

House Condition Survey 2015/16: Analysis of energy efficiency data

Report prepared for the Energy Efficiency and
Conservation Authority (EECA)





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**Energy Efficiency and
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Te Tari Tiaki Pūngao

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SIGNATORIES



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Preface

The analysis presented in this report uses data collected in the 5th BRANZ House Condition Survey. The survey was undertaken from September 2015 to June 2016 and surveyed 560 owned and rented houses throughout New Zealand. This analysis has been provided under contract and as requested by the Energy Efficiency and Conservation Authority.

Acknowledgements

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Contents

SIGNATORIES	I
1. INTRODUCTION	1
1.1 Survey sample	1
1.2 Survey tools	1
1.3 Report scope	2
2. HOT WATER SUPPLY AND SYSTEMS	3
2.1 Hot water supply to bathrooms.....	3
2.1.1 Presence of shower/bath/bath only in whole house, overall and by tenure	3
2.1.2 Shower flow rates	4
2.1.3 Leaking taps/showers heads.....	8
2.1.4 Bathroom sink hot water tap temperature	8
2.2 Hot water systems	10
2.2.1 Hot water system types.....	10
2.2.2 Pipe run distance	11
2.2.3 Hot water cylinders	12
2.2.4 Hot water cylinder and system defects	20
3. LIGHTING AND APPLIANCES	21
3.1 Lighting.....	21
3.1.1 Light fittings	21
3.1.2 Light bulb totals.....	22
3.1.3 Light bulb types	23
4. TECHNOLOGY AND APPLIANCES	24
4.1 Televisions	24
4.2 Computer technology	25
4.3 Home entertainment	26
4.4 Refrigeration	27
4.4.1 Type, number and usage of fridge freezers	27
4.4.2 Age of refrigeration appliances	29
4.4.3 Location of refrigeration appliances.....	30
4.5 Other household appliances.....	30
4.6 Other house features	32
5. ADDITIONAL STATISTICS.....	33
5.1 Cooking.....	33
5.2 Reticulated gas supply to property	34
5.3 Bathroom heating	35
5.4 Dehumidifiers	35
5.5 Windows	36
5.6 Carports and garages.....	36
References	38
Annex A. Appliance-use questionnaire	39
Annex B. Supplementary charts and tables	42
Hot water systems and showers.....	42
Lighting	45
Appliances	50

1. Introduction

The BRANZ House Condition Survey (HCS) has been carried out roughly every 5 years since 1994. The HCS provides insights into the condition of New Zealand's housing stock including:

- assessments of the condition of different property features and building component defects
- the types of materials used in construction
- the presence of services and systems, including heating, hot water and ventilation
- indicators of damp and mould.

1.1 Survey sample

The most recent HCS, representing the fifth in the series, was completed in 2015/16. The sample structure was designed to capture a representative proportion of owner-occupied and rental properties throughout New Zealand. Surveying took place from September 2015 to June 2016. While a total of 560 houses were successfully surveyed in this time, recruitment challenges prevented the full target sample quota from being fulfilled. As a result, the achieved sample of 560 was subject to post-sampling weighting to maintain representativeness of the owner-occupied and rented sector.

All results presented in this report are based on the surveyed sample of 560 houses. These were weighted to represent the estimated total number of owned and rented houses in New Zealand at the time of the survey. The sample sizes, sampling errors and weighted counts are shown in Table 1. While the sample was designed to be broadly representative by tenure, the margins of error associated with the data should be considered when interpreting the results presented in this report.

For more information on the survey sampling, recruitment and weighting process, see White *et al.* (2017).

Table 1. Sample errors for the owner-occupied and rented houses surveyed and used for analysis in this report. (Source: HCS 2015)

Sample used for analysis	Owned	Rented	Total
Surveyed houses ¹	411	149	560
Precision	±6.1%	±10.8%	±5.5%
Weighted count ²	1,011,121	550,652	1,561,773

1. Total number of houses surveyed.

2. Count of houses in the sample with the weighting applied. All analysis is undertaken using weighted data.

1.2 Survey tools

The 2015 BRANZ House Condition Survey incorporated three survey tools:

- **Telephone interview with a household occupant** to collect information on maintenance and repair work undertaken by the householder and some key socio-demographic information about household occupants.
- **Self-completion householder questionnaire on appliance use** to collect information about the use of different appliances in the home, including lighting

and appliances, heating and electronic products. This component was new to the 2015/16 HCS, commissioned by EECA.

- **On-site physical house assessment** to collect detailed information about the condition of houses, materials and systems present. The survey is completed by independent, trained assessors through an on-site home visit.

1.3 Report scope

The analysis presented in this report draws on data collected through the onsite physical house assessment and the householder appliance-use questionnaire. Results have been presented and tailored to meet EECA's information needs, to include data on: hot water supply and systems (collected in the physical house assessment) and use of lighting and appliances in the home (recorded in the householder appliance-use questionnaire). Some additional, miscellaneous statistics are presented in the final section as requested by EECA.

2. Hot water supply and systems

The House Condition Survey onsite physical house assessment records detailed information about the presence, type and condition of different systems present in the home. This information is recorded by an independent, trained assessor, who has expertise and experience in undertaking house assessments. For more information of the survey process see White et al. (2017).

2.1 Hot water supply to bathrooms

All but one house surveyed (representing 0.2%) had a 'functional and hygienic' bath or shower. Owner-occupied houses were more likely to have more than one bathroom (55%) compared to rentals (15%).

2.1.1 Presence of shower/bath/bath only in whole house, overall and by tenure

The House Condition Survey records the presence of bathroom fittings in each bathroom (with capacity to record up to three separate rooms), differentiating between baths, baths with a shower over and separate shower cubicles. The results show that overall most houses (80%) have a combination of baths and showers (Figure 1). However, nearly one quarter (24%) of rental houses have no bath, compared to 17% of owner-occupied houses. Only 1% of houses had only a bath (no shower present, including any shower over the bath). Where baths were present, there was usually only one, although 4% of owner-occupied houses had more than one bath.

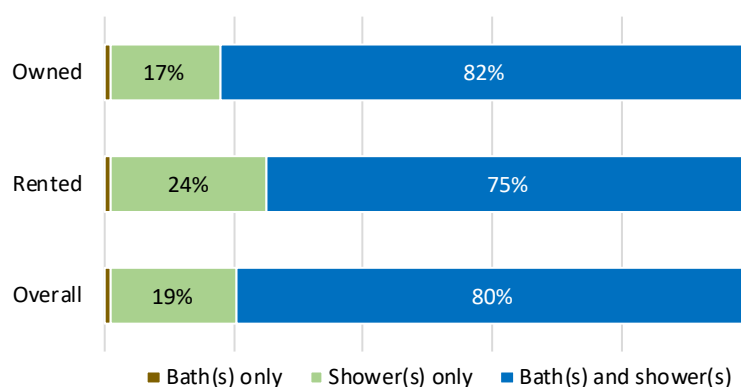


Figure 1. Presence of baths and showers

Showers (including separate cubicles and showers over baths) were more prevalent in owner-occupied houses: 34% had two showers in the house, 8% had three or more, compared to 11% of rentals with two and 1% with three or more (Figure 2) (figures may not sum to 100% due to rounding).

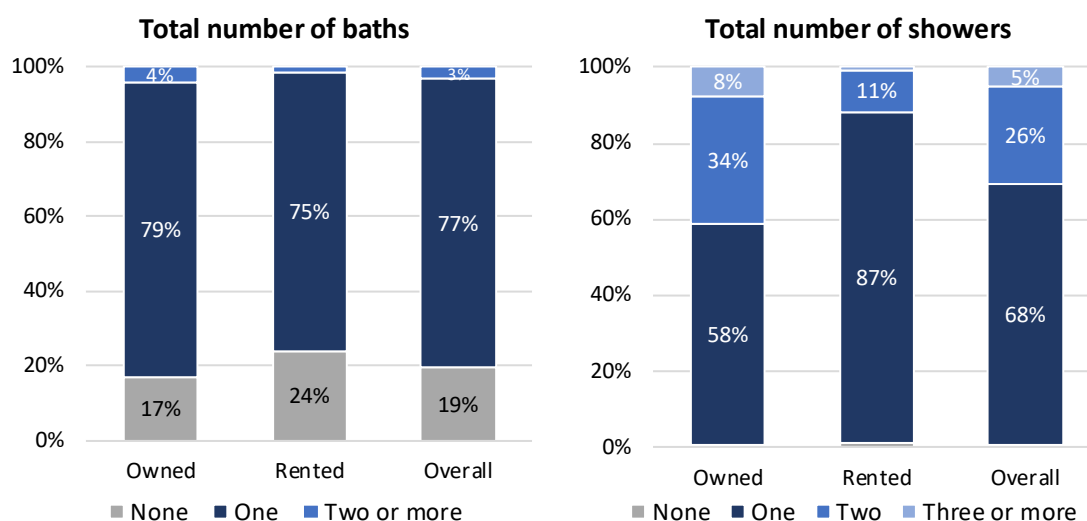


Figure 2. Total number of baths and showers in the house (includes standalone baths, showers over baths and separate shower cubicles)

Separate shower cubicles, which account for three-quarters (76%) of all showers present, were more common in owner-occupied houses: nearly two-fifths (38%) of rentals did not have a separate shower cubicle, over twice the proportion (17%) of owner-occupied houses (Figure 3). Conversely, showers over baths were more common in rentals (42% compared to 26% of owner-occupied) (Figure 3).

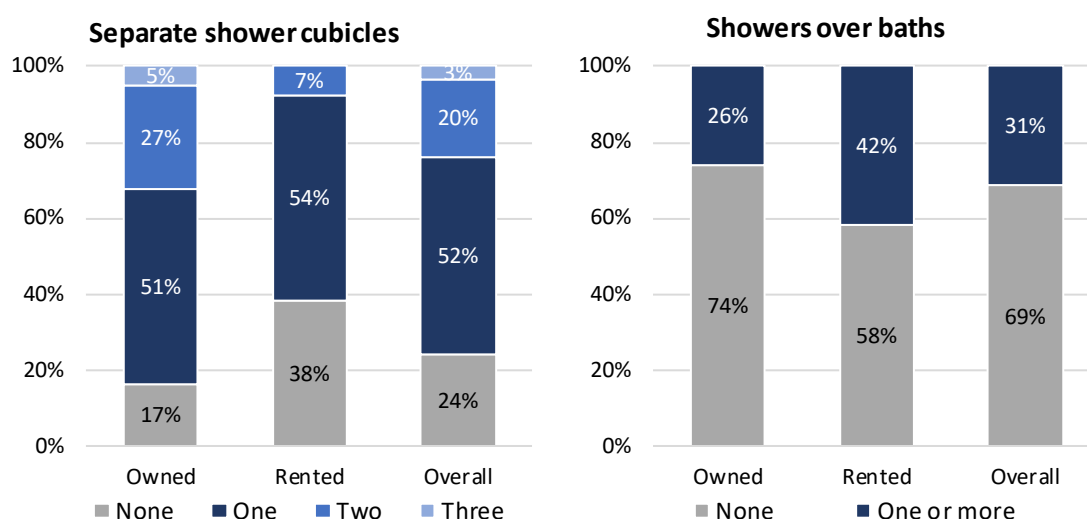


Figure 3. Count of separate shower cubicles and showers over baths

2.1.2 Shower flow rates

Shower flow rates are recorded in the House Condition Survey by timing (in seconds) how long it takes to fill a 4-litre bucket with water at normal temperature. The results have been converted into flow rates in litres per minute.

Based on the data collected, there are an estimated 2.1m showers across the 1.54m houses represented in the survey (Table 2). The average (mean) flow rate across all shower heads measured in the survey was 10 litres per minute. However, this ranged

from a low of 1.6 to a high of 30 litres per minute (Table 2 and Figure 4). The complete table underlying Figure 4 is provided in the spreadsheet accompanying this report.

Table 2. Shower flow rates by tenure

Shower flow rate (litres/sec)	Owned	Rented	Total
Mean	10.5	8.6	10.0
Median	9.2	7.7	8.9
Minimum	1.6	2.2	1.6
Maximum	30.0	24.0	30.0
Range	28.4	21.8	28.4
<i>Number of houses (weighted count)</i>	<i>994,000</i>	<i>545,000</i>	<i>1,539,000</i>
<i>Number of houses (unweighted count)</i>	<i>405</i>	<i>148</i>	<i>553</i>
<i>Number of showers measured (weighted count)</i>	<i>1,496,000</i>	<i>609,000</i>	<i>2,104,000</i>
<i>Number of showers measured (unweighted count)</i>	<i>602</i>	<i>166</i>	<i>768</i>

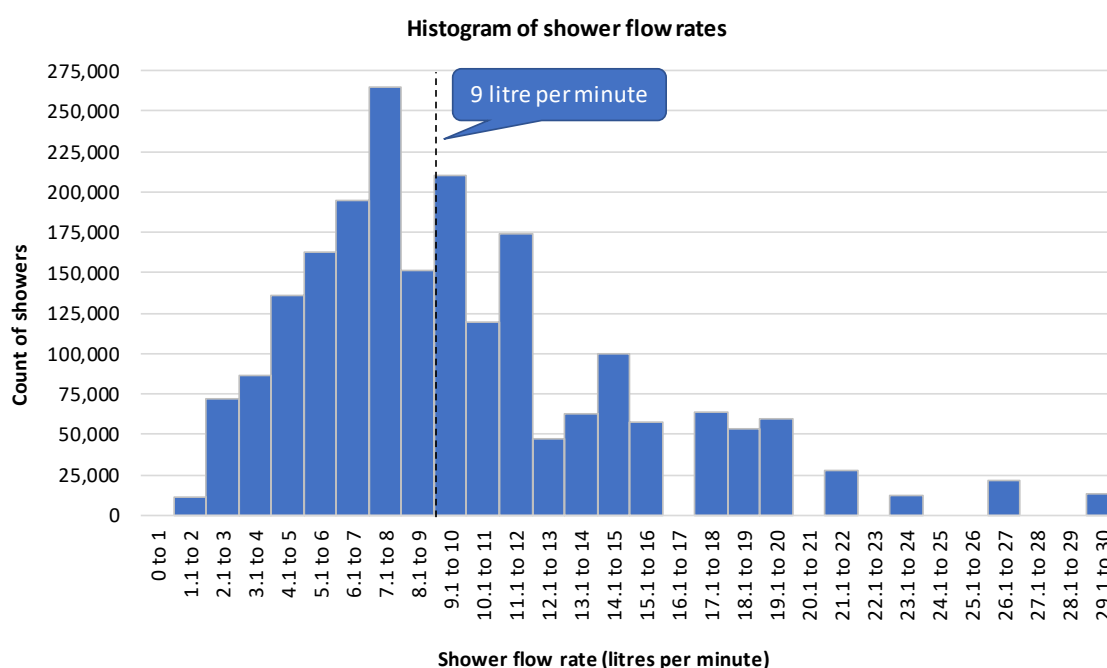


Figure 4. Distribution of shower flow rates across all showers measured in the survey

EECA recommends a shower flow rate of 9 litres per minute or less. Some 46% of houses surveyed had at least one shower with a flow rate greater than 9 litres per minute (Table 3). This equates to nearly half of all showers recorded in the survey (49% or a total of 1.02 million showers) with a flow rate greater than the level recommended by EECA. Nearly 15% of showers exceeded a flow rate of 15 litres per

minute (Figure 5). Owner-occupied houses were more likely to have showers with higher flow rates (Table 3 and Figure 6).

Table 3. Showers with a flow rate greater than 9 litres per minute

		Owned	Rented	Overall
Houses with showers >9l/min	Count	529,000	185,000	714,000
	%	52%	34%	46%
Showers over 9l/min	Count	803,000	221,000	1,024,000
	%	54%	36%	49%

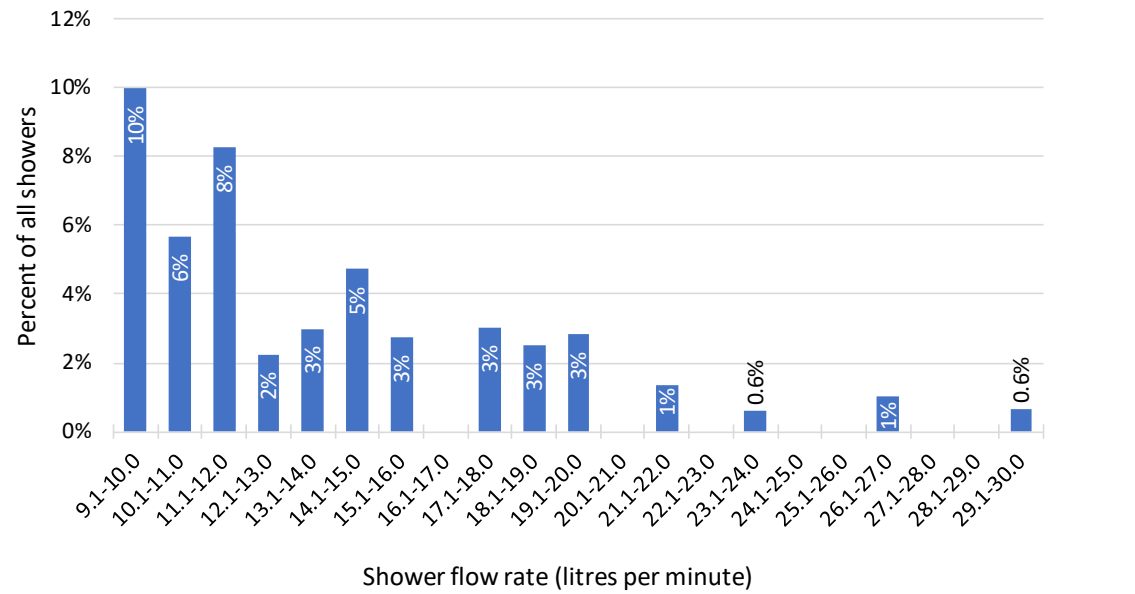


Figure 5. Proportion of showers with flow rates greater than 9 litres per second

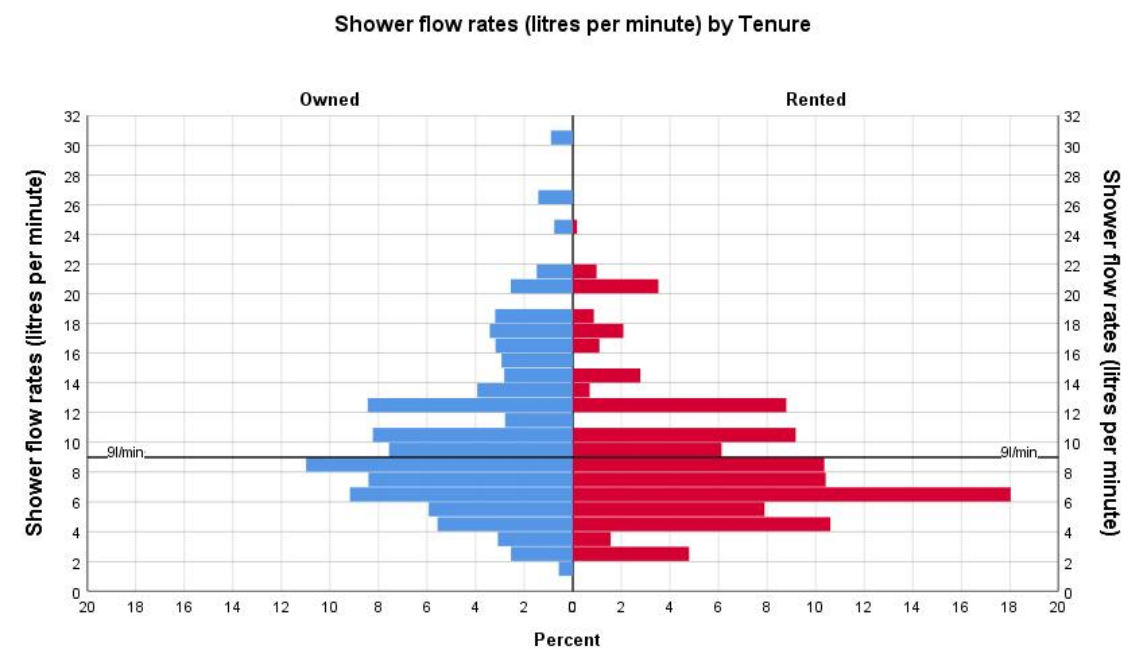


Figure 6. Distribution of shower flow rates by tenure across all showers measured in the survey

1.1.1.1 Shower flow rate by dwelling age

Whilst newer houses, those built since 1990, were more likely to have higher shower flow rates (79% of houses built from 2000 onwards and 55% of houses built in the 1990's had a shower with a flow rate greater than 9 litres per minute), this trend was not evident across all the decades (Figure 7). For example, a higher proportion (around half) of houses built between 1920-1950 had a shower flow rate exceeding 9 litres per minute, compared to just over one third of houses built in the 1980s. Refurbishment could be a factor to consider here, as house age is not necessarily a reflection of the age of the bathroom. There is some evidence of this in 1970's houses in particular: 40% of those surveyed had refurbished the main bathroom within the last 10 years and 47% of these houses had flow rates greater than 9 litres per minute. (Note date of last refurbishment is not known in all cases).

