Household Solar Power and Battery Survey

Project Report

March 2017

Ausgrid

Introduction

The results presented in this project report were gathered from a recent survey of Ausgrid residential customers and covered questions about household solar power and battery systems.

The purpose of this research is to better understand the likely uptake of household solar and battery systems for consideration in the development of demand management options and deferral of network investment. As part of the survey we aimed to better understand customers' levels of knowledge, usage and motivation drivers for installing solar power and battery systems.

The project was funded from the Demand Management and Innovation Allowance (DMIA) and results from the research will help to inform the development of future innovation projects that have the potential to reduce long term network costs.

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Customers in the Ausgrid network

Customer type breakdown

Customer type	Total customers*	Solar customers*
Residential: separate houses	**~840,000**	**~105,000**
Residential: apartments, townhouses, other	~680,000	~<100
Non-residential: – businesses, government	~180,000	~2,500
Total	**~1,700,000**	**~108,000**

***Customer numbers estimated as at March 2017**

Ausgrid's Network Area

Ausgrid distributes electricity to over 1.7 million customers in the Eastern Sydney, Central Coast and Hunter regions of NSW. The focus for this research was on customers in our network area who live in separate houses as they are more likely to own a solar or battery system or to have one installed in the future.

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Survey Development

The survey and questions were designed to take into consideration participation from existing solar and/or battery owners as well as non-solar customers.

The following topic areas were included in the survey:

- the demographic characteristics of solar, non-solar and battery owners;
- motivations for purchasing solar and home storage batteries;
- experience during the application, connection and installation;
- opinions about their system performance and benefits; and
- attitudes towards participation and incentives in demand management trials

Feedback on the survey and questions was sought from a range of stakeholders during the development phase and this was incorporated into the survey design. The final survey was loaded into Survey Monkey and went through several rounds of user acceptance testing before being launched in November 2016.

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Customer Communication and Response

Survey Communications:

A random sample of residential customers residing in separate houses was selected including approximately 10,000 solar and 5,000 to 6,000 non-solar customers. These customers were sent a letter invitation, inviting them to participate in the online survey in early November 2016.

Participants were also offered the opportunity to enter into a prize draw competition where ten entrants were randomly selected to each win a $500 Coles Myer voucher. The online survey and competition ran during 1-28 November 2016 and the competition winners were notified by 7 December 16.

Survey Response:

Overall a pleasing response rate of 10% was achieved with 1,461 completed online responses. A further 86 customers completed a hard copy survey.

The online respondents comprised of 1,075 solar customers and 386 non-solar customers. Of the solar customers, 86 owned a battery in their home. The project results in this report are from the online respondents.

If you have any questions regarding the survey or would like to provide feedback into further research please email us at: solarbatterysurvey@ausgrid.com.au

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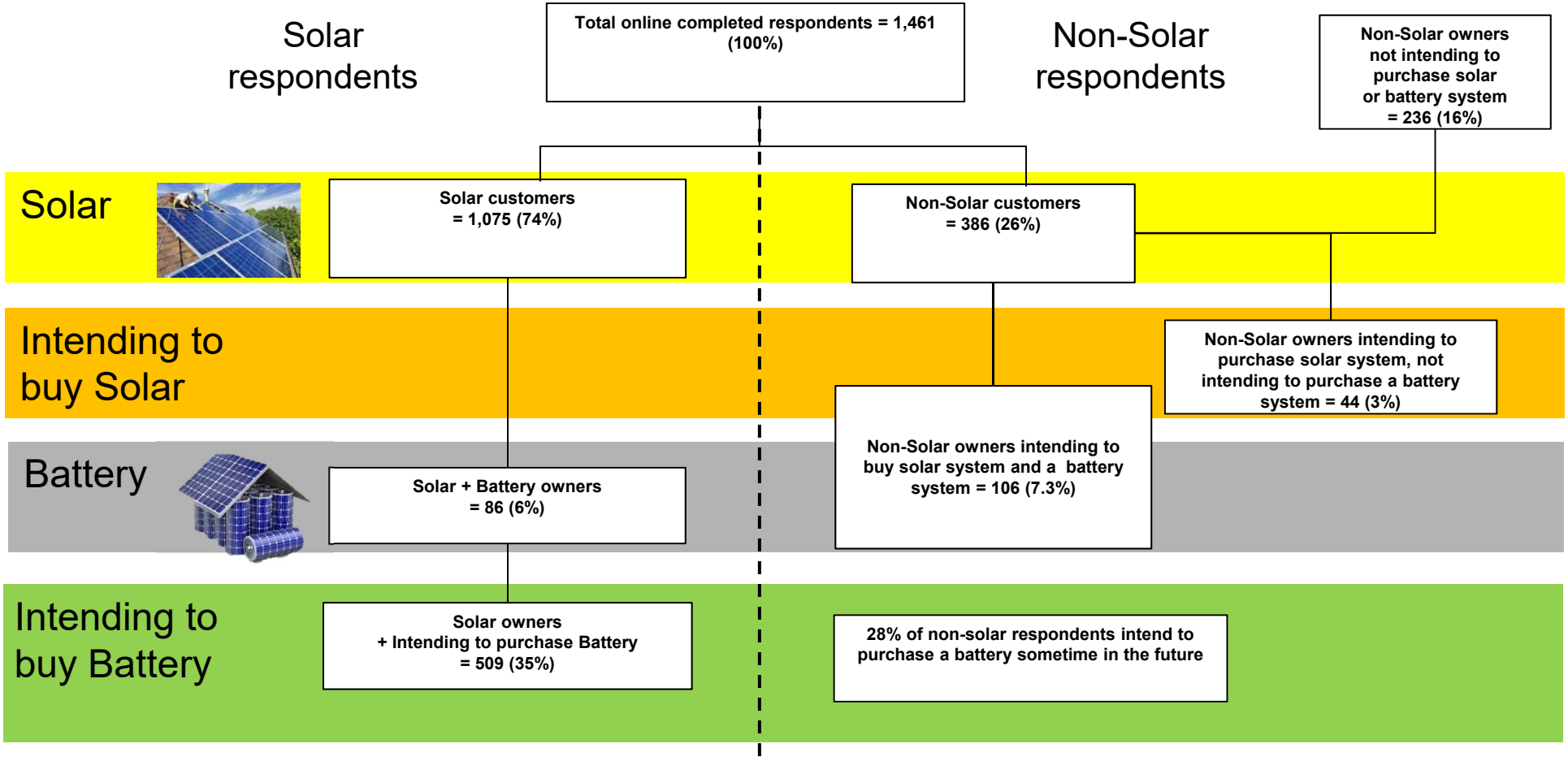
Ownership of Solar and Batteries

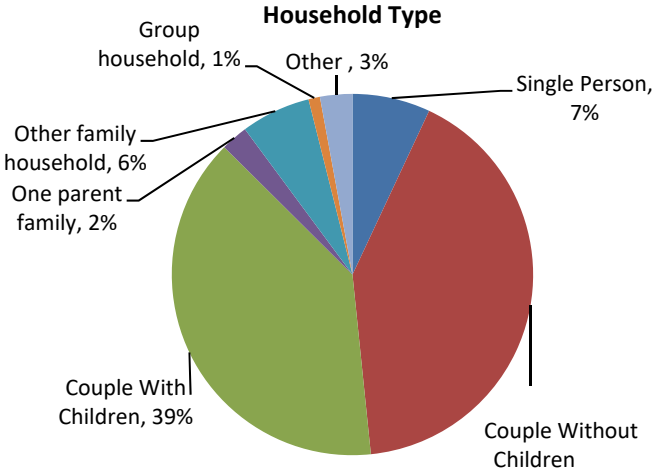


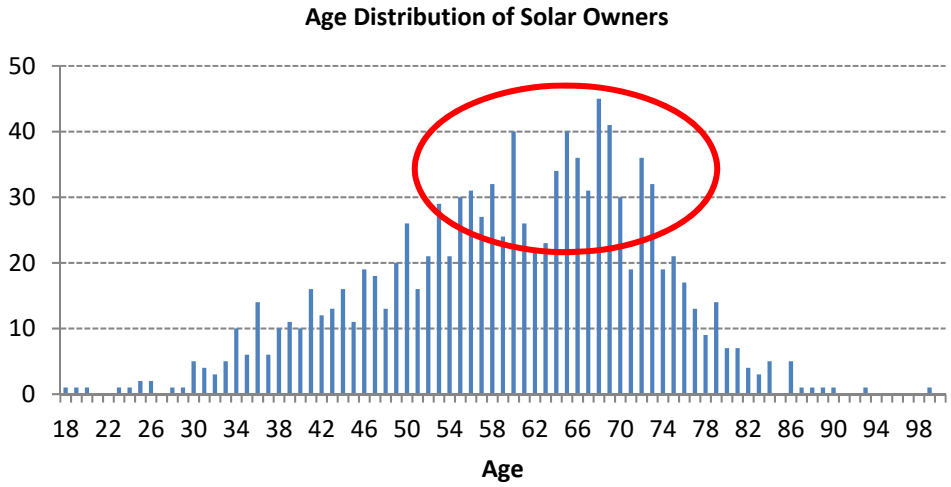
Base = 1,461, total completed online responses, excluding those who do not know if they have purchased a solar system for their home

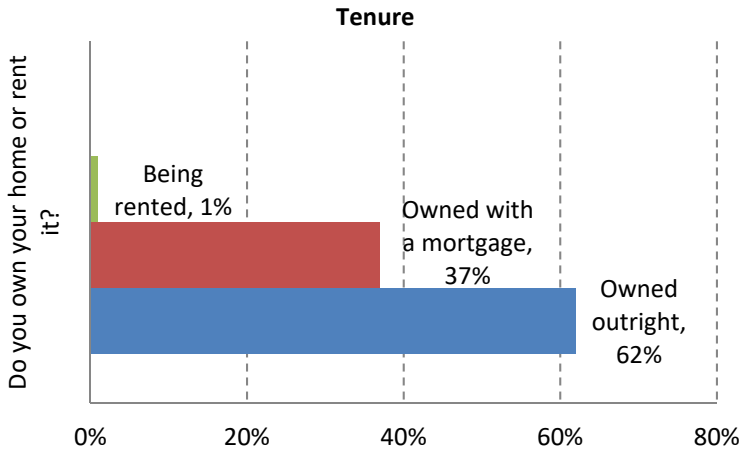
Solar Respondent Profile

Ausgrid solar respondents are more likely to be:

- Significantly skewed to being male (79%)
- Between 54-72 years old
- Living as a couple without children
- Twice as likely to own their home outright (67%) compared to non-solar respondent





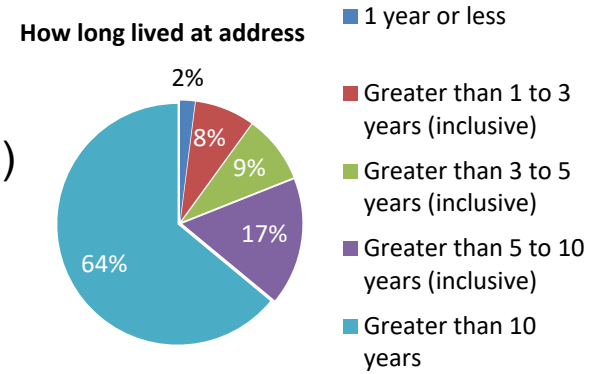


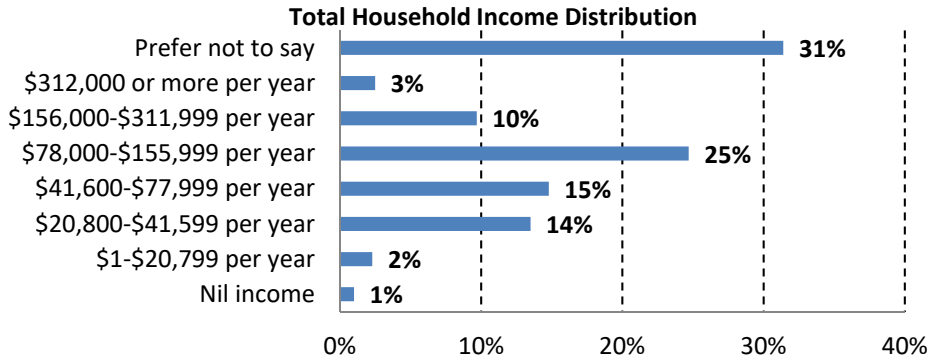
Base = 1,075, total completed online responses, answered 'yes' to having purchased a solar power system in their current household

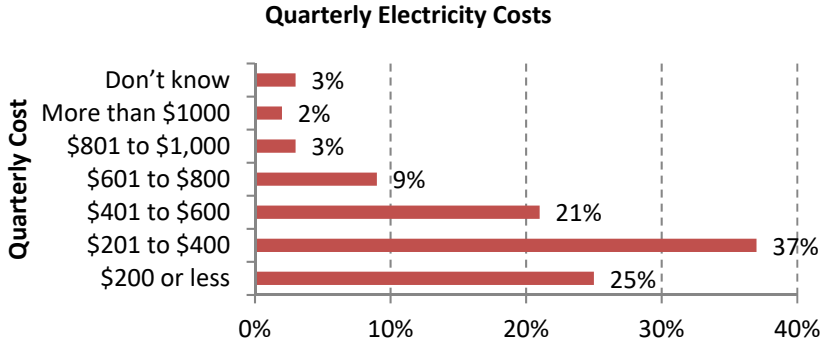
Solar Respondent Profile

Ausgrid solar respondents are more likely to:

- have lived in their current home for more than 10 years
- have an annual household income between $78-$155k (25%)
- be more likely to be living in 4 bedroom house
- have an average quarterly electricity bill $201-$400





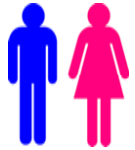


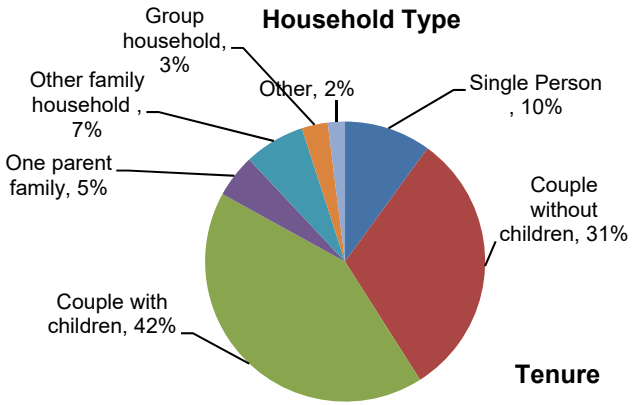
Base = 1,075, total completed online responses, answered 'yes' to having purchased a solar power system in their current household

