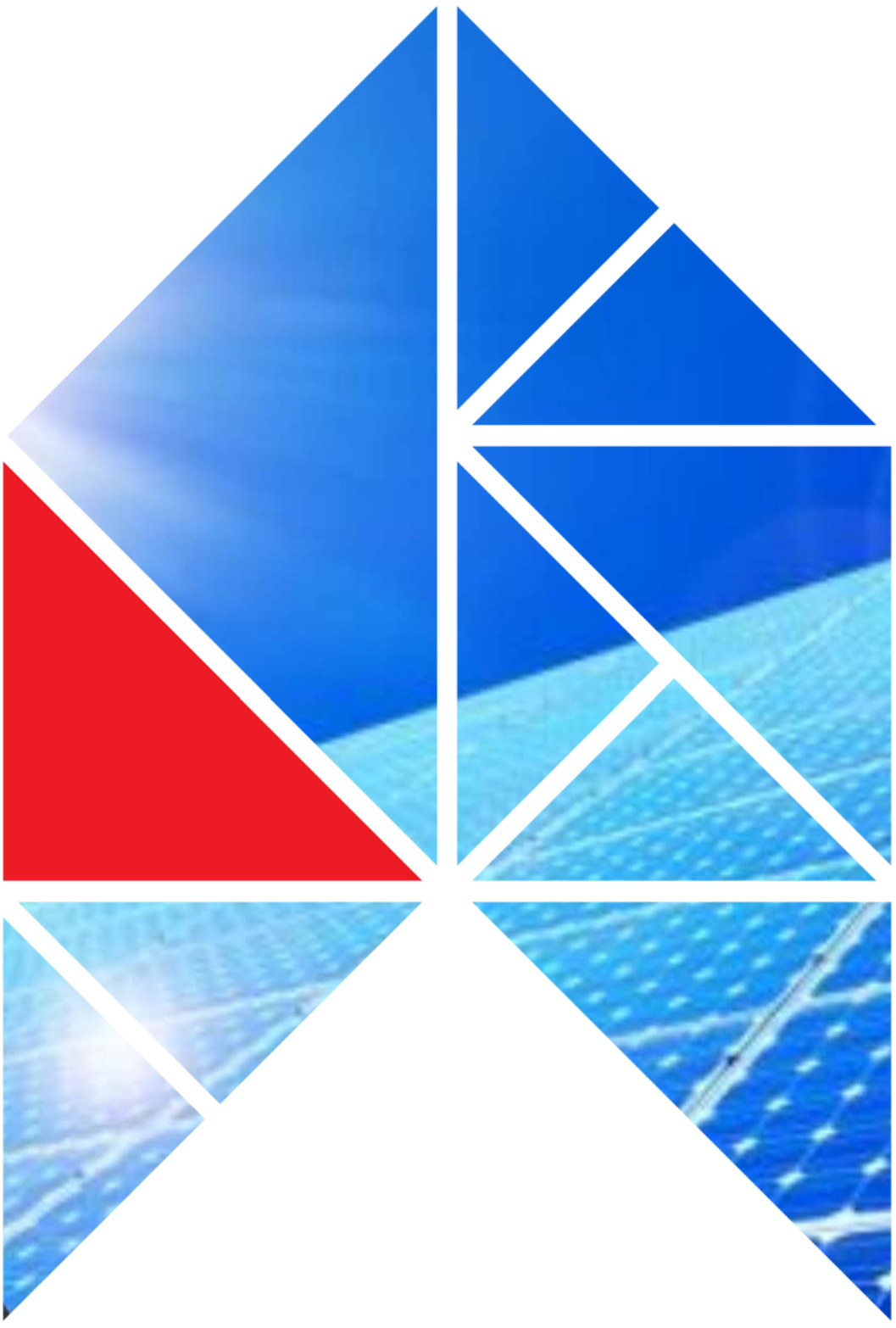
BRANZ

Study Report

SR353 [2016]

The value of sustainability: An investigation into barriers and enablers for solar power in New Zealand

Albrecht Stoecklein and Roman Jaques



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Funded from the Building Research Levy

The work reported here was funded by BRANZ from the Building Research Levy.

ISSN: 1179-6197

Preface

This project forms part of the BRANZ research stream 'Measuring the value of sustainability and resilience features in housing'.

Acknowledgements

This project was funded by the Building Research Levy.

The authors would like to thank all those – some 300 individuals – who participated in the online survey and the follow-up face-to-face interviews.

The authors would also like to thank Dr Rebecca Ford (Research Fellow at the Centre for Sustainability, University of Otago, Dunedin) for her comments on an early draft.

The value of sustainability: An investigation into barriers and enablers for solar power in New Zealand

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Reference

Stoecklein, A. & Jaques, R. (2016). *The value of sustainability: An investigation into barriers and enablers for solar power in New Zealand*. BRANZ Study Report SR353. Judgeford, New Zealand: Design Navigator Ltd for BRANZ Ltd.

Abstract

An investigation was made into the extent solar power (photovoltaic or solar electric) is perceived to influence a home's value. The views of just over 300 respondents were collected to provide an evidence-based understanding of investing in sustainability for dwellings. In addition, a subgroup of 30 participated in face-to-face interviews to explore various themes in more detail. A wide range of aspects concerning solar systems were investigated including: enablers, barriers, drivers, information sources, and the perceived financial benefits to the property.

This work builds on previous work carried out in this area, especially the GREEN Grid project conducted by the University of Otago, New Zealand, which explores how consumer demand for electricity is changing and the impact that this may have on the grid.

Keywords

Photovoltaic power, barriers, enablers, value, sustainability, house.

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Executive summary

Between July 2015 and January 2016, a series of online surveys and face-to-face interviews aimed at measuring the value of solar power (photovoltaic) systems in housing were conducted. Solar power adds to a home's performance, but the question is, to what extent are these improvements valued by the occupants?

The project was intended to provide an evidence base for improved decisions around investing in sustainability features. It will help builders, designers and specifiers to make better-informed choices around the costs and benefits of these features for new and existing housing.

301 people who recently bought a solar power system or had been in contact with a solar power company for a consultation or quote (but did not purchase a system) answered an online survey. A subgroup of 30 people also participated in a series of short face-to-face interviews to further explore issues.

Irrespective of whether they bought a solar power system or not, most people felt well informed about the technology. However, those people who did not purchase a solar power system felt less well informed on all the topic areas than those people who did purchase a solar power system. The largest information gaps were around the track record of the product and company, the personal power cost savings and how the solar power would affect the home's energy and sustainability performance. One large area of uncertainty and misinformation was the buy-back tariffs offered by power companies for surplus generation.

With the exception of real estate agents, who scored rather poorly, the average trust level concerning solar power systems was similar for a number of information resources, in particular 'Other internet web pages', 'Technical experts from solar power sales companies', 'Friends and family', 'Government agency resources' and 'Existing solar power users' comments on the internet'. A large number of people frequently consulted internet pages for information when considering buying a solar power system. Surprisingly, a relatively large number received a quote from only one solar company before deciding to purchase a system. About a third of both owners and non-owners had visited a home with solar power before making a decision.

Several of the most frequently reported barriers for solar power were of a financial nature. Buy-back rates (that is, feed-in tariffs) by power companies were the second most important barrier after the high initial purchase cost of solar systems. Combined with the fact that respondents also reported a lack of clear information about the buy-back rates, this seems to be a critical factor that needs addressing for a more effective promotion of solar power technology in New Zealand. For many barriers, the difference between owners and non-owners of solar power systems was small.

The research found that, whilst most respondents had an ongoing underlying interest in solar power, a large number needed prompting by proactive sales activities (such as cold calling) to become actively engaged in the purchase process.

70% of owners and 50% of non-owners would pay more for a house with solar power, with a median premium of $4,000 for current owners and $1,000 for non-owners. This shows that most of the current owners perceived a real value from their solar power system and would be prepared to pay more for a solar-powered home in the future,

although less than the typical original price of a solar power system. This contradicts some recent findings in overseas studies.

Almost all the interviewees (93%) thought the government should support solar power. It was frequently suggested the government should guarantee minimum buy-back rates. The provision of su bsidies was more controversial, with a number of interviewees suggesting that it would lead to price gouging by solar companies and unfair advantages for the rich. However, a good number of the interviewees referred to insulation subsidies as a positive example of government subsidies.

Several interviewees suggested the government should provide a leadership role by installing solar power systems on government buildings and state houses or schools, and a number of interviewees thought that solar power should be made mandatory for new houses, similar to rainwater tanks in some local districts.

1. Background

This investigation is part of a larger Building Research Levy-funded BRANZ research project aimed at measuring the perceived value of sustainability features in housing to home owners and buyers as well as society as a whole. Sustainability features such as extra insulation levels, water conservation and solar power add to a home's performance. However, the question is to what extent these improvements are valued by the occupants and therefore what the implications are for potential buyers. Naturally, this has flow-on effects for associated groups, such as the building industry, policy makers and energy providers.

The project is intended to provide an evidence base for improved decisions about investing in sustainability features, for both industry and potential owners. It will help builders, designers and specifiers to make better-informed choices around the costs and benefits of these features for new and existing housing.

Solar power (photovoltaic or PV) is an energy technology that has increased in popularity exponentially over the last few years in New Zealand (Figure 1).

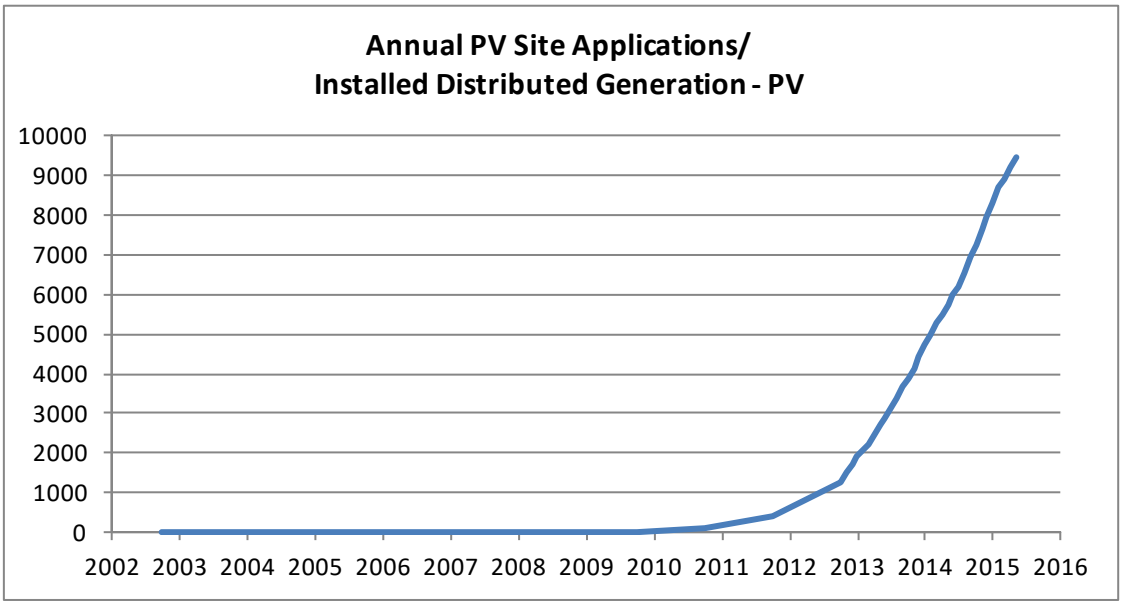


Figure 1. 2003–2013: Annual PV site applications (Miller et al., 2014), 2014–2015: Installed distributed generation trends (Electricity Association of NZ, 2016)

There are a number of motivations for PV's uptake in NZ, including (from Ford et al., 2014):

- importance of independence and self-sufficiency
- insulation against rising energy prices (lack of trust)
- reduced outgoings in retirement
- resilience against power cuts or natural disasters
- last step for energy efficient homes.

Certainly, a large contributing factor most recently has been PV's rapid fall in price – making the decision considerably easier to justify. This was previously a recognised barrier to adoption. Now, as a result, other barriers are more important, such as (King, Stephenson and Ford, 2014):

- uncertainty around buy-back rate
- lack of external financial incentives
- uncertainty around a rapidly changing technology.

Overseas, there has also been a substantial effort to understand the enablers and barriers to rooftop solar power systems, such as by Ryghaug and Sørensen (2009), Margolis and Zuboy (2006), Squires (2008) and Kiel (2012). There findings largely align with the New Zealand findings.

There is a lack of New Zealand-specific and detailed information on the financial value consumers who have installed PV panels on their home place on the technology compared to consumers who have not installed PV panels. There is also a need to explore the barriers and enablers influencing decisions on this technology, as well as the willingness to pay for it, in considerably more detail. With the exponential growth of micro-PV installations (both national and internationally), which shows no sign of abating, this project sought to provide a more complete and robust evidence base for improved decisions on investing in sustainability features.

2. Methodology

The BRANZ research project seeks to explore three research streams, to better understand various groups' perceived value of sustainability features associated with housing:

- Research stream 1: owner surveys and interviews.
- Research stream 2: real estate statistics.
- Research stream 3: group home builder/spec builder interviews.

This report covers only the first of the three streams.

The aim of research stream 1 is to identify:

- what financial value consumers who have installed PV panels on their home place on the technology compared to consumers who have not installed PV panels
- the barriers and enablers for installing solar power systems.

2.1 Target groups

There are two target groups, one of which can be divided into three distinct subgroups:

- Inexperienced consumers – homeowners without any first-hand experience of owning a PV system. This may not equate to their knowledge about this technology (which may be advanced) compared to what is typically known by a randomly selected individual.
- Experienced consumers – homeowners with first-hand experience of PV systems, so either:
    - Owners who purchased a PV system for their home.
    - Owners who bought a home with a PV system previously installed.
    - Previous owners who had bought a PV system for their former home.

By comparing these two target groups, it is possible to determine whether first-hand experience increases the value perception of PV. If this is the case, it would be plausible that increased consumer education would improve consumer attitude towards the technology and thereby increase uptake.

In order to quantify consumer value perceptions, a series of online surveys were undertaken. To tease out the answers more and therefore better understand the individual responses for more accurate interpretation, a series of follow-up interviews were conducted.

2.2 Online questionnaires

The survey population was taken from the customer databases from two solar companies, SolarKing and Right House, and consisted of homeowners who either bought a solar power system or had received a quote for a solar power system but had rejected the quote. The SolarKing database consisted of 181 customers who had bought a solar power system from SolarKing during the last 2 years. The Right House database consisted of 518 customers who had received a quote for a solar power system since December 2013 but had not accepted the quote. The Right House

database also included 300 customers who had a solar power system installed by Right House since December 2013.

The online survey response rate was 301, which equates to 30%, which was deemed acceptable for this study. 216 of the respondents had bought a solar power system, 80 had not and the remaining five had a solar power system on another property or only a small scale-system for a dedicated use.

2.3 Face-to-face interviews

Face-to-face interviews were undertaken with 30 respondents of the earlier online surveys. As part of the earlier online survey, people were asked whether they would be prepared to participate in a short face-to-face interview later on. The potential interviewees were randomly selected within each stratum (that is, location and ownership).

Individuals for the interviews were invited via email. A $50 Prezzy card was offered as an incentive. Approximately 75% of people who were asked agreed to be interviewed.

Half of the interviewees were in Auckland and half in Wellington. Half were owners of solar power systems, and half had made inquiries and received a consultation or quote from a solar power company but decided not to purchase a system. In most cases, the interview questions were emailed to individuals in advance of the meeting in order to allow them to familiarise themselves with the questions. Approximately half of the people had taken this opportunity. The interviews were mostly undertaken at the interviewees' homes and sometimes at their workplaces. They took approximately 30 minutes each. In some instances, more than one person was present (that is, spouses or children). The answers of all people present were recorded, even if this meant that, in rare cases, the answers were contradictory. Answers were noted down by the author during the interviews and later compiled.

One person was not available for a face-to-face interview but completed the emailed interview questions and emailed them back. This person's answers are included in the analysis.

3. Theoretical model

The theoretical model underlying this research is Rogers' (2003) 'diffusion of innovations'. According to the model, new technology is adopted by different consumer groups at different stages. The consumer groups can be categorised into innovators, early adopters, early majority, late majority and laggards.

The motivators for consumers to make a decision on installing the technology is based on Fishbein and Ajzen's (1975) ABC model of attitudes. This model describes that an attitude contains three components – affect, behaviour and cognition – which together create the attitude concept.

These three effects can be ordered to reflect involvement levels towards the attitude object. Novack (2010) suggests three hierarchies of effects: The standard-learning hierarchy, low-involvement hierarchy, and experiential hierarchy as summarised in Dean (2010).

The standard-learning hierarchy is represented by the component order cognition-affect-behaviour. It usually applies for high-value purchases and assumes that consumers will conduct extensive research about the attitude object, which then in turn determined his or her feelings ('affect') towards the object, resulting in a certain behaviour. Because solar power is a high-cost item, this is one of the likely hierarchies representing the purchase decision.

The low-involvement hierarchy is represented by the cognition-behaviour-affect order of events. Purchase decisions are made on the basis of a limited knowledge. Their feeling (affect) towards the object is mainly based on experiencing the object post-purchase. It is unlikely that the solar power purchase is represented by this hierarchy.

The experiential hierarchy is represented by the affect-behaviour-cognition processing order. The consumer is primarily influenced through their feelings towards the product rather than their knowledge. This scenario could apply to solar power purchase decisions if it could be shown that buyers have, for example, strong environmental motivations but have done little factual research about solar power products before purchasing a system.

In the later sections of this report, reference will be made to the hierarchy model most suitable to represent solar power purchases based on the survey results.

In order to measure the value perception of PV technology, 'willingness to pay' questions were asked in the survey. Survey respondents were also asked about their experiences regarding barriers and enablers towards purchasing PV systems in the past and in the future.

4. Online questionnaire

The questionnaire was administered using an online survey via SurveyMonkey (see Appendix B). An invitation to participate in the survey was emailed to all respondents. As an incentive, five randomly drawn Prezzy cards were offered to the respondents. The respondents were given approximately 3 weeks between the email invitation and the time the survey was closed. No reminder emails were required because the intended 300 response target rate was achieved after the initial mail-out.

Rather than using standard Likert scales, it was decided to rely on terminology that represented equal semantic gaps between the choices because it was felt these were easier to understand by the survey respondents. It was anticipated that a statistical evaluation of average values would not be conducted. The questions and response scales that were used are shown below. (Refer to the appendix for the complete survey instrument):

How much do you know about solar power generation?

- Not familiar at all
- Have heard of it
- Somewhat familiar
- Good understanding
- Very knowledgeable

When you considered to buy a solar power system, what topic would you have liked more information on? <list of topics provided>

- I had enough info
- I needed a bit more info
- I wanted a lot more info

For you personally what are the reasons FOR/AGAINST solar power? <list of possible reasons provided>

- I don't agree with this statement
- Critical factor
- Major consideration
- Minor consideration
- Of no concern
- Don't know

The first option ('I don't agree with this statement') was used to allow respondents to respond to any reasons they did not think were factually correct – for example, the respondent may not agree a solar power system increases property resale value. In that case, they were asked to check the 'I don't agree with this statement' response.

Would you trust the advice of the following sources when purchasing a solar power system? <list of possible sources of information>

- Completely
- Mostly
- Sometimes
- Rarely
- Never
- I'm not using these

4.1 PV ownership

Of the 301 people who completed the online survey, 216 (72%) had bought a solar power system and 80 (27%) did not have a solar power system.

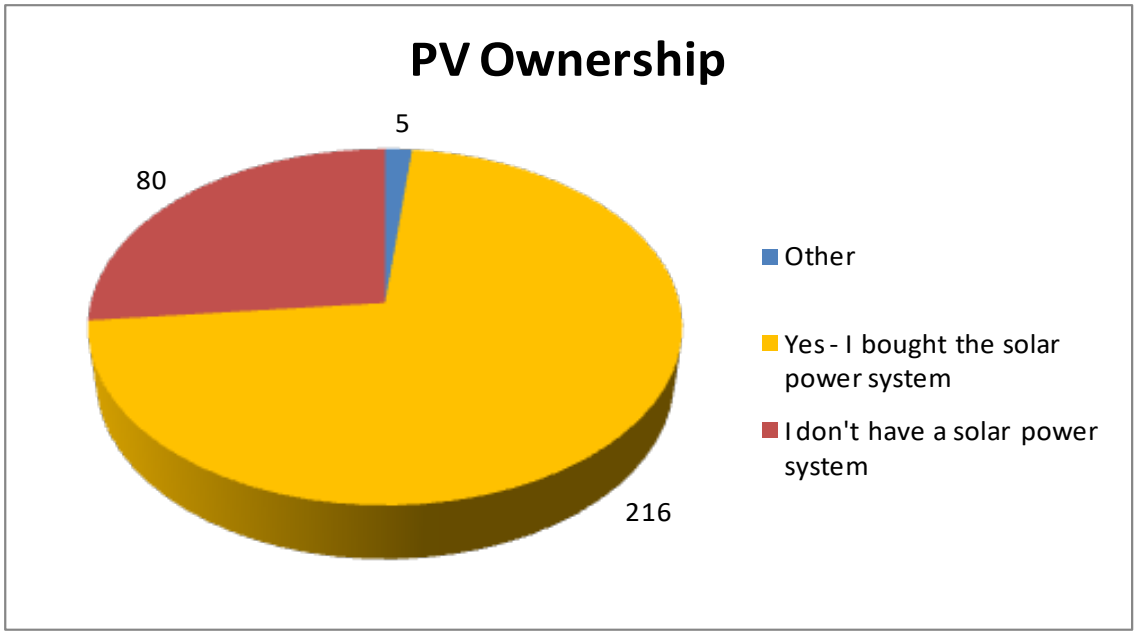


Figure 2. PV ownership.

4.2 Knowledge and information about solar power

Most survey respondents reported they had a 'good understanding' or are 'very knowledgeable' about solar power.

