Review of the NatHERS Software Accreditation Protocol

Discussion Paper

November 2016

NatHERS Administrator
Administered by the Department of the Environment and Energy on behalf of the Australian Commonwealth, states and territories

Table of Contents

1. Purpose

The purpose of this review is to identify known issues with the current Nationwide Energy Rating Scheme (NatHERS) Software Accreditation Protocol (the Protocol) and seek feedback on ways to resolve them. This discussion paper captures these issues and provides further opportunities for stakeholders to suggest other ways of improving the Protocol.

2. Context

NatHERS supports the improvement of the energy efficiency of Australian residential buildings through the availability of scientifically valid, cost-effective and reliable house energy ratings that can be integrated across the building design, compliance, construction and renovation cycle.

NatHERS has no legislative power. However, the software accredited by NatHERS is the preferred method used by industry to demonstrate compliance with the energy efficiency requirements set out in the National Construction Code (NCC). The NCC is referenced in and given power by, Australian state and territory regulations. This means the states and territories are able to vary the technical provisions of the NCC to suit their own circumstances and adopt the NatHERS systems, or vary the use of the NatHERS systems, as appropriate.

The consistency and accuracy of energy efficiency ratings are fundamental to the efficacy and reputation of NatHERS. Good governance and effective operation of the NatHERS software relies on ensuring its processes, procedures, roles and responsibilities are clearly documented and articulated.

The primary aim of the Protocol, as stated in the current version, is

> *…to ensure the NatHERS accredited software tools apply a standardised approach and produce consistent results in the assessment of energy loads and energy ratings of dwellings…*

Testing and accrediting NatHERS software tools is one of the key roles of the NatHERS Administrator, as described in the *NatHERS Strategic Plan 2015-2018:*

> *The NatHERS Administrator accredits and makes available scientifically valid, consistent, reliable and cost-effective software tools that assess the thermal performance of a residential building based on its design.*

The Protocol is used by software developers seeking NatHERS accreditation for new or updated software tools. It sets out minimum software requirements, the testing regime and the accreditation process.

The current version of the Protocol was prepared by the NatHERS Administrator and approved by the former NatHERS Steering Committee (the Energy Efficiency Working Group) of the Select Council on Climate Change on 26 June 2012.

In 2015 the NatHERS Administrator commissioned a governance and operational review of the Scheme. The review raised opportunities to improve a range of the Scheme's governance and operations, and included specific issues raised by stakeholders in relation to the accreditation process and the Protocol. At its September 2016 meeting, the NatHERS Steering Committee (now the Energy Efficiency Advisory Team (EEAT)) agreed to review the Protocol.

In July 2016, the NatHERS Administrator signed a Memorandum of Understanding (MOU) with the Australian Building Codes Board (ABCB), the agency responsible for the NCC. The MOU commits the NatHERS Administrator to notify the ABCB of any software changes that could have regulatory impacts. Such changes may include bug fixes, major or minor changes to software tools and the Chenath Engine. The NatHERS Administrator and the ABCB are trialling a process and timelines for software update approvals until February 2017. This process will be superseded by the updated Protocol.

3. Scope

As identified in EEAT's response to the *NatHERS Governance and Operational Review*, the scope of the Protocol review will include, but is not limited to, the need to

- better document the principles and functional specifications from the NatHERS software tools;
- improve clarity and certainty of software tool update processes;
- clearly outline software tool requirements;
- review and improve the software accreditation process, consider this process in similar international schemes and the potential to move away from a benchmark tool;
- clearly outline regulatory obligations (administered by the Office of Best Practice Regulation) applying to changes to the software tools; and
- other information required to better assist stakeholders.

This review will also address issues raised by stakeholders and received by the NatHERS Administrator, which include:

- the need for greater transparency of the NatHERS benchmark software and
- the need for improvements to the current software testing and accreditation processes.

