



Australian Government



# Proposed changes to the Nationwide House Energy Rating Scheme (NatHERS)

DISCUSSION PAPER

November 2021

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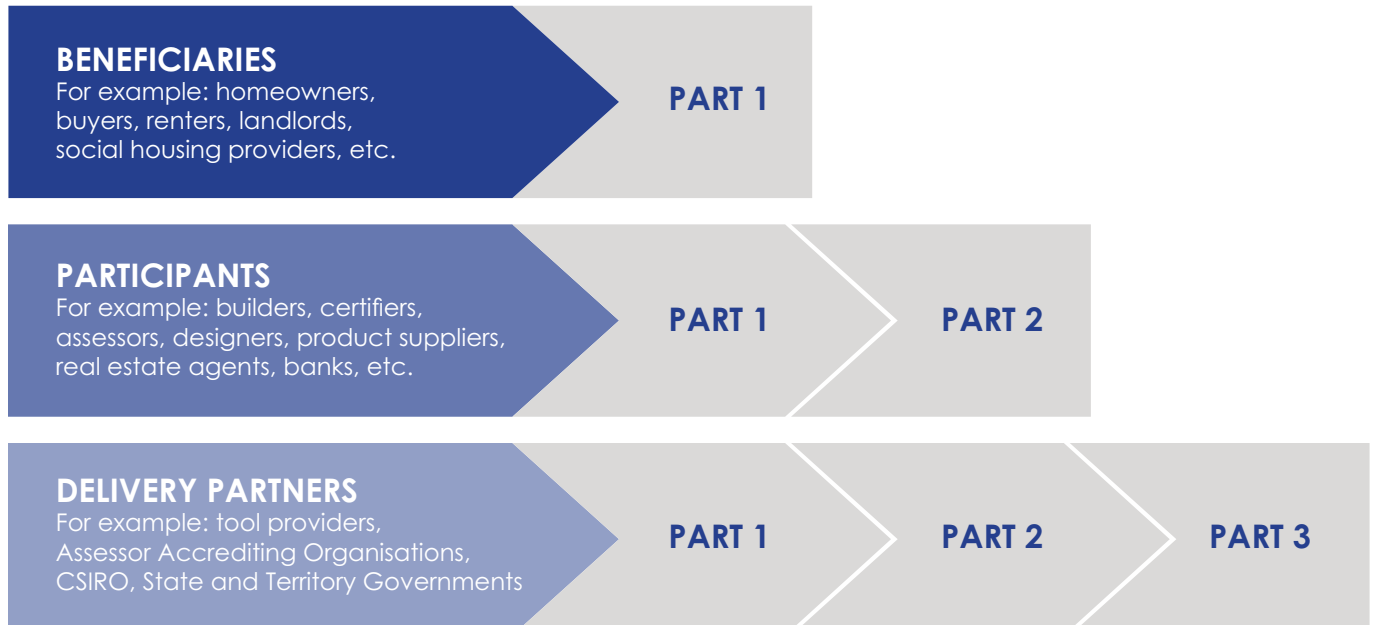
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# INTRODUCTION

This discussion paper outlines the key changes that are underway for the Nationwide House Energy Rating Scheme (NatHERS) and areas where we are seeking stakeholder feedback.

It is structured with a focus on three key NatHERS audiences as shown in Figure 1, who will be directly impacted by the changes. All parts will be relevant to Government and Peak Body audiences.



**Figure 1:** Discussion paper structure based on key audiences

## Why we are consulting

We would like to let you know about the proposed changes to NatHERS and how these changes may affect you. We also want your feedback about the proposed changes to help us better understand any issues that may require consideration before we finalise the changes. Your feedback will help ensure the updated Scheme delivers on consumer and industry needs.

## Providing feedback and making a submission

Please provide your feedback through the [Changes to the Nationwide House Energy Rating Scheme \(NatHERS\) survey](#). Written submissions can also be made.

The survey steps you through a series of questions that are most relevant to your situation (e.g. you may be a home owner, a building professional or an industry representative).



## What we will do with your feedback

The information you provide will guide and inform the final decisions about the changes to NatHERS.

The high level findings from the survey and written submissions (unless requested not to be made public) will be published in the NatHERS Star newsletter and on the Consultation Hub webpage.

In addition to this consultation process, targeted market research will be conducted to ensure comprehensive feedback is sought from beneficiaries.

Following both of these consultation processes, the NatHERS Administrator and NatHERS Steering Committee will consider the feedback and make appropriate adjustments prior to the changes coming into effect.

## Why update NatHERS?

In 2019 Energy Ministers agreed the *Trajectory for Low Energy Buildings* and the *Addendum to the Trajectory for Low Energy Buildings—Existing Buildings* (collectively referred to as '[the Trajectory](#)'), outlining a national plan that aims to achieve zero energy (and carbon) ready buildings in Australia.

These buildings are designed with the future in mind: oriented correctly on the block, and using building materials, insulation and windows to achieve a comfortable and energy efficient home. They also have energy efficient appliances and can be readily adapted to connect to renewable energy systems on, or off-site.

The Trajectory is guiding energy efficiency improvements throughout the building system to help lower energy bills for households and businesses, improve health and comfort, reduce greenhouse gas emissions, and improve the resilience of homes to extreme weather events and blackouts.

To help deliver these objectives, the Trajectory included recommendations for NatHERS:

- The Scheme should be expanded to offer accredited whole-of-home software for verifying the residential energy efficiency provisions in the National Construction Code (NCC).
- A home energy rating scheme for existing homes should be delivered, which leverages the NatHERS framework and accommodates rating tools.

The Trajectory also recommended changes to the NCC, which is the responsibility of Building Ministers. Building Ministers tasked the Australian Building Codes Board (ABCB) to take the Trajectory recommendations into consideration when developing changes to the NCC 2022 and these have been consulted on separately.

# PART 1

## NatHERS IS CHANGING

For almost 30 years, NatHERS ([www.NatHERS.gov.au](http://www.NatHERS.gov.au)) has provided energy performance information and ratings, to support the delivery of comfortable, energy efficient homes to Australian homeowners.

NatHERS helps people buy, build or renovate a home with better energy performance, by guiding smarter design and building choices, such as changing the position of a home on a block, or using higher-rated insulation or windows to make a home more comfortable to live in and cheaper to run. Savings from better energy performance can wipe months or years off a home loan.

Trained and accredited NatHERS assessors use accredited software tools to measure the 'thermal performance' of a new home or major renovation. This is based on its design and materials, (e.g. walls, windows, insulation and orientation). This assessment provides a star rating out of 10. More stars mean less energy is needed to keep the house comfortable through heating or cooling. Fewer stars reflects poor design, and means a home will require more heating and cooling to keep it comfortable and it will be more costly to run.

NatHERS is the preferred pathway used for new homes to show compliance with the energy efficiency requirements of the NCC with around 90% of new residential building approvals using NatHERS during 2020-21.

### New assessments on offer

There are exciting changes coming to NatHERS to improve home energy assessments and help deliver the next generation of modern, sustainable homes for the future.

A new Whole of Home energy assessment will soon be available. The new Whole of Home rating will also soon be added to NatHERS Certificates. It will sit alongside the current 'thermal' star rating and will include the estimated energy used by fixed appliances, such as heating and cooling systems, hot water, lighting and pool/spa pumps. On-site energy generation and storage (e.g. solar panels and batteries) will also be included in the new assessments.

The new Whole of Home rating scale is intended to show how the design of the home meets or exceeds the proposed minimum energy efficiency requirements in the NCC 2022, which will see improvements in home energy efficiency for new buildings and major renovations.

NatHERS is also now offering In Home energy assessments that do not require house plans and building specifications. These voluntary assessments will help homeowners compare their home to others across Australia when choosing a different home, or improving the energy performance of their existing home.

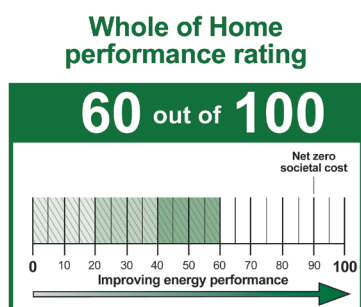
### Updated NatHERS Certificates

[NatHERS Certificates](#) provide important information about home energy assessments. These Certificates can be used to demonstrate the design of the home meets or exceeds the minimum energy efficiency requirements included in the NCC. They can also be used to compare the efficiency of home designs, and identify how the performance of the home can be improved. Recently, NatHERS Certificates have started to be used by financial institutions to verify the energy efficiency performance of customers' building projects, to support access to green loan products.

NatHERS Certificates will soon include additional information regarding the energy performance of appliances within the home, and energy generated or stored on-site. **Appendix A** includes drafts of the updated NatHERS Certificates for either a detached home, or an apartment.

### Whole of Home Rating

A proposed Whole of Home performance rating scale (Figure 2) is being introduced on NatHERS Certificates. Energy costs and associated greenhouse gas emissions, along with on-site renewable energy from solar panels will also be included on the Certificate (Figure 3), creating a useful snapshot for homeowners who can use the information to make the best choices for their circumstances. The final format for displaying the Whole of Home rating, energy costs and greenhouse gas emissions will be informed by the outcomes from this consultation and targeted market research. The new ratings will help homeowners move towards achieving a 'net zero cost' home with lower energy bills. A home with a lower rating will have higher energy costs. A home with a higher rating will use less energy and will therefore have lower associated costs.



**Figure 2:** Example of proposed Class 1 – detached home Whole of Home rating

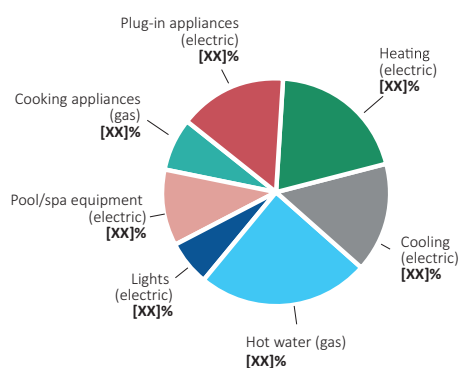
The Whole of Home performance rating will also be useful for building and design professionals, by helping them to create homes that have lower energy bills while also meeting and exceeding construction code requirements. The rating will allow easy comparisons between different home designs to ensure the best design for the climate, block of land and the needs of the homeowner.

## Measuring energy in the home

Hot water, heating and cooling systems can have a big impact on a home's energy rating and running costs. Appliance choice can be an easy way to improve the home's energy rating, make it more comfortable to live in and save on energy bills. For example, heating and cooling accounts for 40 % of household energy use<sup>1</sup> across new and existing buildings, making it the largest energy user in the average Australian home. Hot water systems use 23%, lighting 7% and other appliances and equipment are responsible for 25% of the homes energy use. New information on the updated Certificates (Figure 3) will cover energy use, costs and greenhouse gas emissions of the homes appliances. This will help homeowners make the best choices for their individual circumstances.

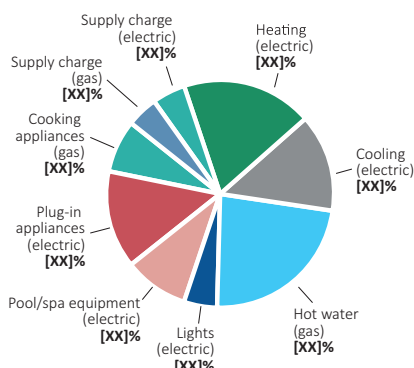
### Energy use

Shows the contribution each appliance has on the home's energy use



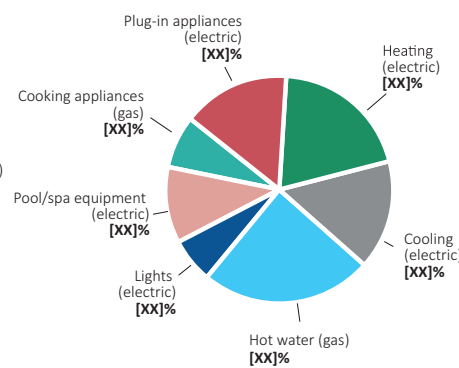
### Costs

Shows the contribution each appliance has on the home's overall annual energy cost



### Greenhouse gas emissions

Shows the contribution each appliance has on the home's annual greenhouse gas emissions



**Figure 3:** Estimated energy use, greenhouse gas emissions and cost as shown on the new NatHERS Certificate (Illustrative only)

The updated NatHERS Certificates will also have information about how much solar (or other renewable) energy the home is generating, using and exporting back to the electricity grid. Figure 4 shows how this information may be included on the Certificate.

<sup>1</sup> Your Home – Australia's Guide to Environmentally Sustainable Homes, Australian Government, Department of Industry, Science, Energy and Resources, 2021, [www.yourhome.gov.au](http://www.yourhome.gov.au)

# PART 1

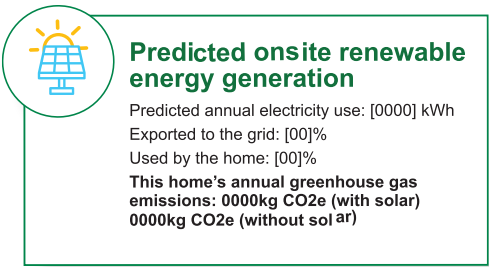


Figure 4: Estimated on-site renewable energy and greenhouse gas emissions

## NatHERS In Home Certificates

As NatHERS moves to offer voluntary In Home energy assessments, a new additional certificate is being designed to help homeowners compare their property to others across Australia. This new In Home Certificate will help people to choose a new home, or improve the energy performance of their existing home.

