

Anti-Dumping Commission. *PV Panel End User Survey*.

Prepared for David Peters, ADC

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Executive summary.

1.1. Introduction

Colmar Brunton was contracted by the Anti-Dumping Commission to conduct research into the purchase decision process for photo voltaic solar panels (PV panels).

The objectives of this research were twofold:

- Develop an understanding of consumers' purchasing decisions concerning installed PV panels. Including consumer attitudes and knowledge of PV solar and the features that they consider to be influential in making their decision.
- 2. Understand the impact that a small price increase in imported PV panels would have on sales of Australian made PV panels.

The research involved an online survey of n=512 Australians who are either main or joint decision makers in their households and either already have PV panels installed (n=254) or were considering the installation of PV panels (n=258). The research was conducted between Wednesday the 13^{th} of July 2016 and Tuesday the 19^{th} of July 2016.

This report presents the findings of this research.

1.2. Key findings

The purchase decision

In order to determine the role of price in the PV solar purchase decision, a choice experiment was conducted to control for a number of different variables. It was designed to ascertain an accurate measure of the importance of country of assembly, product quality and price in the decision making process.

When faced with the choice of a variety of PV solar panel packages we find that country of panel assembly combined with brand is the most important attribute contributing to nearly three fifths (58%) of the choice. Product quality guarantee accounts for a quarter (26%), while price only makes up a sixth (16%) of the choice.

To model the impact of price changes in the market we can consider what happens to consumer choice when we move from a baseline to a scenario where Chinese panels are more expensive. Using the data collected from the study, we reviewed a scenario where Chinese panels are at the lowest possible price point, while Australian panels occupy the top most price point, and panels from Germany, Korea and Taiwan all occupy the middle price point.

We then increase the price of the Chinese panels (by approximately 6%) and find that their individual share of choice drops by 25%, however it is Taiwan's share of choice that benefits increasing by 10%,



while other countries including Australia see smaller gains. In this scenario we also find that Australian assembled panels have the lowest positive cross price elasticity (i.e. are least responsive to changes in the price of Chinese panels).

When price is varied across a range of analytical scenarios we find movement in the percentage increase and decrease of the share of Choice for Chinese assembled panels. However, the decrease in choice moved from Chinese assembled panels to Taiwanese or Korean (most often), and as is seen in the cross price elasticity analysis Australian assembled panels see little benefit from movement in the Chinese price.

Within the brand and country of assembly, Australia (Tindo) had the highest utility (10.8), suggesting they are considered to be a higher quality product. Whereas Chinese and Taiwanese had the lowest utility at –8.0 and -9.1 respectively. Germany was next after Australia (6.9) followed by Korea -0.5). In this context utility is the strength of influence of each individual attribute, therefore the greater the utility the greater the strength of an attribute in the decision.

Knowledge and understanding

The majority of Australians who have PV solar, or have considered it, feel informed about the product; with two fifths (41%) claiming to have high levels of knowledge. Two fifths (43%) believe it will take up to five years to pay for itself, with a further half (47%) believe it will take between five and twenty.

The decision to install PV solar is relatively quick, with the majority doing so in under one year (70%). However, after the decision has been made three in ten (31%) do not know where their panels were assembled. This indicates that for those that have purchased PV solar panels the country of assembly is not always reviewed in detail.

The decision to install PV solar

For three quarters of Australians currently with or having considered PV solar the quality of the Panels (74%), and Price (72%) influence the final decision, with the quality of the inverter (58%) and quality of installation (56%) also influential features. This helps us to understand the greater role of quality in the decisions identified by the choice exercise.

When choosing from a list of simple attributes, price comes up as the most influential feature of the decision for a third of consumers (36%), with quality the go to feature for a quarter (25%).

However, although price is identified as they key feature, the choice exercise analysis tells us the level at which cost enters the decision-making process. Once a certain level of quality is obtained, price then becomes relevant. If quality was the same across the choice it would require Chinese panels to be more expensive than their Australian competitors before we see a specific impact on the appeal of Chinese panels - but importantly it is German and Korean assembled panels that would benefit more greatly than Australian – albeit to a small degree.



2. Methodology

The following flow chart summarises the methodological approach that has been undertaken for this study.





2.1. Interpreting This Report

2.1.1. Definitions

The following terms or abbreviations have been utilised throughout this report.

Table 1: Abbreviations used

Term of abbreviation	Definition
SR	Single response
MR	Multiple response
OE	Open ended response
PV panels	Photo voltaic solar panels
	Households who have/use PV panels in their
Solar bouseholds	household, includes those who installed their
	own systems or those who purchased
	houses already with PV panels.
	Those who are currently or have previously
Considering solar	considered installing PV panels on their
	home.

2.1.2. Percentages and averages

Percentages are rounded to whole numbers. Some percentages may not add to 100 percent due to rounding.

Sorting of results

In all tables, rows are sorted from most frequent response to least.

Tests of Statistical Significance

Tests for statistical significance have been conducted on particular subgroups of interest in this survey, including:

- those who have solar, and
- those who are considering solar.

An exception reporting approach has been undertaken in that if no statistical significance is mentioned, there are none associated with these groups.

