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Appendix A: Energy High User Working Paper - Preliminary Analysis of Telephone Survey Data

Final

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About This Report

Title

Appendix A: Energy High User Working Paper - Preliminary Analysis of Telephone Survey Data

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Abstract

Abstract here

Reference

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Contents

1	Introduction.....	5
2	Beacon’s Energy Research	5
3	Purpose of the High Energy User Survey	6
4	Method.....	6
5	Survey Participants: Socio-demography & Dwelling Characteristics	7
6	The Energy Efficiency of High Energy Users’ Dwellings	11
7	Renovation and Retrofit Activities	20
8	Awareness & Attitudes to Retrofitting	24
9	Some Implications for Beacon and Retrofit	29
10	Annex A: High Energy Users Survey	31

Tables

Table 1: Age Profile of High Energy User Householders.....	8
Table 2: Annual Household Income Profile of High Energy User Respondents	8
Table 3: Household Size Profile of High Energy User Respondent Dwellings	9
Table 4: Bedroom Profile of High Energy User Respondent Dwellings	10
Table 5: Dwelling Type of High Energy Users.....	10
Table 6 Householders' Assessment of Likely Reasons for Their Household's High Energy Use (n=700)	11
Table 7 Energy Issues Considered When Buying, Building or Renting Current House (n=700)	12
Table 8: Reported Insulation Profile of High Energy Users' Dwellings.....	14
Table 9: Space Heating Used in Dwellings.....	16
Table 10: Appliances Used for Cooling in Summer*	17
Table 11 Fuels Used for Heating Hot Water*	17
Table 12: Main Source of Hot Water Heating Where Multiple Fuels Used	18
Table 13: Age of Hot Water Cylinder	18
Table 14: Hot Water Cylinder Wrapping	19
Table 15: Hot Water Cylinder Pipe Lagging.....	19
Table 16: Renovation & Retrofitting Activities and Intentions for High Energy User Households	20
Table 17: Expenditure on Renovation and Retrofit Activities	21
Table 18: Householder Assessed House Condition	22
Table 19: High Energy Users Trying to Reduce Cold, Damp and Mould (n=252)	23
Table 20: Activities Identified by High Energy Users as Associated with Retrofit (n=196).....	24
Table 21: Preferred Low Emission Heating Appliances	25
Table 22: Benefits of Retrofit Activities Identified by High Energy Users (n=700)	26
Table 23: Attitudes and or Activities of High Energy Users in Relation to Retrofitting their Current House.....	26
Table 24: Barriers to Undertaking Retrofit (n= 644)	27
Table 25: Likelihood of High Energy Users Improving Energy Efficiency in Their Homes by Selected Prompts	27
Table 26: Amount Willing to Spend on Measures Identified to Improve Energy Efficiency	28

Figures

Figure 1 Proportion of Windows Double Glazed for Dwellings (n=83).....	15
Figure 2 Proportion of Draughty Windows/Doors for Dwellings with Draughts (n=409)	15

1 Introduction

- 1.1 This working paper provides a preliminary analysis of the data generated by a telephone survey of 700 householders that define themselves as either high or very high energy users.¹ This survey has been undertaken as one component of Beacon Pathway's energy research programme. That programme seeks to transform the energy efficiency of New Zealand's residential built environment. This working paper is designed to be an input into the team's deliberations and is intended to provide the basis for future public reporting.
- 1.2 The paper is structured as follows:
- Section 2 positions the High Energy User Survey in the context of Beacon's Energy Research Programme.
 - Section 3 sets out the purpose of the High Energy User Survey.
 - Section 4 sets out the survey methods including the survey instrument, the sampling and the analysis.
 - Section 5 presents the data related to the socio-demographic characteristics of the participants in the survey and the dwelling characteristics of participant dwellings.
 - Section 6 considers the data related to the energy efficiency of dwellings, and identifies the extent of statistically significant associations between dwelling or household characteristics and energy efficiency characteristics.
 - Section 7 presents data relating to participant renovation and retrofit activities and intentions.
 - Section 8 presents data relating to participant attitudes to retrofit.
 - Section 9 provides a preliminary comment on the implications of these findings for Beacon.
- 1.3 The data presented in this working paper should not be released beyond the research team and the Research Guidance Committee. The database is still in the review phase. The data has, however, been cleaned.

2 Beacon's Energy Research

2.1 Beacon's current research on energy is directed to a market transformation that will ensure that both suppliers and consumers act to improve the energy efficiency of New Zealand's housing stock. The Energy Retrofits - Best Practice research recognises that improving the energy performance of the housing stock is primarily a matter of changing the performance of the existing stock through retrofitting. The research overall involves:

- establishing the relationship between retrofit and building typology

¹ *By energy use, most respondents mean electricity use, although some with 'billed' gas supply also include gas.*

- identifying how to stimulate take-up among key consumers in the housing market, and
- identifying a set of evidence-based, robust retrofit promotional approaches, packages and tools.

The key research questions for Workstrand 2 (the context of this High Energy User Survey) are:

- What user/consumer segments are best targeted to achieve maximum take-up of energy efficiency retrofits of New Zealand homes?
- What are the motivations of these user segments and how should they be targeted?
- Are there common features of building typology of the priority user segments?
- What benefits do other end-users in the supply chain gain through retrofit?

3 Purpose of the High Energy User Survey

3.1 The High Energy Users Survey is one of three surveys to be undertaken which focus on energy and retrofit take-up in key consumer segments in the housing market. The focus of the surveys is to establish the perceptions, awareness and motivations of home owners in relation to the energy-related performance of their homes.

3.2 The High Energy Users Survey is important because this group constitutes the primary portion of residential energy use. Increasing their energy use efficiency and, preferably aggregate, energy use is critical to improving the overall energy performance of the residential housing stock. The Centre for Research, Evaluation and Social Assessment (CRESA) has established in a recent survey for EECA that those households that see themselves as high or very high energy users generally are so. They may make up between 15 and 25 percent of households. That is, between 200,000 and 350,000 households in New Zealand.²

4 Method

4.1 Data was collected from self-identified high energy use households through a national telephone survey using a structured questionnaire of predominantly close-ended questions. The questionnaire was developed by CRESA and includes a number of questions from previous research projects in the energy and retrofit areas. A copy of the questionnaire is presented in Annex A.

4.2 A specialist telephone survey company was commissioned to undertake the telephone interviewing and supply the raw data to CRESA for analysis. Participants for the survey

² *Saville-Smith, K. and R. Fraser (2007) Analysis Report on Telephone and Physical Survey Data, Report prepared for East Harbour, CRESA Ltd, Wellington.*

were selected randomly from throughout New Zealand using telephone numbers extracted from white pages listings. Interviewing was undertaken over a two week period from 12 October 2007 to 26 October 2007. An initial screening question asked respondents to estimate their energy consumption compared to other households – only those respondents who estimated their household energy consumption as high or very high were eligible to complete an interview.

- 4.3 In all 700 interviews were completed and assuming that the sample has captured high energy users, it provides a margin of error of ± 3.8 percentage points at the 95 percent confidence interval. The issue of whether it can be concluded that this population is indeed a high energy user population is addressed in Section 5.
- 4.4 The data from the survey has been entered and analysed in the Statistical Package for the Social Sciences (SPSS). For the purpose of this working paper, data has been subject to univariate and bivariate analysis. Statistical testing – usually chi-square tests – was also undertaken to establish whether there was systematic and statistically significant relationships between selected key variables.

5 Survey Participants: Socio-demography & Dwelling Characteristics

- 5.1 In this section we present socio-demographic and dwelling characteristics of the participants in the survey compared, where possible, to the national profile of households. We also comment on the representativeness of the sample and the generalisability of the findings.

Socio-demographic Characteristics of High Energy Users

- 5.2 The survey collected socio-demographic data related to:
- householder age
 - household income
 - household size
 - dependent household members.
- 5.3 The largest single category of high energy use householders were those aged 41 years to 50 years. Almost two-thirds of respondent householders were aged 50 years or less (Table 1). This data cannot be compared to the national age profile of householders at this stage. Because we have disaggregated the age categories below the standard reporting of census data, a customised table of disaggregated age data from the 2006 census will need to be requested from Statistics New Zealand.

