

# MONITORING HEAT PUMP HOMES

**Two comparative BRANZ studies into household energy use show that heat pumps make homes warmer, but whether they are cheaper to heat than before the pump was installed may depend on location.**

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**T**he way New Zealanders have been conditioning their homes has been changing. In the last decade, the number of homes with heat pumps has risen from 4% to about 28% – more than one in four homes – and heat pumps have become the most common type of heating installed in new homes.

For 3 years, BRANZ has been working on a project on heat pump use in our homes, monitoring their energy use, household temperatures and the social aspects of households with heat pumps. One hundred and seventy houses, randomly selected from Southland to Northland, were monitored, and the information gathered will be used to help ensure our houses are heated efficiently and effectively. The monitoring is nearly complete, and final results will be available in mid-2012.

## The early results

In order to understand future growth in heat pump use, it is necessary to understand why people are installing them. Some of the early findings from interviewing occupants of the homes in the project include:

- the majority of the householders had their heat pump installed after they purchased their house – only 16% moved into a house with a heat pump
- 74% of those moving into houses after 2005 had a heat pump installed within a year of moving in
- 56% of householders replaced a previous heating appliance with a heat pump
- the remaining 44% reported supplementing their existing heating systems with a heat pump
- about 20% of houses in the sample have more than one heat pump



- 39% of householders who installed a heat pump received information about heat pumps from family members or friends
- 40% of householders with heat pumps reported that their neighbours had one – people consistently refer to seeing other people install heat pumps as a motivation for purchase
- 60% of houses replacing an existing heater with a heat pump are changing to electricity from another fuel such as wood, LPG, natural gas or coal. Because of this, no matter how much the heat pump is used, these households will be using more electricity than before.

## More electricity used for heating

The current BRANZ project also compared the data collected on heat pumps with an earlier monitoring study completed before heat pumps were common. The Household Energy End-use Project (HEEP) monitored houses

from 2000–05, with 4% of the houses in the sample fitted with heat pumps. Table 1 shows the average annual space heating use for all energy types and for 'electricity only' per house from both the HEEP and the current heat pump project. Regional information for Auckland and Wellington is also shown.

In HEEP, Auckland was found to be one of two cities to use more electricity for space heating than any other fuel. This is because it has a relatively mild climate and few houses had fixed heating systems installed, instead relying on electric resistance heaters. Now, with the growth of heat pump installations in Auckland, electricity use for space heating has decreased. Table 1 shows that, on average, Auckland HEEP houses used 1,630 kWh, while the heat pump houses monitored in the current study use 740 kWh for electric heating.

In Wellington, the situation is the opposite, with heat pump houses using almost double

(1,420 kWh) the amount of electricity for space heating than houses monitored in HEEP (780 kWh). Wellington houses were less reliant on electric resistance heaters than Auckland houses when monitored in HEEP, but now, with fuel switching, more Wellington homes are heated by heat pumps and more electricity is being consumed. This is the case in most parts of New Zealand.

### Homes warmer and healthier

Although more electricity is being used for space heating, houses are now warmer. This is good news as, previously, house temperatures were often below what was considered healthy – now they are both warm and comfortable.

It does not seem possible in many houses to have both the health benefits and energy-saving benefits of a heat pump. It is important that householders make thermal improvements such as insulating and improving windows so

houses can be both warmer and more energy efficient.

The *Good practice guide to heat pump installation*, available free from [www.eeca.govt.nz/node/6068](http://www.eeca.govt.nz/node/6068), contains information gained from this study. The early results have also been

used for scenario planning for maintenance and upgrade schedules on electricity networks.

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**Table 1: Average annual space heating use per house (kWh).**

Region	Household space heating energy use (HEEP) 2000–05				Heat pump energy use (including cooling) 2010	
	All energy types	Standard deviation	Electricity	Standard deviation	Electricity	Standard deviation
<b>Nationally (preliminary)</b>	3,820	350	920	190	1,380	190
<b>Auckland</b>	3,190	840	1,630	720	740	100
<b>Wellington</b>	2,630	730	780	600	1,420	310