NatHERS In Home assessments measure the energy performance of an existing 'as-built' home through an on-site assessment. This differs from the Whole of Home assessment, which relies solely on a desktop assessment based on a home's design and materials. An In Home Certificate will be similar to a Whole of Home Certificate, recording much of the same information, but it will also feature additional advice about how the energy efficiency of the home can be improved.

An important additional rating included in the In Home Certificate will be a measure of 'thermal comfort'. This measure will help homeowners make their homes more comfortable during hot and cold weather extremes (Figure 5).



Figure 5: Sample of two different options for displaying the comfort rating in the NatHERS In Home Certificate

You can read more about the Whole of Home and In Home updates at [www.nathers.gov.au](http://www.nathers.gov.au). Both certificates are under development. We would greatly value your thoughts and feedback so we can ensure the Certificates best communicate the most important information to homeowners.

## Providing Feedback

We thank you for reading our discussion paper and welcome your views on the proposed changes and designs for the new NatHERS Certificates.

Please provide feedback by completing the 20-25 minute online survey [here](#).

You can also provide a detailed submission if you prefer. Please provide detailed comments on:

- The information you see as most important for inclusion in the Whole of Home and In Home Certificates
- On-site energy production, appliance and comfort rating scales.

## PART 2

### NatHERS SUPPORTING INDUSTRY

In this section we will further explore how the upcoming changes to NatHERS will support the building sector.

Homeowners are becoming more aware of the significant benefits of sustainable, healthy homes which is driving demand for comfortable, cost effective and energy efficient housing stock.<sup>2</sup>

The proposed changes to both NatHERS and the NCC 2022 are focused on designing and creating the buildings of the future, creating a pathway for bespoke and volume builds across Australia.

Building 7-star homes with energy efficient appliances will significantly cut energy bills and reduce greenhouse gas emissions. It helps to ensure homes are comfortable during heatwaves, cold snaps and power outages. Savings from better energy performance can also wipe months or years off a home loan which is a great incentive for homeowners.

As we move towards zero energy ready buildings, with rising consumer demand, NatHERS is updating and improving its suite of home energy assessments. The changes will support industry to deliver the next generation of modern, sustainable homes.

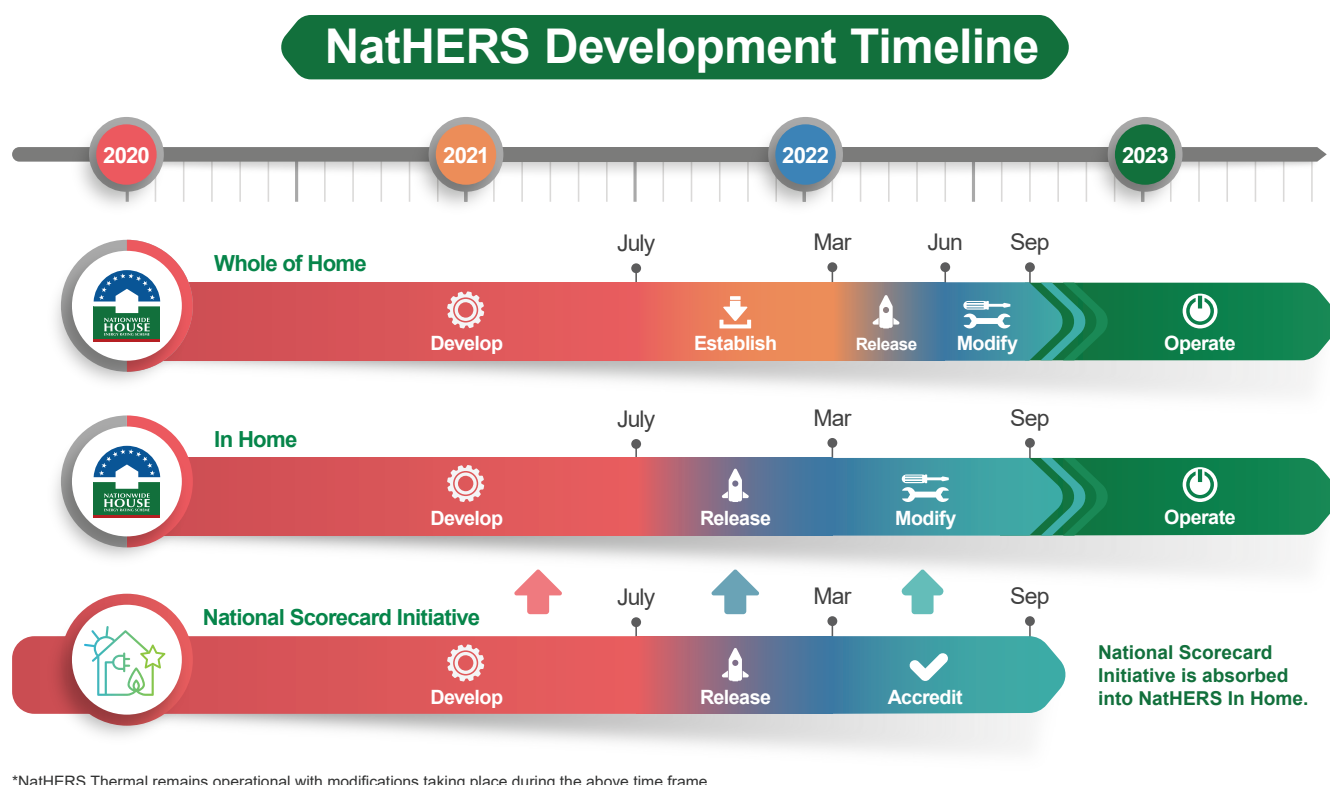
Building on comprehensive updates to software used for thermal assessments, new Whole of Home ratings will provide robust and NCC Construction Code, and help them meet consumer demand for energy efficient homes. New In Home ratings will provide guidance to help consumers identify upgrades to improve their homes (Figure 6).

NatHERS Thermal Assessments (existing scheme)	NatHERS Whole of Home Assessments (expansion of existing scheme)	NatHERS In Home Assessments (extension of existing scheme)
<ul style="list-style-type: none"><li>• A desktop assessment based on design and construction materials (e.g. orientation, windows, wall types, and insulation) and how these influence the heating and cooling needs of a home.</li><li>• Software tool and assessor requirements to generate a thermal performance energy rating.</li><li>• Produces a NatHERS Certificate with a rating for the estimated energy use for heating and cooling.</li></ul>	<ul style="list-style-type: none"><li>• A new desktop assessment and rating for the whole home, which aligns with proposed NCC energy efficiency changes.</li><li>• Assesses the energy performance of the home's appliances (e.g. heating, cooling, hot water, lighting, pool/spa pump and heating, and renewable energy generation and storage), building on the thermal assessment.</li><li>• An updated NatHERS Certificate will estimate energy use for the whole home.</li></ul>	<ul style="list-style-type: none"><li>• A new In Home assessment to generate an energy rating for existing homes where house plans do not exist.</li><li>• Builds on the NatHERS Thermal and Whole of Home assessments, and the National Scorecard Initiative.</li><li>• Will produce a NatHERS Certificate with a rating for the estimated energy use for the home, and how the home's rating can be improved.</li></ul>

**Figure 6:** Three NatHERS work streams

The **indicative timeline** for the changes are outlined in Figure 7.

<sup>2</sup> *Growing the Market for Sustainable Homes*, Low Carbon Living Cooperative Research Centre and the Australian Sustainable Built Environment Council, <https://assets.sustainability.vic.gov.au/asset-download/Report-Growing-the-market-for-sustainable-homes.pdf?mtime=20210116180641&fo-cal=none>



\*NatHERS Thermal remains operational with modifications taking place during the above time frame.

**Figure 7:** NatHERS Development Timeline

## NatHERS Thermal Assessments

Key NatHERS software updates for NCC 2022 include:

- **Climate Files:** will be updated to use more recent and accurate weather data to ensure the best information is provided about which design features are most appropriate for a given climate.
- **Star Bands:** will be recalibrated, so the updated climate files will not have a disproportionate impact on any particular home type or design.
- **Heating and Cooling Load Limits:** the ABCB will be releasing a new Standard for NatHERS heating and cooling load limits, appropriate for 7 stars and for the recalibrated star bands. NatHERS is also improving linkages, with an automatic lookup function in the software, and information about the relevant load limits displayed on the Certificate.
- **Thermal bridging:** is the movement of heat across an object that is more conductive than the materials around it. For example, the frame behind a plasterboard interior wall could form a thermal bridge for heat to move through the wall cavity. The ABCB has proposed thermal bridging changes for residential buildings, as it can significantly reduce the energy efficiency of a home if not accounted for. CSIRO and NatHERS have developed a thermal bridging capability with default parameters and draft modelling guidance on how to apply them, should the provisions be adopted.

## NatHERS Whole of Home Assessments

The new assessments will support proposed NCC 2022 changes, as well as helping industry and homeowners to make informed choices about how they can move towards zero energy (and carbon) ready buildings.



## PART 2

### What will NatHERS Whole of Home assessments be used for?

Whole of Home assessments will help consumers make cost effective choices. Key information on the interaction between appliances and a home's design will provide homeowners with a broad range of technology and appliance choice. An efficient water heating system and appropriately sized heating or cooling systems can save money and ensure the home is comfortable and resilient in hot and cold climates. On-site renewable energy generation can also help offset the home's energy use.

The new assessments will also support the proposed new residential energy efficiency provisions for NCC 2022. The scope of changes proposed for NCC 2022 includes:

- a stringency increase in the thermal performance of homes to the equivalent of a 7-star NatHERS energy rating (current level is equivalent to 6-stars NatHERS) (H6P1)
- a Whole of Home approach with an annual energy use budget for the regulated equipment in the home (i.e. space conditioning, heated water, lighting and swimming pool & spa pumps) (H6P2).

### Using NatHERS to pass energy efficiency requirement in the NCC (H6P1 building fabric and H6P2 energy usage)

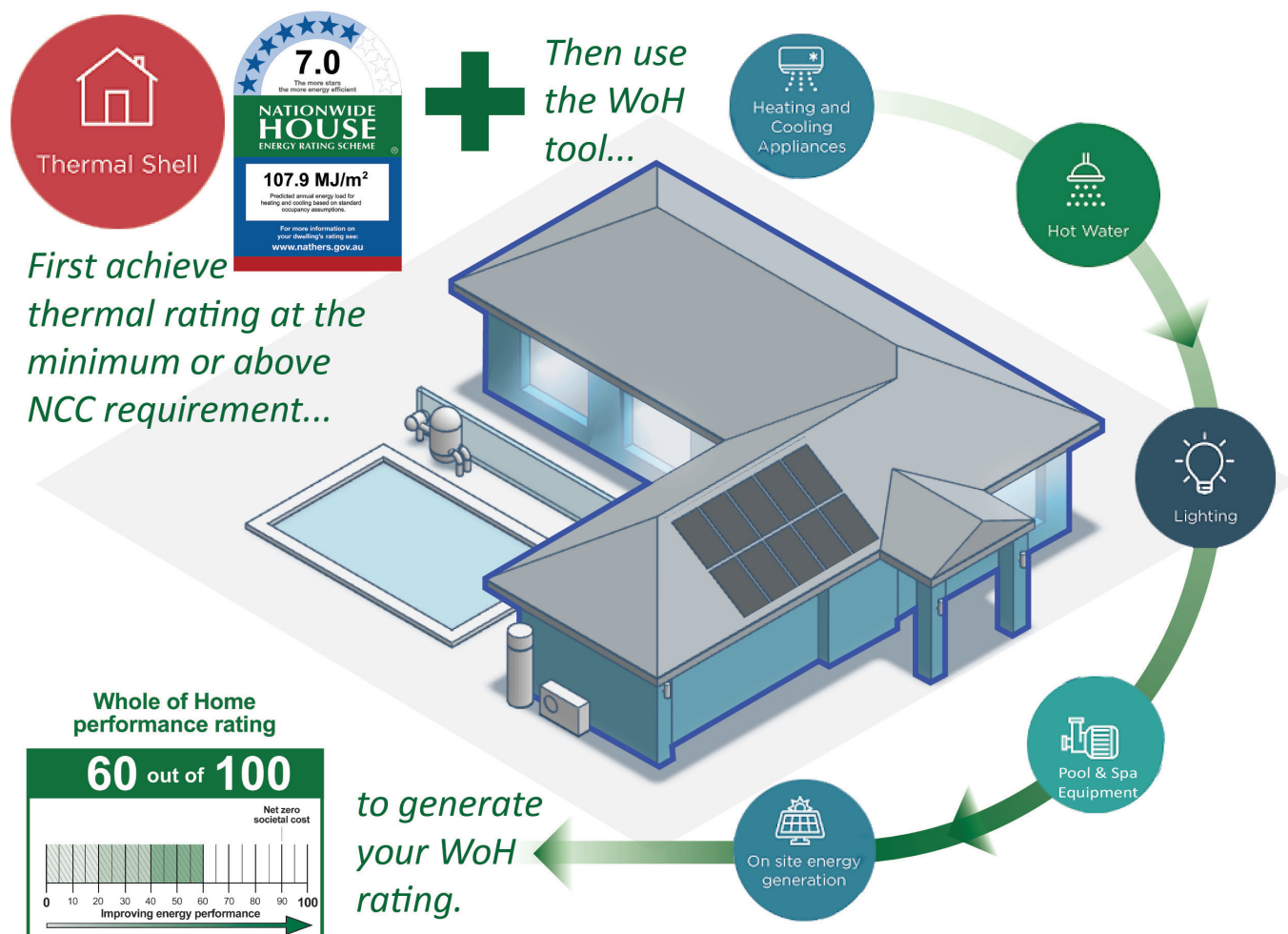


Figure 8: NatHERS and meeting the new NCC 2022 energy efficiency provisions



For the whole-of-home approach, the draft NCC provisions for Class 1 buildings are based on a level of stringency equivalent to 70% of the annual energy usage of these benchmark appliances:

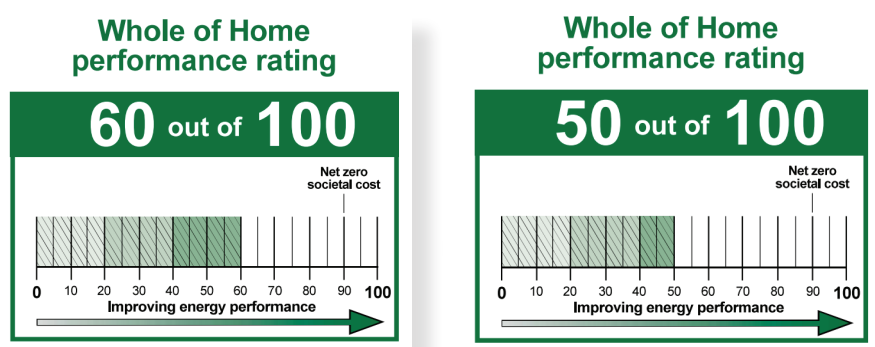
- a 3-star ducted heat pump<sup>3</sup>, rated under the 2019 Greenhouse and Energy Minimum Standards (GEMS) determination, heating all spaces that are provided with heating; and
- a 3-star ducted heat pump<sup>4</sup>, rated under the 2019 GEMS determination, cooling all spaces that are provided with cooling; and
- a 5-star instantaneous gas water heater, rated under the 2017 GEMS determination, providing all domestic hot water; and
- a lighting power density of 4 W/m<sup>2</sup> serving all spaces that are provided with lighting.

The provisions for Class 2 sole-occupancy units (SOUs) and Class 4 parts of buildings are based on 100% of the energy usage of the benchmark appliances in the Class 1 provisions.

NatHERS is providing a pathway for demonstrating compliance with the new NCC residential energy efficiency performance requirements (see Figure 8). To meet the new Whole of Home energy use budget proposed for NCC 2022, different appliance efficiencies and/or on-site generation can be combined to get the best outcome for individual circumstances. This will support builders, designers and consumers to design for and beyond minimum standards, towards a zero energy (and carbon) ready home (as outlined in the [Trajectory](#)). For more information about the proposed changes to the NCC, see the [NCC 2022 summary](#) of changes.

In addition to the current thermal ratings (out of 10 stars), the new Whole of Home rating will be used to demonstrate if a home meets or exceeds the minimum NCC energy efficiency performance requirements. Similar to thermal ratings, a single number on the Whole of Home scale will represent the Deemed to Satisfy (DTS) provisions for demonstrating compliance with the NCC's Whole of Home energy use budget.

Figure 9 shows examples of proposed draft rating scales under development with different stringency levels for Class 1 and Class 2 dwellings. The exact compliance point standard for demonstrating you meet the NCC's whole-of-home energy use budget (H6P2) will be determined following a decision by the ABCB on the final suite of provisions for NCC 2022. Analysis of Whole of Home rating scale options is underway to ensure it aligns with the proposed NCC requirements and to determine its suitability for rating existing buildings. Outcomes are expected in March 2022.



**Figure 9:** Examples of proposed Class 1 (60 out of 100) and Class 2 (50 out of 100) rating scales

For more examples in various climate zones around Australia, that demonstrate minimum compliance and high energy efficiency homes, refer to the scenarios and Whole of Home Example Ratings available as part of this consultation held on our [Industry Consultation Hub](#). For New South Wales approaches to meeting NCC 2022 requirements, visit the Building Sustainability Index website ([BASIX](#)) as NCC refers to BASIX to deliver the energy efficiency requirements for new homes. The Whole of Home Example Ratings outline what the new ratings could mean in practice, under a range of thermal performance ratings and whole of home ratings, and what combinations of thermal performance rating and fixed appliances lead to higher ratings compared to meeting minimum compliance. The Whole of Home Example Ratings are indicative and will be subject to final decisions on the stringency of the NCC energy efficiency provisions.

<sup>3</sup> A 4.5-star heat pump rated under the 2012 GEMS determination is considered equivalent.

<sup>4</sup> A 4.5-star heat pump rated under the 2012 GEMS determination is considered equivalent.

## PART 2

It also shows how the NatHERS pathway provides the ability to get benefits for going beyond a minimum thermal shell. For example, if you have exceeded the 7-star rating, say with an 8 or 9-star thermal shell, the reduced thermal load will be reflected in your Whole of Home assessment. This is a more nuanced approach than can be offered under the NCC DTS elemental pathway, which is necessarily designed to be simple.

The Whole of Home Example Ratings and **Appendix B** show the wider range of technologies and appliance efficiencies that are available under NatHERS compared to the NCC DTS elemental pathway. The process allows assessors to trade off different technologies and appliance efficiencies, enabling industry to adopt the most cost effective and tailored solution to meeting and exceeding compliance.

### How will apartments be assessed using NatHERS Whole of Home?

As outlined above, Whole of Home ratings will also be used for assessing the energy performance of apartments. Each apartment will require a separate assessment and rating for both Thermal and Whole of Home. NCC 2022 proposals are for thermal ratings to be a 7-star average across the block with a 6-star minimum for any apartment. The Whole of Home provisions only state a minimum requirement for each apartment. There is no average across the block of apartments for Whole of Home.

The lowest Whole of Home rating in an apartment block will be displayed on the NatHERS Class 2 Summary Certificate. **Appendix A** shows an example of the new NatHERS Class 2 Summary Certificate.

In the future, Whole of Home assessments for apartments will include methods for assessing central services, such as centralised water heating, and on-site energy generation and storage. This will allow energy use and generation to be appropriately attributed to individual apartments within an apartment block. The assessment of common spaces and the services within these spaces are not included in NatHERS assessments and are currently undertaken by the National Australian Built Environment Rating System (NABERS). Integration of common spaces into NatHERS to enable whole-of-building assessments may be considered in the future.

### How is NatHERS Whole of Home being established?

Whole of Home assessments will leverage and expand on the key elements of the current Scheme and build upon the well-established thermal performance ratings including:

- **Accreditation of software tools.** The CSIRO's Chenath Engine will continue to underpin the calculations for the NatHERS Whole of Home Benchmark Tool. A new Software Accreditation Protocol (SAP) is being developed to support the accreditation of Whole of Home tools.
- **Accreditation of NatHERS Assessors through Assessor Accrediting Organisations (AAOs).** Training is being developed to support NatHERS Assessors to up-skill. Current training pathways, such as the Certificate IV in Home Energy Efficiency and Sustainability is being reviewed and updated to include the competencies needed to undertake Whole of Home assessments. Continuing Professional Development (CPD), the NatHERS Technical Note and Assessor Handbook, are also being revised to support training of Assessors.
- **Communication materials.** This includes updated information on the NatHERS website, and the inclusion of a new Whole of Home rating and information on the NatHERS Certificate. A factsheet and other communications materials will support industry through the transition.

More information can be found on the [NatHERS Whole of Home webpage](#).

## NatHERS In Home Assessments

Existing homeowners across Australia now have an option to find out how energy efficient their home is. This new voluntary 'in home' assessment is extending NatHERS as part of a joint initiative of the Commonwealth, state and territory governments.

No house plans are required for an In Home assessment, as an assessor will visit the home to record information about construction and materials, and the energy used by major fixed appliances, such as air conditioners, heaters and hot water systems. Assessments will provide a rating along with helpful information about how the energy performance of the home could be improved, and will be used for a range of purposes including:

- Identifying cost effective energy savings and upgrade opportunities
- Performance benchmarking and comparison with other homes
- Disclosure of performance for sale or lease purposes
- Supporting applications for 'green' or discounted finance
- Social housing, understanding the state of the building stock and informing upgrade programs.

### How is NatHERS In Home being established?

In Home assessments are building on NatHERS Thermal and Whole of Home assessment processes to ensure results are credible, repeatable, reliable and accurate across all assessment streams. This is important to ensure homeowners are not confused by conflicting ratings for a given property.

However, there are inherent differences in assessing the energy performance of existing homes, as compared to new homes. Existing homes reflect a much wider set of styles, designs, construction methods, materials, fittings and inclusions. Also, in many cases there will be no house plans, as well as no reliable documentation for building materials and appliances. Taking this into consideration, processes are being modified and established to ensure consistency with other NatHERS processes.

In Home is building on and utilising the market-tested National Scorecard Initiative, which will be used for assessments prior to NatHERS In Home being fully established. A transition to an open market will follow, when other energy rating tools can seek accreditation.

The National Scorecard Initiative is endorsed by NatHERS, meaning its current processes are in alignment with the future NatHERS In Home requirements. The National Scorecard Initiative will be phased into NatHERS in 2022 with some amendments anticipated as requirements are agreed and finalised, such as the change from the current Scorecard rating scale to the new NatHERS Whole of Home rating scale. For the time being, all elements of the National Scorecard Initiative, including the assessment tool, training and assessor accreditation, will be delivered by the Victorian Government on behalf of all Australian governments.

More information about the National Scorecard Initiative can be found on the [NatHERS In Home webpage](#).

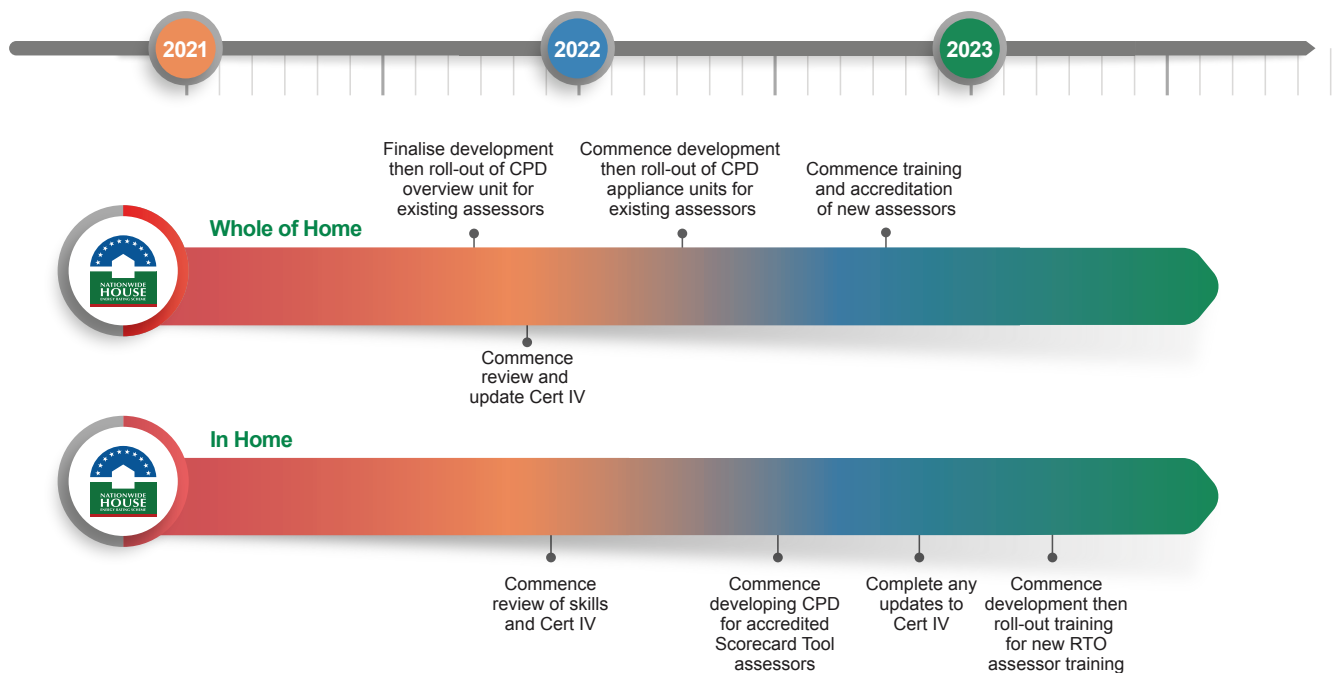
## What do the changes mean for assessors?

There will be many new opportunities for assessors. Accredited NatHERS assessors will be able to upskill to become Whole of Home assessors, with CPD offered to help them gain the skills they need. Changes will also be made to the Certificate IV and associated training for new assessors.

CPD will also be offered to National Scorecard assessors following the accreditation of the National Scorecard Tool under NatHERS. Training will continue to be offered by the Victorian Government until the transition to Registered Training Organisations.

Figure 10 shows an indicative timeline for the roll out of CPD and assessor training.

