Australian Government
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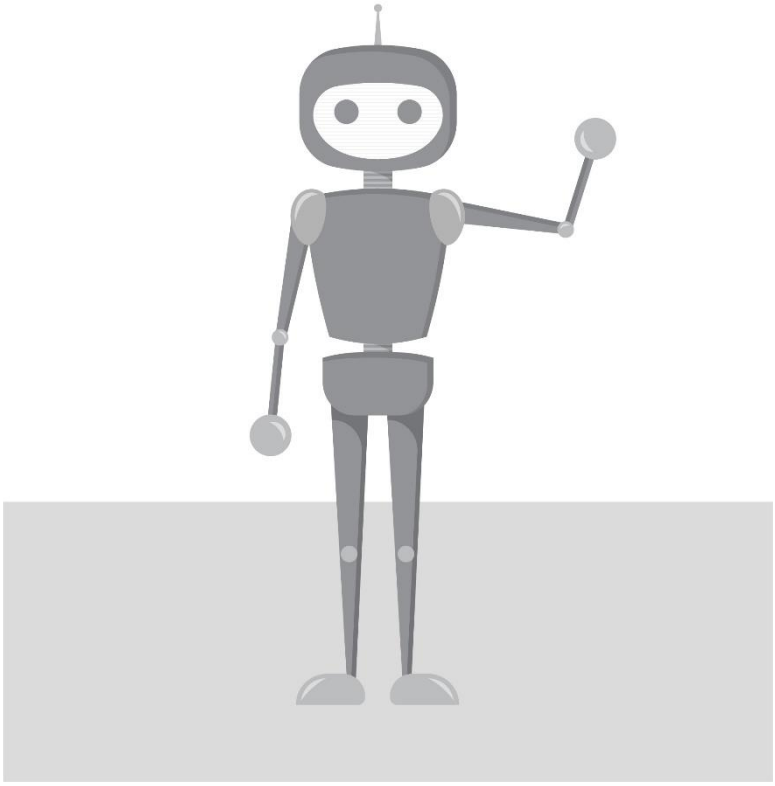
BETA



Technical Appendices

High-impact decisions that reduce household emissions

August 2025

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Appendix 1: Survey design and analysis

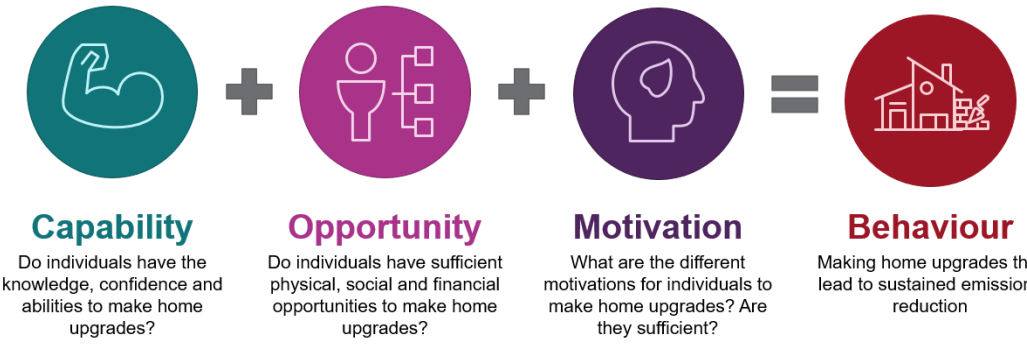
Survey design

BETA designed the *Towards Net Zero* survey, in consultation with the Department of Climate Change, Energy, the Environment and Water and the Australian Energy Regulator, to understand the barriers and enables to making high-impact household decisions that limit greenhouse gas emissions.

We used the COM-B framework (Michie, Van Stralen and West 2011) to examine the home upgrade decision, and to design and analyse the survey. COM-B considers whether a decision-maker has the capability, opportunity, and motivation to perform a certain behaviour.

Figure 1 describes our key research questions (adapted from The Decision Lab, n.d.).

Figure 1. The decision to make home upgrades requires sufficient capability, opportunity, and motivation



We ran an online survey of 4,891 Australians. Our sample was broadly representative of the Australian population, with soft quotas on gender, age, and location (capital city or outside capital city). We oversampled the smaller States and Territories (Australian Capital Territory, Northern Territory and Tasmania) to allow analysis of cohorts within these regions. We set a hard quota of a minimum of 250 respondents from each State, and a minimum of 100 respondents in each Territory. To be eligible to complete our survey, respondents had to indicate they were aged 18 or over, and provide informed consent.

Respondents were recruited through a panel provider (The Online Research Unit) and completed the survey on Qualtrics from 18 July to 28 August 2023. The survey took an average of 15 minutes to complete.

