

Getting a handle on water use in Auckland homes

Water is a precious, finite resource that is often wasted. To help identify where water use could be reduced in Auckland, BRANZ has been monitoring houses to get a clear picture of the efficiency and use patterns for appliances such as toilets, taps and showers.

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In October 2008, BRANZ completed the Auckland water use study funded by Auckland water companies and WaterCare Services Limited. This aimed to find out where water is used in Auckland's households. *Build* 105 April/May 2008, page 54, included some background on the project.

Appliances ranked for efficiency

Fifty-one houses were equipped with high resolution water meters and data loggers, which made it possible to identify when appliances, like a toilet, washing machine and so on, were used. Measurements began in February 2008, and a summer and winter period were closely examined to see how seasonal variations affect water use.

Each appliance type in the study was also ranked according to the Water Efficiency Labelling Scheme – WELS (see *Build* 105 April/May 2008, page 56). WELS is intended to provide consumers with water efficiency information when they buy appliances

and plumbing products. The scheme will require labels with star ratings for washing machines, dishwashers, taps, toilets, urinals and showers.

Higher peak flows in summer

On average, 179 litres of water per person per day were used over the summer and 175 litres in winter. Indoor use remained fairly constant throughout the whole monitoring period, but outdoor use increased, especially irrigation (see Table 1).

During summer, much higher peak flows were measured than in winter, again mainly due to outdoor use.

Showers the big user

The highest use per person was in the shower, at just over 30% of indoor water use (see Table 2). The next highest use was in the washing machine (27%), followed by the toilet (around 20%).

Nearly 9,000 shower events were recorded from all houses over the two monitoring periods.

Table 1: End-use comparison per person – all uses.

	Summer	Winter
Tap	12%	16%
Shower	25%	30%
Washing machine	23%	24%
Toilet	18%	19%
Dishwasher	1%	1%
Bathtub	2%	1%
Miscellaneous	0%	1%
Total indoor	80%	92%
Outdoor	17%	6%
Leaks	4%	2%

Table 2: End-use comparison per person – indoor use only.

	Summer	Winter
Tap	15%	18%
Shower	31%	32%
Washing machine	27%	27%
Toilet	23%	20%
Dishwasher	2%	1%
Bathtub	1%	1%
Miscellaneous	0%	1%

On average, each person took 0.9 showers per day, at an average flow rate of 8 litres per minute (Lpm), lasting around 7 minutes during both summer and winter. All shower flows were ranked on the WELS star rating scale (see Figure 1), and around half the showers in the study group would already receive a rating higher than the 3-star maximum (corresponding to flow rates of less than 7.5 Lpm). Only 2% of showers would rate 0 stars and used more than 16 Lpm.

Higher pressure increases use in shower

One of the main reasons for these shower results is the large number (77%) of low pressure electric hot water systems. The remainder were gas (18%) or other systems (5%). This is comparable to data collected in the BRANZ Household Energy End-use Project (HEEP).

This does not imply that low-flow showerheads are a bad investment; there are still showers with flow rates in excess of 15 or 20 Lpm that unnecessarily waste water and energy for water heating. In houses with higher than average shower flow rates, the shower often represents a much larger proportion of water use than in an average household.

Figure 2 shows a comparison between shower flow rates and the types of water heating system. A shift from a low-pressure cylinder to high-pressure could cause an increase in water used in the shower.

Washing second highest user

Washing machines used over 15,500 litres per year per person. By extrapolating the results over the whole of Auckland, this is equivalent to around 19 billion litres of A-grade drinking water per year. The average volume of water for a single load of washing was just over 120 litres, with a maximum of nearly 200 litres. Replacing existing washing machines with water-efficient machines, such as front-

loaders, could have a large effect on reducing water usage.

Washing machine and shower wastewater is classified as greywater, which can also be recycled for certain purposes such as irrigation, depending on local regulations.

Big potential savings with toilets

On average, toilets were flushed just under 5 times per person per day, with an average flush volume of 6.7 litres. Over 40,000 separate toilet flushes were recorded during the study. Ranking the average flush volumes on a WELS scale found that around 86% of toilets would receive no rating at all (that is, 0 stars).