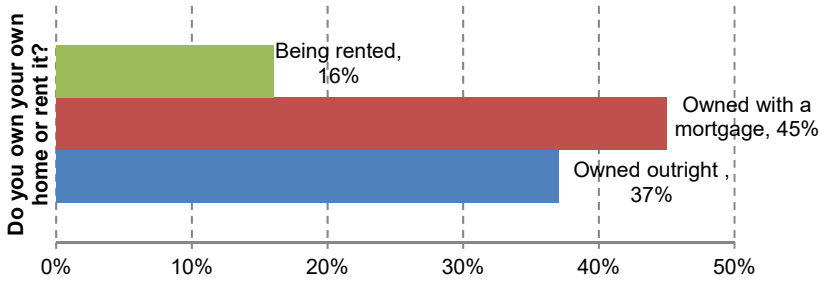
Non-Solar Respondent Profile

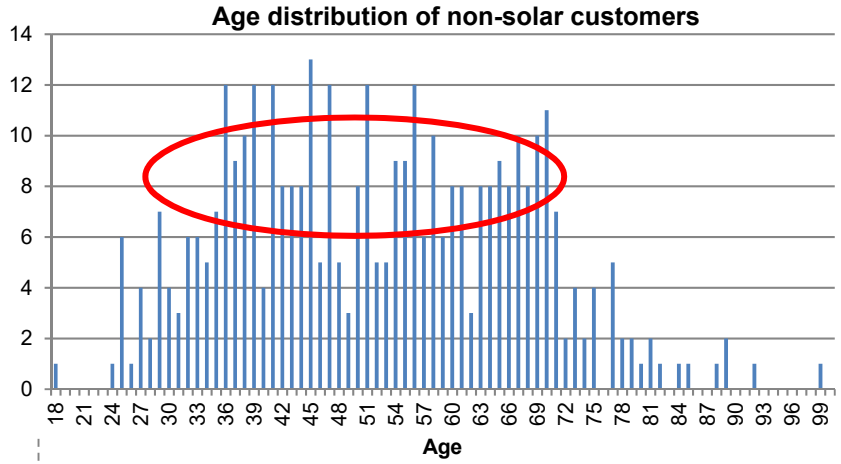
Ausgrid <u>non</u>- solar respondents are more likely to:

- be more evenly spread between males and females (59%/41%)
- have a wider spread of ages between 36-70
- be paying off their home mortgage (45%)









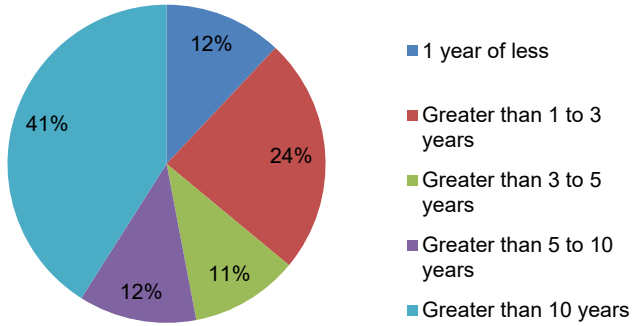
Base = 386, total completed online responses, answered 'no' to having purchased a solar power system in their current household

Non-Solar Respondent Profile

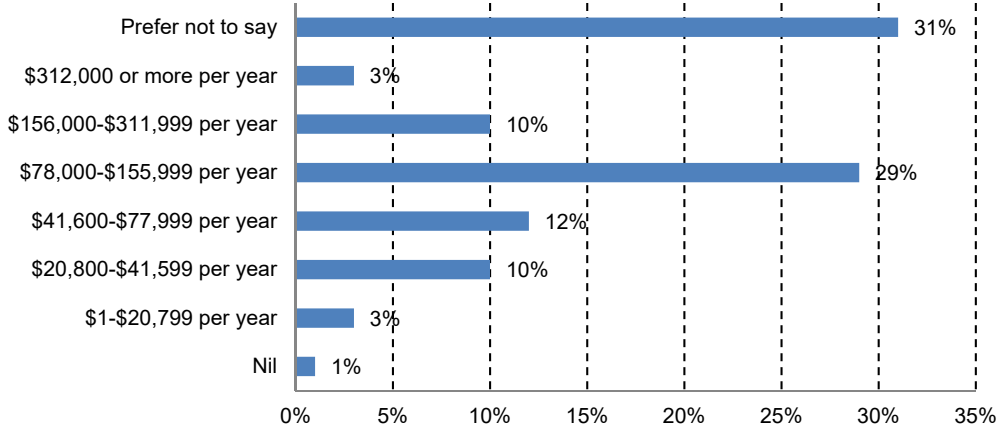
Ausgrid non-solar respondents are more likely to:

- be living as a couple with children
- have children under the age of 24 in the household
- have larger electricity bills with 30% paying between $401-$600 per quarter
- Have lived in their house between 1-3 years

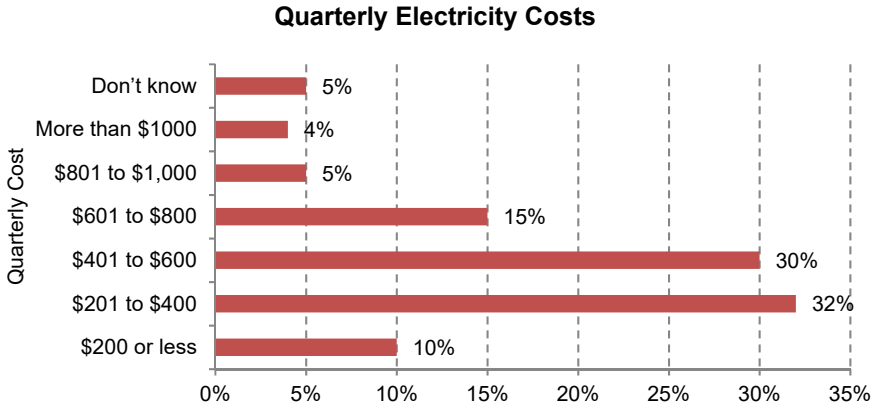
How long lived at address



Income Distribution



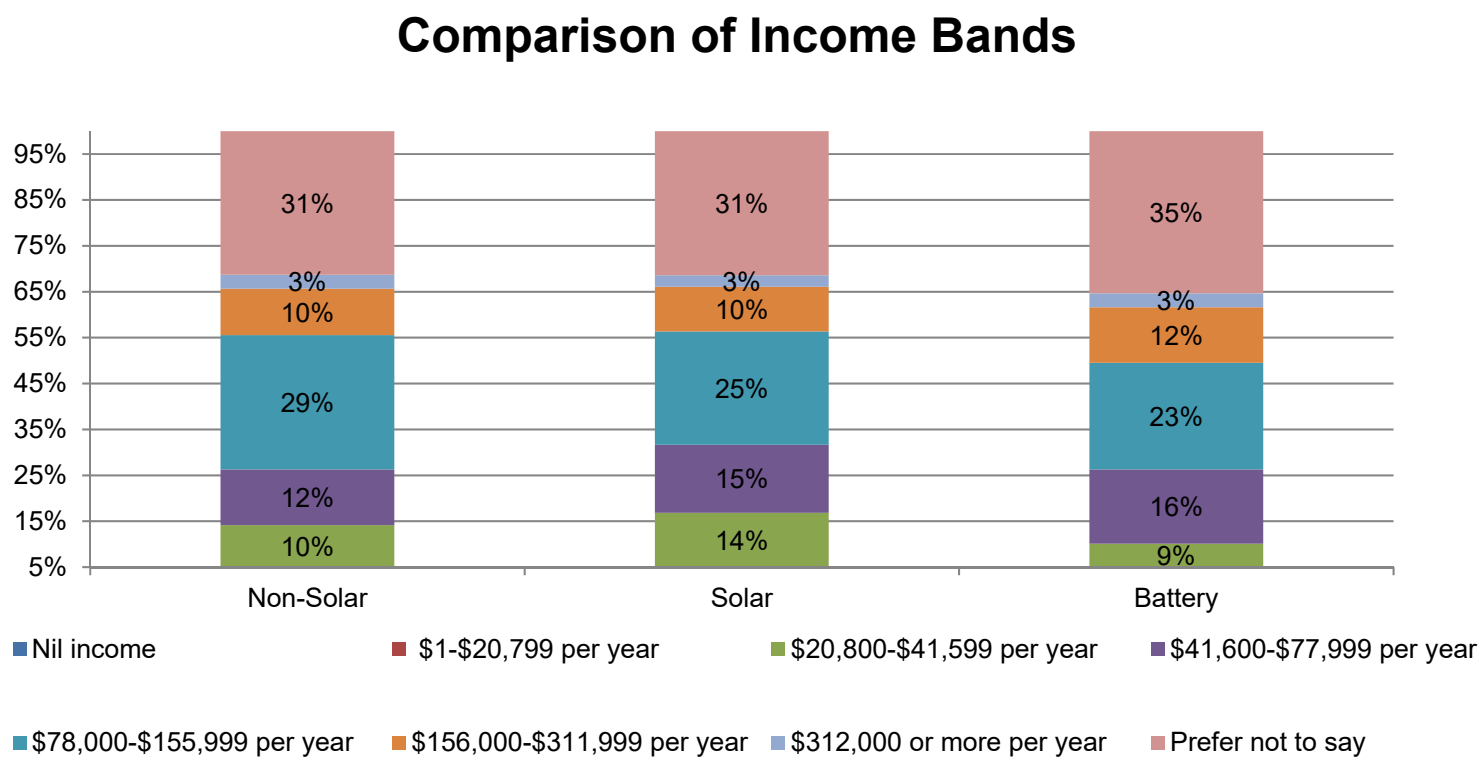
Quarterly Electricity Costs



Base = 386, total completed online responses, answered 'no' to having purchased a solar power system in their current household

Comparisons between Non-Solar, Solar and Battery Owners

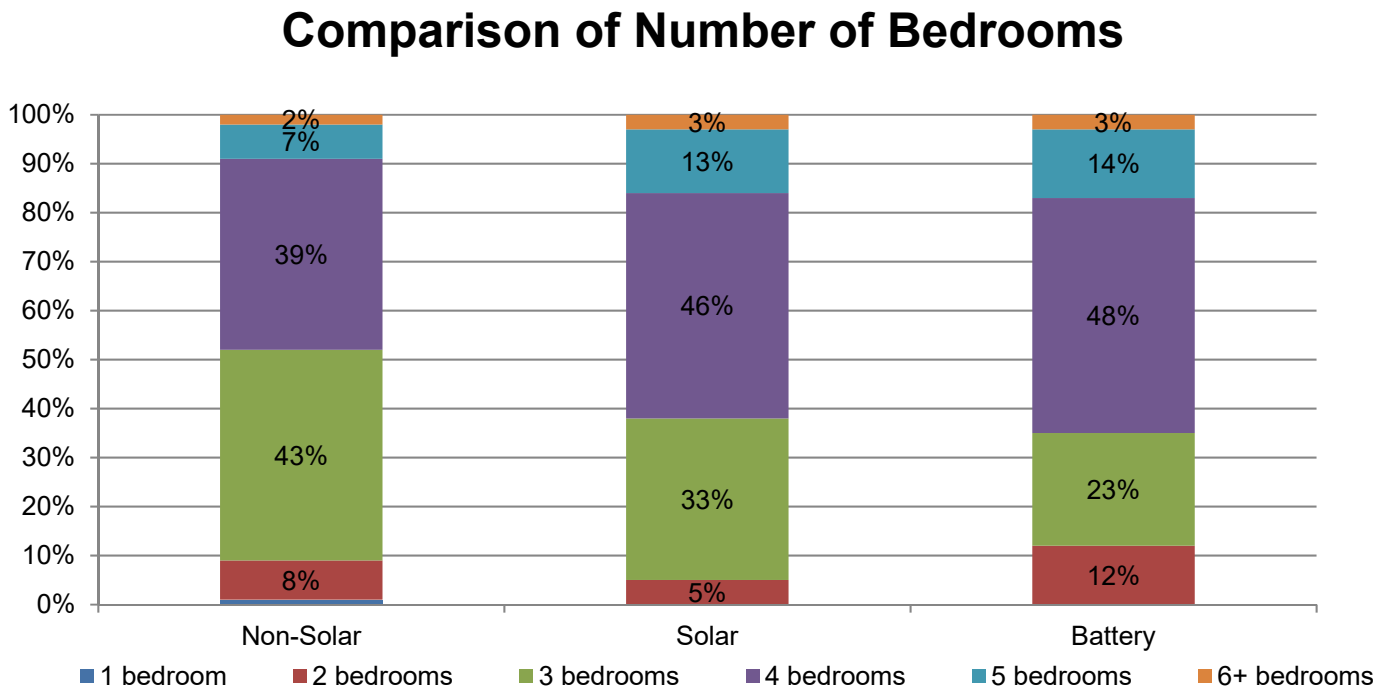
No significant difference between income band distributions amongst Non-Solar, Solar and Battery respondents



Base = 1,461, total completed online responses

Comparisons between Non-Solar, Solar and Battery Owners

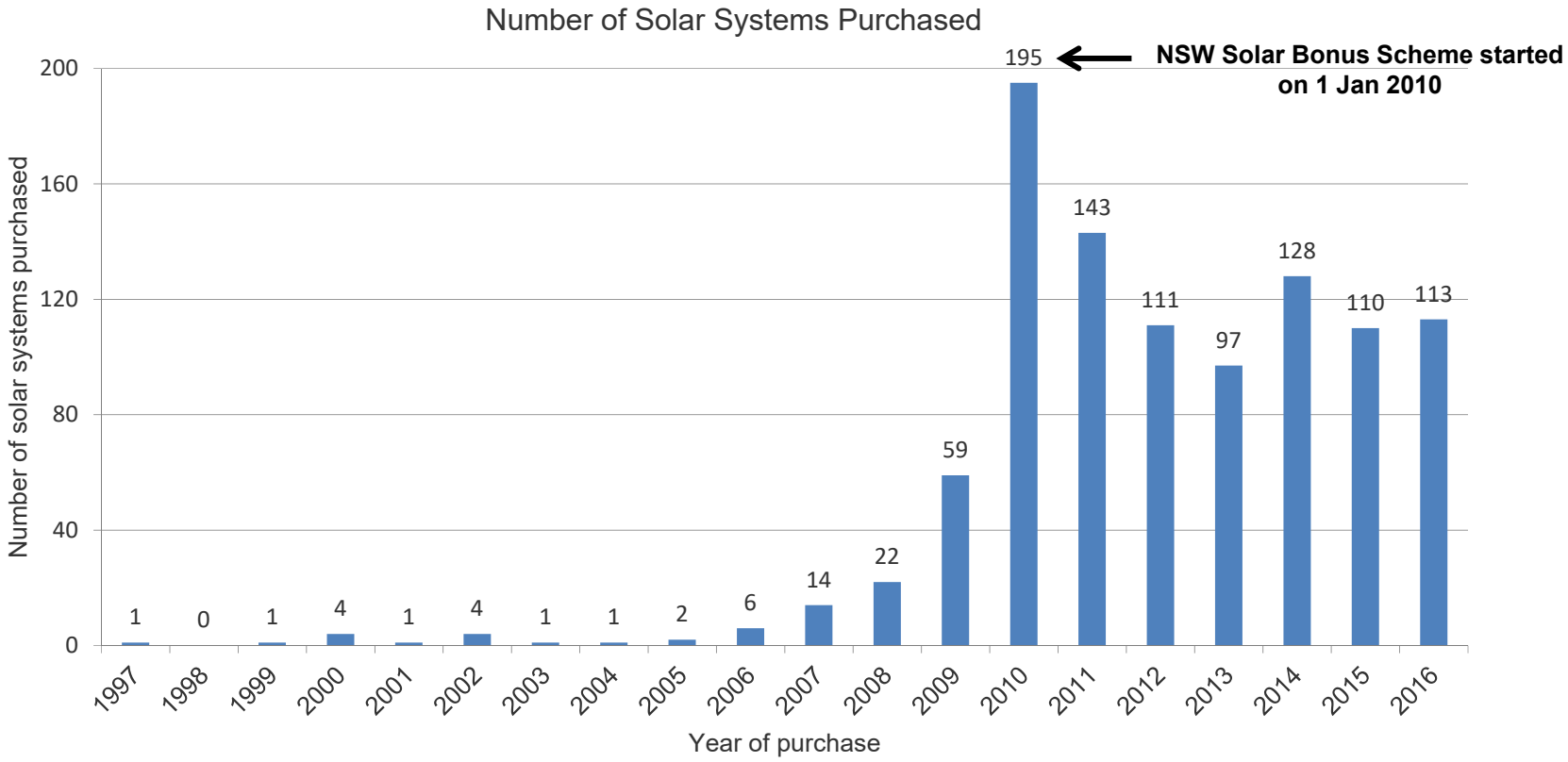
Non-Solar respondents are more likely to live in a 3 bedroom home compared to solar and battery respondents, who are more likely to have 4 bedrooms/larger homes



Base = 1,461, total completed online responses

Solar Ownership – Installation Date

Just over 40% of solar respondents surveyed had their solar system installed between 2010 and 2012.



