Consumer perceptions of policies targeting consumer energy resources (CERs): Third-party control and managing imports/exports

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Better Consumption Lab, Deakin University

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iMOVE

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Executive summary

Executive summary

Approach

+ 1,406 Victorian homeowners were surveyed to assess:
  - How much control they wanted over different consumer energy resources (CERs).
  - Their perception of policies for managing the import/export of electricity between CERs and the network.

CER control

+ Respondents were asked to select the level of control they wanted for each of three CERs (electric vehicle charging, electric space heating, electric water heating):
  - Full control, where they maintain complete control of their CER.
  - Partial control, where they set preferences for how their CER operates that are then enacted by technology or a third-party.
  - Energy-as-a-service, where they relinquish CER control to a third-party in return for guaranteed access to specific CER benefits.
+ Respondents were then presented with information about the personal implications – in the form of increased energy bills – associated with upgrading the network to support greater levels of CER control before once again selecting their preferred level of control over each CER.
+ Comparing these pre- and post-information preferences showed that:
  - Respondents had a general baseline preference for maintaining full control of their CERs.
  - Respondents' desire for full CER control significantly decreased once they became aware that relinquishing some control would help to minimise future energy bill increases. Thus, respondents were prepared to trade-off control for energy bill savings.

Managing CER imports/exports

+ Respondents were also presented with one of the following policies:
  - Mandated mechanism involving import- and export-focused dynamic operating envelopes, which would vary the allowable size of CER imports/exports as a function of network supply/demand.
  - Market-based mechanism involving two-way pricing, with tariffs for imports/exports varying as a function of network supply/demand.
+ Comparing how respondents evaluated each policy indicated that:
  - The market-based mechanism elicited more favourable opinions – and was seen as fairer – relative to the mandated mechanism.
  - Notwithstanding this *relative* difference, *absolute* evaluations of the market-based mechanism were not strongly positive, suggesting begrudging acceptance rather than enthusiastic support.
  - While neither mechanism significantly affected intentions to adopt EVs or electric water heating, both decreased intention to adopt electric space heating.

Background and approach

Background

Consumer energy resources (CER)

+ Consumer energy resources (CERs) are consumer-owned technologies that allow households to generate energy (e.g., rooftop photovoltaics), store energy (e.g., electric vehicles, household batteries), and/or shift how they use energy (e.g., smart electric hot water systems).
+ Encouraging the rapid adoption of CERs will be essential for Australia's efforts to decarbonise its energy system. However, CERs pose unique technical challenges in that they operate on an electricity network that was designed for centralised/one-way flows of electricity, not the decentralised/two-way flows of electricity permitted by CERs.
+ Understanding how consumers perceive potential solutions to these technical challenges is key to ensuring their ongoing support for – and adoption of – CERs. To this end, how do consumers perceive:
  - Options that give consumers reduced control over their CER?
  - Different approaches to managing CER imports/exports?

Consumer control of CER

+ While many consumers express a general desire to maintain control over their CERs (Newton et al., 2023), how this desired level of control manifests is unclear. For example, do consumers want:
  - Full control, where they maintain complete control of their CER.
  - Partial control, where they set preferences for how their CER operates that are then enacted by technology or a third-party.
  - Energy-as-a-service, where they relinquish CER control to a third-party in return for guaranteed access to specific CER benefits.
+ As levels of consumer control increase, so too will the need for additional network upgrades to facilitate such control. The costs of undertaking these upgrades will, in turn, further increase energy bills. To what extent are consumers prepared to trade-off their desired level of control to minimise such energy bill increases?

Managing CER imports/exports

+ CERs operate by importing and/or exporting electricity from the grid, which, depending on network supply/demand, can place additional strain on the electricity network.
+ Two broad approaches could be used to address this issue:
  - Mandated mechanism, which would involve introducing import- and export-focused dynamic operating envelopes that vary the allowable size of CER imports and exports as a function of network supply and demand.
  - Market-based mechanism, which would involve tariff reform to permit two-way pricing as per the Australian Energy Regulator's network tariff reform. For example, prices for electricity imports and exports would vary as a function of network supply and demand.
+ What remains unclear is how consumers view these approaches.