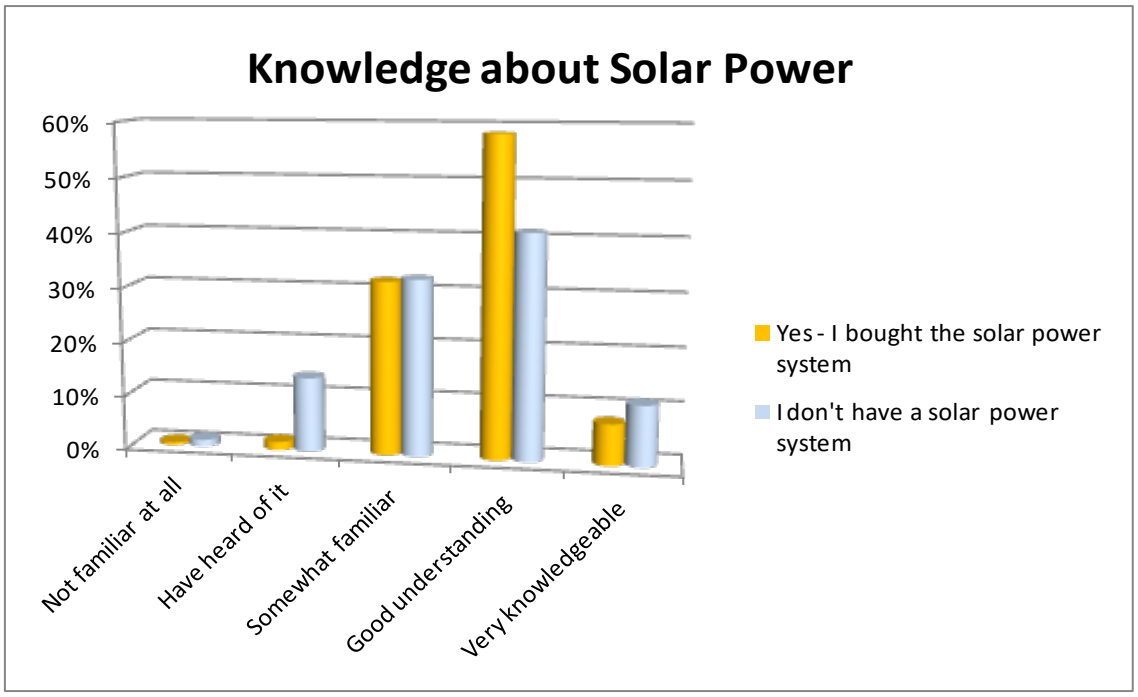


Figure 3. Self-reported knowledge level of solar power.

The results indicate that those people who did not buy a solar power system considered themselves less knowledgeable about solar power than those people who bought solar power systems. This is not surprising since it can be expected that, during the process of selecting and having the system installed, the homeowner gains additional knowledge about the technology and the system.

It is, however, surprising that this trend is reversed for those people reporting they were 'very knowledgeable' – more people without a solar power system claimed they were 'very knowledgeable' than people who had bought a solar power system. One possible explanation is that respondents may have felt they needed to justify their decision not to purchase a system. They may have felt they should emphasise that their decision was based on thorough research and knowledge.

This extensive research into the technology is typical of the standard-learning hierarchy as described in Section 3. For marketers, it suggests that providing knowledge-focused information is critical for influencing consumer behaviour.

Table 1 shows whether the respondents felt they had sufficient information. A number of areas were listed, and the respondents were asked to rate whether they felt they had sufficient information regarding each of the areas.

Table 1: Information gaps perceived by the respondents. For each information topic the proportion of respondents is shown who wanted a lot more information (red), a bit more information (yellow) and those who had enough information (green). Darker colours represent larger percentages.

		Owner	Non-Owner
Technology itself	I wanted a lot more info	11%	11%
	I needed a bit more info	37%	38%
	I had enough info	52%	51%
Purchase price	I wanted a lot more info	8%	18%
	I needed a bit more info	19%	15%
	I had enough info	72%	68%
Financial assistance options	I wanted a lot more info	11%	26%
	I needed a bit more info	24%	28%
	I had enough info	65%	46%
My personal potential power cost savings	I wanted a lot more info	22%	26%
	I needed a bit more info	44%	35%
	I had enough info	34%	39%
How it would be working in my own home	I wanted a lot more info	19%	20%
	I needed a bit more info	33%	36%
	I had enough info	48%	44%
How it looks on the roof	I wanted a lot more info	4%	4%
	I needed a bit more info	14%	25%
	I had enough info	82%	71%
Maintenance	I wanted a lot more info	15%	19%
	I needed a bit more info	46%	51%
	I had enough info	39%	30%
The system's life expectancy	I wanted a lot more info	13%	21%
	I needed a bit more info	37%	51%
	I had enough info	50%	28%
Track record of product and company	I wanted a lot more info	20%	35%
	I needed a bit more info	48%	40%
	I had enough info	32%	25%
Effect on my home's energy and sustainability	I wanted a lot more info	21%	28%
	I needed a bit more info	38%	39%
	I had enough info	41%	34%

Table 1 shows that respondents in general felt well informed. The largest information gaps were around the track record of the product and company, the personal power cost savings and how the solar power would affect the home's energy and sustainability performance.

The track record of the product and power company may have been overstated since Right House, the source of much of the sample population, went into receivership shortly before the survey was administered.

It is somewhat surprising that personal power cost savings ranks quite highly. Most solar power companies, including Right House and SolarKing, provide quite extensive cost-benefit calculations for their systems. The feedback may be related to the complexities of feed-in tariffs provided by power companies (see Figure 4).

It is interesting to note that those people who did not purchase a solar power system felt less well informed on all the topic areas than those people who did purchase a solar power system. This would indicate that lack of sufficient information is one of the barriers towards the purchase of a solar power system. Alternatively, it could also indicate that those who did purchase now feel totally invested in their decision and consequently overstate how well informed they are.

The survey also allowed respondents to add any other information gaps they perceived. About 25% of respondents reported they needed other additional information. The feedback answers were given in free-text format. For analysis purposes, the answers have been grouped into a number of topic areas.

Figure 4 shows the frequency of the topic areas that were mentioned in the 'other information gaps' responses. Lack of financial information was the most frequently mentioned area of information gaps. In particular, the feed-in tariffs and related actual savings seem to be an area where potential purchasers do not feel well enough informed. This was the case for people who had bought solar power systems and those who had not. This seems to be an important finding and should be addressed by public agencies as well as the companies selling solar power systems.

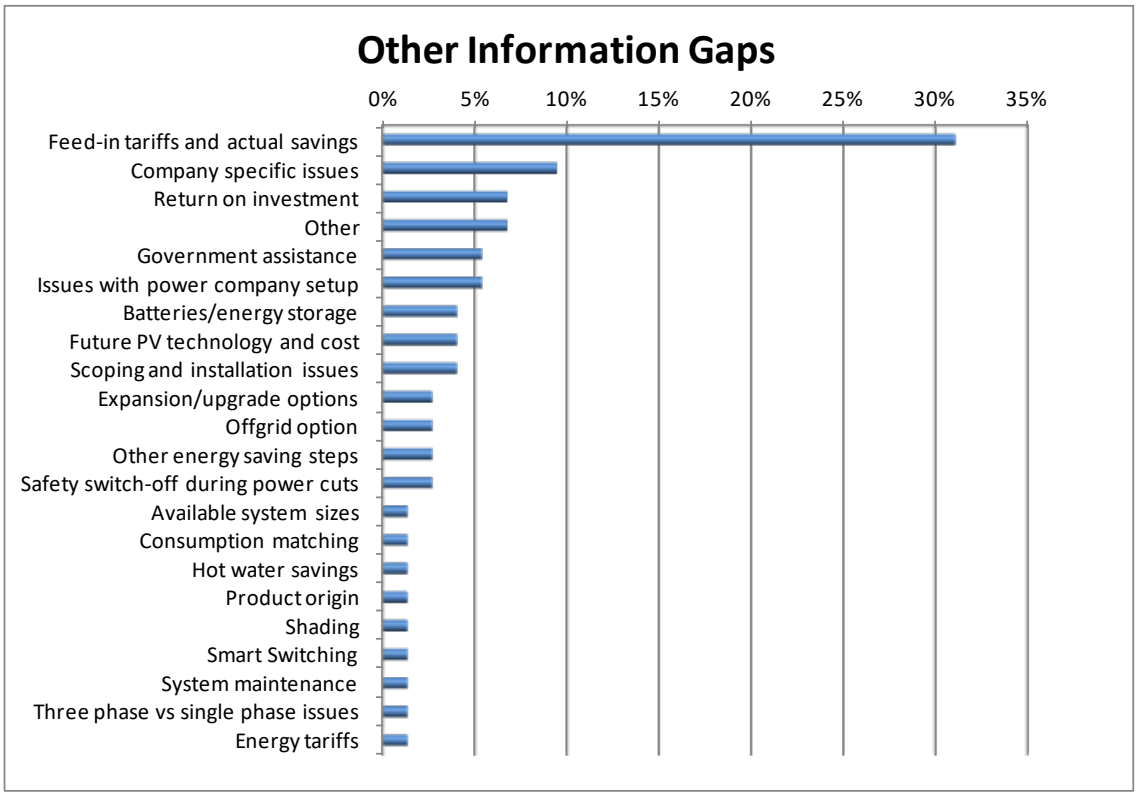


Figure 4. Other information gaps perceived by respondents.

4.3 Information sources

The survey asked a number of questions aimed at identifying how potential buyers collect information about the technology. Figure 5 shows how much buyers trust various information sources. For each of the listed sources, respondents were asked to what degree they trusted them using the scale below:

- Completely: 4
- Mostly: 3
- Sometimes: 2
- Rarely: 1
- Never: 0

In addition, respondents could also reply 'I'm not using these' to capture sources of which they were not aware or could not judge for trustworthiness. The answers were then coded using the ratings shown above and averaged across the sample.

Figure 5 shows trust levels for each information source. Apart from real estate agents, the average trust level was similar for 'Other internet web pages', 'Technical experts from solar power sales companies', 'Friends and family', 'Government agency resources' and 'Existing solar power users' comments on the internet'. There also does not seem to be a notable difference between those people who bought a solar power system and those who did not.

In consumer behavioural research, it is often found that friends and family are much more trusted than other information sources (Nielsen, 2013). The fact that this study found that a number of other information sources enjoy similar trust levels may have a number of explanations:

1. Solar power may be perceived as a rather technical product where it is necessary to rely on suitably trained and experienced people for advice.
2. The survey population consisted largely of early adopters who may be more trusting of other than family and friends.
3. The number of family and friends who have first-hand experience with solar power will be very small. The way the question was worded, it is not defined whether the family and friends do have solar power systems. Some subjects may therefore have only considered family and friends who themselves do not have solar power, which would have reduced the trust level.

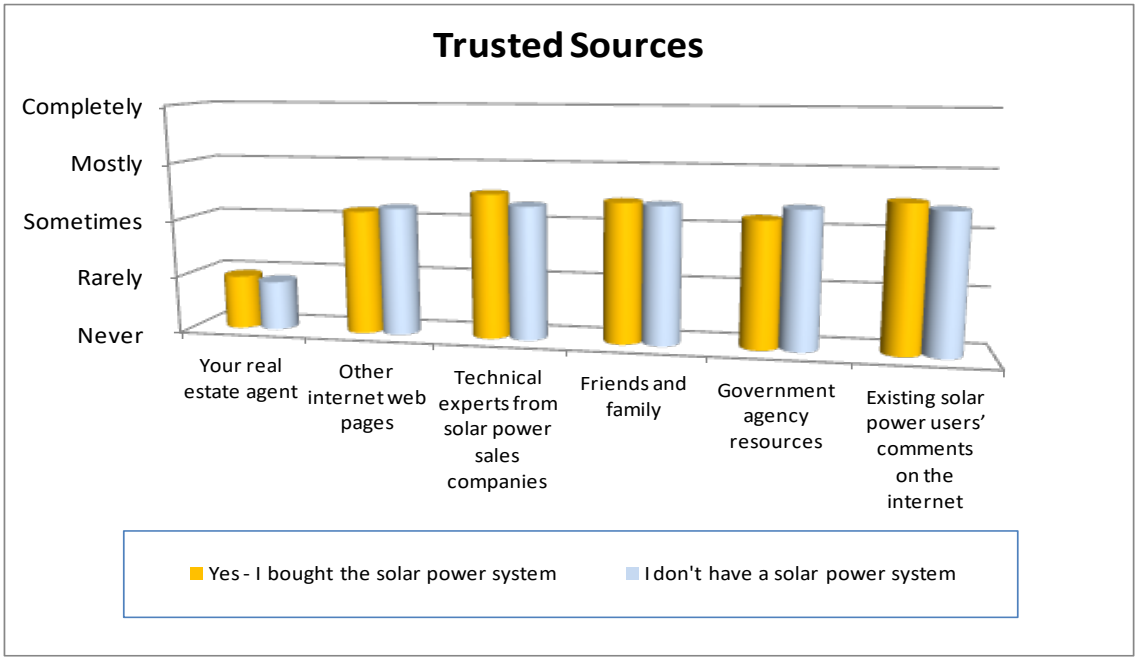


Figure 5. Trusted information sources.

We also asked whether there were any other sources people trusted for advice on solar power systems. About one-third of respondents listed other advisors. Many respondents repeated one of the previously listed sources. The answers have been grouped in categories in Figure 6. The general trend suggests that existing owners of solar power systems are the most trusted source. The responses also suggest that it is important for the respondent that the information source is seen as independent, possibly reflecting an inherent mistrust in sources with a commercial interest in selling solar power products.

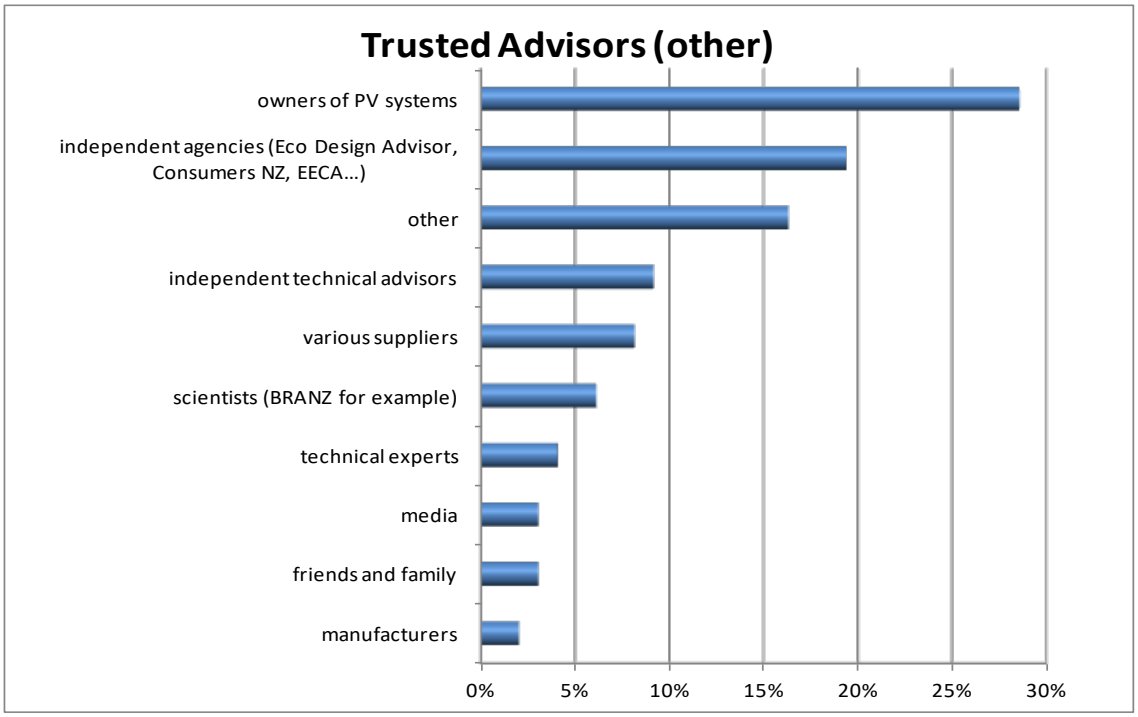
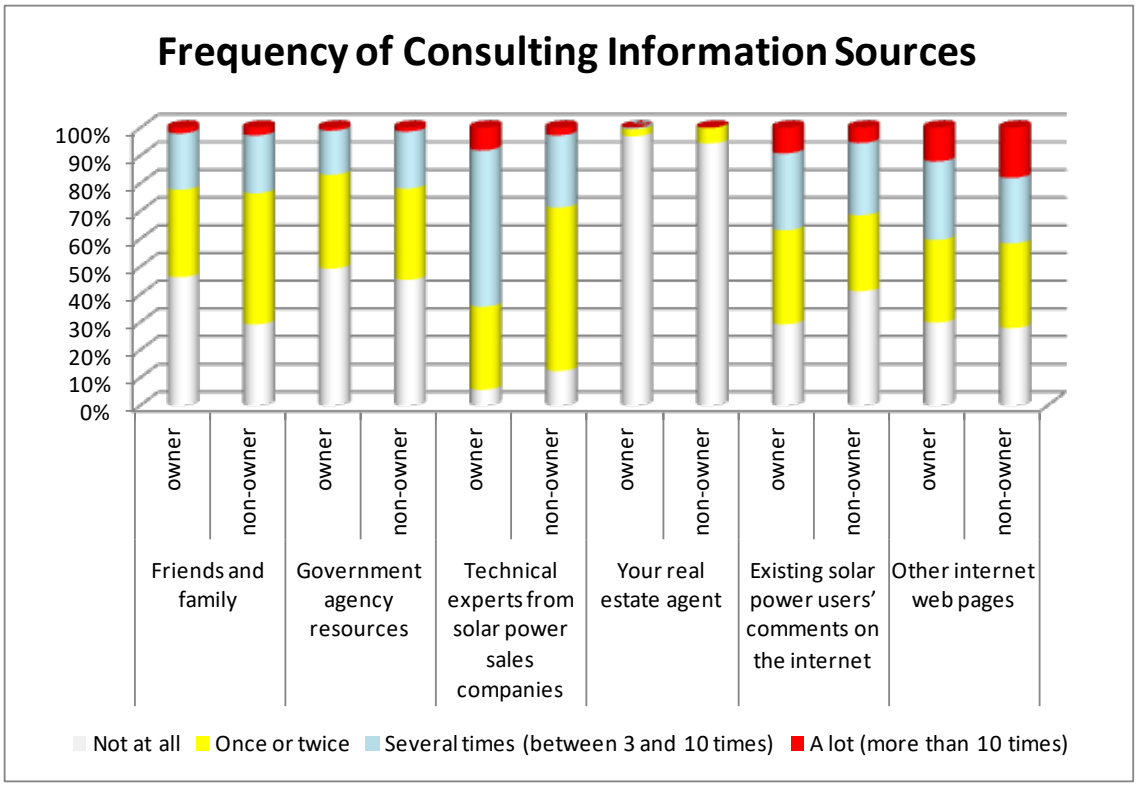


Figure 6. Other trusted information sources.

A similar pattern is also apparent in the information sources that were actually consulted by respondents. Figure 7 shows how often respondents had consulted various information sources.



Note that the scales are not linear, i.e. yellow represents 1–2 consultations whereas red represents more than 10 consultations.

Figure 7. Frequency of consulting information sources.

Solar power system owners consulted technical experts from the solar power sales companies 3–10 times in most cases. Non-owners consulted technical experts from solar power sales companies only once or twice. This is probably to be expected since there will be a lot more interaction between the sales company and the customer if the customer goes ahead with the purchase.

By far the most frequently consulted resources were other internet pages. This holds true for solar power system owners and non-owners.

The least frequently consulted source was real estate agents. This is probably a reflection that real estate agents may not be considered trustworthy and knowledgeable advisors in respect to solar power. It may also indicate that future resale value of a home is not a significant consideration during the purchase decision.

Almost half of the respondents did not consult government agency resources. This is somewhat surprising, since 'independent agencies' scored very high on the trustworthiness questions. It may suggest that independent agencies need to promote their expertise in the area more and make information more readily available.

4.4 Visits to other houses with solar power

Figure 8 shows whether respondents had visited other houses with solar power systems. Approximately 30% of respondents had visited such houses. This is a surprisingly large number considering the current small penetration of solar power in New Zealand.

The high number also suggests that the standard-learning hierarchy best represents the theoretical decision-making framework, as described in Section 3. A large number of potential customers go through significant effort obtaining product knowledge in order to form an opinion (attitude) about the product.

There is a small difference between solar power system owners and non-owners. Non-owners were slightly more likely to have visited other houses with solar power than solar power system owners. (Using a N-1 Chi-Square test shows that there is an 86% chance that non-owners have a higher likelihood of having visited a house with PV than owners.) This is an interesting result, because it suggests that first-hand experience of solar power does not facilitate a positive purchase decision but could even be detrimental.

Without knowing the experiences and conversations that took place during these visits, it is difficult to understand what factors influenced prospective buyers to decide against a solar power system.

It is important to remember that other owners of solar power systems are considered to be one of the most trusted information sources, as shown in Figure 5. If people have decided not to purchase a solar power system after visiting an existing owner, it seems likely that the feedback from the existing owner was not favourable enough to sway the prospective buyer to undertake the purchase.

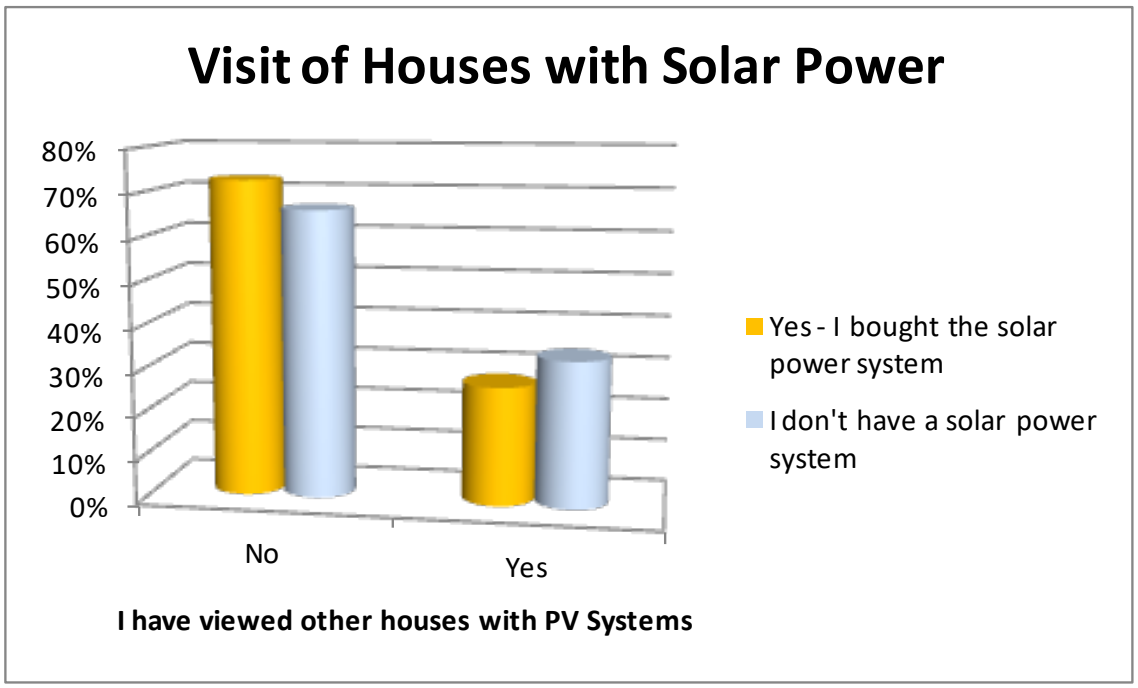


Figure 8. Visits to other houses with solar power.