Base = 1,075, total completed online responses, answered 'yes' to having purchased a solar power system in their current household

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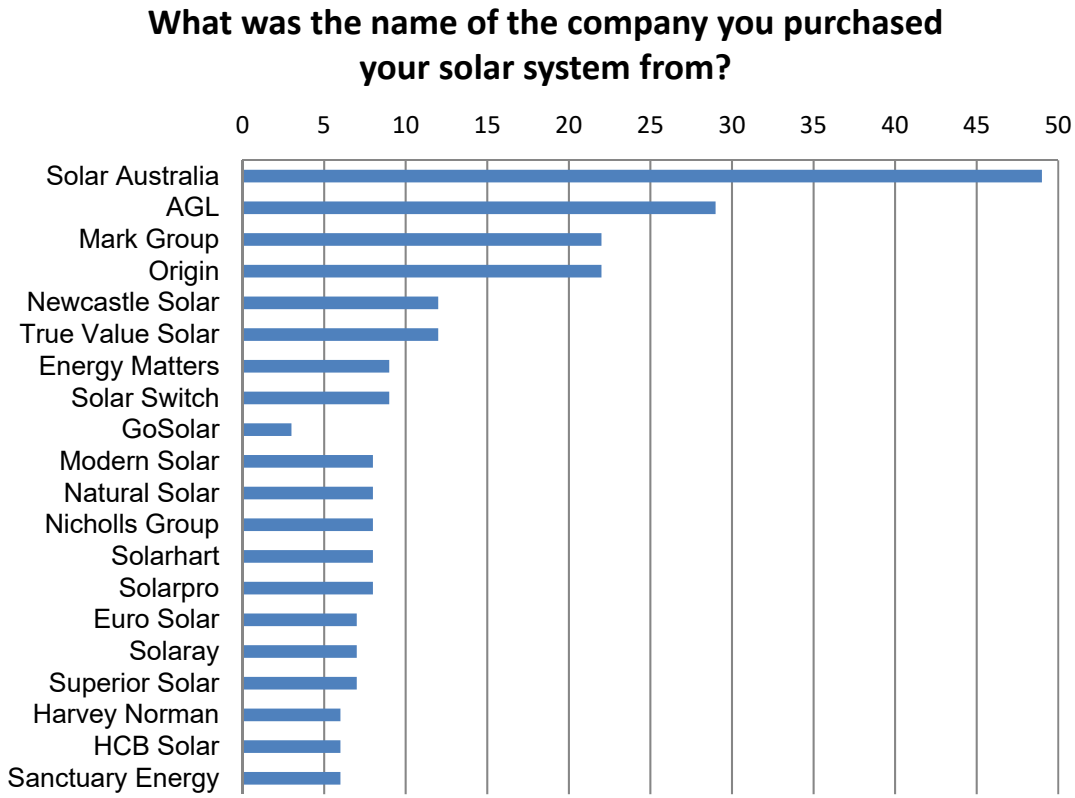
Solar Ownership – Installation Company

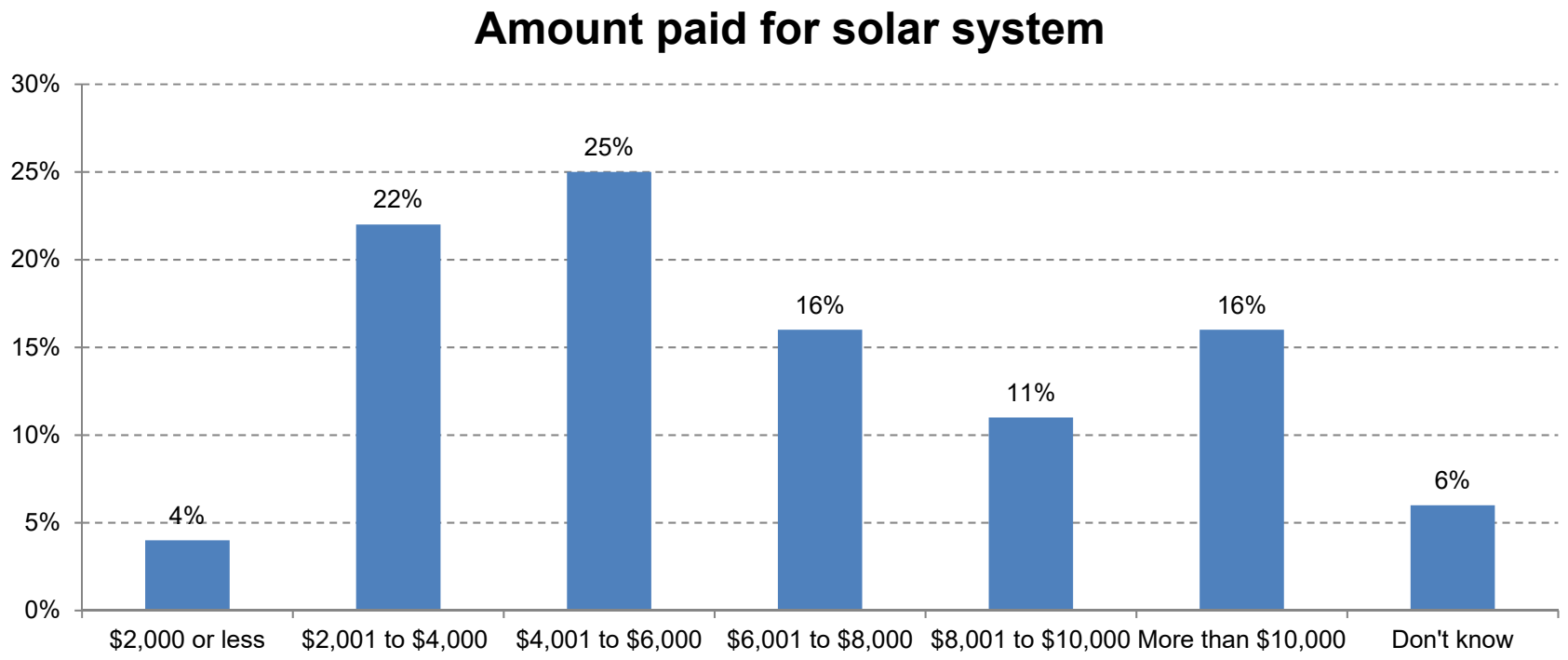
Of those who were able to name the company they purchased their solar system from, below are the top 20 companies named:



Base = 782, total completed online responses, answered 'yes' to having purchased a solar power system in their current household and answered who they purchased solar system from.

Solar Ownership – System Cost

A quarter of respondents surveyed paid between $4,000 and $6,000 (after rebates/certificates) for their solar system while another 22% spent only $2,000-$4000.

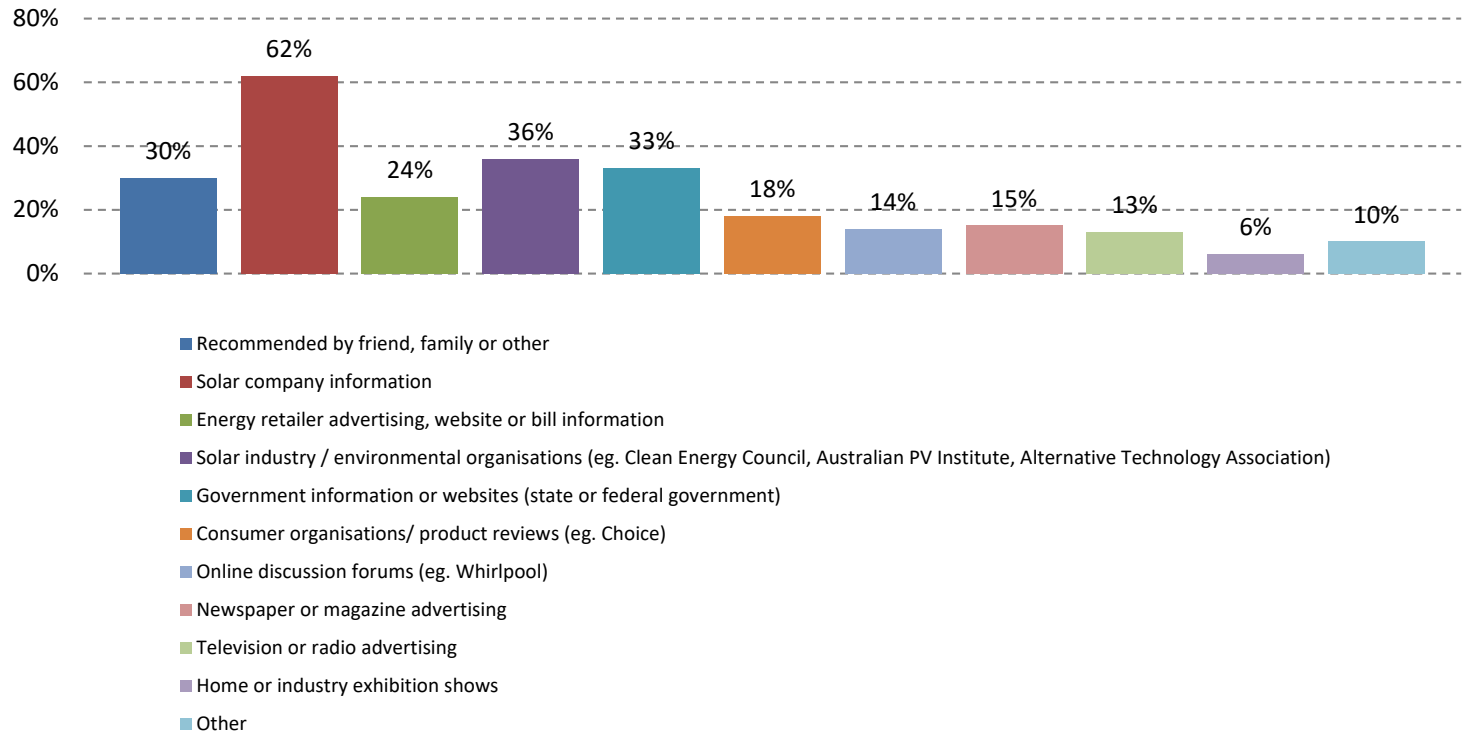


Base = 1,075, total completed online responses, answered 'yes' to having purchased a solar power system in their current household

Solar Ownership – Purchase Information

The most common source of information used for installing solar power was from solar companies, followed by solar industry/environmental bodies and government organisations.

Which of the following information sources did you use to help decide to install a solar power system?

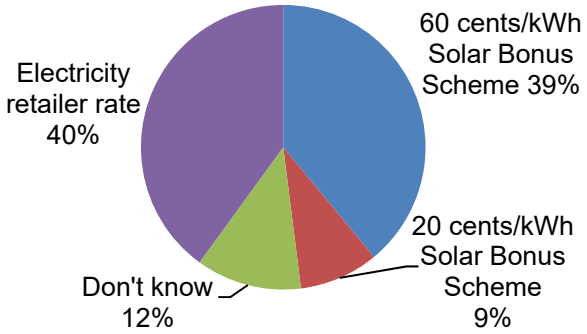


Base = 1,075, total completed online responses, answered 'yes' to having purchased a solar power system in their current household

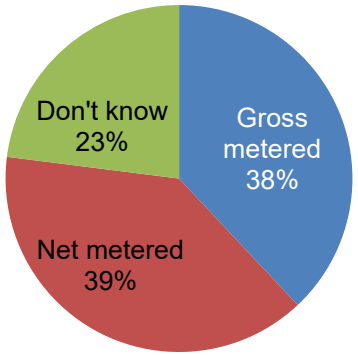
Respondent Feed-In Tariff Distribution

- 40% of respondents surveyed received the 60 cent NSW solar bonus scheme feed-in tariff up until 31 December 2016.
- Those who received incentives from their electricity retailer mainly received between 6 cents and 8 cents/kWh from their retailer.
- The proportion of gross to net meters amongst the solar respondents who knew what type of meter they had, were relatively the same (38%/39%).

