NatHERS Whole of Home
Guidance Note for Assessors

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1 Introduction

This NatHERS Assessor Guidance Note has been developed to help assessors understand and conduct NatHERS Whole of Home assessments. This Guidance Note is an interim document that introduces Whole of Home assessment and its relationship to NatHERS thermal assessments and its relationship to National Construction Code compliance. This note will form the basis of a future chapter in the NatHERS Assessor Handbook.

1.1 Understanding the Whole of Home performance rating

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

Reference dwelling

The performance rating is calculated based on how the assessed dwelling performs compared with a reference dwelling – a score of 50 means that the dwelling design has the same performance as the reference dwelling. The reference dwelling has the following characteristics:

- 7-star thermal shell
- 3-star ducted heat pump (reverse-cycle air-conditioning) for heating and cooling (based on the 2019 Greenhouse and Energy Minimum Standards Determination for air-conditioners)
- 5-star instantaneous gas hot water
- lighting power density of 4 watts per square metre (W/m^2)
- no spa or pool
- no onsite energy production or storage.

Whole of Home assessment basics

Understanding how the assessment is calculated will help designers and assessors maximise the performance rating for a dwelling.

The relationship between the NatHERS thermal rating and the Whole of Home performance rating means that increasing thermal performance will increase the Whole of Home performance rating. This is because the heating and cooling energy requirements will be lower in a dwelling with a higher thermal star rating.

Three key aspects are included in a Whole of Home assessment. These are:

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

Energy value and the Whole of Home performance rating

Assessors should be aware of energy value and its impact on the Whole of Home performance rating.

Energy value is the net cost to society of energy use, including costs to the building user, the environment and energy networks (as defined in the Housing Provisions of the Australian Building Codes Board – ABCB). It is a measure of the dwelling's energy performance, but it also considers the retail cost of the energy used and the greenhouse gas emissions that are produced during energy production.

The lower the energy value of the modelled energy loads in the assessment, the higher the Whole of Home performance rating.

Two main factors affect the energy value of any given unit of energy consumed:

- Fuel type – For example, electricity generated for the grid by coal-fired power stations has a higher energy value than electricity generated by a solar photovoltaic (PV) system. Thus, including solar PV in a housing design can reduce the energy value and improve the Whole of Home performance rating.
- Time of use – For example, electricity sourced from the grid during the afternoon – when demand is typically higher – has a higher energy value than electricity consumed at other times. Thus, including battery storage, which can shift the times when energy is drawn from the grid, can reduce the energy value and improve the Whole of Home performance rating.

1.2 Using this Guidance Note

This Guidance Note is designed to help assessors to complete a NatHERS Whole of Home assessment. The Guidance Note includes:

- a description of the key elements of a Whole of Home assessment
- important information to understand before starting an assessment
- step-by-step guidance for the Whole of Home assessment process
- information on the new NatHERS certificates.

All other aspects of the NatHERS assessment process are covered in more detail in the NatHERS Assessor Handbook.

NatHERS Technical Note

This Guidance Note should be read in conjunction with the NatHERS Technical Note, which contains the requirements that all assessors must follow when conducting a NatHERS assessment.

Note that the guidance in this Guidance Note is nonbinding; it supports but does not replace the use of the current Technical Note. Where there appears to be conflicting information between the current Technical Note and this Guidance Note, the Technical Note takes precedence.

Alterations and additions

For the purposes of compliance, the application of the Whole of Home assessment is yet to be confirmed for alterations and additions. It is likely that this will vary between state and territory jurisdictions. This section will be updated when details are known.

1.3 Whole of Home software

Assessors must use NatHERS-accredited software to obtain certification of a NatHERS assessment.

There are currently 4 software tools in Australia that are accredited for assessing compliance with the thermal energy efficiency requirements in the National Construction Code (NCC):

- AccuRate, developed by CSIRO
- BERS Pro, owned and maintained by Energy Inspection
- FirstRate5, developed by Sustainability Victoria
- HERO, developed by HERO Software.

All new assessments are to be undertaken using the latest version of the chosen software unless an exemption is provided by the relevant building authority. Ensure the software is accredited for a Whole of Home assessment.