4.5 Barriers and benefits

The survey respondents were also asked about the perceived benefits and barriers for solar power.

4.5.1 Barriers

Figure 9 shows how respondents rated the importance of a number of possible barriers for using solar power generation. The answers were encoded using the weights shown on the graph and then averaged.

The respondents had the following options to rate the presented barriers:

- I don't agree with this statement
- Critical factor
- Major consideration
- Minor consideration
- Of no concern
- Don't know

The first option ('I don't agree with this statement') was used to allow respondents to respond to any statements they did not think were factually correct. For example, the respondent may not agree that a solar power system has a negative effect on property resale value. In that case, they were asked to check the 'I don't agree with this statement' answer.

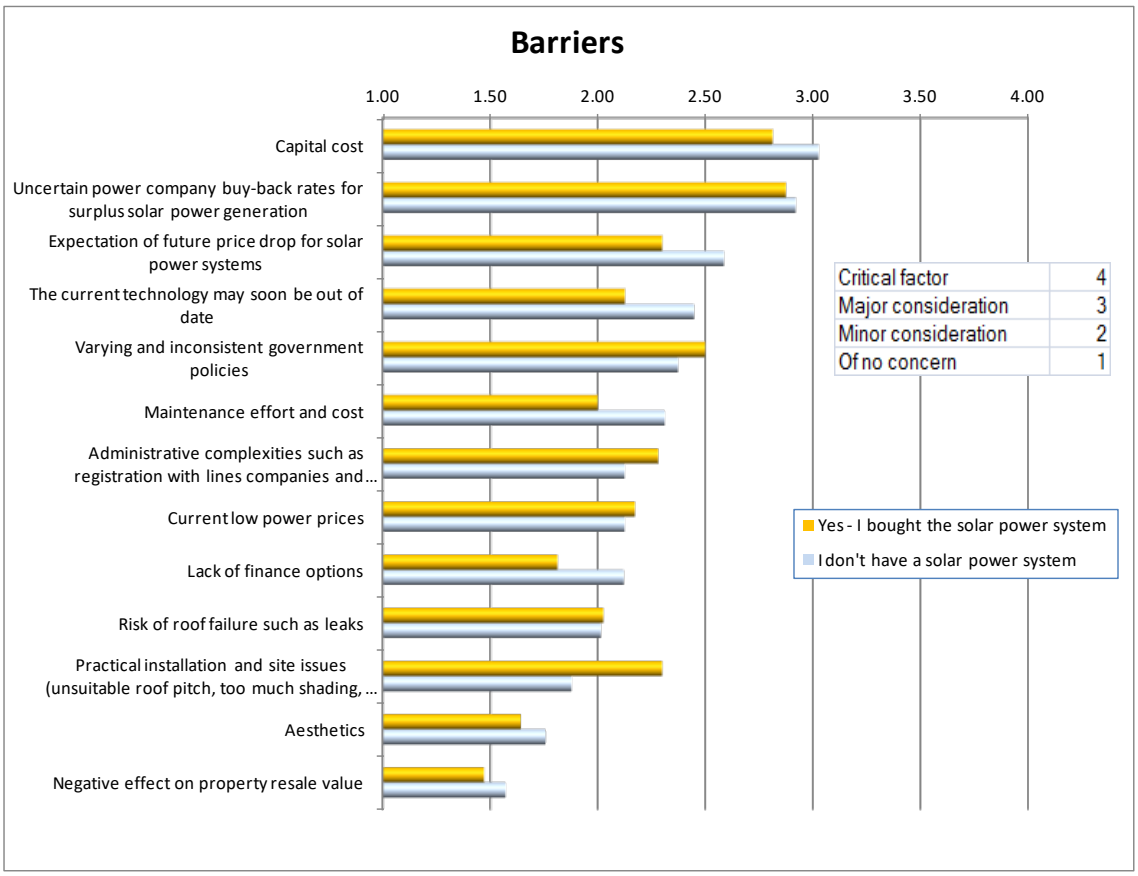


Figure 9. Barriers for solar power

Several of the most frequently reported barriers were of a financial nature. It should be noted that buy-back rates (feed-in tariffs) by power companies were the second most important barrier. Combined with the fact that respondents also reported a lack of clear information about buy-back rates, this seems to be a critical factor that needs addressing for more effective promotion of solar power technology in New Zealand.

For many barriers, there were only small differences between owners and non-owners of solar power systems, although there were some exceptions.

Non-owners rated the following barriers as more important than owners:

- Expectation of future price drop for solar power systems.
- The current technology may soon be out of date.
- Maintenance effort and cost.
- Lack of finance options.

Conversely, solar power system owners rated 'Practical installation and site issues (unsuitable roof pitch, too much shading, etc.)' as more important than non-owners. This can probably be easily explained since non-owners did not experience the practical issues related to the solar power installation.

Figure 10 shows the frequency at which respondents selected the 'I don't agree with this statement' response. About 40% of respondents did not agree that current power prices are low, and around 30% of respondents did not agree that solar power has a negative effect on property resale value.

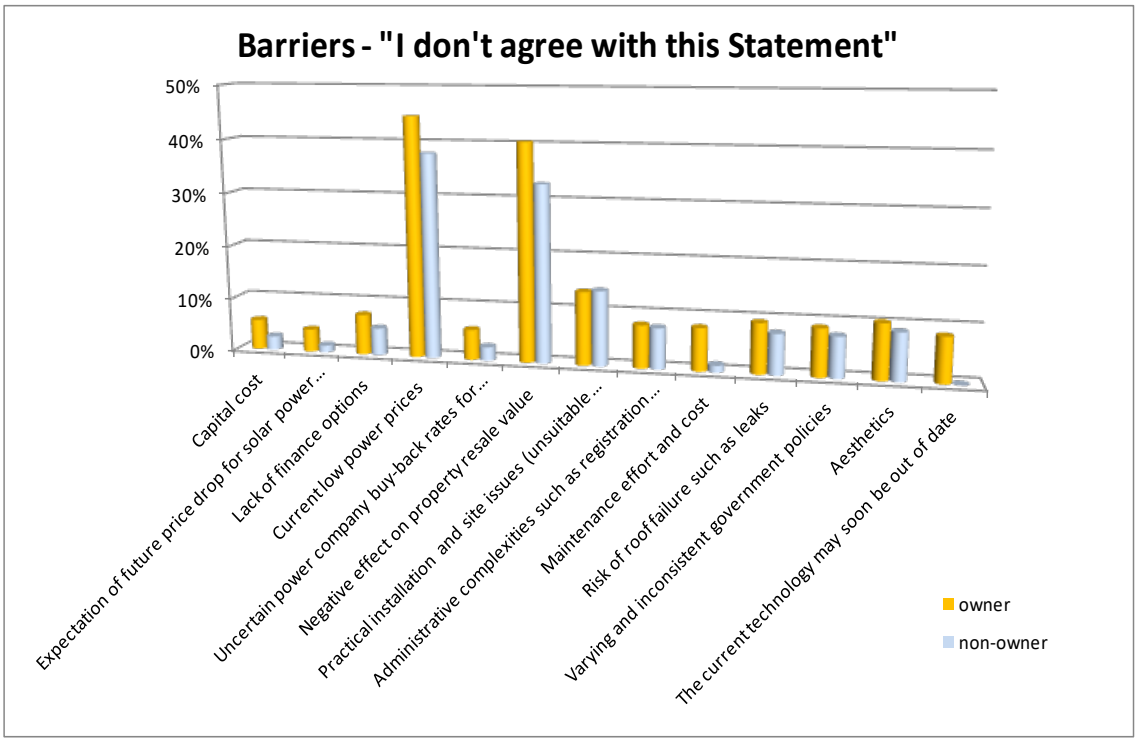


Figure 10. Number of respondents who did not agree that a barrier statement was correct.

Respondents could also add any other barriers they perceived or had experienced. About 15% of respondents listed other barriers. The answers were grouped into categories and are shown in Figure 11.

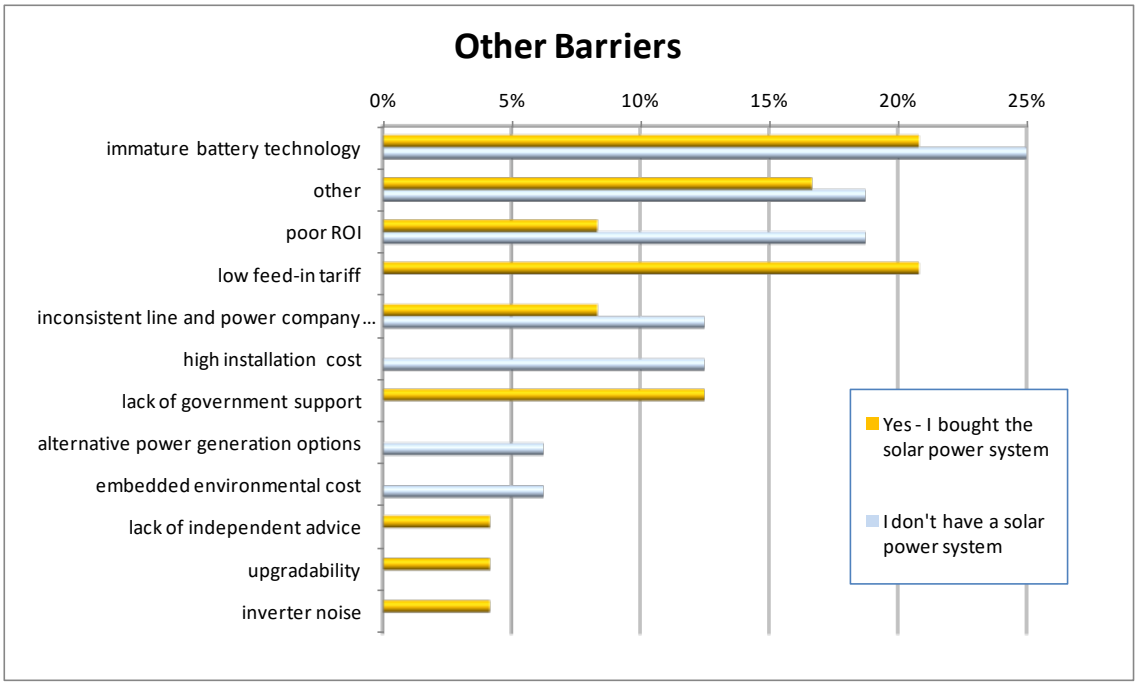


Figure 11. Other barriers (categorised).

Those respondents who did not purchase a solar power system were asked the main reason they did not go ahead. Answers were provided in free text and have been grouped into categories shown in Figure 12.

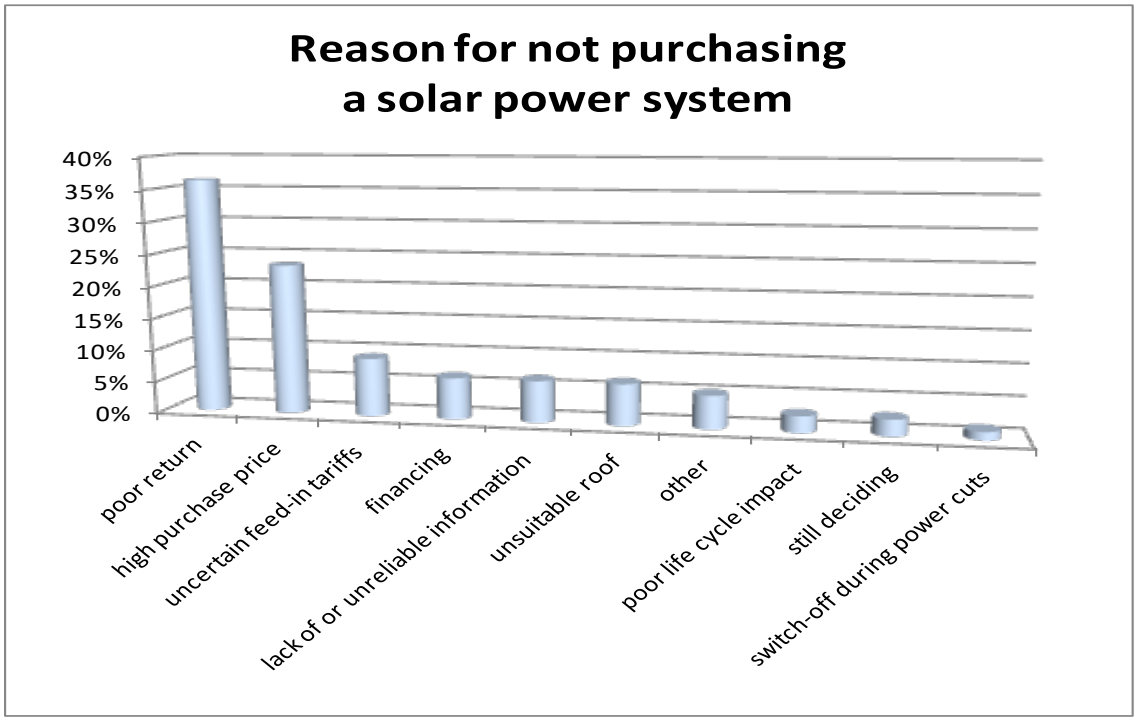


Figure 12. Main reason for not purchasing a solar power system.

The respondents were then asked what would have made them change their minds and go ahead with the purchase. The answers were also provided in free text format and then grouped into categories shown in Figure 13.

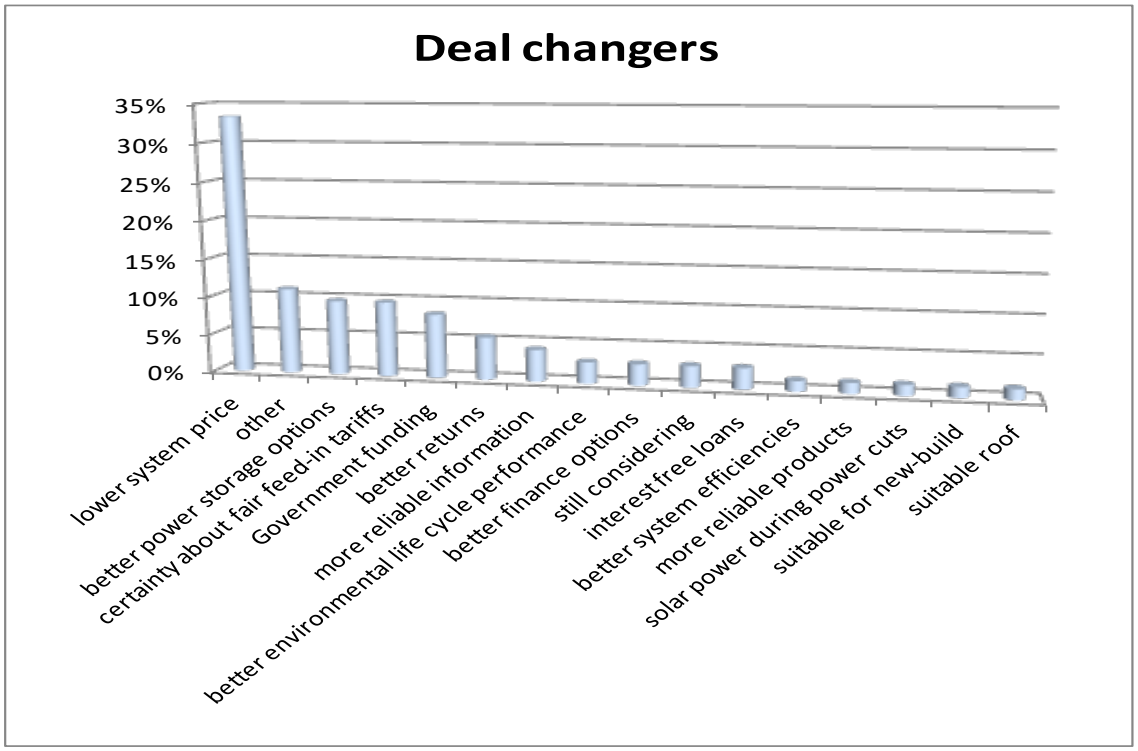


Figure 13. Factors that would have convinced non-buyers to buy a solar power system.

4.5.2 Benefits

Respondents were also asked about the benefits of solar power. The perceived and experienced benefits are shown in Figure 14.

Although power cost savings were listed as the most important benefit, a number of broader environmental benefits such as 'The home's increased sustainability' and 'Support of renewable energy' ranked highly. No large differences were apparent between owners and non-owners of solar power systems.

Interestingly, 'Self-sufficiency in case of power cuts' was rated highly by both owners and non-owners of solar power systems. However, this is not a factual benefit because, for safety reasons, grid-connected solar power systems need to be turned off in the case of power cuts.

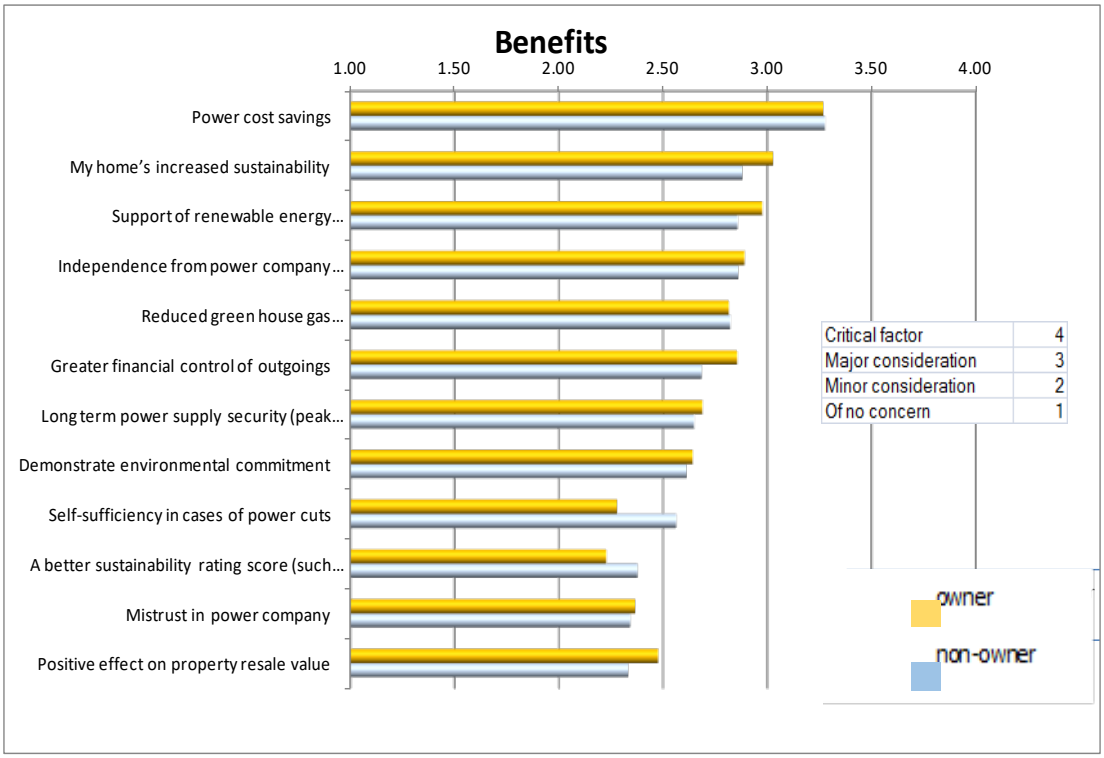


Figure 14. Solar power benefits.

As with barriers, the respondents were given the option to state that they did not agree with a particular statement. Figure 15 shows the responses. Owners of solar power systems were better informed that their solar power system needed to be turned off during a power failure for safety reasons, but it is interesting that only about 20% of owners noted this.

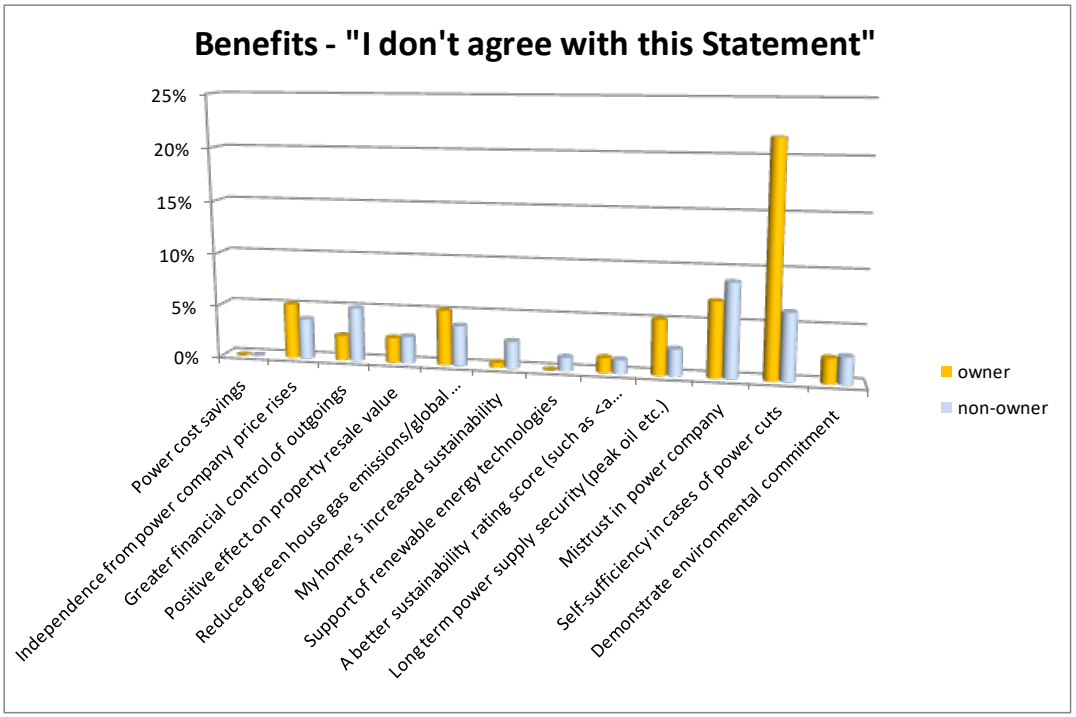


Figure 15. Number of respondents who did not agree that a benefit statement was correct.