Table 1: Age Profile of High Energy User Householders

Ages	High Energy User Survey Respondents	
	n	%
24 years and under	22	3.2
25-30 years	46	6.6
31-40 years	166	23.8
41-50 years	203	29.1
51-60 years	111	15.9
61-65 years	46	6.6
66 years or over	103	14.8
<i>Total</i>	<i>697</i>	<i>100</i>

* 3 missing cases

5.4 There appears to be some differences between the household income of the survey participants and the national population. Among the survey participants there is a very slight under-representation of low income groups and some more pronounced over-representation of high income groups among the high energy users. Around twenty-two percent of the survey respondents reported household incomes in excess of \$100,000 compared to 16.2 percent of the households reported in the 2006 census (Table 2). This is consistent with the sample being of a high energy use set of households.

Table 2: Annual Household Income Profile of High Energy User Respondents

Compared to the 2006 Census

Annual Household Income	Respondent Households		2006 Census	
	n	%	n	%
\$20,000 or Less	85	12.1	200,790	13.8
\$20,001 - \$30,000	62	8.9	155,661	10.7
\$30,001 - \$50,000	114	16.3	238,431	16.4
\$50,001 - \$70,000	107	15.3	197,868	13.6
\$70,001 - \$100,000	123	17.6	189,720	13.0
\$100,001 or More	155	22.1	235,644	16.2
Not Stated	54	7.7	235,992	16.2
<i>Total</i>	<i>700</i>	<i>100</i>	<i>1,454,106</i>	<i>100</i>

5.5 The average household size of respondent households was 3.4 people. Table 3 compares the household size of the respondents with the national profile of household size apparent in the 2006 census. Among the surveyed households there is over-representation of larger households. This too is consistent with the households self-reporting as high energy users.

Table 3: Household Size Profile of High Energy User Respondent Dwellings

Compared to the 2006 Census

Household size	Respondent Dwellings		2006 Census	
	n	%	n	%
1 person	79	11.4	328,313	22.6
2 person	178	25.6	494,044	34.0
3 person	106	15.2	240,291	16.5
4 person	179	25.7	221,667	15.2
5 or more people	154	22.1	169,860	11.7
<i>Total</i>	<i>696</i>	<i>100</i>	<i>1,454,175</i>	<i>100</i>

* 4 missing cases

Number of Bedrooms

5.6 Only one dwelling characteristic was collected in the survey that can be standardised with and compared to the 2006 census. That is, the number of bedrooms in the dwelling.

5.7 As Table 4 shows that the majority of dwellings (72.9 percent) in the sample are either 3- or 4- bedroom houses. This is consistent with the national profile. However, those surveyed are more likely to cluster in larger dwellings compared to the national household profile. This is consistent with other research that shows high energy users tend to be in larger dwellings.

5.8 The Household Energy End-use Project (HEEP) has already shown that higher energy consumption is associated with larger dwellings.³ That finding is also consistent with surveying undertaken by CRESA in 2007, which found the 13 percent of households described themselves as ‘very high’ or ‘higher than average’ energy users were over-represented among the dwellings with 5 or more bedrooms.⁴

³ Isaacs, N.P et.al. (2005) *Energy Use in New Zealand Households: Report on the Year 9 Analysis for the Household Energy End-use Project (HEEP) BRANZ Ltd Study Report 141, Judgeford, Porirua.*

⁴ Saville-Smith, K. and R. Fraser (2007) *Analysis Report on Telephone and Physical Survey Data, Report prepared for East Harbour, CRESA Ltd, Wellington.*

Table 4: Bedroom Profile of High Energy User Respondent Dwellings

Compared to the 2006 Census

Household size	Dwellings		2006 Census	
	n	%	n	%
1 bedroom	16	2.3	81,246	5.8
2 bedrooms	75	10.7	278,145	19.8
3 bedrooms	300	42.9	651,066	46.3
4 bedrooms	210	30.0	303,804	21.6
5+ bedrooms	99	14.1	91,902	6.5
<i>Total</i>	<i>700</i>	<i>100</i>	<i>1,406,163</i>	<i>100</i>

Dwelling Construction and Typology

5.9 Just under half (42 percent) of the participants reported that their houses were built on concrete slabs. Almost two-thirds of the dwellings were stand-alone, fully detached, single-storey dwellings (64.3 percent). Only 4.0 percent were semi-detached dwellings (Table 5). There were a small number of apartments and eighteen dwellings were part of a block of flats.

Table 5: Dwelling Type of High Energy Users

Dwelling Type	Dwellings	
	n	%
A detached single-storey house	450	64.4
A detached multi-storey house	185	26.5
A semi-detached single-storey house	20	2.9
A purpose built flat or a flat in a converted building	18	2.6
A semi-detached multi-storey house	8	1.1
Other	8	1.1
An apartment (in a block two or more storeys high)	6	0.9
A terrace house	4	0.6
<i>Total</i>	<i>699</i>	<i>100.1</i>

* 1 missing cases

Sample Representativeness

- 5.10 Although the sample shows some deviation from the socio-demographic and dwelling characteristics of New Zealand’s population in the 2006 Census, those differences are consistent with a sub-population of high energy users. HEEP data and 2007 survey data show that high energy users tend to live in larger dwellings and have higher incomes.
- 5.11 The sample generated by this high energy user survey shows those tendencies. As such, the sample appears to be well targeted and the findings generalisable to high energy use households. The margin of error for the high energy use dwelling populations is ± 3.8 percentage points at the 95 percent confidence interval.

6 The Energy Efficiency of High Energy Users’ Dwellings

- 6.1 This section presents three different sorts of data related to the energy efficiency of high energy users’ dwellings. They are:
- Data related to householder perception of energy use.
 - Householders energy expenditure data.
 - Data related to the characteristics of dwellings known to be associated with dwelling efficiency.

Householder Perceptions

- 6.2 All the respondents in this survey identified their household as very high or high users of energy. Over a third (35.3 percent) of high energy users reported that their high energy use was associated with heating. A slightly larger proportion (37.1 percent) attributed some of their high energy use to running a large number of appliances in the house. Eighteen percent of high energy user householders associated their high energy use with household members being wasteful of energy (Table 6).

Table 6 Householders’ Assessment of Likely Reasons for Their Household’s High Energy Use (n=700)

Reasons	Respondents	
	n	%
Large number of appliances	260	37.1
Our house takes a lot of energy to heat	247	35.3
Household members are wasteful with energy	126	18.0
House has many lights	46	6.6

We have old hot water tanks	30	4.3
We have many hot water tanks	20	2.9
Our house takes a lot of energy to cool	5	0.7
Don't know	37	5.3

* Multiple response

6.3 Respondents were asked whether they considered the set of energy related issues set out in Table 7 when they bought, built or rented their current dwelling. A substantial minority (26.7 percent) considered none of the issues listed. Moreover, while over half (59.9 percent) considered the dwellings' warmth or comfort, less than half considered whether the dwelling exhibited basic characteristics if an energy efficient and comfortable house such as:

- insulation (47.4 percent)
- draught proofing (35 percent)
- double-glazing (15.3 percent).

Table 7 Energy Issues Considered When Buying, Building or Renting Current House (n=700)

Energy issues	Respondents	
	n	%
Your comfort or warmth within the house	419	59.9
Whether it had insulation in the roof space or under the floor	332	47.4
Whether the windows and doors were tight fitting or draught-proofed	245	35.0
What the energy bill might be like	157	22.4
Whether it had double glazing	107	15.3

* Multiple response

Energy Expenditure

6.4 While energy expenditure data has been collected, household expenditure, as a measure of energy consumption or energy efficiency, has both problems of validity and problems of reliability. With regard to validity, energy efficiency is properly measured when the outputs of energy are calculated relative to the inputs/costs of energy. Energy costs, consequently, provide for only one component of energy efficiency.