Overview of survey questions

The survey questions fell into categories of capability, opportunity, motivations and home upgrade behaviours. We also included a spotlight on rooftop solar, cost of living, and typical demographics questions. The survey contained five main modules:

- **Climate motivations** – we asked about attitudes, values, and behaviours relevant to climate change to understand motivations for emissions reduction behaviours.
- **Home upgrades** – we asked about existing energy infrastructure in respondents' homes, home upgrades they already have, and how much they know about the impact of upgrades on household emissions.
    - We were interested in respondents' **home energy efficiency 'literacy'**. We presented various hypothetical scenarios that involve realistic choices a householder might need to make when considering home upgrades. There was an objectively correct answer to each question in the context of greenhouse gas emission reduction goals.
- **Residential rooftop solar** – as uptake and awareness of solar is high compared to other home upgrades, we asked households with solar panels about their motivations for installing solar and how easy or difficult they found the process. For households without solar, we sought to understand their motivations and barriers.
- **Cost-of-living** – we asked about perceptions and experiences of the cost of living, particularly energy prices, to understand how rising costs impact respondents' values, priorities, and behaviour.
- **Demographics** – we asked about personal characteristics including age, location, employment status and housing status, to facilitate a more nuanced understanding of enablers and barriers across different cohorts.

Our full survey instrument is available on request.

Data cleaning

We excluded responses if:

- They were speeders – defined as completing the survey in less than 4.5 minutes (approximately 33% of median completion time after excluding screenouts).
- Responses were incomplete – that is, respondents did not reach the final (10^{th}) page of survey questions.
- The State or Territory (provided on the first page of survey questions) did not match the postcode (provided on the final page). We did not consider missing postcodes to constitute a mismatch.
- They were flagged by Qualtrics as low-quality. Flags are:
    - A likely duplicate (Q_RelevantIDDuplicate = true)
    - A likely bot (Q_RelevantIDFraudScore ≥ 30)
    - Recaptcha failure (Q_RecaptchaScore < 0.5)
- We discovered instances where the panel-provided ID was duplicated. These duplicates were manually checked. Where it seemed that duplicates represented the

same person (e.g. matching postcode, age, gender), the first instance of each duplicate was retained. All other duplicates were removed.

- They were incomplete because they did not meet our screening criteria (did not give consent, under 18 years old)
- They were incomplete because a quota was full (for example State or Territory quotas).

We received a total of 6,477 survey responses. After excluding incomplete responses and cleaning the data, we were left with a total of 4,891 responses.

Analysis

We had two main data analysis approaches. The first was an explaratory approach, using a series of frequency tables and cross-tabulations to describe the data. We generated these in Q, using data cleaned in Stata. The second was to use multiple regressions to quantify the relative impact of barriers and enablers of certain home upgrades. Regressions were performed in R. Appendix 3 details the regression results.

Appendix 2: Knowledge scenarios

We were interested in understanding respondents' **home energy efficiency 'literacy'**. We presented various hypothetical scenarios that involve realistic choices a householder might need to make when considering home upgrades, across four topics: replacing old appliances, hot water systems, vehicles, and choosing between new appliances . There was an objectively correct answer to each question in the context of greenhouse gas emission reduction goals.

Responses to each question were averaged to generate a score (see Aggregate Measure).

Scenario questions

Participants were asked to tell us what they think the best action is to limit greenhouse gas emissions. Each participant was shown four of the eight possible scenarios, randomly selected so that they saw one scenario about each of the four topics.

Scenario 1: Appliance

Ava lives in Cairns and works from home. Her house has a large air-conditioning unit which is 25 years old.

She wants to limit her household greenhouse gas emissions. What should she do?

Response options:

- Keep her current air-conditioning unit until it breaks down **(incorrect)**
- Replace her air-conditioning unit straight away with a new one that is more energy efficient **(Correct)**
- Don't know **(incorrect)**

Table 1. Scenario 1 results

Response	n	%
Correct choice	1,913	79%
Incorrect choice	324	13%
Didn't know (treated as incorrect)	185	8%
Total	2,422	

Scenario 2: Appliance

Adam lives in a Brisbane apartment and usually eats out. His kitchen has a medium-sized fridge that is 15 years old.

He wants to limit his household greenhouse gas emissions. What should he do?

Response options:

- Keep his current fridge until it breaks down **(incorrect)**
- Replace his fridge straight away with a new one that is more energy efficient **(Correct)**
- Don't know **(incorrect)**

Table 2. Scenario 2 results

Response	n	%
Correct choice	1,539	63%
Incorrect choice	697	28%
Didn’t know (treated as incorrect)	213	9%
Total	2,449	

Scenario 3: Hot water system

Halina lives in country Victoria in a house with no rooftop solar system. The house has an old electric hot water tank.

She wants to limit her household greenhouse gas emissions. What should she do?

Response options:

- Keep her current hot water system until it breaks down **(incorrect)**
- Replace her hot water system straight away with a heat pump hot water system **(Correct)**
- Don't know **(incorrect)**

Table 3. Scenario 3 results

Response	n	%
Correct choice	1,681	69%
Incorrect choice	480	20%
Didn’t know (treated as incorrect)	267	11%
Total	2,428	

Scenario 4: Hot water system

Hamish lives in country NSW in a house with a large rooftop solar system. The house has an old electric hot water tank.