Figure 16 shows other benefits that were mentioned (as a percentage of all 'other benefits'). As for the barriers question, responses were given in free-text format.

The responses were not always logical. Some answers actually referred to barriers rather than benefits (rather than using the 'I don't agree with this statement' answer). This suggests that some respondents seem to have used this question to mention any other issues that were related to benefits and barriers.

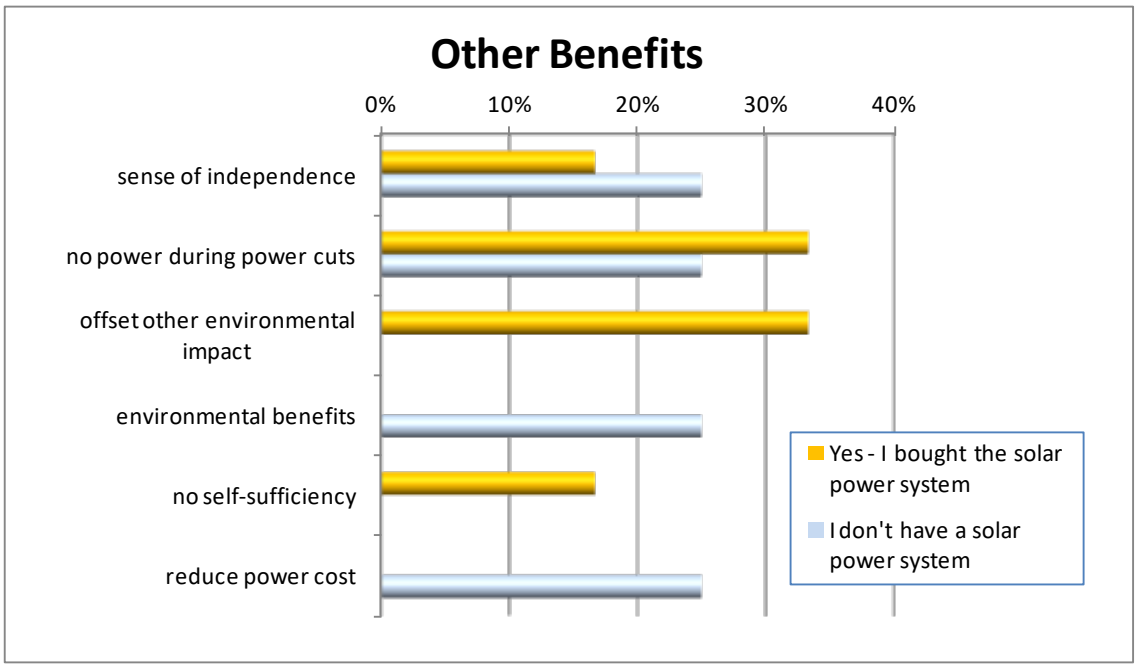


Figure 16. Other benefits (categorised).

4.5.3 Willingness to pay

The survey asked respondents whether they would be willing to pay more, less or the same for a house that had solar power installed. In a subsequent question, the survey asked how much more or less respondents would pay. If they would pay more, they were asked to enter a positive number, and if less, a negative number. An example was given to explain this. The wording of the question is reproduced below:

Q. Would you pay less or more for a house than for the same house without a solar power system?

- *I would pay less for the house with solar power*
- *I would pay the same*
- *I would pay more for the house with solar power*

Q. Please enter how much more or less you would pay.

(Example: If you would pay $10 less please enter '-10', if you would pay $1000 less please enter '-1000', if you would pay the same please enter '0', if you would pay $10 more please enter '10', etc.)

In hindsight, there were two issues with the structure of these two questions.

- Some respondents pointed out in their general feedback to the questionnaire that the question did not specify the size of the solar power system. It was therefore

somewhat arbitrary to ask how much more the respondents would pay for a house with solar power. This is acknowledged, and the question should have been worded more accurately. However, we believe that, in spite of this shortcoming, the responses do give a general reflection of how buyers value an 'average size' solar power system when purchasing homes.

- The second issue relates to the amount respondents were prepared to pay. There were a number of responses showing '10' as an answer. It is unlikely that the respondents were suggesting they would pay $10 more for a house with solar power. There were also a number of responses where the respondents stated they would pay more for a home with solar power but entered a negative value for the amount and vice versa. If this was the case (value of '10' or contradicting value), the answers were ignored in the analysis.

Only three respondents reported they would pay less for a home with solar power although all three actually entered positive values (two $5,000 and one $10 response), thus negating their responses.

Figure 17 shows the percentage of respondents who were prepared to pay more, less or the same for a home with solar power. There is a marked difference between current solar power system owners and non-owners. 70% of current owners would pay more for a home with solar power and about 25% the same. Of the non-owners, about 50% would pay more, and slightly more than 40% would pay the same. This clearly shows that most of the current owners perceive a real value from their solar power system and would be prepared to pay more for a solar-powered home in the future.

For both owners and non-owners, the number of respondents who would pay less is insignificant (less than 2%). The argument that solar power could reduce a home's resale value due to aesthetics or maintenance requirements or any other reason is therefore not supported by these survey results.

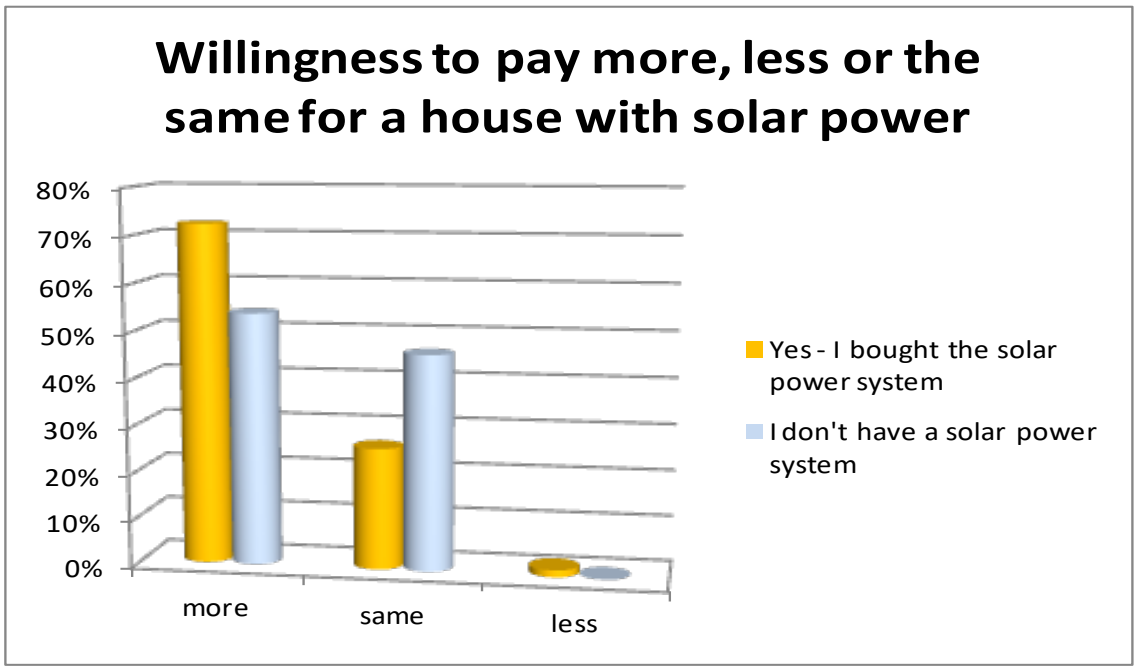


Figure 17. Willingness to pay more, less or the same for a house with solar power.

The second part of the question asked how much more or less people would be prepared to pay for a home with solar power. As mentioned above, the number of

respondents who would pay less is very small, and their answers were inconsistent (that is, 'less' payment but positive value for the payment amount).

Figure 18 shows the distribution of the price premiums respondents reported to be willing to pay for a home with solar power.

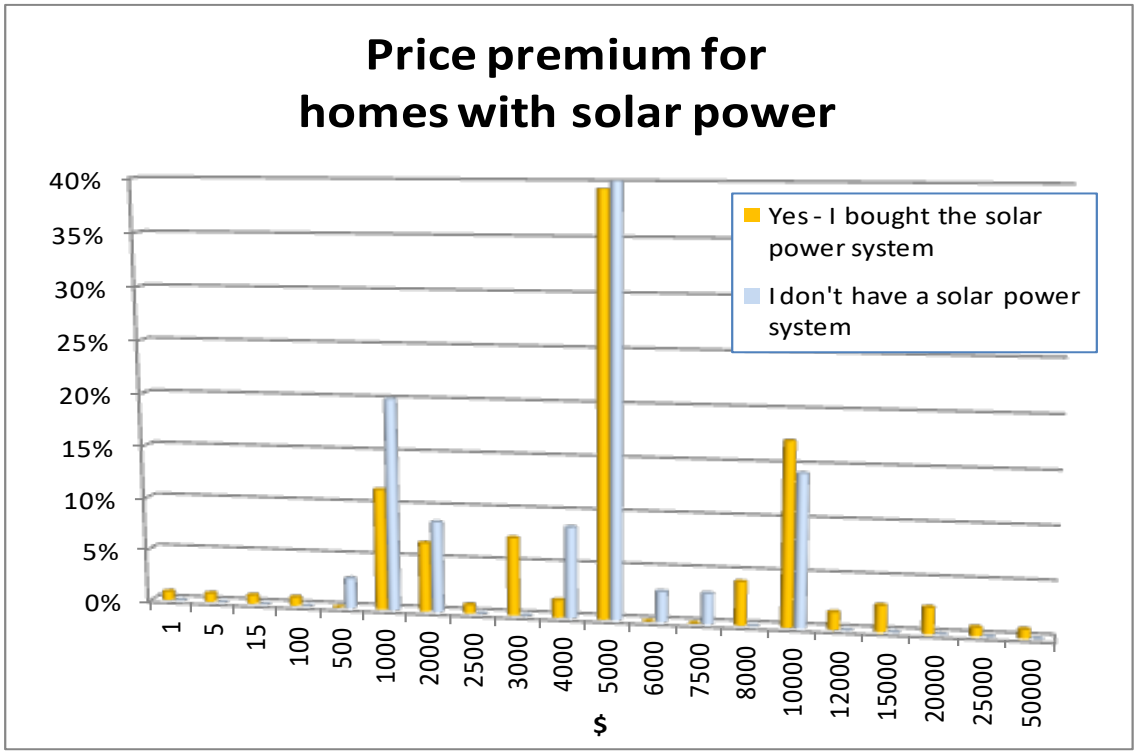


Figure 18. Price premium respondents were prepared to pay for a house with solar power.

An average value was also calculated. In order to calculate the average, a number of adjustments were made.

All respondents were included – that is, also those that reportedly did not want to pay any more for a house with solar power. As discussed above, responses with $10 values were excluded as were the three responses of $1, $5 and $15 because these values do not seem plausible. Respondents may have been unaware that they could enter a $0 value or they may have intended to enter $1k. However, this is speculation, and the numbers were therefore ignored. Values where the respondent had entered conflicting data (that is, pay 'the same' but entered a $5,000 value) were also excluded.

Due to these corrections, the average premium should be used with caution. The average value was $3,977. The median value for all respondents was $3,000–$4,000 for owners and $1,000 for non-owners. For median calculations, the outliers ($1, $5 and $15) were included.

Although the buyers of solar PV attributed a median price premium of $4,000, their 3 kW systems probably cost in the range of $10,000–15,000. This may seem contradictory but could simply reflect the fact that a used item will generally command a lower price than a new one (shorter life expectancy, no opportunity to customise to personal needs, unknown service history, etc.) This result conflicts with many

international studies[1], which show that homes installed with PVs attract a price premium approximately equivalent to or above their installation cost – for example, Hoen et al, 2015 and Wissink, 2013.

4.5.4 General attitudes towards solar power

The survey also asked whether people in general thought that New Zealanders should install more solar power systems. This question was aimed at establishing a general attitude towards solar power without influence of personal constraints or motivators.

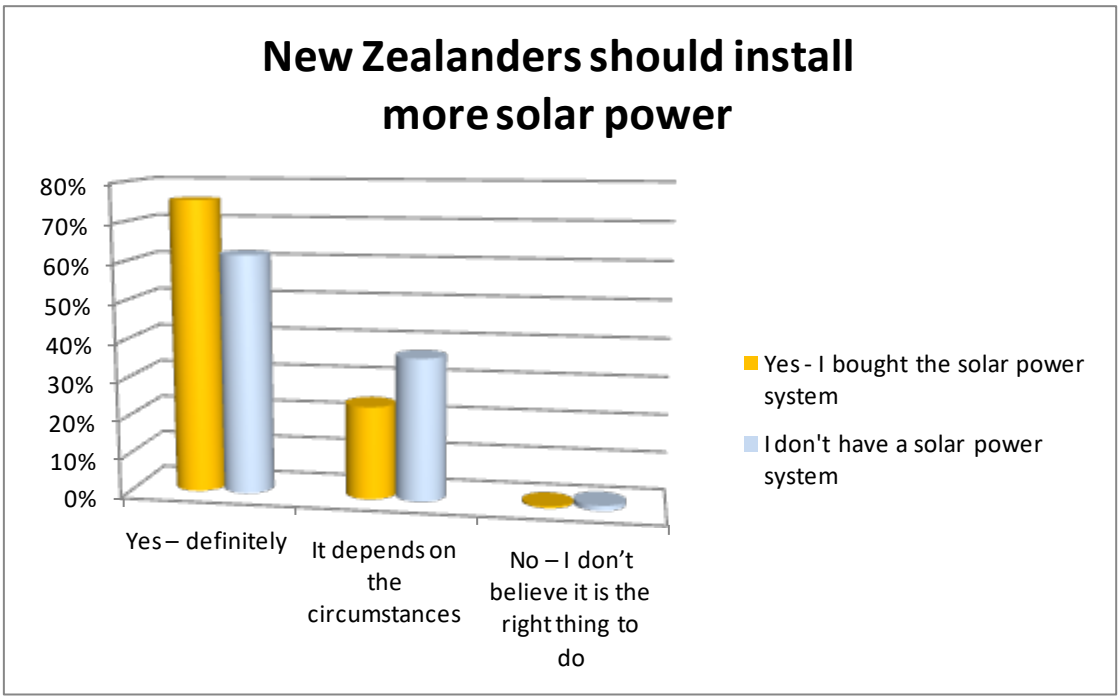


Figure 19. General attitude towards solar power

A large proportion of interviewees, both owners and non-owners, responded strongly affirmative to the question of whether solar power should be installed by more New Zealanders. It has to be kept in mind, of course, that the survey participants were all people who already showed a serious interest in solar power. The result is therefore not representative of the New Zealand population as a whole.

However, one interesting aspect is that this result indicates that those people also have a general positive attitude towards solar power. In terms of the theoretical decision hierarchy (see Section 3), this result is representative of the experiential hierarchy model. For marketing strategies, it suggests that consumers would respond well to emotional advertising messages.

[1] One of the most comprehensive international studies, conducted by Lawrence Berkeley National Laboratory (Hoen et al., 2015), found that homebuyers were willing to pay a premium of around US$14,000 for an averaged sized system. https://emp.lbl.gov/publications/selling-sun-price-premium-analysis

4.6 Summary

In all, just over 300 people responded to the online survey questionnaire. Results showed the following:

- **Knowledge and information** on PV: most respondents reported they had a 'good understanding' or are 'very knowledgeable' about solar power. Those people who did not buy a solar power system considered themselves less knowledgeable about solar power than those people who bought solar power systems.
- **Information gaps** on PV: respondents generally felt well informed. The largest information gaps were around the feed-in tariffs, track record of the product and company, the personal power cost savings and how the solar power would affect the home's energy
- **Trustworthiness of providing useful information**: with the exception of real estate agents, the average trust level was similar for a range of information sources, such as 'Internet web pages' (by far the most frequently consulted resource), 'Technical experts from solar power sales companies', and others.
- **Barriers for using solar power generation**: the most frequently reported were of a financial nature.
- **Benefits of solar power**: power cost savings were listed as the most important benefit, with 'The home's increased sustainability' and 'Support of renewable energy' ranked highly also.
- **Willingness to pay**: for both owners and non-owners, the number of respondents who would pay less is very small (less than 2%). 70% of current owners would pay more for a home with solar power while only about 50% of the non-owners would pay more.

So, in terms of what has supported people to move from thinking they want a PV system to buying one, it is likely that the following all contributed: information from the internet, perceived savings in power costs and the anticipated higher resale value (for current owners).

Conversely, in terms of what issues might lead to potential purchasers of PV systems rejecting this technology, it is likely that the following all contributed: various financial issues (including first-cost and unknown buy-back rates), information provided by real-estate professionals and the resale value (for non-owners). These issues are explored further in the following section.

5. Face-to-face interviews

Between November 2015 and January 2016, 30 face-to-face interviews were conducted with solar power system owners and potential buyers. An additional interviewee was unable to meet but sent in the answers to the interview questions via email.

15 of the interviews were conducted in Auckland with the other 15 in Wellington. Half of the interviewees owned a solar power system, and half of them didn't but had contacted a solar power company within the previous 2 years for a consultation and quote.

The following section summarises the answers given in the interviews:

What size is your solar power system?

Mostly 3 kW.

When did you buy the solar power system? (asked to owners only)

Ranging between 6 months and 2 years.

Tell me about the process of buying your solar power system. (asked to owners only)

Frequently, people had thought about solar for a long time and were then prompted to action by a cold call. Few took the initiative themselves and contacted a solar company. A relatively large number of buyers received a quote from only one company before deciding to go ahead, but most did some research on the internet beforehand.

In general, experiences with solar companies were good. Salespeople were knowledgeable, reports were informative and the installation went smoothly (with some exceptions).

A large number of owners reported they had significant hassles having their systems connected by the power companies. This took several months in some cases.

There was also general displeasure with the reduced or low buy-back rates.

When were you looking for the solar power system? (asked to non-owners only)

Between 6 months and several years ago.

Tell me about the process of looking for a solar power system. (asked to non-owners only)

Several people were cold called, but many also contacted a solar company at their own initiative. Reasons why they did not proceed varied, ranging from personal family reasons, financial uncertainties and plans to move house or renovate.

Low return on investment – often linked to lack of cost-effective storage technology and/or low buy-back rates – was most frequently mentioned as the reason for not going ahead.

Several people noted the lack of consumer-friendly tools and information on the internet. Information often seemed too technical and theoretical.

What were your main considerations (pros and cons) when looking for a system?

Most-frequently mentioned reasons for using solar power were independence from the power companies and the long-term financial savings. A few interviewees also referred to environmental and altruistic reasons.

Barriers included low return on investment, often related to lack of cost-effective storage technology and low buy-back rates, as well as customer-specific reasons such as personal family circumstances, job uncertainty, imminent moving or renovating a house and lack of capital.

Aesthetic reasons did not seem to play a major role, but a solar power system was also generally not considered to be a value-adding feature to the property.

How important are features such as real time feedback and historic data logging?

There was a big split in opinion on this. For the majority, real-time performance metering was not important, but some users were prepared to pay $500 or more for this feature.

Did you consider alternative options to spending the money on a PV system? Which ones? (kitchen upgrade, travel, investment, saving, etc.)

Usually, people had not weighed up other options for spending the money, although in a few cases, the fact that they planned to renovate the house first would have affected the affordability and timeliness of the solar power system purchase.

Why didn't you buy a PV system earlier? (asked to owners only)

Many owners had moved into their property only in the last few years. Some owners also referred to recent system price drops and to the cold calling that prompted them to go ahead now.

What was good and what was bad about the company you bought the system from? (asked to owners only)

Good:

- Most owners were pleased with the consultation and the installation. Most consultants were reported to be knowledgeable and provided suitable information and guidelines.

Bad:

- Some owners mentioned the lack of follow-up calls and insufficient technical guidance, for example, on how to read the solar production on the inverter or missing disclosure that the solar power system does not provide power to the house in the case of grid power failures.
- The most frequent concern was the time and hassle to get the power company transfer completed, although most owners appreciated that this was not under the control of the solar company.

- The fact that one of the companies went into receivership shortly after the purchase and any associated warranty issues was mentioned several times.

How did you finance the system? (asked to owners only)

Most owners had sufficient cash, although some sold shares or similar investments to raise the funds. A smaller proportion used loans and mortgages to finance the system.

Did the solar power system meet your expectations? If not, what was different (better or worse)? (asked to owners only)

Most owners reported that the system met their expectations, although a significant proportion said that the winter production was lower than expected.

Several referred to the unexpected drop in buy-back rates from power companies.

In hindsight what would you do different in terms of the buying process? (asked to owners only)

Most owners were happy with their purchasing process, although some noted they should have done more market research beforehand.

What would you do different in terms of the chosen system, if anything? (asked to owners only)

In hindsight, several owners would install more panels or a larger inverter.

Some were also referring to going off the grid or using batteries, while acknowledging that battery technology was quite expensive at the time and still is.

Why didn't you buy a system? (asked to non-owners only)

People who did not buy a solar power system most frequently quoted the poor economic return as the main reason for not going ahead. A smaller number also referred to personal circumstances or the fact that they were moving or renovating their house soon.

When prompted, most interviewees did not believe the solar power system would significantly increase the property value in the general market, even though they personally would be prepared to pay a premium for a house with solar power.

Did you consider alternative options to buying a PV system? (kitchen upgrade, saving, etc.) Which ones? Did you implement any of these? (asked to non-owners only)

Most non-owners did not weigh up alternative options to spending the money. Only in some cases did they consider home alterations as alternatives.