1.4 Further information

All enquiries and requests for more information should be referred to either:

- the relevant assessor accrediting organisation (AAO)
- the relevant state or territory building regulator.

All enquiries and comments specifically about this Guidance Note should be addressed to the NatHERS Administrator at admin@nathers.gov.au.

For further information, visit the NatHERS website: www.nathers.gov.au.

2 Conducting a NatHERS Whole of Home assessment

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

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

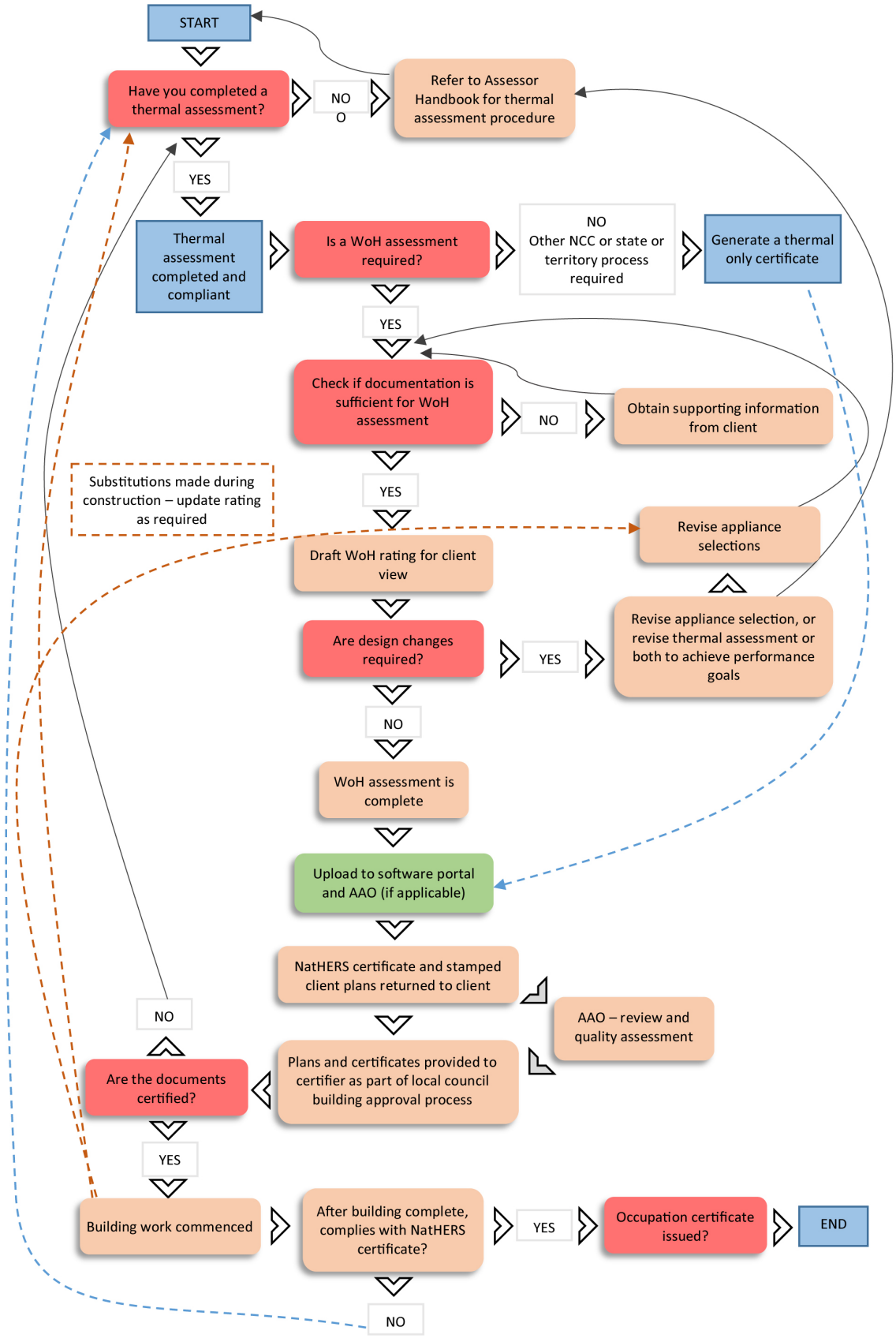
A NatHERS assessment will verify compliance with both of these requirements:

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

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

A NatHERS Whole of Home assessment is undertaken based on a completed NatHERS thermal assessment. The process for conducting a Whole of Home assessment follows a similar approach to the process for conducting a thermal assessment (Figure 1).