He wants to limit his household greenhouse gas emissions. What should he do?

Response options:

- Set a timer to heat the water during the day instead of at night **(Correct)**
- Replace the hot water tank straight away with a heat pump hot water system **(Incorrect)**
- Don't know **(incorrect)**

Table 4. Scenario 4 results

Response	n	%
Correct choice	1,143	47%
Incorrect choice	965	39%
Didn’t know (treated as incorrect)	338	14%
Total	2,446	

Scenario 5: Vehicle

Chesna lives in the Canberra suburbs in a house with no rooftop solar system. She drives her 15-year-old petrol car to the office every day, twenty minutes each way.

She wants to limit her household greenhouse gas emissions. What should she do?

Response options:

- Keep her current car **(incorrect)**
- Replace her car straight away with a new electric vehicle **(Correct)**
- Don't know **(incorrect)**

Table 5. Scenario 5 results

Response	n	%
Correct choice	1,273	52%
Incorrect choice	747	31%
Didn’t know (treated as incorrect)	421	17%
Total	2,441	

Scenario 6

Cole lives in the outer suburbs of Adelaide in a house with no rooftop solar system. He is retired and usually only drives his 5-year-old petrol car to the local shops on Wednesdays.

He wants to limit his household greenhouse gas emissions. What should he do?

Response options:

- Keep his current car **(Correct)**
- Replace his car straight away with a new electric vehicle **(incorrect)**
- Don't know **(incorrect)**

Table 6. Scenario 6 results

Response	n	%
Correct choice	1,484	61%
Incorrect choice	646	27%
Didn’t know (treated as incorrect)	305	13%
Total	2,435	

Scenario 7

Elinor is building a house in Darwin and has already opted for a large rooftop solar system with a battery. Now she has to design her kitchen.

She wants to make her household greenhouse gas emissions as low as possible. What should she choose?

Response options:

- Gas cooktop **(incorrect)**
- Induction cooktop **(Correct)**
- Don't know **(incorrect)**

Table 7. Scenario 7 results

Response	n	%
Correct choice	1,772	73%
Incorrect choice	313	13%
Didn’t know (treated as incorrect)	359	15%
Total	2,444	

Scenario 8

Edwin is building a house in Perth and has already opted for a large rooftop solar system with a battery. Now he has to choose a heating system.

He wants to make his household greenhouse gas emissions as low as possible. What should he choose?

Response options:

- Ducted gas central heating **(incorrect)**
- Reverse cycle heater (split system) **(Correct)**
- Don't know **(incorrect)**

Table 8. Scenario 8 results

Response	n	%
Correct choice	1,588	65%
Incorrect choice	343	14%
Didn’t know (treated as incorrect)	513	21%
Total	2,444	

Aggregate measure

Each person answered four questions – an incorrect answer, a ‘don’t know’ response and a missing answer were all recoded to 0, only a correct answer was coded as 1. People with more than 1 missing data point were excluded from analysis. These were summed and divided by 4 to derive the mean, giving each person a score from 0 – 1, in which 1 = 100% correct.

Appendix 3: Frequency Tables

Demographics

Tables 9-11 show that our sample was broadly representative on gender, age, and location.

Table 9. How do you describe your gender? [Survey sample compared to 2021 Census]

Gender	BETA Survey % (n)	2021 Census
Woman or Female	51% (2,491)	51%
Man or male	49% (2,383)	49%
Non-binary	<1% (9)	
Not stated	<1% (8)	
Total	4,891	

Table 10. Please select your age bracket [Survey sample compared to 2021 Census]

Age	BETA Survey % (n)	2021 Census
18-34	23% (1,148)	21% (20-34)
35-64	51% (2,514)	38%
65+	25% (1,229)	17%
Total	4,891	

Table 11. Do you live in a capital city or another part of the state? [Survey sample compared to 2021 Census]

Location	BETA Survey % (n)	2021 Census
Capital city	68% (3,342)	67% (major Australian cities)
Another part of the state	32% (1,549)	33%
Total	4,891	

Table 12. Where do you live?

State	n	%
Western Australia	687	14%
New South Wales	1,087	22%
Australian Capital Territory	190	4%
Queensland	754	15%
South Australia	598	12%
Tasmania	364	7%
Northern Territory	150	3%
Victoria	1,061	22%
Other Territories	0	0%
Total	4,891	

Table 13. What is the highest level of education that you have completed?

Education	n	%
Year 10 or below	354	7%
Year 11 or equivalent	189	4%
Year 12 or equivalent	695	14%
A trade, technical certificate or diploma	1,357	28%
A university degree	1,377	28%
Postgraduate qualifications	916	19%
Total	4,888	

Table 14. Which of the following best describes your current employment status?