Tests have been undertaken at a 95% confidence level. If there is a statistically significant difference between the result for a particular group and the result for the wider population, we can be confident

that this difference has not occurred by chance, rather that it reflects a genuine difference among that group compared to the wider population.

In tables and graphs, the figures with an upwards arrow (i.e. \uparrow) represent a proportion that is significantly higher than the subtotal of the other subgroups. Conversely, the figures with a downwards arrow (i.e. \checkmark) represent a proportion that is significantly lower than the subtotal of the other subgroups.

Reliability

The margin of error associated with this survey is +/-4.33. This means that if 50% of the sample surveyed expresses a particular sentiment, the true value would lie between 45.67% and 54.33%.

Where sample sizes are low (less than n=50), these are marked by an asterix (*) in this report. These results should be interpreted with caution.



3. Introduction

Colmar Brunton was commissioned by the Anti-Dumping Commission to assist the Commission in its investigation into the alleged dumping of PV panels exported to Australia from China. This study will help identify whether the 'dumping' of Chinese manufactured PV panels on the Australian market has caused any injury to the Australian industry.

When choosing to purchase PV solar panels consumers rely on information supplied by installation companies, written materials available publicly, and the experiences of others. Previously it was unclear which source of information is deemed most reliable, which is sought first and the role of price in the decision-making process.

When considering the role of price in the purchase decision one of the variables is the cost of the PV solar panels. Currently, installation companies can choose to purchase panels from Australian based company Tindo who will assemble the PV panels (after purchasing the components from overseas), or they can purchase assembled panels from companies based overseas. If price is a key factor in the choice to install PV solar panels it might be that installation companies are choosing to purchase fully assembled panels from overseas to ensure the final price to the consumer is highly competitive. Therefore a key element of this study was to model the role of price in the solar purchasing decision.



4. Findings

4.1. The choice process

In this study we developed a choice exercise to test the importance of specific elements of the PV solar panel purchase decision. This is different from asking people to tell us which elements are most important, as often the relationship between variables can be more complicated than this suggests. Consequently the analysis undertaken for this section of the report helps us to understand the choice decision, and the importance of each factor tested.

In the real world the process of PV solar consumer choice is complex with many variables and varying levels of involvement for consumers. A choice experiment was conducted in order to control for a number of these different variables to ascertain an accurate measure of the importance of country of assembly, product quality and price in the decision making process.

The share of choice represents the likelihood to choose a particular brand/ country of assembly and is not calibrated to market share. Factors such as distribution, trade marketing, salience, quality of sales staff, perceived quality of installation, marketing and promotions remain independent from the model.

All market simulations unless otherwise noted assume a product quality guarantee of 25 years. The range of prices were individualised to consumers based on their self-reported power consumption; low (2KW), medium (5KW) or high (10KW). Further given multiple variables may have been adjusted between scenarios, comparisons should be limited to simulations contained within their scenarios and not made across different scenarios.



Scenario 1

For our first scenario we set a baseline where Chinese panels are at the lowest possible price point, while Australian panels occupy the top most price point. The panels from Germany, Korea and Taiwan all occupy the middle price point. This results in Germany holding the highest share of choice (34%) with Australia holding a slightly smaller proportion (28%).

It is important to note, that to allow for the isolation of the role of price in the choice decision the model assumes that issues such as marketing efforts and timing of market entry are non-existent. We understand that in-market this is not the case. However, this does not invalidate the findings.



Figure 1: Simulation 1 – China panels cheapest, Australian most expensive



It is useful to understand the movement that takes place for a specific country of assembly, in terms of share of choice, when the price changes. By increasing the price of the Chinese panels one tier (approximately 6%) their individual share of choice drops by 25%, however it is Taiwan's share of choice that benefits increasing by 10% while other countries including Australia see smaller gains.







This data can also be analysed in terms of price elasticities; looking at the % change in quantity demanded for specific panels in response to a % change in price of Chinese panels (given by % change in quantity divided by % change in price). The change in demand for a non-Chinese panel in response to the change in price of Chinese panels is a cross price elasticity.

When we analyse the price elasticities we see that the Australian Tindo branded product has the lowest cross price elasticity (i.e. is least responsive to a change in price of Chinese panels).







By increasing the price of Chinese panels by yet another tier (approximately 12% more than the benchmark) their share of choice decreases significantly by 74% from their baseline in Simulation 1. By levelling the price with Taiwan and Korea these two countries see gains to share of choice, while Australia sees only a small gain to its share of choice (+6%).





QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR) Base: all respondents (n=512)

Again, in terms of cross price elasticity Australia attracts the lowest positive movement.





QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR) Base: all respondents (n=512)

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Scenario 2

Scenario 2 explores a market where German and Australian panels occupy the top price point while PV panels from China, Korea and Taiwan are approximately 6% cheaper. This results in Australia holding two fifths of the share of choice (38%), while Korean and German assembled panels each hold a quarter of the choice (26% and 25% respectively). China and Taiwan only hold very small proportions of share of choice (5% and 2% respectively).









