house, the ATLAS also includes doors to separate rooms, creating zoned internal spaces, allowing occupants to heat or cool specific, in-use areas, as opposed to the entire house.

North Tamworth is located in NatHERS Climate Zone 14, which experiences hot summers, yet very cold winters, making it a challenging location to achieve 7 stars, unless climatic factors are taken into consideration during the design concept phase.

To achieve 7 stars, the ATLAS required extensive insulation as well as the use of 'smart glass' and double glazing.



NatHERS - THERMAL PERFORMANCE 7 STAR CASE STUDY - COLDER CLIMATE

The ATLAS House - North Tamworth, NSW

Building Specifications

Ceiling	10mm plasterboard on timber frame with R6.0 insulation batts
Roof	Metal sheet roof on timber frame with R1.3 anti-con blanket and reflective foil laminate.
Floor	85mm concrete slab with 300mm waffle pod, no slab insulation.
External Walls	Brick veneer, R2.5 insulation batts, reflective foil membrane (vapour permeable), 10mm plasterboard
Internal Walls	10mm plasterboard on timber frame, R2.0 insulation batts.
	Walls adjoining the garage: 10mm plasterboard on timber frame, R2.0 insulation batts.
Glazing	Combination of Smart Glass TM and Double Glazing
Draught Sealing	Weather strips to all windows and sliding doors. Seals and weather-strips to hinged external doors. Sealed exhaust fans to bathroom, ensuite and kitchen rangehood.
Roof Colour	Wallaby (0.64 Solar Absorptance)
Ext Wall Colour	Shale Grey (0.44 Solar Absorptance)
Ceiling Fans	N/A

SmartGlassTM is a single glazed product with a Low E coating which offers insulation and a choice of solar protection to reduce heat gain. It's the perfect choice for the Australian environment and is known as Australia's leading choice in single glazed energy efficiency.

NatHERS - 7 STARS TRANSITIONAL PHASE

While New South Wales have made the new 7 Star NatHERS upgrades compulsory from October 1st 2023, other states have chosen to delay or defer said changes. See the State based enforcement dates for the new 7 Star minimum below:

Queensland - Voluntary from 1 October 2022, with a transition period until 1 May 2024.

New South Wales - From 1 October 2023 all new home builds and renovations costing more than \$50,000 must have a 7-star energy rating under the state's Building Sustainability Index (BASIX), up from 5.5 stars.

ACT - From 1 October 2023 all new homes built in the ACT will be required to have 7-star energy efficiency and minimum accessibility standards.

Victoria - Voluntary from 1 May 2023 with the transition period delayed until 1 May 2024.

Tasmania - Tasmania will not implement compulsory 7-star energy efficiency standards until further notice.

South Australia - Voluntary from 1 October 2023, with a transition period becoming compulsory 1 October 2024.

Western Australia - The new changes will be voluntary from 1 May 2023 with a transitional period until 1 May 2025.

Northern Territory - Northern Territory will not be adopting the new standards and will continue with 2009 ABCB standards.

By following these guidelines, you can navigate the NatHERS 7-star upgrades to ensure that your building meets the necessary NCC2022 energy efficiency requirements.

For all enquiries, please contact us:



info@stellarthermal.com



www.stellarthermal.com



STELLAR

ECOLOGICALLY SUSTAINABLE
DEVELOPMENT

“Our holistic approach to energy efficiency and thermal performance considers the environmental, economic and social impact of every project to offer clients and their community lasting liveability.”

-Santarita Kollosche (Co-Founder/ESD Consultant)