4. Key stakeholders

As software accreditation is a key function of the Scheme, it is likely that changes to the Protocol will impact all NatHERS stakeholders. However changes most directly affect the work of

- the CSIRO, who develop and manage the NatHERS Chenath Engine and AccuRate – the Scheme's benchmark software tool;
- developers of existing or future front-end NatHERS software (Energy Inspection, developers of BERS Pro and Sustainability Victoria, developers of FirstRate5);
- the ABCB, the body responsible for developing and managing the NCC as a uniform, national approach to building codes and building standards; and
- state and territory building policy and regulatory agencies.

5. Process and Timing

The NatHERS Administrator will progress the Protocol review on behalf of the EEAT.

To ensure stakeholders have sufficient opportunities to inform the outcome, it is proposed this Review will progress as follows (noting these dates are indicative only):

- Early January 2017: Initial feedback received from key stakeholders on this discussion paper.
- March 2017: Draft of a revised Protocol that consolidates stakeholder feedback circulated to key stakeholders for comment.
- April 2017: Meetings with stakeholders to discuss draft revised Protocol.
- May 2017: Revised Protocol finalised.

6. Providing Feedback

Submissions can be sent by email to admin@nathers.gov.au.

Closing date for submissions is **Monday 9 January 2017.**

Each section of this discussion paper includes a list of prompt questions. You may choose to use these questions to structure your submission. However, we welcome any further relevant questions or topics for discussion you wish to be considered as part of this review.

7. Protocol Review and Questions

7.1 Contents of the Protocol

The current Protocol, dated June 2012, is divided into 3 main sections and an additional section of appendices. These sections and their contents are described below.

1. **Scope.** This section sets out the technical parameters and aim of the Protocol.
2. **Minimum Software Requirements.** This section sets out the minimum software requirements for the tools for which developers are seeking NatHERS accreditation.
3. **The Assessment Process**. This section describes both the process of assessment and the testing regime used to accredit new software tools and upgrade new versions of previously accredited software tools.
    - **Formal Application for Accreditation**. This subsection details the three stages of software testing, the training and user supports that are required to accompany the new software and the process of accreditation for successful applications.
4. **Appendices**. These include
    - Appendix A – Definitions, acronyms and related documents.
    - Appendix B – Benchmark tool settings with separate appendices for Internal Sensible and Latent Heat Loads, Cooling Thermostat Settings, Heating Thermostat Settings, Indoor and Outdoor Adjustable Shading Settings.
    - Appendix C – NatHERS Climate Zones Data.
    - Appendix D – Star Band Criteria.

A range of supporting documents referenced in the Protocol are either provided on the NatHERS website or are made available by the NatHERS Administrator to software developers applying for NatHERS accreditation. These documents include:

(a) Area Adjustment Factor;
(b) Climate Zone map;
(c) NatHERS Technical Notes;
(d) Software Testing Results Spreadsheet;
(e) Draft Terms and Conditions of accreditation; and
(f) Standard Set of Base Dwelling Designs (available only on request from the NatHERS Administrator).

Section 7.1 Questions for discussion: Contents of the Protocol

a) Is the current structure of the Protocol appropriate and easy to follow? What would improve comprehension and clarity?
b) Is the information up to date?
c) Can the supporting documentation and appendices be easily accessed?
d) What other way should this reference material be organised and made more accessible?

7.2 Scope

This section defines the scope of the Protocol and includes

- the aim of the Protocol
- a broad overview of the information contained in its two main parts ('Minimum Software Requirements' and 'Assessment Process')
- the limits of the Protocol's application (applying only to dwelling thermal performance assessment software only)
- the mode of software operation necessary to achieve a minimum star rating under the NCC.

Section 7.2 Questions for discussion: Scope of the Protocol

a) How do you think this section could be improved?
b) What other information should be covered?