Should China's price then be increased approximately 6 per cent its share of choice will decrease by 10.4%, however much like in the first scenario, Australia does not gain from this change. Rather the share of choice predominantly shifts to the Korean and Taiwanese panels which now are the lowest prices in the market. Given that product warranty is fixed across all brands, these consumers are likely to be purely seeking the lowest price.





QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR)

Base: all respondents (n=512)

Again, in terms of cross price elasticity Australia attracts the lowest positive movement.

Figure 8: Simulation 5 – Cross price elasticity



QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR) Base: all respondents (n=512)

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Scenario 3

This simulation depicts a market where all PV solar panels have the same product guarantee (25 years) and panels are evenly priced (\$3,380 - \$16,880, dependent on KW required).

In this situation Australia commands over two fifths of the share of choice (45%), followed by Germany which commands over a quarter (28%). Korean assembled panels hold a fifth (19%) of the share of choice. While China holds only 4 per cent of the share of choice and Taiwan holds the smallest share (2%).



Figure 9: Simulation 6 – All panels share equal price point



By increasing only the price of Chinese panels by 6 per cent in a market where all other panels are priced on the middle tier, China's share of choice increases by almost one quarter (23.3%). A likely explanation for this is in a scenario where all other variables are held equal, an increase in price represents an increase in quality and therefore be likely to attract a greater share of choice.

This suggests that increasing the price of Chinese panels in this scenario will have little effect on the market as a whole other than to increase China's share.



Figure 10: Simulation 7 – Chinese price increased by one band

QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR)

Base: all respondents (n=512)

In terms of cross price elasticity, Germany attracts the lowest positive movement.

Figure 11: Simulation 7 – Cross price elasticity



QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR) Base: all respondents (n=512)

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In our next simulation we increase the price of the Chinese panels further again, and, as a result the share of choice only fractionally (-6.7%) diminishes for Chinese panels. The share of choice held by Australian panels also drops, although by a smaller percentage.

Therefore this scenario indicates that it may not be possible to put a high enough duty on the Chinese panels in order to decrease their share of choice completely, particularly when all other competing countries offer panels at the same price. If quality was the same across the choice it would require Chinese panels to be more expensive than their Australian competitors before we see a specific impact on the appeal of Chinese panels - but importantly it is German and Korean assembled panels that would benefit more greatly than Australian – albeit to a small degree.



Figure 12: Simulation 8 – Chinese price increased to top tier

QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR) Base: all respondents (n=512)

In terms of cross price elasticity, Korea attracts the lowest positive movement.





QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR) Base: all respondents (n=512)

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Scenario 4

The fourth scenario attempts to create a 'price ladder' more reminiscent of reality, where we understand perfect choice does not exist and sales teams often remove some elements of the choice for consumers. Here Australian panels are the most expensive, followed by the German panels, while Korean produced panels occupy the middle price point. Lastly Chinese and Taiwanese panels are the cheapest on the market, however this decreased cost also comes with a reduction in quality, possessing only a 15 year guarantee as opposed to the 25 years that all other brands are offering.

As a result German and Australian panel providers both hold three tenths of the total share of choice each (31% and 30% respectively), while Korea holds a quarter (24%) and China holds just under a tenth (9%).







As a result of Chinese panels receiving an approximate 6 per cent increase in price, the Chinese lose 38.9% of their share of choice. This result reinforces the conclusion seen in Simulation 5, where following a price increase for Chinese panels the share of choice will predominantly shift to the next lowest price point, in this case the Taiwanese brand. Suggesting that there is a number of price sensitive consumers in the market who are unlikely to switch to an Australian PV panel in the event of a price increase to their preferred Chinese brands.





QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR)

Base: all respondents (n=512)

In terms of cross price elasticity Germany attracts the lowest positive movement.

Figure 16: Simulation 10 – Cross price elasticity



QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR) Base: all respondents (n=512)

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By increasing the price of Chinese panels a further 6 per cent the effect previously observed is repeated, China's share of choice drops by over 75%, with Taiwan benefitting in terms of the movement of percentage share of choice. The will in part be explained by the Taiwanese brand possessing the most similar offer to the Chinese panels from Simulation 9.





QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR) Base: all respondents (n=512)

Again, in terms of cross price elasticity Australia attracts the lowest positive movement.

Figure 18: Simulation 11 – Cross price elasticity



QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? Base: all respondents (n=512)

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Scenario 5

In this final simulation we can see the conditions necessary for Chinese panels to command a greater share of choice than the Australian Tindo brand. While in reality this is already the case, this is largely due to other factors. These other factors could potentially include Tindo's timing of market entry, their marketing strategy and the price sensitivity of consumers. Therefore this simulation can reveal what specific attributes would help raise the profile of Chinese brands without such extraneous variables.

When Chinese panels offer a 25 year product warranty and hold the lowest price point, while the rest of the market offers only a 15 year warranty and the top price point, the Chinese panels would account for two fifths (43%) of share of choice. However despite these advantages to China Australian assembled panels would still hold over a quarter (27%) of the total share of choice.