### NatHERS assessor training and CPD



**Figure 10:** Indicative timeline for NatHERS assessor training and CPD

#### Providing Feedback

We thank you for reading our discussion paper and welcome your views on the proposed changes. Please provide feedback by completing the 20-25 minute online survey [here](#).

You can also provide a detailed submission if you prefer. Please provide detailed comments on:

- Development timeline for the NatHERS changes
- Proposed NatHERS changes and how they are proposed to be implemented
- Impact of changes for assessors.

## DELIVERING NatHERS INTO THE FUTURE

Currently around 90% of all new builds use NatHERS as a regulatory pathway to meet NCC requirements. This success comes down to working closely with our partners across government and industry.

Acting as the NatHERS Administrator, the Commonwealth Government has responsibility for various activities which are only made possible by the CSIRO, Assessor Accrediting Organisations (AAO) and software tool providers.

This section examines in detail changes to key processes and documents that may impact you as a key delivery partner. Figure 11 is a summarised table of key elements of the Scheme and **Appendix C** provides a summary of Technical Documents referred to in this Part 3.

<b>NatHERS Communications</b>	<ul style="list-style-type: none"> <li>• <b>NatHERS Certificate</b> is produced by accredited NatHERS assessment tools. It shows the details about the assessment, including the rating/s for the dwelling, key elements that make up the rating, etc.</li> <li>• <b>NatHERS Website</b> communicates key aspects of NatHERS to all stakeholders.</li> <li>• <b>NatHERS Factsheets</b> provide additional information, guidance and explanations on specific aspects of NatHERS.</li> <li>• <b>Australian Housing Data Portal</b> communicates data captured from NatHERS assessments.</li> </ul>
<b>NatHERS Assessor Training and Accreditation</b>	<ul style="list-style-type: none"> <li>• <b>Assessor pathway</b> outlines the proposed approach for transitioning assessors to be Whole of Home and/or In Home assessors.</li> <li>• <b>NatHERS AAO Protocol</b> outlines the requirements suitably-qualified organisations must meet and maintain to be accredited under NatHERS, and to then accredit NatHERS assessors.</li> <li>• <b>NatHERS Technical Note</b> provides instructions for conducting assessments under NatHERS, with the aim of ensuring consistency across assessments.</li> <li>• <b>Assessor Handbook</b> provides guidance to assessors and explains in detail the requirements outlined in the Technical Note.</li> </ul>
<b>NatHERS Benchmark Tool and Tool Accreditation</b>	<ul style="list-style-type: none"> <li>• <b>NatHERS Benchmark Tool Methodology</b> outlines the methods that underpin the NatHERS Benchmark Tools. The NatHERS Benchmark Tool is what is used to accredit prospective software tools against.</li> <li>• <b>NatHERS Software Accreditation Protocol (SAP)</b> outlines the key parameters that software tools must have, and the accuracy that must be achieved, for those tools to be accredited under NatHERS.</li> </ul>

**Figure 11:** NatHERS key documents and processes

### NatHERS Assessor Training and Accreditation Processes

All current NatHERS Accredited Assessors must hold a Certificate IV in a relevant qualification, delivered by a Registered Training Organisation (RTO) and be accredited by an AAO.

The Certificate IV will be reviewed and updated as appropriate for Whole of Home and In Home assessments. There will be additional training for new assessors and CPD will be established to up-skill current assessors. The current NatHERS AAO Protocol will have clauses added as appropriate to cover Whole of Home assessments.

For In Home assessments, the AAO Protocol will be based on the current Protocol, but with additions to reflect differing requirements and processes for In Home assessor training and accreditation.

For more information, visit the [NatHERS assessors and AAO webpage](#).

## PART 3

### Training and accreditation for NatHERS Whole of Home

Whole of Home assessor training and accreditation will build off the current NatHERS Thermal performance. There will be two pathways; one for current NatHERS Accredited Assessors and one for new assessors who have not commenced the Certificate IV qualification.

Current NatHERS Accredited Assessors with a Certificate IV qualification will be able to undertake CPD to receive a Statement of Attainment recognising competency in Whole of Home assessments. It is proposed this training is delivered through AAOs. Once an existing Assessor has received their Statement of Attainment, they can be accredited as a Whole of Home assessor by an AAO.

Prospective assessors who have not yet enrolled in a relevant Certificate IV qualification, will receive training in Whole of Home assessments through an updated training package delivered by RTOs. These assessors can be accredited to undertake Whole of Home assessments through existing AAOs.

### Learning and development for Whole of Home assessors

The introduction of Whole of Home assessments requires additional knowledge and skills for assessors. A review of the existing Certificate IV Competency Standards is being conducted in late 2021 to scope changes required to the existing qualification. In addition, the *NatHERS Whole of Home Assessor Training and Accreditation Strategy* identified the skills and knowledge required to move from being a thermal performance assessor to a whole of home assessor, which can be met through CPD units.

It is anticipated that current assessors will be able to commence the Whole of Home overview CPD from December 2021. This will ensure that upskilled and accredited Whole of Home assessors are available for NCC 2022 in September 2022. An updated Certificate IV training package, incorporating Whole of Home competencies and skill sets, will be available for new assessors by 1 September 2022.

### Training and accreditation for NatHERS In Home

In Home assessors require distinct skills as they will be working on-site in a home. Excellent communication, management of health and safety risks, and being able to accurately identify building features and appliances are key.

Using established National Scorecard Initiative processes, In Home assessor training and accreditation will be phased into NatHERS as outlined in the *Pathway for the training and accreditation of NatHERS In Home assessors*. These will align with the current NatHERS Thermal requirements and build upon the NatHERS Whole of Home work, as much as possible and where appropriate.

Initially the National Scorecard Initiative will manage the training and accreditation of NatHERS In Home assessors. During this phase, existing National Scorecard assessors will be classed as NatHERS In Home assessors, but they will be required to undertake some CPD. Following a review of the Certificate IV CPP 41119 in late 2021, a new independent training pathway for In Home assessors will be established.

The National Scorecard Initiative will continue to conduct tool training and accredit NatHERS In Home assessors until the final phase of the transfer, at which point it is proposed RTOs will assume full responsibility for training, including tool training, and AAOs will take over accreditation for all NatHERS In Home assessors.

### NatHERS Technical Note

The current NatHERS Technical Note is focused on the process of modelling the thermal performance of a home based on its floor plans and specifications. It stipulates what must be included in a NatHERS assessment when generating a NatHERS rating. It is critical for assessors, building regulators and AAOs to ensure quality assurance and compliance.

The Technical Note will be updated to reflect any thermal bridging requirements, should they be adopted in the NCC. The other thermal changes (climate files, star bands and improved linkages to the heating and cooling load Standard) will be embedded within NatHERS software tools and will not require changes to how an energy rating is conducted.

For more information, visit the [NatHERS Resources webpage](#).

### Whole of Home Technical Note

The Whole of Home Technical Note will provide assessors with the information and rules they must follow when undertaking a NatHERS Whole of Home assessment.

It is proposed the Whole of Home rules be incorporated into the existing Technical Note. This would require Whole of Home information to be added to some chapters and the introduction of a new 'Appliances' chapter. Required additional information is outlined in the *Technical Note and Assessor Handbook - Analysis for Whole of Home*.

### In Home Technical Note

A tailored, separate In Home Technical Note outlines the requirements for In Home assessments to ensure accuracy and consistency. The key additions from the current NatHERS Technical Note are:

- Information regarding risk and safety, conflict of interest and other considerations unique to In Home assessments
- Techniques for collecting data and evidence, including estimations and assumptions regarding the age of the home, insulation, air-leakage, shading, windows and existing appliances where documentation does not exist
- Evidence requirements, which rely on photographs where documentation does not exist
- Guidance regarding data points that may be assumed to be defaults within tools, rather than collected
- Simplified approach to zoning existing homes.

### NatHERS Assessor Handbook

The current NatHERS Assessor Handbook provides best practice guidance for assessors. It describes how Thermal assessments are to be conducted, including recommended steps for how mandatory processes can be achieved. Assessors can use the Handbook to guide their assessments when using any of the four NatHERS Accredited Thermal tools. The Handbook is designed to be used in conjunction with the NatHERS Technical Note. It provides further explanations and clarifies the Technical Note rules.

If the proposed NCC 2022 thermal bridging requirements are adopted, the Handbook will be updated to explain the objective of the new requirement and the way it is being applied to steel and not timber, as per the proposed NCC provision.

For more information, visit the [NatHERS Resources webpage](#).

### Whole of Home Assessor Handbook

The Whole of Home Assessor Handbook will provide the background to the Whole of Home Technical Note rules. It will be a repository for supporting information and further understanding for assessors. To make it as easy as possible for assessors, it has been proposed that Whole of Home instructions be incorporated into the existing NatHERS Assessor Handbook.

Required additional information is outlined in the *Technical Note and Assessor Handbook Analysis for Whole of Home*.

### In Home Assessor Handbook

In consultation with qualified In Home assessors, a new NatHERS In Home Assessor Handbook will be developed to provide the background to the In Home Technical Note rules. It will be based on the NatHERS Assessor Handbook and the National Scorecard Tool Assessor Manual.



# PART 3

## NatHERS Benchmark Tool and Accreditation Processes

All energy rating software used to produce NatHERS energy ratings must be accredited in accordance with the [NatHERS Software Accreditation Protocol](#) (SAP). There are currently four [NatHERS accredited software tools](#), and two NatHERS 'endorsed' tools. Endorsed tools demonstrate alignment with what NatHERS will require in the future, although some amendments are expected as requirements are finalised. These tools cannot currently be used to assess house designs against the proposed NCC 2022 requirements.

NatHERS accredited Whole of Home tools are anticipated to be available for use from September 2022, in line with the proposed NCC 2022 coming into effect. The NatHERS AccuRate Whole of Home Benchmark Tool will be available from this date.

A consultation version of AccuRate Whole of Home Benchmark Tool is currently available. The purpose of AccuRate Whole of Home is to provide a benchmark that other Whole of Home tools can be measured against as part of the Whole of Home software accreditation under NatHERS.

The accreditation of other tools cannot commence until final decisions on NCC 2022 energy efficiency provisions are confirmed. This means that other tools may not be available by 1 September 2022. The NatHERS Administrator is working closely with potential tool developers and is providing early access to information to help support their development.

The endorsed tools are:

- [FirstRate5 Whole of Home Pilot Tool](#) (Whole of Home endorsed)
- [National Scorecard Tool](#) (In Home endorsed)

Once thermal changes have been implemented, the NatHERS SAP will be updated to reflect new requirements to deliver results consistent with those of the NatHERS Benchmark Tool (AccuRate). The updates will reflect the new climate files, star bands, split load software (look-up function) and thermal bridging. For more information about the NatHERS Thermal Benchmark Tool methodologies, visit the [Chenath Repository webpage](#).

The Whole of Home SAP will be set to the NatHERS Whole of Home Benchmark Tool (AccuRate Whole of Home). There is no requirement that tools seeking only NatHERS Thermal accreditation have to meet Whole of Home SAP provisions. However, tools seeking Whole of Home accreditation need to have/be undertaking thermal accreditation, or have access rights with an accredited thermal software tool.

The In Home SAP is being developed based on the NatHERS Thermal SAP and informed by the Whole of Home work. Additional consultation in early 2022 will support finalisation of the document, which should be launched by mid-2022. The most significant change to the NatHERS In Home SAP, when compared to the NatHERS Thermal SAP, are the *In Home Software Accreditation Protocol – Testing methodology and test homes*. The test homes are based on a range of typical house constructions representative of the current Australian detached residential building stock, which was evaluated as part of the Trajectory for Low Energy Buildings. Typical apartments have also been included.

## NatHERS Benchmark Tool Method

Calculation methods and settings used to model energy performance have been developed for all NatHERS Benchmark Tools (Thermal, Whole of Home and In Home). The equations, context, assumptions and explanations for the settings, are outlined in separate documents. Final versions will be made available to prospective tool developers to assist with tool development.



## Whole of Home Method

*NatHERS Whole of Home National Calculation Methods* outlines details for each of the modules. It includes how to calculate the hourly energy demand of individual appliances and technologies, and the assumptions applied to determine the occupancy patterns of the home.

The methods, developed in consultation with industry experts, will be used to underpin the NatHERS Whole of Home Benchmark Tool. They will also support potential tool developers.

*NatHERS Whole of Home National Calculation Methods* considered:

- Appliance types and technology to be included in Whole of Home assessments, and the best way of calculating each technology's efficiency, using the most accurate available data
- Ensuring NatHERS can generate a Whole of Home rating for demonstrating compliance with the whole-of-home annual energy use budget provisions proposed for NCC 2022.

The modules are designed to calculate the hourly energy use of a home across a full year for a more accurate reflection of real time energy import and export. For example, hourly calculations ensure the correct benefit is given to energy imported or exported in the middle of the day, versus periods of peak demand. Calculating hourly energy demand will also ensure ratings align with the proposed stringency of the whole-of-home energy use budget provisions proposed for NCC 2022.

The Whole of Home methodologies also include calculations that support a comprehensive and accurate assessment of the home. These include an estimate of the energy used by the home's plug in and cooking appliances is made by the tool. This includes items such as whitegoods, audio visual, small appliances, electric cooking appliances, computers, other electronics and standby power. This calculation does not require user inputs and helps determine a more accurate assessment of overall energy use, including the impact of solar PV.