- 6.5 Energy cost data must also be treated with caution because of reliability problems. Monthly energy costs vary seasonally. They are also subject to change due to unit price changes rather than consumption changes. Pricing differences can also account for regional variations. In short, price does not always provide a reliable surrogate indicator for energy consumption. Nevertheless, price can be such an important modifier of consumption as well as a driver of fuel poverty, having an understanding of price exposure is important.
- 6.6 To increase the reliability of the price data collected in the survey, participants were asked to report their previous month's electricity bill. It will, of course, be recognised that not all energy consumption is restricted to electricity although this is by far the dominant form of household energy use within dwellings.
- 6.7 The average electricity bill reported by participants in the previous month was \$282.45. The median was \$250. This appears to be consistent with these energy users being above average. By way of contrast, a 2007 on-site dwelling survey found that the average monthly winter energy bill in 2006 was \$241.04. Despite the relatively high expenditure pattern among the surveyed high users, only a small proportion of these participants have electricity expenditure in excess of 10 percent of their gross monthly household income.⁵ This is because of the relatively higher household incomes of high energy users.

Dwelling characteristics

- 6.8 Another way to assess the energy efficiency of dwellings is to consider the adequacy of dwelling components associated with energy performance. The energy efficiency of dwellings is associated with:
- The integrity of the thermal envelope. In particular:
 - insulation
 - glazing systems
 - draughts and gaps
 - How householders heat or cool and the level of comfort they seek through heating or cooling.
 - The efficiency and type of water heating householders use.
 - Householders use of energy efficient lighting.

Insulation

- 6.9 The majority (77.1 percent) of participants reported that they had insulation in their roof space. Less than half (47.3 percent) reported exterior wall insulation.⁶ Around a quarter (26.7 percent) of participants reported under floor insulation (Table 8). In all, only 15.9

⁵ *A common measure of fuel poverty*

⁶ *This is about the same proportion as in CRESA's 2007 survey.*

percent of participants reported insulation in the roof space, in exterior walls and under floor – i.e. that their house was fully insulated.⁷

Table 8: Reported Insulation Profile of High Energy Users' Dwellings

Insulation	Dwellings	
	n	%
No insulation	93	13.3
Roof space only	181	25.9
Floors only	8	1.1
External walls only	19	2.7
Roof space and floor	58	8.3
Roof space and exterior walls	190	27.1
Floor and exterior walls	10	1.4
Fully insulated	111	15.9
Not sure	30	4.3
<i>Total</i>	<i>700</i>	<i>100</i>

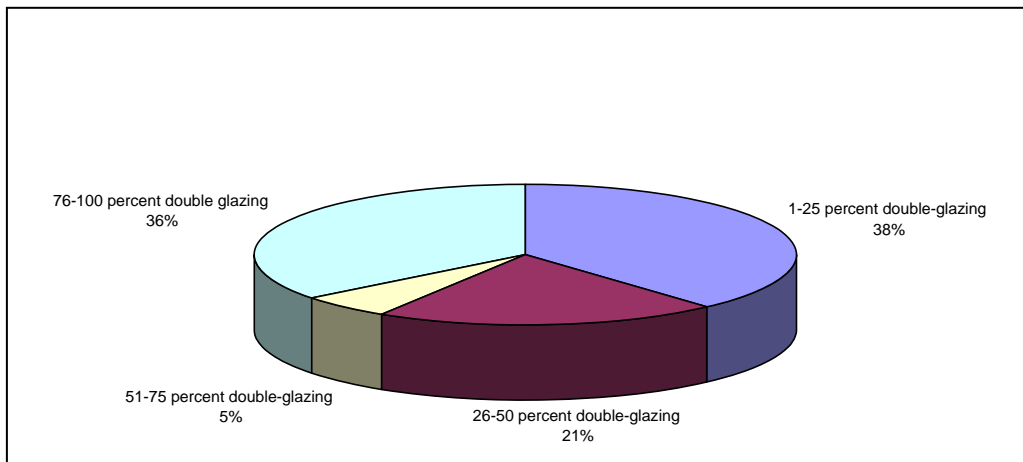
6.10 Some participants are unsure of the current insulation levels in their dwelling. There is least certainty about wall insulation. Only 8.4 percent of participants did not know whether their roof is insulated, but 15.9 percent reported not knowing whether the external walls were insulated and 10.7 percent reported not knowing about their underfloor insulation.

⁷ Saville-Smith, K. and R. Fraser (2007) *Analysis Report on Telephone and Physical Survey Data, Report prepared for East Harbour, CRESA Ltd, Wellington*

Double-glazing

6.11 A minority (11.9 percent) of participants reported some level of double glazing. Almost half of those respondents reported that double glazing was used in less than 50 percent of their dwelling’s windows (Figure 1).

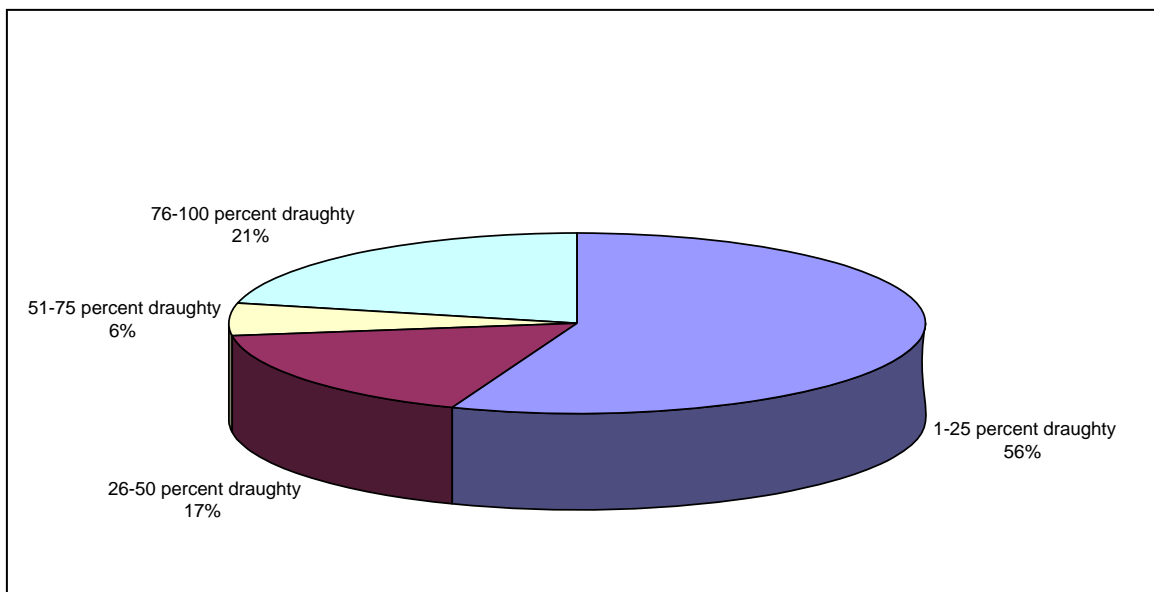
Figure 1 Proportion of Windows Double Glazed for Dwellings (n=83)



Draughts

6.12 A considerable proportion of participants (58.4 percent) report that they have draughty windows or doors. As Figure 2 shows, more than a quarter of those participants reported that over half of their doors and windows are draughty.

Figure 2 Proportion of Draughty Windows/Doors for Dwellings with Draughts (n=409)



Heating

6.13 Electric heaters such as fan, bar, convection or night store heaters are most likely to be reported by participants as a source of space heating. As Table 9 shows, around two-fifths of the survey participants report that they use fixed electric heaters, with similar proportions using portable electric heaters and just under a third using enclosed wood burners.

Table 9: Space Heating Used in Dwellings

Heater Type	Heater Used*		Heater Mainly Used for Heating	
	n	%	n	%
Electric heater e.g. fan, bar, convection heater	278	39.7	105	15.0
Fixed electric radiator or oil column heater	273	39.0	80	11.4
Enclosed woodburner	212	30.3	158	22.6
Portable gas heater e.g. LPG	146	20.9	64	9.1
Heat pump	127	18.1	109	15.6
Fixed and flued gas heater	92	13.1	66	9.4
Open fire	78	11.1	40	5.7
Underfloor heating	55	7.9	21	3.0
Fixed unflued gas heater	50	7.1	23	3.3
Other	32	4.6	25	3.6
No heating used	9	1.3	9	1.3
<i>Total</i>			<i>700</i>	<i>100</i>

* Multiple response

6.14 Only 44.7 percent of high energy user households reported that their dwellings were consistently warm enough. Just over a third (36.6 percent) of households reported being warm enough most of the time. A small minority (4.5 percent) reported never achieving comfortable warmth and 13.7 percent of high energy user households reported being warm enough only some of the time.