Utility of choice

Utility is the strength of influence of each individual attribute, therefore the greater the utility the greater the strength of an attribute in the decision. This allows us to see which attributes will have the greatest impact on the choices made by those purchasing PV solar panels, while simultaneously being able to compare the impact certain attributes have on the purchase decision, both within and between elements (brand, guarantee, price, etc.).

Within the brand and country of assembly, Australia (Tindo) had the highest utility (10.8), whereas Chinese and Taiwanese had the lowest utility –8.0 and -9.1 respectively. Germany was next after Australia (6.9) followed by Korea (-0.5).

This indicates that if a consumer were presented with a complete choice, that the presence of the Australian assembled Tindo branded PV panel would be particularly influential in this choice. However, we also find that the lower priced PV solar panels also have a high utility, and therefore the role of price is worthy of further exploration.



Figure 20: Overall importance of attributes

QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR) Base: all respondents (n=512)

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Overall share of choice

In the real world the process of PV solar consumer choice is complex with many variables and varying levels of involvement for consumers. A choice experiment was conducted in order to control for a number of these different variables to ascertain an accurate measure of the importance of country of assembly, product quality and price in the decision making process.

When faced with the choice of a variety of PV solar panel packages we find that country of panel assembly combined with brand makes up the greatest share of choice, contributing to nearly three fifths (58%) of the choice. Product quality guarantee accounts for a quarter (26%), with price making up a sixth (16%) of the choice.

Figure 21: Overall importance of attributes



QC2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home? (SR) Base: all respondents (n=512)

The role of price

Therefore our choice modelling analysis has shown that quality plays the most significant part of the choice exercise. When presented with a perfect choice, consumers are more likely to associate Australian and German PV panels with quality. However, when Chinese panels come with a higher quality guarantee their share of choice increases, and at a significantly lower price point, they would attract the highest share of choice, as seen in Simulation 12. With these quality guarantees they will hold the largest share of choice regardless of price, especially as the competition is not going to be cheaper.



4.2. Awareness and knowledge

The majority of Australians who have PV solar, or have considered it, feel informed about the product; with two fifths (41%) claiming to have high levels of knowledge. This increases to over one half (55%) when considering those who already use PV solar panels.

Significantly less knowledge is held by those considering PV solar panels, with only one quarter (26%) believing they have a high knowledge of PV solar panels. This suggests that a large portion will need more PV solar panel information as they come closer to making their purchasing decision.



Q1. On a scale of 0 to 10 how much would you say you know about rooftop solar electricity systems? (SR) Base: all respondents (n=512)

Significance testing at 95% confidence between users and those considering – significantly higher 🕯 and significantly lower 🦊





Financial return

Regardless of whether they are users of PV solar panels or not the Australians surveyed have similar expectations regarding the time it would take to make back the costs of PV solar panels.

Nearly half (48%) believe it will take at least 5 years for a PV solar panels system to pay for itself, while a smaller proportion (43%) believe a system could pay for itself in less than five years. Within this second group nearly one fifth (17%) believe their investment will pay for itself in less than 3 years.

Nearly one in ten Australians (8%) do not know how long it would take for a system to pay for itself.

These findings do not differ between those who have PV solar and those considering it.

Figure 23: Expected financial return of solar electricity systems



Q2. How long would you expect it to take for a solar electricity system to pay for itself? (SR) Base: all respondents (n=512)





4.3. Non solar households

Expected length of decision making process

Two fifths of Australians who are considering solar (39%) will make their decision to install PV solar panels within the next year, while a slightly smaller proportion (33%) will decide in the next few months. Suggesting the majority of those considering PV solar believe they will make a decision within 12 months.

One in six (16%) will decide in the next one to two years and a very small proportion (4%) will decide in more than 2 years.

Figure 24: Predicted time needed to make a decision on PV solar panels



Q3. When do you think you will make the final decision about installing a rooftop solar electricity system? (SR) Base: all respondents currently considering solar (n=152)





4.4. Existing solar users

Length of decision making process

Just over half of Australians (52%) who installed PV solar panels in their own homes made the final decision regarding installation within a few months of first considering.

A quarter (24%) took about one year to make their decision, one in eight decided within one to two years (12%) and one in ten (9%) spent more than two years deciding.

Comparing these results between groups it is suggested that the decision process may be quicker than expected. Given that a third (33%) of those currently considering installing PV panels expect their decision to be made with a few months, whereas over half (52%) of those with PV solar made their decision within a few months. However the majority of those considering and those who already have installed panels believe the decision takes up to a year.





Q4. How long did it take to make the final decision to install a rooftop solar electricity system from the time it was first considered? (SR)

Base: all respondents who installed solar (n=235), excludes those who purchased homes with existing panels.





Three in ten Australians (31%) do not know the country of manufacture for their PV panels. Suggesting that consumers purchasing PV panels have a range of issues to consider.

For those that do know where their panels come from, three in ten Australians (31%) believe that they purchased PV panels made by Australian manufacturers. A fifth (20%) purchased German made panels and one in seven (14%) selected panels made in China. A very small proportion have panels made in either Singapore (1%), Korea (1%) or from other countries (1%).