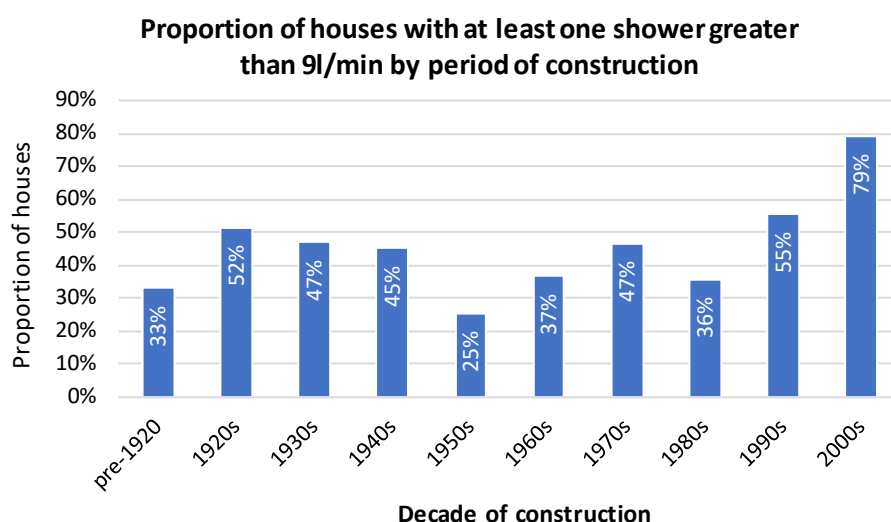


Figure 7. Proportion of houses with a shower flow over 9l/min by decade of construction

1.1.1.2 Shower flow rate by hot water system type

Houses with a mains pressure hot water system (30% of houses surveyed) or instantaneous gas hot water systems (11% of the sample) were more likely to have a shower with a flow rate exceeding 9 litres per minute compared to those with a low-pressure system (Table 4).

Higher flow rates were also observed in houses with newer hot water systems (no more than 15 years old) (see Annex II and section 2.2 for more on hot water heater age). Additional data on shower flow rates by hot water heater age and different heater types is provided in the spreadsheet accompanying this report.

Table 4. Proportion of houses with shower flow rate greater than 9 litres per minute by hot water system pressure

Hot water system	% with shower >9l/min	% of housing stock
Electric: Mains pressure cylinder	71%	30%

Electric: Low pressure	18%	47%
Instantaneous gas	80%	11%

2.1.3 Leaking taps/showers heads

The House Condition Survey has capacity to record defects in up to three bathrooms in the house. Leaking taps or leaking shower heads were observed in 7.5% of owner-occupied bathrooms and 5.6% of rental bathrooms. This equates to some 155,000 bathrooms with a leaking tap/showerhead. These were observed across 9.4% of houses surveyed, representing around 147,000 individual dwellings.

Table 5. Presence of leaking taps/showerheads

		Owned	Rented	Overall
Total leaking taps/shower heads	Weighted count	119,000	36,000	155,000
	%	7.5%	5.6%	6.9%
Houses with leaking tap/showerhead	Weighted count	114,000	33,000	147,000
	%	11.2%	6.1%	9.4%

2.1.4 Bathroom sink hot water tap temperature

The New Zealand Building Code states that in the home the maximum water temperature at the tap for showers, baths and hand basins is 55°C.

The House Condition Survey records the temperature of the hot water tap in all bathrooms in the home. The results show just over one quarter of taps (26%) were over 55°C (Table 4). These were found in 31% of the housing, with a slightly higher proportion of rentals having a tap over 55°C (Figure 8).

Whilst 55°C is the maximum for all homes, in some places (e.g. where young children are present) the temperature should be no higher than 45°C at the tap. Results from the 2015 HCS showed in 95% of houses where a child under 5¹ was present, the temperature at the hot water tap exceeded 45°C, and in 41% the temperature was greater than 55°C.

Table 6. Temperature of bathroom hot water taps (counts and % of all taps recorded in the survey)

Temperate of all bathroom hot water taps		Owned	Rented	Overall
0 to 45 degrees	Weighted count of taps	219,000	69,000	288,000
	% of taps	14%	11%	13%
46 to 55 degrees	Weighted count of taps	957,000	363,000	1,320,000
	% of taps	61%	58%	60%
56 to 69 degrees	Weighted count of taps	384,000	195,000	579,000
	% of taps	25%	31%	26%

¹ One-fifth (20%) of houses surveyed had a child under the age of 5 in the household.

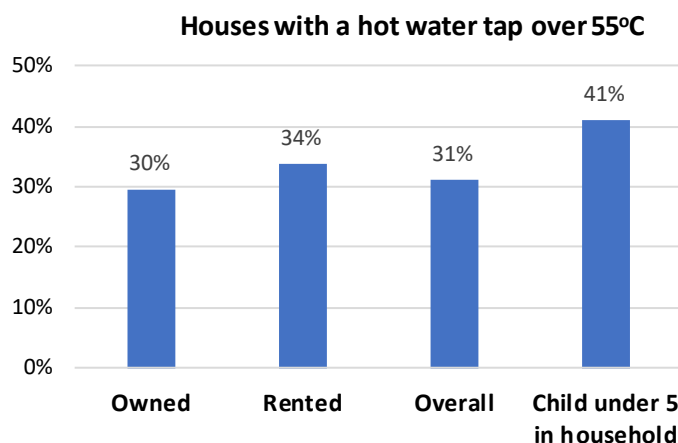


Figure 8. Proportion of houses with a bathroom tap over 55°C

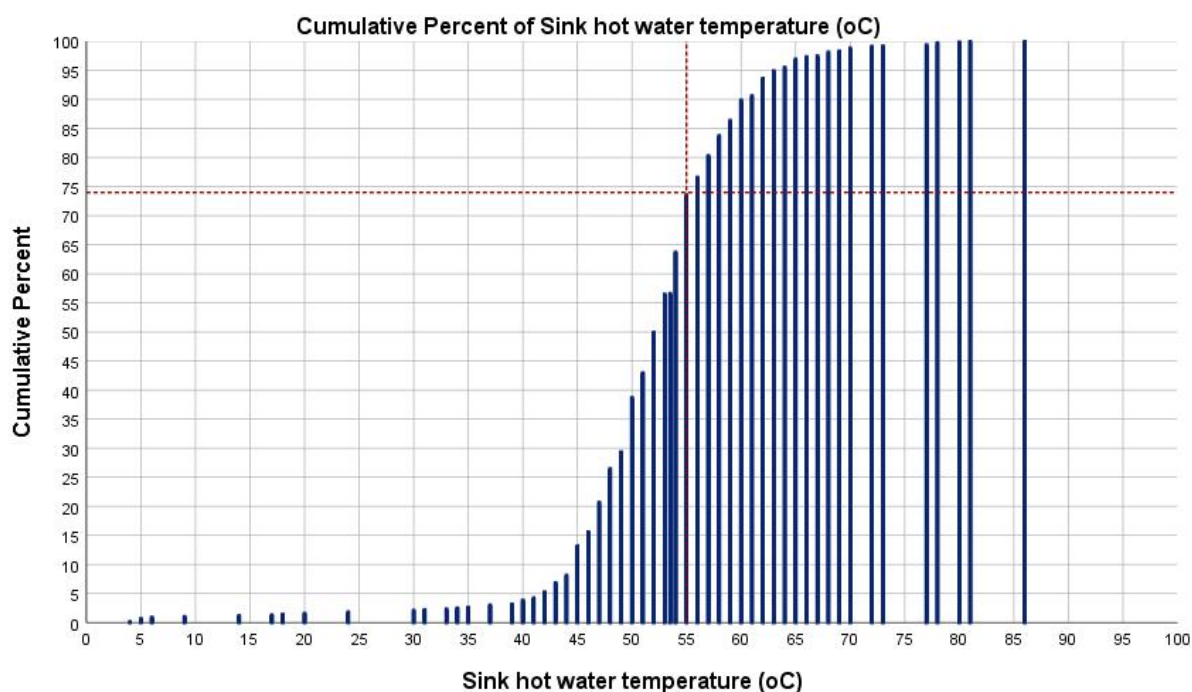


Figure 9. Cumulative percent histogram of all bathroom sink hot water tap temperatures. Dashed lines mark the proportion of taps above and below 55°C

Table 7. Temperature of bathroom hot water taps (all taps recorded in the survey)

	Count of all taps	Mean (°C)	Median (°C)	Minimum (°C)	Maximum (°C)
Owned	1,560,220	51.5	52.0	4.0	86.0
Rented	626,923	53.7	54.0	37.0	81.0
Total	2,187,143	52.1	53.0	4.0	86.0

1.1.1.3 Hot water temperature and system type

Bathroom hot water tap temperatures over 55°C were observed more frequently in houses with an electric low pressure hot water system (39%) compared to those with

an electric mains pressure system (26%) or instantaneous gas system (13%) (Table 8).

Table 8. Temperature of bathroom hot water taps by hot water system type

	% with tap >55°C	% of sample (weighted)
Hot water system 1: Electric - mains pressure cylinder	26%	30%
Hot water system 1: Electric - low pressure	39%	47%
Hot water system 1: Gas - Instantaneous	13%	11%
All houses	31%	100%

Higher water temperatures were also observed in houses with older hot water systems (more than 15 years old): 26% of houses with a hot water cylinder up to 15 years old had a temperature reading over 55°C compared to 44% of houses with cylinders over 15 years old (see Annex B and section 2.2 for more on hot water heater age).

Temperature and pressure relief (TPR) valves are designed to keep the temperature below 99°C and to relieve excess pressure to make sure valve-vented storage water heaters do not explode. TPR valves were observed on the main hot water system in 34% of houses surveyed. Proportionally fewer of these houses (19%) had hot water temperatures over 55°C compared to the whole sample (31%) and houses where the surveyor recorded no TPR valve (40%). (Note in 22% of cases data on the presence of a TPR valve was missing (7%) or the surveyor was unable to tell (14%)). See section 1.1.1.5 for more on TPR valves.

2.2 Hot water systems

2.2.1 Hot water system types

The House Condition Survey records the number of hot water systems and cylinders present in the home and has capacity to collect detailed data on up to two different systems. In most cases (93% overall) there was only one hot water system. Most rentals (92%) had one hot water cylinder, while 9% of owner-occupied dwellings had more than one and 13% had none (i.e. had an instantaneous hot water heater) (Table 9).

Table 9. Presence of hot water systems and cylinders

	Tenure	None	One	More than one
Hot water systems	Owned	0%	90%	10%
	Rented	0%	99%	1%
	Overall	0%	93%	7%
Hot water cylinders	Owned	13%	79%	9%
	Rented	7%	92%	1%
	Overall	11%	83%	6%

The most common hot water system type, in both owned and rented houses, was an electric low-pressure system, present in 48% of houses surveyed (Figure 10). These were slightly more common in rentals, while electric mains pressure systems were more common in owner-occupied. Twice the proportion of owner-occupied houses had an instantaneous gas hot water heater (14% compared to 7% of rentals).

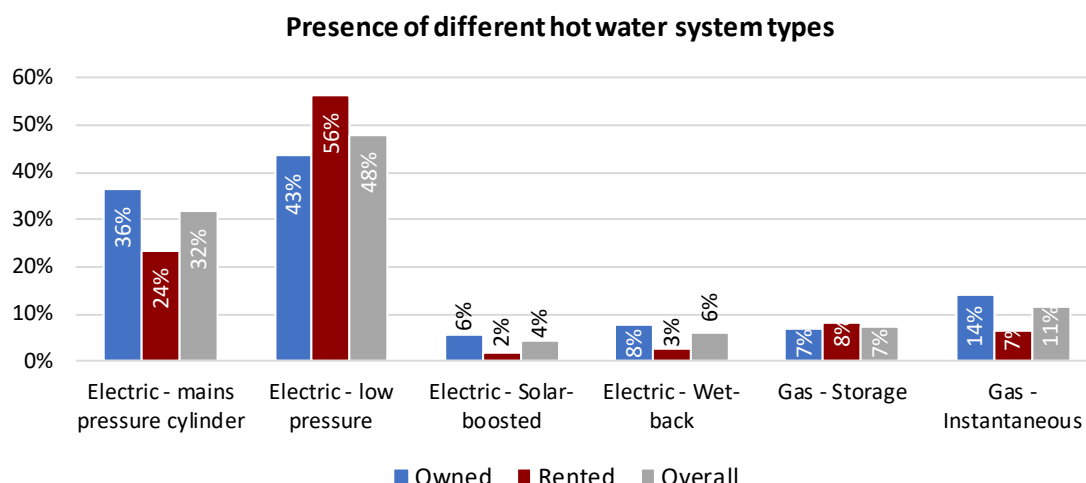


Figure 10. Presence of different hot water heater types by tenure and overall

The 2015 HCS data also shows electric mains pressure and instantaneous gas hot water systems were more commonly observed in newer houses, while low pressure electric systems were more prevalent in the older housing stock.

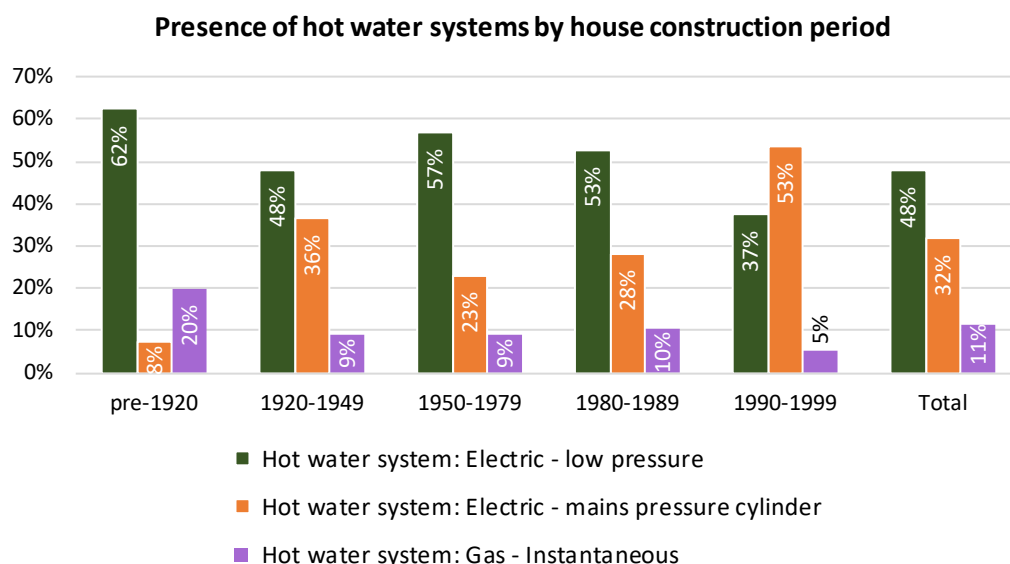


Figure 11. Presence of different hot water heater types by period of construction

2.2.2 Pipe run distance

The House Condition Survey provides an indicative measure of the hot water pipe run distance from the source of the hot water to the kitchen tap. Distance is measured on a descriptive, proxy scale of:

1. "Reasonably close" (e.g. up to one room away)
2. "Medium distance" (e.g. two rooms away)
3. "Long distance" (e.g. more than two rooms away)

This information is recorded for up to two different hot water systems in the house. This data has been cleaned so that the information provided below applies only to the hot water system that supplies the kitchen tap. Owner-occupied houses were more likely to have longer distances between the hot water source and the kitchen tap. This could be related to the size of the house – 33% of owner-occupied houses had four or more bedrooms compared to 16% of rentals, and the average (mean) floor area of the owner-occupied houses surveyed was 170m² compared to 136m² for the rentals.²

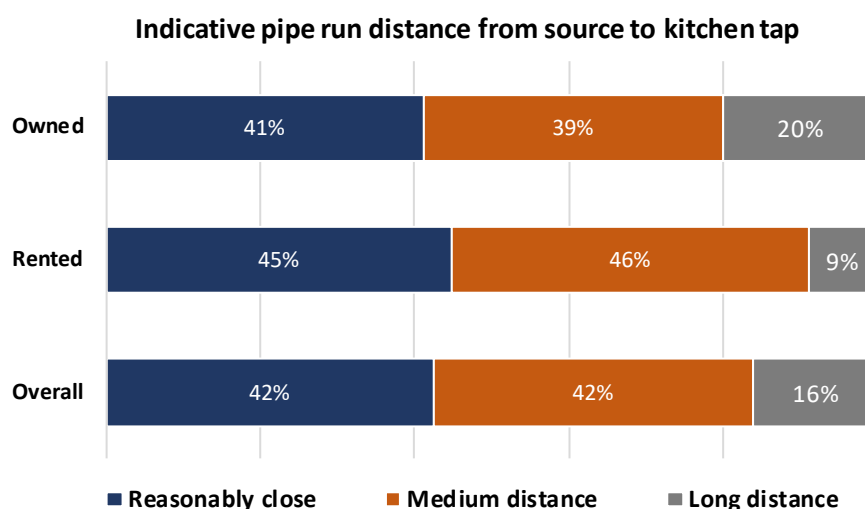


Figure 12. Indicative pipe run distance from the hot water source to the kitchen tap

2.2.3 Hot water cylinders

As shown above (Table 9), 89% of houses surveyed had at least one hot water cylinder, with 6% having more than one.

2.2.3.1 Cylinder locations

Most cylinders were located inside the house, however 8% of all cylinders recorded were in the roof space or under the house and 5% were located in the garage or exterior to the property (Figure 13). Overall, this equates to some 190,000 hot water cylinders being located outside of the living space. This was more common in owner-occupied houses than rentals.

² Floor area data provided by CoreLogic.

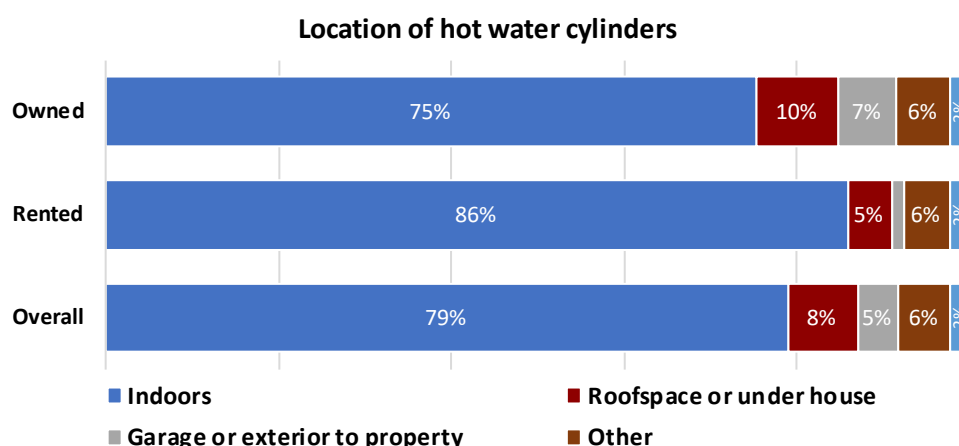


Figure 13. Location of hot water cylinders (percentages as a proportion of all cylinders recorded)

1.1.1.4 Cylinder age, grade, size and thermostat setting

The House Condition Survey asks for the age (year of manufacture shown on cylinder), size, grade and thermostat setting of hot water cylinders (with capacity to record up to two). Due to visibility/accessibility, these questions elicited a high rate of non-response. For example, 103 out of 497 cases where a cylinder was recorded as present, were missing data on cylinder age. As far as possible this information has been subsequently added by reviewing photos taken by the assessor as part of the survey.³ Where cylinder grade was missing or misaligned with cylinder age, the latter has been used to derive an estimate of grade.⁴ Even with this additional information, there remains a high rate of estimation and missing data. These results should therefore be treated with some caution.

Cylinder age

The average age of hot water cylinders recorded in the 2015 House Condition Survey was 18 years (Figure 14). However, this is skewed by a long tail, with 8% of cylinders⁵ recorded as older than 40 years. If these are removed, the average (mean) age reduces to 14 years.

³ With thanks to Andrew Pollard, BRANZ Building Physicist, for his expert input.

