Most New Zealand homes are poor performers environmentally. The good news, as BRANZ research shows, is that it’s not hard to lift their game.

By John Burgess, BRANZ Senior Scientist

BRANZ recently researched the operational-related environmental impact of New Zealand homes, using the Homestar™ tool to rate performance. The aspects investigated include the amount of solid waste generated, the amount of energy consumed for space and hot water heating and the health and comfort provided by the home.

The results will help meet industry’s need for information on the sustainability and environmental impact of our housing.

52 features characterise houses

There are over 1.6 million homes in New Zealand. To differentiate between domestic dwellings, the project separated our housing stock into 14 groups based on the year of initial construction.

While the specific characteristics of homes within each group differ, the characteristics of a typical home can be defined for each group. These form the inputs to the Homestar™ tool and include 52 descriptors – physical and performance features – such as:

- materials, location, orientation, floor area and the number of bedrooms
- the performance of major appliances, fixtures and furnishings
- indicators of air and moisture movement
- external and landscaping issues pertinent to drainage, security and amenity.

The Homestar™ online tool was used to determine the star rating of the typical homes by looking at:

- the original state
- the typical current state as at March 2011
- potential future states following interventions designed to improve performance.

Range of interventions

The interventions, which implemented the policy or aspirations of various government departments, come under five categories:

- Better insulation and space heating – includes the replacement of windows with timber/PVC framed double glazing, the use of heavy curtains, above Building Code levels of insulation in ceilings, walls and floors, the removal of recessed downlights and the use of an NRG-star rated heat pump for space heating.
- Better water heating and moisture control – includes the use of a solar hot water system with wetback and insulated hot water pipes, polythene laid over subfloor ground, rangehood over stove and mechanical venting provided to all wet areas, a covered outdoor washing line and the elimination of indoor moisture problems.
- Draught control – includes the elimination of draughts through floorboards, windows and doors and closing or removing open fireplaces.
- Better waste and water management – includes the provision of indoor and outdoor storage for recycled materials, the use of an organic compost/worm farm facility, installation of a 10,000 litre rainwater tank plumbed for outdoor and toilet/laundry uses, 5/6-star water ratings on toilet, shower, dishwasher and clothes washers and greywater plumbed to toilet cisterns.
- Better site and home management – includes Environmental Choice materials used in renovations, safety and security issues addressed, the home made disabled-friendly and the use of a home maintenance manual.

Interventions that did not include all of these parameters did not always make a noticeable difference in the Homestar™ rating. However, irrespective of whether the star rating was seen to increase, the home will perform better.

Using Homestar™ to rate typical homes

A summary of the typical home characteristics and Homestar™ rating results from three groups (the villa, multi-unit 60s–70s, and the late 2000s) are presented in Table 1.

<table>
<thead>
<tr>
<th>Housing group</th>
<th>Rating if home was in original condition</th>
<th>Average Homestar™ rating in March 2011</th>
<th>Homestar™ rating with better:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early housing, villa, bungalow</td>
<td>2</td>
<td>2</td>
<td>3 4 5 6 7</td>
</tr>
<tr>
<td>1960s–70s multi-unit</td>
<td>2</td>
<td>2</td>
<td>2 3 5 6 7</td>
</tr>
<tr>
<td>1970–78, early 1990s</td>
<td>2</td>
<td>2</td>
<td>2 3 5 6 6</td>
</tr>
<tr>
<td>Late 1990s</td>
<td>2</td>
<td>2</td>
<td>2 4 5 6 6</td>
</tr>
<tr>
<td>Mid 2000s</td>
<td>4</td>
<td>4</td>
<td>4 5 6 6 6</td>
</tr>
<tr>
<td>Late 2000s</td>
<td>4</td>
<td>4</td>
<td>4 5 6 6 6</td>
</tr>
</tbody>
</table>

Priority of improvements run from left to right. The ratings require the interventions in the previous categories to be completed as well.
These are typical results for homes in the relevant group. Specific results for an individual home must be obtained with data from that particular home.

Newer homes do better

The research showed that typical homes in New Zealand constructed before 2001 only achieve a 2-star rating out of a possible 10 for their overall environmental performance, while homes constructed after 2001 typically receive a 4-star rating.

These results indicate that our housing performs poorly, with a significant effect on the environment. However, the results can be easily improved. Upgrading the energy efficiency of homes – including insulation and efficient space and water heating systems – increases the Homestar™ rating. As Table 1 shows, the rating can be increased to 6 or 7 stars by improving the insulation, space and water heating, moisture and draught control, as well as waste, water and home management methods. Improvement beyond this star rating can require significant effort and is not possible for all homes, given their location and orientation.

This research recognises that there are policies and aspirations from government and industry to improve the environmental performance of our homes, and BRANZ supports this through delivering its research.

The detail for the 14 typical New Zealand homes, and the interventions made, are in BRANZ Study Report SR253 available free from the BRANZ Shop, see www.branz.co.nz.

The Homestar™ tool was developed as a joint venture with the New Zealand Green Building Council and Beacon Pathway to evaluate the environmental performance of homes in New Zealand. The tool is a technically robust method of measuring the impact of the operation of a particular home on the environment. The self-assessment version, which was used for this work, is accessible through www.homestar.org.nz.

The tool awards a home a star rating from 0 (poor) to 10 stars (outstanding), depending on the characteristics of the home.

Typical villa (1890–1920)

A typical villa has a 2-star rating without interventions.

Key features
- A single-storey 3-bedroom home of 150 m².
- Heating – open fire, electric storage DHW.
- Electrics – traditional lamps and two fridges.
- Windows – small, single-glazed timber, facing street.
- Insulation – incomplete ceiling, none in wall or floor.
- Water – high water use in bathrooms and laundries.
- Located in central suburbs, not disabled-friendly or secure.

Performance
The typical Homestar™ rating will be 2 stars, although this can be improved to 7 stars by introducing all the interventions listed in Table 1. This set of ratings is shared with the pre-1890 group and bungalows (1920–40s).

1960s–70s multi-unit home

A multi-unit home has 2 stars if in original condition.

Key features
- A single-storey 2-bedroom home of 90 m².
- Heating – fixed electric, electric storage DHW.
- Electrics – traditional lamps and two fridges.
- Windows – medium, single-glazed aluminium.
- Insulation – poor in ceiling, none in wall or floor.
- Water – high water use in bathroom and laundry.
- Located in suburbs, not disabled-friendly or secure.

Performance
The typical Homestar™ rating will be 2 stars, although this can be improved to 7 stars by introducing all the interventions in Table 1.

Late 2000s home

A late 2000s home typically has 4 stars when built.

Key features
- A single-storey 3-bedroom home of 200 m².
- Heating – efficient heat pump, electric storage DHW.
- Electrics – CFL lamps and two fridges.
- Insulation – ceiling, wall and floor to 2008 Building Code levels.
- Water – low water use in bathrooms and laundries.
- Located in distant suburbs, but disabled-friendly and secure.

Performance
The typical Homestar™ rating will be 4 stars, although this can be improved to 6 stars by introducing the interventions in Table 1.

The Homestar™ set of ratings for a typical late 2000s home is shared with homes from the mid-2000s.