As Australian assembled panels do not make up three in ten of all panels purchased it is clear that there is some confusion. It could be that households assume that their panels are Australian assembled when they are not or perhaps that it is not made clear during the sales process. Regardless, given the importance of country of origin and brand in the purchase decision it is clear there is a lack of awareness among consumers on the true origin of their panels.



Figure 26: Solar panel country of origin

Q4. In which country were your solar panels made? (SR) Base: all respondents who have solar (n=254) Note: countries with <1% not charted



When asked to consider what issues were of consideration when choosing PV panels, the majority of households with solar (56%) state the financial cost. Despite this being the stand out issue, a number of other factors impact on the decision. Given that a fifth (20%) had to consider or overcome having limited knowledge on the topic it is likely that the role of salespersons is influential in the final decision.

A smaller proportion (17%) were concerned about the technology improving in the near future. One in six (16%) considered limited roof space and one in eight (12%) weighed up using alternative options to reduce the cost of the energy bills.

Figure 27: Issues considered when installing solar panels



Q6. Which, if any, of the following were issues you had to consider or overcome to install a rooftop solar electricity system? Please select all that apply. (MR) Base: all respondents who have solar (n=254)



4.5. Other choice factors

Influences on decision making

When asked to consider what features would influence their choice of solar panels, the majority consider the quality of the panel (74%) and the total price (72%) to be of influence.

Nearly three fifths consider the quality of the inverter (58%) and a smaller proportion consider the quality of installation (56%) to be features influencing their choice of panel.

Half (50%) also consider the country of assembly to be important while more than two fifths consider local after sales service (45%) and the experience and skills of the installer (45%) to be important.

Figure 28: Features influencing choice of panels



QC3. What would you consider to be the features that influence your choice of solar panels to generate electricity for your home? (MR) Base: all respondents (n=512)

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When asked to consider what are the most influential features when choosing solar panels, over half of Australians (51%) consider the total price to be among the most influential. While a smaller proportion (21%) consider the country of assembly to be the most important factor. This finding confirms the conclusion that the decision is a complex mix of issues. Although this tells us that price is important, the choice modelling tells us that when combined with issues of quality smaller differences in price have little influence.

A quarter (25%) considers the quality of the panels to be influential. However when considering the top two most influential features, half of Australians consider price (51%) of almost equal importance to quality solar panels (51%).



QC4. Please rank the features that would influence your choice from 1 to 3, with 1 being the most influential, 2 the second most influential, and 3 the third most influential. (MR)

Base: all respondents (n=512), all respondents who made two choices (n=439), all respondents who made one choice (n=406) Note: Asterix indicates low base size (*)

Influences on achieving high quality results

When asking Australians to consider which elements will impact on achieving high quality results, we find another issue to be important; the experience and skill of the installer. This aspect was not touched on in earlier questions and its presence here highlights that it is of importance.

Three fifths consider experience and quality of the installer (59%) to contribute to a high quality result. While a smaller proportion (55%) believe the performance warranty of their panel to influence high quality results.

Approximately half also consider the product warranty of the PV panels (52%) and the components of the panels (50%) to be indicators of a high quality final result. Further, over two fifths believe country of assembly (46%) to contribute to a quality result.

Figure 30: Elements contributing to a high quality result



QC5. Which of the following elements of the solar panel installation process would you consider contribute to a high quality final result? (MR)

Base: all respondents (n=512)



When limited to choosing the three most important elements that contribute to a high quality final result, two fifths state the experience and skill of the installer (43%), reaffirming that the installer is a key indicator of final quality.

Further over one third state the performance warranty (36%) as a key indicator, and a smaller proportion note the product warranty (33%) and the solar panel components (31%). This suggests that these elements of the panel as a product are also key to achieving high quality results.

A quarter of Australians (26%) select the country of assembly and a fifth (20%) considers the solar panel assembly as contributing to a high quality result. Less than one in six (15%) believe the cost of the solar panels to be an indicator of quality, suggesting that for the majority a high price may not necessarily be an indicator of quality solar panels.

Figure 31: Elements most contributing to a high quality result



QC6. And which of the following elements of the solar panel installation process would you consider most contributes to a high quality final result? (MR UP TO THREE)

Base: all respondents (n=512)



When asked to choose the single most important contributing element, the experience and skill of the installer (21%) and the performance warranty of the panel (20%), remain at the top of the list for one fifth of all Australians. Given the significant proportion of Australians nominating these elements, it is suggested that the meaning of quality is made up of multiple elements and not just connected to the country of assembly or manufacture. This includes the human element of installing the panels, which was previously not included.

In terms of physical components in PV panels, approximately one in six (17%) consider the solar panel components to the most important element of quality, while one in eight attribute the country of assembly (12%) and the product warranty to be the most important indicators of quality (12%).

Figure 32: Element most important in contributing to a high quality result



QC7. And if you had to choose the most important, which of the following elements of the solar panel installation process would you consider contribute to a high quality final result? (SR) Base: all respondents (n=512)



5. Conclusions

PV solar purchasing is a complicated choice, therefore many variables must be considered when analysing the purchase decision. The choice exercise suggests that country of panel assembly and the associated brand to be the most important attribute involved in the decision making process, contributing to nearly three fifths (58%) of the choice. While product quality guarantee accounted for a quarter (26%) of the choice, and price making up just a sixth (16%).