⁴ Grade was estimated from cylinder age according to the following: Pre-1975 = Grade D; 1976 – 1985 = C; 1986 – 2002 = B; Post-2002 = A. These assumptions are based NZ standards and requirements for installation. C-grade was defined in the mid-70s, with installation required from 1976; B became requirement from 1986; A from 2003 onwards.

⁵ Representing some 122,000 cylinders (47 cases unweighted)

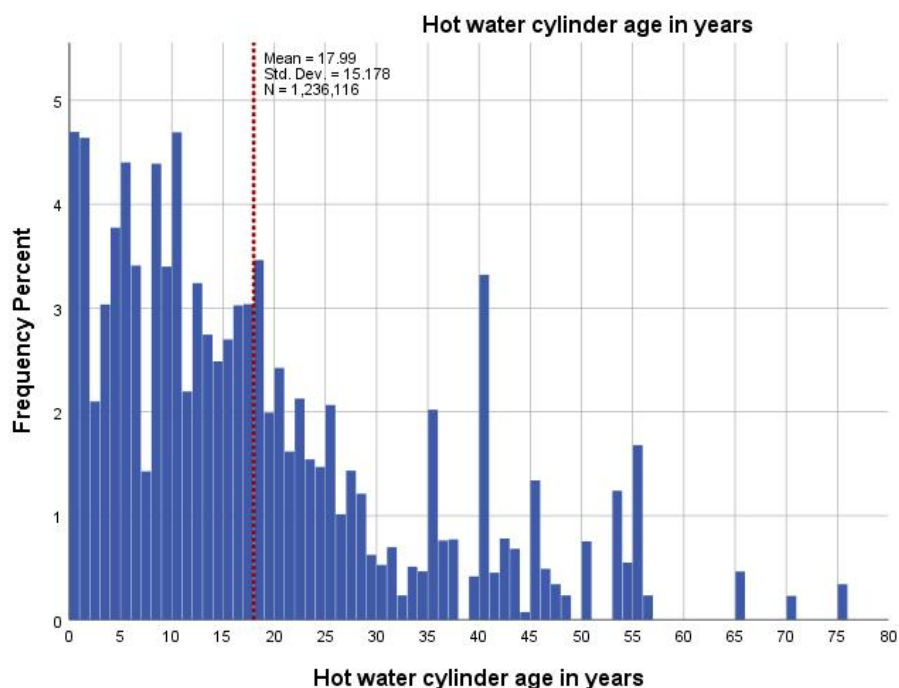


Figure 14. Frequency histogram of cylinder age (N represents all cylinders for which the age was recorded in the survey or could be ascertained from photographs)

A higher proportion of rentals had hot water cylinders less than 6 years old (24% of all cylinders in rentals, compared to 16% of cylinders in owner-occupied houses, Figure 15). However, there was little difference in the average age of cylinders between owned and rental houses, with a mean of 18.2 and 17.7 years and medians of 14.0 and 15.0 years respectively.

Other than amongst the newest housing stock (houses built from 2000 onwards, which had a lower average cylinder age of 9 years) there appears little pattern in cylinder age by dwelling age. This may be due to the lifetime of cylinders and natural cycle of replacement over time.

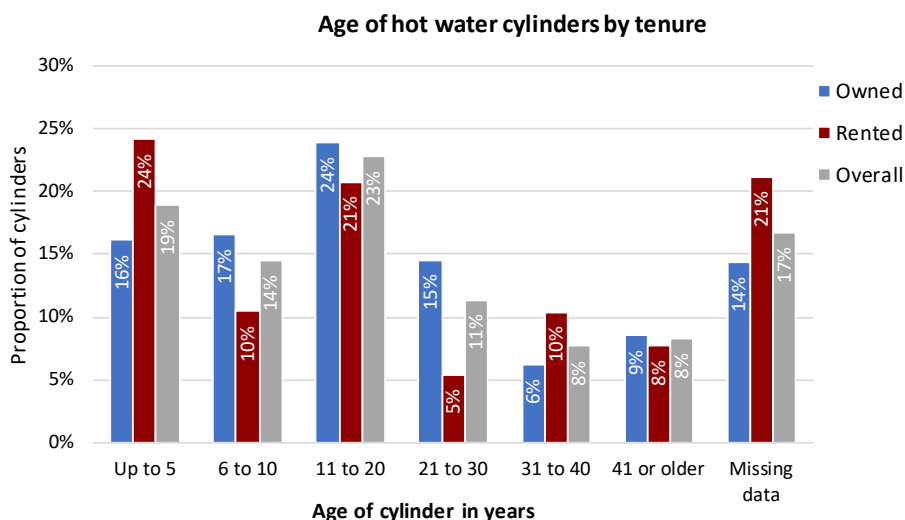


Figure 15. Proportion of cylinders by age band and tenure. (Proportions are of all cylinders, including those missing data (also shown))

Cylinder grade

Specifications and requirements for hot water cylinder ratings were first introduced in the 1970s and have increased over time. The age of the cylinder will therefore have some bearing on its likely rating. The data on hot water cylinder grade has been derived through a combination of assessor's observations, photos and age of cylinder. The results suggest there is little variation in cylinder grades between owned and rented houses. As with cylinder age, there appears inconclusive patterns in cylinder grade by dwelling age, other than in the later decades, with 54% of cylinders in 1980-1999 houses being B-grade, and 74% of cylinders being A-grade in houses built from 2000 onwards.

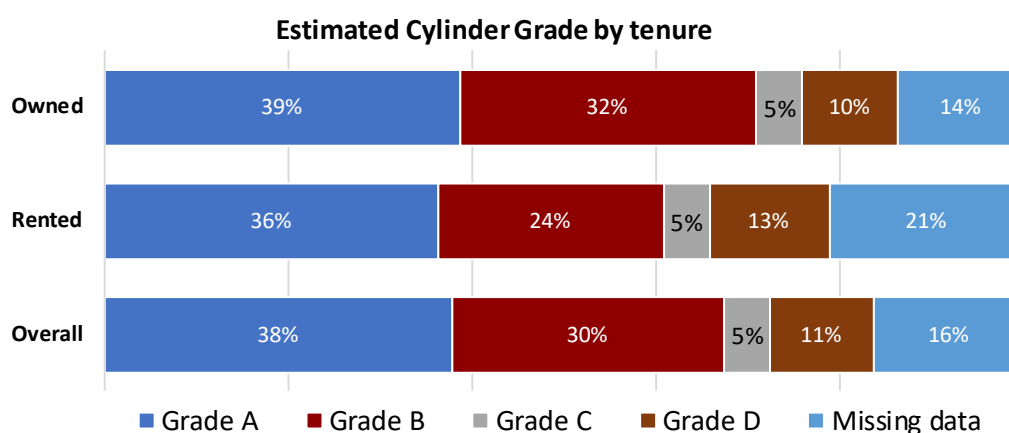


Figure 16. Estimated grade of all cylinders in owned and rented houses (figures are proportion of all cylinders; missing data has been included due to high rate of non-response)⁶

Cylinder size

The average (mean) size of all cylinders recorded in the 2015 HCS was 171 litres, however this ranged from a minimum of 15 litres to a maximum of 850 litres (Figure 17).⁷ The smaller units were typically secondary systems, used for heating the hot water supply to just one room (often the kitchen): the average (mean and median) size of all second cylinders recorded was 105 and 80 litres respectively (compared to the mean and median of the first system of 176 and 180 litres). A high proportion of cylinders were between 180-190 litres (48%) or 130-140 litres (27%). This aligns with standard cylinder sizes (135 litres and 180 litres being commonly available in NZ).

⁶ Figures may not sum due to rounding.

⁷ The largest system was a wood pellet boiler with a buffer tank which provided hot water and heating to the whole house.

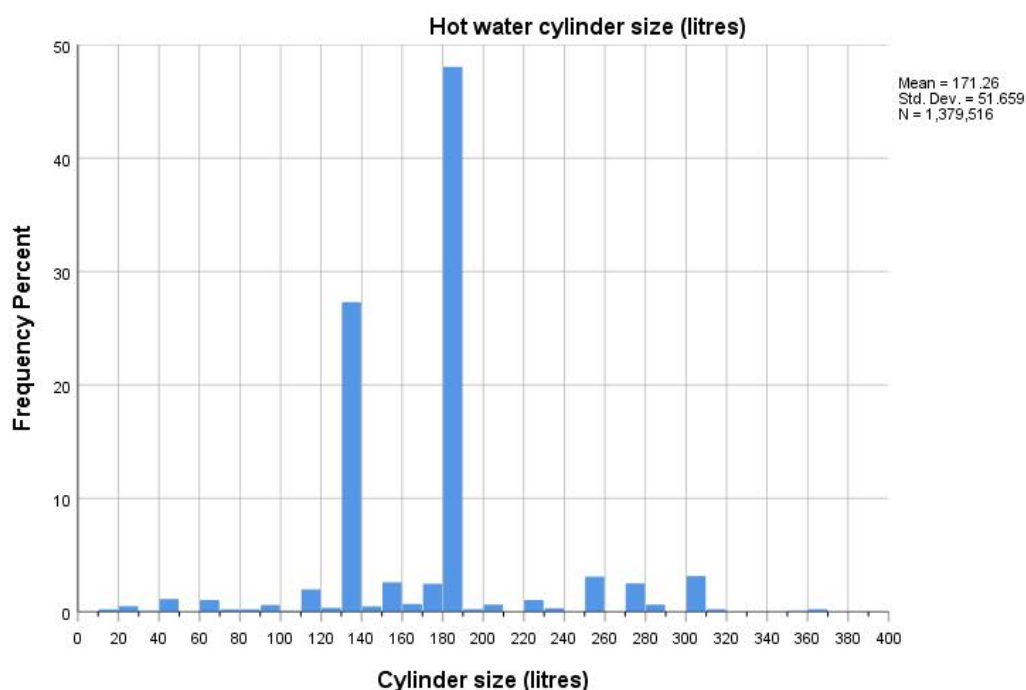


Figure 17. Distribution of cylinder sizes (bin size = 10 litres)

Hot water cylinder thermostat settings

The recommended temperature for the hot water cylinder thermostat setting is 60°C. Lower than this risks legionella bacteria growth, while higher temperatures risk scalding and unnecessary, wasteful use of energy.

The average temperature of all cylinder thermostats recorded in the 2015 HCS was 62°C, however this ranged from a minimum of 40°C to a high of 85°C (Figure 18). A setting lower than 60°C was recorded on 16% of cylinders, while 30% exceeded 65°C and 13% exceeded 70°C (Figure 19). This equates to 14% of houses surveyed having at least one cylinder set at less than 60°C, 25% with a cylinder set at 65°C or higher and 11% of houses with a hot water cylinder thermostat set at 70°C or higher (Table 10). These proportions represent some 210,000, 400,000 and 170,000 NZ houses respectively.

It should be noted that the data on thermostat setting was missing for 39% of cylinders recorded in the survey, hence the results are based on a smaller sample size and should be treated with some caution.

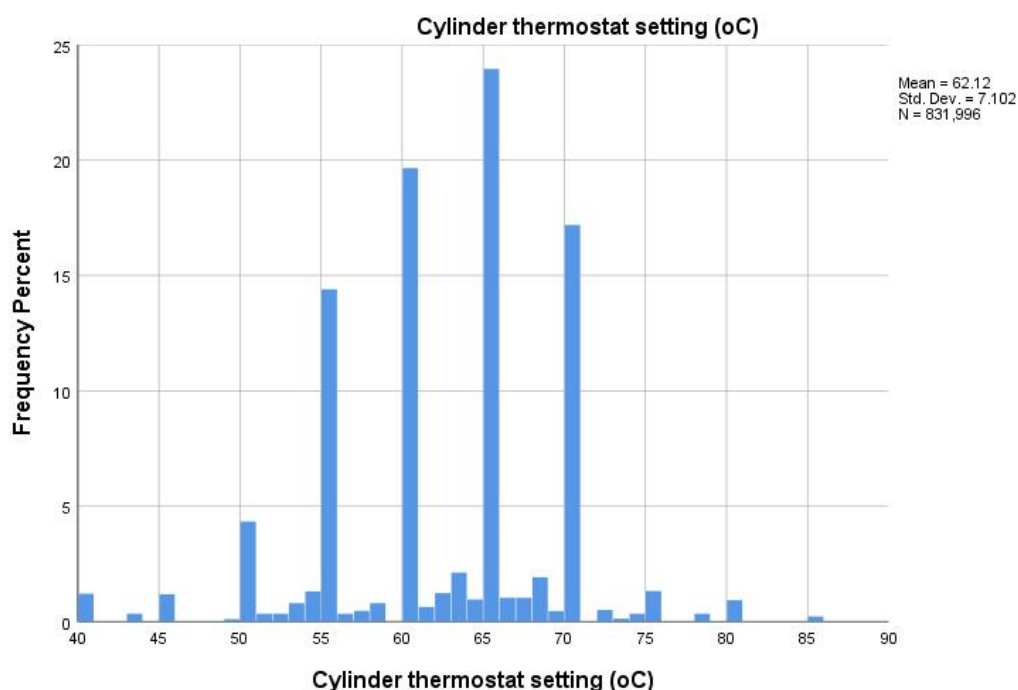


Figure 18. Distribution of cylinder thermostat settings (bin size = 1°C)

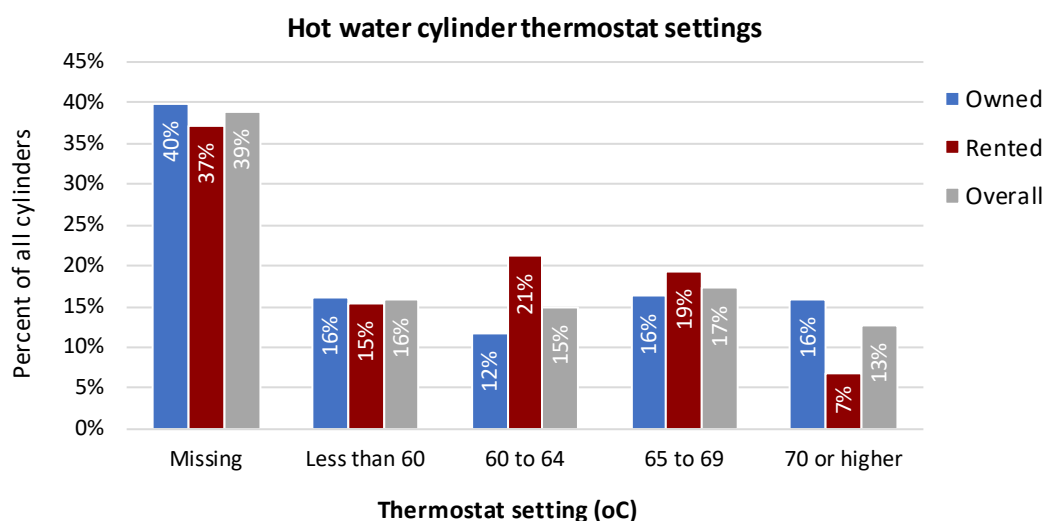


Figure 19. Cylinder thermostat settings by tenure (percent shown as a proportion of all cylinders, including those where this data was missing (shown)).

Table 10. Proportion of houses with at least one cylinder set lower than 60°C or higher than 65°C or 70°C

Cylinder thermostat setting	Owned	Rented	Overall
Less than 60°C	14%	13%	14%
65°C or higher	27%	22%	25%
70°C or higher	13%	6%	11%

1.1.1.5 TPR Valves

As noted above (section 1.1.1.3) temperature and pressure relief (TPR) valves are designed to keep the temperature below 99°C and to relieve excess pressure to make sure valve-vented storage water heaters do not explode. TPR valves were observed on 38% of all hot water cylinders, while 45% were recorded as having no TPR valve and in 16% of cases the surveyor was unable to tell or the data was missing (Figure 20). This equates to 42% of all houses surveyed having a cylinder without a TPR valve. Cylinders without a TPR valve were more commonly observed in rental properties. Older cylinders were more susceptible to access issues ('unable to tell' if a TPR valve was present), while new cylinders were more likely to have one (see Annex B).

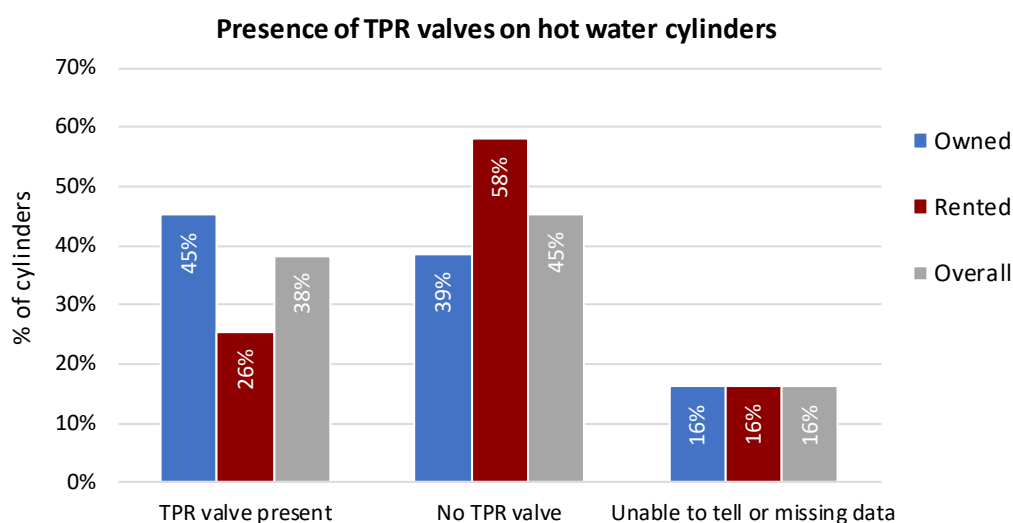


Figure 20. Presence of TPR valves on hot water cylinders in owned and rental properties (base count = all water cylinders)

1.1.1.6 Cylinder and pipe insulation

The House Condition Survey records the presence of hot water pipe lagging, cylinder wraps and, in the absence of the latter, whether there is space for a cylinder wrap. This information is recorded for up to two different systems/cylinders in the house.

The results show two-thirds of hot water system pipes were not lagged (Figure 21). This equates to over 1 million houses lacking insulation on hot water pipes.

The 2015 HCS data also shows a lack of wraps on hot water cylinders, with some 79% of cylinders recorded as not wrapped.⁸ However, some cylinders, particularly newer models, are designed/built with insulating material. EECA recommends wrapping cylinders that pre-date 2002. The results from the HCS show a slightly higher proportion of older cylinders were wrapped (Figure 22). Overall, some 79% of cylinders that pre-dated 2002, 34% of all cylinders overall, were lacking a cylinder wrap (Figure 22, Table 11). This equates to just under half a million households that could benefit from this low-cost improvement measure.

⁸ Note 8% were missing this data, hence the proportion recorded with a cylinder wrap is 13%. This applies to electric cylinders only, as gas cylinders should not be wrapped.

Note that the age of cylinder is missing on 17% of cylinders recorded in the HCS. If all of these ‘unknowns’ pre-date 2002, the proportion that could benefit from wrapping increases to 43% (some 640,000 cylinders, or 600,000 households).

Of those that were not wrapped, just under three-quarters (74%) had space for a wrap.