6.15 Despite the overall satisfaction with temperature much of the time, there are indications that these dwellings are affected negatively by low temperatures and moisture. Almost a quarter (22 percent) of dwellings have mould in at least one bedroom, and around 12

percent of dwellings have mould in a bathroom. Overall, 313 dwellings (44.7 percent) are reported as having at least one room affected by mould.⁸

Cooling

6.16 Overall, over half (56.4 percent) of participants reported that they used summer cooling devices. The most common of those was a fan (41.7 percent) followed by small proportions of people using heat pumps (11.4 percent), dehumidifiers (11.0 percent) and air conditioning (5.1 percent) (Table 10).

Table 10: Appliances Used for Cooling in Summer*

Cooling Appliance	Respondents (n=700)	
	n	%
Fans	292	41.7
Heat pumps	80	11.4
Dehumidifier	77	11.0
Air conditioning	36	5.1
No cooling appliances used	305	43.6

* Multiple response

Hot Water

6.17 Most participants report a single mode of heating water. As Table 11 shows, the predominant method of water heating is electricity. Ninety-two dwellings were reported as using no electricity for hot water heating. Of the electricity users, five dwellings had no electric hot water cylinder.

Table 11 Fuels Used for Heating Hot Water*

Source of Water Heating	Respondents (n=700)	
	n	%
Electricity	593	84.7
Gas	123	17.6
Wood wetback	84	12.0
Solar	22	3.1

* Multiple response

⁸ Note also that a considerable proportion of householders have attempted to address mould, damp or cold issues in the past (Section 7).

6.18 Of those using electricity for hot water heating, 26.6 percent used instantaneous electricity. Of the 123 gas users, 64.2 percent reported using instantaneous gas. Of the 118 respondents reporting multiple sources of hot water heating, 74.6 percent reported that traditional electrical hot water cylinders were their main source of hot water heating used (Table 12).

Table 12: Main Source of Hot Water Heating Where Multiple Fuels Used

Source of Water Heating	Respondents	
	n	%
Electricity	88	74.6
Gas	11	9.3
Wood wetback	9	7.6
Instantaneous gas or electricity	6	5.1
Solar	4	3.4
<i>Total</i>	<i>118</i>	<i>100</i>

6.19 Of the 629 dwellings with electric hot water cylinders, the main cylinder tended to be more than ten years old (Table 13).

Table 13: Age of Hot Water Cylinder

Age of Hot Water Cylinder	Respondents	
	n	%
Less than 1 year	38	6.0
1-4 years	115	18.3
5-10 years	120	19.1
More than 10 years	265	42.1
Don't know	91	14.5
<i>Total</i>	<i>629</i>	<i>100</i>

6.20 Most (61.2 percent) of the primary hot water cylinders have no insulation wrapping. A further 11.4 percent of participants reported that they did not know whether their hot water cylinder is wrapped. As Table 14 shows a substantial minority of cylinders are poorly wrapped. Overall, then, around 69 percent of respondents reported hot water cylinders with either no or poor insulation wrapping.

Table 14: Hot Water Cylinder Wrapping

Type of Wrapping	Respondents	
	n	%
Hard foam	29	4.6
New well-fitted jacket	95	15.1
Older poorly-fitted jacket	48	7.6
No wrapping	385	61.2
Unsure	72	11.4
<i>Total</i>	<i>629</i>	<i>99.9</i>

6.21 Over half (51.4 percent) of participants reported that the pipes from their primary hot water cylinder are not lagged. A substantial proportion of dwellings have poorly lagged pipes. Only 21.8 percent of respondents reported that their pipes are wrapped with new, well-fitting lagging (Table 15).

Table 15: Hot Water Cylinder Pipe Lagging

Type of Lagging	Respondents	
	n	%
Wrapped with new and well-fitted lagging	137	21.8
Wrapped with older poorly-fitted lagging	90	14.3
Not lagged at all	323	51.4
Unsure	79	12.6
<i>Total</i>	<i>629</i>	<i>100.1</i>

Energy Efficient Light Bulbs

6.22 Two-thirds (66.1 percent) of participants reported using energy efficient light bulbs. However, only around a fifth (21.6 percent) reported that energy efficient light bulbs make up 76 percent or more of the light bulbs in their dwelling. Around two-thirds (67.3 percent) of respondents report that half or less of their light bulbs are energy efficient.

7 Renovation and Retrofit Activities

- 7.1 High energy user households were asked to report on any renovations they had undertaken in the year prior to surveying.
- 7.2 Of the 700 dwellings, a third (33.3 percent) are reported as having been subject to renovation or retrofit work in excess of \$2,000. Table 16 sets out the nature of the renovations and retrofitting undertaken. Table 16 also sets out the nature of the renovations and retrofitting that are likely to be undertaken by the 35.9 percent of households intending to expend more than \$2,000 on renovations and retrofitting in the coming year.

Table 16: Renovation & Retrofitting Activities and Intentions for High Energy User Households

Renovation or Retrofit	Previous Year (n=233)		Intended Next Year (n=251)	
	n	%	n	%
Interior repainting and/or wallpapering	46	19.7	49	19.5
Replacement of bathroom whiteware	37	15.9	40	15.9
Carpeting	31	13.3	23	9.2
Full exterior re-paint	28	12.0	33	13.1
Installing a heat pump	23	9.9	13	5.2
Replacement of kitchen appliances	22	9.4	18	7.2
Replacement of kitchen cabinetry	19	8.2	20	8.0
Installing a ventilation system e.g. HRV, DVS	17	7.3	0	-
Adding rooms	16	6.9	33	13.1
Roof replacement	15	6.4	15	6.0
Replacement of interior cladding	15	6.4	6	2.4
Replacement of bathroom cabinetry	15	6.4	30	12.0
Installing ceiling insulation	13	5.6	8	3.2
Replumbing	8	3.4	9	3.6
Installing underfloor insulation	8	3.4	11	4.4
Replacement of significant amounts of exterior cladding	7	3.0	3	1.2

Installing wall insulation	7	3.0	12	4.8
Installing a new hot water cylinder	7	3.0	2	0.8
Installing a wood burner	6	2.6	1	0.4
Rewiring full or significant part of the dwelling	5	2.1	6	2.4
Installing a solar hot water system	4	1.7	3	1.2
Installing double glazing	4	1.7	7	2.8
Installing a heat pump hot water system	4	1.7	3	1.2
Installing an extractor fan in the bathroom	3	1.3	5	2.0
Polishing floors	3	1.3	4	1.6
Installing a pellet burner	1	0.4	1	0.4
Installing a wet back hot water system	1	0.4	0	-
Installing a rainwater tank	1	0.4	0	-
Installing a rangehood/extractor fan in the kitchen	1	0.4	3	1.2
Venting drier to the outside	1	0.4	0	-
Upgrading hot water systems to instant gas	1	0.4	3	1.2
Installing a low flow showerhead	1	0.4	3	1.2

* Multiple response

7.3 The average reported expenditure on renovations/retrofit is \$25,284 and the median is \$9,500. The profile of expenditure is set out in Table 17.