Feed In-Tariff Rate for Solar Exported to the Grid (to 31 Dec 16)



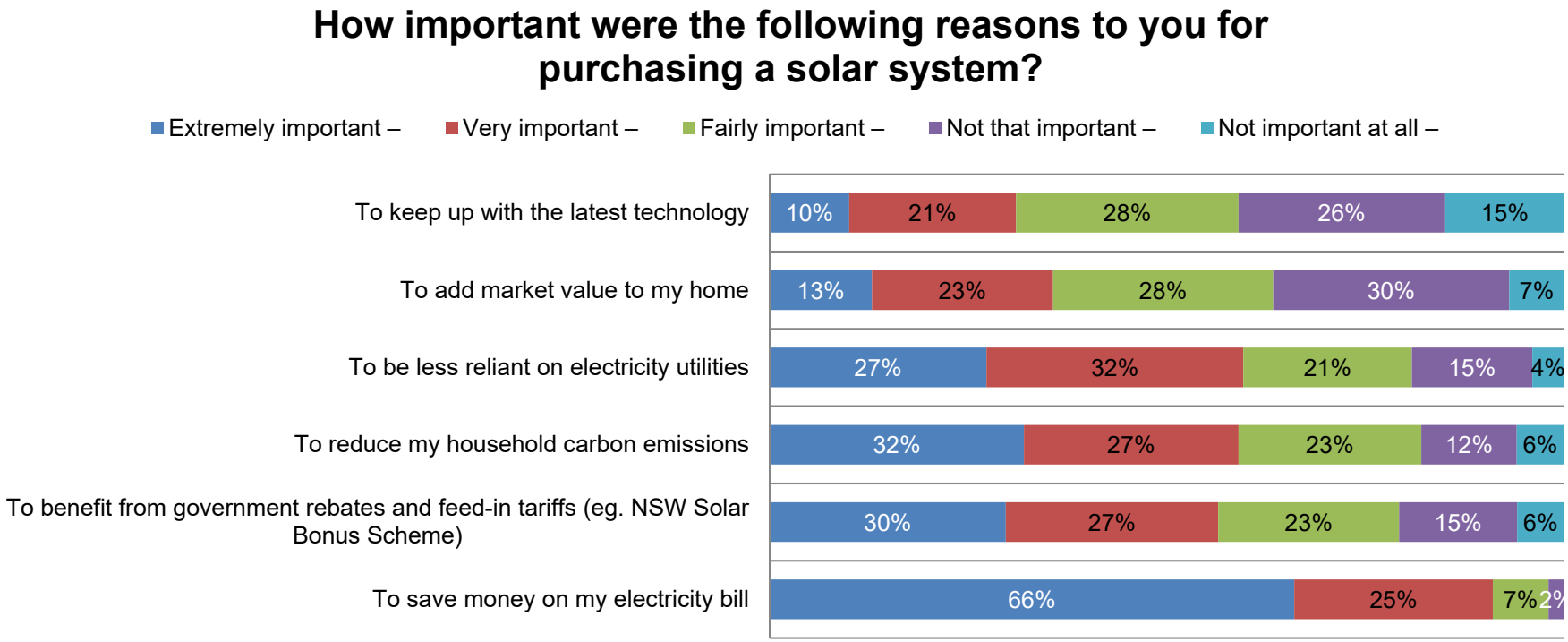
Type of metering system for solar system



Base = 1,075, total completed online responses, answered 'yes' to having purchased a solar power system in their current household

Motivation for Purchasing a Solar Power System

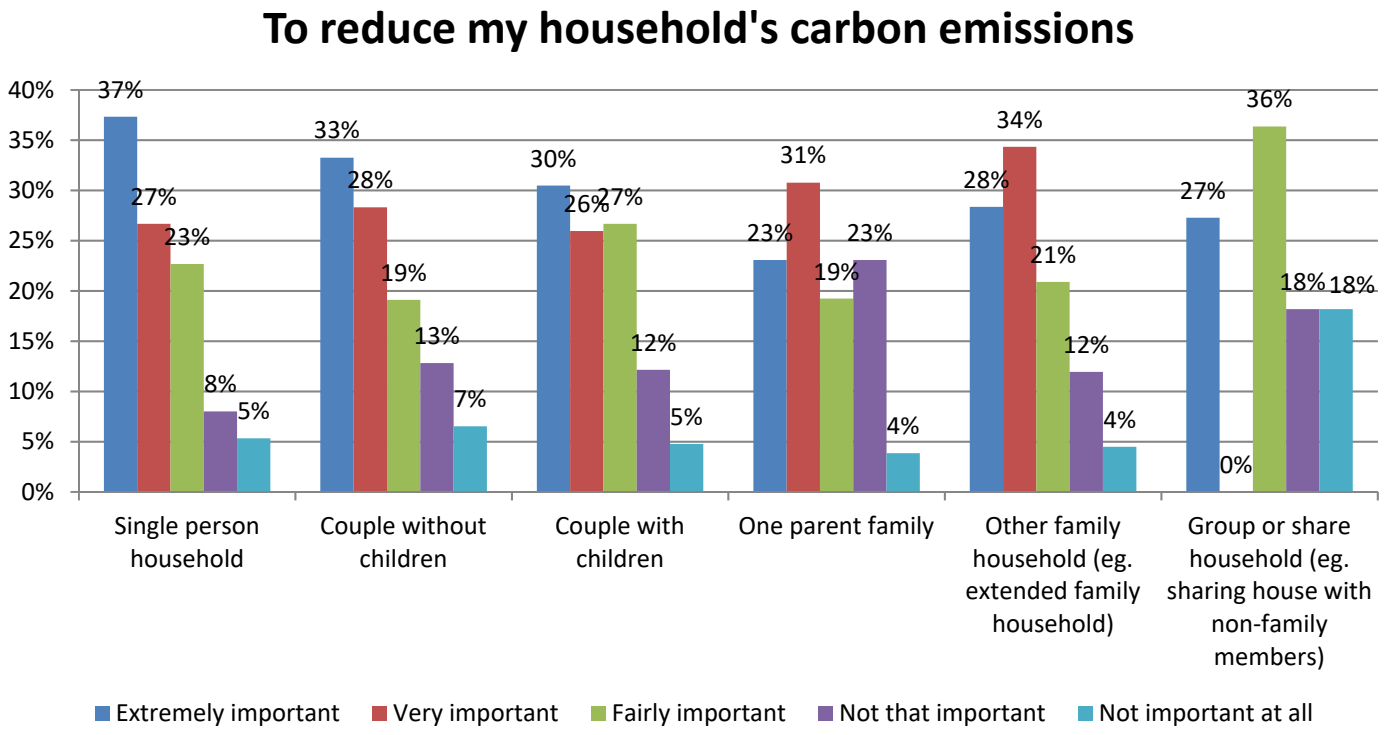
Of those who purchased a solar system to save money on their electricity bills, two thirds felt this was ‘extremely important’.



Base = 1,075, total completed online responses, answered ‘yes’ to having purchased a solar power system in their current household

Purchase Motivation by Household Type

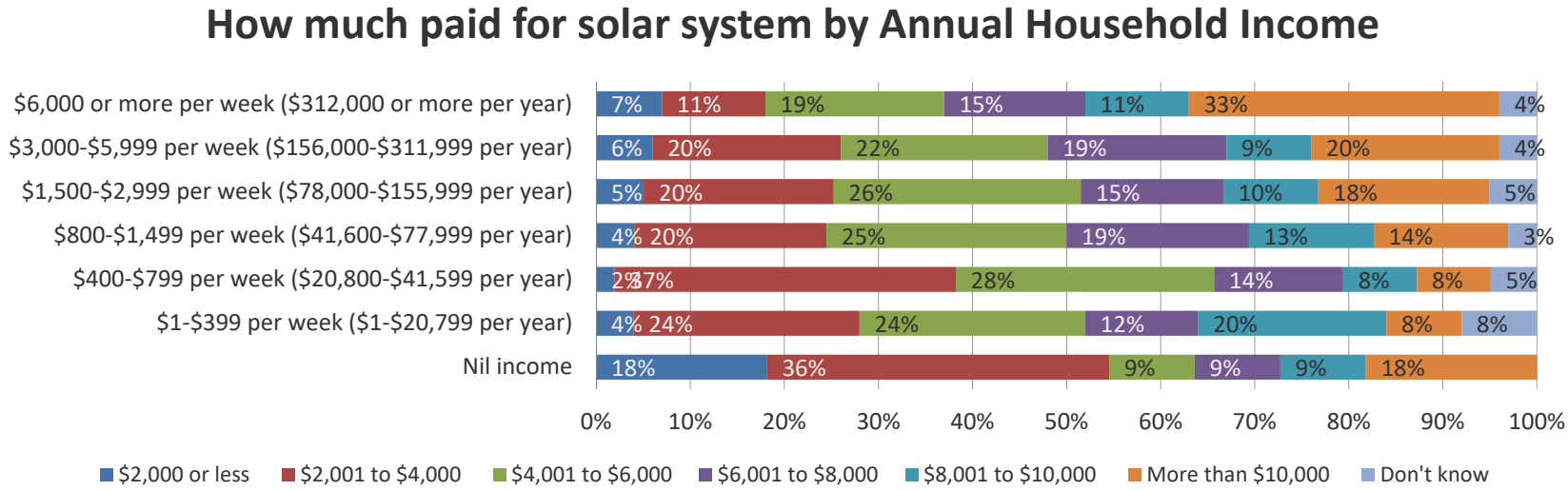
Respondents who live alone are more likely than any other household type to be strongly motivated to help reduce their GHG emissions by purchasing a solar system for their home.



Base = 1,075, total completed online responses, answered 'yes' to having purchased a solar power system in their current household

Solar System Ownership by Income Band

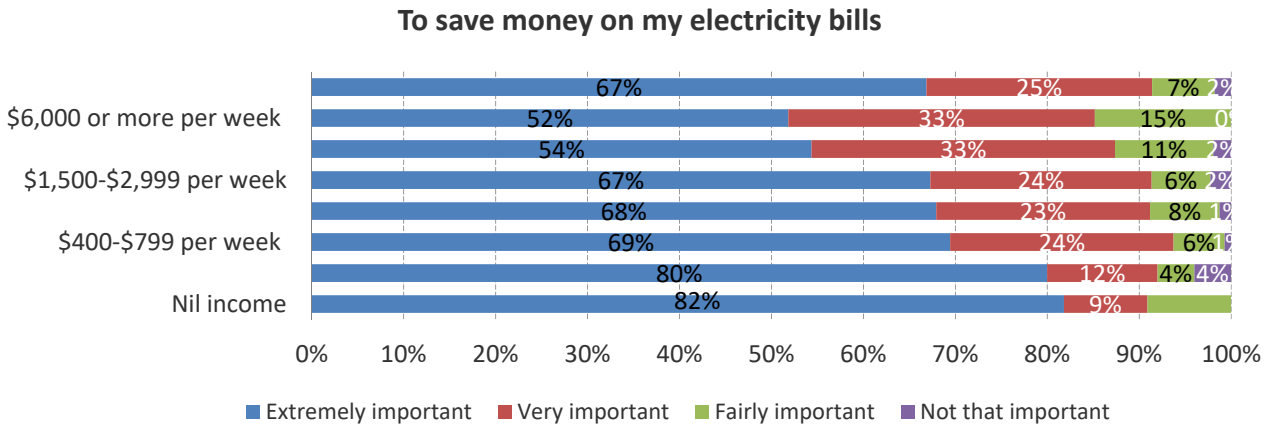
Households that are not actively earning an annual income are more likely to have paid between <$2,000 and $4,000 for their solar system than any other income group. Those who paid more than $10,000 for their solar system earn more than $6,000 per week.

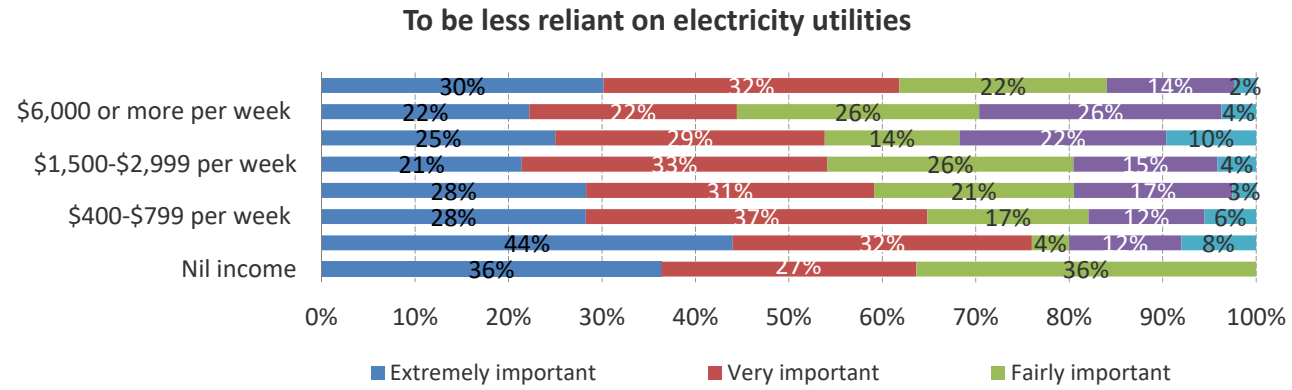


Base = 1,075, total completed online responses, answered ‘yes’ to having purchased a solar power system in their current household

Motivation for Purchase by Income Band

Respondents whose households are generally earning less than $3,000 per week were more likely to be motivated to save money on their electricity bill and from government solar rebates.





Base = 1,075, total completed online responses, answered ‘yes’ to having purchased a solar power system in their current household

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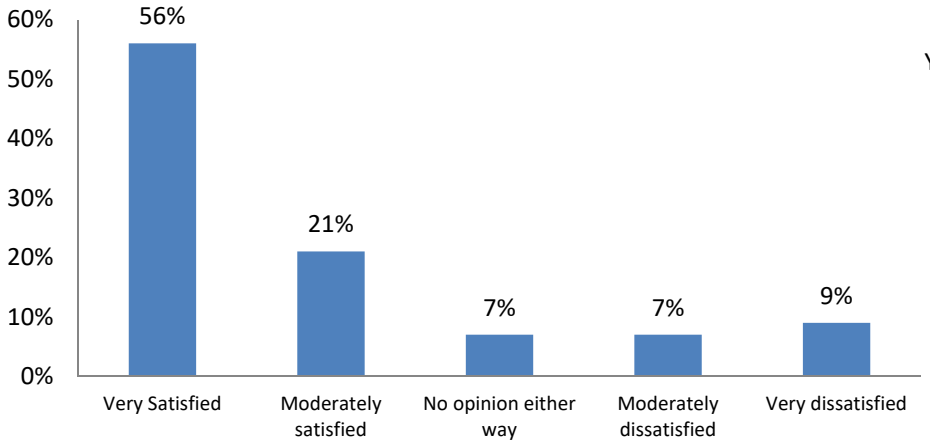
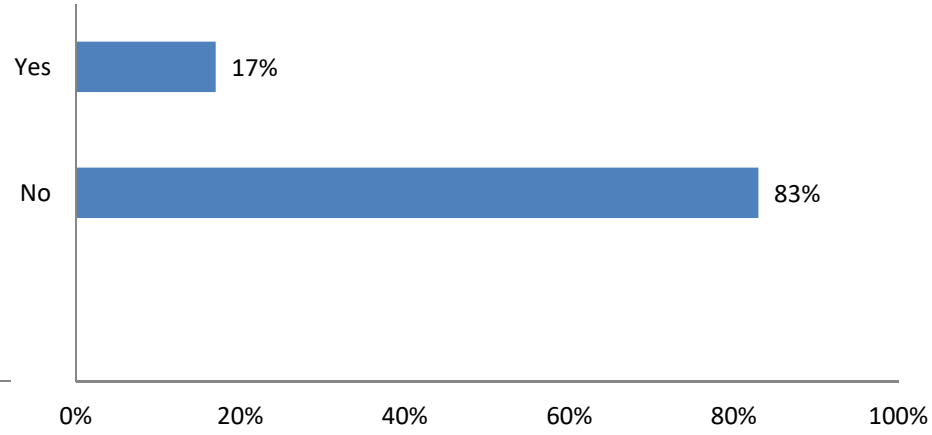
Installation Experience

- Just over half of respondents surveyed (56%) were ‘very satisfied’ with their installation.
- Of the 17% (188) who encountered difficulties with their installer, the most common complaint was with damage to roof tiles and water leakage due to the installation.
- Problems with panels was the second most common problem. These problems were mainly either the wrong number of panels were installed, installation was in the wrong place due to TV aerials being in the way or shadowing on roof.
- The third most common problem was to do with inverters, being either faulty and requiring replacement or servicing.

