Australian Government

YourHome
Australia's guide to environmentally sustainable homes

Design For Place

WELL-DESIGNED
COMFORTABLE
FUNCTIONAL SPACES
SUN-FILLED
CLIMATE SPECIFIC
ADAPTABLE

TELOPEA

Telopea House

Features a two-storey family home with lots of natural light and sun-filled, flexible living areas. This will provide solar warmth from the sun in winter and make it easy to shade from the direct sun in summer.

4 bedroom

3 bathroom

2 living

182m² (excluding carport)

Potential to achieve an energy star rating of:

7.4
The more stars the more energy efficient
NATIONWIDE HOUSE ENERGY RATING SCHEME

Designed for Hobart

To be read with the Telopea House Hobart Technical Drawings.

Ideal for a block with north to the side; but can be adapted for blocks with other orientations.

How to use these design options

These design packs provide an example of what a well-designed, sustainable house might look like. It also gives you information to support your discussions with architects, designers or builders.

The Telopea house provides a best practice example to help you apply energy-efficient design principles to your home. It offers construction detail options for the Telopea house, as well as a snapshot of key principles to consider when designing a sustainable home.

The Telopea house has been designed by an architect in collaboration with an energy assessor, and is ready to use or can be adapted to best suit your climate, block and orientation.

Your architect, designer or builder can help you tweak these plans to meet your needs. You could also use the Telopea house design options to:

- develop a concept for your own design brief to take to an architect, designer or builder
- incorporate design features into your house design or renovation
- understand key principles to consider when designing a sustainable home
- consider how to adapt the specifications for your climate and local requirements.

Telopea House street view

Energy star ratings

The Nationwide House Energy Rating Scheme (NatHERS) is a star rating system that measures the energy efficiency of a home, using key features of the home, including the design, orientation, materials and climate. A NatHERS rating is the most common method used to show that a new home complies with the minimum energy efficiency requirements in the National Construction Code.

An energy assessor calculates the star rating using a NatHERS software tool to determine the thermal performance of a home. Assessors are generally engaged by the architect, designer or builder on your behalf, but engaging an assessor early in the process will help you adapt your design to get the best outcome.

Your home will need to be rated by an energy assessor based on its exact location, design and building specifications, even if you decide not to alter the Telopea house. Any changes to the Telopea house specifications or drawings will affect your energy rating. By engaging an assessor early, they can help you compare options before decisions are locked in.

Benefits of a higher energy star rating

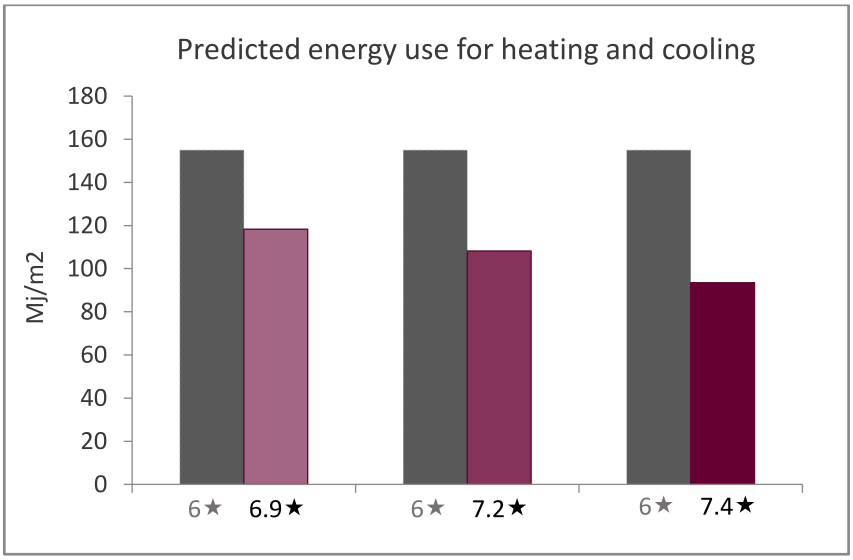
A 6 star rating is the minimum standard in most states and territories, however aiming for a higher energy star rating can have significant benefits to the comfort and cost of running your home.

Homes with higher energy ratings rely less on heating and cooling systems. Less energy use means lower energy bills. Aiming for a high star rating can help you get a home that's cheaper to run and more comfortable to live in.

On average, a 7 star home in Hobart is predicted to use 27% less energy for heating and cooling compared to a 6 star home. And an 8 star home is predicted to use a massive 54% less energy.

Below are three examples for Hobart based on the Telopea house design and specifications.

The Telopea house 6.9★ requires 24% less energy[1] than a 6★ house.
The Telopea house 7.4★ requires 40% less energy[1] than a 6★ house.



[1] Predicted annual energy use for heating and cooling of the Telopea House Hobart design and specifications.