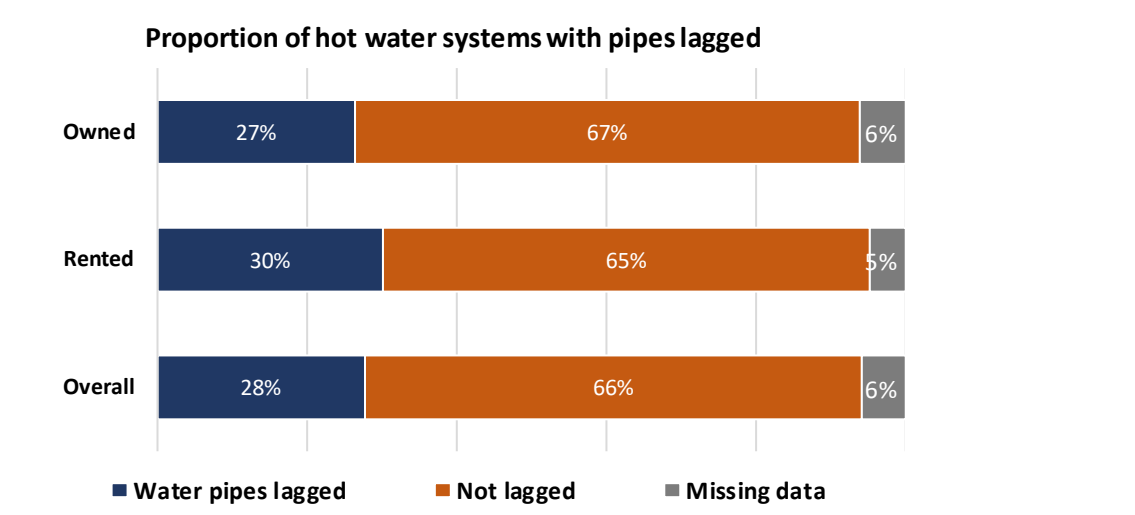


Figure 21. Proportion of hot water systems with pipes lagged by tenure (base count = total hot water systems, with a maximum of two per house)

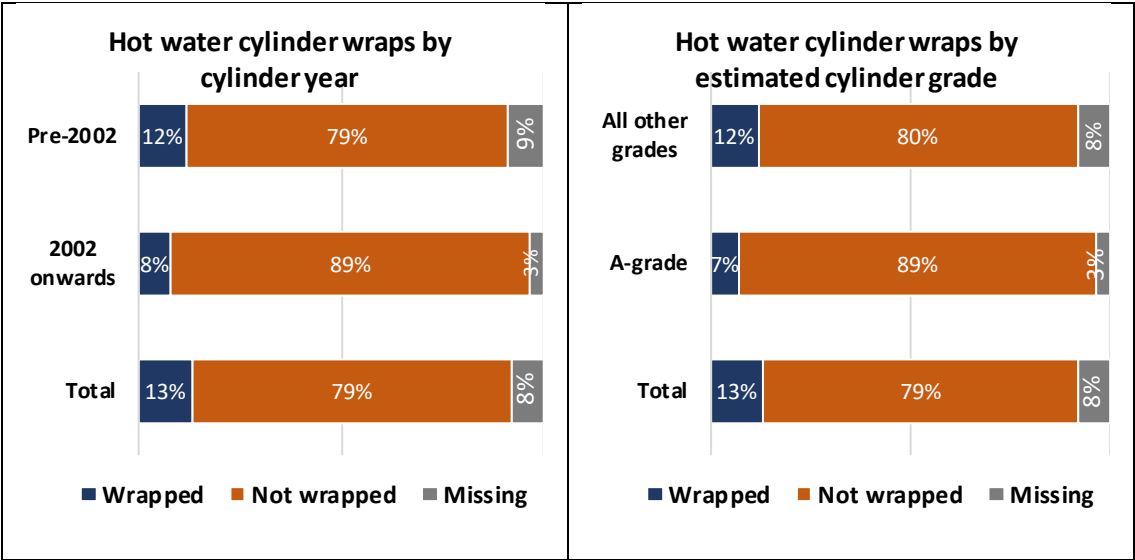


Figure 22. Proportion of hot water cylinders wrapped by cylinder year and by cylinder grade⁹ (base count = total hot water cylinders, with a maximum of two per house)

⁹ Note little difference between the two charts, which is at least in part due to grade estimates being derived from cylinder age where grade data was missing.

Table 11. Status of cylinders that pre-date 2002 or date is unknown

Cylinder age		Not wrapped	Total cylinders
Pre-2002	Count (to nearest '000)	510,000	640,000
	% of all cylinders	34%	43%
Pre-2002 or unknown age	Count (to nearest '000)	640,000	890,000
	% of all cylinders	43%	60%

2.2.4 Hot water cylinder and system defects

Very few defects were recorded with hot water cylinders. Only between 1-2% of cylinders were reported with the following:

- Leaking at cylinder outlets
- Cylinder leaking
- Thermostat not operating/broken
- Pipe lagging deteriorating
- Cylinder wrap damaged/undone

These findings should be considered within the context of access/visibility constraints and the number of houses to which some of these defects apply (e.g. two-thirds of hot water system pipes were not lagged and only 13% of cylinders had a wrap), and due to small sample sizes should be treated with some caution.

3. Lighting and appliances

The 2015 House Condition Survey included a new, additional householder questionnaire that asked about appliance use in the home. This included lighting, heating and consumer products. Commissioned by EECA, this was the first time this information had been recorded as part of the HCS.

3.1 Lighting

The householder was asked about the light fitting type and number of different bulbs in each (generic) room of the house.¹⁰ Pictures were included in the questionnaire to assist the householder in identifying the type of fitting and light bulb.

3.1.1 Light fittings

3.1.1.1 Light fitting types

The most common light fitting type in all areas of the house was the pendant/surface mounted fitting. This fitting type was found in living areas in 71% of houses and in bedrooms in over three-quarters (76%) of houses (Figure 23). Downlights were the next most common light fitting, found in the living area in nearly two-fifths of houses (39%) and in kitchens in one-third (33%) of houses.

There was evidence of some difference in the type of light fittings most commonly found in owned and rental houses. While pendant/surface mounted lights were the dominant light fitting in all areas of both, downlights were more commonly found owner-occupied houses, particularly living areas (45% of houses, compared to 27% of rentals), kitchens (40% vs 20% of rentals) and bathrooms (41% vs 17% of rentals) (see White et al, (2017)).

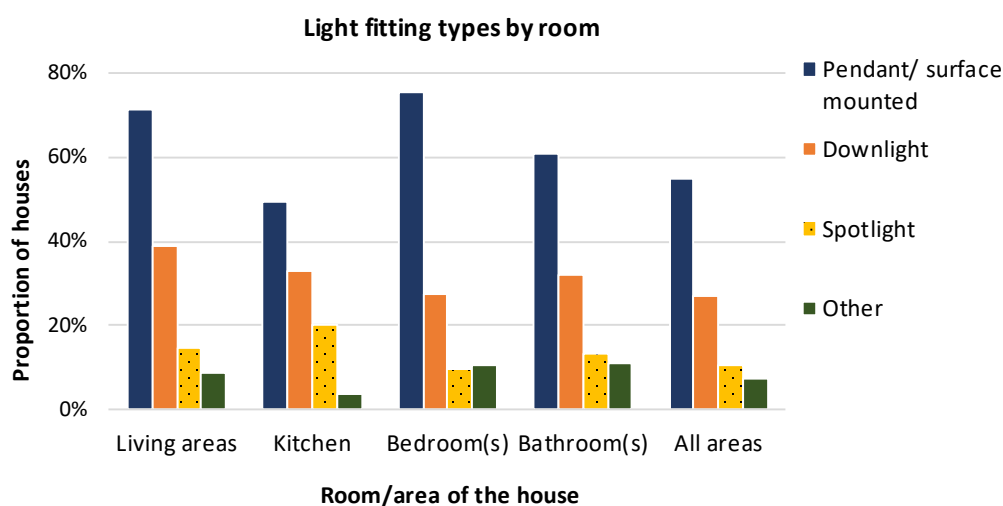


Figure 23. Proportion of houses with different light fitting types by area of the house

¹⁰ Information was collected for all living areas, kitchens, bedrooms, bathrooms and other interior spaces. Living areas included all dining, lounge and family rooms. Where the kitchen was open plan and the kitchen zone was not easily distinguishable from the rest of the living area, this information was included as part of the living area.

3.1.2 Light bulb totals

Householders were asked to record the number of different light bulb types in each area of the house.

The average number of bulbs recorded in owner-occupied houses was 27 (median 23), compared to an average of 15 (median 12) in rental properties (Figure 24). Applying the survey weight, this extrapolates to a total of over 35.1 million bulbs (26.9 million in owner-occupied houses and 8.3 million in rentals). Figure 25 shows the total count of bulbs by room of the house. Living areas account for 30% of all bulbs recorded and bedrooms around one-quarter (23%). (All data on bulb count by room, tenure and dwelling age is provided in the accompanying spreadsheet).

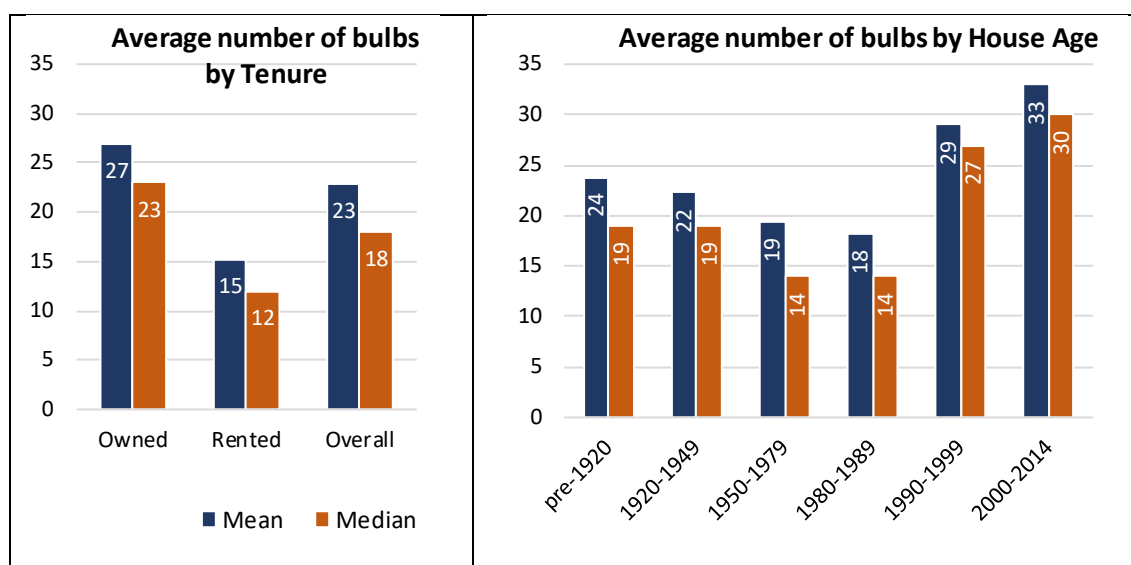


Figure 24. Average (mean and median) number of bulbs by tenure and house age (period of construction)

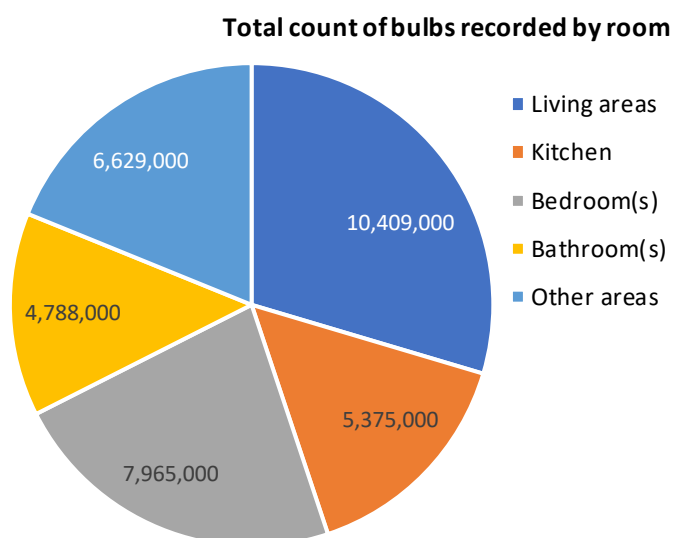


Figure 25. Estimated total number of bulbs by room of the house based on counts provided in the survey

3.1.3 Light bulb types

Results show some difference in bulb types by room/area of the house, with incandescent bulbs and CFL's accounting for almost equal proportions of all light bulbs recorded in living areas (31% and 30% respectively), while halogens were the most common light bulb in kitchens (accounting for over one-quarter (26%) of bulbs recorded in kitchens) (Figure 26).

Overall, incandescent bulbs accounted for just over one-third (34%) of all bulbs recorded in the house (excluding other, unknown bulb types)). This equates to some 12 million incandescent bulbs, which if replaced with the more efficient CFL or LEDs, could reduce the householder's energy bills.

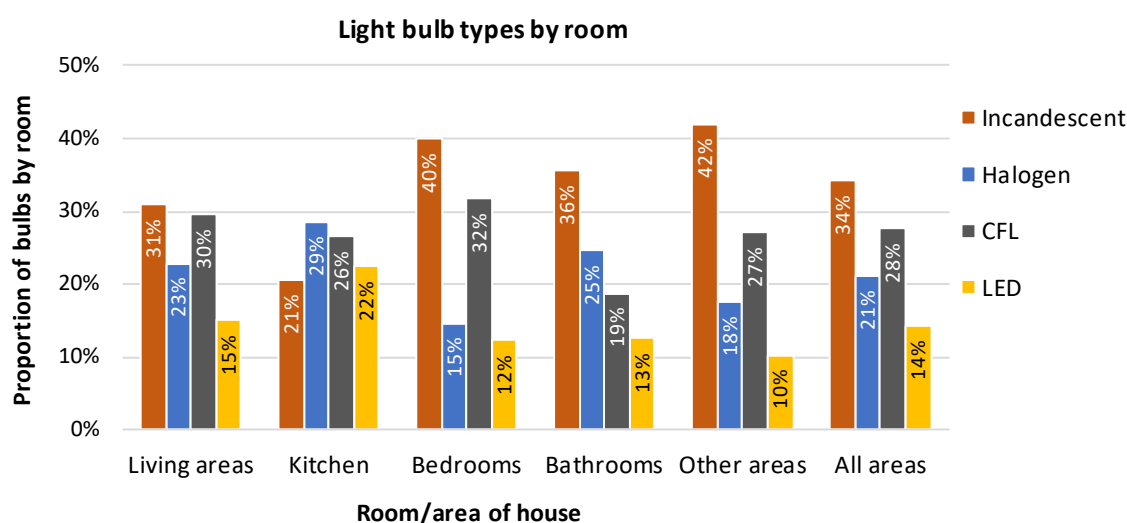


Figure 26. Proportion of different light bulb types by room/area of the house

Again, some difference in the prevalence of different light bulb types was observed between owned and rented houses. CFLs were more common in rentals (in all areas of the house), accounting for 35% of all bulbs recorded, compared to 25% in owner-occupied houses, while LEDs were more common in owner-occupied houses (see Annex B).

The data also shows newer houses (built 2000 onwards) are more likely to have a more even mix of different bulb types, with equal proportions of incandescent bulbs, halogens and CFLs, while incandescent bulbs still dominate in older (pre-1950s) houses (see Annex B).

Incandescent bulbs and CFLs were also more commonly observed in lower income households, whilst LEDs and halogen bulbs accounted for proportionally more of all bulbs recorded in higher income households (see Annex B). It should be noted that the HCS is not representative on household income¹¹ and 14% of survey respondents did not know or refused to disclose this information.

¹¹ For example, the income brackets between \$30,000 and \$100,000 are reasonably well represented, but there is under-representation of high-income households and over-representation of lower-income households in the HCS compared with the national (Census) profile. For more information, see: White, V. W., Jones, M., Cowan V. J. & Chun, S. (2017). *BRANZ 2015 House Condition Survey: Comparison of house condition by tenure*. BRANZ Study Report SR370. Judgeford, New Zealand: BRANZ Ltd

4. Technology and appliances

4.1 Televisions

The householder appliance-use questionnaire asked about the number of flat screen and regular televisions used regularly¹² in the house and screen size (in inches).

Results show most houses (55%) had one flat screen TV that was used regularly and 30% had two (Figure 27). There was very little difference between owned and rented houses in flat screen TV use. Similarly, there was little difference between tenures in the use of regular TVs, with 88% of households not having a television of this type.

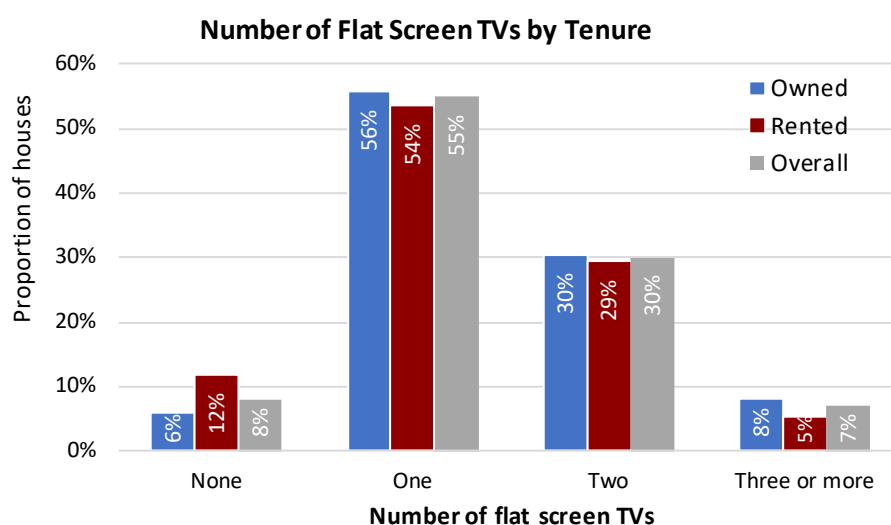


Figure 27. Number of flat screen TVs used regularly by tenure

The average (mean) screen size of all flat screen TVs recorded was 38 inches (Table 12), with no difference between owned and rented houses (see Annex B). Where households had more than one flat screen TV, the second tended to be very marginally larger (median of 40 inches, compared to 38 for the first TV recorded). The size of regular TVs (though based on a small sample as few houses had these) was smaller at 29 inches.

Table 12. Screen sizes of flat screen TVs used regularly (size in inches)

	All flat screen TVs	Flat screen TV 1	Flat screen TV 2
Mean	38.1	37.8	39.2
Median	40.0	38.0	40.0
Min	11	17	11
Max	84	84	60
Base count (weighted)	1,880,000 ¹³	880,000	440,000

¹² Defined as used "an average of at least once a week".

¹³ The total count of flat screen TVs recorded in the survey is higher (2,080,000), but some were missing data on screen size, hence smaller count shown here.

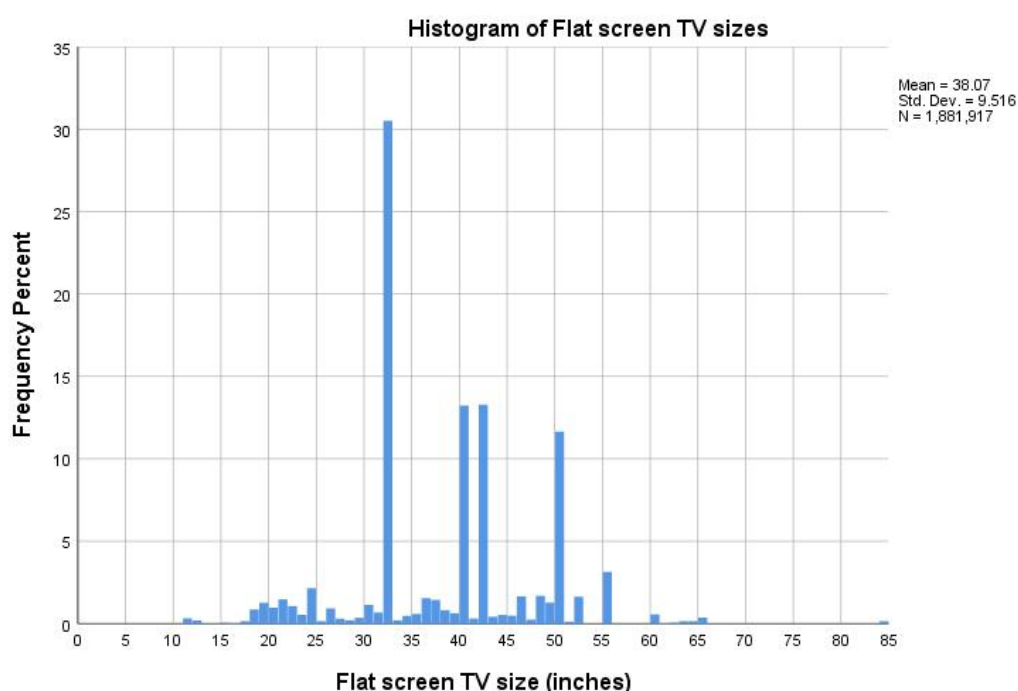


Figure 28. Distribution of flat screen TV sizes

4.2 Computer technology

The appliance-use questionnaire asked householders how many of the following were used regularly in the household: laptops, desktops, monitors, tablets and smart phones. The results show smart phones were the most commonly used appliance, with two-fifths of households regularly using two or more devices (Figure 29). Laptops were slightly more commonly used in rentals, with 55% using one and 20% using two or more (compared to 40% and 26% respectively in owner-occupied dwellings). Desktops and tablets on the other hand were more common in owner-occupied houses.

Some of these devices, smart phones in particular, may belong to an individual rather than the household. The number of people in the house may therefore be a key driver of (higher) ownership of these devices. Comparing the total number of devices used with the number of people in the house shows that whilst use of smart phones per dwelling is slightly higher for the rental stock on a household basis¹⁴, on a per capita basis it is slightly higher for owner-occupied houses (see Annex B).

¹⁴ The average number of people per dwelling in surveyed households was higher in rentals at 2.8 compared to 2.4 for owner-occupied houses.

