



A High Standard of Sustainability for New Zealand Homes

Authors: Lois Easton and Dr. Megan Howell, Beacon Pathway
For further information, please contact Lois Easton (loise@beaconpathway.co.nz)
Website : www.beaconpathway.co.nz

SUMMARY

New Zealand faces a challenge to retrofit its 1.6 million existing, mostly cold and damp, homes to be more sustainable. Homeowners are increasingly interested in making changes, and need practical advice and achievable targets to help them begin; solutions are needed to suit the mass market.

The HSS High Standard of Sustainability® (HSS®) provides a set of benchmarks to measure improvements. It takes a whole-of-house approach, covering water, energy, indoor environment quality, materials and waste, and helps homeowners to understand the performance of their homes and gain insight into the effect of their behavioural choices.

THE NEED FOR THE HSS®

As sustainability becomes a more common claim in the marketing of home building products, there is the potential for a great deal of confusion – just what makes for a sustainable home? How can homeowners make the best choices for their specific needs?

All of these factors point to a need for New Zealanders to be able to define what achieving a high standard of sustainability in a home means – how the home should perform, and what features are necessary to deliver that level of performance.



THE HSS®: IMPROVING UNDERSTANDING

The HSS High Standard of Sustainability® (HSS®) identifies benchmarks in five key performance areas (see figure 1). The benchmarks are underpinned by issues of affordability and future flexibility. In combination, they are a tool by which homeowners can:

- understand the performance of their homes; and
- gain insight into the effect of their behavioural choices (that is, the gap between the home's design potential and its actual performance).

Beacon's focus is on the homes of ordinary New Zealanders rather than any particular income or demographic group. For this reason, the HSS® is defined within the confines of what is reasonably achievable for the mass market today.

Initial benchmarks were established as a 'first cut' starting point, based on the best available national information. This included the Household Energy Enduse Project and the ALF3 model for setting energy benchmarks, and work commissioned to assess national levels of domestic water consumption (on a per capita basis) for the water benchmark. These benchmarks were revised in 2008, reflecting the findings of Beacon's performance monitoring of new and retrofit homes and the increased knowledge on house performance.

reticulated energy use

- climate zone 1:**
- New homes: 5800 kWh/yr
 - Existing homes: 6200 kWh/yr
- climate zone 2:**
- New homes: 6300kWh/yr
 - Existing homes: 7300 kWh/yr

- climate zone 3:**
- New homes: 7300 kWh/yr
 - Existing homes: 8400 kWh/yr

reticulated water use

- 125 litres/person/day

indoor environment quality

- average temperature:**
- Living room 5-11pm in winter >18°C
 - Bedroom 11pm-7am in winter >16°C
- average relative humidity:**
- Living room 5-11pm in winter 40-70%
 - Bedroom 11pm-7am in winter 40-70%
 - Surface relative humidity <80% year round
- checklist:**
- Mechanical extract ventilation of kitchen, bathroom and laundry
 - Means to passively vent dwelling
 - No unflued gas heaters
 - Damp proof membrane under house
 - No indoor clothes drying

waste

- A maximum of 2.6 tonnes per house or 16kg/m² of construction waste for new building
- Separate construction wastes for collection
- Waste management plan produced for site in accordance with REBRI guidelines
- Provide space in kitchen for organic collection – 5 litres minimum capacity
- Provide space for non-organic recycling bins in or near kitchen – 20 litres minimum capacity
- For detached dwellings on suburban lot sizes, provide space in garden of at least 1 m² for composting of organics. On sites of 250m² or less, provide for worm farm, communal composting or kitchen waste collection.

materials

- new homes:**
- materials which:**
- promote good indoor air quality, e.g. through use of Environmental Choice certified paints and finishes
 - have minimal health risks during construction or renovation
 - are durable and have low maintenance requirements
 - re-use existing or demolished building materials or can readily be re-used
 - are made from renewable or sustainably managed resources
 - have low embodied energy including minimal impacts due to transport
 - minimal impact on the environment (air, water, land, habitats and wildlife)
 - have third-party certification (e.g. NZ Environmental Choice, Forest Stewardship Council)
- existing homes:**
- Retrofit or renovation applies principles from materials checklist where appropriate

A WHOLE-OF-HOUSE APPROACH



Fig. 2. Interdependencies between key performance areas

The sustainability of a home is an interdependent web of features/performance areas (see figure 2). It is not possible to address only one resource stream and call the house sustainable because this can lead to compromises and under-performance in other aspects of the home. For example, energy efficiency can be achieved through under-heating the home, but this compromises indoor environment quality. High water use has energy implications - approximately 30% of typical New Zealand household energy consumption is spent heating water.

A MEASURABLE APPROACH

By specifying measurable benchmarks, the HSS® identifies the design potential of a home and establishes a simple feedback loop between occupant behaviour and home performance. Occupants can regularly measure their performance against the benchmarks, and better understand where they can make improvements. Some measures can be easily obtained (e.g. from power and water bills). In some instances, the HSS® has had to rely on checklists - due to the nature of the performance being measured and the lack of available data to set measurable benchmarks. As research progresses, it may be possible to specify measurable benchmarks for these areas.



The Waitakere NOW Home: Beacon's live research project

APPLICATION

Beacon's live research projects – the Waitakere NOW Home, the Rotorua NOW Home and Papakowhai Renovations – have all provided data which has helped verify the achievability of the 2006 HSS® benchmarks. This has given the confidence for Beacon to 'raise the bar' to reflect the improvements in design understanding, and the availability of technologies to enable the construction and renovation of New Zealand's homes to achieve high performance.

The HSS® 2008 has informed the development of the New Zealand Residential Rating Tool, and continues to provide a benchmark against which the actual performance of New Zealand's homes can be measured.

CHALLENGES AND FURTHER RESEARCH

The HSS® has a number of ongoing challenges to respond to, including:

- ensuring benchmarks strike a balance between 'stretch' and achievability for the mass market.
- developing fine-grained measures to reflect different housing designs and regional climate variations.
- further developing the knowledge base and tools to support achievement of the HSS® (e.g. life cycle analysis on systems and packages of features.)
- potentially expanding to include other performance areas, e.g storm water, wastewater, ecology and social sustainability dimensions.

Fig 1. Benchmarks of the HSS®