Design features

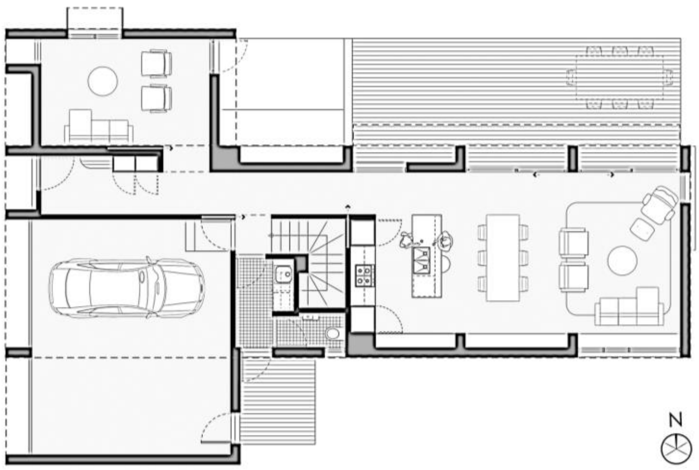
The Telopea house design offers a home with desirable features such as;

- generous living area ceiling heights of 2.7m
- practical bathroom and laundry layouts
- open plan kitchen-dining and separate living area
- generous-sized bedrooms suited to fit a queen bed

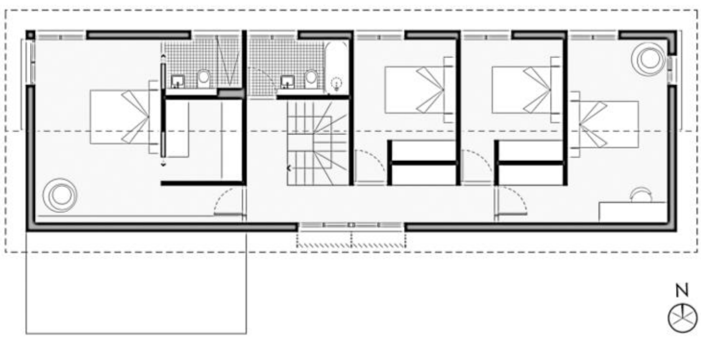
The design also incorporates sustainability principles and considerations to maximise energy efficiency and comfort.

The Telopea house design:

- Provides a great outcome for a small site that places north to the side of the block
- Is positioned away from the side boundary for a usable north-facing yard
- Provides natural light and winter sun to fill all living areas and bedrooms
- Embraces windows sized and positioned for solar orientation, natural light and cross-flow ventilation
- Optimises eaves and shading devices for summer shade, while allowing in winter sun
- Includes burnished concrete floor for greater thermal mass
- Has living areas open to outdoor spaces with connection to the yard
- Provides a functional floor plan with minimal circulation space. The compact house size reduces construction and operating costs to heat and cool
- Simple layout of rooms to support ease of construction and reduce build costs
- Has doors to separate rooms and provides zoned internal spaces, so you can heat and cool only the rooms you need
- Includes a double carport that can be converted to a garage, or reduced to a single carport or garage if preferred
- Approximately 150m2 roof space available for solar panels



Ground floor plan



First floor plan

See **Telopea House Hobart Technical Drawings** for detailed floor plan (*Hobart – Option 1* design shown above)

Visit **YourHome.gov.au** for detailed information on key sustainable design principles

Building specifications

The building specifications outlined below show what construction materials you will need to help you reach the star rating goal that best suits you. Discuss these options with your architect, designer or builder, so they can customise it to suit your needs. For a well-designed house, often the difference between the options listed below do not cost significantly more, and can result in longer term savings and comfort.

These construction details have been optimised for the Telopea house designed for Hobart. The 6.9 and 7.2★ construction details below are for the 'Hobart - Option 1' design in the technical drawings. The 7.4★ details are for the 'Hobart - Option 2' design. Option 2 includes the changes as outlined below, but also encompasses minor design tweaks more suited to a cold climate (i.e. window sizes). See the technical drawings for more details.

Construction details		6.9 ★	7.2 ★	7.4 ★
Floor	Ground floor: 100mm concrete slab with 300mm waffle pod	✓	✓	
	Ground floor: 100mm concrete slab on ground with R1.8 under slab insulation			✓
	First floor: Timber joists with R4.0 insulation in floor framing between floors	✓	✓	
	First floor: Timber joists with R5.0 insulation in floor framing between floors			✓
	Finishes: Burnished concrete to living areas, carpet to bedrooms, ceramic tiles to wet areas	✓	✓	✓
Ceiling	10mm plasterboard on timber framing with R5.0 batt insulation	✓	✓	✓
Roof	Metal sheet roofing on timber battens with R1.5 reflective foil laminate	✓	✓	✓
External walls	Ground floor: Brick veneer, R2.5 batt insulation, reflective foil membrane (vapour permeable if appropriate), 10mm plasterboard	✓	✓	✓
	First floor: Lightweight cladding on battens, reflective foil membrane (vapour permeable if appropriate), timber frame, R2.5 batt insulation, 10mm plasterboard	✓	✓	✓
Internal walls	10mm plasterboard on timber framing with R2.0 batt insulation	✓	✓	✓
Windows	Double glazed, low emissivity glass, aluminium frame	✓		
	Double glazed, low emissivity glass, uPVC 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, powder room and kitchen rangehood.	✓	✓	✓
Ceiling fans	1400mm diameter fans. 1 in each bedroom, 1 in the dining area, 1 in the front living area.	✓	✓	✓