When price is varied across a range of analytical scenarios we find movement in the percentage increase and decrease of the share of Choice for Chinese assembled panels. However, the decrease in choice moved from Chinese assembled panels to Taiwanese or Korean (most often), and as is seen in the cross price elasticity analysis Australian assembled panels see little benefit from movement in the Chinese price.

When asking Australians to consider what they think influences their choice three quarters nominate the quality of the Panels (74%), and Price (72%) as influencing the final decision, with the quality of the inverter (58%) and quality of installation (56%) also influential features. Further the role of the installer was also considered by over two fifths (43%) to be one of the key indicators of a high quality result.

When choosing from a list of simple attributes, price comes up as the most influential feature of the decision for a third of consumers (36%); this is further enforced with a majority of those who installed panels (56%) considering the financial cost to be a significant barrier to acquiring PV panels. However deeper analysis indicates that there is a lack of knowledge on where PV panels are assembled suggesting consumers may struggle to collate all the information they require.

Despite price being identified as a key feature, the choice exercise analysis explains that a certain level of quality needs to be obtained before price can become relevant. If quality was the same across the choice it would require Chinese panels to be more expensive than their Australian competitors before we see a specific impact on the appeal of Chinese panels - but importantly it is German and Korean assembled panels that would benefit more greatly than Australian – albeit to a small degree.





6. Sample profile

Table 2: Gender

	Total (n=512)
Male	44%
Female	56%
Other	-

S1. Please indicate your gender: (SR) Base: all respondents (n=512)

Table 3: Age

	Total (n=512)
15-24 years	15%
25-34 years	17%
35-44 years	17%
45-54 years	18%
55-64 years	18%
65+ years	16%

S2. Which one of the following age groups do you fall into? (SR) Base: all respondents (n=512)



Table 4: Location

	Total
	(n=512)
New South Wales	32%
Victoria	24%
Queensland	21%
South Australia	8%
Western Australia	10%
Northern Territory	1%
Tasmania	2%
Australian Capital Territory	2%

S3. Please enter your postcode in the space below? (OE) Base: all respondents (n=512).

Table 5: Dwelling type

	Total (n=512)
Separate house	89%
Semi-detached house	11%

S4. Which of the following best describes the type of dwelling or place where you currently live? (SR) Base: all respondents (n=512).

Table 6: Home ownership

	Total (n=512)
I live at home with family	34%
I own/jointly own my home	53%
I own the home I occupy and have an investment property (not an apartment)	11%
I rent the home I occupy and have an investment property (not an apartment)	2%

S5. Which of the following best describes your situation? (OE) Base: all respondents (n=512).



Appendix A: quantitative questionnaire

1. Schedule/Timing

Final Questionnaire sent to Field Project Manager: 8-07-16 Pilot Commences (mail out): 13-07-16 Pilot Concludes (ready to download): 14-07-16 Fieldwork Commences (mail out): 14-07-16 Fieldwork Concludes (ready to download): 19-07-16

2. Sample Size

N= 500

3. Interview Length

10 minutes

4. Sampling

Qualifying Criteria:

- n=250 main/joint decision-makers who have PV solar panels in their home (10% of homes have SV panels in Australia)
- n=250 main/joint decision-makers who are also home owners and interested in PV solar

Sub-Quota Requirements:

• roughly Nat Rep by location - minimum numbers for analysis in each area.

Estimated Net Qualifying Rate:

• 20-30%



ONLINE QUESTIONNAIRE

SCREENING QUESTIONS

GENDER

ASK ALL, SR S1 Please indicate your gender:

- 1. Male
- 2. Female
- 3. Other

AGE

ASK ALL, SR [UNDER 14YRS SCREEN OUT] S2 Which one of the following age groups do you fall into?

1.14 or under

- 2. 15-17 3. 18-19 4. 20-24
- 5. 25-29
- 6. 30-34
- 7. 35-39
- 8. 40-44
- 9.45-49
- 10. 50-54
- 11. 55-59
- 12.60-64
- 13.65-69
- 14.70+

TERMINATE IF CODE 1

LOCATION

ASK ALL, OE-NUM (0-9999)

S3. Please enter your postcode in the space below.

HIDDEN

hs3_CITY. LOCATION CLASSIFICATION

- 1. Sydney
- 2. NSW other than Sydney
- 3. Melbourne
- 4. Victoria other than Melbourne
- 5. Brisbane metropolitan area
- 6. Queensland other than Brisbane metropolitan area
- 7. Adelaide
- 8. South Australia other than Adelaide
- 9. Perth
- 10. Western Australia other than Perth
- 11. Darwin
- 12. Northern Territory other than Darwin
- 13. Hobart
- 14. Tasmania other than Hobart
- 15. Canberra
- 16. ACT outside Canberra

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CHECK QUOTAS

hS3_STATE

- 1. NSW (CODE 1 OR 2)
- 2. VIC (CODE 3 OR 4)
- 3. QLD (CODE 5 OR 6)
- 4. SA (CODE 7 OR 8)
- 5. WA (CODE 9 OR 10)
- 6. TAS (CODE 13 OR 14)
- 7. NT (CODE 11 OR 12)
- 8. ACT (CODE 15 OR 16)

DWELTYP

ASK ALL, SR

S4 Which of the following best describes the type of dwelling or place where you currently live? Please select one option.