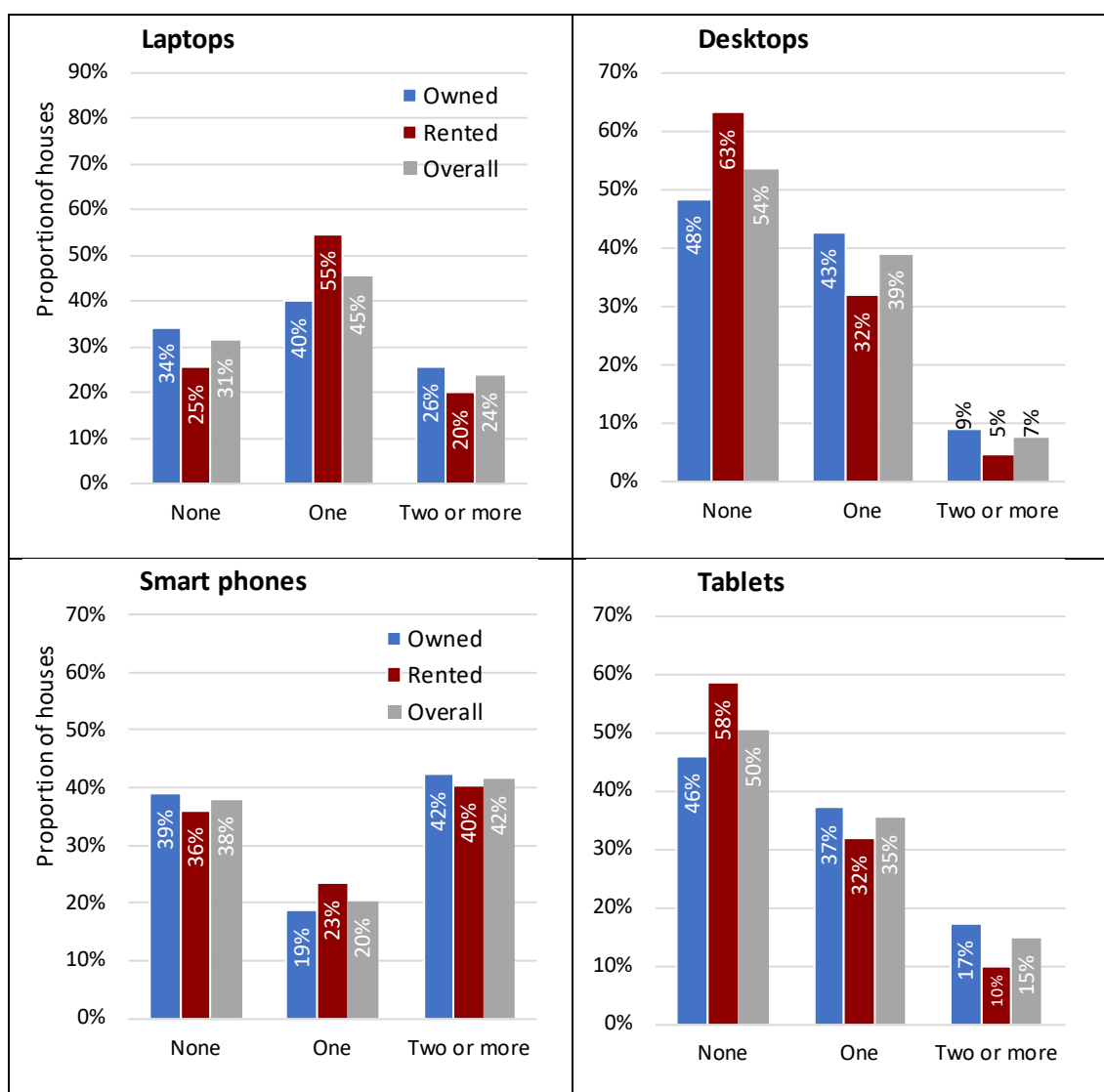


Figure 29. Number of computers, smart phones and tablets regularly used in the household

4.3 Home entertainment

The householder appliance-use questionnaire asked how many game consoles, home entertainment systems, stereos and set-top boxes (e.g. Sky/Telstra box) were regularly used in the home.

Overall, less than one-fifth of households regularly used a games console or home entertainment system, but three-fifths (60%) used stereos and 46% set-top boxes (Figure 30). Games consoles were slightly more commonly used in rental properties, while stereos were more common in owner-occupied dwellings.¹⁵

¹⁵ Occupant age could be an important factor here and it should be noted that the occupancy characteristics (age) of survey participants were not necessarily representative of the New Zealand population. See White et al (2017) for more information on the sample.

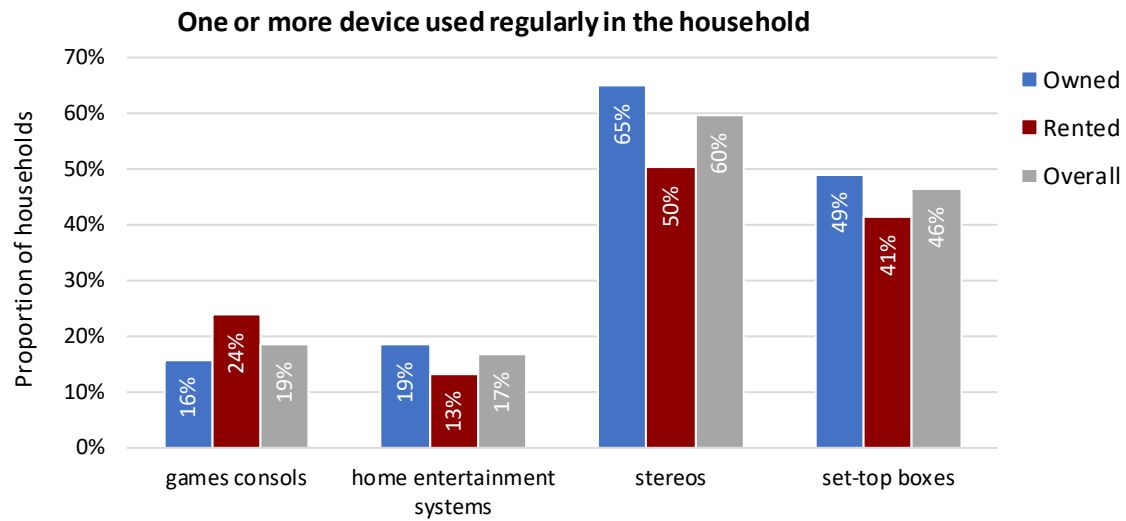


Figure 30. Use of home entertainment equipment in owned and rented houses

4.4 Refrigeration

The householder appliance-use questionnaire asked about the type and number of fridges and freezers in the home, how old they were, where they were located and whether they were in use (see Annex A for appliance-use questionnaire). To assist householders in identifying the type of refrigeration appliance, pictures of seven different types were included in the questionnaire. The survey had capacity to record details of up to five different refrigeration appliances.

4.4.1 Type, number and usage of fridge freezers

The data collected represents a total of 2.97m refrigeration appliances. The average (median) number of refrigeration appliances was 2 for owner-occupied houses and 1 for rentals (with an overall average of 2 across all houses surveyed). While just over half of rental houses had only one refrigeration appliance, two-fifths of owner-occupied houses had two and nearly one quarter (23%) had three (Figure 31) (note figures may not sum to 100% due to rounding).

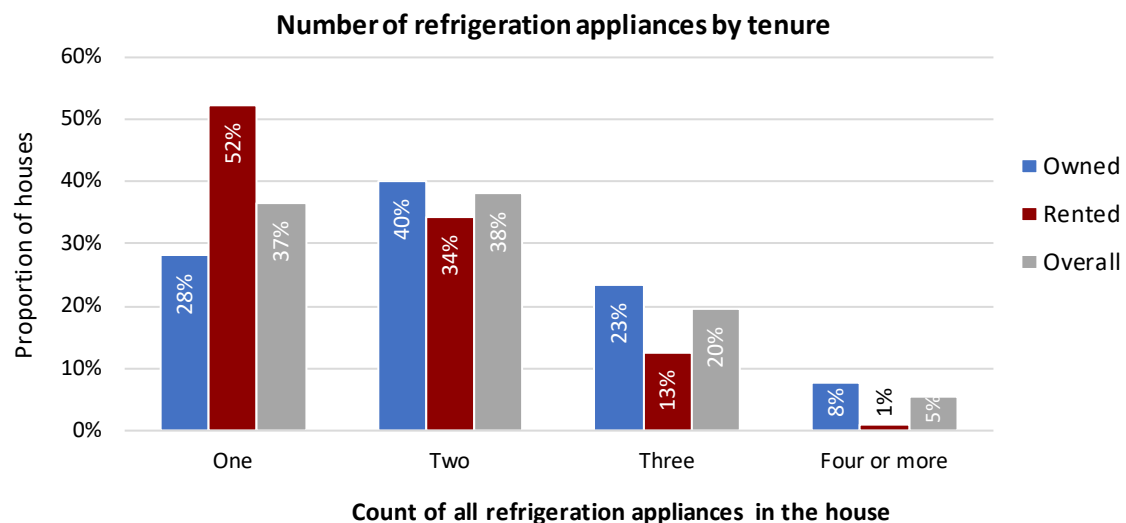


Figure 31. Number of fridge freezers present in the house, by tenure

Of all the refrigeration appliances recorded in the survey, the most common type (accounting for 35% of all refrigeration appliances recorded) was the vertical fridge freezer with a bottom freezer. These were slightly more prominent in rental houses, accounting for 43% of all refrigeration appliances recorded in rentals, compared to 32% of all appliances in owner-occupied properties. Overall 62% of all houses surveyed had a vertical fridge freezer with a bottom freezer.

Bar fridges accounted for 5% of all refrigeration appliances recorded in owner-occupied houses, being present in 10% of owned dwellings.

The average count of each refrigeration appliance type is provided in Appendix B.

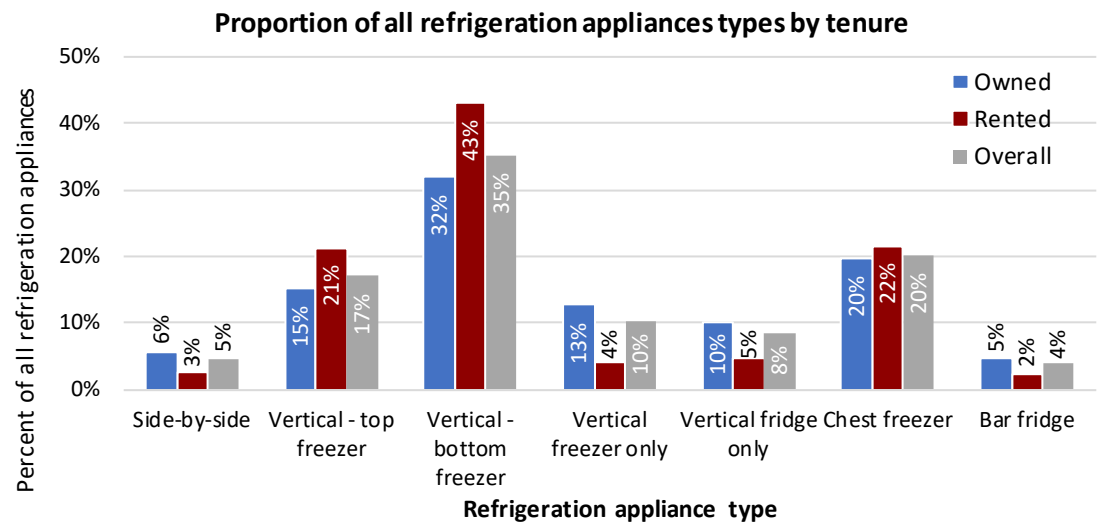


Figure 32. Types of refrigeration appliances present (percentages as a proportion of all refrigeration appliances recorded, by tenure and overall)

Of all the refrigeration appliances recorded, the vast majority (90%) were “always on”, 4% were “occasionally on” and only 1% were “never on” (note data on usage was missing for 4% of fridge freezers, Figure 33). The bar fridge was the most likely fridge type to not be in use all the time (50% “always on”).

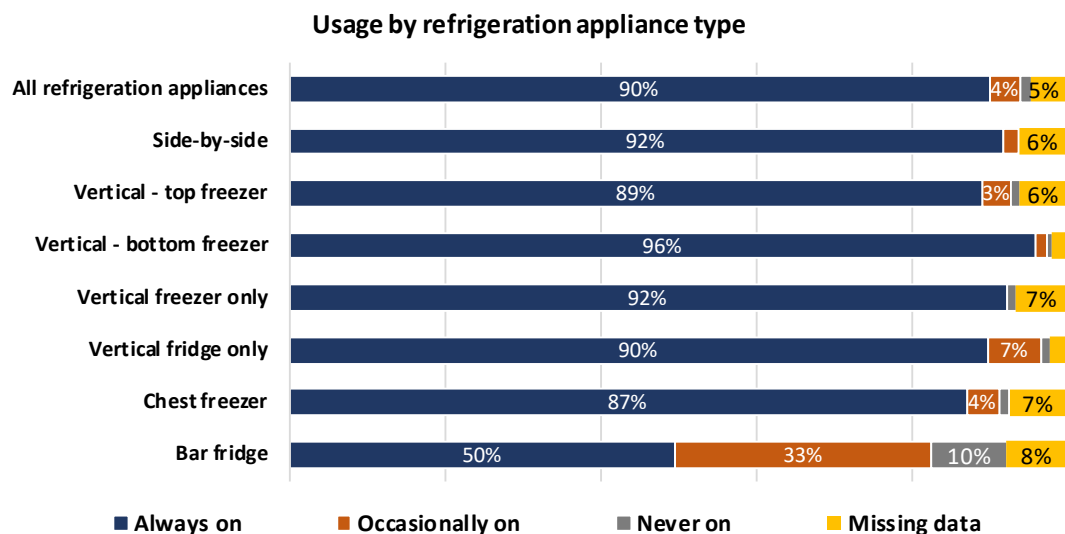


Figure 33. Usage of refrigeration appliances by type (percentages as a proportion of all refrigeration appliances recorded; missing data on usage included)

4.4.2 Age of refrigeration appliances

Householders were asked to estimate the age of each refrigeration appliance. It should be noted that this question elicited high rates of non-response, with 42% of all refrigeration appliances missing information on age. The data below therefore applies to a smaller sample size.

The average (mean) age of all refrigeration appliances recorded was just over 10 years. Nearly one third (32%) of refrigeration appliances for which an age estimate was provided were up to 5 years old and a further third (33%) between 6 and 10 years old. EECA recommends replacing refrigeration appliances that are over 20 years old. This applies to 7% of refrigeration appliances in the survey (where data is available).

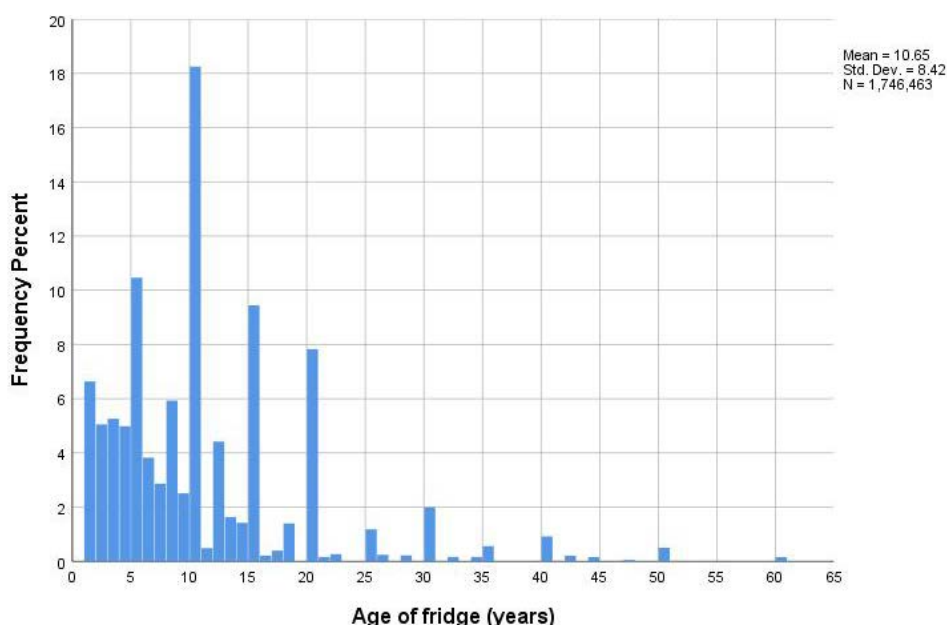


Figure 34. Distribution of refrigeration appliance ages

Table 13. Age bands of refrigeration appliances recorded in the survey¹⁶

	Owned	Rented	Overall
Up to 5 years old	34%	29%	32%
6 to 10 years old	30%	41%	33%
11 to 15 years old	17%	18%	17%
16 to 20 years old	10%	9%	10%
Over 20 years old	8%	4%	7%

4.4.3 Location of refrigeration appliances

Householders were asked about the location of each refrigeration appliances in the house, with the options of 'kitchen', 'garage' or 'other'. Results show that nearly two-thirds (63%) of all refrigeration appliances in rental houses were in the kitchen, compared to 52% in owner-occupied houses, with nearly one third (31%) of the latter being in the garage.

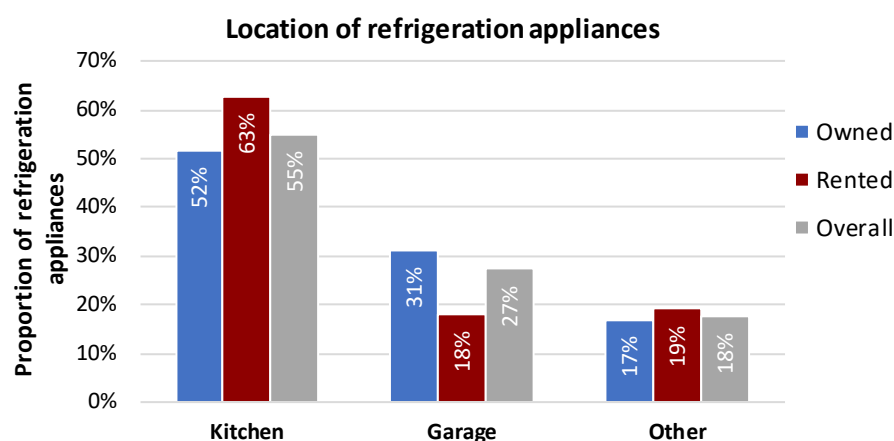


Figure 35. Location of refrigeration appliances in owned and rental houses (proportions as a percent of all refrigeration appliances)

4.5 Other household appliances

Householders were asked about the use of several other common household appliances. Whilst the householder could specify how many of each were used, for the vast majority, only one of each appliance (listed in the survey) was regularly used (i.e. few households had more than one of these appliances).

There was very little difference between owned and rented households in the use of the more common and smaller household appliances, such as the kettle, toaster and microwave (Figure 36). Top loader washing machines were slightly more common in rentals, although this was still the dominant type used in owner-occupied dwellings. The greatest difference observed was in the use of dishwashers – used regularly in 68% in owner-occupied houses compared to 34% in rentals.

¹⁶ Missing data cases have been excluded hence the base count is smaller.

