



Sustainable
Builders
Alliance



ACHIEVING NATHERS 7 STARS CHEAT SHEET

INTRODUCTION & HOW TO USE THIS GUIDE

The following checklist comes from 20 years of designing, assessing, and building sustainable homes at Positive Footprints. It comes from over 1,000 energy ratings for others, and from discussion and tips given to me by generous assessors over the years who have done many more assessments.

The aim of the list is to make it easy for designers to meet the new residential efficiency standards by designing a home using passive solar design strategies. Employing such strategies is the most cost effective way of achieving 7 stars, or beyond in energy efficiency. It is also the first step to get right, when aiming for Net Zero outcomes.

The good news is that passive solar principles are timeless and simple, and easy to learn.

While this list allows practitioners to 'cut to the chase' for quick thermal design guidance, it importantly provides links to background explanations on the SBA website. Understanding these principles allows much greater design flexibility than a tick sheet can provide, and is recommended.

In this document are the questions you should be asking yourself when assessing plans for good thermal outcomes.

Answering a question negatively doesn't mean the house won't reach 7 stars. But it should be a red flag.

Two or more such flags, and we recommend you check with an Energy Assessor before proceeding much further.

Aim high...

And make your footprints positive,



Jeremy Spencer
The Sustainable Builders Alliance

Cover image credit: Passive House Alphington | G-LUX Builders

THE PASSIVE SOLAR DESIGN TOOLBOX

The NatHERS star rating is simply a measure of how well a house uses Passive Solar Design principles. That is, how well does it make use of the natural environment to provide most of the energy for comfortable temperatures inside the home over the year.

There are 5 tools in the toolbox of Passive Solar Design.

They are:

1. Orientation
2. Windows
3. Insulation
4. Mass
5. Ventilation

To achieve 7 stars your design will need to touch on most of them. If the design hits them all well, you should score much higher. The higher the score, the greater the comfort, and the lower the heating and cooling costs.

ORIENTATION

All Climates:

- Has the wall to floor area ratio been minimised within the scope of the design? Heat loss or gain is proportional to surface area.
- Is the main kitchen/living area on the ground floor? Ground living benefits from the stability of being close to the mass of the earth.
- Are Hallways minimised?

In Cool & Mixed Climates:

- Are the Living Areas placed to get northern sunlight most of the day in Winter?
- Can the north sun reach other rooms in Winter too? The more the merrier!
- Have bedrooms, utilities and garages been placed to help buffer the colder south sides of the home?



Image credit: Hillside House | Positive Footprints

Tropical Climates

- Is shading adequate to keep the sun out all year?
- Are east and west wall faces minimised or well shaded?

SBA Roadmap Quick Links

- [Rule 1: Orientation](#)
- [Cost Effective Orientation Tips](#)

WINDOWS

All Climates:

- Is the total window area less than 22% of the floor area? (Exclude the garage area.)
 - This can be pushed up a bit in Cool & Mixed climates if you have thermal mass and mostly north facing windows.
 - Check against what the normal 7-star window area averages are in your state at the [CSIRO Housing Data Portal](#)
 - Lower percentage window areas are recommended in Tropical areas.
- Are specified window U-values less than 3.0? The lower the better.
 - For Solar Heat Gain Coefficients (SHGC), generally aim for higher in cooler climates, and lower as you move to hotter climates. (SHGC optimisation by an assessor can gain up to 1 star in the tropics.)
 - Where cost is a factor, start with higher performance windows to living areas first, where you will get bigger bang for your buck.
- Are actual window models specified? If not, the assessor will model generic values which are often lower performing.
- [For a guide on how to use the Windows Energy Rating Scheme \(WERS\) database to choose windows see the SBA Roadmap.](#)



Image credit: Studio B Architects | Michael Limb Builders

Cool & Mixed Climates:

- Is it easy to work out which direction is north just by looking at the elevations?

Winter:

- Does the sun shine into living areas for most of the day? Will it also shine into other rooms?
- Are windows placed out of wall areas of Winter overshadowing?

Summer:

- Is the sun blocked from shining into living areas and most windows over the day in Summer?
- Is there shielding to stop it shining into east and west windows?

SBA Roadmap Quick Links

- [Rule 2: Windows & Eaves](#)
- [Cost Effective Orientation Tips](#)

WINDOWS CONT.

Tropical Areas (all year):

- Is the sun blocked from shining into living areas and most windows over the day? (Remember above the Tropic of Capricorn the sun shines from the south in Summer!)
- Is there shielding to stop it shining into any east and west windows?

Image credit: Filson St | Aligned Building



INSULATION

All Climates:

- Are insulation levels adequate?
 - Start with Subfloors R2, External Walls R2.5, Ceilings R4+... to be optimised by Energy Assessor. (R5 to ceilings in cold climates.)
 - For Internal Walls start with R2.0 to garage walls and utilities/bathrooms.
 - For Tropical Climate Zones 1-3 where subfloor walls exist, start with R1.5 to subfloor walls, and none to subfloor, as this maximises cooling to subfloor. Confirm with assessor. Make sure all vents are maintained.
- Will insulation specified fit in the structure? Check thickness for any tight areas.
 - Is there enough height for ceiling batts (and any required ventilation pathways) where rafters pitch on external walls, or should raised-heel trusses, or thicker rafters be specified?
- Are air infiltration pathways minimised?
 - Where downlights are used, are they noted as sealed and IC-4 rated, for insulation to cover?
 - Are extraction fans ducted to the exterior with self-closing dampers?
 - Are any chimneys fitted with dampers?
 - Are external doors weather-stripped, including any to garage?
- Where chasing star points: Is there any reflective foil abutting an airspace, in the roof and wall assemblies? There can be thermal gains from the use of reflective foil products, particularly in warmer climates. However always consider NCC condensation requirements for your Climate Zone. For a full rundown of this [see the SBA Roadmap](#).