Approach

Who

+ We collected 1,406 survey responses from individuals who met all the following criteria:
  - Aged 18 years or older.
  - Currently reside in Victoria.
  - Live in a freestanding house or townhouse/duplex.
  - Own their home outright or with a mortgage.
  - Joint or main decision maker in choosing energy products/services for their household.
  - Passed a comprehension check that assessed their understanding of the policy scenario they had been assigned to evaluate.
+ The full sample sociodemographic profile can be found in Appendix 1.

How

+ Respondents were recruited from an online panel provider from May – June 2024.
+ Institutional ethics approval was obtained before recruitment started.

What

+ Mechanisms to manage CER imports/exports could conceivably affect future CER adoption. To gauge this potential influence, respondents were first asked to report – for three product categories (car, space heating, water heating) – their:
  - Current adoption profile. That is, what products (example: hybrid car) they currently use in each category (example: car).
  - Business as usual (BAU) adoption intentions. That is, over the next 5 years, what product they would purchase if they were going to replace/buy a new product in each category.
+ Respondents were then asked to choose their desired level of control for electric vehicle charging, electric space heating, and electric water heating, both before and after being presented with information about the general energy bill implications of desiring greater levels of control.
+ Next, respondents were randomly presented with a policy scenario that described either a market-based mechanism or a mandated mechanism for managing CER imports/exports. After reading the scenario, respondents:
  - Provided their opinions and perceived fairness of the policy.
  - Recorded their post-policy technology adoption intentions. That is, assuming the policy was enacted, what product they would purchase over the next 5 years if they were to replace/buy a new product in each of the three focal product categories.
+ Respondents were then shown both policy scenarios and asked to rank them in order of preference.
+ The survey concluded after respondents completed a series of psychographic and demographic questions.

Approach

Our findings are organised as follows:

- CER control
  - EV charging
  - Electric space heating
  - Electric water heating
- Managing CER imports/exports
  - Policy perceptions (opinion)
  - Policy perceptions (fairness)
  - Policy perceptions (outcomes)
  - Policy impact on adoption
  - Policy preferences

Appendices

- Demographic profile of the study sample
- Psychographic segmentation profiles
- EV adoption
- Electric space heating adoption
- Electric water heating adoption

Consumer energy resources (CER) control

CER control: EV charging (scenarios)

Pre-explanation scenarios

Respondents were asked to imagine that they had an EV and that their home could generate/store some of its own power. They were then asked to select which of the following options they most preferred for home EV recharging:

+ Option 1 [Full control]: *You can recharge your EV to your preferred level of battery charge at any time*
+ Option 2 [Partial control]: *You can choose from a menu of options when you would like your EV to recharge to your preferred level of battery charge (e.g., when your home's solar panels are generating power)*
+ Option 3 [Energy-as-a-service]: *Your power retailer will guarantee that your EV will achieve your preferred level of battery charge across a certain window of time but will manage when recharging occurs within that window*

Explanation

Next, respondents were presented with the following information:

> *Over the next 20 years, more investment will be needed to maintain Australia's power grid. The least-cost option – and the one Australia has selected – is to switch to a grid powered by renewables. This will still increase power bills, however.*
>
> *Further investments to the power grid may also be needed depending on choices made by consumers. For example, if most consumers want full control over how some of their appliances use power, the poles and wires that make up the grid will need additional upgrades. This will further increase power bills for everyone.*

Post-explanation scenarios

Respondents were then shown updated information for each option and asked to select the one they most preferred:

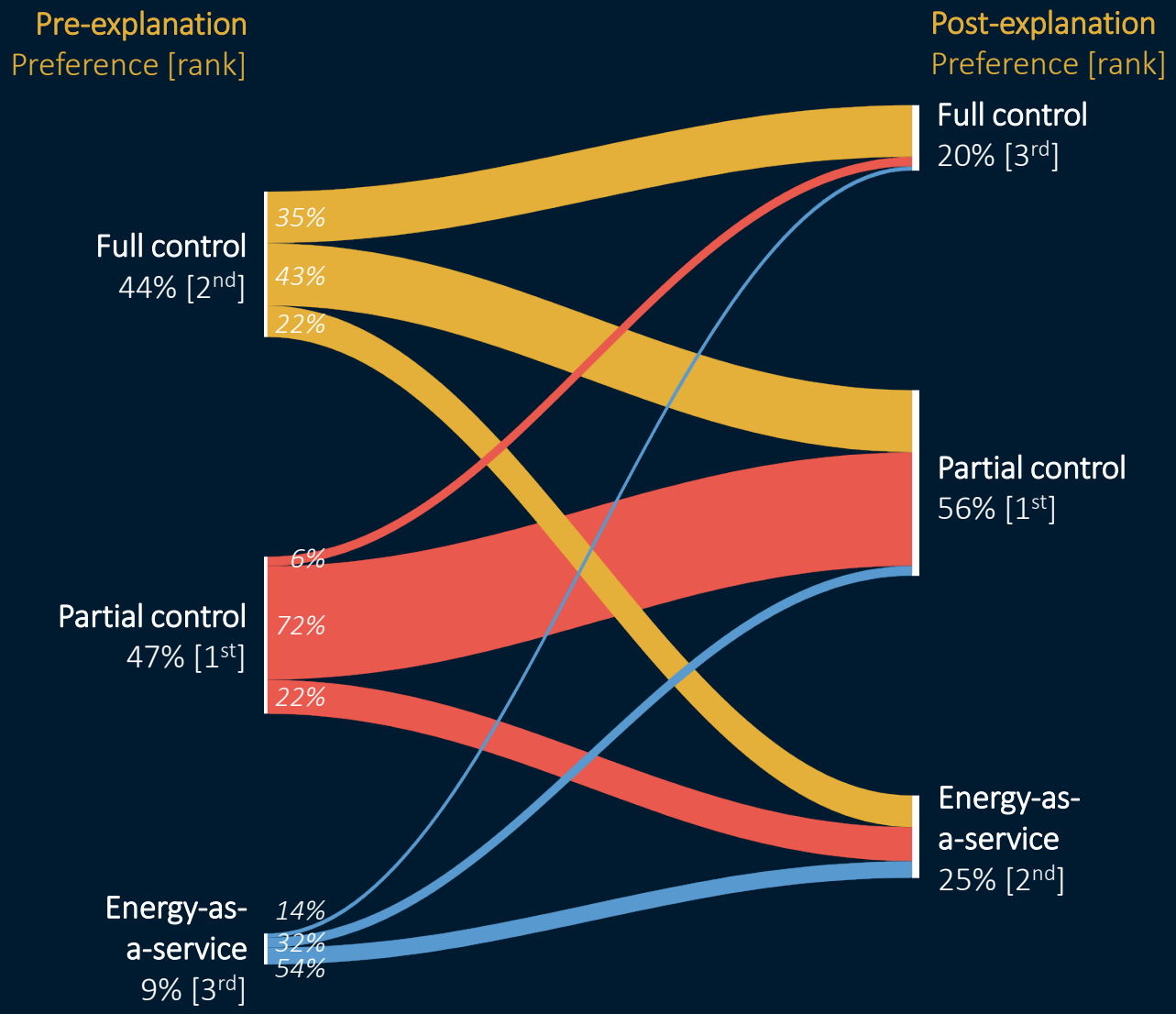
	Impact on power bills from grid upgrades	Description
Option 1 [Full control]	*Biggest increase*	*You can recharge your EV to your preferred level of battery charge at any time*
Option 2 [Partial control]	*Intermediate increase*	*You can choose from a menu of options when you would like your EV to recharge to your preferred level of battery charge (e.g., when your home's solar panels are generating power)*
Option 3 [Energy-as-a-service]	*Smallest increase*	*Your power retailer will guarantee that your EV will achieve your preferred level of battery charge across a certain window of time but will manage when recharging occurs within that window*

Note: content in square brackets was not shown to respondents.