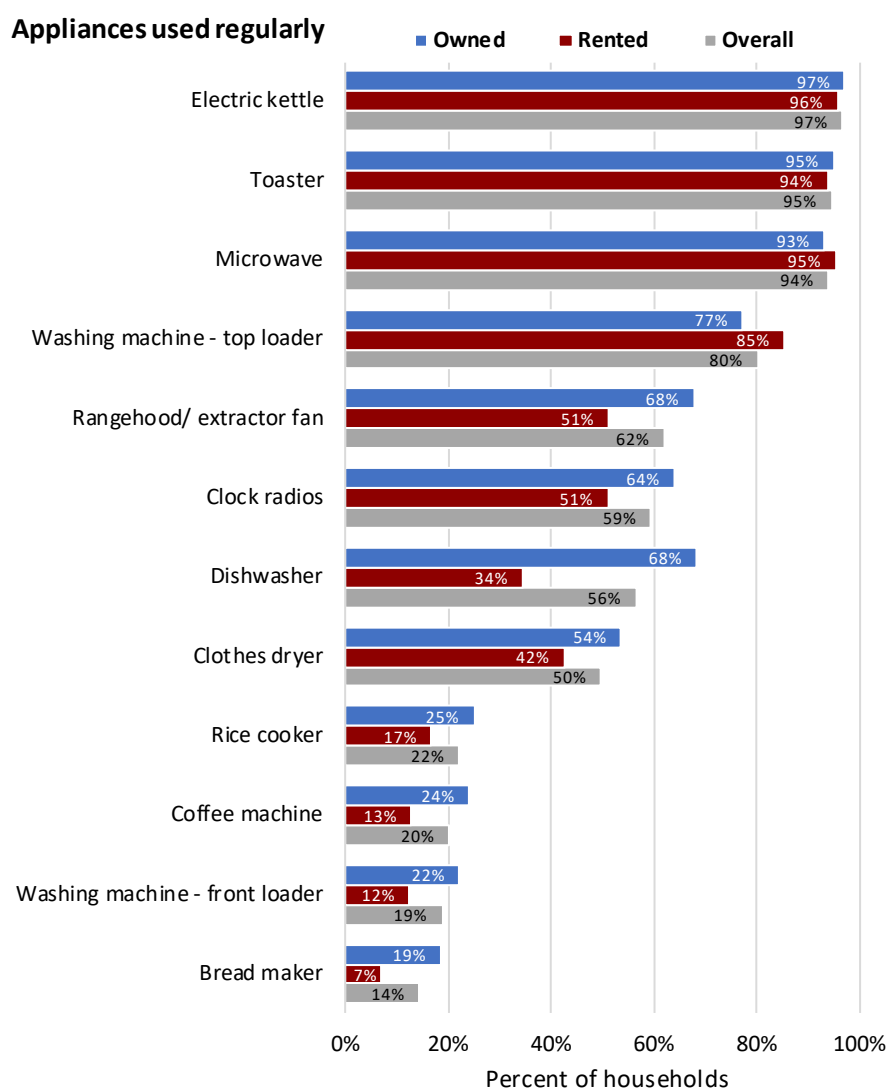


Figure 36. Appliances used regularly in the home

Rangehoods/extractor fans, which are important for helping control moisture generated in the home, were reportedly used regularly in just over half of rentals, compared to 68% of owner-occupied houses. This pattern – a higher rate of mechanical extract ventilation in owner-occupied houses – aligns with analysis of data from the physical house assessment part of the House Condition Survey, which also found mechanical extract ventilation was more common in owner-occupied houses.¹⁷ However, while the patterns align, it is not possible to directly compare the results of the householder questionnaire and the physical house assessment data as the householder questionnaire did not differentiate between extractors used in the kitchen and bathroom. The use of the term ‘rangehood’ in the householder questionnaire may have tended respondents to think only of the kitchen, but it is not possible to say conclusively which area(s) of the house their response about use of extractor fans/rangehoods applied to.

¹⁷ For more information see: White, V. & Jones, M. (2017). *Warm, dry, healthy? Insights from the 2015 House Condition Survey on insulation, ventilation, heating and mould in New Zealand houses*. BRANZ Study Report SR372. Judgeford, New Zealand: BRANZ Ltd.

A further important consideration, which would not be picked up in the householder appliance-use questionnaire, is where the extractor vents to. The house assessment showed not all extractors/rangehoods were extracting to the outside, particularly in the kitchen where around one-quarter were not extracting to the outside.¹⁸

Clothes dryers should also be vented to the outside to avoid moisture being released into the house. Half of all houses surveyed said they regularly used a clothes dryer, but results from the physical house assessment shows around three-quarters of these were not vented to the outside.¹⁹

4.6 Other house features

The householder appliance use questionnaire also asked about the use of other house features that could have implications for household energy use, including garage door openers, swimming pools, spa pools and saunas. The results show garage door openers were much more commonly used in owner-occupied houses (55%) compared to rentals (19%). Only a small proportion of houses – the vast majority being owner-occupied – regularly used a swimming pool, spa pool or sauna.

Table 14. Proportion of households regularly using other dwelling

	Owned	Rented	Overall
Garage door opener	55%	19%	42%
Swimming pool	3.4%	0.0%	2.2%
Spa pool	5.1%	0.2%	3.4%
Sauna	0.8%	0.0%	0.5%

¹⁸ *ibid.*

¹⁹ *ibid.*

5. Additional statistics

5.1 Cooking

The majority of houses surveyed in the 2015 House Condition Survey (80%) had an all-electric cooking facility (Figure 37). Gas was also more commonly used for cooking in owner-occupied houses and higher income households (Figure 38).²⁰ Where gas was used, this was most commonly in combination with electric (electric oven and gas hob being the most common combination).

Of the one-fifth of households that used gas for cooking, roughly equal proportions used reticulated (49%) and bottled gas (51%). The latter was more common in rentals, used by 64% of those that cooked with gas, while only 36% had a reticulated gas supply for cooking. It should be noted that there was a high proportion of missing data on the source of gas used for cooking²¹ - these results should therefore be treated with some caution.

In terms of cooker defects, damaged seals were recorded in 4% of households.

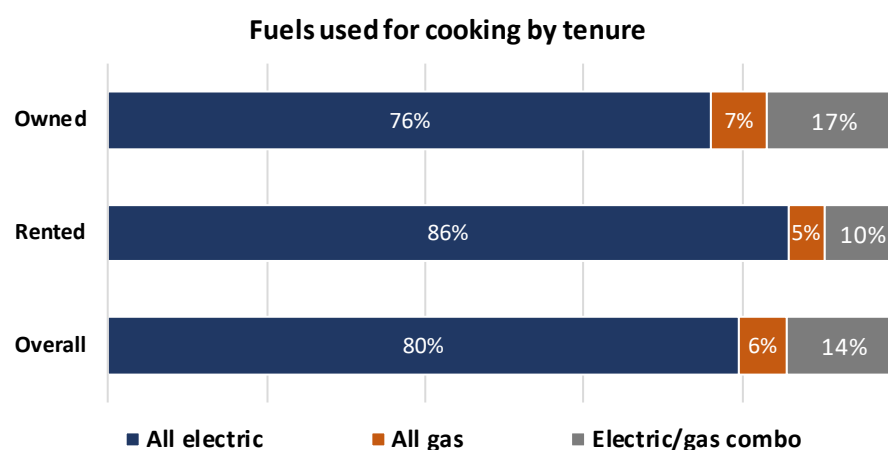


Figure 37. Fuels used for cooking in owned and rented houses

²⁰ As noted previously, the HCS is not representative on household income and 14% of survey respondents did not know or refused to disclose this information.

²¹ 55% of cases that used gas for cooking were missing data on the type of gas.

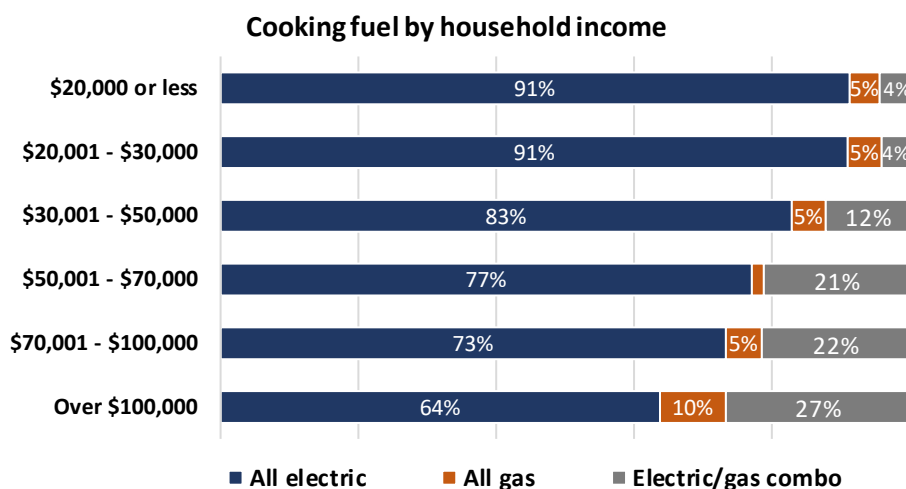


Figure 38. Fuels used for cooking by household income

5.2 Reticulated gas supply to property

The House Condition Survey records the type of gas used for space heating and cooking separately.²² It should be noted that the wording of the survey means this information is only recorded where gas is used. There may therefore be some houses with a gas supply that is not being used. These houses would not be picked up in the survey.

The results show that overall 12% of houses used a reticulated natural gas supply (for heating, cooking or both) and 9% were using LPG.²³ As noted in the section on cooking, there is a relatively high rate of missing data on the source of the gas supply and with relatively few houses using gas at all, the sample size is limited.

Table 15. Use of gas for heating and cooking

Gas source	Gas used	% of all households	
Reticulated natural gas	Used for heating only	8%	12%
	Used for cooking only	1%	
	Used for both	3%	
LPG tanks	Used for heating only	5%	9%
	Used for cooking only	4%	
	Used for both	1%	
Source unknown	Gas used for heating only	2%	8%
	Gas used for cooking only	5%	
	Gas used for both	1%	
No gas used for heating or cooking		70%	

²² The survey does not record gas type for water heating, just whether water heating is by gas or electric.

²³ For a small sample of houses on the South Island, the LPG supply was piped to the house from an external site. These have been counted in the LPG tanks category.

5.3 Bathroom heating

The type of heating present in bathrooms was recorded as part of the physical house assessment, for up to three different bathrooms in the house. In some cases, the additional 'bathrooms' were toilets only (with or without a washbasin). The analysis below counts only those rooms that had a bath or shower. Additional bathrooms (to the one main bathroom) were more common in owner-occupied houses: 46% had a second bathroom and 7% a third, while only 15% of rentals had two bathrooms (with a bath/shower).

Fan heaters and heat bulbs were the most common heating type in bathrooms, each present in just under one quarter (Figure 39). Rental houses were more likely to have no heating at all in the bathroom, with 64% of all bathrooms in the rented stock not having a heat source, compared to 42% in the owner-occupied stock. Heating is important for helping manage moisture, as warmer air can 'hold' more moisture and warmer surfaces reduce the risk of condensation forming. However, the presence of heating does not necessarily mean the household occupants use it.

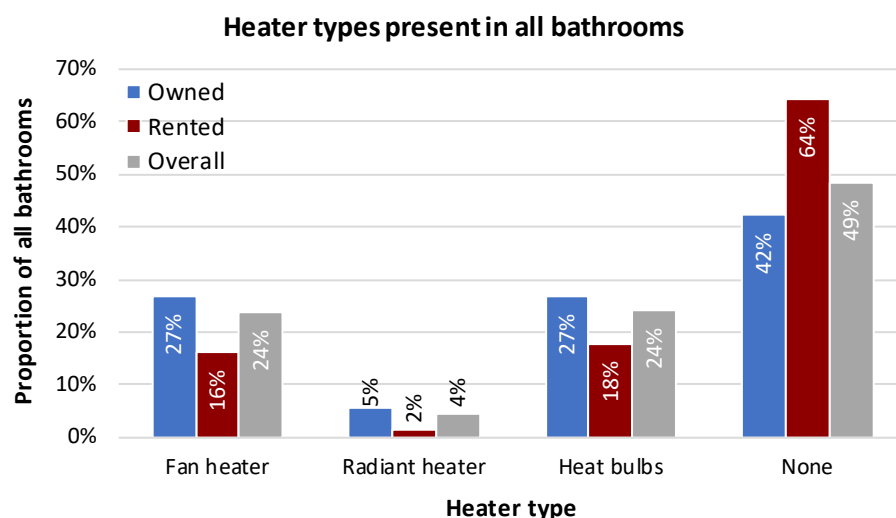


Figure 39. Presence of different heating types in bathrooms (counting only bathrooms with a bath/shower)

5.4 Dehumidifiers

The presence of dehumidifiers was recorded by the surveyor as part of the physical house assessment. These were found in 6% of owner-occupied houses, 2% of rentals, and 5% of houses overall. There was a slightly higher occurrence of mould (any visible mould in the house) and damp (any feel of damp) in houses with a dehumidifier compared to those without. This could be evidence of houses with damp/mould problems using a dehumidifier to help alleviate the problem.

However, these differences are marginal and statistics are based on a very small sample (i.e. 5% of houses surveyed using a dehumidifier). There is also a chance more houses had dehumidifiers, but these were not visible to the surveyor (e.g. stored away for summer months), and hence this may be an underestimate of the prevalence of these appliances. And as with heating, the presence of the appliance does not mean it is being used.

5.5 Windows

Less than one-fifth (19%) of houses surveyed had any double-glazed windows (i.e. 81% of houses surveyed had only single-glazed windows). In over half of those with some double-glazing (11% of all houses) over 90% of all windows were double-glazed (Figure 40). Double-glazing was more common in owner-occupied houses, where 12% were fully or near-fully (over 90%) double-glazed, while 5% had at least half the windows double-glazed.²⁴

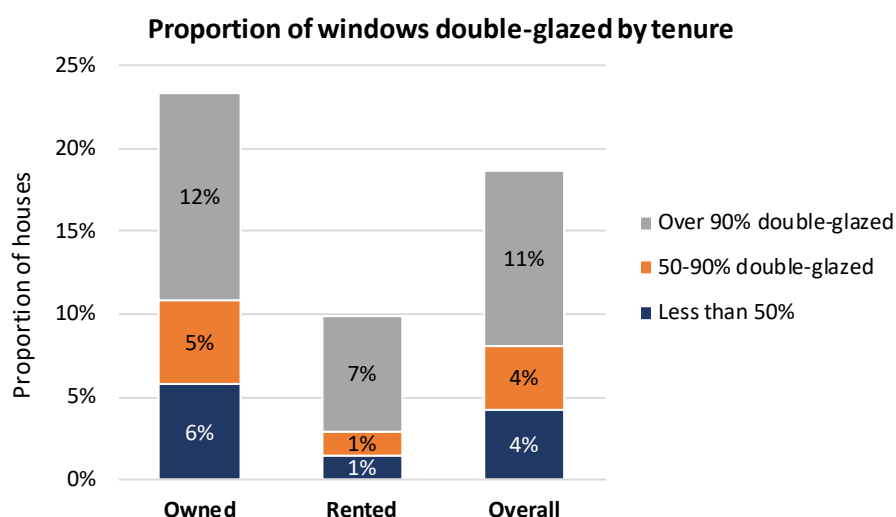


Figure 40. Proportion of houses with double-glazed windows by tenure

House age appears a key factor in the prevalence of double-glazing, with over half (52%) of houses surveyed that were built post-2000 being fully or near-full double-glazed, compared to 5% of houses built before 2000. Double-glazing was also more common in houses in Southland, Dunedin, Christchurch and Canterbury. The latter two could be a factor of both climate zone (building code requirements) and the 2010/11 earthquakes which have resulted in widespread renovations. Double-glazing was least commonly observed in properties in Northland (nearly all fully single-glazed) and Auckland (around 4% fully or near-fully double-glazed, 91% single-glazing only).

5.6 Carports and garages

The House Condition Survey records the presence of all carports and garages. For the former, only carports attached to the house should have been recorded. For garages, the survey differentiates between attached, detached and basement, and what they are being used for (living space, storage, car garage). Only garages that are used for cars have been included in the analysis below.

Overall, just over two-thirds of houses surveyed had a carport or attached or basement garage (Figure 41). The presence of a carport or basement garage was similar for the owned and rented stock, but attached garages were more common in owner-occupied houses, present in one third (33%), compared to 18% of rentals. Attached garages were also more commonly observed in higher income households.

²⁴ The survey did not record the presence of triple glazing nor thermally broken windows.

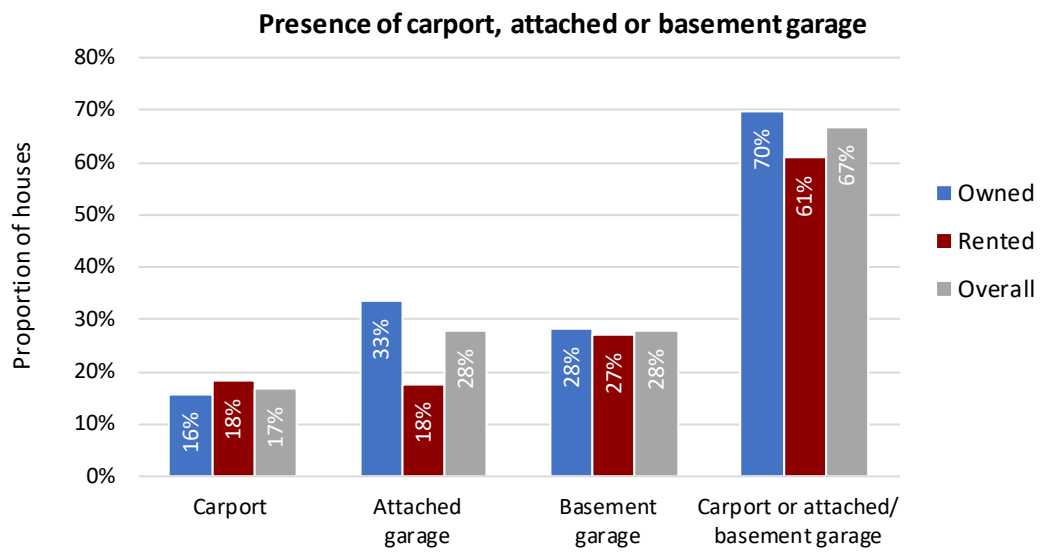


Figure 41. Presence of carports, attached and basement garages

References

- White, V., Jones, M., Cowan, V. & Chun, S. (2017). BRANZ 2015 House Condition Survey: Comparison of house condition by tenure. BRANZ Study Report SR370. Judgeford, New Zealand: BRANZ Ltd.
- White, V. & Jones, M. (2017). Warm, dry, healthy? Insights from the 2015 House Condition Survey on insulation, ventilation, heating and mould in New Zealand houses. BRANZ Study Report SR372. Judgeford, New Zealand: BRANZ Ltd.

Annex A. Appliance-use questionnaire

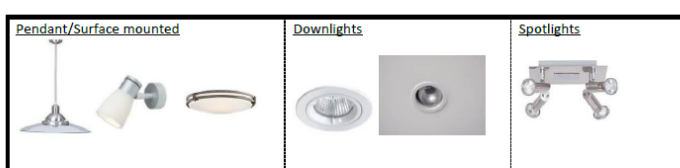
This self-completion (paper), householder questionnaire was a new addition for the 2015/16 House Condition Survey, commissioned by EECA, to record information about the use of different appliances in the home. The extracts below show the relevant sections of the householder appliance-use questionnaire that have been analysed in this report.

Section A: Lighting in the Home

This section of the survey explores the number of different types of light fittings and light bulbs you have in your home. For each of the areas on the page below please go to the room(s) and tell us about the lighting and lightbulbs. *Don't count lamps or lighting that plug into a power point.*

Below are some examples of common fittings and bulbs which may help you with identifying the lighting you have.

Examples of Light Fittings



Examples of Light Bulbs










Area	Which light fitting types do you have in this area (tick all that apply)	Please count the different light bulb types in this area and identify them if you can
1. Living Areas (includes dining, lounge, family rooms) <i>If the rooms are separate rather than open plan then combine the rooms to complete this section.</i>	<input type="checkbox"/> Pendant/surface mounted <input type="checkbox"/> Downlight <input type="checkbox"/> Spotlight <input type="checkbox"/> Other (if any)	Incandescent bulbs _____ halogen bulbs _____ CFL bulbs _____ LED bulbs _____ Bulb type unknown _____
2. Kitchen <i>If the kitchen is separate or you can identify kitchen zone in open plan space then record here. If kitchen lighting is shared with open plan living space then combine in living area above.</i>	<input type="checkbox"/> Pendant/surface mounted <input type="checkbox"/> Downlight <input type="checkbox"/> Spotlight <input type="checkbox"/> Other (if any)	Incandescent bulbs _____ halogen bulbs _____ CFL bulbs _____ LED bulbs _____ Bulb type unknown _____
3. Bedroom(s)	<input type="checkbox"/> Pendant/surface mounted <input type="checkbox"/> Downlight <input type="checkbox"/> Spotlight <input type="checkbox"/> Other (if any)	Incandescent bulbs _____ halogen bulbs _____ CFL bulbs _____ LED bulbs _____ Bulb type unknown _____
4. Bathroom (s)	<input type="checkbox"/> Pendant/surface mounted <input type="checkbox"/> Downlight <input type="checkbox"/> Spotlight <input type="checkbox"/> Other (if any)	Incandescent bulbs _____ halogen bulbs _____ CFL bulbs _____ LED bulbs _____ Bulb type unknown _____
5. Other interior spaces	<input type="checkbox"/> Pendant/surface mounted <input type="checkbox"/> Downlight <input type="checkbox"/> Spotlight <input type="checkbox"/> Other (if any)	Incandescent bulbs _____ halogen bulbs _____ CFL bulbs _____ LED bulbs _____ Bulb type unknown _____

Section D: Refrigeration in the Home

This section of the survey looks at refrigeration. The type and number of fridges and freezers you have, where they are and whether they are in use.