A description of each module is provided in **Table 1**. A summary of appliance types and technologies, the inputs for calculations, tool outputs and default settings is at **Appendix B**.

**Table 1:** Whole of Home Modules

MODULE	DESCRIPTION
<b>Occupancy</b>	The occupancy module is used to calculate the number of occupants and pattern of occupation. The number of occupants is calculated based on the floor area of the home. The pattern of occupation for Whole of Home is different to the thermal performance assessment, which assumes the home is fully occupied all the time. Dual occupancy profiles (All Day and Work Day) will be introduced in Whole of Home assessments to ensure a more realistic calculation of the home's heating and cooling equipment energy use.
<b>Heating and Cooling</b>	The heating and cooling modules define what heating and cooling appliances service each conditioned zone of the home. They leverage the thermal performance calculation conducted by the Chenath Engine, which outputs in Mega Joules (MJ), and applies the appropriate fuel type and efficiency for the selected heating and cooling appliance/s. This allows for the calculation of actual energy use, by fuel type, required to meet the thermal loads calculated by the Chenath Engine for each hour of the day.
<b>Hot Water</b>	The hot water module uses information about the hot water demand, the geographic location of the home and the hot water system technology and efficiency to calculate the hourly energy use of the hot water system. The hot water demand is based on a standard daily water allowance per occupant and hourly time of hot water use as defined in AS/NZ4234. Postcode information from the thermal performance assessment is used to determine the water heater climate zones. Depending on the hot water technology type selected, users are required to input different information to calculation the system's efficiency.
<b>Lighting</b>	The lighting module uses default values for lighting density and average hours of use per day, and information on the total floor area of the home to calculate the hourly lighting energy use. This module does not require any data input from the user, however future changes may allow for users to input a different value for lighting density.

## PART 3

MODULE	DESCRIPTION
<b>Pool/Spa</b>	<p>The Pool/Spa module uses information about the size of the pool/spa (volume or area) to determine the pump size. The module then calculates the energy used by the pump based on the selected pump technology and efficiency. It also applies assumptions on the number of cycles the pump will run in a 24 hour period. The Pool/Spa module also calculates the energy used by the pool cleaner. This calculation is based on the pump technology and filter type. In future, the Pool/Spa module will also calculate the energy used by the Pool/Spa heater based on the selected heater technology and efficiency.</p>
<b>Solar PV</b>	<p>The Solar PV module uses information on the geographic location of the home, the amount of solar radiation present in the NatHERS climate file, and the angle and orientation of the panels to calculate the hourly electricity generation of the PV array. It relies on user inputs, information taken from the thermal performance calculation and default values.</p> <p>Information about the GMT Time Zone, latitude and longitude of dwelling are all derived from the postcode data entered as part of the thermal performance calculation.</p> <p>Standard values are used to determine the:</p> <ul style="list-style-type: none"> <li>- solar constant</li> <li>- ground reflectance</li> <li>- derating factor</li> </ul> <p>The module also uses information input by the user, including:</p> <ul style="list-style-type: none"> <li>- slope and azimuth of the panels</li> <li>- size of the solar array in kW</li> <li>- number of phases across which the PV array is to be connected</li> <li>- total capacity of all installed inverters (kW)</li> <li>- PV export limit of the electrical network (kW)</li> </ul> <p>The specification for the phases, inverters and exports limits are taken from the system being installed. Where users do not know the specifications of phase, inverters and exports default values are applied.</p>
<b>Battery</b>	<p>The battery module assumes that whenever excess solar PV generation is available it is stored by the battery up to its storage limit and subject to its charging rate limit, and whenever on-site electricity demand exceeds available supply from a PV system, the battery is used to make up any shortfall in any particular hour, subject to there being sufficient energy stored and to the discharge rate limit of the battery. The user is required to input the battery technology and battery capacity. Depending on the technology type selected, the tool will apply default assumptions for the maximum depth of discharge, maximum C-rate (charge and discharge rate), charge efficiency, discharge efficiency and initial charge in battery.</p>

## In Home Method

To ensure NatHERS In Home assessments align with other NatHERS streams, In Home assessment modules (Table 2) build on the modules used in the Whole of Home ratings. However, to reflect the differences in assessments and the way information is collected for existing homes, methods used in the National Scorecard Tool have also been adopted where appropriate. Some methods and settings have been adapted to balance the cost of the assessment against the need for precise information. These adapted methods and settings are outlined in **Table 2**.

**Table 2:** NatHERS In Home Assessment Modules

METHOD	DESCRIPTION	KEY DIFFERENCES
<b>Home Comfort Zoning</b>	The home is separated into three zones, day time, night time and unconditioned.	Individual rooms do not need specific zoning.
<b>Windows</b>	Where documentation does not exist, windows are separated into glass and frame components, with various options able to be selected. Other details, including solar gain through the window, opening level and configuration, are also entered to determine thermal efficiency.	Where exact details of windows are unknown, known or assumed details can be used to estimate thermal efficiency.
<b>Heating and Cooling</b>	Energy use required to meet the thermal loads in each hour calculated by Chenath are based on the appliances servicing the three zones. Where no fixed heating or cooling device is present in the daytime zone to maintain the temperature range underpinning NatHERS, least-cost plug-in devices are assumed.	Simplified zoning is the bases for heating and cooling loads calculations. Assumptions are made where no fixed appliances are present.
<b>Hot Water</b>	The size of the system is based on the size of the home and not on-site observations, which can be difficult. Where the system efficiency cannot be determined by the assessor, a worst case scenario default is selected based on fuel type and age of the system. The shower(s) flow rate is to be measured on-site by the assessor using a bucket test to measure the flow rate per minute.	The shower(s) flow rate is to be measured on-site. System size is assumed.
<b>Lighting</b>	Standard assumptions determine the lighting level across the months. Only halogen lighting is counted by the assessor and the energy need for these is calculated separately.	Halogen lighting energy use is calculated, standard assumptions are used for all other lighting.
<b>Pools/Spas</b>	Pool size is determined by the pump and is not to be assessed on-site, which can be time consuming. Where the pump, heating and cleaning system type and efficiency cannot be determined by the assessor, a worst case scenario default is selected by the tool.  Where a spa exists, this is factored into the assessment based on a standard default, which takes into account the energy used by the pump and water heater.	Where exact details of pools is unknown, known or assumed details can be used to estimate pool pump efficacy and pool size.
<b>Solar PV</b>	Plug-in appliances and baseline energy demand, such as cooking, is factored into the on-site solar PV energy use and export to the grid.  Battery storage requirements will be evaluated for use in NatHERS In Home based on NatHERS Whole of Home.	Energy demand from Plug in appliances is factored into on-site solar PV energy use and export

## PART 3

### Providing Feedback

We thank you for reading our discussion paper and welcome your views on the proposed changes to the NatHERS Training, Benchmark Tool and Accreditation Processes.

Please provide feedback by completing the 20-25 minute online survey [here](#). You can also provide a detailed submission if you prefer. Please comment on the:

- NatHERS Benchmark Tool
- Tool accreditation processes
- Calculation methods
- Key communications, processes, and documentation changes
- Technical Notes and Assessor Handbooks
- Assessor training and accreditation strategy and pathway
- NatHERS In Home SAP – testing methodology and test homes

## DRAFT NatHERS CERTIFICATES

## Example Individual Home or Apartment Certificate

### Nationwide House Energy Rating Scheme

### NatHERS Certificate No. #000000000-00

Generated on [date] using [software and version]

[other boilerplate text other boilerplate text other boilerplate text other boilerplate text other boilerplate text other boilerplate text other boilerplate text]

#### Property

Address [00 Street, Suburb, State/Territory, Postcode]

Lot/DP [number]

NCC Class\* [number]

Type [new/renovation/existing]

#### Plans

Main plan [plan number, version & date]

Prepared by [name of preparer of plans]

#### Construction and environment

Assessed floor area (m <sup>2</sup> )*	Exposure type
Conditioned* 000.0	[exposure]
Unconditioned* 0.0	NatHERS climate zone
Total 0.0	[number, town/suburb]
Garage 0.0	

#### NCC Requirements

BCA provisions [Volume 1/Volume 2]

State/Territory variation [Yes/No]



#### Accredited assessor

Name [assessor name]

Business name [business name]

Email [email address]

Phone [00 0000 0000]

Accreditation No. [0000 000 000]


Assessor Accrediting Organisation [name of Assessor Accrediting Organisation]

Declaration of interest [declaration]

#### National Construction Code (NCC) requirements

[This section is to be updated with NCC code requirement wording when confirmed]

#### Thermal performance star rating



**X.X**

The more stars the more energy efficient

### NATIONWIDE HOUSE ENERGY RATING SCHEME

**YYYY.Y MJ/m<sup>2</sup>**

Predicted annual energy load for heating and cooling based on standard occupancy assumptions.

For more information on your dwelling's rating see:  
[www.nathers.gov.au](http://www.nathers.gov.au)

#### Thermal performance (MJ/m<sup>2</sup>)

Limits taken from ABCB Standard 2019.1

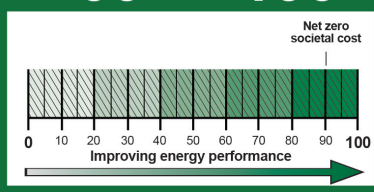
	Heating	Cooling
Modelled	0000.0	0000.0
Load limits	0000.0	0000.0

#### Load limit settings

Floor Type (lowest living area)	[Type]
NCC Climate Zone 1 or 2	[Y/N/NA]
Outdoor Living Area	[Y/N/NA]
Outdoor Living Area Ceiling Fan	[Y/N/NA]

#### Whole of Home performance rating

**00 out of 100**




Net zero societal cost

Improving energy performance

#### Verification

To verify this certificate, scan the QR code or visit [Hstar-dev.azurewebsites.net/QR/Generate?p=MlalCPqJ.]

When using either link, ensure you are visiting [hstar-dev.azurewebsites.net](http://hstar-dev.azurewebsites.net)



\* Refer to glossary.

Generated on [date] using [software] for [address]

Page 1 of 9



[#000000000-00] NatHERS Certificate

0.0 Star Rating and 00 Whole of Home Rating as of [Date]



About the ratings

Thermal Performance rating

NatHERS thermal software models the expected heating and cooling energy loads using information about the design, construction, climate and common patterns of household use. The thermal performance rating (shown as a star rating on this Certificate) does not take into account appliances, apart from the airflow impacts from ceiling fans.

Whole of Home Performance rating

NatHERS Whole of Home software uses the heating and cooling energy loads combined with the energy performance of the home's appliances (heating, cooling, hot water, lighting, pool/spa pump and onsite renewable energy generation and storage) and models the expected societal cost of the whole home. The Whole of Home performance rating is shown as a score out of 100 on this Certificate.

Heating & Cooling Load Limits

Additional information

In some locations under the NCC NatHERS pathway, separate heating and cooling load limits may apply. Minimum required star ratings in northern parts of Australia may also be affected by the presence or absence of an outdoor living area and/or an outdoor living area ceiling fan. Refer to the *ABCB Standard 2019.1: NatHERS heating and cooling load limits* for details or contact the relevant local building regulating authority, noting that State and Territory variations may also apply.

Setting Options:

Floor Type:

- CSOG – Concrete Slab on Ground
- SF – Suspended Floor
- NA – Not Applicable

NCC Climate Zone 1 or 2:

- Yes
- No
- NA – Not Applicable

Outdoor Living Area:

- Yes
- No
- NA – Not Applicable

Outdoor Living Area Ceiling Fan:

- Yes
- No
- NA – Not Applicable



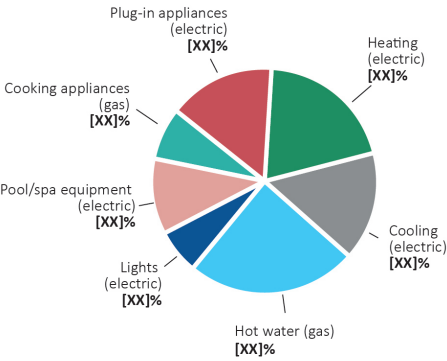
Predicted onsite renewable energy generation

Predicted annual electricity use: [0000] kWh  
Exported to the grid: [00]%  
Used by the home: [00]%  
**This home's annual greenhouse gas emissions: 0000kg CO2e (with solar)  
0000kg CO2e (without solar)**

Predicted Whole of Home annual impact by appliance

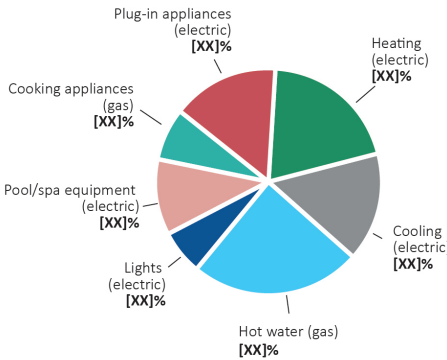
Energy use

Shows the contribution each appliance has on the home's energy use.



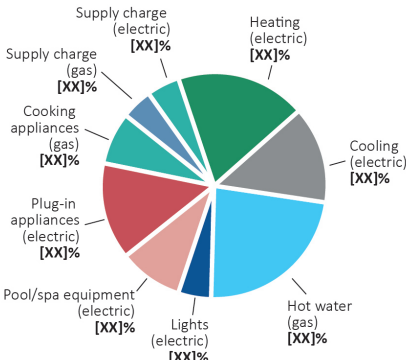
Greenhouse gas emissions

Shows the contribution each appliance has on the home's annual greenhouse gas emissions.