Assessors should collect the information needed for the assessment before entering data into the assessment software. An assessment may need to be iterative, with adjustments made to inputs to improve energy performance and meet regulatory requirements, before it is finalised and the certificate issued.



AAO = assessor accrediting organisation; NCC = National Construction Code; WoH = Whole of Home

Figure 1: NatHERS Whole of Home assessment

2.1 Before you start

Before you start, ensure that you have the resources needed to conduct and complete the Whole of Home assessment.

Step 1 Access a completed NatHERS thermal rating

Ensure that the dwelling has a thermal rating that is compliant in the state or territory in which the dwelling will be constructed. You will also need to ensure that the NatHERS Whole of Home software that you are using is compatible with the NatHERS thermal rating software that was used for the thermal assessment.

Step 2 Identify and collect information and documentation

In addition to the documentation requirements for the NatHERS thermal modelling, the following information is to be collected and used for data input during the Whole of Home assessment. Retain all design, assessment and supporting documentation in line with the relevant jurisdiction's requirements and for auditing and quality assurance.

If the specified type of appliance is not available in the software, guidance from your AAO or the NatHERS Administrator must be sought and included in the 'additional notes' section of the certificate.

Heating and cooling appliances

- Heating and cooling appliance types (ideally including models and sizes)
- Appliance efficiencies (with metrics appropriate to the appliance types)
- Mark-up of NatHERS conditioned zones to be serviced by the heating and cooling appliances (several different areas in a home may be heated/cooled, and different equipment may be specified in each of these areas)

If this information is not available, use the default values in the Whole of Home software in accordance with the Technical Note.

Hot water system

- Hot water service type (ideally including model and size)
- Appliance efficiency (with metric appropriate to the appliance type)

If this information is not available, use the default values in the Whole of Home software in accordance with the Technical Note.

Lighting

- Calculated lighting power density (W/m^2) complying with Section 13.7.6 of the ABCB Housing Provisions

If this information is not available, use the default values in the Whole of Home software in accordance with the Technical Note.

Pool and spa pumps (if applicable)

[Note that the spa and pool module is under review at the time of drafting and this section will be updated when complete.]

- Pool dimensions (either the total surface area of the pool (m^2) or the total volume of water (litres) that the pool is designed to hold)
- Pool pump model and type (single-, double- or multispeed)
- Pool cleaner type
- Pump efficiency expressed as a star rating (based on the energy rating label commencing 1 October 2022)

If this information is not available, these items are not to be included in the Whole of Home assessment.

Renewable energy (if applicable)

- Rated sizes (in kilowatt – kW) of PV arrays – if there is more than one group of PV panels, then the size of each group is required
- Azimuth (orientation) and inclination (slope) of PV arrays – if there is more than one group of PV panels, then these details are required for each array location
- Rated inverter size (kW), number of phases (single-, two- or three-phase) and export limits (kW)

If this information is not available, these items are not to be included in the Whole of Home assessment.

2.2 Data input

Ensure you enter all data and details accurately, and capture assumptions and other information in the 'additional notes' section.

Step 3 Enter heating and cooling details

Identify all the areas of the dwelling design that will be serviced by fixed heating and/or cooling equipment (conditioned zones). A dwelling design might have a single conditioned zone (e.g. central heating/cooling in an open-plan home), or might have several different conditioned zones that are heated and cooled by different equipment.

Assign heating and cooling appliances to each conditioned zone:

- If a heating and cooling appliance is not specified, use the provisional types listed in the Technical Note.
- If appliance details are specified, enter the efficiency for the appliance type as shown on documentation.
- If appliance details are not specified, apply default values as per the Technical Note.

Where more than one heating or cooling appliance type is specified for a conditioned zone, select the heating or cooling equipment that serves at least 70% of the conditioned zone. If no single heating or cooling appliance serves at least 70%, select the type that results in the lowest Whole of Home performance rating.

If a ducted system is documented as supplying several zones, apply the heating or cooling appliance type to all zones serviced by the ducted system.