We have provided some illustrations below to help identify some common refrigeration types which can be used as a guide to help you completing the table on the next page.

Examples of refrigeration types

<p><u>Side by side fridge freezer</u></p>  <p>A</p>	<p><u>Vertical fridge/freezer – top freezer</u></p>  <p>B</p>	<p><u>Vertical fridge/freezer – bottom freezer</u></p>  <p>C</p>	<p><u>Vertical freezer only</u></p>  <p>D</p>
<p><u>Vertical fridge only</u></p>  <p>E</p>	<p><u>Chest freezer only</u></p>  <p>F</p>	<p><u>Bar fridge</u></p>  <p>G</p>	

Number	Type of fridge (please circle code for type using pictures above)	Approximately how old is the fridge or freezer	Location (please tick)	Usage (please tick)
Fridge/Freezer 1	<div>A B C D</div> <div>E F G None</div>		<input type="checkbox"/> Kitchen <input type="checkbox"/> Garage <input type="checkbox"/> Other (please specify) _____	<input type="checkbox"/> Always on <input type="checkbox"/> Occasionally on <input type="checkbox"/> Never on
Fridge/Freezer 2	<div>A B C D</div> <div>E F G None</div>		<input type="checkbox"/> Kitchen <input type="checkbox"/> Garage <input type="checkbox"/> Other (please specify) _____	<input type="checkbox"/> Always on <input type="checkbox"/> Occasionally on <input type="checkbox"/> Never on
Fridge/Freezer 3	<div>A B C D</div> <div>E F G None</div>		<input type="checkbox"/> Kitchen <input type="checkbox"/> Garage <input type="checkbox"/> Other (please specify) _____	<input type="checkbox"/> Always on <input type="checkbox"/> Occasionally on <input type="checkbox"/> Never on
Fridge/Freezer 4	<div>A B C D</div> <div>E F G None</div>		<input type="checkbox"/> Kitchen <input type="checkbox"/> Garage <input type="checkbox"/> Other (please specify) _____	<input type="checkbox"/> Always on <input type="checkbox"/> Occasionally on <input type="checkbox"/> Never on
Fridge/Freezer 5	<div>A B C D</div> <div>E F G None</div>		<input type="checkbox"/> Kitchen <input type="checkbox"/> Garage <input type="checkbox"/> Other (please specify) _____	<input type="checkbox"/> Always on <input type="checkbox"/> Occasionally on <input type="checkbox"/> Never on

Section F: Technology and Appliances in the Home

This final section of the survey looks at technology and appliance you may use in your home. *Please only include those you use regularly in your home (ie an average of at least once a week).*

1. Televisions

Design	How many used regularly?	Size (inches)
E.G. Flatscreen	2	32, 50 inches
Flat screen		
Regular (old box shape)		

2. Computer Technology

Type	How many used regularly?
Laptops	
Desktops	
Monitors	
Tablets	
Smart phones	

3. Home entertainment equipment

Type	How many used regularly?
Game consoles	
Home entertainment systems	
Stereos	
Set-top boxes (e.g. Sky/Telstra box)	

4. Appliances in the home

Appliance	How many used regularly?
Washing machine- Front loader	
Washing machine-Top loader	
Clothes dryer	
Dishwasher	
Microwave	
Electric Kettle /Jug	
Coffee Machine	
Toaster	
Rice cooker	
Bread maker	
Range-hood/Extractor fan	
Clock radios	

5. Other

Type	How many used regularly?
Garage door opener	
Swimming pool	
Spa pool	
Sauna	

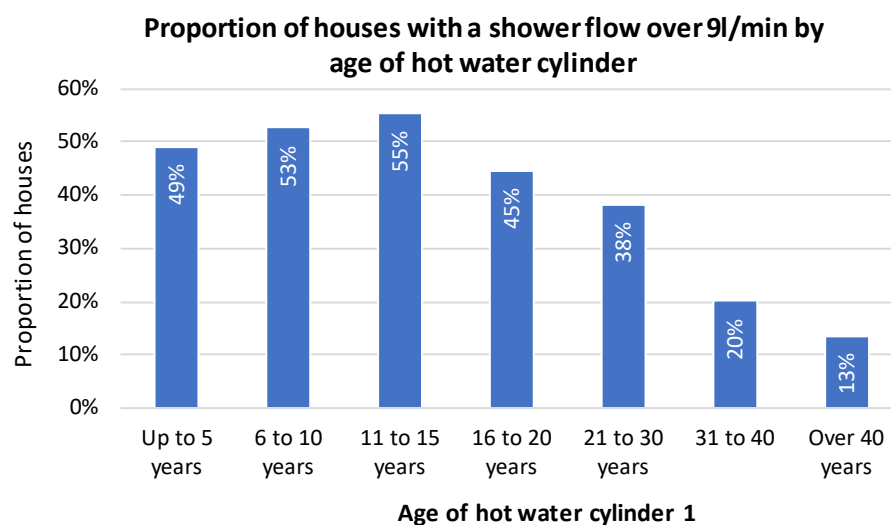
Thank you for your participation. Please return your completed survey to the BRANZ assessor before they leave.

Annex B. Supplementary charts and tables

Hot water systems and showers

Shower flow rates and cylinder age

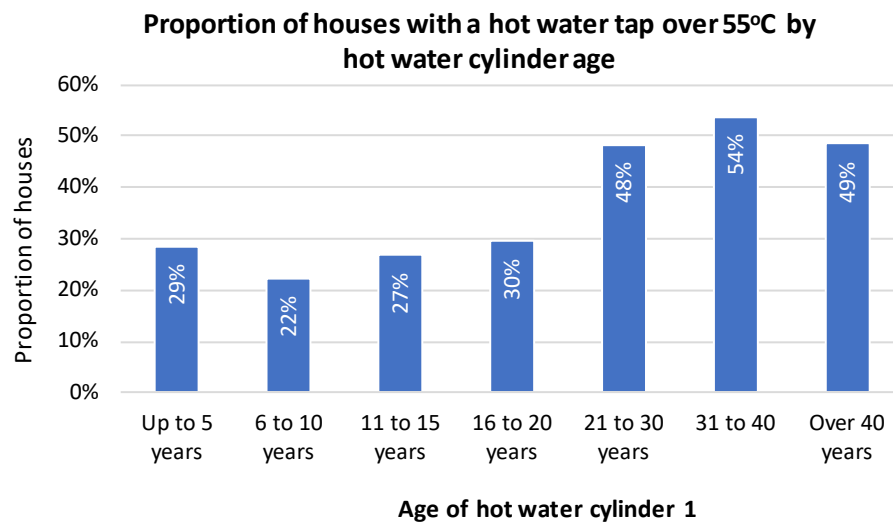
The figure below shows the proportion of houses that had at least one shower over 9 litres per minute by the age of the main hot water cylinder. Some houses had more than one hot water cylinder and therefore there may be some cases where there is a mismatch in the data below – i.e. the main hot water cylinder was not the cylinder that supplied the shower with the flow rate exceeding 9l/min. These cases will be few however and are unlikely to affect the overall trend.



Annex Figure 1. Proportion of houses with shower flow over 9 litre per minute by age of cylinder

Hot water tap temperatures and cylinder age

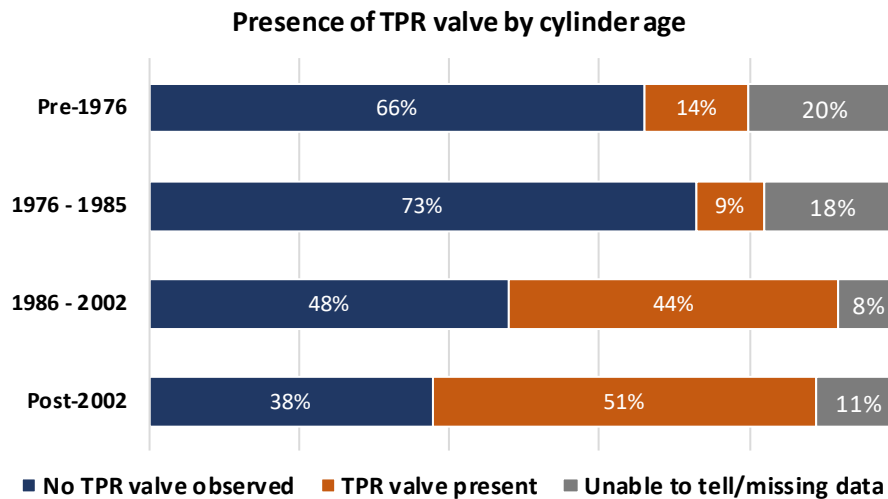
The figure below shows the proportion of houses that had at least one hot water tap over 55°C by the age of the main hot water cylinder. As noted above, some houses had more than one hot water cylinder and therefore there may be some cases where there is a mismatch in the data below – i.e. the main hot water cylinder was not the cylinder that supplied the tap exceeding 55°C. These cases will be few however and are unlikely to affect the overall trend.



Annex Figure 2. Proportion of houses with hot water tap over 55°C by age of cylinder

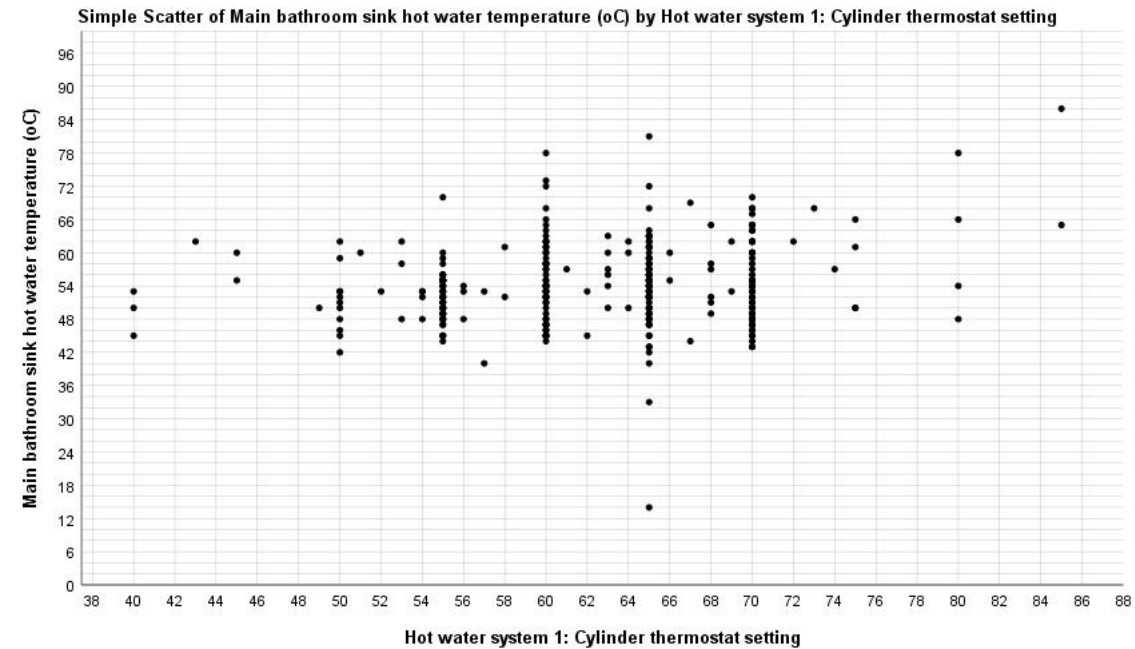
TPR valve and cylinder age

Data below applies to hot water cylinder one. (Base count: houses with at least one hot water cylinder = 89% of houses surveyed).

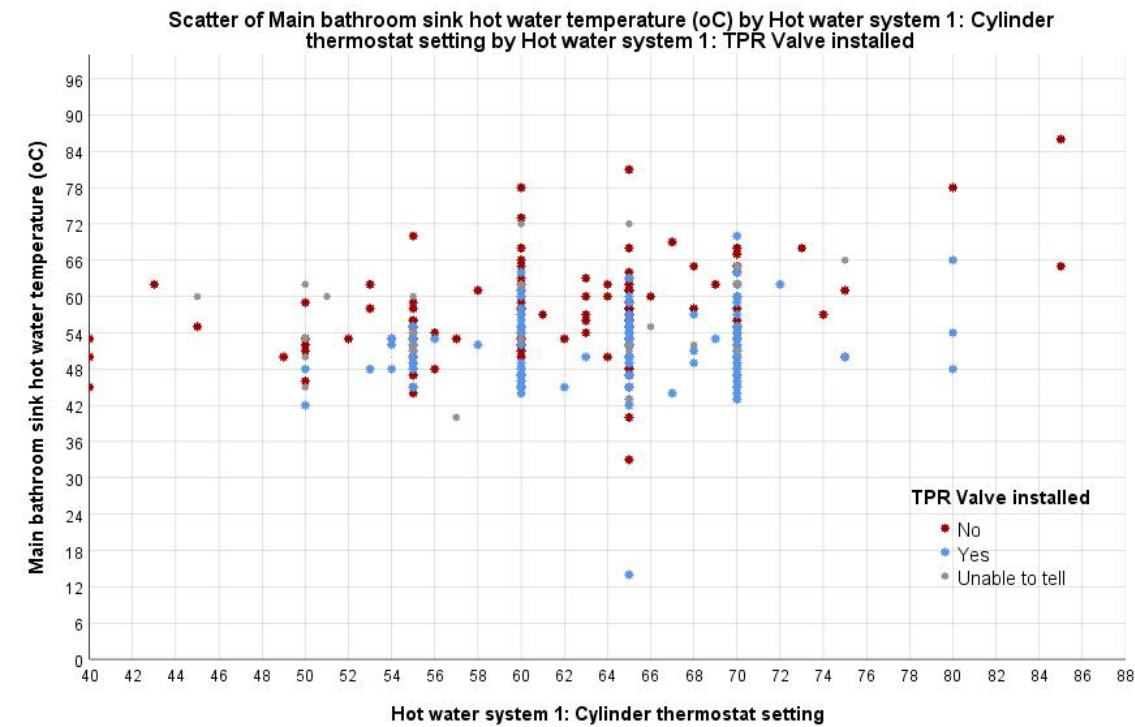


Annex Figure 3. Proportion of houses with TPR valve on hot water cylinder by age of cylinder

Thermostat settings and hot water tap temperature



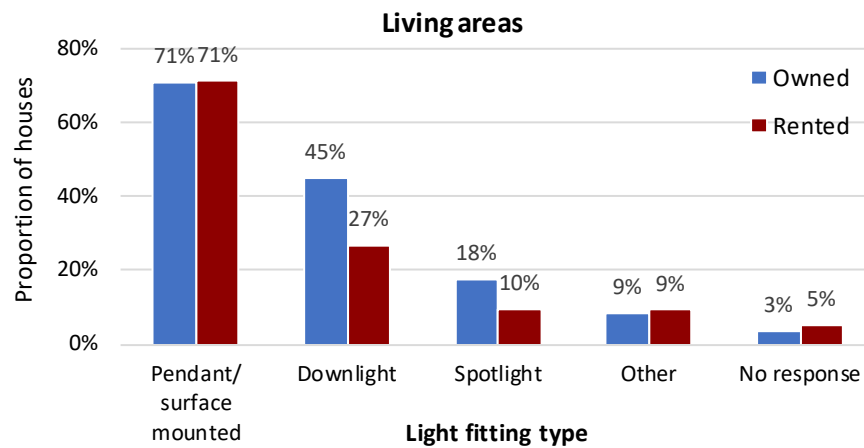
Annex Figure 4. Scatter plot of hot water tap temperature by cylinder thermostat setting



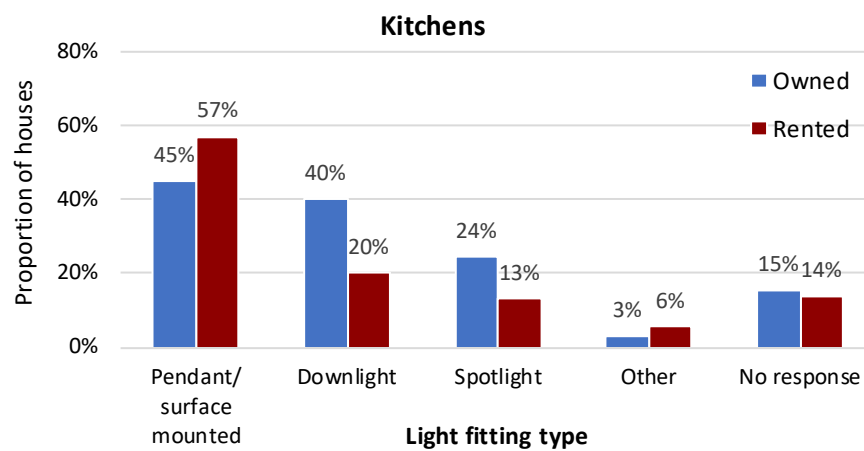
Annex Figure 5. Scatter plot of hot water tap temperature by cylinder thermostat setting and whether TPR valve present

Lighting

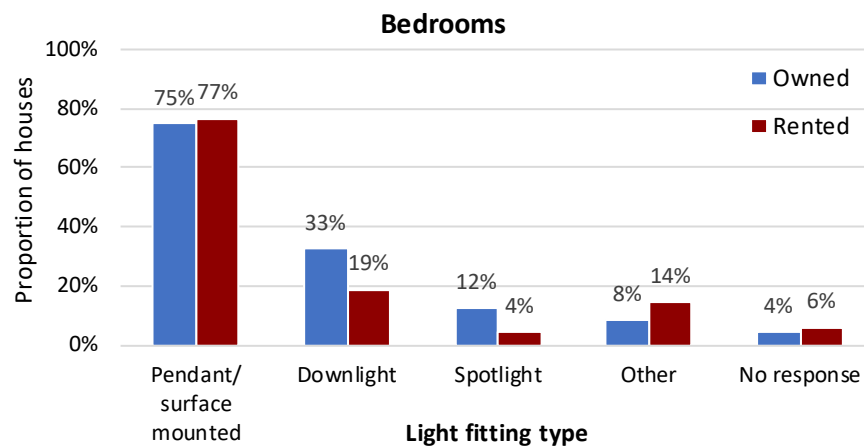
Light fitting types in owned and rental houses



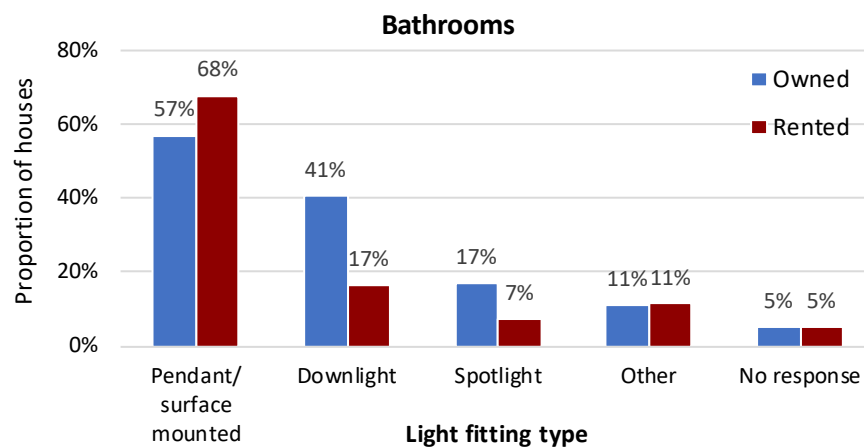
Annex Figure 6. Proportion of owned and rented houses with different light fitting types in living areas



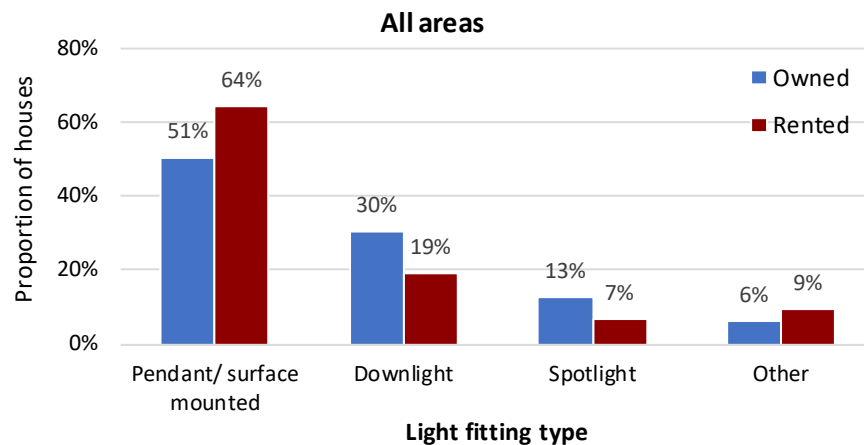
Annex Figure 7. Proportion of owned and rented houses with different light fitting types in kitchens