Table 17: Expenditure on Renovation and Retrofit Activities

Expenditure	Respondents	
	n	%
\$3,000 or less	42	19.1
\$3,001 to \$5,000	36	16.4
\$5,001 to \$8,000	26	11.8
\$8,001 to \$10,000	30	13.6
\$10,001 to \$15,000	29	13.2
\$15,001 to \$20,000	21	9.5

More than \$20,000	36	16.4
<i>Total</i>	<i>220</i>	<i>100</i>

* 13 missing cases

- 7.3 The nature of the activities set out in Table 16 suggest that renovation expenditure is directed to ‘taste’ or a response to changing needs rather than repair or retrofit directed. They do not appear to be prompted by a perception of poor dwelling condition or performance.
- 7.4 Most respondents (78.5 percent) report that their dwelling is in ‘excellent’ or ‘good’ condition (Table 18). Those with dwellings in ‘average’ or worse condition are all over-represented among householders intending to undertake renovations, repairs or retrofit of \$2,000 or more. However, the greatest degree of over-representation is among those who typify their houses in good condition needing only minor maintenance. The latter make up around 43.4 percent of respondents but constitute 51.7 percent of those intending to undertake substantial renovations, repairs or retrofitting in the next year.

Table 18: Householder Assessed House Condition

House condition	Respondents	
	n	%
Excellent – no immediate repair and maintenance needed	229	32.7
Good – minor maintenance needed	304	43.4
Average – some repair and maintenance needed	138	19.7
Poor – Immediate repairs and maintenance needed	25	3.6
Very poor – Extensive repairs and immediate repair and maintenance needed	4	0.6
<i>Total</i>	<i>700</i>	<i>100</i>

- 7.5 Over a third (36 percent) of high energy users, however, did report that they have tried to address mould, cold and damp problems in their houses through repairs or renovation or acquisition of appliances.⁹ Table 19 sets out the different strategies that that third of high energy users use to address mould, damp or cold.

⁹ *It will be recalled that 43.6 percent of dwellings were affected by mould in at least one room.*

Table 19: High Energy Users Trying to Reduce Cold, Damp and Mould (n=252)

House condition	Respondents	
	n	%
Putting in an HRV/DVS or similar ventilation system	116	46.0
Installing heat pump	25	9.9
Installing an extractor fan in the bathroom	17	6.7
Installing efficient wood burner	9	3.6
Installing underfloor insulation	8	3.2
Installing insulation/batts in the ceiling	7	2.8
Draught stopping the doors and windows	6	2.4
Installing insulation in the walls	4	1.6
Installing double glazing	2	0.8
Installing a rangehood/extractor fan in the kitchen	2	0.8
Venting the drier to the outside	2	0.8
Putting heavy thermal curtains with pelmets	1	0.4
Installing passive vents on the windows	0	-
Upgrading hot water systems to instant gas	0	-
Upgrading hot water systems to solar hot water	0	-
Putting in a wetback hot water system	0	-
Installing a low flow shower head	0	-

* Multiple response

7.6 What is particularly interesting, however, is that of the 252 respondents reporting that they have undertaken measures to address mould, damp or cold, 56.3 percent report that their house has mould in at least one room. In addition, of the 313 householders reporting mould in one or more rooms, 45.4 percent have previously attempted to address these problems through renovations, repairs or appliance use.

8 Awareness & Attitudes to Retrofitting

- 8.1 The survey explored with high energy users:
- Their awareness of retrofit.
 - Their perceptions of the benefits associated with various retrofit activities.
 - Their desire to retrofit.
 - Barriers and prompts to take-up retrofit.

Awareness of Retrofit

- 8.2 Despite the fact that 36 percent of respondents reported that they had attempted to address cold, damp and mould in their house through activities we would broadly define as retrofitting, only 28 percent of high energy users reported that they had heard of the term ‘retrofit’.
- 8.3 Of the 196 respondents that had heard of the term, there was considerable variation in the proportions of high energy users that identified different activities as retrofit. As Table 20 shows, installation of ceiling insulation is associated by substantial numbers with retrofitting but many of the lowest cost and most basic options such as draught stopping are not associated by householders with retrofitting.

Table 20: Activities Identified by High Energy Users as Associated with Retrofit (n=196)

Activities	Respondents	
	n	%
Installing insulation/batts in the ceiling	66	33.7
Installing underfloor insulation	57	29.1
Installing insulation in the walls	46	23.5
Installing double glazing	44	22.4
Installing heat pump	19	9.7
Upgrading hot water systems to solar hot water	12	6.1
Draught stopping the doors and windows	11	5.6
Putting in an HRV/DVS or similar ventilation system	11	5.6
Installing efficient wood burner	6	3.1
Upgrading hot water systems to instant gas	5	2.6
Installing an extractor fan in the bathroom	4	2.0
Putting heavy thermal curtains with pelmets	4	2.0

Installing a rangehood/extractor fan in the kitchen	3	1.5
Installing passive vents on the windows	2	1.0
Putting in a wetback hot water system	2	1.0
Venting the drier to the outside	0	-
Installing a low flow shower head	0	-

* Multiple response

8.4 Similarly, water saving, heating and hot water heating alternatives are not strongly associated by high energy users with retrofitting although there is a strong preference for heat pumps as low emission heating appliances (Table 21).

Table 21: Preferred Low Emission Heating Appliances

Heating Appliances	Respondents	
	n	%
Heat pumps	328	46.9
Low emission enclosed wood fire	209	29.9
Flued gas	77	11.0
Pellet burners	25	3.6
Other	5	0.7
Don't know	36	5.1
None of the above	20	2.9
<i>Total</i>	<i>700</i>	<i>100</i>

8.5 In addition, the range of benefits that might emerge from particular forms of retrofitting are not equally recognised. The benefits of retrofitting in relation to damp and mould are less likely to be recognised than temperature and energy efficiency benefits (Table 22).

Table 22: Benefits of Retrofit Activities Identified by High Energy Users (n=700)

Benefits	Retrofit Activities					
	Insulation		Double Glazing		Heating Appliances	
	n	%	n	%	n	%
Warmer house	514	73.4	543	77.6	526	75.1
Energy Efficient house	476	68.0	483	69.0	465	66.4
Less damp	356	50.9	332	47.4	397	56.7
Less mould	319	45.6	302	43.1	381	54.4
Healthier home	425	60.7	387	55.3	438	62.6
More comfort	458	65.4	437	62.4	483	69.0

* Multiple response

Desire for Retrofitting

8.6 High energy users were asked to identify the statements set out in Table 23 that best reflect their attitude to retrofit.

Table 23: Attitudes and or Activities of High Energy Users in Relation to Retrofitting their Current House

	Respondents	
	n	%
Retrofit for comfort, warmth and health if power bill savings	322	46.0
Will not retrofit current house	153	21.9
Retrofit for comfort, warmth and health even if no power bill savings	123	17.6
Already retrofitted	56	8.0
Don't know	46	6.6
<i>Total</i>	<i>700</i>	<i>100.1</i>

8.7 The 644 high energy users with not fully retrofitted dwellings identified a number of barriers to retrofit take-up – the primary one being expense (Table 24).

Table 24: Barriers to Undertaking Retrofit (n= 644)

	Respondents	
	n	%
Too expensive	327	50.8
It would be inconvenient	87	13.5
I have other priorities	31	4.8
I don't know what my particular house needs and/or how to get the best value for money from a retrofit	17	2.6
I can't get access to credible information	16	2.5
I can't get trades people	7	1.1
I don't know how to do it myself	3	0.5

* Multiple response

8.8 The preoccupation with direct costs of retrofit and the desire for savings on power bills is also evident when high users are asked to assess a series of factors that might prompt their take-up of retrofit options (Table 25).

Table 25: Likelihood of High Energy Users Improving Energy Efficiency in Their Homes by Selected Prompts

Prompts	Likely		Unlikely		Don't know/Not applicable		Total
	n	%	n	%	n	%	
Making my home healthier	566	80.9	128	18.3	6	0.9	700
Savings on my power bills	562	80.3	125	17.9	13	1.9	700
Financial assistance from the Government	530	75.7	156	22.3	14	2.0	700
Knowing it is better for the environment	529	75.6	162	23.1	9	1.3	700
Improved comfort or warmth	483	69.0	197	28.1	20	2.9	700

Adding to the value of my home	410	58.6	213	30.4	77	11.0	700
A retailer promotion	368	52.6	310	44.3	22	3.1	700
Making my home easier to sell	352	50.3	252	36.0	96	13.7	700

8.9 Financial preoccupations are also evident in the relatively low investment high energy users want to make to improve their dwelling’s energy efficiency (Table 26).