7.3 Minimum Software Requirements

This section specifies minimum technical standards for NatHERS accredited software. This includes the 'regulation mode', thermal assessment calculation engine, climate data, energy load, area adjustment factor, energy rating and reporting requirements.

It references accompanying material contained in Appendices B to D, and a related document entitled '*Principles for Ratings in Regulation Mode*' – which has been superseded and is now included on the NatHERS website under the title, '*Technical Notes*'.

7.3.1 Transparency of NatHERS software

The *NatHERS Governance and Operational Review* highlighted the need for greater transparency of NatHERS software's functional specifications. Some of this information will be made available in the *NatHERS Best Practice User Guide* which is currently under development, however, the guide is designed with NatHERS assessors in mind and does not target the specific information needs of software developers seeking NatHERS accreditation. There may be scope to expand the minimum software requirements section in the Protocol, to better document this technical information.

7.3.2 Transparency of the NatHERS benchmark tool

CSIRO has recently made public a repository of documents which detail the workings of the Chenath Engine. There may be opportunities to improve the accessibility and visibility of this information by including it in the Protocol.

While CSIRO will provide software developers with access to Chenath, it is unclear to some stakeholders whether CSIRO is also required to support them with access to the AccuRate front-end code and the assumptions underlying it. The visibility of this information was cited as critical to software developers seeking accreditation, as they must match some of its assumptions to meet testing requirements under the Protocol.

In seeking a resolution to this issue, it is important to bear in mind CSIRO's right to protect its intellectual property. A balance needs to be struck that meets this need while also

providing software developers with access to the assumptions and calculations underpinning the benchmark tool.

Section 7.3 Questions for discussion: Minimum Software Requirements

a) How accessible is information about Chenath and AccuRate and how they work? Is more information needed?
b) What other functional specifications need to be documented to satisfy the requirements of different users?
c) How do you think this component of the Protocol could be improved?

7.4 The assessment process

This section describes a two-stage application process for prospective software developers to follow. The process involves submitting an initial Expression of Interest (EOI), followed by a formal application for accreditation. The application process also details the software testing against the NatHERS benchmark software (the Chenath Engine and AccuRate front end tool) required for accreditation. A final section sets out how formal accreditation is granted once the software tool has met its requirements.

The issues raised by stakeholders fall broadly into two categories:

- the Scheme's reliance on benchmark software and
- the software accreditation process.

These issues are detailed below.

7.4.1 Reliance on benchmark software

Stakeholders are asking the NatHERS Administrator to consider the merits of the Scheme's reliance on a benchmark tool.

a) *Achieving accuracy.* Some stakeholders commented on the difficulties for both Chenath and non-Chenath based tools in achieving accuracy requirements against the current benchmark tool. Some stakeholders suggest opening the Scheme to other best practice simulation engines, such as Energy Plus. It is important to consider the benefits as well the risks associated with broadening accuracy requirements, which could give rise to different ratings for the same residential design.

b) *Software errors***.** According to some stakeholders, tight accuracy requirements means any bugs in the benchmark tool can result in non-compliance of other tools seeking accreditation, if not detected and rectified. This can slow the accreditation process.

c) *Preferential treatment.* Some stakeholders commented on the real or perceived preferential treatment of the benchmark tool at the expense of other accredited tools. Specific issues include that CSIRO does not have the same time constraints and expectations regarding update processes as other accredited tools and that they are not subject to the same challenges in meeting accuracy against another tool. Stakeholders also thought that providers of the benchmark tool had more capacity

to negotiate development and delivery processes with the NatHERS Administrator than other tool providers.

It has also been considered that requirements for Chenath testing could be better referenced, to improve confidence in testing procedures.

d) *Removing cost burden.* While CSIRO makes the Chenath freely available, some stakeholders argue that other documentation necessary to achieve accreditation should also be made available, at no cost, particularly with regards to AccuRate.