Annex Figure 8. Proportion of owned and rented houses with different light fitting types in bedrooms

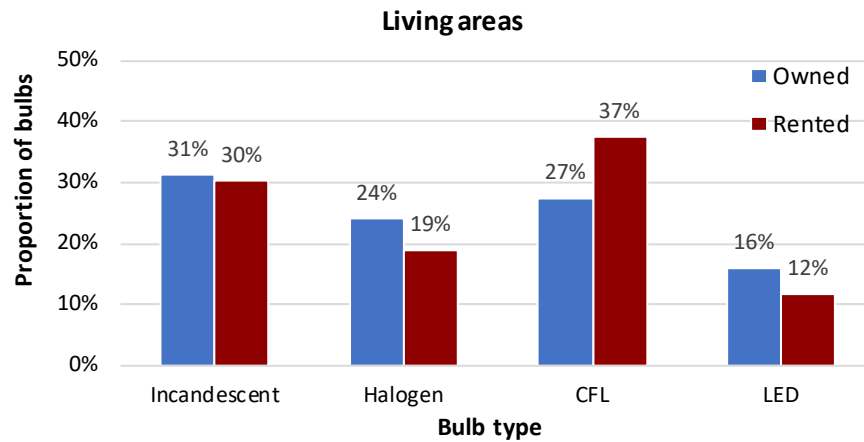


Annex Figure 9. Proportion of owned and rented houses with different light fitting types in bathrooms

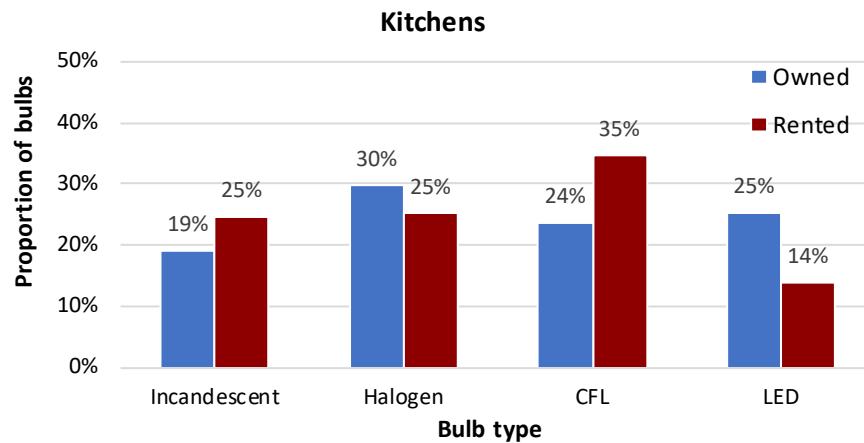


Annex Figure 10. Proportion of owned and rented houses with different light fitting types overall

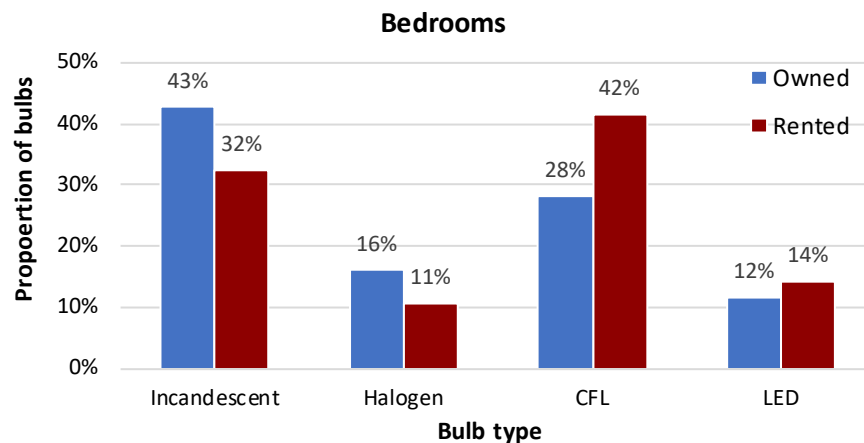
Light bulb types in owned and rental houses



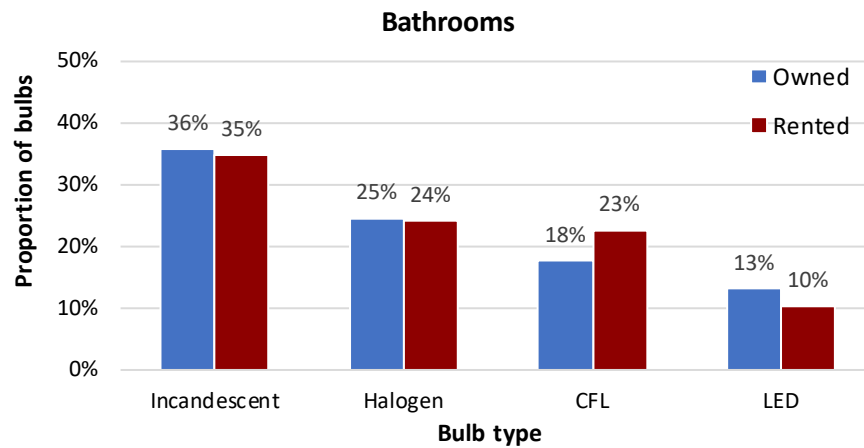
Annex Figure 11. Proportion of different light bulb types in living areas in owned and rented houses



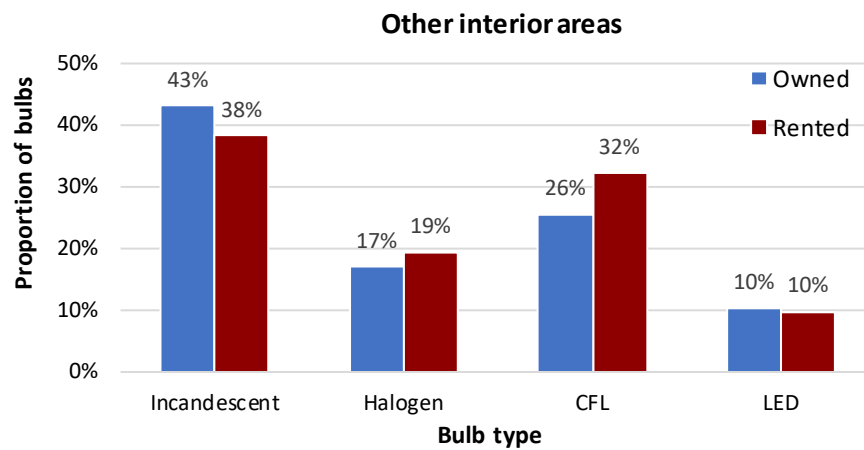
Annex Figure 12. Proportion of different light bulb types in kitchens in owned and rented houses



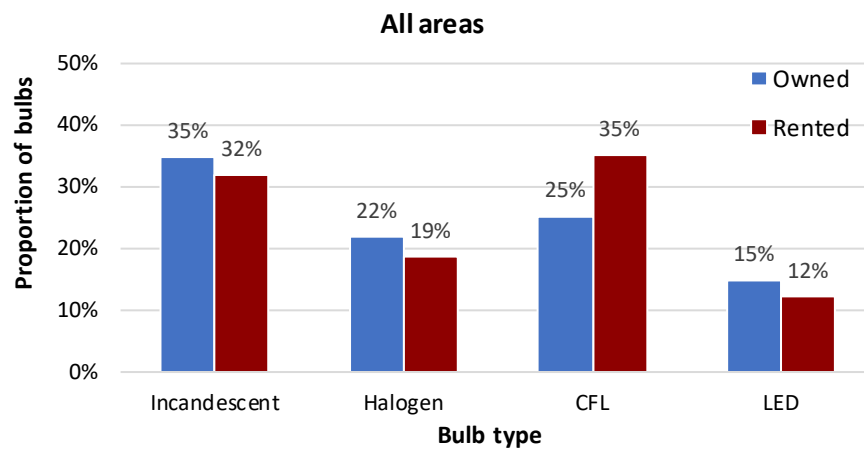
Annex Figure 13. Proportion of different light bulb types in bedrooms in owned and rented houses



Annex Figure 14. Proportion of different light bulb types in bathrooms in owned and rented houses

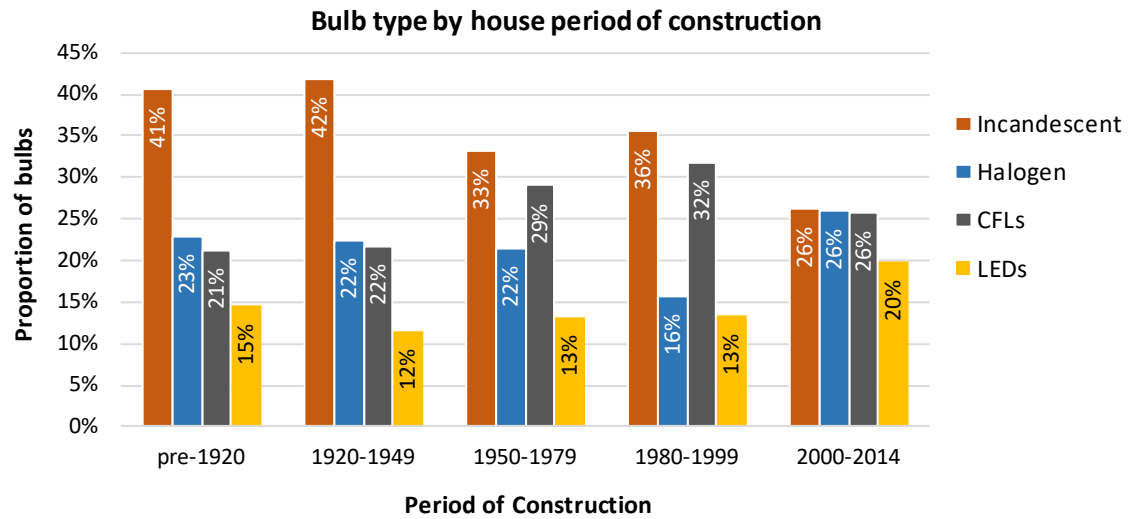


Annex Figure 15. Proportion of different light bulb types in other areas in owned and rented houses



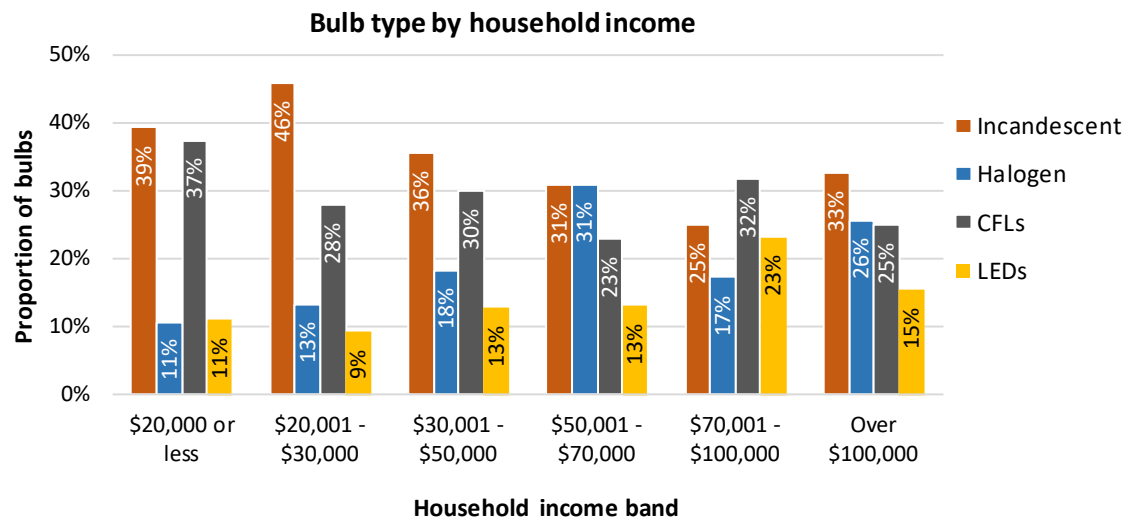
Annex Figure 16. Proportion of different light bulb types overall in owned and rented houses

Bulb type by house age



Annex Figure 17. Proportion of different light bulb types by house age

Bulb type by household income



Annex Figure 18. Proportion of different light bulb types by household income

Appliances

Refrigeration appliance type

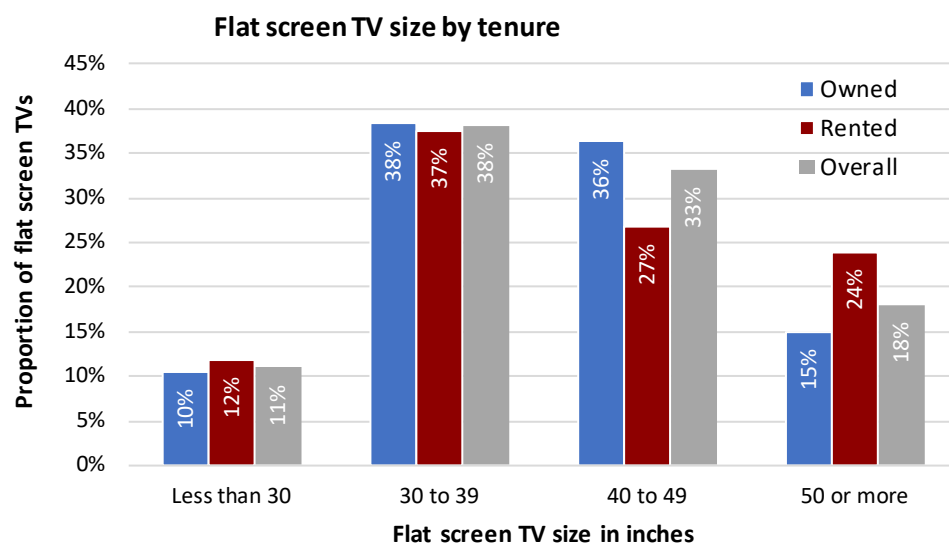
Annex Table 1. Mean number of each refrigeration type by tenure and overall

	Owned	Rented	Overall
Side-by-side	0.1	0.0	0.1
Vertical - top freezer	0.3	0.3	0.3
Vertical - bottom freezer	0.7	0.7	0.7
Vertical freezer only	0.3	0.1	0.2
Vertical fridge only	0.2	0.1	0.2
Chest freezer	0.4	0.3	0.4
Bar fridge	0.1	0.0	0.1
<i>Total fridges</i>	<i>2.1</i>	<i>1.6</i>	<i>1.9</i>

Flat screen TV sizes by tenure

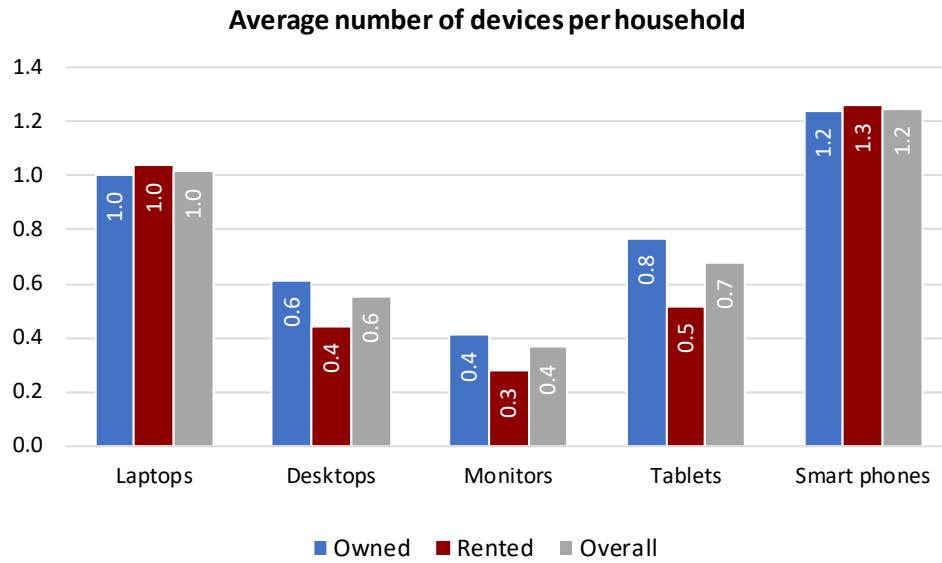
Annex Table 2. Size of flat screen televisions in owned and rented houses

	Owned	Rented	Total
Count of TVs	1,260,000	620,000	1,880,000
Mean size	38.0	38.3	38.1
Median size	40	40	40
Minimum size	12	11	11
Maximum size	84	65	84

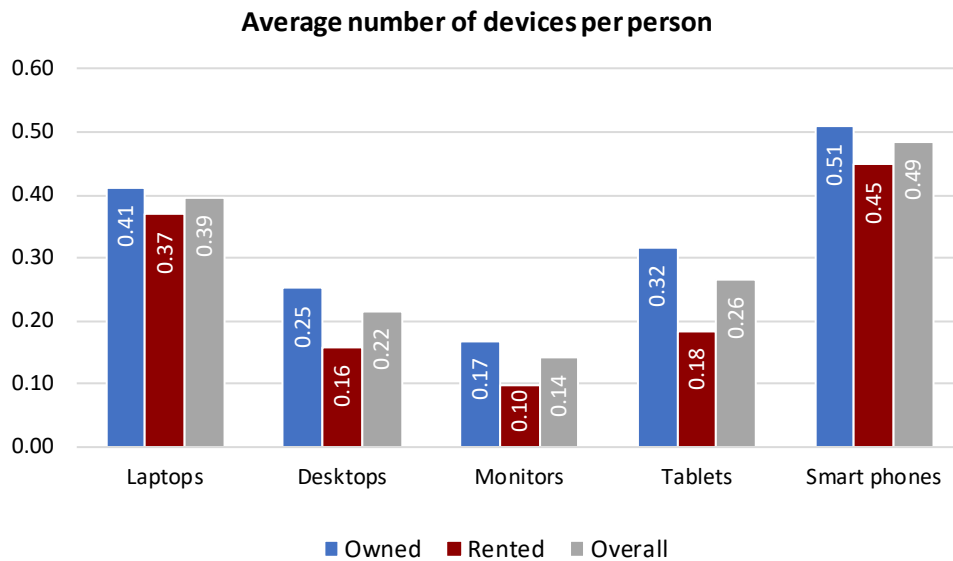


Annex Figure 19. Distribution of flat screen television size in owned and rented houses

Number of appliances per household and per capita

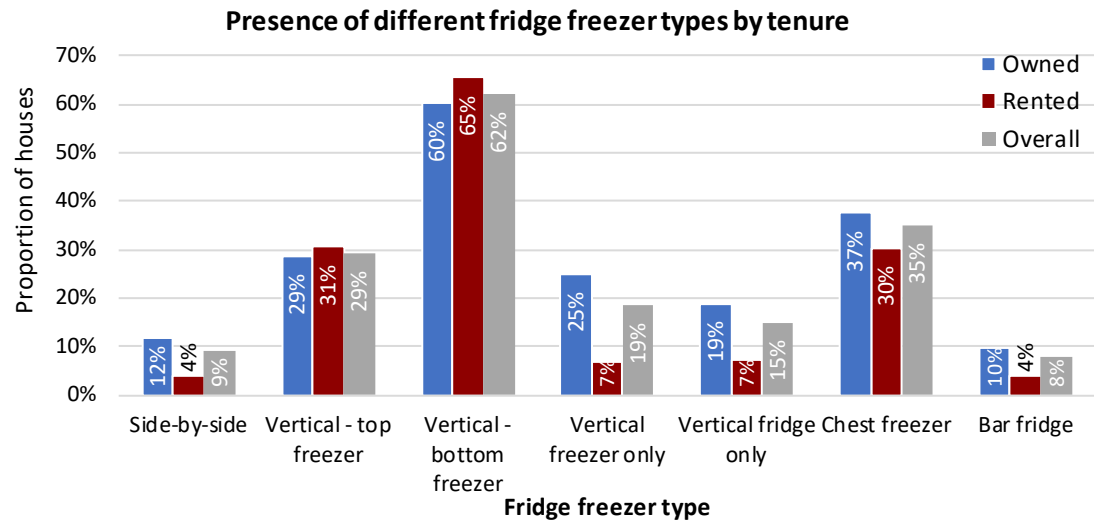


Annex Figure 20. Average number of different devices per household by tenure and overall



Annex Figure 21. Average number of different devices per person by tenure and overall

Presence of different fridge freezer types



Annex Figure 22. Proportion of owned and rented houses with different refrigeration appliances (each appliance counted once regardless of whether there was more than one in the dwelling)