General Notes

- uPVC (unplasticised polyvinyl chloride) window frames have similar insulating properties to timber frames.
- Insulation is often measured as an R value – a measure of resistance to heat through a specific thickness of a material. Higher values indicate better insulating properties.
- Reverse brick veneer places the brickwork on the inside of the building rather than the outside. It can increase the thermal mass performance, however is less common in practice compared to conventional brick veneer and can be more costly.
- Burnished concrete allows maximum thermal mass, and works particularly well in cool locations. For the thermal mass of a concrete slab to work effectively, it must interact with the house interior to absorb heat, and be used in conjunction with good passive design. Covering the slab with finishes such as carpet, reduces the effectiveness of the thermal mass.

Windows and doors

Windows and glass doors can be a major source of heat gain in summer and heat loss in winter. Up to 87% of a home's heat can be gained, and up to 40% of its heat lost, through windows and glass doors. Improving the thermal performance of windows reduces these heat gains and losses, and reduces energy costs. The building specifications on the previous page show an example of the impact of different frame and glass types.

Generally, windows and glass doors transfer heat faster than a well-insulated wall. This is one of the reasons why the type of glazing has a massive impact on an energy rating. Other considerations include optimising glazing to floor area ratios for each room and adequate shading.

The estimated NatHERS star ratings on the previous page are based on generic window performance values - your architect, designer or builder can tell you what products are available to match the window specifications. Engaging an energy assessor as soon as your window selection has been made, or even better, working with an energy assessor on your window selection and optimisation, will ensure you achieve the best outcome in your home.

See the technical drawings for window sizes and types which have been optimised for the Hobart climate.

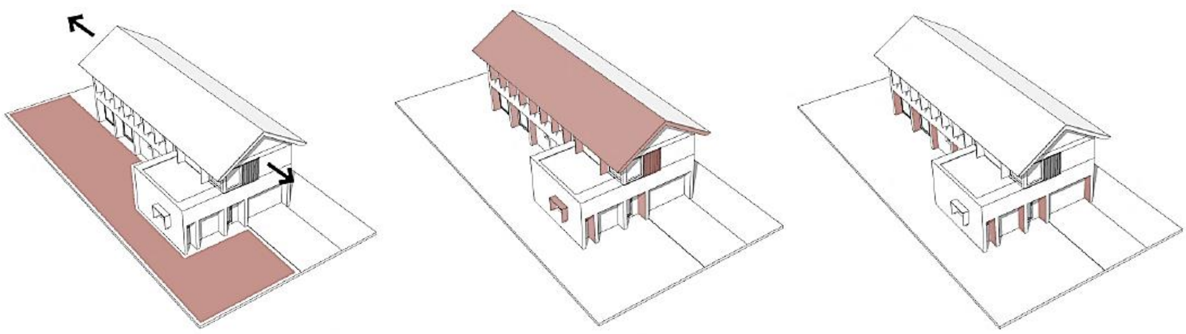
Shading

Shading can make a big difference to your comfort and energy use. In summer and in warmer climates, external barriers like eaves and sunshades can be used to block the sun from entering windows. In winter and in colder climates, shading can be reduced to allow the sun to naturally warm your home. Good design will use shading to optimise or limit solar access for your specific climate.

Northern sides of your home benefit most from fixed shading such as eaves and awnings. When they are designed well, the shading can self-regulate solar access throughout the year without requiring any user effort.

Adjustable shading that is vertical, such as external blinds or screens, are often recommended for the eastern and western sides of your home. This is because the sun rises and sets at lower angles in the sky on the east and west, and horizontal shading from eaves and awnings will generally not keep the sun out. Shade cloth and deciduous planting can also be used to provide self-adjusting seasonal shading.

The Hobart Telopea house has 600mm eaves (see technical drawings for more detail). These has been optimised for adequate summer shading while still allowing solar heat gain in winter.



Concept sketches of key principles - design shaped to maximise northern exposure and preserve pleasant outdoor spaces, and various features used to shade windows from the summer sun.