The heating appliance types available for selection in NatHERS Whole of Home software are:

- room reverse-cycle air-conditioner (heat pump)
- ducted reverse-cycle air-conditioner (heat pump)
- room gas heater
- ducted gas heater
- electric resistive heater
- slow-combustion wood heater
- gas hydronic heater
- reverse-cycle heat pump hydronic.

The cooling appliance types available for selection in NatHERS Whole of Home software are:

- room reverse-cycle air-conditioner (heat pump)
- ducted reverse-cycle air-conditioner (heat pump)
- evaporative cooler
- ducted evaporative cooler.

These lists may expand as the NatHERS Whole of Home assessment method is further developed.

Step 4 Enter hot water details

Assign hot water system type and efficiency:

- Where a hot water heater is not specified, use the provisional types listed in the Technical Note.
- If hot water appliance details are specified, enter the type and performance value (if applicable) for the appliance type as shown in the documentation.
- If appliance details are not specified, apply default values as per the Technical Note.

The water heater types available to be selected in NatHERS Whole of Home software are:

- solid-fuel heater
- heat pump
- off-peak electric storage (assumes ‘large’ volume electric resistive hot water cylinder, heated mainly overnight)
- continuous electric storage (assumes ‘smaller’ volume hot water cylinder, with heat on demand)
- instantaneous electric
- electric boosted solar thermal
- gas boosted solar thermal
- gas storage
- gas instantaneous
- solar PV diverter water heaters.

Step 5 Enter lighting details

Lighting energy use is calculated using the lighting density (W/m^2).

The values you enter will depend on the available information, and the capabilities of the Whole of Home assessment software (not all software supports the input of calculated lighting density):

- If the software does not allow this input, apply the default lighting density of 5 W/m^2.
- If the software does allow this input and you have the lighting specifications, calculate the lighting density for the house using the relevant ABCB lighting calculator. Enter the calculated lighting density into the software (W/m^2).
- If the software does allow this input but you do not have the lighting specifications, use the default lighting density of 5 W/m^2.

Step 6 Enter spa and pool details (if applicable)

[Note that the spa and pool module is under review at the time of drafting and this section will be updated when complete.]

If spas and pools are shown on the documentation, they must be included in the Whole of Home assessment. The energy calculation will consider the energy use of pumps and cleaners. Pool heating is not currently included in the Whole of Home energy calculations, but it will be included in future iterations of the Whole of Home assessment method.

Assessors should enter the details for spa and pool volume, and pool pumping and cleaning.

For spa and pool volume, enter the details as follows:

- If a spa is specified in the documentation, calculate and enter the spa volume (litres).
- If a pool is specified on the documentation, calculate and enter the pool volume (litres). If the depth of the pool is unknown, enter the surface area (m^2) and the Whole of Home software will use a default value for pool depth.

For pool pumping and cleaning, enter the details as follows:

- If pool pumping and cleaning equipment information is not specified, apply default values as per the Technical Note.
- If pool pumping information is included in the documentation, enter the equipment type (e.g. single-, two-, or multispeed pump) and efficiency. If the pump has a current energy rating, this should be used in the assessment. From 1 October 2022, there will be a requirement for all new pool pumps to meet Greenhouse and Energy Minimum Standards and display a star rating on a 10-star scale. Pumps available on the market before this date may not have a star rating displayed, so assessors may need to use the provisional values.
- If pool cleaning information is included in the documentation, enter the equipment type and efficiency. Pool cleaners fall into 4 categories for the Whole of Home assessment
  - cleaners operated by the main pool pump with a flow of greater than 6,000 litres per hour; no further energy load is added above that of the pool pump
  - cleaners operated by the main pool pump where the flow rate is less than 6,000 litres per hour; the Whole of Home software applies an additional energy load to dual and multispeed pumps
  - cleaners operated by an ancillary pump; these are assumed by the Whole of Home software to have a power rating of 1 kW
  - robotic cleaners; these are assumed to have a power rating of 0.07 kW.

Step 7 Enter onsite renewable energy details (if applicable)

Incorporating renewable energy generation in the NatHERS Whole of Home assessment allows households to offset their modelled energy use. In many cases, onsite renewable energy may be needed for a project to pass the Whole of Home performance rating requirement. Or, if the household is more ambitious, onsite renewable energy can be used to move towards a net zero home.