Employment status	n	%
Full-time	2,018	41%
Part-time	537	11%
Casual	247	5%
Self employed	280	6%
Not employed	156	3%
Student	73	1%
Retired	1,193	24%
Home duties	232	5%
Unable to work	114	2%
Other	34	1%
Total	4,884	

Table 15. Do you own or rent the home you live in?

Home ownership	n	%
I pay rent/board to a private landlord or real estate agent	1,059	22%
I pay rent/board through public or community housing	189	4%
I'm paying a mortgage on the home	1,623	33%
I own the home outright and do not have a mortgage	1,707	35%
I live with family or friends and do not pay rent	242	5%
Other (please specify)	69	1%
Total	4,889	

Table 16. Is English the main language spoken at home?

English spoken at home	n	%
No	360	7%
Yes	4,517	93%
Total	4,877	

Table 17. Climate zone (derived from 'What is the postcode where you usually live?')

Climate zone	n	%
Hot humid summer, warm winter	185	4%
Warm humid summer, mild winter	680	14%
Hot dry summer, warm winter	45	1%
Hot dry summer, cool winter	97	2%
Warm temperate	1,758	37%
Mild temperate	1,347	28%
Cool temperate	657	14%
Total	4,769	

Table 18. Solar zone (derived from 'What is the postcode where you usually live?')

Solar zones	n	%
Zone 1 (highest)	37	1%
Zone 2	151	3%
Zone 3	3,375	71%
Zone 4	1,214	25%
Total	4,777	

Climate motivations

Table 19. Have you heard the term *net zero* before when talking about climate change?

Awareness	n	%
No, never heard it	604	12%
I think I have	1,653	34%
Yes, I'm familiar with it	2,437	50%
Not sure	194	4%
Total	4,888	

Table 20. Please rate your agreement or disagreement with the following statements about climate change.

Climate change beliefs	Strongly disagree	Somewhat disagree	Neither	Somewhat agree	Strongly agree	n
I believe that climate change is real	5%	5%	11%	29%	51%	4,866
Climate change will bring about serious negative consequences	5%	7%	15%	31%	42%	4,874
The main cause of climate change is human activity	6%	8%	14%	35%	37%	4,876
My local area will be influenced by climate change	5%	6%	21%	39%	28%	4,873
It will be a long time before the consequences of climate change are felt	19%	27%	19%	24%	11%	4,875

Climate change beliefs	Strongly disagree	Somewhat disagree	Neither	Somewhat agree	Strongly agree	n
If we act collectively, we can limit further climate change	6%	7%	13%	39%	35%	4,879
I believe my actions can have a positive effect on climate change	7%	8%	19%	45%	22%	4,877

Table 21. How important is it to you that you limit your greenhouse gas emissions?[1]

Importance	n	%
Not at all important	390	8%
Slightly important	511	10%
Moderately important	1,195	24%
Very important	1,591	33%
Extremely important	1,193	24%
Total	4,880	

Table 22. How confident are you that you know which individual or household actions most limit greenhouse gas emissions?

Confidence	n	%
Not at all confident	340	7%
Not very confident	975	20%
Neutral	1,499	31%
Fairly confident	1,659	34%
Very confident	412	8%
Total	4,885	

[1] In the survey question we included the following text: “When we talk about 'limiting greenhouse gas emissions' in this survey, we are talking broadly about any actions that prevent carbon dioxide and methane being released into the atmosphere, tackling the most widely agreed cause of climate change.”

Home upgrades

Table 23. How many people live in your household?

Number of people	n	%
1 (only me)	895	18%
2	2,046	42%
3	818	17%
4	751	15%
5	254	5%
6	85	2%
7 or more	37	1%
Total	4,886	

Table 24. Is there someone at home during the day?

Someone at home	n	%
Hardly ever or never	403	8%
Some of the time	935	19%
Half of the time	946	19%
All or most of the time	2,594	53%
Total	4,878	

Table 25. What type of building do you live in?

Type of home	n	%
Separate house	3,474	71%
Semi-detached, row or terrace house or townhouse	591	12%
Flat or apartment	751	15%
Other type of home (please specify)	67	1%
Total	4,883	

Table 26. Is your home located within shared or common property?

Shared or common property	n	%
No	3,702	76%
Residence with a body corporate, home owners association or strata title	901	18%
Retirement village	107	2%
Caravan Park	19	0%
Don't know	96	2%
Other (please specify)	55	1%
Total	4,880	

Table 27. What year was your home built? (If unsure, please take your best guess)

Year of build	n	%
Pre-1900	98	2%
1900-1949	265	5%
1950-1979	1,006	21%
1980-1999	1,361	28%
2000-2009	856	18%
2010-2014	523	11%
2015-2019	530	11%
2020-2023	245	5%
Total	4,884	

Table 28. How energy efficient do you think your home is?

Self-rated energy efficiency	n	%
Terrible	148	3%
Poor	580	12%
Average	2,128	45%
Good	1,541	32%
Excellent	363	8%
Total	125	

Table 29. Has your home ever had an energy assessment?