Table 26: Amount Willing to Spend on Measures Identified to Improve Energy Efficiency

	Respondents	
	n	%
Less than \$100	105	15.0
\$101-\$500	80	11.4
\$501-\$1,000	82	11.7
\$1,001 to \$3,000	127	18.1
\$3,001 to \$5,000	76	10.9
\$5,001 to \$8,000	27	3.9
\$8,001 to \$10,000	24	3.4
\$10,001 to \$15,000	7	1.0
\$15,001 to \$20,000	3	0.4
More than \$20,000	17	2.4
I am unlikely to act on recommended measures	82	11.7
Unsure	70	10.0
<i>Total</i>	<i>700</i>	<i>100</i>

8.10 Over a quarter of high energy users reported that they might act on retrofits that cost less than \$500. Another quarter of respondents reported that they were either unlikely to take up credible measures or did not know how they would respond. Around 18 percent reported that they would take up measures costing \$1,001-\$3,000.

9 Some Implications for Beacon and Retrofit

- 9.1 There are some key implications for retrofit arising out of even this preliminary analysis of the data. Before commenting on those, however, it is perhaps worth noting the implications for new houses.
- 9.2 It is clear that high energy users are:
- Resistant to investment in retrofitting.
 - Show little interest or ability to select dwellings that are likely to be resource efficient.
- 9.3 Both those tendencies suggest that achieving high standards of sustainability in new dwellings is critical to the sustainability of future housing stock. In addition, this data shows, as have previous studies, that increased dwelling size appears to be associated with high energy use. This suggests that controlling dwelling size might be a necessary component of achieving new stock efficiency and sustainability. This has some very real implications for Beacon's Now Home and High Standards of Sustainability and the way in which size can be incorporated into good design.
- 9.4 In relation to retrofit, the data suggests:
- While high energy users have higher than average energy expenditure, their higher incomes do not enforce a desire for retrofitting or increased energy efficiency. Nevertheless, savings on power bills and low cost retrofit options are critical if high energy users are to invest in retrofit.
 - Most high energy users dwellings have basic energy deficiencies easily retrofitted at low cost including:
 - Draughty doors and windows
 - Poor insulation of hot water cylinders and pipes
 - Partial roof and underfloor insulation
 - Low use of energy efficient and low electricity use heating and lighting.
 - There is low awareness of many low cost options to increase energy efficiency and comfort.
 - There is acceptance of mould, damp and cold despite householders reporting that 'healthier' houses would prompt retrofit take-up. This suggests that mould, damp and cold are still not strongly associated in consumers' minds with health.
 - Attempts by householders to address mould, cold and damp are frequently misdirected and are ineffective.
 - It appears that where householders do undertake work that might be considered 'retrofit' they undertake to put in complex systems rather than address basic issues of thermal performance such as draught control and efficient heating.
 - There is significant renovation work undertaken that could allow extensive retrofitting opportunities at minimal marginal costs.

9.5 The data shows that willingness to pay for energy performance improvement is complex among these high energy user dwellings. Less than a third of high energy users reported that they would pay more than \$5,000 for measures that would improve the energy efficiency of their homes. However, the median expenditure on renovations in the previous year was \$9,500. Moreover, over a third of high energy users reported making renovations on appliance investments directed specifically to address mould, cold and damp problems. This suggests that the pathway to improved energy, and probably other resource, efficiency lies in:

- connecting retrofitting to the renovation decisions and investments that high user households make in relation to their dwellings
- developing a range of low cost as well as higher cost retrofit packages, and
- providing advice around the relative impacts and appropriate sequencing of retrofit products and packages.

9.6 It should be noted that this working paper presents the data largely in aggregate. The next steps in data analysis can include:

- analysis of variation by variables such as:
 - location
 - building typology
 - house age
 - householder characteristics including life stage.
- analysis to identify the characteristics different 'types' of renovation contribute to developing different marginal cost rates for different retrofit options.

10 Annex A: High Energy Users Survey

HIGH ENERGY USER SURVEY

Research New Zealand P/N #3666-00

27 September 2007

Good morning/afternoon/evening, my name is ^I from Research New Zealand. We are conducting research on behalf of Beacon about household energy efficiency.

Can I please speak to the person who is mainly responsible for making decisions about heating, lighting, and water heating.

IF NO "ST APPOINTMENT" CODE THE HOUSEHOLD AS UNAVAILABLE ON OUTCOME SCREEN.

IF PERSON AVAILABLE, REINTRODUCE AS NECESSARY

I'm calling to arrange a time to do a 15 minute interview with households that have a high or very high energy consumption. Does this apply to your household?

IF YES: Do you have 15 minutes now?

IF NO: When would be a more convenient time? **MAKE APPOINTMENT ONLY IF SPOKEN TO "ST" APPOINTMENT**

IF NOT A HIGH/VERY HIGH USER - TERMINATE

BACKGROUND INFORMATION ONLY IF NEEDED:

- This is genuine market research. I'm not selling anything.
- Information provided is confidential. We report summary results about groups; we do not identify which individuals have said what.
- Beacon is a research consortium that is working to find affordable ways to make New Zealand homes more sustainable, warmer, cheaper and healthier. Beacon is partly funded by the Government through the Foundation for Research, Science and Technology.

READ

As part of our quality improvement process, my Supervisor may listen to this call.

In the last year, have you undertaken any renovations or major maintenance on your dwelling costing in excess of \$2,000?

- 1Yes
 2No
 3No, because I rent this house
-] Go 0
] Go 0

What did those renovations or major maintenance involve? CODE MANY

- 1Roof replacement
 2Full exterior re-paint
 3Replacement of significant amounts of exterior cladding
 4Replacement of interior cladding
 5Interior repainting and/or wallpapering
 6Carpeting
 7Polishing floors
 8Adding rooms (**PLEASE SPECIFY AND INDICATE NUMBER**)
 9Replace bathroom whiteware
 10 ...Replace kitchen appliances
 11 ...Replace bathroom cabinetry
 12 ...Replace kitchen cabinetry
 13 ...Rewiring full or significant part of the dwelling
 14 ...Replumbing
 15 ...Install underfloor insulation
 16 ...Install ceiling insulation
 17 ...Install wall insulation
 18 ...Install double glazing
 19 ...Install wood burner
 20 ...Install pellet burner
 21 ...Install heat pump
 22 ...Install solar hot water system
 23 ...Install heat pump hot water system
 24 ...Install wet back hot water system
 25 ...Install ventilation systems, such as HRV/DVS
 26 ...Install rainwater tank
 27 ...Install new hot water cylinder
 28 ...Installing a rangehood / extractor fan in the kitchen
 29 ...Installing an extractor fan in the bathroom
 30 ...Venting the drier to the outside
 31 ...Installing passive vents in the windows
 32 ...Upgrading hot water system to instant gas
 33 ...Installing a low flow shower head
 96 ...Other (**SPECIFY**)

How much did those renovations cost? PROMPT: A rough estimate is okay.

- 1Answer (**SPECIFY**)
 98 ...Don't know

In the next year, do you intend to undertake any renovations or major maintenance on your dwelling costing in excess of \$2,000?

- | | |
|------------------|--------|
| 1Yes | |
| 2No |] Go 0 |
| 98 ...Don't know |] Go 0 |

What will those involve? CODE MANY

- 1Roof replacement
- 2Full exterior re-paint
- 3Replacement of significant amounts of exterior cladding
- 4Replacement of interior cladding
- 5Interior repainting and/or wallpapering
- 6Carpeting
- 7Polishing floors
- 8Adding rooms (**PLEASE SPECIFY AND INDICATE NUMBER**)
- 9Replace bathroom whiteware
- 10 ...Replace kitchen appliances
- 11 ...Replace bathroom cabinetry of
- 12 ...Replace kitchen cabinetry
- 13 ...Rewiring full or significant part of the dwelling
- 14 ...Replumbing
- 15 ...Install underfloor insulation
- 16 ...Install ceiling insulation
- 17 ...Install wall insulation
- 18 ...Install double glazing
- 19 ...Install wood burner
- 20 ...Install pellet burner
- 21 ...Install heat pump
- 22 ...Install solar hot water system
- 23 ...Install heat pump hot water system
- 24 ...Install wet back hot water system
- 25 ...Install ventilation systems, such as HRV/DVS
- 26 ...Install rainwater tank
- 27 ...Install new hot water cylinder
- 28 ...Installing a rangehood / extractor fan in the kitchen
- 29 ...Installing an extractor fan in the bathroom
- 30 ...Venting the drier to the outside
- 31 ...Installing passive vents in the windows
- 32 ...Upgrading hot water system to instant gas
- 33 ...Installing a low flow shower head
- 96 ...Other (**SPECIFY**)
- 98 ...Don't know ;**E**

How much do you intend to spend on these renovations?