CER control: EV charging (preference flows)

Preference for lower control/lower bill options increased following exposure to information linking greater levels of control with higher energy bills

+ Baseline preferences for CER control were (in order of preference):
  - Partial control (47%).
  - Full control (44%).
  - Energy-as-a-service (9%).
+ After receiving an explanation linking greater levels of CER control with higher energy bills, partial control (47% to 56%) and energy-as-a-service (9% to 25%) increased their preference share, while full control's preference share decreased (44% to 20%). These pre- vs. post-explanation changes were all statistically significant.
+ Almost two-thirds (65%) of respondents who initially preferred having full control over home EV charging were prepared to accept less control once they became aware of the potential bill-related implications.



CER control: Electric space heating (scenarios)

Pre-explanation scenarios

Respondents were asked to imagine that they had an electric heating/ cooling system and that their home could generate/store some of its own power. They were then asked to select which of the following heating/cooling options they most preferred:

+ Option 1 [Full control]: *You can heat/cool your home to your preferred temperature at any time*
+ Option 2 [Partial control]: *You can choose from a menu of options when you would like your home to be heated/cooled to your preferred temperature (e.g., when your home's solar panels are generating power)*
+ Option 3 [Energy-as-a-service]: *Your power retailer will guarantee that your home will be heated/cooled to your preferred temperature but will manage when heating/cooling occurs*

Explanation

Next, respondents were presented with the following information:

> *Over the next 20 years, more investment will be needed to maintain Australia's power grid. The least-cost option – and the one Australia has selected – is to switch to a grid powered by renewables. This will still increase power bills, however.*
>
> *Further investments to the power grid may also be needed depending on choices made by consumers. For example, if most consumers want full control over how some of their appliances use power, the poles and wires that make up the grid will need additional upgrades. This will further increase power bills for everyone.*

Post-explanation scenarios

Respondents were then shown updated information for each option and asked to select the one they most preferred:

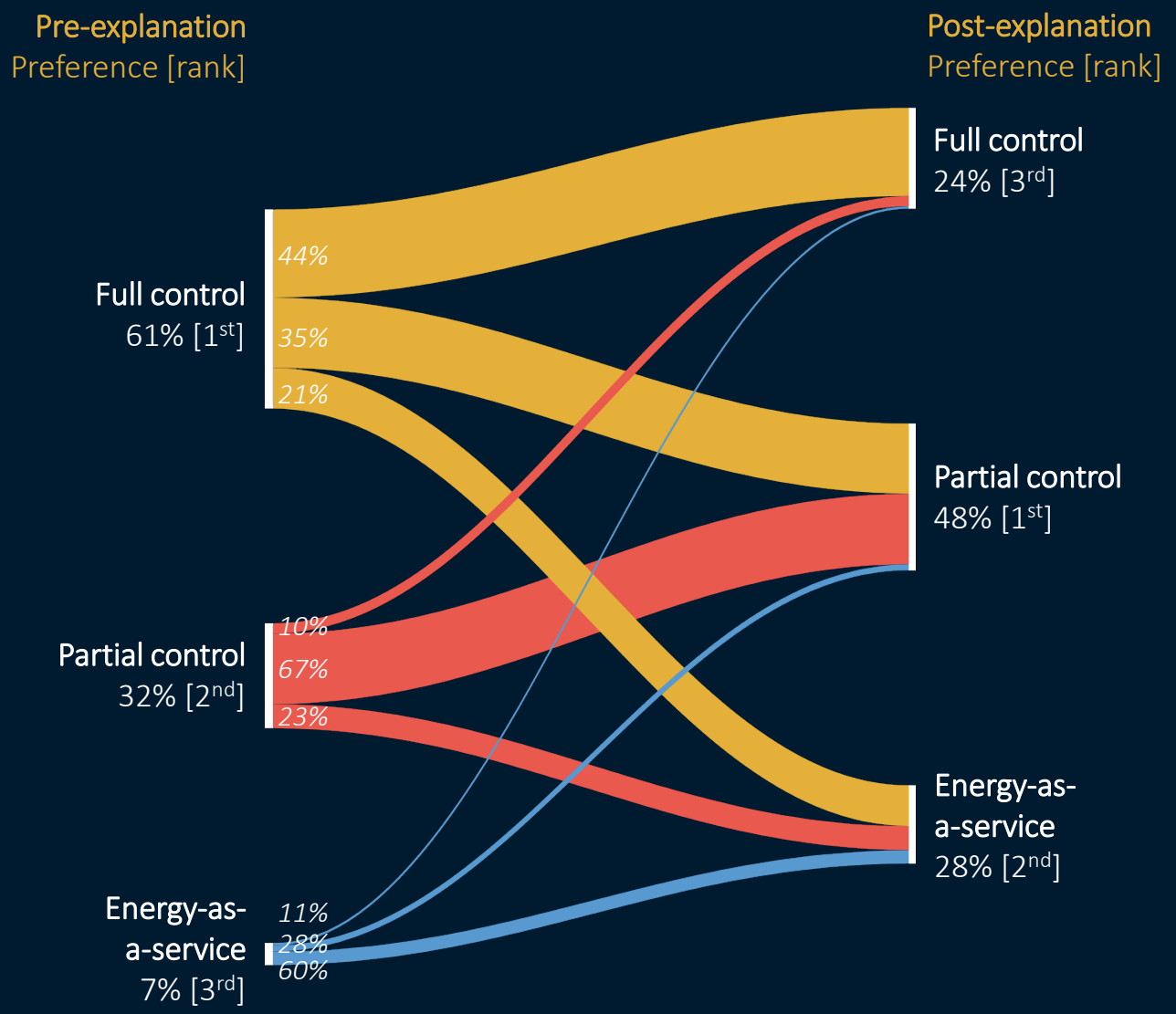
	Impact on power bills from grid upgrades	Description
Option 1 [Full control]	*Biggest increase*	*You can heat/cool your home to your preferred temperature at any time*
Option 2 [Partial control]	*Intermediate increase*	*You can choose from a menu of options when you would like your home to be heated/cooled to your preferred temperature (e.g., when your home's solar panels are generating power).*
Option 3 [Energy-as-a-service]	*Smallest increase*	*Your power retailer will guarantee that your home will be heated/cooled to your preferred temperature but will manage when heating/cooling occurs*