Cost

Shows the contribution each appliance has on the home's overall annual energy cost.



\* Refer to glossary.  
Generated on [date] using [software] for [address]

[#000000000-00] NatHERS Certificate

0.0 Star Rating and 00 Whole of Home Rating as of [Date]



## Certificate check

The checklist covers important items impacting the dwelling's ratings. It is recommended that the accuracy of the whole certificate is checked.

Note: The boxes indicate when and by whom each item should be checked. It is not mandatory to complete this checklist.

	Approval Stage		Construction Stage		
	Assessor checked	Consent Authority/ Surveyor checked	Builder checked	Consent Authority/ Surveyor checked	Occupancy/Other
<b>Genuine certificate check</b>					
Does this Certificate match the one available at the web address or QR code in the verification box on the front page?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the NatHERS certificate number on the NatHERS-stamped plans match the number on this Certificate?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Thermal performance check</b>					
<b>Windows and glazed doors</b>					
Does the window size and location shown on the NatHERS-stamped plans or installed, match what is shown in Window and glazed doors and Roof window schedule, type and performance tables on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the installed window meet the substitution tolerances (SHGC and U-value) and window type, of the window shown in the Window and glazed door and Roof window type and performance table on this Certificate?			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>External walls</b>					
Does the external wall bulk insulation (R-value) shown on the NatHERS-stamped plans or installed, match what is shown in the External wall type table on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the external wall shade (colour) match what is shown in the External wall type table on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Floor</b>					
Does the floor insulation R-value shown on the NatHERS-stamped plans or installed, match what is shown in the Floor type table on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Ceiling penetrations*</b>					
Does the 'number' and 'type' of ceiling penetrations (e.g. downlights, exhaust fans, etc) shown on the NatHERS-stamped plans or installed, match what is shown on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Ceiling</b>					
Does the ceiling insulation R-value shown on the NatHERS-stamped plans or installed, match what is shown in the Ceiling type table on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Roof</b>					
Does the external roof shade (colour) match what is shown in the Roof type table on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Apartment entrance doors (NCC Class 2 assessments only)</b>					
Does the 'External Door Schedule' show apartment entrance doors? Please note that an "external door" between the modelled dwelling and a shared space, such as an enclosed corridor or foyer, should not be included in the assessment (because it overstates the possible ventilation) and would invalidate the Certificate.	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
<b>Exposure*</b>					
Has the appropriate exposure type (terrain) (shown on page 1) been applied? For example, it is unlikely that a ground-floor apartment is "exposed" or a top floor high-rise apartment is "protected".	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
<b>Heating and Cooling Load Limits*</b>					
Do the load limits settings (shown on page 1) match what is shown on the NatHERS-stamped plans?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\* Refer to glossary.

Generated on [date] using [software] for [address]

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# APPENDIX A

[#000000000-00] NatHERS Certificate

0.0 Star Rating and 00 Whole of Home Rating as of [Date]



## Certificate check

Continued

	Approval Stage		Construction Stage		
	Assessor checked	Consent Authority/ Surveyor checked	Builder checked	Consent Authority Surveyor checked	Occupancy/Other
<b>Additional NCC Requirements for thermal performance (not included in the NatHERS assessment)</b>					
<b>Thermal bridging</b>					
Does the dwelling meet the NCC requirement for thermal bridging?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Insulation installation method</b>					
Has the insulation been installed according to the NCC requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Building sealing</b>					
Does the dwelling meet the NCC requirements for Building Sealing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Whole of Home performance check</b>					
<b>Appliances</b>					
Does the cooling appliance/s type, location and efficiency/performance shown on the NatHERS-stamped plans or installed, match the location and minimum efficiency/performance requirements shown in the Appliance schedule on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the heating appliance/s type, location and efficiency/performance shown on the NatHERS-stamped plans or installed, match the location and minimum efficiency/performance requirements shown in the Appliance schedule on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the hot water system type, location and efficiency/performance shown on the NatHERS-stamped plans or installed, match the location and minimum efficiency/performance requirements shown in the Appliance schedule on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the pool pump location and efficiency/performance shown on the NatHERS-stamped plans or installed, match the location and minimum efficiency/performance requirements shown in the Appliance schedule on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the on-site renewable energy system type, orientation and system size or generation capacity shown on the NatHERS stamped plans or installed match the Onsite Renewable Energy schedule on this Certificate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Additional NCC Requirements for Services (not included in the NatHERS assessment)</b>					
Does the lighting meet the artificial lighting requirements specified in the NCC?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the hot water system meet the additional requirements specified in the NCC?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Provisional* values check</b>					
Have provisional values been used in the assessment and, if so, noted in "additional notes" below?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Other NCC Requirements</b>					
Note: This Certificate only covers the energy efficiency requirements in the NCC. Additional requirements that should be considered in conjunction with energy efficiency requirements and must also be satisfied include, but are not limited to: condensation, structural and fire safety requirements and any state or territory variations to the NCC energy efficiency requirements.					
<b>Additional notes</b>					
<hr/>					
<hr/>					
<hr/>					

\* Refer to glossary.  
Generated on [date] using [software] for [address]

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[#000000000-00] NatHERS Certificate

0.0 Star Rating and 00 Whole of Home Rating as of [Date]



## Window and glazed door *type and performance*

Default\* windows

Window ID	Window description	Maximum U-value*	SHGC*	Substitution tolerance ranges	
				SHGC lower limit	SHGC upper limit

Custom\* windows

Window ID	Window description	Maximum U-value*	SHGC*	Substitution tolerance ranges	
				SHGC lower limit	SHGC upper limit

## Window and glazed door *schedule*

Location	Window ID	Window no.	Height (mm)	Width (mm)	Window type	Opening %	Orientation	Window shading device*

## Roof window *type and performance value*

Default\* roof windows

Window ID	Window description	Maximum U-value*	SHGC*	Substitution tolerance ranges	
				SHGC lower limit	SHGC upper limit

Custom\* roof windows

Window ID	Window description	Maximum U-value*	SHGC*	Substitution tolerance ranges	
				SHGC lower limit	SHGC upper limit

## Roof window *schedule*

Location	Window ID	Window No.	Opening %	Height (mm)	Width (mm)	Orientation	Outdoor shade	Indoor shade

\* Refer to glossary.

Generated on [date] using [software] for [address]

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# APPENDIX A

[#000000000-00] NatHERS Certificate

0.0 Star Rating and 00 Whole of Home Rating as of [Date]



## Skylight type and performance

Skylight ID	Skylight description	Skylight shaft reflectance

## Skylight schedule

Location	Skylight ID	Skylight No.	Skylight shaft length (mm)	Area (m <sup>2</sup> )	Orientation	Outdoor shade	Diffuser

## External door schedule

Location	Height (mm)	Width (mm)	Opening %	Orientation

## External wall type

Wall ID	Wall type	Solar absorptance	Wall shade (colour)	Bulk insulation (R-value)	Reflective wall wrap*

## External wall schedule

Location	Wall ID	Height (mm)	Width (mm)	Orientation	Horizontal shading feature* maximum projection (mm)	Vertical shading feature (yes/no)

## Internal wall type

Wall ID	Wall type	Area (m <sup>2</sup> )	Bulk insulation

## Floor type

Location	Construction	Area (m <sup>2</sup> )	Sub-floor ventilation	Added insulation (R-value)	Covering

\* Refer to glossary.

Generated on [date] using [software] for [address]

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[#000000000-00] NatHERS Certificate

0.0 Star Rating and 00 Whole of Home Rating as of [Date]

**Ceiling type**

Location	Construction material/type	Bulk insulation R-value (may include edge batt values)	Reflective wrap*

**Ceiling penetrations\***

Location	Quantity	Type	Diameter (mm <sup>2</sup> )	Sealed/unsealed

**Ceiling fans**

Location	Quantity	Diameter (mm)

**Roof type**

Construction	Added insulation (R-value)	Solar absorptance	Roof shade

**[Thermal bridging schedule]**

xxx	xxx	xxx()	xxx

A thermal bridging schedule is being developed and will disclose key aspects of the thermal bridging inputs. This will be consulted on prior to certificate finalisation.

# APPENDIX A

[#000000000-00] NatHERS Certificate

0.0 Star Rating and 00 Whole of Home Rating as of [Date]



## Appliance schedule

Note: A flat assumption of 5W/m<sup>2</sup> is used for lighting, therefore lighting is not included in the appliance schedule.

Appliance/ System Type	Location	Fuel Type	Minimum Efficiency/ Performance	Recommended Capacity
<b>Cooling system</b>				
Ducted Refrigerative air conditioning (heat pump)	Kitchen/Dining/Living	Electric	00	00
Ducted Refrigerative air conditioning (heat pump)	Bedroom 1	Electric	00	00
Ducted Refrigerative air conditioning (heat pump)	Bedroom 2	Electric	00	00
Ducted Refrigerative air conditioning (heat pump)	Bedroom 3	Electric	00	00
<b>Heating system</b>				
Ducted reverse cycle air-conditioner (heat pump)	Kitchen/Dining/Living	Electric	00	00
Ducted reverse cycle air-conditioner (heat pump)	Bedroom 1	Electric	00	00
Ducted reverse cycle air-conditioner (heat pump)	Bedroom 2	Electric	00	00
Ducted reverse cycle air-conditioner (heat pump)	Bedroom 3	Electric	00	00
<b>Hot water system</b>				
Gas instantaneous	-	Gas	0 star	
<b>Pool/Spa Equipment</b>				
Single Speed Pressure Cleaner with Main Filtration Pump	-	Electric	00	00

## Onsite Renewable Energy schedule

System Type	Orientation	System size or generation capacity
Solar PV	North West	0 kWp

## Battery schedule

System Type	Size (Battery Storage Capacity)
Lithium-Ion	0 kWh

[#000000000-00] NatHERS Certificate

0.0 Star Rating and 00 Whole of Home Rating as of [Date]



## Explanatory notes

### About this report

NatHERS ratings are a reliable guide for comparing different dwelling designs and to demonstrate that designs meet the energy efficiency requirements in the National Construction Code.

NatHERS ratings use computer modelling to evaluate a home's energy efficiency and performance. They use localised climate data and standard assumptions on how people use their home to predict the heating and cooling energy loads and societal cost of the whole home. The thermal performance star rating uses the home's building specifications, layout, orientation and fabric (i.e. walls, windows, floors, roofs and ceilings) to predict the heating and cooling energy loads. The Whole of Home performance rating uses information about the home's appliances and onsite energy generation and storage to estimate the home's societal cost.

The actual energy loads, cost and greenhouse gas emissions of a home may vary from that predicted. This is because the assumptions will not always match the actual occupant usage patterns. For example, the number of occupants and how people use their appliances will vary.

Energy efficient homes use less energy, are warmer on cool days, cooler on hot days and cost less to run.

### Accredited assessors

For quality assured NatHERS Certificates, always use an accredited or licenced assessor registered with an Assessor Accrediting Organisation (AAO). AAOs have strict quality assurance processes, and professional development requirements ensuring consistently high standards for assessments.

Non-accredited assessors (Raters) have no ongoing training requirements and

are not quality assured.

Any queries about this report should be directed to the assessor. If the assessor is unable to address questions or concerns, contact the AAO specified on the front of this certificate.

### Disclaimer

The NatHERS Certificate format is developed by the NatHERS Administrator. However, the content in the certificate is entered by the assessor. It is the assessor's responsibility to use NatHERS accredited software correctly and follow the NatHERS Technical Note to produce a NatHERS Certificate.

The predicted annual energy load, cost and greenhouse gas emissions in this NatHERS Certificate are an estimate based on an assessment of the dwelling's design by the assessor. It is not a prediction of actual energy use, cost or emissions. The information and ratings may be used to compare how other dwellings are likely to perform when used in a similar way.

Information presented in this report relies on a range of standard assumptions (both embedded in NatHERS accredited software and made by the assessor who prepared this report), including assumptions about occupancy, behaviour, appliance performance, indoor air temperature and local climate.

Not all assumptions made by the assessor using the NatHERS accredited software tool are presented in this report and further details or data files may be obtained from the assessor.