How satisfied or dissatisfied were you with your solar installation?



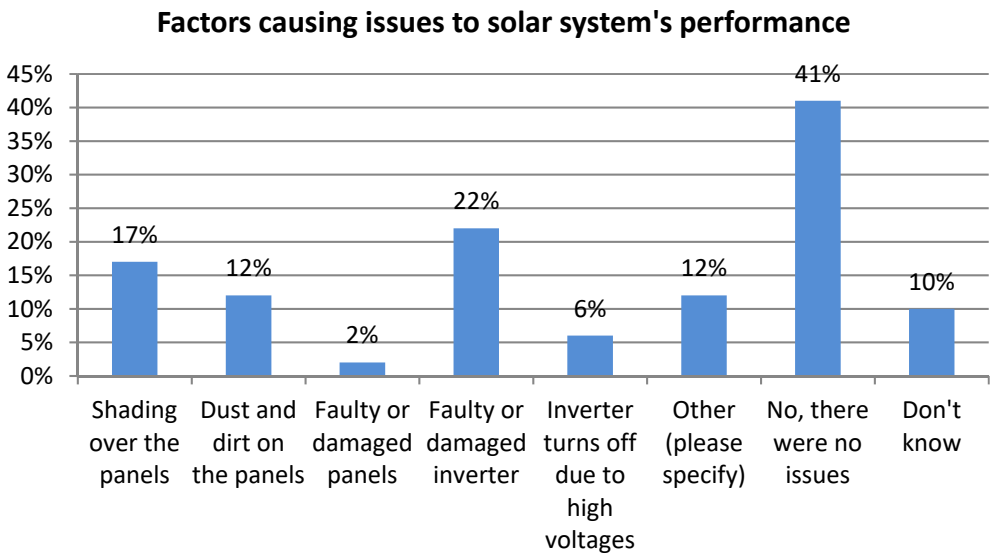
Did you encounter any difficulties with the installation of your solar power system?

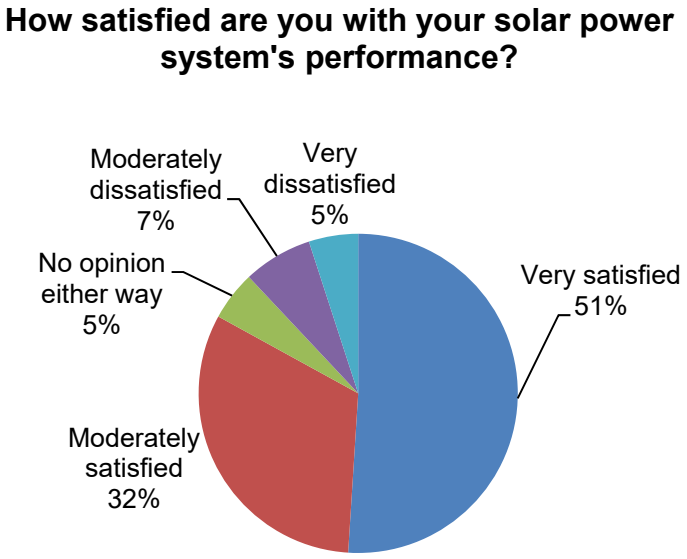


Base = 1,075, total completed online responses, answered ‘yes’ to having purchased a solar power system in their current household

Solar System Performance and Benefits

Of those respondents who were either moderately dissatisfied or very dissatisfied, the most common problem with their system's performance was due to either their inverter being faulty or damaged, or by shading occurring over their panels.



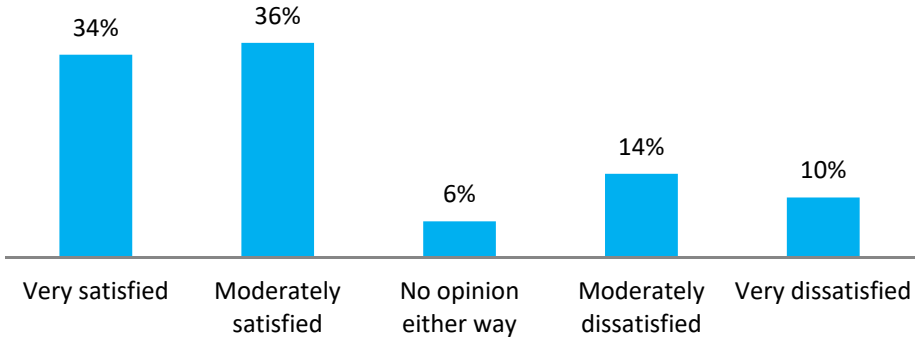


Base = 1,075, total completed online responses, answered 'yes' to having purchased a solar power system in their current household

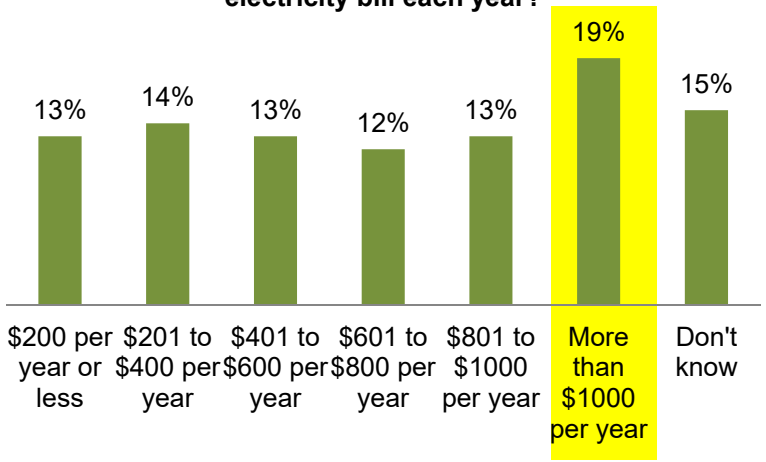
Solar System Performance and Benefits

Overall, 70% of all surveyed were either moderately or very satisfied with the level of savings they received from installing their solar systems, with 19% claiming to have saved $1,000 or more per year from their energy bills.

How satisfied are you with your electricity bill savings as a result of installing your solar power system?



By how much has the solar system reduced your electricity bill each year?



Solar System Performance and Benefits

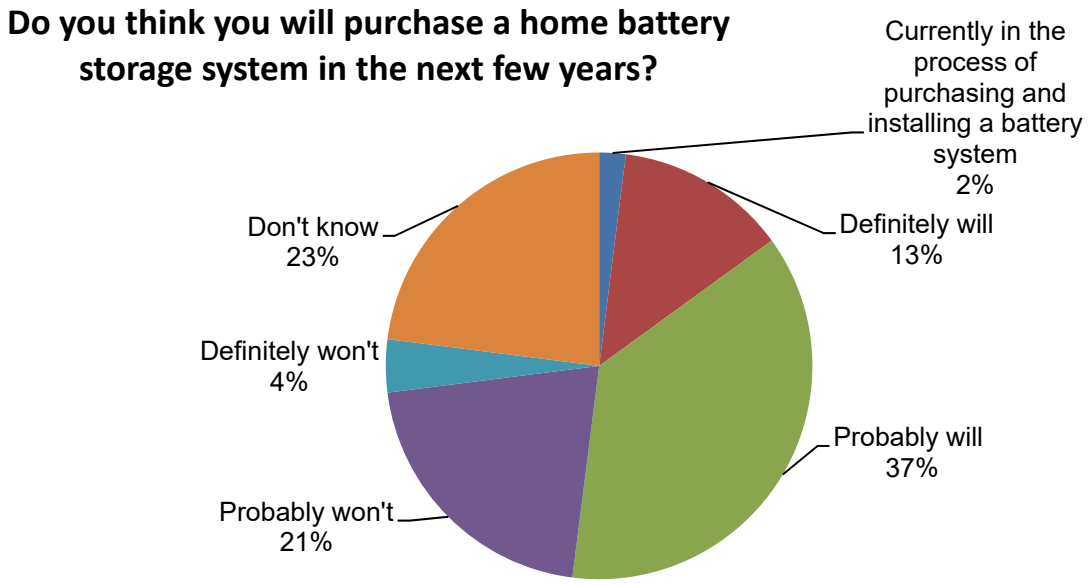
Amongst those who were moderately or very satisfied with their electricity savings, 24% of this group claimed more than $1,000 in annual savings.

Half of this group felt that their household has changed the way appliances or electricity is used in their home as a result of installing a solar system. The most common changes were:

- Using electrical appliances more when panels are generating power / during the daytime
- Delay the start of dishwasher and washing machine until after 10pm (for those on timed power)
- Turning off appliances at the power point/ not leaving on standby

Future intention to purchase a home storage battery

Intention to purchase a battery amongst solar respondents is strong with just over half (52%) of solar system respondents surveyed claimed that they would either probably/definitely buy one in the future or were in the process of purchasing a battery system.

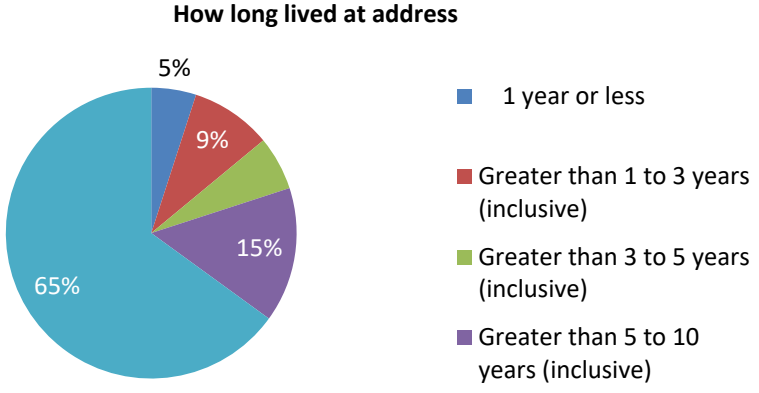


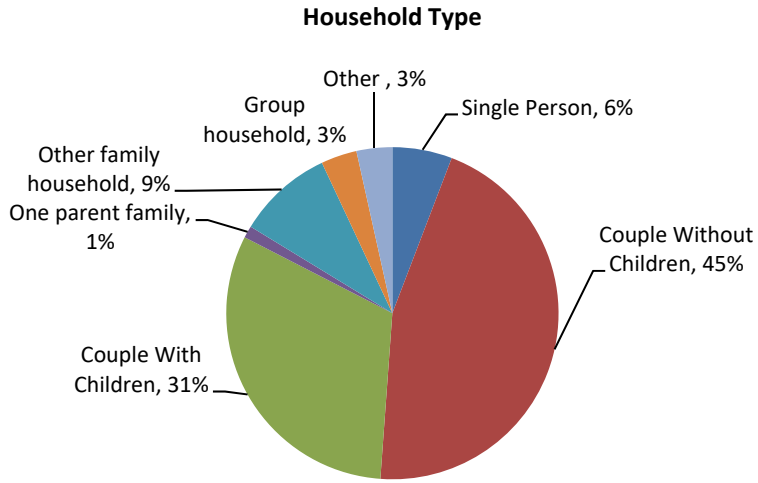
Base = 977, total completed online responses, answered 'no' to having purchased a battery system in their current household

Customer Segment Profiles – Battery Owners

Battery respondents are more likely to be:

- Couples aged 55 or older, and also singles aged 75 or older
- Skewed towards being male (74%)
- Similar household tenure as solar owners, 67% own their home outright and also more likely to have been living in home for more than 10 years.

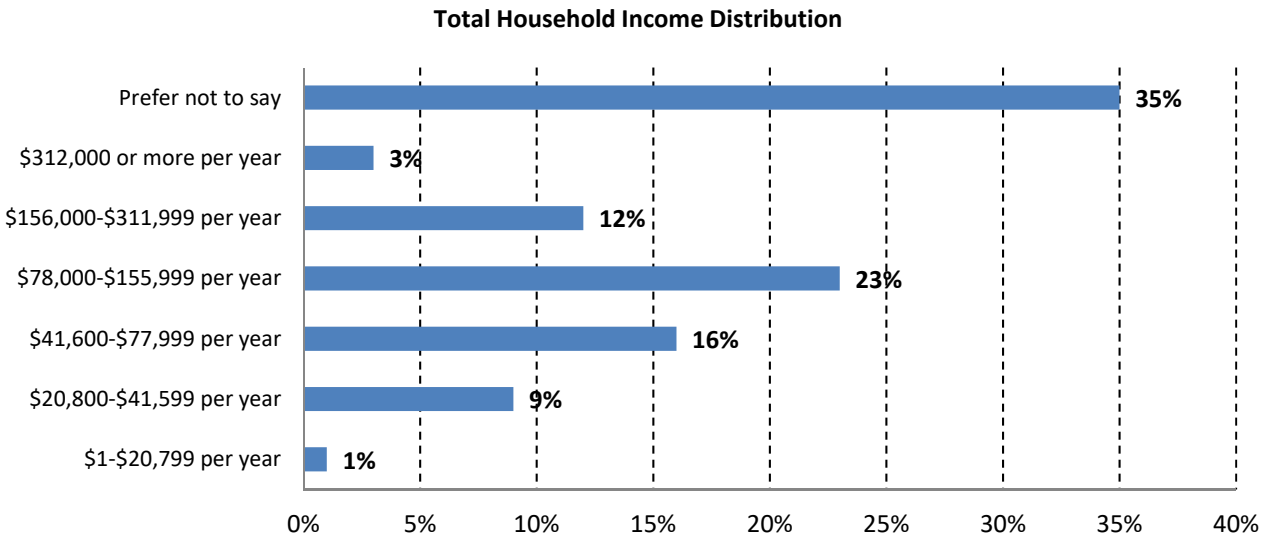




Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

Battery Respondent Segment Profile

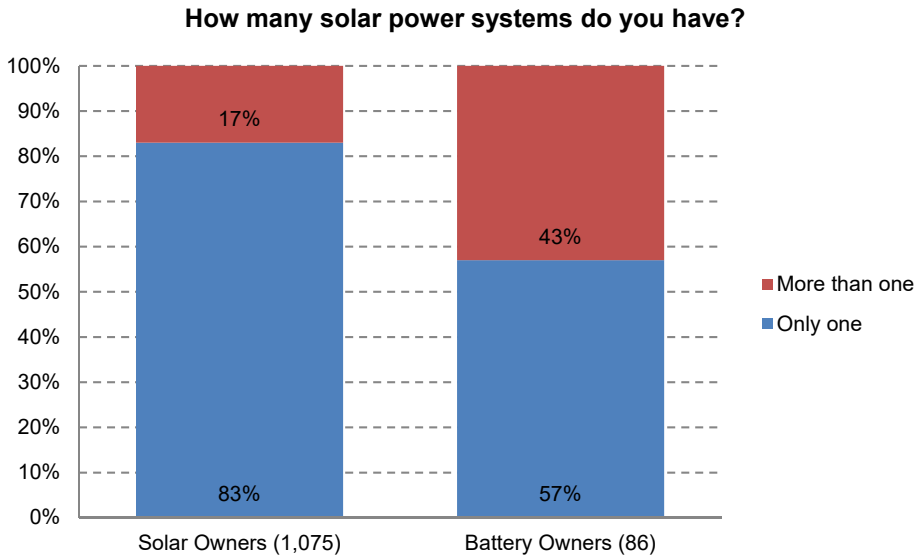
- Similar income distribution as per solar owners and non-solar owners