Home ever had an energy assessment	n	%
Yes	552	11%
No	3,249	66%
Don't know	1,085	22%
Total	4,886	

Table 30. Do you know what rating scheme was used to assess your home?[2]

Efficiency rating scheme used	n	%
NatHERS - Nationwide House Energy Rating Scheme	37	7%
NSW BASIX scheme	30	5%
NABERS	33	6%
Green Star	81	15%
ACT EER	47	9%
Victorian Residential Efficiency Scorecard	30	5%
Don't know	283	52%
Other (please tell us)	8	1%
Total	549	

Table 31. Do you know your home's energy efficiency star rating?[3]

Efficiency star rating	n	%
Less than 1 star	5	1%
1 or 2 stars	11	2%
3 or 4 stars	50	9%
5 or 6 stars	134	24%
7 or 8 stars	104	19%

[2] This question was only displayed to respondents who answered 'Yes' to ever had an energy assessment.

[3] This question was only displayed to respondents who answered 'Yes' to ever had an energy assessment.

Efficiency star rating	n	%
9 or 10 stars	29	5%
Don't know	209	38%
Other (please tell us)	9	2%
Total	551	

Table 32. Thinking about your home, do you think that renovating your home or replacing a major appliance would reduce your energy bill?

Think home upgrade would reduce energy bills	n	%
Definitely not	267	5%
Unlikely	1,508	31%
Likely	2,311	47%
Definitely	800	16%
Total	4886	

Table 33. How confident are you that you could choose the right renovation or major appliance upgrade to reduce your energy bills?[4]

Confidence in choosing the right upgrade	n	%
Not confident at all	91	3%
Not very confident	557	18%
Somewhat confident	1,827	59%
Very confident	628	20%
Total	3,103	

Table 34. Does your current home have insulation?

Insulation	n	%
Roof insulation	3,153	65%
Wall insulation	1692	35%
Underfloor insulation	367	8%
No	547	11%

[4] This question was only displayed to respondents who answered 'Definitely' or 'Likely' to home upgrades would reduce their energy bills.

Insulation	n	%
Don't know	875	18%
Total	4,880	

Table 35. Does your current home have double glazing?

Glazing	n	%
Double or triple glazing on all windows	3,182	9%
Double or triple glazing on most windows	463	6%
Double or triple glazing on some windows	317	5%
No	260	65%
Don't know	659	14%
Total	4,881	

Table 36. Does your current home have a natural gas connection?

Gas connection	n	%
Mains gas	2,519	52%
Bottle gas	550	11%
No gas connection to the house	1,577	32%
Don't know	242	5%
Total	4,888	

Table 37. Have you ever replaced any gas appliances with electric appliances?[5]

Ever replaced gas with electric appliance	n	%
No	1,926	63%
No, but I'm considering doing so in future	461	20%
Yes	607	15%
Don't know	66	2%
Total	3,060	

[5] This question was only displayed to respondents who answered 'Mains gas' or 'Bottle gas' to home has natural gas connection.

Table 38. Have you had your gas connection disconnected and switched your appliances to electric?[6]

Ever disconnected gas connection	n	%
Yes, in the last two years	46	3%
Yes, more than two years ago	69	4%
No, have never had a gas connection in this house	1,397	89%
Don't know	60	4%
Total	1,572	

Table 39. What were your reasons for replacing gas appliances with electric appliances?[7]

Reasons switched from gas to electric appliance	n	%
To save on energy costs	292	51%
To be environmentally sustainable	227	40%
To improve the value of the house	97	17%
To make the home more comfortable	134	23%
Better performing appliances	243	42%
To improve the air quality in the home	130	23%
Don't know	24	4%
Other	64	11%
Total	574	

Table 40. Do you own any of the following vehicles (car, truck, or motorbike)?

Vehicle owned	n	%
Electric Vehicle	147	3%
Hybrid Vehicle	259	5%
Petrol Vehicle	3,793	78%

[6] This question was only displayed to respondents who answered 'No gas connection to the house' to home has natural gas connection.

[7] This question was only displayed to respondents who answered 'Yes' to ever replaced any gas appliances with electric appliances, or 'Yes' to ever disconnected gas connection from home.

Vehicle owned	n	%
Diesel Vehicle	1,000	20%
None	377	8%
Don't know	14	0%
Other vehicle (specify)	34	1%
Total	4,881	

Table 41. Does your home have any of the following features?

Home features	n	%
Fixed rooftop solar panels, no battery	1,569	32%
A battery storage system connected to solar panels	332	7%
Solar hot water	717	15%
Smart meter	1,437	30%
Home energy power monitor (e.g. smart plug or in-home display)	330	7%
Wind turbines	56	1%
Passive design	160	3%
Electric Vehicle charging point	113	2%
Off-grid	37	1%
None	1,879	39%
Don't know	183	4%
Total	4,863	

Residential rooftop solar

Table 42. Were your solar panels installed when the house was built?