7.4.2 The accreditation process

The assessment process set out in the Protocol includes a formal accreditation process, which includes the testing of software against the benchmark tool. Some stakeholders have proposed the following options to improve the accreditation process:

a) *Representative house files*. Some stakeholders raised issues with the five dwelling design process used as the basis for software testing for the following reasons:

   i. Several of the houses are quite old designs that rate well below five stars and are not representative of what is being built in today's market.

   ii. Where there is non-compliance, the five representative files do not make it clear why this has occurred. This is time consuming to rectify.

b) *Parametric testing.* Some stakeholders have suggested that a preferable testing system might be based on a series of project files, incrementally increasing in complexity:

   i. Each project file would vary in a small number of ways from the previous project file in the series. When results are compared with the benchmark results and a divergence is detected, the software provider can then isolate the project file showing the divergence and investigate the code behind the limited changes between the project file and the previous file in the series.

   ii. Some software developers already use parametric testing internally and suggested it replace the current five-dwelling design process currently used to test software for accreditation.

c) *User behaviour.* To be NatHERS accredited, software needs to be independently tested, in order to compare the ratings generated by an independent user of the software against an independent user of the benchmark tool. Some stakeholders have suggested the testing should be independent of differences in user behaviour. However, assessor benchmarking studies and annual reports from Assessor Accrediting Organisations have revealed that ratings vary considerably between assessors. Therefore, it may be worthwhile considering whether differences in user behaviour be reflected in the testing regime.

d) *Dispute resolution.* Disputes may occur when the NatHERS Administrator and the software tool developer are unable to agree on the significance of a proposed software update and the update process required. The resolution of any potential dispute could be mitigated by documenting a clear dispute resolution process, starting with defining what constitutes a 'dispute,' and a clear course of action for dispute resolution for any party to the dispute.

e) *Clear processes for re-accreditation, de-accreditation and software updates.* Clearly stated mechanisms for de-accreditation, re-accreditation and software updates are missing from the current version of the Protocol. Articulating these processes will provide clarity and transparency about rules and expectations that must be adhered to and ensure that all parties provide documented evidence of action. This process needs to acknowledge the role NatHERS plays in demonstrating compliance with the provisions of the NCC.

f) *Opportunities for better industry consultation.* Stakeholders have identified a lack of transparency and stakeholder engagement in the accreditation process. Any updated Protocol will need to better document processes for engagement and consultation on software changes.

Section 7.4 Questions for discussion: The accreditation process

a) *Are these the main issues with the NatHERS software accreditation process, or are there others you think this review should consider? To what extent do these issues impact on you?*
b) *How do you consider the software testing and accreditation process could be improved?*
c) *What do you think are the risks and opportunities of replacing the current accreditation testing process with parametric testing?*
d) Are there international processes for accrediting software tools that you suggest this review consider?

7.5 Supporting Documentation

A number of supporting documents accompany the Protocol and are referenced in the current version. These are either provided on the NatHERS website or are made available by the NatHERS Administrator to software developers applying for NatHERS accreditation. These documents include:

a) Area Adjustment Factor
b) Climate Zone map
c) NatHERS Technical Notes
d) Software Testing Results Spreadsheet
e) Draft terms and conditions of accreditation
f) Standard Set of Base Dwelling Designs (available only on request from the NatHERS Administrator.

7.5.1 Inconsistencies

There are a number of inconsistencies in the Protocol text that need to be rectified and updated. For example, the *Principles for Ratings in Regulation Mode* that is referenced in the Protocol, has been superseded by the *Technical Notes* on the NatHERS website.

Developing a more user friendly style and layout with branding consistent across all NatHERS document, would also improve the Protocol.

Section 7.5 Questions for discussion: Supporting Documentation

a) *How do you think this section could be improved?*
b) *Should the supporting documents be incorporated into an appendix section of the Protocol?*
c) *Do you use the supporting documents?*
d) *Can any of the supporting documents be consolidated or eliminated?*
e) *Are there any other supporting documents that are needed?*