SBA Roadmap Quick Links

- [Rule 3: Insulation & Tightness](#)
- [Cost Effective Insulation Tips](#)

Image credit: Construction of Ordinary Miracle 1 | Positive Footprints



MASS

All Climates:

- Does the site commonly have a Diurnal temperature swing above 7 degrees?
 - If so mass likely to be beneficial. Check with Energy Assessor.
- Is the mass exposed where it can work, or is it covered with linings/finishes?
- Have colours for mass been considered to maximise heat gains?
 - Darker colours make energy uptake more effective.
- Have mass benefits been checked by an Energy Assessor?

Cool & Mixed Climates:

- Is there good solar access to heat the mass in winter? If so, mass is likely to be beneficial.

- Slab floors generally are most effective at evenly spreading mass through the home, followed by large area mass walls in the living zones.

Tropical Climates (zones 1 & 2) and Cool/Cold Climates (zones 6, 7 & 8):

- Is there insulation under the slab if there is one?
 - If not, check benefit with an Energy Assessor.
- High slabs - are edges insulated.

SBA Roadmap Quick Links

- [Rule 4: Thermal Mass](#)
- [Cost Effective Mass Tips](#)

Image credit: Golden Turret | Sustainable Homes Melbourne



VENTILATION

All Climates:

- Have sash types been chosen to maximise openings?

Cool & Mixed Climates:

- Are there fans in the living areas?

Tropical Areas:

- Are there fans in ALL living areas and bedrooms?
- Is there good openability of windows?
 - Try to avoid window restrictors on second stories, as they significantly decrease ventilation benefits. Where fall prevention is required, choose code compliant safety screens, or specify fully openable sash sections above 1.7m.
- Are the roofs ventilated in Climate Zone 1? This can have a small benefit on cooling loads in hot climates. Check for benefit with assessor. ([See NCC ventilator area and venting requirements.](#))

Image credit: Coburg Passsive House | G-LUX



Image credit: Munro Street | Sustainable Homes Melbourne

SBA Roadmap Quick Links

- [Rule 5: Ventilation](#)
- [Cost Effective Ventilation Tips](#)

COLOUR

All Climates:

- Are surface colours suitable for the climate?
- In cooler climates, darker wall, roof and window frame colours can give a little bump in the rating.
- In warmer climates, lighter colours will benefit.

SBA Roadmap Quick Links

- [Cost Effective Final Tips](#)

ENSURING ON GROUND PERFORMANCE

Important considerations for the House to Perform as per Rating:

- Has engineering been checked for Thermal Bridging?
- Do the plans have notes on membrane type and tape, and taping details?
 - For permeability confirm code requirements for the climate zone.
- Do plans include the SBA Builders Thermal Performance Checklist?
 - For a rundown of the control measures suggested in the checklist see the Roadmap Step 3
- Do plans specify a tightness figure to achieve, between 5-10 ACH@50pa? Or lower where whole home ventilation is specified.



Image credit: Wanneroo | I Smart Building Group

If you want the high star outcomes, there's one more secret that you need to know...

To find an accredited assessor visit [DMN Thermal Performance Assessor Lookup](#)

PERFORM 2 RATINGS!

Go to an accredited Energy Assessor at Design Concept Stage for a Thermal Check & Optimisation Report. This will;

- Save embarrassment and wasted time of a design not rating up.
- Save the owner money on operational expenses for the life of the house.
- Build your reputation for High Performance.
- Allow you to test appliance choices, and size up PV for NET ZERO OUTCOMES.

USING THE SBA ROADMAP AS A RESOURCE

This advice list sits alongside the SBA Roadmap to Net Zero Homes, [STEP 1: Good Design](#).

To fully understand all the tips given on this cheat sheet it is recommended that time be given to read the explanatory information you will find in Step 1.

At the end of Step 1 you will also find a link to [Module 1 of the Net Zero Homes program, Designing for Thermal Performance](#). This was created in collaboration with Design Matters National and the SA Government. It goes through the theory and rules of Passive Solar Design and is a recommended accompaniment to this 7+ Star Cheat Sheet.

OTHER USEFUL LINKS

In addition to visiting The SBA website, you may also like to check out these helpful sites:

[Your Home](#)

[NatHERS](#)

[Sustainability Victoria Energy Smart Housing Manual](#)

ABOUT THE SBA

The Sustainable Builders Alliance was formed with the objective to promote low carbon, sustainable and high-performing house construction practices within the Australian residential market.

Arising from the Australian Builders Declare movement, the organisation has been driven by a coming together of experienced, independent sustainable builders looking to accelerate change, through the power of a group rather than individual voices.

Our aim is to drive real change, spread practical knowledge and create a

community of informed builders, architects and designers, trades and professionals, to lead the construction industry to a carbon neutral sustainable future.

If you're ready to be an industry leader and be part of the solution, please sign up to the Sustainable Builders Alliance or [become a sponsor](#) and help change the future of building, today.

For more information about The Sustainable Builders Alliance visit <http://thesba.com.au>

DISCLAIMER

This resource is given freely to the industry in good faith. The information is general in nature and you should always get professional advice particular to your project. Passive Solar Design in particular is holistic, and suggested benefits are best tested by accredited energy assessors using NatHERS tools.

The Sustainable Builders Alliance seeks to give useful and current advice, but do not accept responsibility for the accuracy or completeness of the contents, and

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