Solar panels installed after house built	n	%
Yes	314	17%
No, solar panels were installed later	1,530	80%
Don't know	57	3%
Total	1,901	

Table 43. When were your solar panels installed? (If unsure, please take your best guess)

Year solar panels installed	n	%
Before 2000	11	1%
2000-2009	113	7%
2010-2014	354	23%
2015-2019	497	32%
2020-2023	504	33%
Don't know	51	3%
Total	1,530	

Table 44. What were all the reasons for installing solar panels?

Reasons for installing solar	n	%
To save on energy costs	1,545	81%
To be environmentally sustainable	899	47%
To improve the value of the house	430	23%
To have off-grid access to electricity	224	12%
To keep the power on during blackouts	196	10%
To charge an electric vehicle	94	5%
The choice was made by someone else	184	10%
I don't remember	16	1%
Other	40	2%
Total	1,901	

Table 45. Out of the reasons you've chosen, what was the main reason for installing solar?

Main reason for installing solar	n	%
To save on energy costs	1,258	67%
To be environmentally sustainable	256	14%
To improve the value of the house	47	2%
To have off-grid access to electricity	39	2%
To keep the power on during blackouts	35	2%
To charge an electric vehicle	24	1%
I don't remember	16	1%
Don't know - the choice was made by someone else	184	10%
Other (please specify)	25	1%
Total	1,884	

Table 46. These are some of the tasks that people might do when making the choice to get solar panels. Did you find these tasks easy or hard? (Participants with solar)

Task	I didn't do this	Very difficult	Somewhat difficult	Somewhat easy	Very easy	n
Choosing the system that was right for you	8%	5%	23%	43%	20%	1,693
Working out how big a system was needed	10%	5%	21%	43%	20%	1,697
Working out how big the savings would be	13%	8%	25%	39%	14%	1,690
Checking my eligibility for government subsidies o	17%	6%	17%	38%	23%	1,693
Choosing an installer	8%	6%	20%	44%	22%	1,693
Getting finance or a loan	60%	3%	8%	18%	11%	1,690
Learning the technical jargon	15%	10%	26%	35%	14%	1,691
Deciding whether or not to get a battery	29%	6%	19%	26%	20%	1,695

Task	I didn't do this	Very difficult	Somewhat difficult	Somewhat easy	Very easy	n
Deciding whether or not to get solar panels	6%	2%	12%	39%	42%	1,694
Working out the environmental benefits	25%	6%	17%	33%	19%	1,692
Working out how much money to spend	9%	5%	24%	41%	21%	1,695
Getting a quote	7%	3%	12%	43%	35%	1,690

Table 47. These are some of the tasks that people might do when making the choice to get solar. Are you finding these tasks easy or hard? (Participants without solar)

Task	I have not done this	Very difficult	Somewhat difficult	Somewhat easy	Very easy	n
Choosing the system that is right for you	10%	14%	39%	29%	7%	387
Working out how big a system is needed	10%	13%	37%	32%	8%	387
Working out how big the savings will be	13%	15%	33%	31%	9%	386
Checking my eligibility for government subsidy	14%	13%	32%	31%	10%	387
Choosing an installer	16%	19%	33%	26%	6%	388
Getting finance or a loan	36%	9%	22%	24%	8%	387
Learning the technical jargon	10%	15%	36%	31%	9%	387
Deciding whether or not to get a battery	10%	11%	36%	31%	11%	387
Deciding whether or not to get solar panels	3%	6%	30%	39%	23%	388
Working out the environmental benefits	13%	6%	23%	43%	15%	386
Working out how much money to spend	9%	15%	36%	32%	7%	388

Task	I have not done this	Very difficult	Somewhat difficult	Somewhat easy	Very easy	n
Getting a quote	15%	6%	19%	43%	17%	385

Table 48. Was the cost of solar panels higher or lower than you expected?

Cost of solar compared to expectations	n	%
A lot higher	165	10%
A bit higher	466	27%
As expected	858	51%
Lower	110	6%
Don't know	100	6%
Total	1,699	

Table 49. How did you manage the upfront cost of the solar panels? (The amount you needed to pay after any rebates or discounts were applied). Select all that apply.

Upfront cost of solar panels	n	%
Used savings	1,125	66%
Financed with a mortgage (e.g. line of credit, redraw or by increasing mortgage)	163	10%
Financed with a personal loan	108	6%
Financed with a credit card	133	8%
Financed with a low interest green loan (or a government loan)	144	8%
Don't know	84	5%
Other	133	8%
Total	1,699	

Table 50. Did you notice any of the following before you got solar panels installed?

Noticed	n	%
A neighbour had solar panels or a battery installed	272	16%
Friends or family had solar panels or a battery installed	508	30%

Noticed	n	%
You came across a website containing helpful information o	353	21%
You heard about government subsidies or rebates for solar	782	46%
A door to door salesperson offered to assess your home for	167	10%
A salesperson or installer provided you with helpful information	473	28%
You heard about loan or finance options for solar panels o	181	11%
None of the above	340	20%
Total	1,696	

Table 51. Have you been satisfied or dissatisfied with your solar panels?