Note: content in square brackets was not shown to respondents.

CER control: Electric space heating (preference flows)

Information about the bill implications of increased CER control shifted respondents towards options with lower control/lower bills

+ Before the explanation, the most popular options (in order of preference) were:
  - Full control (61%).
  - Partial control (32%).
  - Energy-as-a-service (7%).
+ After the explanation, the partial control (32% to 48%) and energy-as-a-service (7% to 28%) options increased their preference shares, while the preference share for full control declined (61% to 24%). These changes were all statistically significant.
+ Slightly more than half (56%) of respondents who initially wanted full control over electric space heating came to prefer lower control/lower bill options once they became aware of the bill-related impacts of maintaining full control.



CER control: Electric water heating (scenarios)

Pre-explanation scenarios

Respondents were asked to imagine that they had an electric hot water system and that their home could generate/store some of its own power. They were then asked to select which of the following water heating options they most preferred:

+ Option 1 [Full control]: *Your system will heat water at any time to maintain your preferred amount of hot water*
+ Option 2 [Partial control]: *You can choose from a menu of options when you would like your system to heat water to maintain your preferred amount of hot water (e.g., when your home's solar panels are generating power)*
+ Option 3 [Energy-as-a-service]: *Your power retailer will guarantee that you will maintain your preferred amount of hot water but will manage when your system heats water*

Explanation

Next, respondents were presented with the following information:

> *Over the next 20 years, more investment will be needed to maintain Australia's power grid. The least-cost option – and the one Australia has selected – is to switch to a grid powered by renewables. This will still increase power bills, however.*
>
> *Further investments to the power grid may also be needed depending on choices made by consumers. For example, if most consumers want full control over how some of their appliances use power, the poles and wires that make up the grid will need additional upgrades. This will further increase power bills for everyone.*

Post-explanation scenarios

Respondents were then shown updated information for each option and asked to select the one they most preferred:

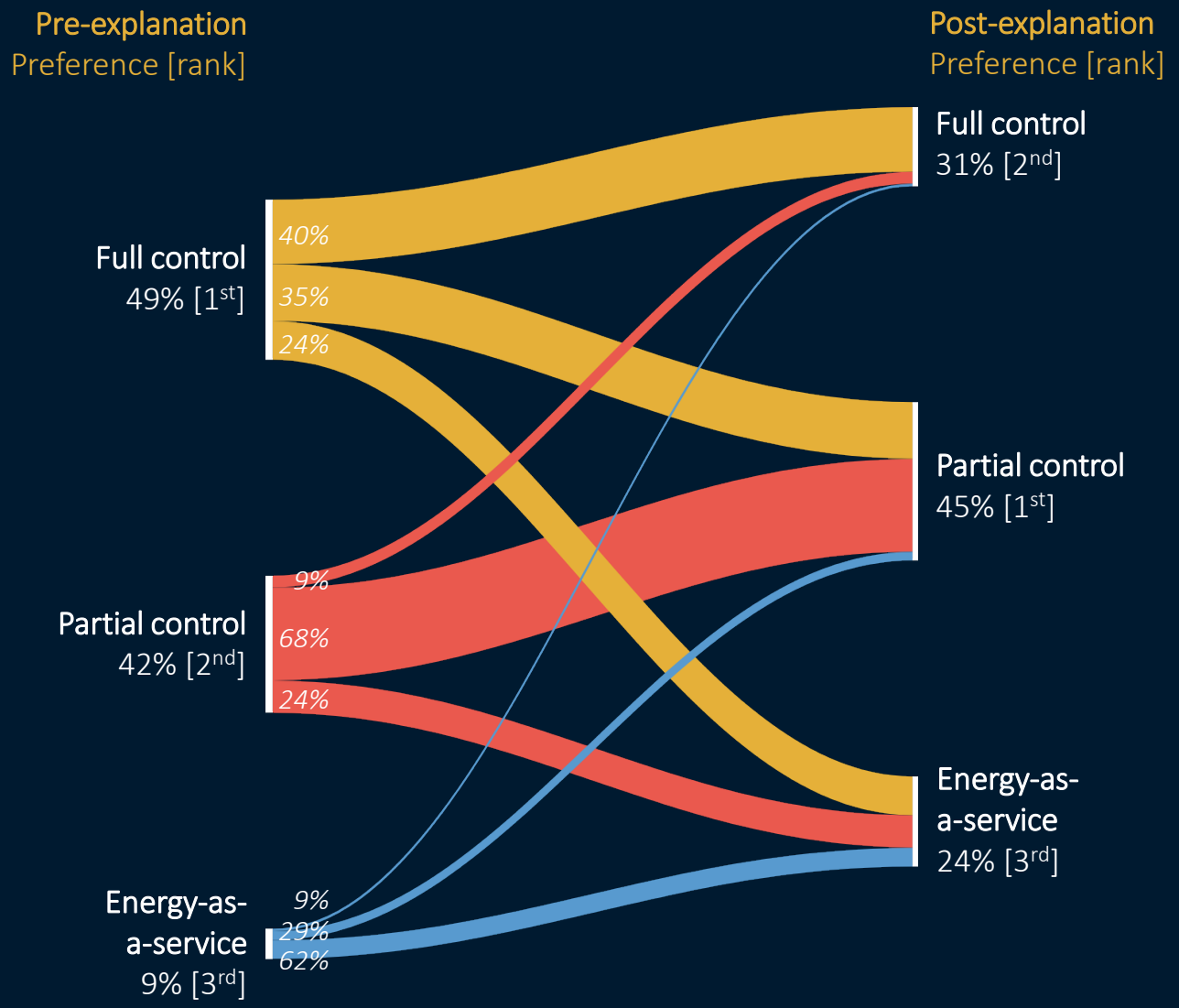
	Impact on power bills from grid upgrades	Description
Option 1 [Full control]	*Biggest increase*	*Your system will heat water at any time to maintain your preferred amount of hot water*
Option 2 [Partial control]	*Intermediate increase*	*You can choose from a menu of options when you would like your system to heat water to maintain your preferred amount of hot water (e.g., when your home's solar panels are generating power)*
Option 3 [Energy-as-a-service]	*Smallest increase*	*Your power retailer will guarantee that you will maintain your preferred amount of hot water but will manage when your system heats water*

Note: content in square brackets was not shown to respondents.