What would need to change in order for you to reconsider and buy a system? (asked to non-owners only)

About half of the non-owners referred to lower prices or higher buy-back rates or government subsidies to make solar power systems more cost effective. The other half referred to changes in personal circumstances, in particular, moving or completing house renovations.

What was good and what was bad about the companies that tried to sell you a PV system? (asked to non-owners only)

In general, non-owners were also happy with the consultation process, although some felt that technical expertise was lacking or solar generation projections were unrealistic. Several noted they did not like that some sales consultants tried to push other unrelated products.

What advice would you give to other potential buyers?

The large majority of interviewees were positive about solar power systems in general. Unsurprisingly, interviewees who did not purchase a system referred mainly to the issues that caused them not to buy a system, such as doing a thorough financial analysis. Several said they would suggest to other potential buyers to do more research and to be very clear what their personal objectives were (financial, environmental, etc.).

Do you think the government should support renewable energy? If so, how? ($, information, regulation…)

Almost all of the interviewees thought the government should support solar power uptake.

Frequently, it was suggested that the government should guarantee minimum buy-back rates.

The provision of subsidies was more controversial, with a number of interviewees suggesting it would lead to price gouging by solar companies and unfair advantages for the rich. However, a number of interviewees referred to insulation subsidies as a positive example of government subsidies.

Several interviewees suggested that the government should provide a leadership role by installing solar power systems on government buildings and state houses or schools.

A number of interviewees thought solar power should be made mandatory for new houses, similar to rainwater tanks in some local districts.

Are there areas that should be more researched by someone like BRANZ regarding solar power or sustainability in general?

Several interviewees were looking to BRANZ for more user-friendly independent guidance on environmentally friendly house design and solar and wind technologies.

Some suggested that BRANZ do more research into new battery technologies, but many appreciated that BRANZ's resources would best be used to understand how to apply new technologies in the New Zealand context rather than doing fundamental technology research.

Some suggested that BRANZ should have a role in developing quality standards for solar power systems and to facilitate the process of implementing new technologies (consenting guidance, etc.).

Some people also suggested more general research topics such as collapsible emergency housing, material use, weathertightness and electric cars.

6. Conclusions

The aim of this research project was to understand the barriers to uptake of residential solar power (PV) systems in New Zealand. 301 online surveys and 30 face-to-face interviews were conducted with owners and non-owners of PV systems. Non-owners were selected from contact details supplied by PV companies of prospective customers who did not progress to purchasing a solar power system.

The research found that, whilst most respondents had an ongoing underlying interest in solar power, a large number needed prompting by proactive sales activities such as cold calling to become actively engaged in the purchase process.

Those people who purchased a system were largely pleased with its performance and had few regrets. PV companies in general seem to have provided appropriate advice, although some respondents reported that the solar generation projections seemed optimistic.

Overwhelmingly, the return on investment was the main consideration for owners and non-owners. It was also the main reason for non-owners not to proceed with the purchase.

Related to the financial performance were the PV buy-back rates offered by power companies. Many owners and non-owners expressed disappointment in the low buy-back rates. High system costs and low buy-back rates were the most frequently quoted barriers to purchasing a PV system. Other potential barriers such as system maintenance, visual impact and so on played only very marginal roles.

While most owners and non-owners were prepared to pay more for a property that had solar power (median price premium $4,000 for owners and $1,000 for non-owners), most interviewees did not believe a solar power system would mean a property value increase for the general house-buying public. This is an area that was explored in more detail with the real estate, valuer and builder professionals in the BRANZ report *Valuing sustainability and resilience features in housing* (Jaques, Norman & Page, 2015).

Most interviewees thought the government should support solar power. However, the provision of subsidies was controversial, with a number of interviewees suggesting it would distort market mechanisms with undesirable effects. However, several interviewees also referred to insulation subsidies as a positive example of government subsidies.

Several interviewees suggested the government should provide a leadership role. Installing PV systems on government buildings and state houses or schools was seen as one appropriate measure. A number of interviewees even thought that PV should be made mandatory in new houses, similar to rainwater tanks in some local districts.

References

Dean, G. (2010). *Understanding consumer attitudes*. Retrieved from https://marketography.com/tag/abc-model-of-attitudes/

Electricity Association of New Zealand. (2016). In 'Data and insights/retail'. Retrieved from www.emi.ea.govt.nz

Fishbein, M. and Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, Massachusetts: Addison-Wesley.

Ford, R., Stephenson, J., Scott, M., Williams, J., Wooliscroft, B., King, G., and Miller, A. (2014). *PV in New Zealand: The story so far*. Dunedin, New Zealand: Centre for Sustainability, University of Otago.

Hoen, B., Adomatis, S., Jackson, T., Graff-Zivin, J., Thayer, M., Klise, G., and Wiser R. (2015). *Selling into the sun: Price premium analysis of a multi-state dataset of solar homes*. LBNL-6942E. USA: Lawrence Berkeley National Laboratory.

Jaques, R., Norman, D., and Page, I. (2015). *Valuing sustainability and resilience features in housing*. Study Report SR333, Wellington, New Zealand: BRANZ.

Kiel, R. (2012). *An investigation into customer caution in photovoltaic markets*. Thesis for Bachelor of Engineering in Photovoltaic Engineering, University of New South Wales. SOLA3655/SOLA4911. Retrieved from http://www.solarchoice.net.au/blog/an-investigation-into-customer-caution-on-photovoltaic-markets/

King, G., Stephenson, J., and Ford, R. (2014). *PV in Blueskin: Drivers, barriers and enablers of uptake of household photovoltaic systems in the Blueskin communities, Otago, New Zealand*. Dunedin, New Zealand: Centre for Sustainability, University of Otago.

Margolis, R. and Zuboy, J. (2006). *Nontechnical barriers to solar energy use: Review of recent literature*. Colorado: National Renewable Energy Laboratory.

Miller, A., Williams, J., Wood, A., Santos-Martin, D., Lemon, S., Watson, N., and Pandey, S. (2014). *Photovoltaic solar power uptake in New Zealand*. Presented at the EEA Conference & Exhibition 2014, 18–20 June.

Nielsen. (2013). *Under the influence: Consumer trust in advertising*. Retrieved from http://www.nielsen.com/us/en/insights/news/2013/under-the-influence-consumer-trust-in-advertising.html

Novack, J. (2010). *Internal influences – lifestyle and attitude*. Retrieved from http://www.marketingteacher.com/lesson-store/lesson-internal-influences-lifestyle-attitude.html

Rogers, E. M. (2003*). Diffusion of innovations*. New York: Free Press.

Ryghaug, M. and Sørensen, K. H. (2009). How energy efficiency fails in the building industry. *Energy Policy*, *37*(3), 984–991.

Squires, H. (2008). *Consumer choices on household solar rooftop systems*. Research funded by the UCF Boardman Foundation Grant Program. Retrieved from http://media.cbsm.com/comments/168517/Heather_Squires_Final_Paper_6.22.08.pdf

Wissink, T. P. (2013). *Home buyers appreciation of installed photovoltaic systems. A discrete choice experiment.* Eindhoven, The Netherlands: Eindhoven University of Technology.

Appendix A: List of face-to-face interview answers

Below are the answers of all of the people interviewed:

When did you buy the solar power system?

1: Owner (1.75 kW) – Auckland	1.5 years ago
2: Owner (3 kW) – Auckland	February 2014
3: Owner (3 kW) – Auckland	October/December 2014 (I moved here in April)
4: Owner (4 kW) – Auckland	December 2014
5: Owner (3 kW) – Auckland	About 1 year ago
6: Owner (5 kW) – Auckland	June 2014
7: Owner (3 kW) – Auckland	October 2014
8: Owner (2 kW) – Auckland	January 2015
9: Owner (3 kW) – Wellington	2013
10: Owner (3 kW) – Wellington	April 2014
11: Owner (3 kW) – Wellington	July 2014
12: Owner (3 kW) – Wellington	14 months ago
13: Owner (3 kW) – Wellington	December 2014
14: Owner (1.75 kW) – Wellington	January 2015
15: Owner (3 kW) – Wellington	1 year ago (hooked up 1 week before Christmas)
16: Owner (3 kW) – Wellington	14 months ago

Tell me about the process of buying your solar power system.

1: Owner (1.75 kW) – Auckland	I did an environmental study course in California some years ago and am very keen on sustainable living. It is not only about the physical and economic side of it. The next big thing will be electric cars. I am interested in this for a while. I then found an advert in the public press and rang them up and got a price. I also got one other quote. The company used Google Maps to show where the panels would be, and we decided to place them on the garage. That also reduces any risk of fire to the house. I withdrew some money and made a deposit. It was installed within 10 days. The only hassles were with Meridian. It took a couple of months to sort this out. But <Company 2> was very helpful and still are. They will soon put my water heater on a day timer.

2: Owner (3 kW) – Auckland	A supplier gave a presentation to our company (architecture). At the time, I was doing extensions to our house. I had do redo the wiring. I received three quotes from <Company 2>, <Company 4> and <Company 3>, all of them remote quotes without any visits. I chose <Company 2> because the panels are German, and they had comparable prices to the other companies, which had Chinese panels. They inspected my house and confirmed their quote. We changed our power company from Contact to Meridian. Because we did the rewiring and needed a new meter board, it took a long time. Meridian didn't have an import/export meter in stock. To get this sorted took 2 months, during which we did not have solar power. Once it was done, <Company 2> came back and reconfigured the inverter because we noticed that all our power was exported.
3: Owner (3 kW) – Auckland	I was always interested, so I contacted <Company 1>. There are people at home most of the day, and we try to adjust to different usage patterns. <Company 1> called me and then their sales consultant come by later. He was good. I had also seen some things on the home show and knew that the prices had dropped, so I decided to go ahead. Then it was handed over to the installation team, but the installer didn't show up. They were totally unorganised. At some stage, two installation teams showed up, and they started to fight in front of me whose job it was. Once it was installed, I also had trouble getting the right paperwork. There were 3 months between the agreement and the installation being complete, so I couldn't get it activated. The <Company 1> price and salesman was good, but there was no coordination within the company. The installation quality was good though.
4: Owner (4 kW) – Auckland	We discussed it in previous years. A friend of ours has a solar power system that is grid connected. We looked at several home shows as well. Then we received a cold call. A <Company 1> consultant visited us later. He looked at our power bills and measured the roof. The whole visit took about 90 minutes. We were able to get an interest-free loan until January 2016. They quoted the system on the spot and adjusted it down a bit later because they decided that they didn't need scaffolding. They were very helpful organising the Q Card arrangements. The installation went very smoothly, and they very very pleasant. Two weeks later, we had it connected with Vector Energy.
5: Owner (3 kW) – Auckland	I was thinking about it for a long time. When I walk the dog, I go past houses with solar power. My brother in Australia also has a solar power system and loves it. It is more economic in Australia though. Then I received a cold call. I rang some other customers from the same company. They said that it is difficult to judge the economics, but they were all pleased with the systems. They said that the whole process went well.

	So I got the company to give me a quote after I done a little bit of searching on the internet. The sales consultant visited and gave me a quote. I considered it and agreed. The whole installation went very smoothly. They did not leave any metal filings on the roof. Only the connection with the power company went terrible. I changed from Genesis to Meridian, and Meridian was terrible.
6: Owner (5 kW) – Auckland	I did my own research online, but the stuff is too complex for average consumers. There should be online quotes for this. I have actually published my own results with the pay-back times online on LinkedIn so that other people can learn from it. In other countries, there are lower power prices. So there, it is mainly green reasons why consumers choose solar power. My father is a roofer, and he worked with the General Manager of <Company 2>. So we met with him, and he filled in the blanks for us. I calculated the pay-back time for the given sunlight hours and looked at the practicalities such as roof layout, battery options and inverters. <Company 2> visited after we had accepted the quote. It was installed 3 weeks later. <Company 2> was really good, but they had given us no warning about the difficulties with the power companies. It took 2 months to sort that out before everything worked. We got 17.5 c/kWh with Contact Energy. Some people may have mixed experience with solar power because of the power companies. I did the cost-effectiveness calculations and oversized the system, so the export buy-back rate is quite important for me. I would have got a 7.5 kW system if there would have been enough space on the roof.
7: Owner (3 kW) – Auckland	When I moved here, I rang several PV companies, but most of them didn't cover the area where I live. Then I went to a home show and spoke to someone from <Company 1>. They did cover the area here. They had the best price but no micro inverters. But their panels are good quality. I did some more research on the internet and was talking to some other companies but think that many of them are ripping you off. I wanted a 3 kW system, although I am by myself, because of the spa pool, and I have some other electric appliances such as the weed eater and dryer. Therefore I wanted a large system. <Company 1> was good except for the sales manager. The price was very good, and the installation went smoothly, only the transfer to Meridian was a big hassle. It took from October to December for the smart meter to be installed, and now they dropped the buy-back rate to 7–8 cents/kWh.
8: Owner (2 kW) – Auckland	I was always interested and looked at the numbers. It has become more viable in recent years. Then I received a cold call and the sales consultant visited me. I did no other research beforehand but a little bit afterward. I signed up a few days later after thinking about it.
9: Owner (3 kW) – Wellington	Old solar hot water system worked great. Rural property uses off-grid water and usage. That means we are very dependent

	on power (pump…). There are often power cuts in the rural setting. Therefore, it made sense to generate own power. I searched the internet and realised that grid connected PV can't be used during power cuts, but I was determined anyway. I previously attended a sustainable design course (BBE) and have friends at VUW (<Consultant 2>). There were also some features about PV on the radio. Initially, I had considered a wind turbine even before the house was built 10 years ago, but the technical advisor told me that the location is unsuitable. The builder had already built sustainable houses before, and I was kind of committed to add the PV already before. Then <Company 1> cold called. <Company 1> calculated the pay-back and it stacked up. There were some installation issues. We had agreed to have it installed on a tilted frame, and the installers forgot, but it turned out that my wife preferred the flat installation because it is less visible on the roof. I prefer it because it is less vulnerable to the wind. I was impressed by the <Company 1> thorough inspection process. Also, the negotiations with the power and lines companies went smoothly.
10: Owner (3 kW) – Wellington	Received a cold call from <Company 1>. Appointment a few days later. I had not done any previous research. We did not have any 'spare' money because we lost a lot on the share market but have managed to save up a bit again. This was difficult as a retired couple. The PV looked better as a financial investment than putting it in the bank and was safer than investing in the share market. It also helped us to reduce our monthly outgoings, which is important when on a small pension. I did not consult with other PV companies. The system was guaranteed for 25 years, but I also requested (and received) a performance guarantee from <Company 1> for the first year. The ROI for investing $10,000 for the PV system was better than a bank investment. Someone told me later that it may have been better to invest in the PV company, but we are happy with our decision.
11: Owner (3 kW) – Wellington	Been thinking about solar power for some time. Attended a home show to check systems and installers (and cost and how long before it pays for itself) So our age and how long we will live in the property related. However, money was not the main factor. Power prices are always going to increase. I also considered a wind turbine because our location is very exposed. I went to some home shows and saw <Company 1> there. They were likable people and were backed by an international company. In the end, they provided great service. The only difficult thing was the connection with Meridian Energy. We went to them because they offered to continue the higher buy-back rates. But later on, <Company 1> went bust. That was after the work was completed, so it was no problem for us.

	I got my information mainly from going to shows. I also talked to some friends who have a system, but I did not do a detailed cost-benefit analysis. But I asked them about the pitfalls. Their system was not working initially. The <Company 1> report had a good shading analysis
12: Owner (3 kW) – Wellington	I wanted it already for about 3–4 years. A friend had a system installed about 2 years ago, and it worked well, but he had it self-installed. At that time, it cost him $18,000. I looked for several companies on the internet. <Company 1> responded the quickest and seemed to be best organised. They quoted $10,000–12,000, which was much cheaper than my friend's system.
13: Owner (3 kW) – Wellington	I thought about it for several years. Initially, I thought of it for the beach house. I did have money in the bank but at a low interest rate. Then I did some courses about sustainability. <Consultant 1> gave me some advice, although he mostly does off-grid systems. For my husband, the return on investment was really important. For me, it was also the environmental aspect of it. Initially, I wanted to use an installer who had also done several small wind turbines, but he is a one-man band and it seemed a bit risky. Therefore, I contacted <Company 1>. Their salesperson was very good. During the installation, we, for example, mentioned that our house is very exposed to the wind, and they listened and installed some additional fixings.
14: Owner (1.75 kW) – Wellington	We are a small power user because we are using a lot of gas. We visited a few home shows. A few months later, we called a few solar companies but initially left it. Later, we received a cold call from <Company 1>. We thought about it, in particular, the pay-back, because we are away mostly during the day and are not interested in selling it back to the power company. <Company 1> explained the pay-back period. We were just sick of paying the power companies, and we wanted to do the right thing. It is also nice to be the first house with solar power in the whole street. It's nice to have new technology on an old house. <Company 1> sent us a report. We briefly looked at other prices on the internet, for example, <Company 3>. Our friends had good experience with <Company 1>. That's what swung us.
15: Owner (3 kW) – Wellington	My friend is off the grid. He first used a generator and now two solar systems and a water turbine. I used to be a fisherman, and we had PV systems on the boat. I usually don't make decisions fast. First, I wanted to build the PV system myself, but then I rang a few companies. No one rang back. So I went on the internet and spoke to a Nelson company. They were very helpful, but talking to them, it became clear that I should not install it myself. I also saw some ads from that carpet company, but they could not install it in the Wairarapa and they only had smaller systems.

	Then I saw an ad for <Company 1> in the paper. I rang them, and 2 days later, their sales consultant visited me. It was good service. I had $10,000 to spend. He quoted me on the spot, and I agreed on the spot. The whole process took only 4 weeks. I would actually go off the grid if I had the money because I had horrific power bills. But the whole process was SO easy. Earlier, I had rung <Company 5>, but no one returned the call. Also, another company I rang never returned the call. Even the tradespeople at <Company 1> were the most professional of all the tradespeople I ever met. And when they did not have the quoted panels in stock, they upgraded me with better panels for the same price.
16: Owner (3 kW) – Wellington	I was quite disinterested in solar power. Then I received a cold call from <Company 1> about solar power and agreed that a consultant visits me. They came a few days later, measured it up, checked the roof structure and gave me a plan with orientation etc. One week later, they gave me a quote. The sales manager and a consultant visited me. They seemed very experienced (one of them had installed systems in the Wairarapa before). The manager told me that his mother and father had a 3 kW PV system and are happy with it. Then they offered me a price reduction. I had to decide within 7 days and agreed after 4 days, after I had done a little bit of research on the internet about prices. Their system is made in China, like most systems, but designed in Canada. Then they measured it again, and it turned out that the orientation needed to be changed because there was not enough space to walk around the panels for maintenance. Later during the installation, it turned out that the brackets did not fit, but finally they got some locally made of stainless steel that fitted. They were very enthusiastic and friendly. The installation took about a week, and they were very tidy. The certification went also very smoothly. Wellington Energy gave permission very quickly. With Meridian, it took about 2 weeks, which seems to be normal with Meridian.

When were you looking for the solar power system?

17: Non-owner – Auckland	6 months ago
18: Non-owner – Auckland	A few months ago, after the Build/Design NZ Expo
19: Non-owner – Auckland	1 year ago
20: Non-owner – Auckland	Have been for years
21: Non-owner – Auckland	1.5 years ago
22: Non-owner – Auckland	12–18 months ago
23: Non-owner – Auckland	2 years ago
24: Non-owner – Auckland	2014
25: Non-owner – Wellington	Last year – <Company 1> contacted me
26: Non-owner – Wellington	Last year

27: Non-owner – Wellington	1 year ago
28: Non-owner – Wellington	Initially about 5 years ago
29: Non-owner – Wellington	1 year ago
30: Non-owner – Wellington	1 year ago
31: Non-owner – Wellington	1 year ago

Tell me about the process of looking for a solar power system.

17: Non-owner – Auckland	I was cold called twice within a week. I booked two visits. The first company didn't know their products. They measured the roof, asked for the power bills and then suggested a 'starter pack'. But they were just going through the formats. They said it should save me 25% of the power bill, but they did not do calculations. The second company knew their products and explained that, for example, the micro inverters would be a better product. They did the calculations but just took the percentages of the usage and did not use a solar profile calculation. They offered an interest-free loan for 5 years, but then it would increase to 27% interest. None of them could show me figures that would have made it practical.
18: Non-owner – Auckland	I had a couple of assessments and quotes. It was good advice. I am interested in general and did a lot of research on the internet. I also received a flyer from <Company 3> in the mail. The Warehouse is partnering with one company and offer a fixed power price for 20 years. I got a few quotes from several power companies including <Company 2>, <Company 3> <Company 1> and <Company 7>.
19: Non-owner – Auckland	I have a science background and was always interested in solar power. My parents have a solar hot water heater. I did some online research and made an enquiry at a home show. The company from the home show then did a house visit and gave me a quote. Altogether, I got three quotes from different companies. The prices were between $7,500 and $10,000. This is still quite expensive, and there are no storage capabilities, so I decided to better wait a few years. I also visited a 'green home' in Auckland.
20: Non-owner – Auckland	Contacting suppliers and installers locally and overseas, home shows, ads, etc.
21: Non-owner – Auckland	We had a cold call and then a visit. We were thinking about it for a while but had not done a lot of research, but it turned out to be not cost effective. We plan to move house some time in the next 2–8 years, and it is not cost effective within that time. Our next house will be for 20 years, and we will then definitely look at it, but for this house, it was not cost effective.