Satisfaction	n	%
Dissatisfied	113	6%
A bit of both	468	25%
Satisfied	1,202	63%
Don't know	111	6%
Total	1,894	

Table 52. Would you like your home to have rooftop solar?

Would like solar	n	%
No	329	11%
Not really	472	16%
Yes, somewhat	1,038	35%
Yes, very much	1,151	38%
Total	2,990	

Table 53. What are all the reasons you would like your home to have rooftop solar?

Reasons for wanting solar	n	%
To save on energy costs	1,960	90%
To be environmentally sustainable	1,490	68%
To improve the value of the house	633	29%

Reasons for wanting solar	n	%
To have off-grid access to electricit	804	37%
To keep the power on during blackouts	704	32%
To charge an electric vehicle	165	8%
Don't know	30	1%
Other	13	1%
Total	2,188	

Table 54. Out of the reasons you've chosen, what is the main reason you would like your home to have rooftop solar?

Main reason for wanting solar	n	%
To save on energy costs	1,364	63%
To be environmentally sustainable	541	25%
To improve the value of the house	44	2%
To have off-grid access to electricity	90	4%
To keep the power on during blackouts	75	3%
To charge an electric vehicle	22	1%
Don't know	30	1%
Other (please specify)	6	0%
Total	2,172	

Table 55. Are you planning to have rooftop solar installed?

Planning to install solar	n	%
Not my choice to make	572	26%
No	257	12%
Unlikely	230	11%
Yes some day	507	23%
Yes in the next five years	336	15%
Yes in the next year	151	7%
No, don't want solar	0	0%
Don't know	132	6%
Total	2,185	

Table 56. Have you started investigating the options for rooftop solar yet?[8]

Started investigating rooftop solar	n	%
No	98	20%
A little	290	60%
Yes	99	20%
Total	487	

[8] This question was only asked to respondents who said 'Yes' to planning to have rooftop solar installed.

Cost of living

Table 57. How do you think the price you pay for electricity ($ per kilowatt-hour) has changed since this time last year?

Perceived rise in electricity prices	n	%
Price has gone up a lot	2,644	54%
Price has gone up a bit	1,560	32%
No change	255	5%
Price has gone down	94	2%
Don't know	280	6%
NA	47	1%
Total	4,880	

Table 58. How do you think the price you pay for gas ($ per megajoule) has changed since this time last year?

Perceived rise in mains gas prices	n	%
Price has gone up a lot	23	50%
Price has gone up a bit	181	35%
No change	891	7%
Price has gone down	1,261	1%
Don't know	162	6%
NA	0	0%
Total	2,518	

Table 59. How do you think the price you pay for gas ($ per bottle) has changed since this time last year?

Perceived rise in bottle gas prices	n	%
Price has gone up a lot	19	31%
Price has gone up a bit	71	40%
No change	222	13%
Price has gone down	172	3%
Don't know	65	12%
NA	0	0%

Perceived rise in bottle gas prices	n	%
Total	549	

Table 60. Perceived rise in energy prices[9]

Perceived rise in energy prices	n	%
No	276	6%
Yes	4,333	94%
Total	4,609	

Table 61. Who is responsible for making financial decision in your household, including making major purchases?

Responsibility for financial decisions	n	%
Me	2,250	46%
Someone else	314	6%
Shared responsibility	2,304	47%
Other	11	0%
Total	4,879	

Table 62. Given your current needs and financial responsibilities, would you say that you are:

Current level of financial comfort	n	%
Struggling	559	11%
Just getting along	1,590	33%
Reasonably comfortable	2,193	45%
Very comfortable	495	10%
Prefer not to say	45	1%
Total	4,882	

[9] 'Yes' responses if respondents answered 'How do you think the price you pay for electricity ($ per kilowatt-hour) / gas ($ per megajoule) / gas ($ per bottle) has changed since this time last year?' was 'Price has gone up a lot' or 'Price has gone up a bit'.

Table 63. In the last 12 months, did any of the following happen to you because of a shortage of money?

Financial hardship indicators	n	%
Could not pay electricity, gas or telephone bills on time	412	8%
Could not pay the mortgage or rent on time	250	5%
Pawn or sold something	439	9%
Went without meals	412	8%
Was unable to heat home	363	7%
Asked for financial help from family and friends	481	10%
Asked for help from welfare / community organisation	153	3%
None of these	3604	74%
Total	4,877	

Table 64. How much could you afford to pay upfront? (without needed a loan or credit)

Amount they could afford to pay upfront	n	%
Little or nothing	976	20%
Up to $500	412	8%
Up to $1000	524	11%
Up to $2000	711	15%
Up to $5000	766	16%
Up to $10,000	454	9%
More than $10,000	595	12%
Don’t know	449	9%
Total	4,887	

Appendix 4: Regression Results

Solar panel uptake is significantly predicted by living in a house, owning your home, and living in a geographical area that receives more solar radiation