The NatHERS Whole of Home assessment is limited to inclusion of solar PV systems. Future expansion to include other renewable energy – such as wind and micro-hydro systems – will occur as the uptake of those technologies in residential settings increases.

The Whole of Home software calculates the hourly available electrical supply from a PV installation for the whole year. This calculation takes into consideration the:

- location and climatic conditions
- slope and orientation of the PV panels
- rated output of the array.

The available solar radiation at the location of the dwelling is assigned based on the climate zone used for the assessment.

Assessors should enter the details for both the system and the panels. The system details to be entered are:

- the rated PV system size (kW; number of panels × watts per panel/1,000)
- the capacity of the specified inverter (kW)
- the PV energy export limit relevant to the local jurisdiction. The software will set a default of 5 kW per phase because this is the limit in most jurisdictions around Australia. The software will allow assessors to override the default value, but there must be evidence to support a higher limit.

If a PV diverter to hot water is specified, enter the relevant details as part of the hot water module (see Step 4).

The panel details to be entered are:

- PV array azimuth (orientation); if panels are oriented due north, the azimuth can be entered as 0 or 360˚ (note that orientation must be relative to true north, not magnetic north – see Section 4 of the NatHERS Assessor Handbook)
- PV array slope (i.e. the angle above horizontal that the panels are elevated); angle between 0 and 90°.

Each separate array (groups of panels with a different orientation and/or slope) must be entered individually into the Whole of Home software.

Step 8 Enter onsite energy storage details (if applicable)

Where the output from solar PV exceeds the hourly demand for electricity in any given hour, then a battery may be used to store that excess generation for use at a later time (e.g. at night).

Installing a battery system can significantly improve performance on the Whole of Home performance rating, because it allows the household to retain and use a greater proportion of the electricity generated onsite. This reduces the need to import from the grid during shoulder and peak times. Since the energy value of imports is higher than that of exports, reducing imports is more effective than increasing exports for improving the performance rating.

Two parameters are required for the NatHERS Whole of Home software to calculate the impact of the battery storage system on the energy calculations. If an onsite storage system is specified in the documentation, enter the:

- battery technology type – initially the 3 battery type choices will be lithium ion, lead acid and zinc bromine (other battery types may be added to the Whole of Home software in future iterations of the assessment method)
- battery nominal storage capacity (kilowatt-hour).

To maintain consistency in ratings, default values are used for all other characteristics, based on battery technology type. These characteristics are:

- maximum depth of discharge
- charge efficiency
- discharge efficiency
- battery charge rate
- round-trip efficiency
- assumed initial battery charge.

If more detailed information about onsite battery characteristics is available, this may be entered if there is documentation to justify it, otherwise the default values will be used.

Step 9 Other notes and considerations

Cooking load

The Whole of Home software estimates the energy used by cooking in the Whole of Home assessment. Assessors are required to enter the energy source of the cooking appliances. The choices are gas, electricity (including induction) or both (e.g. gas cooktop and electric oven).

If energy source(s) for cooking appliances are not specified, refer to the default energy source(s) in the Technical Note.

Plug-load

The Whole of Home software estimates the energy used by plug-in appliances in the Whole of Home assessment, based on the number of occupants for the dwelling. The plug-load covers all other electrical equipment, apart from appliances noted in other sections of the assessment. It includes items such as whitegoods, audio visual equipment, small appliances, computers and peripherals, other electronics, standby power and plug-in electric cooking equipment, such as microwave ovens.

Assessors are not required to enter any information about plug-loads. However, you should be aware that the electricity used by plug-in appliances will affect the overall energy use of the home and the Whole of Home rating.

Being aware of the plug-load is particularly important in relation to solar PV generation (if installed; see Step 7). These loads can consume a considerable amount of electricity, which will be reflected in the calculation done by the software.

Class 2 considerations

For individual sole occupancy unit (SOU) ratings, the NatHERS summary certificate will report the lowest Whole of Home performance rating and list the rating for each SOU in the summary table. This is because the NCC requirements specify the minimum performance for each SOU and do not reference an overall building average for Whole of Home performance.