- 1Answer (**SPECIFY**)
- 98 ...Don't know

ENERGY USE

Now thinking about the amount of energy you use, what do you think are the most likely reasons for your higher energy use? CODE MANY

- 1Large number of appliances
- 2House has many lights
- 3We have old hot water tanks
- 4We have many hot water tanks
- 5Our house takes a lot of energy to heat
- 6Our house takes a lot of energy to cool
- 7Household members are wasteful with energy
- 96 ...Other (**SPECIFY**)
- 98 ...Don't know ;E

What was your last month's energy bill? PROMPT A rough estimate is okay.

- 1Answer (**SPECIFY**)
- 98 ...Don't know

Did you consider any of the following energy issues when you bought, built or rented the home that you are currently living in? READ CODE MANY

- 1What the energy bill might be like
- 2Your comfort or warmth within the home
- 3Whether it had insulation in the roof space or under the floor
- 4Whether it had double glazing
- 5Whether the windows and doors were tight fitting or draught-proofed
- 97 ...Did not consider any of these issues ;E ***DO NOT READ***

Are any of the following areas in your home insulated? READ

	Yes	No	Don't know
The roof space	1	2	98
External Walls	1	2	98
Under the floor	1	2	98

Which of the following do you use for water heating? READ

	Yes	No	Don't know
Electricity	1	2	98
Gas	1	2	98
Wood wetback	1	2	98
Solar	1	2	98

IF 0=1 OR 2 ASK, ELSE GO 0: **Is this electricity / gas instantaneous?** IF NECESSARY:
Instantaneous gas / electricity systems heat water only as it is needed. Water is heated in the pipes rather than being stored in hot water cylinders e.g., Rinnai Infinity Systems CODE MANY

- 1Yes, instantaneous electricity
- 2Yes, instantaneous gas
- 97 ...No ;E
- 98 ...Don't know ;E

IF MORE THAN ONE CODED AT 0 ASK, ELSE GO0: **And which of those do you mainly use for water heating?**

- 1Electricity
- 2Gas
- 3Wood wetback
- 4Instantaneous gas or electricity
- 5Solar

How many electric hot water cylinders are there in your home?

- 1Answer (**SPECIFY**)
- 97 ...None
- 98 ...Don't know

] Go 0
]

How old is the main hot water cylinder in your dwelling?

- 1More than 10 years old
- 25 to 10 years old
- 31 to less than 5 years old
- 4Less than 1 year old
- 98 ...Don't know

Is it wrapped with hard foam, a new well-fitted jacket or an older poorly-fitted jacket?

- 1Hard foam
- 2New well-fitted jacket
- 3Older poorly-fitted jacket
- 97 ...Not applicable / no wrapping
- 98 ...Don't know

Are the pipes from the hot water cylinder.....? READ

- 1Wrapped with new and well-fitted lagging
- 2Wrapped with older poorly-fitted lagging
- 3Not lagged at all
- 98 ...Don't know ***DO NOT READ***

Which of the following types of heater do you use to heat your home? READ CODE MANY

- 1Electric heaters such as fan, bar, convection and night store heaters
- 2Fixed electric radiators or oil-filled column heaters
- 3Fixed unflued gas heater
- 4Fixed and flued gas heaters
- 5Portable gas heaters such as an LPG heater
- 6Heat pumps
- 7Under floor heating
- 8Enclosed wood burner
- 9Open log fire
- 96 ...Other (**SPECIFY**) ***DO NOT READ***
- 97 ...None of the above ;**E** ***DO NOT READ***

] Go 0

IF MORE THAN ONE CODED AT 0 ASK, ELSE GO 0: **Which of those do you mainly use for home heating?**

- 1Electric heaters such as fan, bar, convection and night store heaters
- 2Fixed electric radiators or oil-filled column heaters
- 3Fixed unflued gas heater
- 4Fixed and flued gas heaters
- 5Portable gas heaters such as an LPG heater
- 6Heat pumps
- 7Under floor heating
- 8Enclosed wood burner
- 9Open log fire
- 96 ...Other (**SPECIFY**)

During the winter months, do you generally find that your heating keeps you warm enough? READ IF NECESSARY

- 1Yes, always
- 2Yes, most of the time
- 3Only some of the time
- 4No, never
- 98 ...Don't know ***DO NOT READ***

Do you use any of the following appliances to cool your home in summer? READ CODE MANY

- 1Fans
- 2Heat pumps
- 3Dehumidifier
- 4Air conditioning
- 96 ...Other (**SPECIFY**) ***DO NOT READ***
- 97 ...No / None of the above ;**E** ***DO NOT READ***

What proportion of doors and windows in your house are draughty?

- 1None are draughty
- 21% to 25% are draughty
- 326% to 50% are draughty
- 451% to 75% are draughty
- 576% to 100% are draughty
- 98 ...Don't know

What proportion of the windows in your house are double glazed?

- 1None are double-glazed
- 21% to 25% are double-glazed
- 326% to 50% are double-glazed
- 451% to 75% are double-glazed
- 576% to 100% are double-glazed
- 98 ...Don't know

Of all the light bulbs in your home, what proportion are energy efficient light bulbs?

- 1None are energy efficient
- 21% to 25% are energy efficient
- 326% to 50% are energy efficient
- 451% to 75% are energy efficient
- 576% to 100% are energy efficient
- 98 ...Don't know

HOME

How would you describe the condition of your house? READ

- 1Excellent – No immediate repair and maintenance needed
- 2Good – Minor maintenance needed
- 3Average – Some repair and maintenance needed
- 4Poor – Immediate repairs and maintenance needed
- 5Very poor – Extensive and immediate repair and maintenance needed

In which specific rooms of your home, if any, do you find you get mould? NOTE TO INTERVIEWER: PLEASE CHECK NUMBER OF BEDROOMS AND TYPE OF BATHROOM/TOILET. CODE MANY

- 1Bedroom 1
- 2Bedroom 2
- 3Bedroom 3
- 4Bedroom 4
- 5Sitting Room/Lounge
- 6Dining Room
- 7Kitchen
- 8Laundry
- 9Bathroom with Toilet
- 10 ...Bathroom without Toilet
- 11 ...Separate Toilet
- 96 ...Other (**SPECIFY**) ***DO NOT READ***
- 97 ...None of the above ;E ***DO NOT READ***

Have you made any renovations, repairs, or acquired appliances in your house to reduce cold, damp or mould? IF YES: What did you do / have you done? CODE MANY

IF NECESSARY: Have you done any of these things in the last 12 months?

- 1Draught stopping the doors and windows
- 2Installing insulation/batts in the ceiling
- 3Installing underfloor insulation
- 4Installing insulation in the walls
- 5Installing double glazing
- 6Putting heavy thermal curtains with pelmets
- 7Installing heat pump
- 8Installing efficient wood burner
- 9Installing a rangehood./ extractor fan in the kitchen
- 10 ...Installing an extractor fan in the bathroom
- 11 ...Venting the drier to the outside
- 12 ...Installing passive vents on the windows
- 13 ...Putting in an HRV/DVS or similar ventilation system
- 14 ...Upgrading hot water system to instant gas
- 15 ...Upgrading hot water systems to solar hot water
- 16 ...Putting in a wetback hot water system
- 17 ...Installing a low flow shower head
- 18 ...Not applicable – Rented dwelling ;E] Go 0
- 96 ...Other (**SPECIFY**)
- 97 ...No ;E] Go 0

Can you estimate the cost of those changes?