We hypothesised that home ownership status, type of housing, financial comfort, and solar zone would have a stronger effect on solar panel uptake than self-perceived efficacy and attitudes towards energy reduction. We expected:

- Renting (rather than owning your home) to be a barrier to having solar panels installed, as renters cannot make the decision themselves.
- 'Strong enablers' facilitate uptake of solar panels, and include: living in a separate or semi-detached house (rather than an apartment), living in a low solar zone (where lower numbers indicate the geographical area receives more solar radiation and is therefore eligible for a higher government rebate), and a greater level of self-rated financial comfort.
- 'Soft enablers' that may be related to uptake of solar panels. Soft enablers are: greater response efficacy (i.e. belief that climate change can be mitigated), greater self-rated importance of limiting greenhouse gas emissions, and a belief that renovating your home or upgrading appliances can reduce energy bills.

Table 65 shows that renting was significantly related to lower solar uptake. But solar uptake among renters was not zero; 17.5% of renters reported having solar panels. It is possible that most (or all) of these renters live in properties whose owners decided to install solar panels (that is, the decision to install solar panels had nothing to do with the tenants).

Living in a detached or semi-detached house was even more influential than rental status, and had the largest effect of all predictors tested.

People living in solar zone 4 (i.e. the areas of the country that receive the least solar radiation) were less likely to have solar panels than people living in solar zones 1, 2, or 3. Other research has also found a relationship between solar uptake and geographical location, based on solar radiation and therefore amount of government subsidy received (e.g. Best et al. 2019).

Although self-rated level of financial comfort was a significant predictor, it had a relatively small effect. It is likely that a more precise measure of financial status *at the time rooftop solar was installed* may be more predictive.

Of the soft enablers, only the self-rated importance of limiting personal greenhouse gas emissions was a significant predictor. The size of this effect was comparable to the size of

the effect of financial comfort. Response efficacy and the belief that a household renovation or upgrade could reduce energy bills had non-significant effects.

Table 65. Results of the hierarchical regression testing strong and soft enablers of installing solar panels.

Independent Variables	Strong enablers	Soft enablers
Renting	-.197***	-.200***
Living in a house	.262***	.262***
Living in solar zone 1 or 2 (zone 3 reference group)	-.059	-.060
Living in solar zone 4 (zone 3 reference group)	-.153***	-.153***
Financial comfort	.067***	.063***
Climate change response efficacy		-.001
Personal importance of limiting greenhouse gas emissions		.071***
Belief that upgrade or renovation can reduce energy bills		.004
N	4,697	4,679
Adjusted R^2	.121	.125
R^2_{change}		.004

Note. Entries are estimated coefficients; *p < .05, **p < .01, ***p < .001. Significant predictors in the final model are shown in bold.

Climate change beliefs have a larger effect on intentions to install solar panels, than actual solar panel uptake

We again hypothesised that home ownership status, type of housing, financial comfort, and solar zone would have a stronger effect on intending to install solar panels than self-perceived efficacy and attitudes towards energy reduction.

We operationalised 'intending to install solar panels' as responding *Yes in the next year* or *Yes in the next five years* to the question 'Are you planning to have rooftop solar installed?'.

Respondents only answered this question about intentions to install rooftop solar if they previously said they would like to have rooftop solar. We excluded renters from this analysis, because very few said they would like to have rooftop solar. Based on qualitative responses, we think that many renters who said they would not like solar said that because they *cannot* install solar.

Table 66 shows that the soft enablers played a much larger role in intending to install solar panels than they did in explaining actual solar uptake (as previously shown in Table 65). All three soft enablers were significant predictors, suggesting beliefs about emissions reduction are related to motivations to install solar.

Living in a house rather than an apartment had a large significant effect on intentions. Solar zone or level of financial comfort were not significant predictors.

The difference in results between actual solar panel uptake and intentions to install solar point to an intention-action gap. Intention-action gaps are widely documented in the literature on environmental behaviours (Grandin et al. 2021; Kormos and Gifford 2014). For many of the reasons we outlined earlier in the document, climate change beliefs might drive a desire for solar but not actually translate into solar uptake. The results of this regression show that the people who ultimately installed solar were also more financially comfortable.

Table 66. Results of the regression testing strong and soft enablers of intending to install solar panels

Independent Variables	Strong enablers	Soft enablers
Living in a house	.129***	.126***
Living in solar zone 1 or 2 (zone 3 reference group)	-.058	-.061
Living in solar zone 4 (zone 3 reference group)	-.014	-.018
Financial comfort	.019	.014
Climate change response efficacy		.042***
Personal importance of limiting greenhouse gas emissions		.083***
Belief that upgrade or renovation can reduce energy bills		.124***
N	1,696	1,686
Adjusted R^2	.013	.087
R^2_{change}		.074

Note. Entries are estimated coefficients; *p < .05, **p < .01, ***p < .001. Significant predictors in the final model are shown in bold.

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