CER control: Electric water heating (preference flows)

Preferences shifted towards lower control/lower bill options once the bill-related impacts of control were made salient

+ Before the explanation, the most popular options (in order of preference) were:
  - Full control (49%).
  - Partial control (42%).
  - Energy-as-a-service (9%).
+ After seeing the explanation, the preference shares for the partial control (42% to 45%) and energy-as-a-service (9% to 24%) options increased, while the full control option decreased its preference share (49% to 31%). These changes were all statistically significant.
+ Almost three in five (59%) respondents who initially wanted to maintain full control over electric water heating indicated a preference for an option with lower control/lower bills once they became aware of the trade-off between CER control and energy bill magnitude.



CER control: Cross-technology comparisons (pre-explanation)

Before the explanation, preference for full control was most pronounced for electric space heating

+ Across the three technologies, the strongest preference for full control was observed for electric space heating (61%).
+ Of the three levels of control, full control was also the most popular pre-explanation preference for both electric space heating and electric water heating (49%).

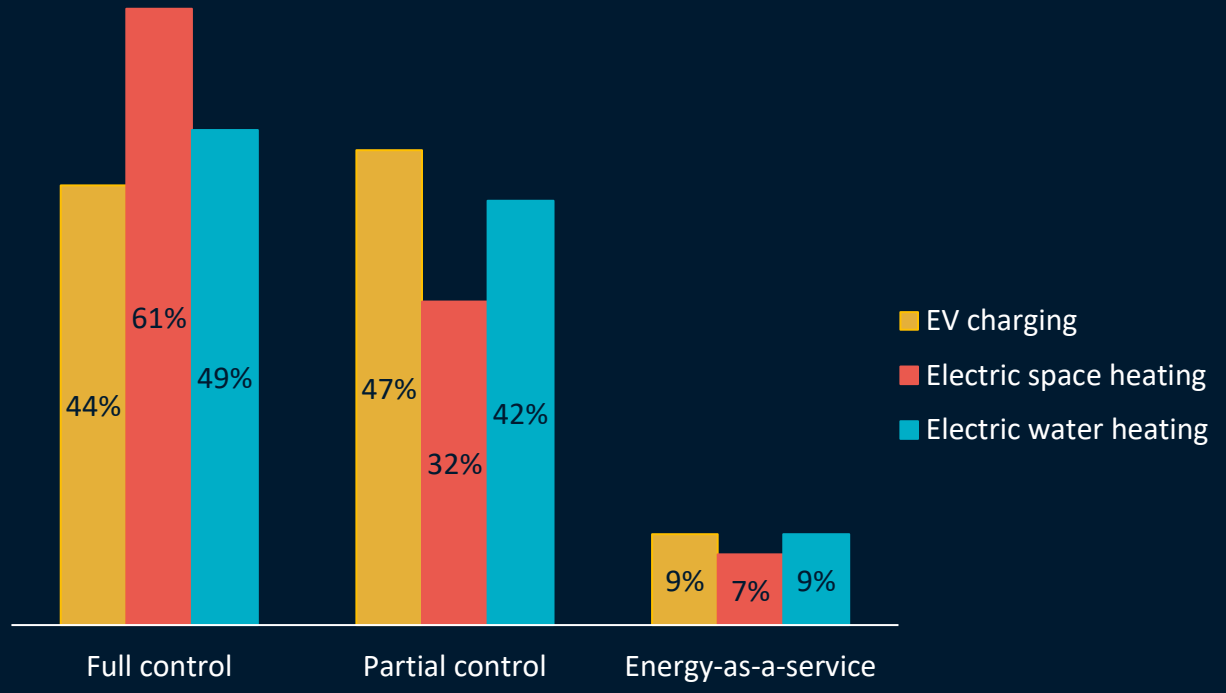
The technology with the lowest preference for partial control was electric space heating

+ Of the three technologies, the one with the lowest preference for partial control was electric space heating (32%).