Hence, toilet replacements were identified as one of the big potential water savers. Replacing all toilets in Auckland with 6-star WELS-rated models (average flush volume of less than 2.5 litres) could reduce Auckland's mains water use by about 7%, equivalent to over 9 billion litres of supplied drinking water per year.

Single-flush models made up 27% of toilets, with some using 12 litres per flush. There was at least one single flush toilet in 31% of households, with an average of 1.6 toilets in each home.

Taps used efficiently

Indoor tap use represented around 15–18% (summer and winter, respectively) of indoor use. Over 200,000 individual events were recorded, and

81–88% (summer and winter, respectively) of tap uses had a flow rate of less than 4.5 Lpm, which is equivalent to a maximum 6-star WELS rating.

Even though taps might be capable of higher flows, they are already used efficiently, suggesting that installing flow restrictors would have limited effect in reducing overall water use in the study group.

Any leaks need fixing

Leaks, even if only a small proportion of total use, can have a large effect on an individual house's water use. During April, one home had a leak that wasted 200,000 litres. It is sometimes just a matter of changing a seal costing 50 cents to eliminate leaks, especially in toilet cisterns or dripping taps.

Better use of efficient technology needed

This study, and the Building Research levy-funded WEEP pilot study (see *Build* 105 April/May 2008, pages 47–48), show that improving the water efficiency and water-using appliances in each house could make large savings to water supplied and wastewater treated.

With increasing population comes more strain on water infrastructure and the environment. Water efficient technology has been available for many years; it now needs to be used with the new knowledge of this research to upgrade the building stock for a more sustainable future. ◀

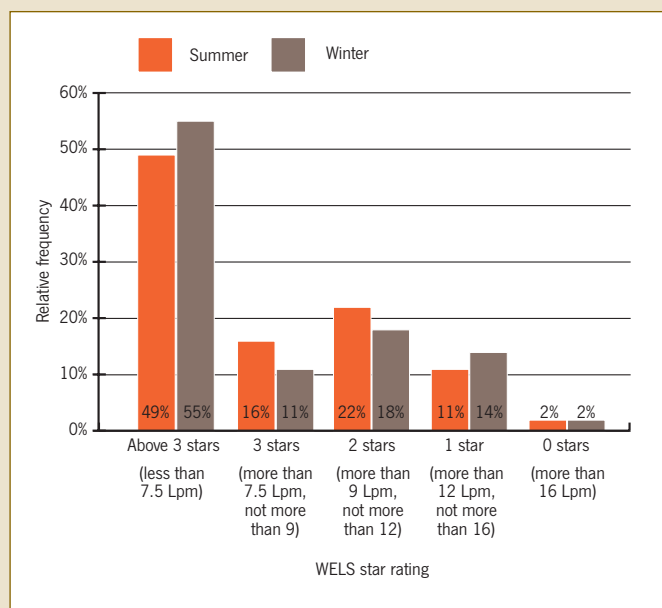


Figure 1: Shower flow rates according to WELS.

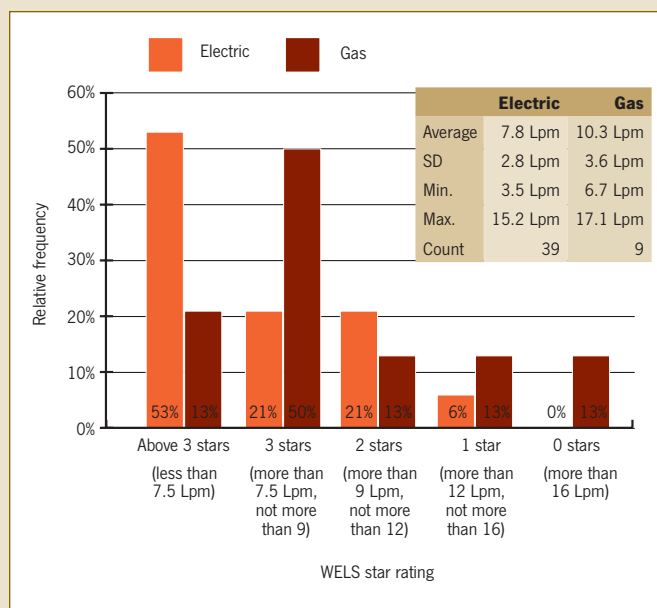


Figure 2: Shower flow rates according to type of hot water system.