22: Non-owner – Auckland	For years, I have been reading the papers about it. I also stayed on islands where they used solar power. I realised that, about 12–18 months ago, the prices had dropped a lot, so I contacted a solar power company online. I received a visit and a quote, but it was only somewhat viable. At the same time, we also decided to buy an investment property in Dunedin for my son.
23: Non-owner – Auckland	We went to a home show and had a look on the internet afterwards. Our son checked the financial viability using the prices we saw at the home show. At the home show, we noticed a move from solar water heating to solar power. We then had one consultant visit us, and he gave us a quote for $8,000–9,000. Our roof has a very good position. But then, our plans changed, and we are now thinking of rebuilding or to make some big changes to the house first.
24: Non-owner – Auckland	I did research on the internet and saw an advert in the paper. I ended up getting quotes from <Company 3> and <Company 1>. I had developed my own performance calculator. That showed that the <Company 3> estimates were much more than realistic. The <Company 1> quoting tool was good though. But using my own calculator, I realised that the pay-back time was simply not good enough. There were also too many risks associated with it such as finance rates (we would have to finance the purchase) and power price increases or drops. I think there are better energy-efficiency options such as hot water heat pumps. (Our gas heater is starting to fail.)
25: Non-owner – Wellington	I already have a solar hot water system that works very well and was thinking about PV for a while. Then <Company 1> rang and came out to quote. But we were already thinking of moving.
26: Non-owner – Wellington	Looking on the internet for a while, but demand assessment is important, and there are no suitable tools to do that, at least not for a casual user of assessment tools. They are too technical. But I did not have sufficient funds available. Once I have enough funds, I will get several quotes.
27: Non-owner – Wellington	I first looked for solar power and then also for insulation. I was always interested in solar power. My friends have a system. I can't exactly remember where I made contact with the solar company, but it was probably at a home show. It was not a cold call. I contacted <Company 1> and <Company 3>. I received proposals from both and was very keen to go ahead. I could have used $2,000 KiwiSaver money, and the ASB bank was prepared to match that. I spoke to my accountant, and it made financial sense. That was before the buy-back rates dropped. But my wife was a bit hesitant. In hindsight, she probably knew that our relationship would not last and therefore didn't want to commit to the investment. At that time, I also received a loan for a rainwater tank, and I looked into double glazing.
28: Non-owner – Wellington	Initially when we built a house in 2010, but we did not buy the system because we are far distance commuting and are spending only some time in the house. We were also looking

	into solar water heating at that time but have gas heating. Our peak demand would be on the weekends when we heat and cool the house. It is getting very hot in the summer. We would need heating in the morning when it is still dark, and on nice days, there is no need for heating anyway. And in the evenings, there is no solar either in winter. These were our considerations also 2 years ago when we looked into solar power. The main issue is the storability and related to the buy-back rates. We did a cost-benefit analysis. Initially, it was marginally OK, but the buy-back rates dropped. Storage technology would make a difference. There would be other options for heating, like in-slab hydronic heating, but heat pumps are better for cooling. In the summer, we have an outdoors lifestyle and leave everything open and get airflow through. We would need cooling only in the evenings, but then there is no more solar. We just considered these things ourselves and did a little bit of research on the internet such as on the EECA website. <Company 1> gave us a cold call and visited us. They are always easy to install at a later stage. We are just waiting for better and cheaper storage technology because we have quite strong environmental values. When we are retiring, the situation may change because then we will be living permanently in the house. At the moment, we are 4 days in Wellington and 3 days in our other house per week.
29: Non-owner – Wellington	As part of improving our home, for the last 10 years, we were thinking about it, but it came down to the price of the solar power at the time, and then health issues were delaying our home improvements. We must have left our contact details with one of the solar companies at a home show. Then someone visited us and gave us an assessment, but we decided that first the roof needs fixing.
30: Non-owner – Wellington	We initiated it. I am a farming consultant, and we do a lot of environmental things on our farms. When we built our house, we installed a wetback and made sure it is solar ready. Five years ago, I did the numbers for solar power. Although my brother has a solar hot water system, I found that the numbers did not stack up. There would be no break-even point because of our wetback and because we are on night rate. The cost of solar water would have been 18 c/kWh. Then I saw an ad 1 year ago and started to do some research on solar power. Initially, I planned to have an off-grid system. That would have been $23,000, but then we changed the location of our house, and it was more cost effective to be connected to the grid. We contacted <Company 1>, <Company 3> and <Company 6> to get different quotes. There were some issues because we are on 3-phase power and we would have to do some significant load shifting. But even then, we would use about 30 kWh/day in summer and 24 kWh/day in winter. Therefore, the solar power was not cost-effective.

31: Non-owner – Wellington	I always liked alternative energy. I considered a wind turbine and wanted to make one myself. My friend runs his whole house on 12 V and has installed most systems himself. I saw an ad on TV, so I rang <Company 3> and another company. I had two house visits and received a report. <Company 1> did not follow up on the visit. <Company 3> sent a quote. The break-even point would have been 10 years, but the question is whether we will stay at this place for 10 years. The ROI is just too low. The other thing is that the solar system will only augment the existing supply and will not work when there is a power failure, and selling back to the power companies is not worth while because of the low buy-back rates. So because of there is no end-to-end solution and because of the low ROI, we did not find the case compelling enough.

What were your main considerations (pros and cons) when looking for a system?

1: Owner (1.75 kW) – Auckland	I looked into wind power, those systems that are made out of converted washing machine motors, but they are too noisy for the urban environment. Pros: • No moving parts. • No maintenance. • They are good for 25 years. • ROI is 7–8%, and it will be paid off after about 5 years. • The good thing is that we will use less money for power, use less fuel and are less dependent on power companies. Cons: • Meridian Energy has dropped the buy-back rates, so we don't know how it will work as a long-term investment
2: Owner (3 kW) – Auckland	Pros: • It is lowering the household expenses. • It increased our mortgage by $50 per month and saves us $160–$200 per month.
3: Owner (3 kW) – Auckland	Pros: • Good for the environment. • Cost savings are good. • At the time, the buy-back rates were good, but now they are only 7–8 c/kWh. Cons: • We are not saving a lot.
4: Owner (4 kW) – Auckland	Pros: • The long-term power savings. • It's good for the environment. We are doing the right thing. Cons: • We actually don't care about the look of the system. It does not bother us.
5: Owner (3 kW) – Auckland	Pros:

	• There is an altruistic reason. • It is also an insurance against increasing power prices. • I didn't think about the option of storage systems. • It is a good sustainable solution. • We don't expect to get our money back. We are too old for that. Cons: • We were concerned about the look because it would break up the strong lines of the house design, but we are happy with the position where it is now. • We were also concerned that it does not damage the roof or any pipes.
6: Owner (5 kW) – Auckland	Pros: • Environmental reasons. • It is cost effective. • I believe there is a capital gain of the house. I have seen studies which say that a generation of $2,000 per year will increase the value of the house by $4,000. Cons: • I don't mind the look of it. I actually think it looks awesome. • I questioned the structural integrity of the roof (wind and water), but the PV company allayed my fears.
7: Owner (3 kW) – Auckland	Pros: • Financial independence. • I can minimise the risk of unexpected bills. • I aim to go partially or fully off the grid one day.
8: Owner (2 kW) – Auckland	Pros: • Ensuring that there are good buy-back rates. • Good return on investment. • Possibly adding value to the house in the long term.
9: Owner (3 kW) – Wellington	Pros: • Self-sufficiency (although I realised that this is not the case for grid-connected systems). We are also self-sufficient with lots of other things such as vegetables, fruit and firewood. Cons: • PV will become cheaper. I should also have already done it when building the house. It would have been a bit easier and cheaper.
10: Owner (3 kW) – Wellington	Pros: • Financial ROI. • The site was suitable on the garage roof (facing west) because there is no visual impact of the house. • <Company 1> provided a good detailed technical report with all the details I required. • The 25 c/kWh buy-back rate from Meridian was good but was not critical to our decision.
11: Owner (3 kW) – Wellington	Pros: • Annual power savings (we changed from Energy Online to Meridian to get better buy-back rates).

	• It saves money now and in the future. • After 10 years, the money is paid back, and it leaves money for life, but I would have even bought the system with a 5-year life expectancy. That way you are more independent for the power providers. • A reputable installation company. Cons: • Cost of the system. • The technology should be around long enough to have the fledgling issues sorted out. • Repairs and maintenance particularly because we are close to the sea, corrosion, but it turned out that they worked very well and they look like new.
12: Owner (3 kW) – Wellington	Pros: • It made financial sense. I have a 9% rate of return. Cons: • It was originally supposed to be installed on the garage, but that had a butyl roof and there was a leaking risk. Therefore, it was installed on the house roof. I actually prepared the roof and sealed off all the screw holes before <Company 1> installed the panels. • I was concerned about the wind ripping it off, but it turned out not to be a problem. • I was worried about salt spray, but it is washing off OK.
13: Owner (3 kW) – Wellington	Pros: • I quite like the fact that it makes a statement. We put our money where our mouth is and show our friends and acquaintances that we are serious about this. Cons: • There is an issue of how to paint the roof once the solar panels are installed, but they seem to be easy to unscrew. • We are not worried about the looks. • We are also not concerned about the structural load.
14: Owner (1.75 kW) – Wellington	Pros: • We are less reliable on the grid in respect to future price increases. • The solar power is a green renewable resource. We are doing the right thing. • We can grow it later and possibly go off the grid. Batteries are getting cheaper, and they are better technology now. Cons: • They are still expensive ($6,000). • The wind might rip them off the roof. • I also wonder about the accuracy of the financial numbers in the report.
15: Owner (3 kW) – Wellington	<Company 1> recommended a 3 kW system to be the smallest feasible system for me. If I want to add more panels, it will be cheaper because at that time inverters will be cheaper, and I had only $10,000 to spend at the time.
16: Owner (3 kW) – Wellington	Pros: • I wanted to reduce my power bill ($200/month). • I just like the idea of producing my own electricity.

	Cons: • The price. I looked at <Company 3> lease system. That seemed very complicated, and I didn't get it. • Next time if I would build a new house, I would make the roof out of PV. An Auckland company is doing that, and I saw pictures on the internet. • But I would never get batteries. I have worked in jobs where I had to maintain batteries and it was a big hassle (maintenance, cost).
17: Non-owner – Auckland	Pros: • It would reduce the high power bills ($400/month). • I also believe a little bit that we need to look after the environment. Cons: • The initial cost. • How long they last. • I don't think they are financially viable. • I am uncertain whether they work properly.
18: Non-owner – Auckland	Pros: • Future proofing. • Expandability. • Whether I can add batteries in the future and what inverter I need for that. • How to optimise the panel position. • What the ROI is from day 1. It turns out that I had to be at home all day to make it work, so there is a load scheduling issue. Batteries would be a solution for that. • In 10 years, I'll be driving an electric car. As consumers, we have to maximise the benefits from the costs. The solution needs to be integrated. At the moment, no one is able to provide an integrated solution.
19: Non-owner – Auckland	Pros: • Not relying on power companies. • I also like being green. Cons: • The price. • No storage capabilities • The buy-back rates are too low.
20: Non-owner – Auckland	Pros: • Saves money in the long term (not too long). • Renewable energy at no cost eventually (or at minimum cost at least). Cons: • At present, too dear. Capital recovery would take decades.
21: Non-owner – Auckland	Pros: • A huge part is to be more self-sufficient. • Savings over the long term. • It is more environmentally friendly, although I am not sure whether that is actually true. • It is the way of the future. Solar is an infinite source of energy.

	Cons: • Initial outlay.
22: Non-owner – Auckland	Pros: • Although I am not a greenie, I have some green feelings about it. Cons: • There is an imbalance in the use profile. When we get most solar power, we don't use it. Our potential for load shifting is really small. • The power companies give us very low buy-back rates.
23: Non-owner – Auckland	Pros: • To be more self-sufficient. • To be able to sell back power. • Good to heat hot water. Cons: • Cost/price of the systems. • They also gave us too many options without enough guidance what we should choose.
24: Non-owner – Auckland	Pros: • Pay-back. • Reliable brands seem to last a long time. • They need to be professionally installed. Cons: • The performance expectations may not always be met. • I also wondered whether the companies would be around for years.
25: Non-owner – Wellington	Pros: • Save some money and be more independent from power companies, although I know that this is currently only hypothetical. Therefore, we plan to build the next house off the grid. • The pay-back is good. Cons: • Power companies have changed the buy-back rates.
26: Non-owner – Wellington	Pros: • Less dependence on the power companies, especially with high winter power bills. • Could feed PV into storage heaters (like sold by HRV). PV runs HRV during the day. • It is really important to get the combined package to maximise PV. • I want to reduce power companies' profits. • Once Tesla/Panasonic batteries become more available and cheaper (currently $3,000), I would go off the grid. Cons: • Not enough funds. • Expansion possibility is difficult if future demand increases. • Is it better (ROI) to start small and then expand later?
27: Non-owner – Wellington	Pros: • The interest-free period made it cost-effective, and my accountant confirmed that.

	• It is the right thing to do for the world. I think we have to be environmentally sustainable. Cons: • The price of solar power will come down even more, so it may be better to wait.
28: Non-owner – Wellington	Pros: In that area, we have many power cuts.
29: Non-owner – Wellington	Pros: • It would be good to be off the grid and be independent of power prices. • I think our location would also be good for wind energy. Cons: • The cost and the timing was bad because of our health issues. Aesthetics are not as important as for a house in town, but it would be good if it could be integrated into the roof to look the same. There may be some maintenance issues.
30: Non-owner – Wellington	Pros: • It would be good for the environment. Cons: • It's a bad investment. • We also considered the aesthetics, but they are not that important.
31: Non-owner – Wellington	Pros: • We would like some control over our energy destiny (self sufficiency if something happens). • We would get cheaper power over 20 years. Cons: • It is not a complete solution. • We can't go off the grid. • Reselling surplus power is not cost-effective. • There is also the ugliness factor, but that was not really an important issue for us.

How important are features such as real time feedback and historic data logging?

1: Owner (1.75 kW) – Auckland	Not at all. It comes through on our monthly statements anyway.
2: Owner (3 kW) – Auckland	Our system doesn't have it. It is not important to me, only for troubleshooting. It wouldn't be worth $500 to me. I also don't check the display on the inverter regularly.
3: Owner (3 kW) – Auckland	It could be useful but the salesperson downsold it.
4: Owner (4 kW) – Auckland	Not really.
5: Owner (3 kW) – Auckland	I don't know how important that is. I don't think it's important, but would be good to see the instant production.
6: Owner (5 kW) – Auckland	It is very important to me, but our system does not have it so I am tracking it myself. I would have paid $500 for it.
7: Owner (3 kW) – Auckland	It will be at some point.
8: Owner (2 kW) – Auckland	Very important. I installed a Raspberry Pie to look at the PV output online. I would also love to get the raw data.

9: Owner (3 kW) – Wellington	The system does not have historic data logging, only instant generation. I check that often, but historic data are not really required.
10: Owner (3 kW) – Wellington	It is important, but I don't know how to read the display on the inverter. The <Company 1> people explained it but I forgot. I would like to learn it. We have adjusted our power consumption to use more during the day (washing, dryer…) We considered switching to Electra, because they offered a 15% prompt payment discount, which worked out better than getting money back from Meridian for surplus power, but their meters don't allow to feed electricity back. (Originally, we were with Powershop and changed to Meridian because of the PV who then changed our meter.) We also discovered during the installation that we were on 3-phase. It was changed to single-phase. <Company 1> did initially not tell us about it and seemed uncertain of the technical issues. The advice from power companies was also poor. A frustrating experience...
11: Owner (3 kW) – Wellington	Not a lot. I checked the display once every 3 months and rarely looked at the online data.
12: Owner (3 kW) – Wellington	I don't have it. I am a bit annoyed that I did not get it. I read off the solar production manually every day. I should have got it.
13: Owner (3 kW) – Wellington	Not important.
14: Owner (1.75 kW) – Wellington	More for general interest, but it's not a big deal. I just read the output every day on the inverter.
15: Owner (3 kW) – Wellington	Not really important. For the first 2 months, I looked at the solar production every day but not any more.
16: Owner (3 kW) – Wellington	I read the production from the inverter display daily and write it down. My largest production was 20 kWh in 1 day just a few days ago. But I am pretty computer illiterate, so I would not use an online tracking system.
17: Non-owner – Auckland	Good in respect to see that it was working. It would be $500 worth to me.
18: Non-owner – Auckland	Quite important. It would be worth $500 to me. I am using the Genesis power app all the time.
19: Non-owner – Auckland	Interesting but not critical. It would be important for finding out when to run appliances.
20: Non-owner – Auckland	Very important.
21: Non-owner – Auckland	I would not pay extra for it.
22: Non-owner – Auckland	I would be very interested but probably only for a short period of time. Maybe I would pay $100 more for it.
23: Non-owner – Auckland	Really important. I would pay $500 more for that. I have seen one of my colleagues who has a system like that. One reason is that I don't want to touch the system itself because something may go wrong.
24: Non-owner – Auckland	Important. I would pay about $200 for it. There are two reasons: 1. To verify the output.

	2. It is one of the attractions of solar power that it is measurable.
25: Non-owner – Wellington	Yes, very important to see the performance.
26: Non-owner – Wellington	Nice to have but not important. It would be important to monitor the efficiency degradation over time.
27: Non-owner – Wellington	It is very important for me. I would have probably chosen the <Company 3> system for that particular reason.
28: Non-owner – Wellington	It is not important, only for trouble shooting or checking when there is unexpected low output.
29: Non-owner – Wellington	It would be interesting, but I would not spend significant money for it.
30: Non-owner – Wellington	Somewhat, but I would not spend a lot of money for it.
31: Non-owner – Wellington	Reasonably important, but I wouldn't micro manage it. Some feedback is enough.

Did you consider alternative options to spending the money on a PV system? Which ones? (kitchen upgrade, travel, investment, saving, etc.)

1: Owner (1.75 kW) – Auckland	No.
2: Owner (3 kW) – Auckland	No.
3: Owner (3 kW) – Auckland	We had done the insulation and heat pump at the same time. There were no trade-offs. We just want to make this house more liveable.
4: Owner (4 kW) – Auckland	No. We had reduced our cars from two to one earlier and don't really need a second car.
5: Owner (3 kW) – Auckland	We installed new curtains and double glazed some part of the house. But we could afford this and the solar power system.
6: Owner (5 kW) – Auckland	We saved the money specifically for the solar power system. The only other thing would have been a heat pump for the hot water, but I don't think that's cost-effective enough.
7: Owner (3 kW) – Auckland	None. I view it as an investment in the future – reduce my cash outgoings and improve my sustainability.
8: Owner (2 kW) – Auckland	We also did the toilet and bathroom upgrades and financed everything. Later on, we will upgrade the kitchen, too.
9: Owner (3 kW) – Wellington	We did not consider alternative spending. The PV has a better return than putting the money in the bank.
10: Owner (3 kW) – Wellington	We would have left the money in the bank as an investment for retirement emergencies. We are self-sufficient in a number of aspects (have our own cows for milking) so the PV also made us more self-sufficient.
11: Owner (3 kW) – Wellington	Not really but one goes through a basic cost-benefit analysis. We recently had to fix the roof and balustrade, which cost $15,000, but we were able to do it all including the PV.
12: Owner (3 kW) – Wellington	I sold some Contact shares to buy the PV.
13: Owner (3 kW) – Wellington	We compared it to investing the money on the share market. The return is better than the interest from the bank.

	The cost of power is always going up.
14: Owner (1.75 kW) – Wellington	Pay off the mortgage, but we had some cash at that moment.
15: Owner (3 kW) – Wellington	I borrowed some money from the bank for other things at the same time. I upgraded the car and included the $10,000 for the PV in the loan. I also considered solar water but it was not cost-effective.
16: Owner (3 kW) – Wellington	No, I recently sold a property and had enough cash to do several things and keep some money for a "rainy day" during retirement now. In the bank, I only received 4.5% interest, so the PV was a bit of a gamble but worked out very well.

Why didn't you buy a PV system earlier?

1: Owner (1.75 kW) – Auckland	The price came down enough.
2: Owner (3 kW) – Auckland	We tied it in with our renovations.
3: Owner (3 kW) – Auckland	We just moved in.
4: Owner (4 kW) – Auckland	We just saw it at the home show and then received the phone call. It was a bit like the perfect storm, and we just had the other alterations to our house finished.
5: Owner (3 kW) – Auckland	We just moved in 2.5 years ago.
6: Owner (5 kW) – Auckland	It's our first own house. We installed the system 6 months after we had moved in.
7: Owner (3 kW) – Auckland	I just bought the house. This is my semi-retirement plan.
8: Owner (2 kW) – Auckland	Prices were too high ($30,000+).
9: Owner (3 kW) – Wellington	When we installed the solar water heater when the house was built, the installer told us that PV can be done later.
10: Owner (3 kW) – Wellington	We were never prompted to do it. We did not have saved money in the bank, and we would not have wanted to borrow money (took up a mortgage) for the PV.
11: Owner (3 kW) – Wellington	The cost exceeded the benefits. Now the PV system became more reasonable and the price of electricity was increasing.
12: Owner (3 kW) – Wellington	It was too expensive.
13: Owner (3 kW) – Wellington	I guess lethargy.
14: Owner (1.75 kW) – Wellington	We just had the money now. I was coincidentally just talking to a friend about it earlier and so we just tried it.
15: Owner (3 kW) – Wellington	We only bought the house 3 years ago. We are planning to stay here. If I had another $20,000, I would go off the grid.
16: Owner (3 kW) – Wellington	The cold call came just with perfect timing. I had some cash and the price was right. I may have looked into <Company 3> because of their recent marketing campaign, but I am not sure.

What was good and what was bad about the company you bought the system from?

1: Owner (1.75 kW) – Auckland	They were very good. I painted the roof before they came and then they installed it in 1 day. They were very punctual.