## Glossary

<b>Annual energy load</b>	the predicted amount of energy required for heating and cooling, based on standard occupancy assumptions.
<b>Assessed floor area</b>	the floor area modelled in the software for the purpose of the NatHERS assessment. Note, this may not be consistent with the floor area in the design documents.
<b>Ceiling penetrations</b>	features that require a penetration to the ceiling, including downlights, vents, exhaust fans, rangehoods, chimneys and flues. Excludes fixtures attached to the ceiling with small holes through the ceiling for wiring, e.g. ceiling fans; pendant lights, and heating and cooling ducts.
<b>Conditioned</b>	a zone within a dwelling that is expected to require heating and cooling based on standard occupancy assumptions. In some circumstances it will include garages.
<b>COP</b>	Coefficient of performance
<b>Custom windows</b>	windows listed in NatHERS software that are available on the market in Australia and have a WERS (Window Energy Rating Scheme) rating.
<b>Default windows</b>	windows that are representative of a specific type of window product and whose properties have been derived by statistical methods.
<b>EER</b>	Energy Efficiency Ratio, measure of how much cooling can be achieved by an air conditioner for a single kWh of electricity input
<b>Energy value</b>	Refer to societal cost
<b>Entrance door</b>	these signify ventilation benefits in the modelling software and must not be modelled as a door when opening to a minimally ventilated corridor in a Class 2 building.
<b>Exposure category – exposed</b>	terrain with no obstructions e.g. flat grazing land, ocean-frontage, desert, exposed high-rise unit (usually above 10 floors).
<b>Exposure category – open</b>	terrain with few obstructions at a similar height e.g. grasslands with few well scattered obstructions below 10m, farmland with scattered sheds, lightly vegetated bush blocks, elevated units (e.g. above 3 floors).
<b>Exposure category – suburban</b>	terrain with numerous, closely spaced obstructions below 10m e.g. suburban housing, heavily vegetated bushland areas.
<b>Exposure category – protected</b>	terrain with numerous, closely spaced obstructions over 10 m e.g. city and industrial areas.
<b>Horizontal shading feature</b>	provides shading to the building in the horizontal plane, e.g. eaves, verandahs, pergolas, carports, or overhangs or balconies from upper levels.
<b>National Construction Code (NCC) Class</b>	the NCC groups buildings by their function and use, and assigns a classification code. NatHERS software models NCC Class 1, 2 or 4 buildings and attached Class 10a buildings. Definitions can be found at <a href="http://www.abcb.gov.au">www.abcb.gov.au</a> .
<b>Opening percentage</b>	the openability percentage or operable (moveable) area of doors or windows that is used in ventilation calculations.
<b>Provisional value</b>	an assumed value that does not represent an actual value. For example, if the wall colour is unspecified in the documentation, a provisional value of 'medium' must be modelled. Acceptable provisional values are outlined in the NatHERS Technical Note and can be found at <a href="http://www.nathers.gov.au">www.nathers.gov.au</a>
<b>Reflective wrap (also known as foil)</b>	can be applied to walls, roofs and ceilings. When combined with an appropriate airgap and emissivity value, it provides insulative properties.
<b>Roof window</b>	for NatHERS this is typically an operable window (i.e. can be opened), will have a plaster or similar light well if there is an attic space, and generally does not have a diffuser.
<b>Shading device</b>	a device fixed to windows that provides shading e.g. window awnings or screens but excludes eaves.
<b>Shading features</b>	includes neighbouring buildings, fences, and wing walls, but excludes eaves.
<b>Societal cost</b>	means the net cost to society, including but not limited to, costs to the dwelling user, the environment and energy networks.
<b>Solar heat gain coefficient (SHGC)</b>	the fraction of incident solar radiation admitted through a window, both directly transmitted as well as absorbed and subsequently released inward. SHGC is expressed as a number between 0 and 1. The lower a window's SHGC, the less solar heat it transmits.
<b>Skylight (also known as roof lights)</b>	for NatHERS this is typically a moulded unit with flexible reflective tubing (light well) and a diffuser at ceiling level.
<b>STCs</b>	Small-scale Technology Certificates, certificates created by the REC registry for renewable energy technologies that may be bought and sold as part of the Small-scale Renewable Energy Scheme operated by the Clean Energy Regulator
<b>U-value</b>	the rate of heat transfer through a window. The lower the U-value, the better the insulating ability.
<b>Unconditioned</b>	a zone within a dwelling that is assumed to not require heating and cooling based on standard occupancy assumptions.
<b>Vertical shading features</b>	provides shading to the building in the vertical plane and can be parallel or perpendicular to the subject wall/window. Includes privacy screens, other walls in the building (wing walls), fences, other buildings, vegetation (protected or listed heritage trees).

## Example Class 2 Apartment – Summary Certificate

32 PROPOSED CHANGES TO THE NATIONWIDE HOUSE ENERGY RATING SCHEME (NatHERS) – DISCUSSION PAPER



[#000000000-00] NatHERS Certificate

0.0 Star Rating and 00 Whole of Home Rating as of [Date]



### Summary of all dwellings (continued)

Certificate number and link	Unit Number	Heating load (MJ/m <sup>2</sup> /p.a.)	Cooling load (MJ/m <sup>2</sup> /p.a.)	Total load (MJ/m <sup>2</sup> /p.a.)	Star Rating	Whole of Home Rating
<a href="#">0000000000</a>	A1	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A2	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A3	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A4	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A5	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A6	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A7	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A8	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A9	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A10	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A11	0000.0	0000.0	0000.0	0.0	000
<a href="#">0000000000</a>	A12	0000.0	0000.0	0000.0	0.0	000

### Explanatory notes

#### About the ratings

The thermal performance star rating in this Certificate is the average rating of all NCC Class 2 dwellings in an apartment block. The Whole of Home performance rating in this Certificate is the lowest rating for the apartment block. Individual unit ratings are listed in the 'Summary of all dwellings' section of this Certificate.

NatHERS ratings use computer modelling to evaluate a home's energy efficiency and performance. They use localised climate data and standard assumptions on how people use their home to predict the energy loads and societal cost. The thermal performance star rating uses the home's building specifications, layout, orientation and fabric (i.e. walls, windows, floors, roofs and ceilings) to predict the heating and cooling energy loads. The Whole of Home performance rating uses information about the home's appliances and onsite energy production and storage to estimate the home's societal cost.

For more details about an individual dwelling's assessment, refer to the individual dwelling's NatHERS Certificate (accessible via link).

#### Accredited Assessors

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Non-accredited assessors (Raters) have no ongoing training requirements and are not quality assured.

Licensed assessors in the Australian Capital Territory (ACT) can produce assessments for regulatory purposes only, using endorsed software, as listed on the ACT licensing register.

Any queries about this report should be directed to the assessor. If the assessor is unable to address questions or concerns, contact the AAO specified on the front of this certificate.

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The predicted annual energy use, cost and greenhouse gas emissions in this NatHERS Certificate are an estimate based on an assessment of the dwelling's design by the assessor. It is not a prediction of actual energy use, cost or emissions. The information and ratings may be used to compare how other dwellings are likely to perform when used in a similar way.

Information presented in this report relies on a range of standard assumptions (both embedded in NatHERS accredited software and made by the assessor who prepared this report), including assumptions about occupancy, behaviour, appliance performance, indoor air temperature and local climate.

Not all assumptions made by the assessor while using the NatHERS accredited software tool are presented in this report and further details or data files may be available from the assessor.

\* Refer to glossary.

## APPENDIX B

# WHOLE OF HOME APPLIANCE TYPES, TECHNOLOGIES, INPUTS AND OUTPUTS

Energy loads are calculated for each appliance in each hour. These are then aggregated together for each module, and for the whole house. The hourly household energy loads are converted to societal costs for the dwelling. Although the scope of the societal cost calculation covers only heating/cooling, water heating, lighting and pool/spa equipment. If there is a PV system present, it provides an offset for the societal cost of these end-uses, and the tools will calculate a net societal cost.

## Heating Module

USER INPUTS			IN-BUILT INFORMATION	OUTPUTS
Heating technology	Efficiency	Other		
Non-ducted Reverse cycle air-conditioner (heat pump)	<ul style="list-style-type: none"> <li>Star rating using the Zoned Energy Rating Label (ZERL), or</li> <li>Heating Seasonal Performance Factor (HSPF), or</li> <li>Energy Rating Label star rating or annual coefficient of performance (ACOP) for older systems rated under the 2013 Greenhouse and Energy Minimum Standards (GEMS) Determination</li> </ul>	<ul style="list-style-type: none"> <li>Zone/s serviced by the heating appliance/s</li> </ul>	<ul style="list-style-type: none"> <li>ZERL, Energy Rating Label star rating and ACOP are converted to equivalent HSPF values</li> <li>NatHERS climate zone is converted to ZERL climate zone</li> </ul>	<ul style="list-style-type: none"> <li>Hourly fuel consumption for appliance (e.g. kWh electricity for each hour of year)</li> </ul>
Ducted reverse cycle air-conditioner (heat pump)	<ul style="list-style-type: none"> <li>Star rating using the Zoned Energy Rating Label (ZERL), or</li> <li>Heating Seasonal Performance Factor (HSPF), or</li> <li>Energy Rating Label star rating or annual co-efficient of performance (ACOP) for older systems rated under the 2013 GEMS Determination</li> </ul>	<ul style="list-style-type: none"> <li>Zone/s serviced by the heating appliance/s</li> </ul>	<ul style="list-style-type: none"> <li>ZERL, Energy Rating Label star rating and ACOP are converted to equivalent HSPF values</li> <li>System losses of 15-25% depending on age of appliance.</li> <li>NatHERS climate zone is converted to ZERL climate zone</li> </ul>	<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Electric resistive		<ul style="list-style-type: none"> <li>Zone/s serviced by the heating appliance/s</li> </ul>	<ul style="list-style-type: none"> <li>Coefficient of performance (COP = 1)</li> </ul>	<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Gas space/room heater	<ul style="list-style-type: none"> <li>Gas Star Rating (based on Australian Gas Association - Space Heating Appliances)</li> </ul>	<ul style="list-style-type: none"> <li>Zone/s serviced by the heating appliance/s</li> </ul>	<ul style="list-style-type: none"> <li>Star ratings are converted to a conversion efficiency</li> <li>Ancillary electric load as a % of gas consumption</li> </ul>	<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for ancillaries and MJ gas for each hour of year)</li> </ul>



USER INPUTS			IN-BUILT INFORMATION	OUTPUTS
Heating technology	Efficiency	Other		
Gas ducted heater	<ul style="list-style-type: none"> <li>Gas Star Rating (based on Australian Gas Association - Indirect Fired Air Heaters)</li> </ul>	<ul style="list-style-type: none"> <li>Zone/s serviced by the heating appliance/s</li> </ul>	<ul style="list-style-type: none"> <li>Star ratings are converted to a conversion efficiency</li> <li>System losses of 15-25% depending on age of appliance.</li> <li>Ancillary electric load as a % of gas consumption</li> </ul>	<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for ancillaries and MJ gas for each hour of year)</li> </ul>
Slow combustion wood heater	<ul style="list-style-type: none"> <li>Efficiency rating value as complied by the Australian Home Heating Association.</li> </ul>	<ul style="list-style-type: none"> <li>Wood heater type:               <ul style="list-style-type: none"> <li>- Radiant</li> <li>- Fan assisted or</li> <li>- Ducted</li> </ul> </li> <li>Zone/s serviced by the heating appliance/s</li> </ul>	<ul style="list-style-type: none"> <li>Ancillary electric load as a % of wood consumption</li> <li>If efficiency not entered, default value applied.</li> <li>If wood heater type not entered, default of fan wood heater assisted applied.</li> </ul>	<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for ancillaries and MJ wood for each hour of year)</li> </ul>
Unknown or conditioned zone with no heater specified	<ul style="list-style-type: none"> <li>Default heating appliance selected. This is a MEPS level non-ducted reverse-cycle air conditioner (heat pump)</li> </ul>		<ul style="list-style-type: none"> <li>Fuel Type (electric)</li> <li>HSPF for climate zone is applied.</li> <li>Applied to any zone with a heating load where a heater hasn't been specified.</li> </ul>	<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Hydronic heater (panel type)	<i>Future development</i>		<ul style="list-style-type: none"> <li>System loss of 10%</li> <li>Ancillary electric load</li> </ul>	
Concrete slab heating	<i>Future development</i>		<ul style="list-style-type: none"> <li>System loss of 15%</li> </ul>	

The capacity of a heater or cooler serving a zone or set of zones is not a required input into the calculation at this stage. Only the type and performance characteristics of the heating/cooling equipment need to be input. The calculation shall assume that the system capacity will be adequate to meet the load at the end of any given hour in the year. Further work on guidance regarding the sizing of heating and cooling equipment is under investigation.

# APPENDIX B

## Cooling Module

USER INPUTS			IN-BUILT INFORMATION	OUTPUTS
Cooling technology	Efficiency	Other		
Non-ducted Refrigerative air conditioning (heat pump)	<ul style="list-style-type: none"> <li>• Zoned Energy Rating Label (ZERL), or</li> <li>• Total Cooling Seasonal Performance Factor (TCSPF), or</li> <li>• Energy Rating Label star rating or Annual Energy Efficiency Ratio (AEER) for older systems rated under the 2013 GEMS Determination.</li> </ul>	<ul style="list-style-type: none"> <li>• Zone/s serviced by the cooling appliance/s</li> </ul>	<ul style="list-style-type: none"> <li>• ZERL, Energy Rating Label star rating and AEER are converted to equivalent TCSPF values</li> <li>• NatHERS climate zone to ZERL climate zone</li> </ul>	<ul style="list-style-type: none"> <li>• Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Ducted Refrigerative air conditioning (heat pump)	<ul style="list-style-type: none"> <li>• Zoned Energy Rating Label (ZERL), or</li> <li>• Total Cooling Seasonal Performance Factor (TCSPF), or</li> <li>• Energy Rating Label star rating or Annual Energy Efficiency Ratio (AEER) for older systems rated under the 2013 GEMS Determination.</li> </ul>	<ul style="list-style-type: none"> <li>• Zone/s serviced by the cooling appliance/s</li> </ul>	<ul style="list-style-type: none"> <li>• ZERL, Energy Rating Label star rating and AEER are converted to equivalent TCSPF values</li> <li>• System losses of 15-25% depending on age of appliance</li> <li>• NatHERS climate zone to ZERL climate zone.</li> </ul>	<ul style="list-style-type: none"> <li>• Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Evaporative cooler	<ul style="list-style-type: none"> <li>• n/a</li> </ul>	<ul style="list-style-type: none"> <li>• Zone/s serviced by the cooling appliance/s</li> </ul>	<ul style="list-style-type: none"> <li>• Default assumed operating efficiency.</li> <li>• Flag indicating when evaporative cooler has been selected for use in an unsuitable climate zone.</li> </ul>	<ul style="list-style-type: none"> <li>• Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Unknown or conditioned zone with no cooler specified	<ul style="list-style-type: none"> <li>• Default cooling appliance selected. This is a MEPS level non-ducted refrigerative air conditioner (heat pump).</li> </ul>		<ul style="list-style-type: none"> <li>• Fuel Type (electric)</li> <li>• TCSPF for climate zone is applied.</li> <li>• Applied to any zone with a cooling load where a cooler hasn't been specified.</li> </ul>	<ul style="list-style-type: none"> <li>• Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>

The capacity of a heater or cooler serving a zone or set of zones is not a required input into the calculation at this stage. Only the type and performance characteristics of the heating/cooling equipment need to be input. The calculation shall assume that the system capacity will be adequate to meet the load at the end of any given hour in the year. Further work on guidance regarding the sizing of heating and cooling equipment is under investigation.