- 1Answer (**SPECIFY**)
- 98 ...Don't know] Go 0

ASK IF 0=1, ELSE GO 0: Is this amount included in the amounts you reported paying for renovations earlier?

- 1Yes
- 2No
- 3In part, except the following amount (**SPECIFY**)
- 98 ...Don't know

RETROFITTING

Have you heard of the term 'retrofit'?

- 1Yes
- 2No
- 98 ...Don't know

] Go 0
]

To the best of your knowledge, what kinds of activities does retrofitting involve? CODE

MANY

- 1Draught stopping the doors and windows
- 2Installing insulation/batts in the ceiling
- 3Installing underfloor insulation
- 4Installing insulation in the walls
- 5Installing double glazing
- 6Putting heavy thermal curtains with pelmets
- 7Installing heat pump
- 8Installing efficient wood burner
- 9Installing a rangehood./ extractor fan in the kitchen
- 10 ...Installing an extractor fan in the bathroom
- 11 ...Venting the drier to the outside
- 12 ...Installing passive vents on the windows
- 13 ...Putting in an HRV/DVS or similar ventilation system
- 14 ...Upgrading hot water system to instant gas
- 15 ...Upgrading hot water systems to solar hot water
- 16 ...Putting in a wetback hot water system
- 17 ...Installing a low flow shower head
- 96 ...Other (**SPECIFY**)
- 98 ...Don't know ;**E**

Insulation can be part of a retrofit package. What benefits might insulation have for you?

READ CODE MANY

- 1A warmer house
- 2A more energy efficient house
- 3A less damp house
- 4Less mould in the house
- 5A healthier home
- 6A more comfortable home
- 96 ...Other (**SPECIFY**) ***DO NOT READ***
- 97 ...None of the above ;**E** ***DO NOT READ***
- 98 ...Don't know ;**E** ***DO NOT READ***

What, if any, benefits might you get by double glazing your windows? READ CODE
MANY

- 1A warmer house
- 2A more energy efficient house
- 3A less damp house
- 4Less mould in the house
- 5A healthier home
- 6A more comfortable home
- 96 ...Other (**SPECIFY**) ***DO NOT READ***
- 97 ...None of the above ;**E** ***DO NOT READ***
- 98 ...Don't know ;**E** ***DO NOT READ***

Heating appliances such as pellet burners, low emission enclosed wood burners or heat pumps can be part of a retrofit package. What, if any, benefits might there be in using these types of heating appliances? READ CODE MANY

- 1A warmer house
- 2A more energy efficient house
- 3A less damp house
- 4Less mould in the house
- 5A healthier home
- 6A more comfortable home
- 96 ...Other (**SPECIFY**) ***DO NOT READ***
- 97 ...None of the above ;**E** ***DO NOT READ***
- 98 ...Don't know ;**E** ***DO NOT READ***

Of the following efficient low emissions heating appliances, which do you prefer? READ

- 1Heat pumps
- 2Pellet burners
- 3Low emission enclosed wood fire
- 4Flued gas
- 96 ...Other (**SPECIFY**) ***DO NOT READ***
- 97 ...None of the above ***DO NOT READ***
- 98 ...Don't know ***DO NOT READ***

Which of the following statements best reflects your views about retrofitting? READ

- 1I do not want to retrofit this house
- 2I have already retrofitted my house
- 3I have partially retrofitted my house and will do more to get greater comfort, warmth and health, but ONLY if I got savings on my power bill
- 4I have partially retrofitted my house and will do more to get greater comfort, warmth and health, even if I DO NOT save on my power bill
- 5I would retrofit my house to get greater comfort, warmth and health, but ONLY if I got savings on my power bill
- 6I would retrofit my house to get greater comfort, warmth and health, even if I DO NOT save on my power bill
- 98 ...Don't know ***DO NOT READ***

IF 0=2 SKIP TO 0, ELSE ASK: **What stops you retrofitting your home?** CODE MANY

- 1It would be inconvenient
- 2I don't know what my particular house needs and/or how to get the best value for money from a retrofit
- 3Too expensive
- 4I can't get trades people
- 5I don't know how to do it myself
- 6I can't get access to credible information
- 7I have other priorities
- 96 ...Other (**SPECIFY**)
- 97 ...Nothing ;E
- 98 ...Don't know ;E

If a professional helped you identify a range of measures to improve energy efficiency, warmth and comfort, which of the following is most likely to describe your response?

Would you say you are likely to carry out measures that cost... **READ**

- 1Less than \$100
- 2\$101 to \$500
- 3\$501 to \$1000
- 4\$1001 to \$3,000
- 5\$3,001 to \$5,000
- 6\$5,001 to \$8,000
- 7\$8,001 to \$10,000
- 8\$10,001 to \$15,000
- 9\$15,001 to \$20,000
- 10...More than \$20,000
- 97 ...I am unlikely to act on the recommendations *****DO NOT READ*****
- 98 ...Don't know *****DO NOT READ*****

On a scale of 1-4, where 1 is very likely and 4 is not at all likely, how likely are the following things to prompt you to improve the performance of your home? **READ**

	Very likely	Likely	Unlikely	Not at all likely	N/A (renting)	Don't know
Improved comfort or warmth	1	2	3	4	///	98
Savings on my power bills	1	2	3	4	///	98
Adding to the value of my home	1	2	3	4	97	98
A retailer promotion, for example on light bulbs or heat pumps, pellet fires or insulation	1	2	3	4	///	98
Financial assistance from the Government	1	2	3	4	///	98
Knowing it is better for the environment	1	2	3	4	///	98
Making my home healthier	1	2	3	4	///	98
Making my home easier to sell	1	2	3	4	97	98

DEMOGRAPHICS

The final questions ask for some details that describe yourself and your household.

Which of the following age groups do you fall into? READ

- 124 years or under
- 225 to 30 years
- 331 to 40 years
- 441 to 50 years
- 551 to 60 years
- 661 to 65 years
- 766 or over
- 99...Refused ***DO NOT READ***

What is your household's total annual income before tax? READ

- 1\$10,000 or less
- 2\$10,001 to \$20,000
- 3\$20,001 to \$30,000
- 4\$30,001 to \$40,000
- 5\$40,001 to \$50,000
- 6\$50,001 to \$70,000
- 7\$70,001 to \$100,000
- 8Over \$100,000
- 99...Refused ***DO NOT READ***

Including yourself, how many people live in your household?

- 1Answer (**SPECIFY**)
- 99...Refused

] Go 0

How many of these people are aged 65 years and over?

- 1Answer (**SPECIFY**)
- 99...Refused

And how many children aged 5 and under live in the household?

- 1Answer (**SPECIFY**)
- 99...Refused

And finally, in which of the following areas do you live? READ

- 1Northland
- 2Auckland
- 3Waikato
- 4Bay of Plenty
- 5Gisborne
- 6Hawke's Bay
- 7Taranaki
- 8Manawatu-Wanganui
- 9Wellington-Wairarapa
- 10 ...Tasman
- 11 ...Nelson
- 12 ...Marlborough
- 13 ...West Coast
- 14 ...Canterbury
- 15 ...Otago
- 16 Southland
- 98 ...Don't know ***DO NOT READ***

Those are all the questions I have. Do you have any other comments you'd like to make about the subject of this interview?

- 1Comments (**SPECIFY**)
- 2No

May I please have your first name in case my supervisor needs to check on the quality of this interview?

- 1Agreed
- 2 Refused

Respondent Name

Thank you very much for your help. My name is ^3 from Research New Zealand. If you have enquiries about this survey, please ring the Project Manager, Bronwen Honeyfield, on our toll-free number: 0800 500 168. (Wellington respondents 499-3088).

^3 - are there any additional comments/issues that need to be noted?

- 1Yes (**SPECIFY**)
- 2No

I certify that this is a true and accurate record of the interview conducted by me in full accordance with the Market Research Code of Practice.

- 1Yes
- 2No