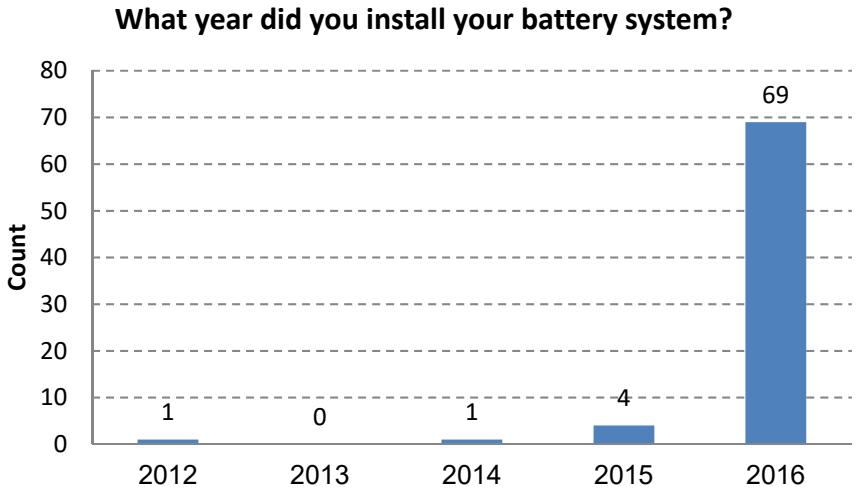


Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

Battery Ownership – Installation date

Solar customers who also own a battery are more likely to have more than one solar system in their home. The majority of customers had their battery installed in the last 12 months.

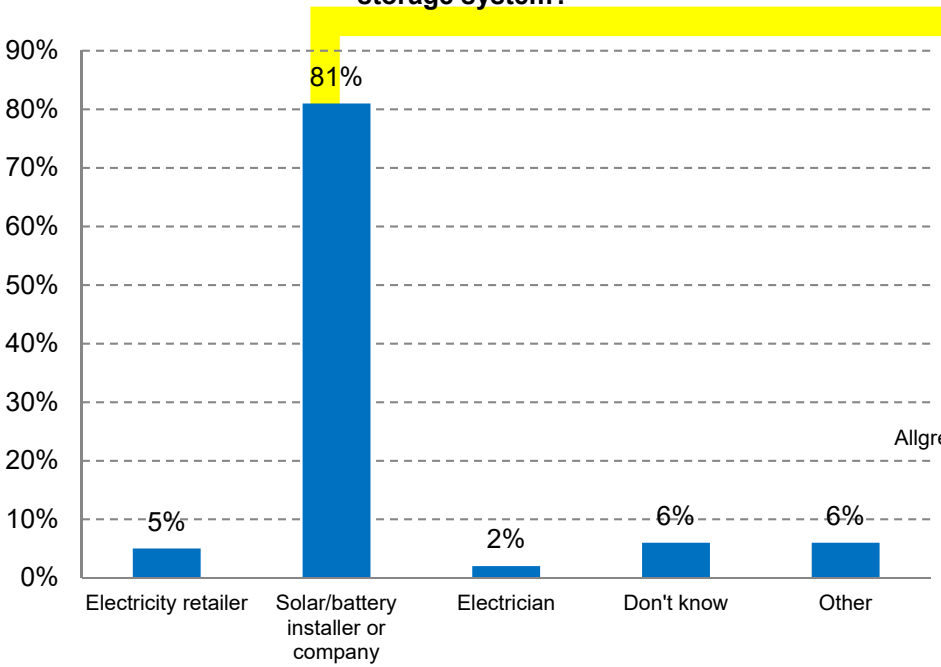




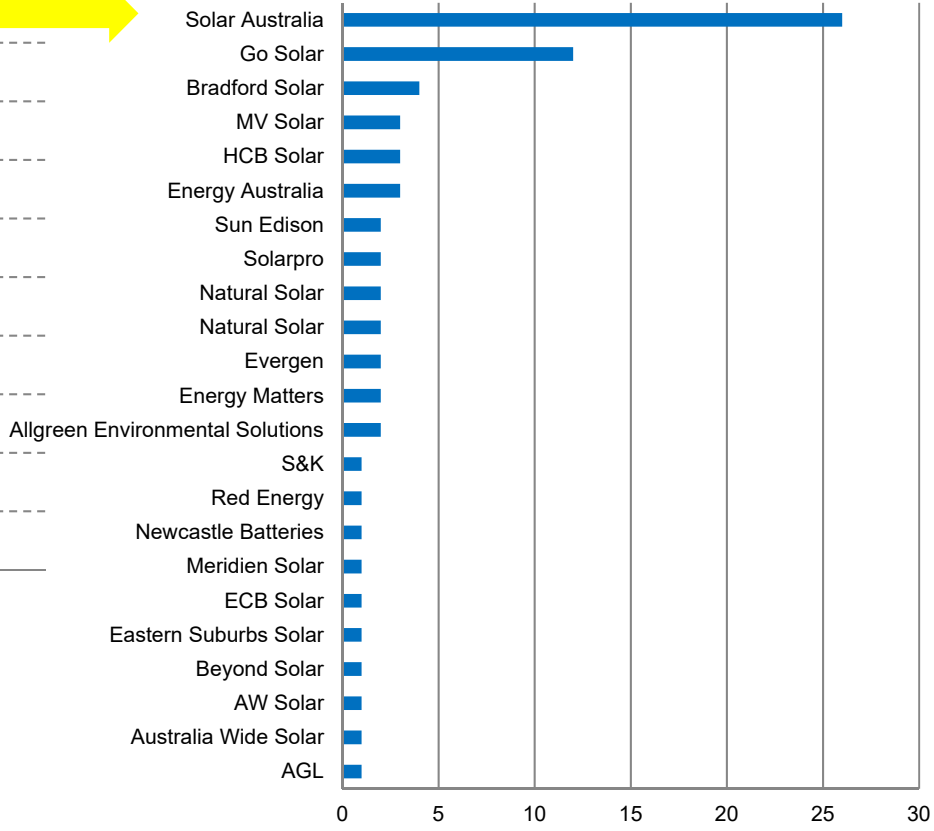
Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

Battery Ownership – Installation Company

From which type of company did you purchase your battery storage system?



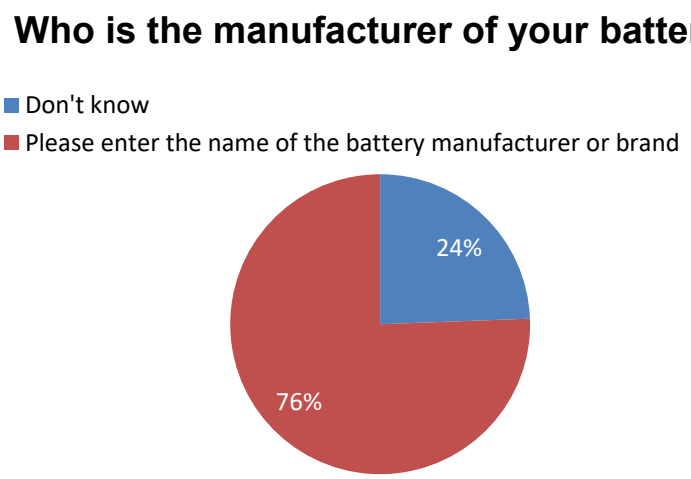
Which company did you purchase your battery from?

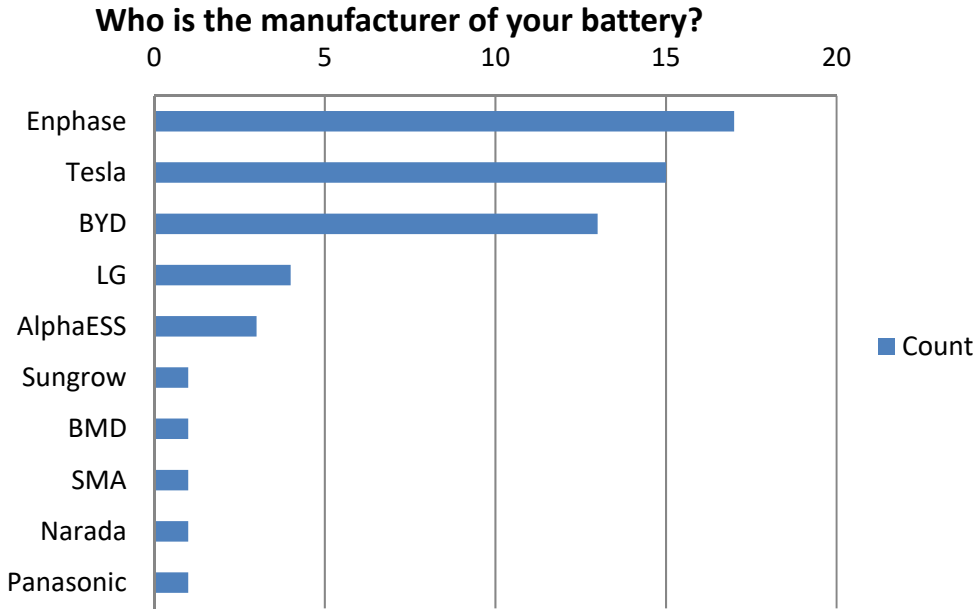


Base = 86, total completed online responses, answered 'yes' to having purchased a battery system in their current household

Battery Ownership – Battery Brand

The most common battery brand amongst battery owners surveyed is Enphase followed by Tesla and then BYD.



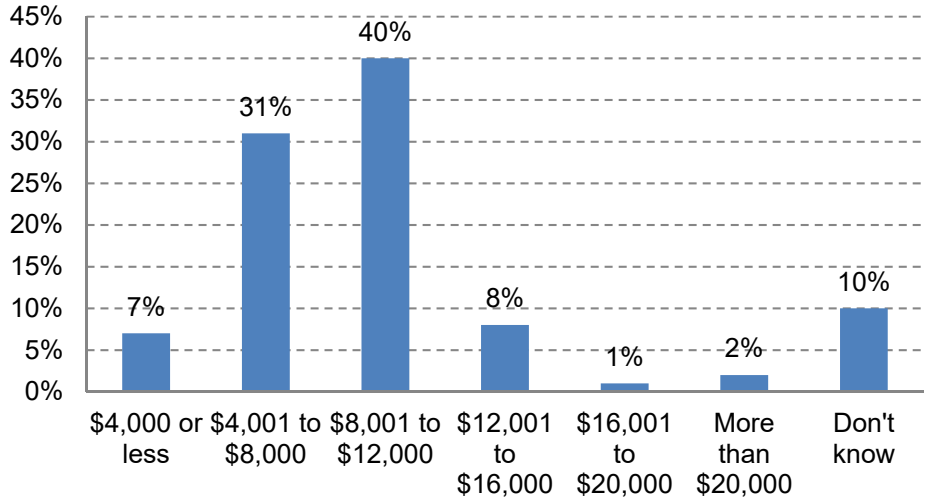


Base = 76, total completed online responses, answered 'yes' to having purchased a battery system in their current household and knew whom they purchased battery from

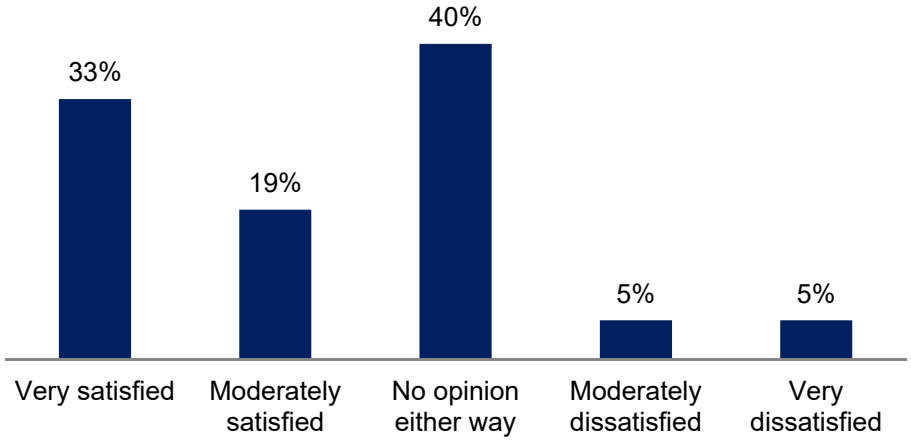
Battery Ownership – Battery Cost

40% of customers surveyed paid between $8,000 and $12,000 for their battery. Just over half the number of battery customers were either very or moderately satisfied with their bills savings, however another 40% appeared indifferent.

How much did you pay for your battery system?



How satisfied are you with electricity bill savings as a result of installing your battery system?