Heating, cooling and appliances

Very little energy is needed to make a well-designed house comfortable. Appropriate insulation, which is essential for a comfortable house, combined with passive solar design and a home sealed from unwanted draughts, can create low or even no energy requirements for heating and cooling.

When choosing heating and cooling appliances, consider options that allow you to heat and cool only the occupied areas of your home. Fans are an excellent choice for cooling in a well-designed home. Typically, the air flow created by a fan provides a similar improvement to comfort as reducing the temperature by around 3°C.

Choosing a correctly sized system is also very important, as is careful consideration of its positioning. An undersized system will need to work hard for longer and therefore not be as efficient, and an oversized system will be using more energy than needed. Expert advice is recommended.

Most heating and cooling systems have Energy Rating Labels to help you choose the most efficient model. For efficient space conditioning (ie. reverse cycle air conditioner), the house should be sealed and insulated, with windows shaded from the summer sun or covered with curtains and pelmets to keep winter warmth in.

Careful selection of appliances can also save money and reduce your environmental impact without compromising lifestyle. The key appliances of higher energy use include fridge freezers, cooking, and TVs. Consider the lifetime costs of energy efficient appliances not just the purchase cost. Energy efficient appliances can save you hundreds of dollars each year in running costs. The Energy Rating Label is mandatory for many household appliances and can help you choose an efficient appliance.

Although heating and cooling systems, and appliances, are not included in NatHERS star ratings, it is important to incorporate these into your design process, to achieve your energy efficient home.

Talking to your designer or builder

Use the information on the following page to guide your conversations with architects, designers or builders, to help you get the most out of your Design For Place project. Talk to a few to find one that best suits your needs and ask for references from their clients.

Consider your needs

Take some time to consider your needs, including likely changes to your lifestyle over time. Think about how you use the spaces in your current home. Prioritise these, and weigh up whether more space will deliver the best outcome over time. In many cases a smaller but well-designed, flexible space is more practical and better able to meet your needs long term. Bigger isn't always better—a larger home means more space to heat, cool and maintain.

Discuss key principles

Review the Design For Place Design Option specifications and technical drawings, and discuss these with an architect, designer or builder. Talk about how you can apply these principles, plans and energy performance ideas to build a more sustainable, efficient and liveable home. For example, you may wish to use the checklist on the following page as a guide for what to ask and discuss.

Checklist

☐ ORIENTATION AND SITE

In the Australian climates, keeping living areas facing north, but with adequate shading, will be critical to keep your home cool in summer and warm in winter. You could ask:

- Do these plans need to be adapted to work best with my block orientation and setbacks?

☐ ENERGY ASSESSOR

Early engagement with an experienced assessor will give you the best chance to optimise your home for energy efficiency and comfort before it is finalised and changes to key design principles are no longer possible. You could ask:

- Who is the energy assessor? Are they NatHERS Accredited?
- Are they experienced with optimising energy-efficient designs beyond minimum standards?
- Can I organise my own energy assessment?
- Can we engage an assessor early to compare options and design decisions such as orientation and eaves?

☐ MATERIALS

Builders may have preferred construction methods and material availability can differ across Australia. Changing construction will affect the thermal performance of the design. You could ask:

- Are the specified construction materials available and affordable?
- Would any of the specifications require altering? Can any changes be compared by the energy assessor before deciding?

☐ CONSTRUCTION

Effectively keeping heat in or out, works hand-in-hand with insulation and adequate shading. Careful consideration of air tightness and sealing can make a big difference to how your house performs. You could ask:

- How do you ensure air tightness and sealing?
- Once built, do you inspect homes to help confirm what was designed is built? Such as, checking insulation installation?
- Are the LED downlights sealed and insulated?

☐ WINDOWS

These designs have been developed with careful consideration to windows. Engage an energy assessor if changes are suggested, as window selection, sizes and locations will affect the star rating. This will help ensure positioning, size and performance is optimised, such as optimal glazing to floor area ratios for each room and adequate shading to suit your climate. You could ask:

- What are the available window options?
- What are the cost differences and benefits?
- Where do you usually source your windows?
- Can you provide the window types and sizes specified?

☐ COST

The technical drawings and specifications include all the details builders should need to estimate construction costs and timeframes. You could ask:

- What is the estimated cost, based on this design and specifications?
- What is included or excluded?
- How is the cost calculated, is it a $/m2?

☐ APPLIANCES

The choice of appliances, including heating/cooling and hot water systems, will impact ongoing running costs. The position and size of these will affect efficiency. You could ask:

- How do you calculate the appropriate size and position for heating and cooling systems?
- Can you recommend energy-efficient appliance options?

☐ COMPLIANCE

The design will need to be submitted for approval with your local planning authority. An architect, designer or builder should be experienced in meeting the requirements of the National Construction Code, as well as any state or local requirements. You could ask:

- Are there local council and state building requirements that need to be considered?
- Does the proposed design pose any issues with meeting compliance?