

SECCCA NEW HOME ENERGY ADVISORY SERVICE NET ZERO CARBON NEW HOMES LEARNINGS AND RECOMMENDATIONS

From 2017 – 2020 SECCCA delivered the New Home Energy Advisory Service (NHEAS) which provided bespoke and detailed design advice to numerous households regarding how to achieve net zero carbon. Twelve of these households received an as-built verification of their homes, an air tightness test and a report quantifying costs, energy savings and experiences.

SECCCA's Net Zero Carbon Learnings and Recommendations have been developed using the results derived from the case studies conducted on these twelve households. The results are consistent with recent findings from Curtin University and the CSIRO [Mainstreaming Net Zero Energy Housing: Cost Analysis Report](#) in which SECCCA participated through the build of [JD Net Zero Home](#). SECCCA has excluded some interventions (e.g. Anticon Insulation) that demonstrated lower paybacks.

The Council Alliance for a Sustainable Built Environment (CASBE) submission to the National Construction Code (NCC) is also consistent with SECCCA's NHEAS project findings, such as the need for additional onsite checks, as built verification methods, carbon neutral or positive homes, blower door testing and minimum air exchange rates. While SECCCA supports CASBE's proposal to lift to NatHERS ([Nationwide House Energy Rating Scheme](#)) to 7 stars or higher, SECCCA believes that this should occur over a 3 – 7 year trajectory to ensure proper verification services are developed and affordability is maintained. The NHEAS outcomes also demonstrate that zero carbon homes can be achieved today and that they are affordable. Verification of zero carbon compliance remains a key requirement. The NCC must be amended to mandate key elements of zero carbon homes.

Note that CASBE [ESD Policy](#) 2.0 refers to a range of sustainability improvements made through local and state planning frameworks that address the entire building sector. SECCCA's project findings relate only to energy use in the residential sector.

Recommendation 1. Legislation is needed to mandate Net Zero Energy homes.

The key barrier to the increased uptake of additional energy efficiency above the NatHERS 6 stars is a 'minimum compliance' approach by builders. The majority of builders only build to the minimum standard as a voluntarily increase energy efficiency ratings would put them at a competitive disadvantage. Legislation through the NCC is needed to provide the operating framework for builders to comply.

Recommendation 2. The National Construction Code emphasis should be on achieving net zero carbon now, not in 2030.

A review of the current NCC Scoping Study suggests achieving net zero energy by 2030. The NHEAS project demonstrates how affordable and easy net zero energy is today.

Achieving NatHERS 7 Stars was demonstrated to be difficult and expensive for some homes due to poor orientation. Poorly orientated homes do not have the northern solar aspect required to easily reach 7 stars, where, for example, blocks have a north facing street frontage. In these cases, owners need to invest in expensive glazing or insulation products. Builders commented that for some homes/blocks of land it was simply not possible to achieve 7 Stars.

SECCCA recommends that a transitional approach is implemented, whereby a trajectory to NatHERS 7 Stars is created; for example, starting with 6.5 Stars mandated by 2025 and then 7 stars by 2030.

Recommendation 3. As built Verification and Certification is required, including air tightness testing

To achieve net zero targets, as built verification and certification needs to occur. Options are currently proposed in the next NCC update. The Victorian Residential Efficiency Scorecard (VRES) has proved to be a valuable tool for assessing the whole-of-house energy use and as-built verification and certification. The star rating, also up to 10 (with 10 exceeding the energy needs of the home) provided a useful tool for participants to validate the upgrades they had made and how they could make further improvements if they did not achieve 10 Stars.

However, both NatHERS and VRES fall short on testing air tightness. During the NHEAS project, air tightness testing identified internal cavity doors, heaters, cabinetry, fans, corking, doors, windows, piping penetrations and joinery with significant air leaks. Participants were both surprised and disappointed at how poorly their homes were performing despite paying thousands of dollars on insulation and double-glazing upgrades only to have this effectively voided by air leaks. When it comes to home building shell, air leaks are an aspect many overlook. As the project demonstrated improving air tightness is easy to achieve and affordable with the right air tightness specifications and critical testing to determine performance.

Learning 4. Incorporating net zero carbon homes into the housing sector is easily achievable NOW

The 12 case studies in this project demonstrated that the technology is available today to build zero carbon homes and they are affordable. NHEAS showed that zero carbon costs represent between 2-3% of the total build, including land (approx. \$20,000 for a 30 square home in a growth area). Paybacks are around 8 years however, coupled with a green loan and zero power bills, can result in a 4-year payback (through a saving of \$5,000 per year on energy bills and interest rate reduction).

Learning 5. Homes will be resilient to climate change, particularly extreme weather events

Overwhelmingly, all those that implemented changes according to the NHEAS program advice could not have been happier. Participants all enjoyed having a cool house during summer and warm house during winter without having to turn on space conditioners as much, particularly during extreme weather events. It is estimated that with an airtight home of <3.5ACH (air exchanges per hour at 50 Pa of pressure) heating and cooling requirements are reduced by 70% compared to homes with 10ACH or greater.

Learning 6. Health will be improved

The NHEAS project demonstrated that once specifications for air tightness is made to reduce heating and cooling requirements, then there is a risk of over tightening a home. To rectify this, a Heat Recovery Ventilation (HRV) System is required. The added benefit of reducing heating and cooling requirements (through improving air tightness and installing an HRV systems) is that the heating and cooling units can be downsized. This is because less heating and cooling is needed and the HRV systems circulate the air to all areas of the house. These changes in technology use were demonstrated to be affordable and near cost neutral to current trends of using evaporative cooling and ducted gas heating.

The benefits of a Heat Recovery Ventilation System to health from ensuring fresh air is circulated around the home is well known. It enables smoke, dust, VOC's, pollen, CO2 and other pollutants to be filtered out of the breathable air.

Learning 7. Other benefits to a Net Zero Carbon home – it's a win all round

Participants commented that beyond the energy savings, homes felt more comfortable, quieter, were less dusty with less cleaning and less bugs. These benefits along with the financial savings, carbon reduction and health benefits resulted in a high performing and desirable home.

The outlook for these homes now and in the future is only positive. SECCCA makes the following recommendations to achieve a net zero carbon/energy home for all new homes immediately:

- 1. Energy source 100% renewable energy (eg. on-site solar or off-site GreenPower purchase)**
- 2. External shading for east and west windows**
- 3. Roof insulation minimum R2.5 walls and R5 in the roof**
- 4. Glazing minimum R0.3 and U value 3.3 windows & doors**
- 5. Achieve a building envelop airtightness value of less than 5ACH at 50pa of pressure under tests conditions**
- 6. Achieve an air ventilation rate of 1ACH every 2 hours (under natural air exchange conditions). Including the recovery of heat to 90% in exchanged air and filtering of air to M5 / G4**
- 7. Three additional onsite inspections - Pre insulation, Pre plaster & Post occupancy: on-site as built verification and certification (such as VRES)**

In regard to lifting the NatHERS star rating, SECCCA believes it could remain at 6 Stars in the short to medium term; however, homes must incorporate ALL of the above recommendations. They cannot be traded off with other alternate interventions in order to achieve 6 stars. This will likely result in some homes achieving higher than 6.0 stars.

In time, the NatHERS star rating could be lifted further, with a trajectory 7 Stars by 2030. However, this may not be necessary if the policy objective is to achieve operationally carbon neutral or positive homes - this can be achieved through a balance of affordable energy efficiency upgrades and solar installations.

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