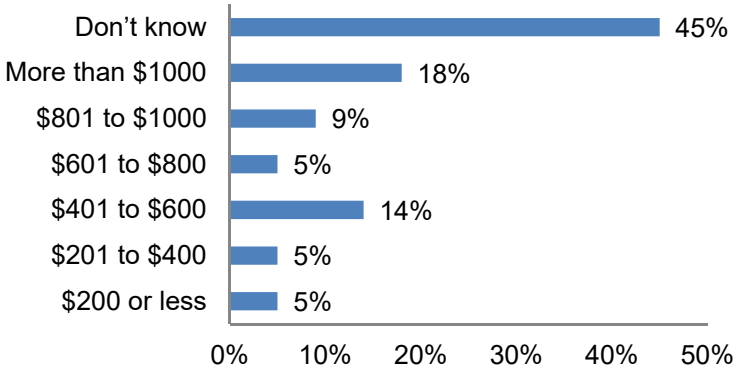


Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

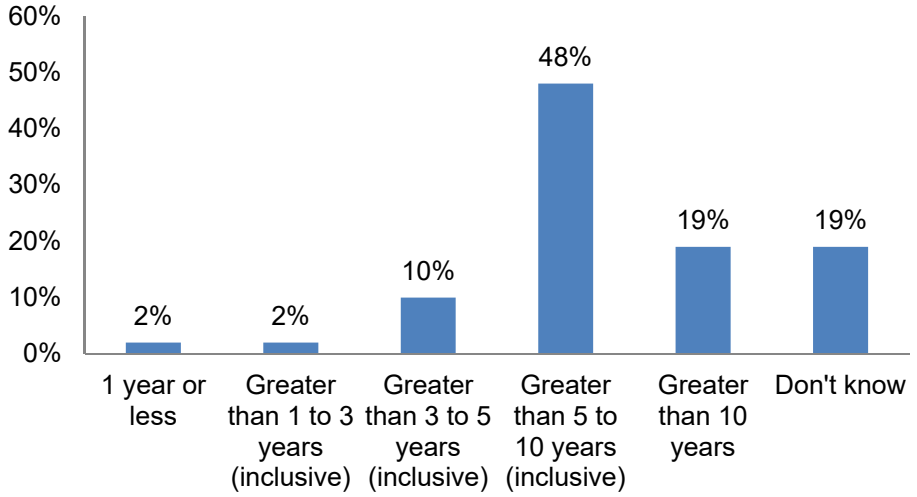
Battery Ownership – Warranty Length

- However, when asked exactly how much they think they have saved, the majority of customers did not know.
- Almost half of the battery customers surveyed said their warranty length fell between 5 and 10 years.

By how much has the battery system reduced your electricity bill each year?



What is the warranty length for your battery system?



How much has the battery system reduced your electricity bill chart , base = 44, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household and who were either very or moderately satisfied with their electricity bill savings as a result of installing a battery storage system. Warranty length chart, base = 86

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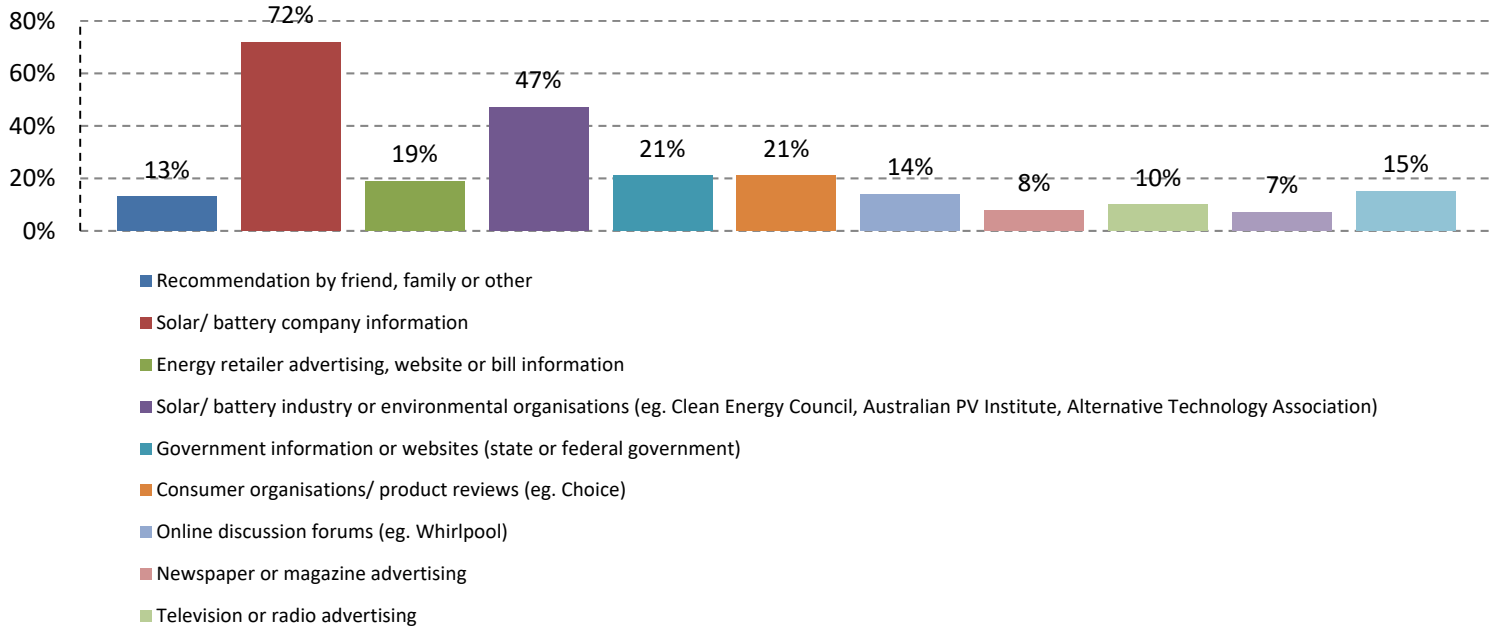
Battery Ownership – Purchase Information

The most common source of information used for installing a battery was from solar companies, followed by solar industry/environmental bodies.

Which of the following information sources did you use to help decide to install a battery storage system?

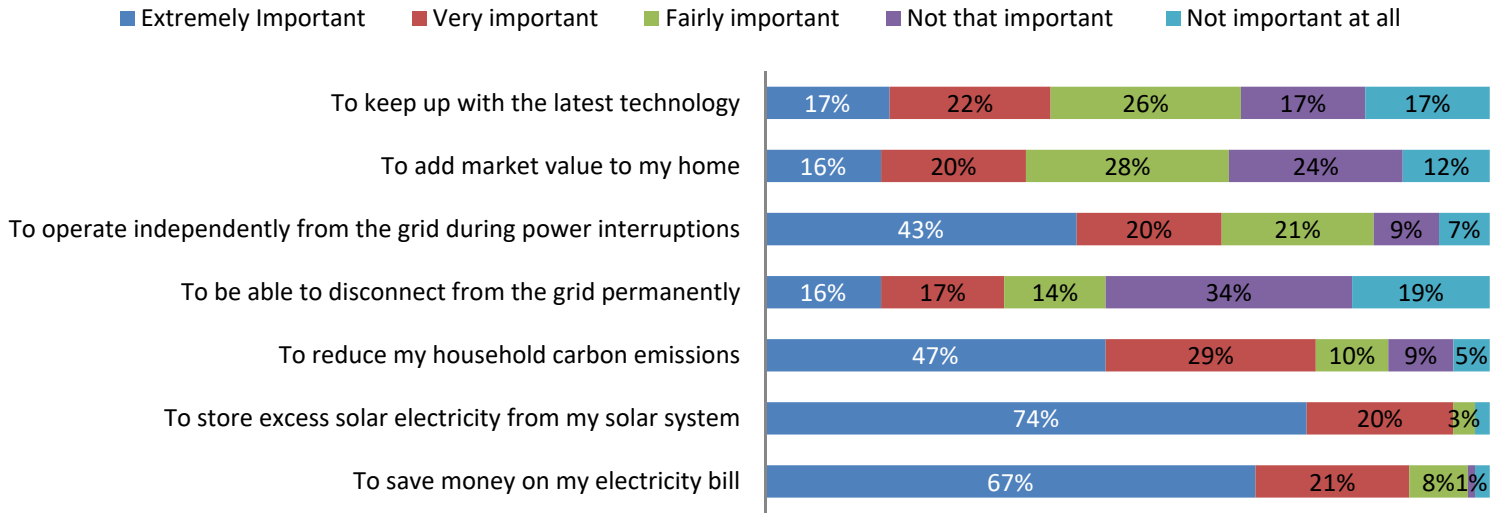


Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

Purchase Motivation for Battery Owners

Similar to their responses to solar power, owners of batteries are naturally most motivated by wanting to store excess solar energy from their solar systems. They also appear to be more likely to be more motivated by helping to reduce their carbon emissions compared to just solar power owners.

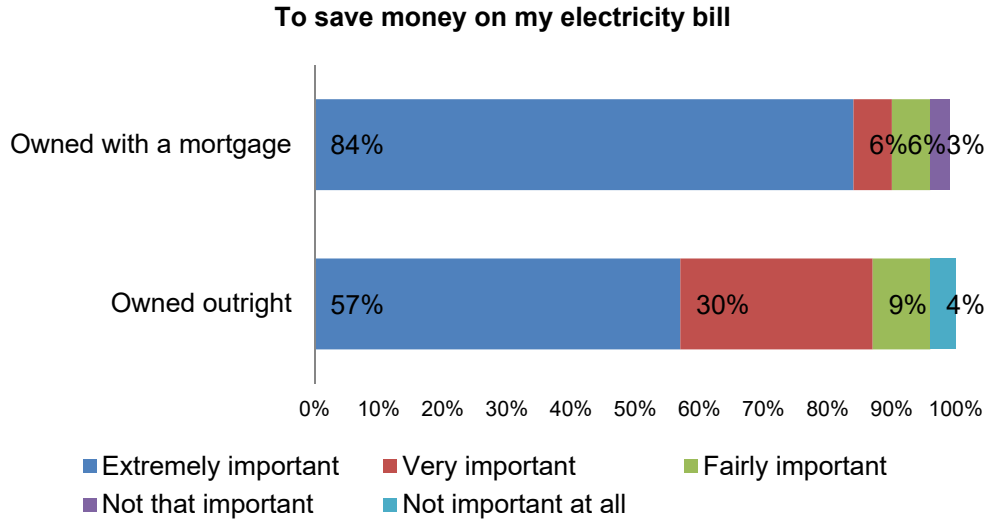
How important were each of these reasons in your decision to install a battery system?

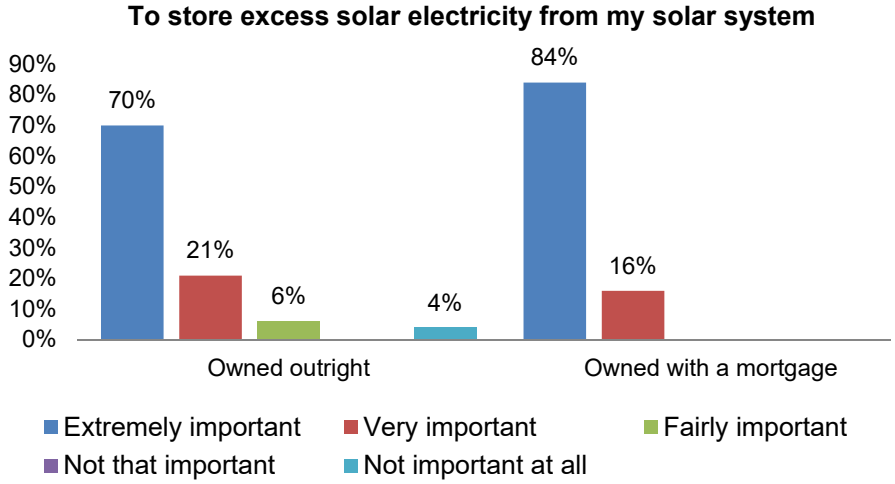


Base = 86, total completed online responses, answered 'yes' to having purchased a battery system in their current household

Motivation to purchase a battery by home ownership type

Respondents who are paying off their mortgages are 50% more likely than those who own their home outright to be motivated to save money on their electricity bills. Both groups consider that the ability to store excess solar from their solar system as extremely important.

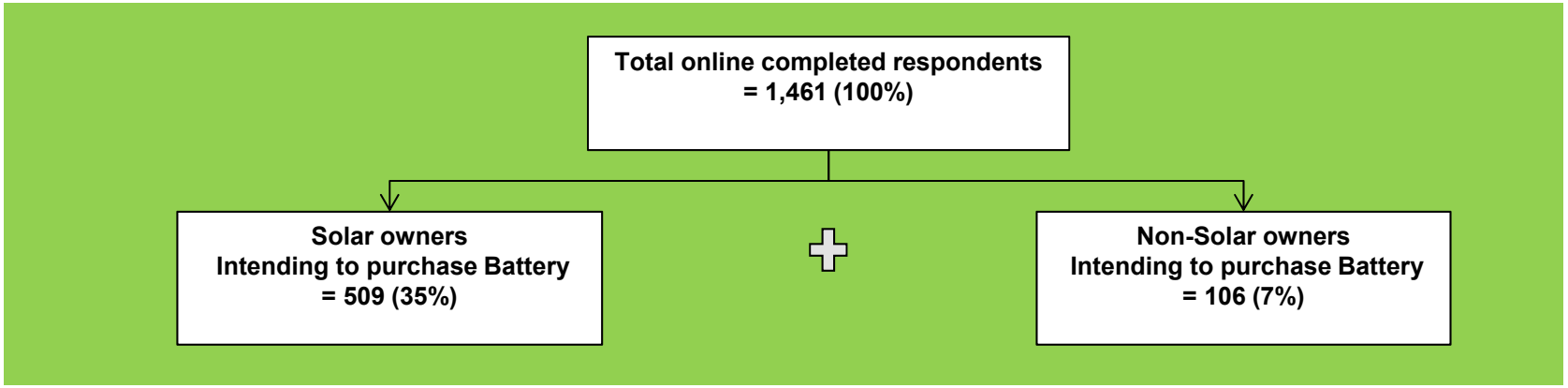




Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

Intention to purchase battery

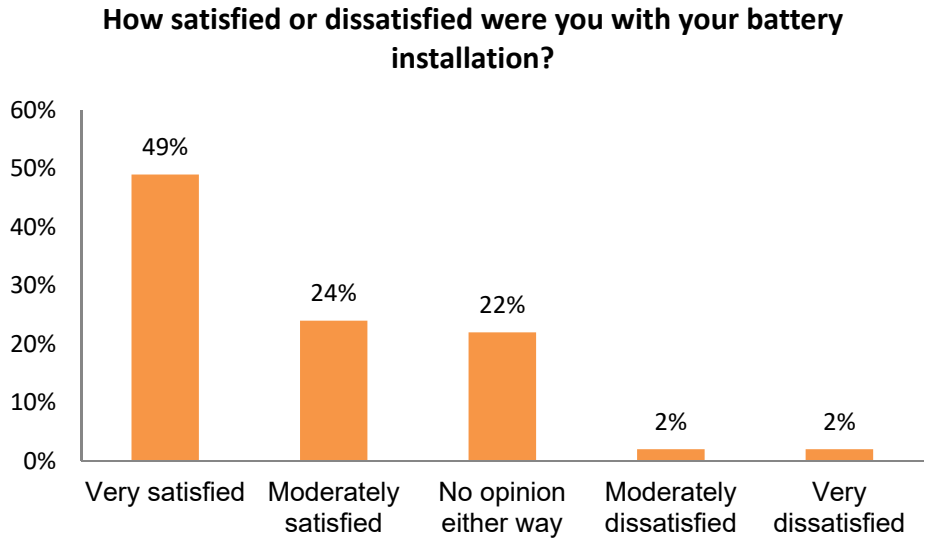
42% of all customers surveyed expressed future intention of purchasing a battery system for their home.