## Hot Water Module

USER INPUTS		IN-BUILT INFORMATION		OUTPUTS
Hot water technology	Efficiency	Common	Technology specific	
Gas instantaneous	<ul style="list-style-type: none"> <li>Gas Industry Star Rating (4.0, 4.5, 5.0, 5.5, 6.0, 6.5 and 7.0 options)</li> </ul>	<ul style="list-style-type: none"> <li>Household size (persons) based on occupancy calculation.</li> </ul>	<ul style="list-style-type: none"> <li>Auxiliary electricity energy consumption</li> </ul>	<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Gas storage	<ul style="list-style-type: none"> <li>Gas Industry Star Rating (4.0, 4.5, 5.0 options)</li> </ul>	<ul style="list-style-type: none"> <li>Hot water demand</li> <li>Water heater climate zone from AS/NZ4234 derived from postcode using Clean Energy Regulator data.</li> </ul>		<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Solar thermal (Gas boost)	<ul style="list-style-type: none"> <li>Number of Small-scale technology certificates (STCs) earned according to water heater climate zone as defined by the Clean Energy Regulator</li> </ul>	<ul style="list-style-type: none"> <li>Water heater performance factors based on TRNSYS simulation applying AS/NZ4234</li> <li>Hot water usage profile from AS/NZ4234</li> </ul>	<ul style="list-style-type: none"> <li>Auxiliary electricity energy consumption</li> </ul>	<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Solar thermal (electric boost)	<ul style="list-style-type: none"> <li>Number of Small-scale technology certificates (STCs) earned according to water heater climate zone as defined by the Clean Energy Regulator.</li> </ul>			<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Heat pump	<ul style="list-style-type: none"> <li>Number of Small-scale technology certificates (STCs) earned according to water heater climate zone as defined by the Clean Energy Regulator</li> </ul>			<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
Off-peak electric (Electric storage – large system)				<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh of electricity for each hour of year)</li> </ul>
Continuous electric (Electric storage – small system)				<ul style="list-style-type: none"> <li>Hourly fuel consumption (e.g. kWh electricity for each hour of year)</li> </ul>
PV solar diverter	<i>Under development</i>			
Central systems	<i>Future development</i>			

# APPENDIX B

## Lighting Module

USER INPUTS	IN-BUILT INFORMATION	OUTPUTS
<p>No user input are required for the lighting module.</p> <p>In future, users may be able to adjust the default light power density (W/m<sup>2</sup>).</p>	<ul style="list-style-type: none"> <li>• Default 5W/m<sup>2</sup> light power density</li> <li>• 1.6 average hours use per day (this does not mean that lights are only used for 1.6 hours per day)</li> <li>• Total floor area of all conditioned, unconditioned and garage zones.</li> </ul>	<ul style="list-style-type: none"> <li>• Hourly fuel consumption (e.g. kWh of electricity for each hour of year)</li> </ul>

## Pool and Spa Module

USER INPUTS			IN-BUILT INFORMATION	OUTPUTS
Pool technology	Efficiency	Other		
Single speed pump	<ul style="list-style-type: none"> <li>• Star rating under the GEMS (Swimming Pool Pump-units) Determination 2020</li> <li>• If unknown 2-star rating applied</li> </ul>	<ul style="list-style-type: none"> <li>• Pool size:               <ul style="list-style-type: none"> <li>- Pool volume (Litres) or pool surface area (m<sup>2</sup>)</li> </ul> </li> <li>• Pool cleaner:               <ul style="list-style-type: none"> <li>- Pressure cleaner with main filtration pump</li> <li>- Pressure cleaner with booster pump</li> <li>- Robotic cleaner</li> <li>- If unknown, pressure cleaner with booster pump applied.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Default assumptions are applied for hours of operation</li> </ul>	<ul style="list-style-type: none"> <li>• Hourly fuel consumption (e.g. kWh of electricity for each hour of year)</li> </ul>
Dual speed (future option)	<ul style="list-style-type: none"> <li>• Star rating under the GEMS (Swimming Pool Pump-units) Determination 2020</li> <li>• If unknown 5-star rating applied</li> </ul>			<ul style="list-style-type: none"> <li>• Hourly fuel consumption (e.g. kWh of electricity for each hour of year)</li> </ul>
Multi speed (future option)	<ul style="list-style-type: none"> <li>• Star rating under the GEMS (Swimming Pool Pump-units) Determination 2020</li> <li>• If unknown 8-star rating applied</li> </ul>			<ul style="list-style-type: none"> <li>• Hourly fuel consumption (e.g. kWh of electricity for each hour of year)</li> </ul>
Pool heating	<i>Future development</i>			
Spa technologies (pump and heating)	<i>Future development</i>			

## On-site Energy Generation Module

Note that users will be able to enter information about multiple arrays (e.g. a set of panels facing east and a second set facing west).

USER INPUTS		IN-BUILT INFORMATION	OUTPUTS
Solar photovoltaic system (Solar PV)	<p>For each array of panels:</p> <ul style="list-style-type: none"> <li>Slope of the panels (degrees)</li> <li>Orientation (azimuth angle) of the panels (degrees)</li> <li>Size of solar array (kW)</li> <li>Number of phases the PV array is connected (Options = 1 (default), 2 or 3)</li> <li>Total capacity of all installed inverters (kW) (picklist of common options or if unknown default applied based on size of solar array)</li> <li>Shading - for each potential overshadowing object the assessor needs to collect and input the following three data points, relative to the centre of the PV array: <ul style="list-style-type: none"> <li>Elevation angle of the top of the object (degrees)</li> <li>Azimuth of the left-hand edge of the object (degrees)</li> <li>Azimuth of the right-hand edge of the object (degrees).</li> </ul> </li> <li>PV export limit of the electrical network (kW) (default option 5kW per phase).</li> </ul>	<ul style="list-style-type: none"> <li>GMT time zone, Latitude and Longitude derived from dwelling postcode</li> <li>Climatic conditions such as amount of solar radiation is taken from the climate file</li> <li>Solar Constant (1367)</li> <li>Ground reflectance (0.6)</li> <li>System losses: <ul style="list-style-type: none"> <li>Ambient temperature (calculated from climate file information)</li> <li>Soiling losses (default 5%)</li> <li>DC wiring losses (default 3%)</li> <li>Conversion losses (3%)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Hourly electricity generation (kWh)</li> </ul>
Simplified shading method	<i>Future development</i>		

# APPENDIX B

## Battery Module

USER INPUTS		IN-BUILT INFORMATION	OUTPUTS
Battery technologies	Capacity		
Lithium-Ion	<ul style="list-style-type: none"> <li>Storage capacity (kWh)</li> </ul>	<ul style="list-style-type: none"> <li>Maximum depth of discharge 90% of storage capacity</li> <li>Charge efficiency 92%</li> <li>Discharge efficiency 92%</li> <li>Battery C-rate (maximum proportion of the battery's rated capacity that can be charged or discharged within one hour) 0.5</li> <li>Assumed initial charge 50%</li> </ul>	<ul style="list-style-type: none"> <li>Net charge/dis-charge for each hour of the year.</li> <li>Change state at end of hour. (i.e. How full is the battery)</li> </ul>
Lead Acid	<ul style="list-style-type: none"> <li>Storage capacity (kWh)</li> </ul>	<ul style="list-style-type: none"> <li>Maximum depth of discharge 50% of storage capacity</li> <li>Charge efficiency 89.5%</li> <li>Discharge efficiency 89.5%</li> <li>Battery C-rate (maximum proportion of the battery's rated capacity that can be charged or discharged within one hour) 0.2</li> <li>Assumed initial charge 50%</li> </ul>	<ul style="list-style-type: none"> <li>Net charge/dis-charge for each hour of the year.</li> <li>Change state at end of hour. (i.e. How full is the battery)</li> </ul>
Zinc Bromine	<ul style="list-style-type: none"> <li>Storage capacity (kWh)</li> </ul>	<ul style="list-style-type: none"> <li>Maximum depth of discharge 100% of storage capacity</li> <li>Charge efficiency 87%</li> <li>Discharge efficiency 87%</li> <li>Battery C-rate (maximum proportion of the battery's rated capacity that can be charged or discharged within one hour) 0.25</li> <li>Assumed initial charge 50%</li> </ul>	<ul style="list-style-type: none"> <li>Net charge/dis-charge for each hour of the year.</li> <li>Change state at end of hour. (i.e. How full is the battery)</li> </ul>
Unknown	Default battery applied – Lithium-Ion.		

## SUMMARY OF TECHNICAL DOCUMENTS

### NatHERS Whole of Home

#### Whole of Home Assessor Training and Accreditation Strategy

This Strategy was developed in consultation with NatHERS AAOs, RTOs and other interested NatHERS stakeholders. It outlines the agreed approach to expanding NatHERS training and accreditation pathways to include Whole of Home. It outlines the skills Whole of Home assessors will require and the pathways new and existing assessors can take to become accredited NatHERS Whole of Home assessors. The Strategy has been provided so that stakeholders can see in more detail, and provide feedback on the proposed approach.

#### Technical Note and Assessor Handbook – Analysis for Whole of Home (*Strategy.Policy.Research*)

The report provides an overview of the conceptual Whole of Home content that is proposed to be included in the existing NatHERS Technical Note and Assessor Handbook. For each document it outlines what additional information is required for each chapter to support a NatHERS assessor undertaking a Whole of Home assessment. This report has been provided to help stakeholders understand and provide feedback on the proposed approach to including Whole of Home elements in the exiting NatHERS Technical Note and Assessor Handbook.

#### Whole of Home National Calculation Methods

This report outlines the calculation methods used to develop the NatHERS Whole of Home Benchmark tool (AccuRate). It provides information on the background to developing the method for each of the Whole of Home modules and the detailed calculations. This report has been provided so that stakeholders can understand and provide feedback on the calculation methods used to develop NatHERS Whole of Home.

#### Whole of Home Example Ratings

The Whole of Home Example Ratings include examples of Whole of Home assessments for Class 1 dwellings for each capital city in Australia. They are provided to give stakeholders an indication of what elements make up a Whole of Home rating and what impact different appliance combinations may have on the rating outcome for regulatory purposes.

#### NatHERS Whole of Home Expansion: *Research – Communication Features for a new Whole of Home certificate (Instinct and Reason)*

This report outlines the results of market research undertaken with industry stakeholders in 2020 on the features that should be included in a Whole of Home NatHERS Certificate. The research included a review of current energy efficiency certificate being used in Australia and overseas, qualitative research through discussion groups and interviews, quantitative research through an online survey with 206 participants. This report has been provided to help stakeholders understand the reasoning behind the development of the new NatHERS Certificates and Whole of Home rating.

#### Whole of Home Certificate Guide

The Whole of Home Certificate Guide outlines the changes made to NatHERS Certificates (draft Whole of Home Class 1 and draft Whole of Home Class 2) to support the introduction of Whole of Home assessments and the proposed changes to the NCC for 2022. The guide is provided to help stakeholders understand the changes and how the Certificates can be used to support compliance with the proposed provisions for NCC 2022.



# APPENDIX C

## NatHERS In Home

### Pathway for the training and accreditation of NatHERS In Home assessors

This Pathway was developed in consultation with the National Scorecard Team, NatHERS AAOs, RTOs and other interested NatHERS stakeholders. It outlines the proposed approach to extending NatHERS training and accreditation pathways to include In Home. It outlines the skills In Home assessors will require and the pathways new and existing NatHERS assessors and National Scorecard assessors can take to become accredited NatHERS In Home assessors. The Pathway has been provided so that stakeholders can see in more detail, and provide feedback on the proposed approach.

### In Home Software Accreditation Protocol – Testing methodology and test homes

The In Home SAP is based on the NatHERS Thermal SAP and has been informed by the Whole of Home work, with the key differences being the testing methodology and test homes. These have been drafted specifically for In Home assessments.

### In Home Technical Note

This tailored, separate In Home Technical Note, outlines the requirements for In Home assessments to ensure accuracy and consistency. This draft In Home Technical Note has been developed based on the current NatHERS Technical Note, has been informed by the Whole of Home work and in consultation with the National Scorecard Team.