2: Owner (3 kW) – Auckland	Good: • They were good at staying in contact and had good communications. • They had good detailed knowledge about the installation details. Bad: • They recommended putting the inverter in the attic, but it gets hot in there, which would affect the inverter's life expectancy, so I suggested a different place. The cost-benefit analysis is important. We wanted to have the inverter installed flush with the roof, but now it is not an issue, and in hindsight, I would have preferred a frame to get better output.
3: Owner (3 kW) – Auckland	Good: • The salesman was good. He explained it well and left lots of resource material. He was not too pushy and was good at follow-ups, but he should have explained the monitoring option better. Bad: • The installation coordination was poor.
4: Owner (4 kW) – Auckland	Good: • They were very good. • They were knowledgeable, walked around the house and took some pictures. They gave us options for different system sizes, which was quite different from <Company 3>. They explained the cleaning of the system and provided us with all the paperwork. They knew their product, and they were pleasant on the phone. Bad: • They did not explain the importance of our consumption well enough. • The sales consultant then moved to another company so there was no response to our emails, but once we got a hold of someone else in the company, they responded very quickly. • But the communication with Vector was not that good.
5: Owner (3 kW) – Auckland	The original explanations were good. There needs to be a better control and management of the connection of the system to the power company. They should have explained better how to read the meter. I was surprised that they did not give us a follow-up call once everything was complete.
6: Owner (5 kW) – Auckland	Good: • It was all very good. There was a fault with the inverter, but they fixed it very quickly. • It was all managed by one person. That was good. Bad: • We did not expect the problems with the power companies. • They did not explain that the system won't work when there is a power failure.
7: Owner (3 kW) – Auckland	Good:

	• Paula, the sales rep was very knowledgeable. • The installation went very smoothly. Bad: • The sales manager wanted to sell me some insulation, which I didn't want.
8: Owner (2 kW) – Auckland	Good: • The installation was quick. • The sales consultant was knowledgeable. Bad: • The company fell over a little afterwards.
9: Owner (3 kW) – Wellington	Good: • Good plan and price. They stuck to the price. Advice was accessible on the phone. They cleaned up well after the installation. The post-installation inspection was very thorough. Bad: • The tilt-up frame was missed (but it turned out better this way).
10: Owner (3 kW) – Wellington	Good: • <Company 1> in the end rectified all the issues well. • The technical handouts pack were good including the installation guides. • They stuck to their quoted price • <Company 1> also tried to sell us Gold Card insulation (subsidised). That was a bonus. The insulation installation was very efficient, but I felt sorry that the installers seemed under huge time pressure. I don't think they were treated fairly. Bad: • <Company 1> had insufficient product knowledge. • The communication between the installation team, management and accounts was poor (we were reminded to pay the invoice even before the system was complete). It must have been because <Company 1> needed cash urgently. • <Company 1> seemed to be still learning about the technical issues themselves, but in the end, the service was OK.
11: Owner (3 kW) – Wellington	The worst thing about the company (<Company 1>) is that they closed down around 6 months after purchasing the PV system. Good to deal with and kept us informed (regular calls, etc.) Can't believe they went under…
12: Owner (3 kW) – Wellington	Good: • They were excellent. • Their timing was good. • They got custom-made brackets because their normal brackets did not fit and did not charge me extra. • They warned me that the inverter may have some issues at some stage, but so far it works well. Bad: • Nothing.

13: Owner (3 kW) – Wellington	Good: • Good communication. Bad: • They could have explained a bit better how to read the yield data on the inverter.
14: Owner (1.75 kW) – Wellington	Good: • The salesperson was knowledgeable and nice. • They gave us good technical info. • The installation was very professional. • They were very responsive to our wishes, for example, they installed a conduit in the wall rather than outside of the house. Bad: • The company (<Company 1>) went bust. • I don't know about future support for the systems.
15: Owner (3 kW) – Wellington	Nothing bad. They were good. The salesman even helped with the installation, and the sales manager helped as well. They gave me good info about the system and advised me to keep the inverter outside so that it does not overheat. They set up the panels for easy expansion in the future.
16: Owner (3 kW) – Wellington	Good: • They did not put any pressure on me. • They discounted the price. • They were very friendly and helpful all of the time. Bad: • One of the days, they didn't show up because their electrician wasn't available, but that was not a big problem.

How did you finance the system?

1: Owner (1.75 kW) – Auckland	I sold some stocks on the share market where they made 7–8%.
2: Owner (3 kW) – Auckland	Mortgage.
3: Owner (3 kW) – Auckland	Q Card.
4: Owner (4 kW) – Auckland	Q Card interest free until January 2016. Then we'll pay it off with cash.
5: Owner (3 kW) – Auckland	Cash.
6: Owner (5 kW) – Auckland	We saved the cash but have a revolving credit account together with our mortgage.
7: Owner (3 kW) – Auckland	Cash.
8: Owner (2 kW) – Auckland	Q Card and rebate via Kiwibank.
9: Owner (3 kW) – Wellington	Cash in the bank.
10: Owner (3 kW) – Wellington	Cash from our retirement investment.
11: Owner (3 kW) – Wellington	Savings. I would not have taken up a mortgage to buy the PV system.
12: Owner (3 kW) – Wellington	I sold some shares.

13: Owner (3 kW) – Wellington	Cash. We would not have taken up a mortgage for it.
14: Owner (1.75 kW) – Wellington	We had cash in the bank. We would not have increased our mortgage for it, but we may have saved the money or borrowed it from family.
15: Owner (3 kW) – Wellington	Mortgage on the house.
16: Owner (3 kW) – Wellington	I had the money in the bank.

Did the solar power system meet your expectations? If not, what was better or worse?

1: Owner (1.75 kW) – Auckland	Pretty much what I expected. I think we save about $1,200 per year.
2: Owner (3 kW) – Auckland	It produces more power than quoted.
3: Owner (3 kW) – Auckland	The savings are less than expected. We are heavy energy users. The savings are in line with the solar company predictions, but we had hoped for more.
4: Owner (4 kW) – Auckland	In the summer, it is good. In the winter, we are not getting anything at all. It is annoying that Vector requires us to invoice them for the surplus power. It is a big hassle.
5: Owner (3 kW) – Auckland	Pretty much what we expected, but we didn't expect that the export buy-back prices would drop.
6: Owner (5 kW) – Auckland	Exactly what I expected. Only the fact that it does not work during power failures was unexpected.
7: Owner (3 kW) – Auckland	What I expected. I have adjusted my lifestyle a bit (load shifting).
8: Owner (2 kW) – Auckland	Negative: • In winter, the output is slightly lower than predicted. Positive: • During summer, there is lots of output. We do practise quite a bit of load shifting, for example, when using the dryer.
9: Owner (3 kW) – Wellington	Met expectations. The only very minor issue was that the sticker on the meter box came loose after a while.
10: Owner (3 kW) – Wellington	Performance is disappointing during the winter. [Interviewer note: The panels are on a low-sloped roof facing west with some shading from a tree.] We still had a power bill of over $200, but I am optimistic for the summer. Meridian has now given us a fixed rate for selling us power and a 15% prompt payment discount. During summer, the performance is good. [Interviewer note: After the interview, I showed the owner how to read the power generation. The system has produced about 4,300 kWh since installation – 16 months.]
11: Owner (3 kW) – Wellington	Power company (Meridian) took a long time to install the import/export meter (6 months). Up to that time, we could not export power. Then they changed the price for exported power.

	They also installed a smart meter at the same time, and there have been issues with it. But given all this, our expectations have been met. I have compared the power bill only with the last month, and we are paying less than our friends. Maintenance is better (less) than expected. No corrosion, no leaks...
12: Owner (3 kW) – Wellington	The power bill was not quite as low as projected. They said $100 per year, but it is more like $500 per year. But I leave the heater on all over winter. The maintenance is lower than expected. The rain washes the panels well. It took Contact 6 months to install the smart meter correctly, but I still get the 16 c/kWh for existing customers.
13: Owner (3 kW) – Wellington	It is what I expected.
14: Owner (1.75 kW) – Wellington	And some… We exported more than we used last month. We did adjust our lifestyle a bit. For example, we adjusted the time when we use the dryer and washing machine and charge our power tools at different times. Once we can store the power, we want to get an even bigger system.
15: Owner (3 kW) – Wellington	I expected a bit more output in the winter. It is around 300–400 W. I was thinking of having adjustable frames. A friend of mine has doubled his PV output because he can adjust the angle of the panels. I always have a surplus, but the month the system was installed, Meridian dropped the buy-back prices. I should adjust my lifestyle a bit more.
16: Owner (3 kW) – Wellington	A little bit better than expected. I have had virtually no power bill for the last year. I expected to still pay about $50 per month.

In hindsight what would you do different in terms of the buying process?

1: Owner (1.75 kW) – Auckland	No.
2: Owner (3 kW) – Auckland	No change.
3: Owner (3 kW) – Auckland	I would have looked into a few more companies and would have asked a few more neighbours with solar power about their experiences.
4: Owner (4 kW) – Auckland	Nothing.
5: Owner (3 kW) – Auckland	I would get more quotes, but I am not dissatisfied at all.
6: Owner (5 kW) – Auckland	No.
7: Owner (3 kW) – Auckland	I should have played the solar companies a bit more against each other.
8: Owner (2 kW) – Auckland	Do some more market research whether other companies would be cheaper.
9: Owner (3 kW) – Wellington	Nothing.
10: Owner (3 kW) – Wellington	We were given a 12-month performance guarantee, but <Company 1> was liquidated. I should have done more research into the PV company from which we bought the system.

	I would not buy it from <Company 3>. They sell carpets. I don't trust their expertise.
11: Owner (3 kW) – Wellington	Not a lot. I would check the company better. Maybe choose a local company, but overall everything went well.
12: Owner (3 kW) – Wellington	No change. <Company 1> did a good job.
13: Owner (3 kW) – Wellington	Get more quotes, maybe even just talk to other suppliers.
14: Owner (1.75 kW) – Wellington	Get several companies to quote. Do some more studies on the types of cells. Ours are not the highest grade cells. Do a little bit more research.
15: Owner (3 kW) – Wellington	Nothing.
16: Owner (3 kW) – Wellington	Nothing, but that depends whether the system remains trouble free in the future.

What would you do different in terms of the chosen system, if anything?

1: Owner (1.75 kW) – Auckland	Maybe I would get a 2 kW system.
2: Owner (3 kW) – Auckland	It is flush with the roof (15°), so we have our main production in summer. I would prefer an adjustable frame, manual or with hydraulics like with skylight windows. I would get micro inverters. Maybe I would get a monitoring system.
3: Owner (3 kW) – Auckland	Hard to know. Maybe a data-logging system. Meridian does not provide energy use profiles for houses with solar power. I would be looking into Tesla batteries but would not go off the grid.
4: Owner (4 kW) – Auckland	Now we are looking into battery technology.
5: Owner (3 kW) – Auckland	No change.
6: Owner (5 kW) – Auckland	I would get an expandable system and go from 5 kW to 7.5 kW.
7: Owner (3 kW) – Auckland	I wish I had gone off the grid.
8: Owner (2 kW) – Auckland	We have quite high morning and evening consumption so I would maybe split the system to have panels facing west and east. I would also consider a tracking system, but they are quite expensive.
9: Owner (3 kW) – Wellington	Maybe get a larger system.
10: Owner (3 kW) – Wellington	Include batteries if they are viable.
11: Owner (3 kW) – Wellington	Nothing.
12: Owner (3 kW) – Wellington	I would get a different inverter with historical tracking.
13: Owner (3 kW) – Wellington	No. We have the flexibility to add more panels later on.
14: Owner (1.75 kW) – Wellington	We would get a larger inverter now, but we spoke to <Company 2> and found out that new panels have their own little inverters.

	If we would have had more money, we would have got a bigger system. But then power companies dropped their buy-back rates to 8 c/kWh. I think that for older couples who are at home most of the time, a bigger system would be better. We did weigh up the option of buying a bigger system now or later.
15: Owner (3 kW) – Wellington	For more money, I would go off the grid.
16: Owner (3 kW) – Wellington	<Company 1> gave me no other options, but as long as there is no maintenance, it would be OK.

Why didn't you buy a system?

17: Non-owner – Auckland	It's not economic. The solar predictions are not reliable enough.
18: Non-owner – Auckland	The residential ROI is not good enough. The complete package must include batteries.
19: Non-owner – Auckland	Cost. We also may not be living here forever, and I will soon go back to work.
20: Non-owner – Auckland	Too expensive. Systems for sale are supposedly reasonably priced but can only supply a small portion of the electricity used.
21: Non-owner – Auckland	The initial outlay was too high considering the time we plan to be in this house. I don't think it would increase the resale value of the house for most buyers, although it would for me.
22: Non-owner – Auckland	It was not financially viable.
23: Non-owner – Auckland	Our plans have changed, i.e. we plan to rebuild the house.
24: Non-owner – Auckland	The pay-back was not good enough.
25: Non-owner – Wellington	Pay-back is not good enough because we are planning to move soon. I don't believe that the resale value of the house would increase sufficiently to get the money back. It would be good if the QV valuation would allow for PV systems. The power company buy-back rates are not good enough.
26: Non-owner – Wellington	Lack of cash (don't have a job at the moment).
27: Non-owner – Wellington	Our marriage broke up.
28: Non-owner – Wellington	[See above.]
29: Non-owner – Wellington	It was just bad timing. We need to do other things first such as the roof, but the most important one are the health issues.
30: Non-owner – Wellington	The numbers didn't stack up. There was a significant shortfall.
31: Non-owner – Wellington	The economics didn't stack up.

Did you consider alternative options to buying a PV system? (Kitchen upgrade, saving, etc.) Which ones? Did you implement any of these?

17: Non-owner – Auckland	No.
18: Non-owner – Auckland	Renovations to the house.
19: Non-owner – Auckland	Paying off the mortgage.
20: Non-owner – Auckland	No.

21: Non-owner – Auckland	No.
22: Non-owner – Auckland	No, but we did not really investigate that.
23: Non-owner – Auckland	No.
24: Non-owner – Auckland	It is a bit like a journey. First we have done the insulation. Now we are doing the second-order priorities such as the water heater. Solar power is a bit further down the list.
25: Non-owner – Wellington	Get the house freehold.
26: Non-owner – Wellington	Rainwater tank (the council gives interest-free loans). Wall insulation. Double glazing in living areas. Storage heater. HRV. It MUST be a system approach rather than one product only.
27: Non-owner – Wellington	I would have increased our mortgage and possibly also got solar water, although I read that it is less cost-effective and less reliable and requires more maintenance.
28: Non-owner – Wellington	I would even have done it if the return on investment would have been lower than interest from the bank. It is a long-term investment decision. We would have paid it in cash.
29: Non-owner – Wellington	No, we have sufficient money to do all of the required home improvements.
30: Non-owner – Wellington	No.
31: Non-owner – Wellington	No.

What would need to change in order for you to reconsider and buy a system?

17: Non-owner – Auckland	They need to be more practical, more economical and longer lasting.
18: Non-owner – Auckland	Better future proofing. Better battery technology. It needs to be more flexible. Mitsubishi now offers micro inverter systems.
19: Non-owner – Auckland	Storage options or better buy-back rates.
20: Non-owner – Auckland	Government subsidies: substantial increase to compensate for gross profits expected by companies importing materials. More choices or systems from reputable sources. More competition. More trained installers.
21: Non-owner – Auckland	Move house or the cost of solar power has to come down significantly. We would like to recover the cost within 4–5 years.
22: Non-owner – Auckland	If we would buy a new house or in a rural setting to go off grid.
23: Non-owner – Auckland	Once the house has been rebuilt or the new building is finished, we will reconsider it.
24: Non-owner – Auckland	Better pay-back or maybe use the Vector model of levelised energy costs, i.e. pay a small amount upfront such as $2,000. That would allow us to do it without financing and then get fixed power prices for the next 12 years.
25: Non-owner – Wellington	New house with free tenure. Power company buy-back rates need to increase.

26: Non-owner – Wellington	Get a job/income.
27: Non-owner – Wellington	If I buy another house in which I would stay for a long time, I would reconsider it.
28: Non-owner – Wellington	There needs to be better and cheaper storage technology. If our living arrangements would change, like permanently living on our house, we would reconsider.
29: Non-owner – Wellington	My personal circumstances.
30: Non-owner – Wellington	Economics. Better buy-back prices.
31: Non-owner – Wellington	The initial cost needs to drop. I would need an ROI of about 5 years. (I don't think it increases the property value. It can even be a liability.) There should be government subsidies or there must be a guaranteed buy-back rate by power companies. Energy storage technology must advance. It should be integrated with electric cars, for example.

What was good and what was bad about the companies that tried to sell you a PV system?

17: Non-owner – Auckland	One was quite incompetent and did not know their product. They also seemed untrustworthy.
18: Non-owner – Auckland	All of them knew their products The <Company 3> presentation was beautiful, and the summer/winter output was realistic. They also explained the installation process. They were less good explaining the need for change in behaviour, like, for example, a diesel car needs to be treated different from a petrol car. There should be programmable dishwashers and tumble dryers to do the load shifting.
19: Non-owner – Auckland	The photo image overlay was good. They talked us through the installation process. The pay-back explanation was good. They even said that they could have matched other solar companies' deals.
20: Non-owner – Auckland	Information was lacking due to inexperience and lack of comprehensive training of the sales personnel. All too expensive – obviously salespeople were on a commission. Details on recovery of capital were always wrong and hugely optimistic.
21: Non-owner – Auckland	Good: • They had a lot of good detail about stuff without being overwhelming. • They explained the details well. Bad: • They were a little bit pushy • I would have liked it if he would have been more of an environmental person rather than a salesperson.
22: Non-owner – Auckland	They were practical and knowledgeable. They suggested the option to put the system on the garage roof rather than the house, so he did not follow just a cookie-cutter solution.

23: Non-owner – Auckland	Good: • They made the buy-back rates clear. • They showed us how it sits on the roof and how many panels we would have. • They had good diagrams. Bad: • They tried to also sell us other products. • They gave too many options and too little guidance.
24: Non-owner – Auckland	Good: • <Company 1> had good information and seemed to have more integrity. They justified their estimates and supported it with good information. Bad: • <Company 3> made exaggerated performance claims and gave misleading information.
25: Non-owner – Wellington	They were not honest about the imminent drop in the buy-back rates. They must have known beforehand. I noticed that <Company 1> went into liquidation in February 2015, so it was good that I did not go with them.
26: Non-owner – Wellington	Good: • Quote was useful to know how much they cost (it seemed a bit high). Bad: • Their approach was too simplistic. • They were selling the company rather than the product.
27: Non-owner – Wellington	Both <Company 1> and <Company 3> were good, but <Company 3> had the better technology, including Wi-Fi connection to the inverter. The information from both looked trustworthy.
28: Non-owner – Wellington	They gave us a good report. The consultant simply couldn't factor in our living arrangements. These are quite peculiar circumstances.
29: Non-owner – Wellington	He was good. Not too pushy and very knowledgeable. He seemed trustworthy.
30: Non-owner – Wellington	<Company 1> went bankrupt. Some people even lost their deposits. <Company 6> had good service and were more flexible with their product options. The salesperson had a solar system himself. The <Company 3> salesperson seemed to have little knowledge. I had some subsidised insulation installed on my previous house and later found out that it would have been cheaper to buy the insulation myself and have it installed by a builder. That really annoyed me.
31: Non-owner – Wellington	<Company 3> did a thorough study and used Google Maps images. It was a thorough report. <Company 1> seemed inexperienced. The interview was shorter, and there was no cost-benefit analysis. I never received a report from them.

What advice would you give to other potential buyers?

1: Owner (1.75 kW) – Auckland	Get onto it. Heat pumps, for example, still consume power but they don't generate power like the solar panels. We have all the resources here in New Zealand like sun and wind.
2: Owner (3 kW) – Auckland	I recommend it to everyone. Get different quotes, the technology is changing very quickly. Find valid current information.
3: Owner (3 kW) – Auckland	Yes – it's good. Talk to as many people as you can. At <Company 1>, each part seemed fine, but they were not talking to each other.
4: Owner (4 kW) – Auckland	Probably they should do it. Give the <Company 1> people a call.
5: Owner (3 kW) – Auckland	We would recommend the company that we used but would suggest to also look at others. Talk to other users. I believe that you need some altruistic motivation, and you need to consider your specific circumstances.
6: Owner (5 kW) – Auckland	A lot of people have asked us. I suggest to them to look at their power bill and calculate what their gains are. Ultimately, make sure it makes commercial sense and understand how it works.
7: Owner (3 kW) – Auckland	Yes, do it. They freak out about the cost, but it pays back in the long run. There are timers for load shifting, too.
8: Owner (2 kW) – Auckland	My dad and brother-in-law asked about a system. My brother-in-law uses a lot of gas for cooking and hot water and heating and therefore decided against it. I told my dad to look at the power consumption and do the calculations. He is retired.
9: Owner (3 kW) – Wellington	It is a good investment. It is good to have a combination of solar hot water and solar power. Get several quotes (although I only got one and it worked out fine). Have good insulation, too.
10: Owner (3 kW) – Wellington	I would explain my situation to them. PV does not change the world but is good if you are on a small fixed income for the $10,000 investment.
11: Owner (3 kW) – Wellington	Undertake a cost-benefit analysis. Talk to existing owners (at least three). Check alternative companies (at least three quotes). Go for it. This was the only thing we didn't have issues with.
12: Owner (3 kW) – Wellington	PV is pretty good. Look into micro inverters (especially if you have shading). Check out the Tesla battery packs. Do your research. Permits were the most complicated part, but <Company 1> dealt with that.
13: Owner (3 kW) – Wellington	Talk to several companies. Do it! (If you have the sun.)
14: Owner (1.75 kW) – Wellington	Yes, but do your homework. Let them quote for it. Make sure you can afford it, especially larger systems.

	Think about the future – whether you want to go off the grid. Then you may want a larger system.
15: Owner (3 kW) – Wellington	I would give them the <Company 1> contacts. Tell them to be careful that you get value for money. The <Company 3> system was not value for money.
16: Owner (3 kW) – Wellington	I think a lot of people don't understand how it works, and we are in tight times. Sometimes, it does not make financial sense. I would not have taken up a mortgage to finance the system, even if the rate of return would have been better than the mortgage rate. I like the look of the system on the roof. It looks ecological and would also fit on a lifestyle block in the bush. I don't like the <Company 3> lease scheme.
17: Non-owner – Auckland	Look on the internet and find people. Get a large number of quotes. Make sure they know what they are talking about.
18: Non-owner – Auckland	I would give them the contacts for the companies I used. They need to ask themselves, if it is marginal, would they do it?
19: Non-owner – Auckland	Get several quotes. Decide whether you will live there long enough. I am not sure whether the solar system would increase the resale value of the house. The more energy efficient you are, the better. I probably would have got it if we would have stayed for 5 years rather than 2 years.
20: Non-owner – Auckland	Do more research.
21: Non-owner – Auckland	Read as much as you can, in particular, also about new technologies, such as the Tesla batteries. Make sure you time the market right. There will be a big price drop at some stage when the new batteries are coming in.
22: Non-owner – Auckland	Check online first to get a market overview. The sales conversation is more pleasant if you know the subject. If they have a windfall, they should get solar power. It may not be as good as other investment options. It would also be a reasonable use of KiwiSaver money compare to the 2% that you get from the bank.
23: Non-owner – Auckland	Consider it. Home shows are good, but now there are too many PV companies. Don't feel forced by the time pressure at the home shows. Take your time and consider it.
24: Non-owner – Auckland	Understand your drivers. Is it for lowering your carbon footprint or for financial returns? Get independent advice, for example, from an Eco Design Advisor. Consider solar power as one option but look at other options for energy conservation and lowering your power bill as well.
25: Non-owner – Wellington	Shop around. Get several quotes.
26: Non-owner – Wellington	Shop around. Look for PV as part of a package of different measures.
27: Non-owner – Wellington	I actually encouraged my sister to get solar power. They prewired their new house.