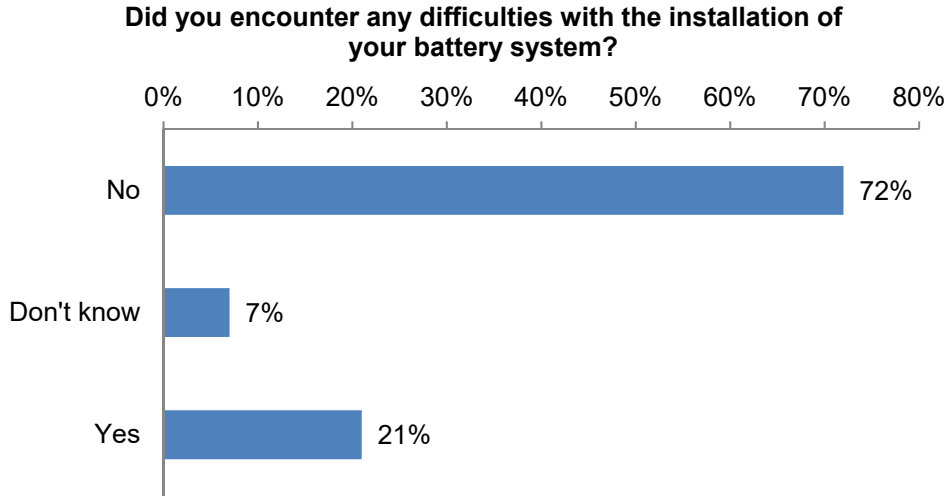


Base = 1,461, total completed online responses

Battery Installation Experience

Half of all battery respondents were very satisfied with their battery installation, and of the 21% who encountered difficulties, had various issues ranging from house wiring problems, faulty inverter, portal communication problems and loud operation of battery fan.



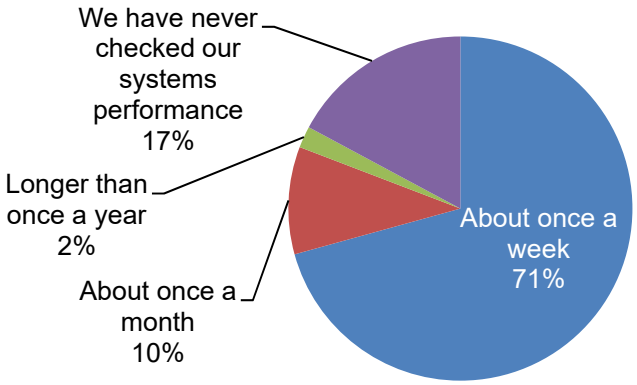


Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

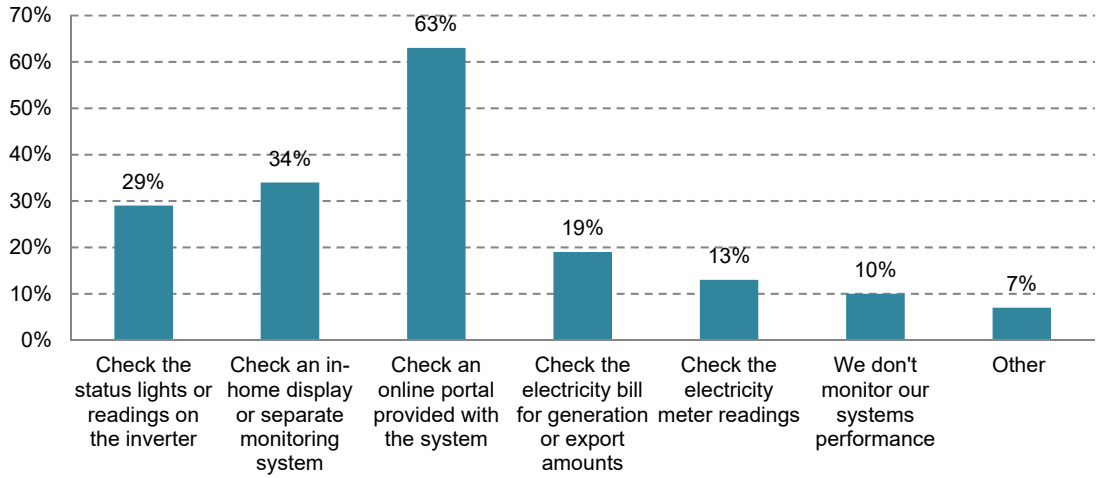
Battery Performance and Benefits

A significantly larger proportion of battery owners (71%) check their battery systems compared to solar owners (25%) once a week. The most popular way of monitoring their system was checking their online portal followed by checking their in-home display/monitoring system.

How often do you check your battery system's performance?



How do you monitor your battery system's performance?

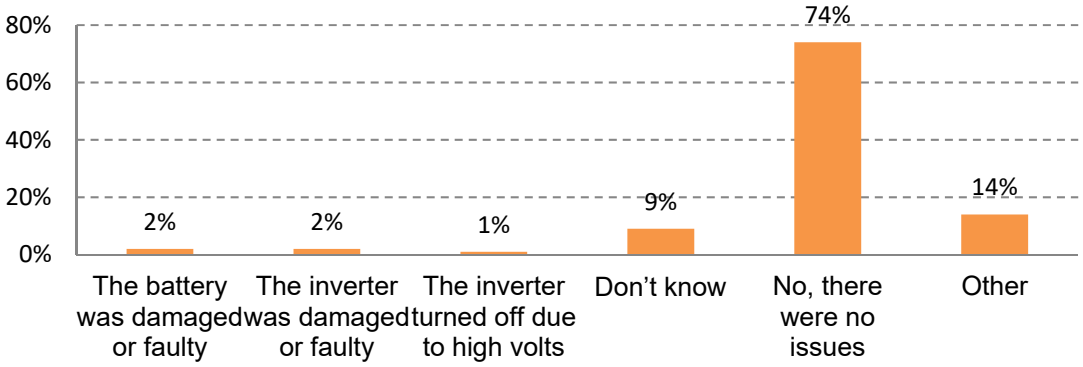


Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

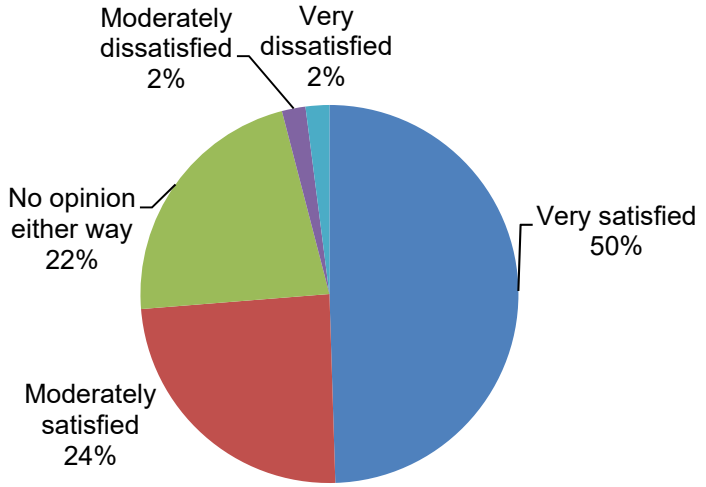
Battery Performance and Benefits

Approximately the same proportion of battery respondents were very satisfied with their battery's performance (50%), reflected by the large proportion of those who did not have any performance issues with their batteries (74%).

Have you had any of the following issues that may have affected your battery system's operation or performance?



How satisfied or dissatisfied are you with your battery system's performance



Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

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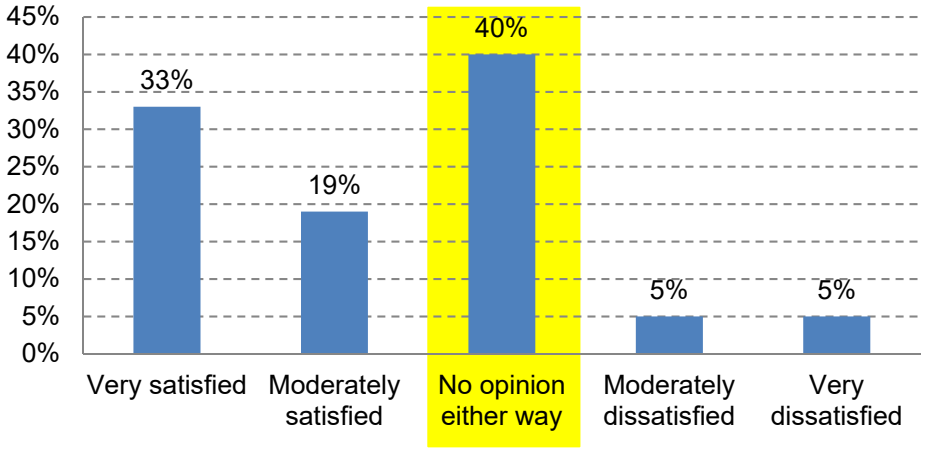
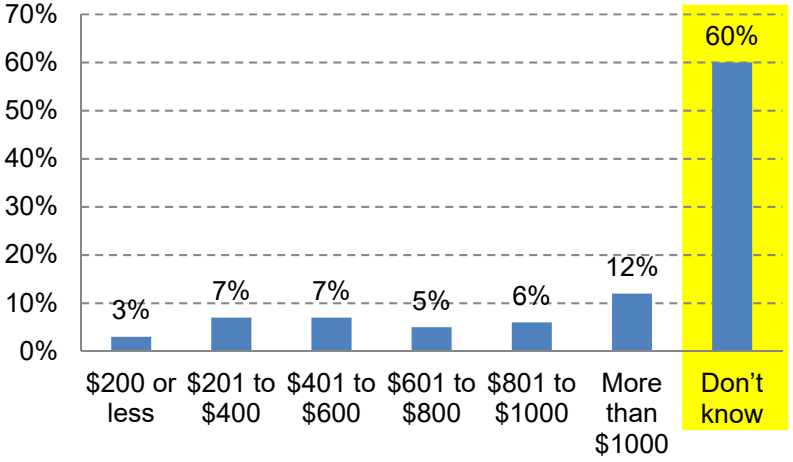
Battery Performance and Benefits

Most battery respondents do not have an opinion (40%) about how much they have saved so far on their electricity bill as a result of their battery installation, as they do not know how much they have saved (60%). This may reflects the short period of time which the majority have owned their system and the lack of historical information about the $ benefits it is generating for them.

How satisfied or dissatisfied are you with your electricity bill savings as a result of installing your battery storage system?



By how much has the battery system reduced your electricity bill each year?



Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

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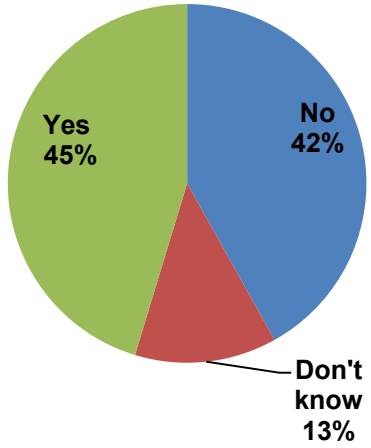
Battery Performance and Benefits

45% of battery respondents said that their behaviour around their use of appliances in their home has changed as a result of installing a battery system by:

- Planning and moderating their use of appliances more carefully to take advantage of the best time of battery storage use.
- Using more appliances during the daytime and allowing batteries to charge overnight
- Use high draining power appliances (eg. only when battery power is available)

Has having a battery system installed changed the way appliances or electricity is used in your home?

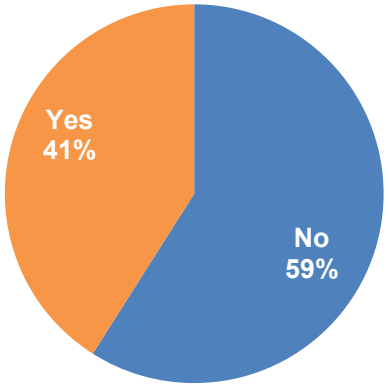


Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

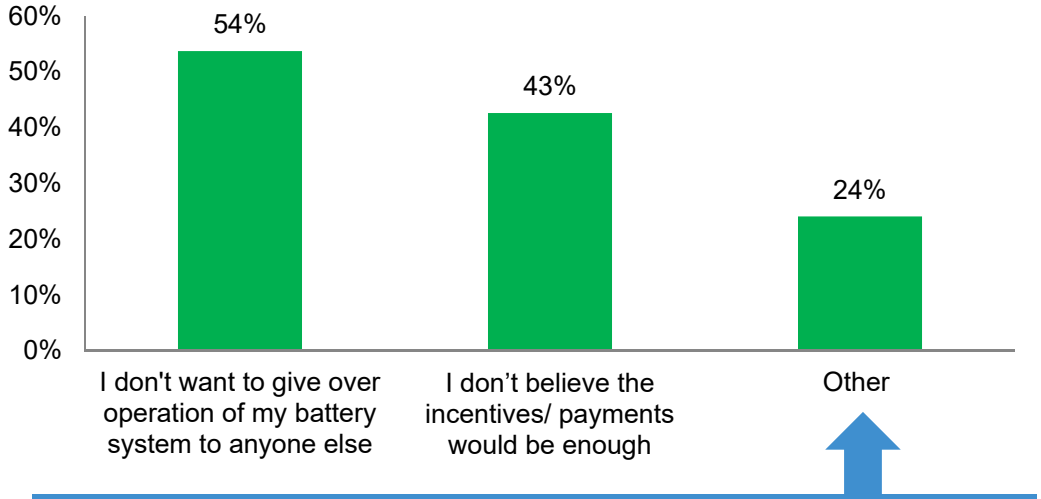
Demand Management for Batteries

59% of battery customers answered that they would not consider participating in a demand management trial for batteries with a financial incentive. The main reason was their perceived reluctance to give control over to someone else.

Would you consider allowing an electricity utility to operate your battery system for a financial incentive or payment to you?



If No, why would you not consider allowing an electricity utility to operate your battery?



Of the 24% who would not consider allowing an electricity operator to operate their battery, the main reason was because they felt they did not have enough information at the time to make an accurate decision.

Base = 86, total completed online responses, answered 'yes' to having purchased a solar power system and battery system in their current household

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Next steps, feedback and further information

Next steps

A more detailed analysis of the survey results is planned to be undertaken soon and a final report will be released later in 2017.

Your feedback

If you have any questions regarding this survey or would like to provide feedback or suggestions regarding further research and analysis, please email us at:

solarbatterysurvey@ausgrid.com.au

Further information

You can find more information about solar systems and batteries on the Ausgrid website at:

http://www.ausgrid.com.au/Common/Customer-Services/Homes/Solar-power-and-batteries.aspx