Assessors should be aware of specific approaches to 2 aspects of Class 2 buildings:

- Centralised services – NatHERS is not currently able to specify centralised services. The calculation method for centralised applications is being developed and this will be updated in later iterations of the assessment method. If the dwelling being assessed includes centralised air-conditioning and/or centralised hot water, assessors may proxy this by matching the technology type and efficiency of the central service. Assessors should include any such assumptions in the 'additional notes' section of the certificate. Centralised heating and cooling should be modelled as a ducted system.
- Renewable energy and storage – If a solar PV array or battery system is connected to only the SOU and not to any other common property in a Class 2 building, then assessors may include it as part of the assessment. If not, assessors cannot include solar or battery systems as part of the NatHERS assessment. Accurately performing solar PV and battery calculations where systems are shared between multiple SOUs requires whole-of-building assessment, which is not possible with current NatHERS software.

2.3 Final processes

Once the data have been entered, you can finalise the assessment.

Step 10 Run the Whole of Home calculation

When inputs have been completed as per Steps 3–9, the Whole of Home energy calculation can be run:

- If the Whole of Home performance rating complies with your regulatory requirements, you may move to the next step.
- If the Whole of Home performance rating does not comply, then further discussion may be required with the designer or client on how to achieve compliance (*Figure 1: NatHERS Whole of Home assessment*). Return to Step 2Identify and collect information and documentation and adjust the specifications and inputs as necessary, in consultation with the designer and client.

Step 11 Generate the NatHERS certificate and mini-certificate (stamp)

Once a complying Whole of Home performance rating has been achieved and the documentation is finalised, you can generate the NatHERS certificate and mini-certificate (stamp), using NatHERS software in conjunction with an online certification portal. Refer to the relevant software tool manual on how to generate the certificates.

Step 12 Stamp drawings and provide to client with the NatHERS certificate

Follow the AAO and NatHERS requirements (see Section 10 of the NatHERS assessor handbook) to stamp documentation for building approval purposes.

3 Whole of Home NatHERS certificate

The updated NatHERS certificate with the Whole of Home assessment includes details of the property, Whole of Home performance rating, heating and cooling load limits, and appliance impact (the first 2 pages of the certificate are shown in Figure 2).

The other pages (not shown in the figure) will include a checklist, schedules of selections used in both the thermal and Whole of Home assessments, explanatory notes and a glossary.

A guide to the new certificate is available on the NatHERS website.