- 1. Separate house
- 2. Semi-detached house/Terrace house/Townhouse/Villa
- 3. Flat or unit in a multi-storey apartment block
- 4. "Lifestyle" (e.g. Over 45s, Over 55s) accommodation
- 5. Residential aged care facility
- 6. Other. (please specify)
- 7. I have no permanent residence

TERMINATE IF CODE 3,4,5,6,OR 7

OWNERSHIP

ASK ALL, SR

S5. Which of the following best describes your situation?

1. I live at home with family

2. I rent the home I occupy (i.e. I don't own a home or investment property)

3. I own/jointly own my own home

4. I own the home I occupy AND have an investment property that is a house, town-house etc., i.e.

not an apartment

5. I rent the home I occupy AND have an investment property that is a house, town-house etc., i.e. not an apartment

99. Refuse to answer

TERMINATE IF CODE IF 2 OR 99

DECISION

ASK ALL, SR

S6 Which of the following best describes your role in household decision-making? By decision-making we mean things such as renovations, improvements, maintenance etc. of this property? Please select one option.

- 1. I am the main decision-maker
- 2. I jointly share the decision-making with another household member
- 3. I seldom do any household decision-making
- 4. I never do any household decision-making

TERMINATE IF CODE 3 OR 4



PRESENCE OF SOLAR

ASK ALL, SR

S7. Does your residence have a rooftop solar electricity system installed?

- 1. Yes
- 2. No

CHECK QUOTAS

hS7

1. Have solar

CONSIDERATION OF SOLAR

ASK ALL CODE 2 AT S7, SR

S8. Are you currently considering, or have you previously considered, installing a rooftop solar electricity system on your home?

- 1. Yes, previously considered
- 2. Yes, currently considering
- 3. No

TERMINATE IF CODE 3

CHECK QUOTAS hS7 2. Considering solar

IF UNSUCCESSFUL

Thank you for your patience in answering these questions. Unfortunately, we do not need you to participate in our research this time, but we sincerely appreciate your time and assistance today.





MAIN BODY OF QUESTIONNAIRE

AWARENESS AND KNOWLEDGE

AWARENESS

ASK ALL, SR

Q1. On a scale of 0 to 10 how much would you say you know about rooftop solar electricity systems?

0. I don't know anything about rooftop solar electricity systems

1. 2.

3.

4.

5.

6.

7.

8.

9.

10. I know a lot about rooftop solar electricity systems

FINANCIAL RETURN

ASK ALL, SR

Q2. How long would you expect it to take for a solar electricity system to pay for itself?

- 1. Less than 2 years
- 2. 2 to less than 3 years
 3. 3 to less than 5 years
 4. 5 to less than10 years
- 5. 11 to less than 20 years
 6. More than 20 years
- 97. Don't know

NON SOLAR USERS

FUTURE INSTALLATION

ASK IFS8=2, SR

Q3. When do you think you will make the final decision about installing a rooftop solar electricity system?

- 1. In a few months
- 2. Sometime next year
- 3. In 1 to 2 years
- 4. More than 2 years from now
- 97. Don't know



EXISTING SOLAR USERS

DECISION TIMILINESS ASK IF 'HAVE SOLAR' QUOTA GROUP, SR

Q4. How long did it take to make the final decision to install a rooftop solar electricity system from the time it was first considered?

- 1. Within a few months
- 2. About 1 year
- 3. 1 to 2 years
- 4. 2 to 5 years
- 5. More than 5 years
- 99. The solar panels were installed before I purchased my home
- 97. I don't know

AU MADE

ASK IF 'HAVE SOLAR' QUOTA GROUP, SR

Q5. In which country were your solar panels made?

- 1. Australia
- 2. China
- 3. Taiwan
- 4. Germany
- 5. Singapore
- 6. Philippines
- 7. Korea
- 96. Other (specify)
- 97. Don't know

BARRIERS TO SOLAR ASK IF 'HAVE SOLAR' QUOTA GROUP, MR **RANDOMISE CODES**

Q6. Which, if any, of the following were issues you had to consider or overcome to install a rooftop solar electricity system? Please select all that apply.

- 1. My limited knowledge about rooftop solar electricity systems
- 2. Limited time available
- The implementation was difficult
 Limited available roof space
- 5. Asbestos on rooftop
- 6. Achieving access to rooftop
- 7. Strength of building
- 8. I don't/my company doesn't own the building
- 9. The possibility of moving to a different building
- 10. The possibility of selling the property/building
- 11. The financial cost
- 12. Lack of financing options
- 13. Overshadowing from taller buildings
- 14. Foreseeable construction of taller buildings
- 15. Availability of alternative options to save on electricity bill
- 16. Technology will improve significantly in the near future
- 17. Poor level of service from solar providers
- 18. Lack of information about rooftop solar
- 19. Heritage listing status of building
- 20. Planning controls (other than Heritage listing)
- 96. Other

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CHOICE EXERCISE

We're about to show you some options to choose between. Before we do, please answer the following question.