	I would tell people to get several quotes, compare the technologies and research about solar power on the internet.
28: Non-owner – Wellington	Think about your living arrangement and power usage, such as taking showers, your family size, timing of your power use and so on. Go through your checklist.
29: Non-owner – Wellington	Go for it. Do your research on the internet, ask friends, talk to experts. Maybe Consumers NZ has some information.
30: Non-owner – Wellington	Get some quotes. Talk to existing owners. Do your homework on the net. Check the economics.
31: Non-owner – Wellington	Be clear in your mind what motivation you have for this and how you will make your decision. Use a company that provides sufficient technical information.

Do you think the government should support renewable energy? If so, how? ($, information, regulation…)

1: Owner (1.75 kW) – Auckland	Yes. They should do all of it – more information, subsidies and regulated buy-back rates. They should make it mandatory. The oil resources in the Middle East are under threat. That is a risk to our oil supply. It will get scarce and expensive. Solar would get us miles ahead. We are spending billions of dollars on fossil fuels. All that could be put back into the economy.
2: Owner (3 kW) – Auckland	It should be mandatory for new builds. It is a necessity in New Zealand. That would change the supply and demand dynamics and reduce prices. I don't believe in subsidies. There were a lot of rip-offs with insulation subsidies. There needs to be clearer information about the benefits to help people make the right decisions.
3: Owner (3 kW) – Auckland	Yes. Schools should have it and government buildings, but power companies are not publicly owned any more. They should regulate buy-back rates. There should be regulations to make solar power mandatory, and there should be better building regulations.
4: Owner (4 kW) – Auckland	Yes. All new houses must have water tanks now, so it should be mandatory but they need to sort out any resource consent issues. There is conflicting information about government subsidies. The support should not be means tested but should apply to everyone.
5: Owner (3 kW) – Auckland	Yes. There should be legislation for minimum export prices.
6: Owner (5 kW) – Auckland	Absolutely 100%. As a minimum, they should provide more information. It is important to be clean green. It is criminal that we are not doing more of it.

	Subsidies would be a huge help. The government can safely invest in it. The Labour Party was happy to invest in state housing. State houses should be used to install solar power systems. It is a smart investment.
7: Owner (3 kW) – Auckland	Yes. But more information means nothing. It's just talk. They have to make a level playing field and give guaranteed buy-back rates. They should also make solar power mandatory and subsidise offline storage.
8: Owner (2 kW) – Auckland	Yes, they should do something. But don't change the buy-back rates. It would lead to us producing too much power. There should be subsidies for installations like for insulation. The government should also use solar power on their own housing stock and feed back any surplus power into the grid. That would also have some social benefits.
9: Owner (3 kW) – Wellington	Yes, definitely. A long-term vision is required. Information for consumers is important, but it is not enough. Subsidies are required. These should be independent of income levels or wealth.
10: Owner (3 kW) – Wellington	Yes. The government should guarantee minimum buy-back prices.
11: Owner (3 kW) – Wellington	Yes, maybe subsidise solar installation and provide information. Definitely, anything renewable should be supported. They need to provide us with information, but it does not have a subsidy like for insulation
12: Owner (3 kW) – Wellington	Yes. I don't think subsidies are a good way. Better to have guaranteed buy-back rates once agreed on with the power company so that the pay-back time is secure.
13: Owner (3 kW) – Wellington	YES. Stop the power companies charging more for the line usage. The Electricity Commission should promote renewables.
14: Owner (1.75 kW) – Wellington	Yes. But no subsidy. Maybe loans at reasonable rates. They should regulate the buy-back rates. Maybe 12–13 c/kWh.
15: Owner (3 kW) – Wellington	Definitely. The only reason why they don't do it is because of the power companies.
16: Owner (3 kW) – Wellington	Yes. They should subsidise PV, but the scheme needs to be well developed, so that not only the rich people benefit (like with lower ACC levies for newer cars). Rich people probably don't buy PV because they can afford the power anyway.
17: Non-owner – Auckland	Yes. Subsidies like for house insulation. Advice for people and questions to ask like a checklist – whether it is better to buy or lease.
18: Non-owner – Auckland	Yes. The government needs to be much more active. They have to provide thought leadership by, for example, using solar power for car parks and bus stops. They need to challenge power

	companies to make solar power cheaper. We are paying 10 times as much as we should be paying. This is very big, and the government needs to look at this. It will create opportunities and new industries. It will make a better New Zealand.
19: Non-owner – Auckland	The government has subsidies for insulation and solar hot water. They should develop packages with power companies. If you sign up, you should get it cheaper.
20: Non-owner – Auckland	The government in the US has banned imports from China due to their substandard materials, but New Zealand is importing cheap Chinese materials and touting them at industry standards rules.
21: Non-owner – Auckland	It shouldn't be mandatory, but the priority should be the people's wellbeing rather than company profits, for example, healthy homes. The government could use solar power on all state houses, or lower-income households should get solar power, because that reduces their power bills and has social benefits. Therefore, they should subsidise lower-income households. They should also invest in development of renewables. The government has some responsibility, similar as they did with the insulation retrofits. It prompted us to do it. It would be brilliant to have the same system for solar power.
22: Non-owner – Auckland	They shouldn't be spending serious money on it. Usually the wrong people would benefit (the middle class rather than the poor). They should have a role facilitating the reduction of greenhouse gas emissions. Renewable energy is also good in civil defence emergency situations, i.e. to have distributed generation. But in general, it is better if the government stays out of these things. They just distort the market, although it would be good if they would, for example, regulate that the power companies have to use at least two-thirds of the market price to buy back the power.
23: Non-owner – Auckland	They should do all – advice, regulate the buy-back rates, give finance options. Including it in the rates would be very good, and they should also make it mandatory. There shouldn't be large differences in the buy-back rates between different power companies. It just makes it too complicated.
24: Non-owner – Auckland	We need a low-carbon approach. There needs to be stronger government policies for renewable energy. In particular in Auckland, we are actually using only 34% of renewable power. There needs to be better independent advice available and promoted. Renewable energy and energy conservation should be subsidised. Conservation seems to have a lower risk, though, than solar power.
25: Non-owner – Wellington	YES. Enforce a fair buy-back rate from power companies. Interest-free installation loans. Remove GST on solar power systems.
26: Non-owner – Wellington	Yes. There should be feed-in tariff regulations with a mechanism to adjust it over time, i.e. when demand increases. That will create economies of scale. It may reduce power company dividends to the government, but the money would be returned in the form of other taxes. Follow the NEECS strategy.

27: Non-owner – Wellington	Yes. But subsidies would advantage the rich. Maybe the government should pay for leasing the roof. They should regulate the buy-back rates and would get the lost revenue back through taxes in other ways (GST on solar systems etc.). Powershop has, for example, some options for sustainably generated power. The government should also put out more information about solar power.
28: Non-owner – Wellington	There should be tax incentives for renewables to consider carbon and environmental factors. Renewables reduce the environmental damage and cost to society. But I would be cautious about subsidising energy use.
29: Non-owner – Wellington	Yes. I think subsidies are good. Same as for insulation. They should be free for low-income households. There should be regulations for new houses to make them self-sufficient, also for water.
30: Non-owner – Wellington	It would be more cost-effective to have mini grids, like town or transformer size. This would be better than many small one-off investments. It is the same with small and large dairy farms. Yes, the government should support it, but I am suspicious about subsidies. If Comalco is shut down, we will have a lot of very cheap power in New Zealand. The insulation subsidies were a total rip-off. The middleman earned a lot of money, and the taxpayer was ripped off. I think the government should invest in it but needs to have an exit strategy.
31: Non-owner – Wellington	Yes, I think so. We have to meet our carbon emission commitments. How? Not tax cuts. Maybe subsidies like for insulation. The government could set up a central purchasing agency to negotiate better prices. Regulating the buy-back rates would be too difficult.

Are there areas that should be more researched by someone like BRANZ regarding solar power or sustainability in general?

1: Owner (1.75 kW) – Auckland	Emergency housing. We are experiencing a housing crisis, homelessness, etc. There is an imbalance between large and small houses. There needs to be a push for more economical houses, and we need to know how to make more economic houses. We could export collapsible emergency houses or emergency shelters that use all the timber that we have. Car driving is a major issue. There need to be alternative transport options.
2: Owner (3 kW) – Auckland	Misinformation about the life cycle impact of solar power (it takes more energy to produce them than they generate). We need pay-back time calculations from an independent source that are specific to individuals. We need independent advice on the cost benefits of sustainable products such as the hot water heat recovery units (GFX, for example).

3: Owner (3 kW) – Auckland	There is not enough information and advice on the internet.
4: Owner (4 kW) – Auckland	Consent issues are too complex at the moment, for example, for getting a water tank.
5: Owner (3 kW) – Auckland	Whether roof structures are strong enough. We took the PV company's word for it.
6: Owner (5 kW) – Auckland	Battery technology. Vector bought the distribution rights for the Tesla Power Wall. They have a perverse incentive. There should be more research in wind power applications.
7: Owner (3 kW) – Auckland	Where the panels come from. There needs to be more independent advice for consumers. Whether the panel coating affects the maintenance, for example, whether tree seeds or something similar sticks on it.
8: Owner (2 kW) – Auckland	Eco housing. There should be more guidelines on good design such as layout, the right orientation of windows, etc.
9: Owner (3 kW) – Wellington	Battery systems. We need to be more proactive in terms of GOOD insulation. BRANZ should provide that guidance.
10: Owner (3 kW) – Wellington	Renewable energy or solar power for schools and other public buildings.
11: Owner (3 kW) – Wellington	Quality of PV. Small windmill for Wellington (efficiency improvements for individuals).
12: Owner (3 kW) – Wellington	General sustainability. Over the years, make the process of installation and consenting easier. There should be industry standards for PV systems like minimum performance standards.
13: Owner (3 kW) – Wellington	Off-grid technologies and their cost benefits. Develop guidelines because it is difficult for non-technical people to understand. BRANZ is good at promoting this.
14: Owner (1.75 kW) – Wellington	Wind generation, particularly noise.
15: Owner (3 kW) – Wellington	No. I just wonder why we are so far behind with using solar power.
16: Owner (3 kW) – Wellington	They should research how to make the whole roof out of solar arrays. I'm also interested in collecting rainwater.
17: Non-owner – Auckland	Guidelines. Provide independent advice (panel life expectancy, for example). Checklists.
18: Non-owner – Auckland	We need a battery technology solution. There should be storage of power at the community level – for all new subdivisions, for example.
19: Non-owner – Auckland	Knowledge transfer for retrofitting existing houses. General energy efficiency. PV tiles – they look better.
20: Non-owner – Auckland	Some advice re substandard products that would have to be renewed before the end of recovery of capital. Review energy return to gas prices as they are previously fixed for a massive benefit to electricity suppliers and detrimental to recovery of capital.

21: Non-owner – Auckland	Waste of resources in the building industry. It requires a change in thinking. Straw bale houses are, for example, a fringe technology, but it is a lot more environmentally sound. They need to give more kudos to alternative options. People also shouldn't be allowed to build that big. There should be an extra tax for large houses. Big houses are not necessary but are more like a status symbol.
22: Non-owner – Auckland	They should do some market research internationally for new suppliers and for new technologies.
23: Non-owner – Auckland	Sustainability, but also material usage so that we don't have another leaky building problem. There should be quality controls for solar power and standards and minimum performance levels. Solar power should be incorporated into new houses and should be subsidised via cost reductions for consents.
24: Non-owner – Auckland	BRANZ needs much more money for research in these areas. BRANZ should leverage international research for the local context, for example, the use of solar power for hot water heating.
25: Non-owner – Wellington	BRANZ and EECA should provide free and easily accessible data on solar power (sunshine hours, etc.). They should produce and enforce quality standards for PV products (isolators, etc.). They should do research on embodied energy comparing timber and concrete houses including transport impact (local versus imported products). There should be INDEPENDENT government research not influenced by the industry. BRANZ should influence universities to train architect and design students on sustainability.
26: Non-owner – Wellington	Benefits of more energy-efficient houses. There should be one-stop shops for finding the best solution for homeowners. The advice on the internet for option packages must be improved.
27: Non-owner – Wellington	Rainwater tanks. There are limited numbers of loans available. The question is why more people are not doing it. Another area is electric cars.
28: Non-owner – Wellington	Wind energy was never suggested by our designers, but possibly there already is information available.
29: Non-owner – Wellington	How to make them cheaper and easier to maintain.
30: Non-owner – Wellington	Community size renewables, like schemes around transformer size systems. And buy-back rates, but that is not really a research topic.
31: Non-owner – Wellington	Not really. I believe that private businesses will discover the most important issues. The compelling factors are well understood. "Weighing and researching the pig doesn't make it fatter."

Appendix B: Online survey

The Value of Sustainability - Solar Power

BRANZ is an independent research, testing, and consulting company providing resources for the building industry.

This survey is part of a BRANZ study on how New Zealand homeowners value sustainable technologies – in this case, solar power for electricity generation. We are interested in why homeowners install them (or why not) and what things influence purchase decisions. Your feedback will ultimately help other New Zealanders to make informed choices about using solar power in their homes.

Your responses will be confidential.

If you have any questions about the survey, please email our team at: ***valuingsustainability@branz.co.nz***

Most of the questions are multi-choice. Completion should take about 10 - 15 minutes. Please note that all questions with an asterisk require answering before you can progress to the next page.

If you would like to be entered into the prize draw for one of five $50 Prezzy Cards, please check the button in the final section.

Thank you for taking time to complete this survey!

NOTE

This survey is about ***solar power*** *(for generating electricity) also called photovoltaic or PV. It is not about* ***solar hot water heating****. The images below show a typical solar power setup on the left and two solar hot water systems on the right.*

Solar power (PV)

Solar hot water (using evacuated tubes)

Solar hot water (using flat plate)

*** Q. How much do you know about solar power generation?**

- ○ Very knowledgeable
- ○ Good understanding
- ○ Somewhat familiar
- ○ Have heard of it
- ○ Not familiar at all
- ○ Other (please specify)

*** Q. When you considered to buy a solar power system, what topic would you have liked more information on?** ***(Please check one response per line only)***

	I wanted a lot more info	I needed a bit more info	I had enough info
The solar power technology itself	○	○	○
The purchase price	○	○	○
Financial assistance options	○	○	○
My personal potential power cost savings	○	○	○
How it would be working in my own home	○	○	○
How it looks on the roof	○	○	○
Maintenance issues	○	○	○
The system's life expectancy	○	○	○
The track record of the product and company	○	○	○
How it affects my home's energy and sustainability performance	○	○	○

Was there other information you would have liked? Please specify below.

*** Q. Did you view any other houses with solar power before making your decision?**

- ○ Yes
- ○ No

*** Q. Do you have solar power on your current home?**

- ○ Yes - I bought the solar power system
- ○ Yes - it was already on the house when I bought it
- ○ No
- ○ Other (please specify)

Reasons against installing solar power

There are a number of frequently quoted reasons why people don't purchase solar power systems.
The following questions ask you to rate these potential reasons.

Hint: There may be some statement which you do not think are factually correct.
For example you may not agree that power prices are low at the moment. In that case please check the "I don't agree with this statement" answer. On the other hand you may agree with the statement that power prices are low. However, your personal motivation for getting solar power is to reduce green house gas emissions. Therefore you are not concerned if solar power is not cost effective at current low power prices. In that case please check the "Of no concern" answer.

Q. For you personally what are the:

*** ...financial reasons AGAINST solar power?**

	I don't agree with this statement	Critical factor	Major consideration	Minor consideration	Of no concern	Don't know
Capital cost	○	○	○	○	○	○
Expectation of future price drop for solar power systems	○	○	○	○	○	○
Lack of finance options	○	○	○	○	○	○
Current low power prices	○	○	○	○	○	○
Uncertain power company buy-back rates for surplus solar power generation	○	○	○	○	○	○
Negative effect on property resale value	○	○	○	○	○	○

*** ...technical reasons AGAINST solar power?**

	I don't agree with this statement	Critical factor	Major consideration	Minor consideration	Of no concern	Don't know
Practical installation and site issues (unsuitable roof pitch, too much shading, etc.)	○	○	○	○	○	○
Administrative complexities such as registration with lines companies and power retail companies	○	○	○	○	○	○
Maintenance effort and cost	○	○	○	○	○	○
Risk of roof failure such as leaks	○	○	○	○	○	○

* **Q. How much do you know about solar power generation?**

- ○ Very knowledgeable
- ○ Good understanding
- ○ Somewhat familiar
- ○ Have heard of it
- ○ Not familiar at all
- ○ Other (please specify)

This questions requires an answer.

* **Q. When you considered to buy a solar power system, what topic would you have liked more information on?** ***(Please check one response per line only)***

	I wanted a lot more info	I needed a bit more info	I had enough info
The solar power technology itself	○	○	○
The purchase price	○	○	○
Financial assistance options	○	○	○
My personal potential power cost savings	○	○	○
How it would be working in my own home	○	○	○
How it looks on the roof	○	○	○
Maintenance issues	○	○	○
The system's life expectancy	○	○	○
The track record of the product and company	○	○	○
How it affects my home's energy and sustainability performance	○	○	○

Was there other information you would have liked? Please specify below.

This question requires an answer.

* **Q. Did you view any other houses with solar power before making your decision?**

- ○ Yes
- ○ No

*** ...other reasons AGAINST solar power?**

	I don't agree with this statement	Critical factor	Major consideration	Minor consideration	Of no concern	Don't know
Varying and inconsistent government policies	○	○	○	○	○	○
Aesthetics	○	○	○	○	○	○
The current technology may soon be out of date	○	○	○	○	○	○

Other important barriers for you (please specify)

Reasons for installing solar power

... and now to the potential benefits of solar power systems.

Hint: There may be some statement which you do not think are factually correct.
For example you may not agree that solar power panels do in fact increase the property resale value. Instead you believe that they may even decrease the resale value. In that case please check the "I don't agree with this statement" answer.
On the other hand you may agree with the statement that solar power panels could increase the resale value. However, you may be intending to live in the house permanently and are therefore not worried about its resale value. In that case please check the "Of no concern" answer.

Q. For you personally what are the:

*** ...financial reasons FOR solar power?**

	I don't agree with this statement	Critical factor	Major consideration	Minor consideration	Of no concern	Don't know
Power cost savings	○	○	○	○	○	○
Independence from power company price rises	○	○	○	○	○	○
Greater financial control of outgoings	○	○	○	○	○	○
Positive effect on property resale value	○	○	○	○	○	○

*** ...environmental reasons FOR solar power?**

	I don't agree with this statement	Critical factor	Major consideration	Minor consideration	Of no concern	Don't know
Reduced green house gas emissions/global warming	○	○	○	○	○	○
My home's increased sustainability	○	○	○	○	○	○
Support of renewable energy technologies	○	○	○	○	○	○
A better sustainability rating score (such as Home Star)	○	○	○	○	○	○

*** ...other reasons FOR solar power?**

	I don't agree with this statement	Critical factor	Major consideration	Minor consideration	Of no concern	Don't know
Long term power supply security (peak oil etc.)	○	○	○	○	○	○
Mistrust in power company	○	○	○	○	○	○
Self-sufficiency in cases of power cuts	○	○	○	○	○	○
Demonstrate environmental commitment	○	○	○	○	○	○

Other important benefits for you (please specify)

Your overall feeling towards solar power

Q. How do you feel in general about a solar power system for your home?

*** Q. Would you pay less or more for a house than for the same house without a solar power system?**

- ○ I would pay **less** for the house with solar power
- ○ I would pay **the same**
- ○ I would pay **more** for the house with solar power

*** Q. Please enter how much more or less you would pay.**

(Example: If you would pay $10 less please enter '-10', if you would pay $1000 less please enter '-1000', if you would pay the same please enter '0', if you would pay $10 more please enter '10', etc.)

*** Q. In general, do you think New Zealanders should install more solar power systems?**

- ○ Yes – definitely
- ○ It depends on the circumstances
- ○ No – I don't believe it is the right thing to do

Advice on solar power

*** Q. Would you trust the advice of the following sources when purchasing a solar power system?**

	Completely	Mostly	Sometimes	Rarely	Never	I'm not using these
Friends and family	✓	○	○	○	○	○
Government agency resources	✓	○	○	○	○	○
Technical experts from solar power sales companies	✓	○	○	○	○	○
Your real estate agent	✓	○	○	○	○	○
Existing solar power users' comments on the internet	✓	○	○	○	○	○
Other internet web pages	✓	○	○	○	○	○

What people or sources do you trust? (Please list them).

*** Q. When you considered purchasing a solar power system, how often did you consult:**

	A lot (more than 10 times)	Several times (between 3 and 10 times)	Once or twice	Not at all
Friends and family	✓	○	○	○
Government agency resources	✓	○	○	○
Technical experts from solar power sales companies	✓	○	○	○
Your real estate agent	✓	○	○	○
Existing solar power users' comments on the internet	✓	○	○	○
Other internet web pages	✓	○	○	○

What people or sources did you consult? (Please list them and indicate how often you consulted them.)

Demographics

Q. In which region do you live? *(Click on the down arrow to select a region)*

Q. Are you...

- [x] Male
- [ ] Female

Q. In which age group do you belong?

45-54

Q. What is the highest level of education you have completed?

Pre-secondary school

Q. What is your annual household income before tax?

$100k - $124k

Q. Do you have any other comments about solar power or about this research project?

ZXD

Please check this button if you would like to go into the $50 Prezzy Card draw.
The five winners will be drawn on Friday 21st August 2015 and contacted by email.

◯ Yes, I'd like to go into the prize draw.

If you live in the Auckland or Wellington regions and wouldn't mind being interviewed for about half an hour on the issues above, please check this button. If you are selected to be interviewed we would like to give you a $30 Prezzy Card to show our appreciation.

◯ Yes, I'm OK for a short interview at a convenient time. Please contact me.

Please enter your preferred contact details (Name + email or phone number)

Thank you for completing this survey!

This research will provide us with a better understanding of how New Zealanders value one aspect of sustainability.