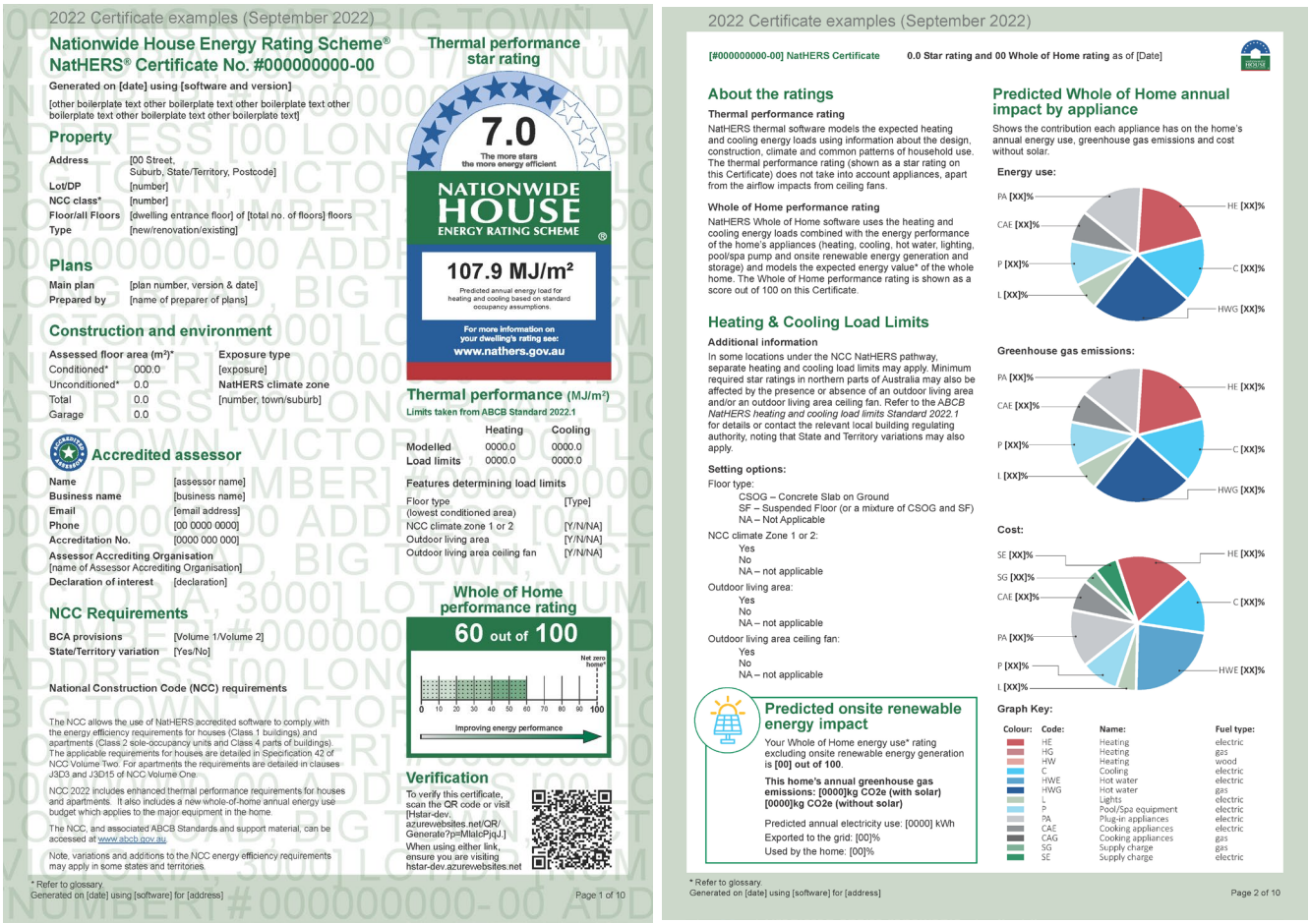


Figure 2: NatHERS certificate with Whole of Home assessment

3.1 Whole of Home performance rating scale

The Whole of Home performance rating scale (Figure 3) is designed to clearly describe the compliance value (shown as 60 out of 100) at the top of the box, with a bar scale to represent how high the home has scored and how close it is to being a net zero home. A net zero home is defined in the Whole of Home performance rating and calculated in the assessment method as a home that achieves a net zero energy value (see Section 1.1 for an explanation of energy value).

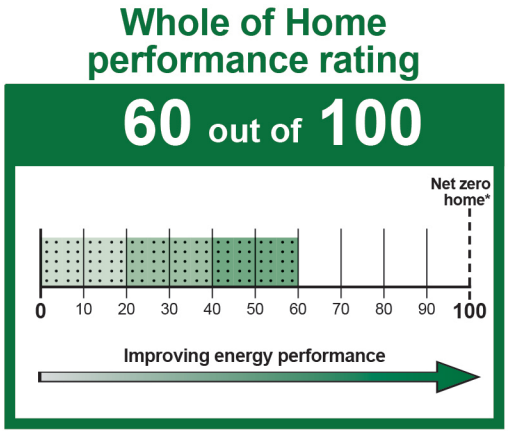


Figure 3: Whole of Home performance rating

3.2 Changes to a NatHERS Whole of Home assessment

Changes to appliance specifications may require that the assessment be revised and the NatHERS certificate be reissued. This may happen when:

- the technology used in the dwelling changes (e.g. a reverse-cycle air-conditioner is replaced by a gas heater)
- an appliance is replaced by one of lower efficiency.

If an appliance or technology is replaced by a higher-efficiency version of the same technology (e.g. a 6-star hot water system replaces a 5-star hot water system), then no change is required.

If the change is to a solar hot water system, note that the number of small-scale technology certificates (STCs) associated with a solar water heater is not necessarily a measure of efficiency. Higher STCs can indicate that the system is more efficient, or that the system is larger than the original specifications.

See the Technical Note for further information and seek guidance from the client and revise accordingly:

- If the system is more efficient, then no change is required.
- If the system is larger, then the assessment must be revised.