USAGE

ASK ALL, SR

C1. How would you describe your electricity usage at your home?

- 1. Lower than average (HIDDEN ALLOCATE TO 2KW CHOICES)
- 2. Average (HIDDEN ALLOCATE TO 5KW CHOICES)
- 3. Higher than average (HIDDEN ALLOCATE TO 10KW CHOICES)

The series of options we are about to show you, may seem similar, but each choice will be different, please take your time and read each carefully. You will make 9 choices between 6 alternatives.

C2. In the boxes below, please indicate which solar package you would choose if you were to purchase solar panels to generate electricity for your home?

START SCERNARIO CHOICES

Information for choices

	(1-3 person home)	(2-4 Person home)	(3-4+ person home)
Size	2KW	5KW	10KW
Panels	8 x 250 Watt panels	20 x 250 Watt panels	40 x 250 Watt panels
Product Quality Guarantee	5, 15, 25 yrs	5, 15, 25 yrs	5, 15, 25 yrs
Product Warranty	10 yrs	10 yrs	10 yrs
Inverter	SMA SunnyBoy	SMA SunnyBoy	SMA SunnyBoy
Installer	Australian based installer	Australian based installer	Australian based installer

Price point 1	\$3,000	\$7,500	\$15,000
Price point 2	\$3,190	\$7,970	\$15,940
Price point 3	\$3,380	\$8,440	\$16,880
Price point 4	\$3,560	\$8,910	\$17,810
Price point 5	\$3,750	\$9,375	\$18,750

Brand	Assembled in
Q Cells	Germany
Trina	China
Tindo	Australia
LG Electronics	Korea
Solar Juice	China
WINAICO	Taiwan

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FINAL CHOICE ASK ALL, MR RANDOMISE CODES, ANCHORING 1,3,4 & 5,6,7 TOGETHER

C3 What would you consider to be the features that influence your choice of solar panels to generate electricity for your home?

- 1. Total price
- 2. Experience and skill of installer
- 3. Price for installation component of the total price
- 4. Price for solar panel component of the total price
- 5. Quality of the solar panels
- 6. Quality of the installation
- 7. Quality of the inverter
- 8. Brand
- 9. Country of assembly
- 10. Sales information
- 11. Recommendation by friends or family
- 12. Local after sales service

FINAL CHOICE RANK ASK ALL, MR, SHOW CODES SELECTED AT C3 AUTOCODE IF C3<3 RESPONSES

C4. Please rank the features that would influence your choice from 1 to 3, with 1 being the most influential, 2 the second most influential, and 3 the third most influential.

- 1. Total price
- 2. Experience and skill of installer
- 3. Price for installation component of the total price
- 4. Price for solar panel component of the total price
- 5. Quality of the solar panels
- 6. Quality of the installation
- 7. Quality of the inverter
- 8. Brand
- 9. Country of assembly
- 10. Sales information
- 11. Recommendation by friends or family
- 12. Local after sales service

QUALITY TOTAL

ASK ALL, MR

C5. Which of the following elements of the solar panel installation process would you consider contribute to a high quality final result?

- 1. Experience and skill of installer
- 2. Solar panel assembly
- 3. Solar panel components
- 4. Performance warranty of the solar panel
- 5. Product warranty of the solar panel
- 6. Country where the solar panels are assembled
- 7. Brand of solar panel supplier
- 8. Cost of the solar panels
- 9. Cost of the installation



QUALITY UP TO 3 ASK IF SELECTED MORE THAN 3 CODES AT C5, MR UP TO THREE SHOW ALL CODES SELECTED AT C5 C6. And which of the following elements of the solar panel installation process would you most

C6. And which of the following elements of the solar panel installation process would you most consider contributes to a high quality final result? *Please select the three most applicable*

- 1. Experience and skill of installer
- 2. Solar panel assembly
- 3. Solar panel components
- 4. Performance warranty of the solar panel
- 5. Product warranty of the solar panel
- 6. Country where the solar panels are assembled
- 7. Brand of solar panel supplier
- 8. Cost of the solar panels
- 9. Cost of the installation

IF CHOSE ≤3 CODES AT C5, AUTOCODE RESPONSES FROM C5 TO C6

QUALITY MAIN ASK IF SELECTED 2 OR MORE CODES AT C5, SR IF SELECTED >3 CODES AT C5 ONLY SHOW CODES SELECTED AT C6, IF SELECTED ≤3 BUT > 1 AT C5 ONLY SHOW CODES SELECTED AT C5

C7. And if you had to choose the most important, which of the following elements of the solar panel installation process would you consider contribute to a high quality final result?

- 1. Experience and skill of installer
- 2. Solar panel assembly
- 3. Solar panel components
- 4. Performance warranty of the solar panel
- 5. Product warranty of the solar panel
- 6. Country where the solar panels are assembled
- 7. Brand of solar panel supplier
- 8. Cost of the solar panels
- 9. Cost of the installation

IF CHOSE 1 CODE AT C5, AUTOCODE RESPONSES FROM C5 TO C7