Energy-as-a-service had the lowest pre-explanation preference shares across all technologies

+ Before receiving the explanation, energy-as-a-service was the least popular option across all three technologies.

Pre-explanation preferences for each option



CER control: Cross-technology comparisons (post-explanation)

The technology that maintained the greatest post-explanation preference for full control was electric water heating

+ After the explanation, full control was the least popular option for EV charging (20%) and electric space heating (24%).
+ Across the three technologies, the one with the largest preference for full control was electric water heating (31%).

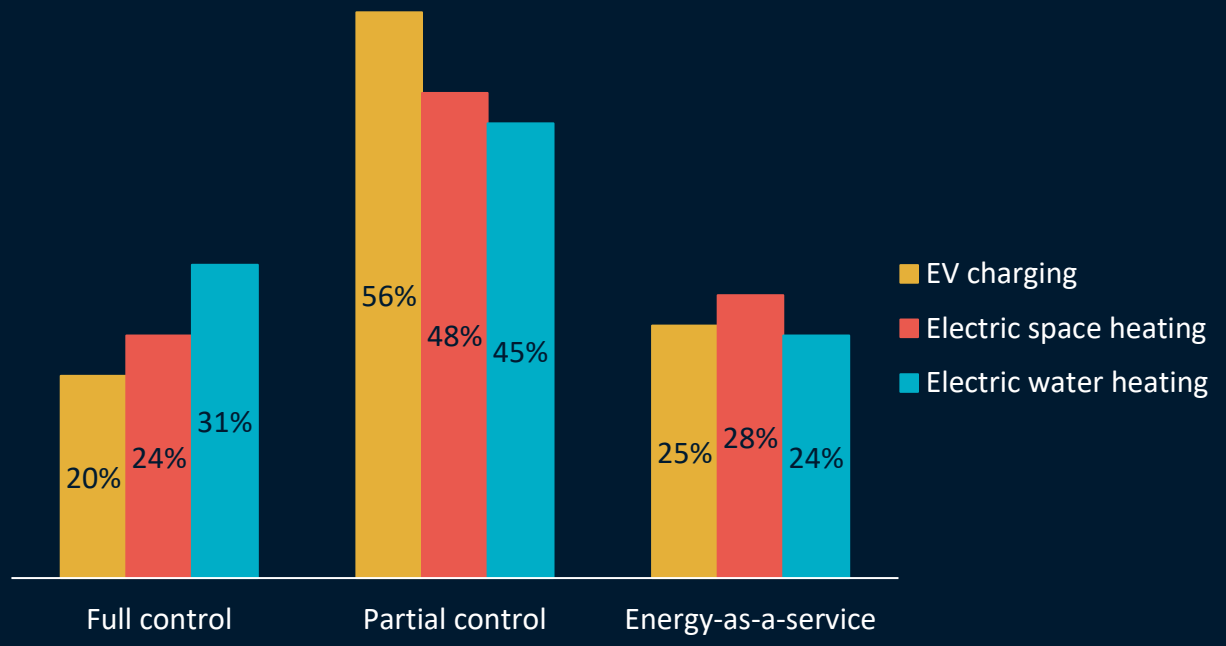
After receiving the explanation, partial control was the most popular preference across all three technologies

+ Partial control was the preferred option for nearly half of respondents across each of the three technologies.

Energy-as-a-service saw the greatest post-explanation increases in preference, albeit from a low base

+ The greatest increases in preference share following the explanation were observed for energy-as-a-service.
+ Energy-as-a-service became the second most preferred option for two technologies: EV charging (25%) and electric space heating (28%).

Post-explanation preferences for each option



CER control

Key takeaways

+ With one exception (EVs), the most popular baseline option for managing consumer energy resources (CERs) among respondents was to maintain full control over how those CERs could be used.
+ Once respondents were made aware of the potential energy bill-related impacts of maintaining full control over their CER, preferences across all technologies significantly shifted towards reduced CER control. Put differently, the mere prospect of future energy bill increases – and the potential to minimise these increases by forgoing full control over their CER – was sufficient for respondents to shift their CER control preferences.
+ After becoming aware of this CER control vs. energy bill trade-off, the most popular preference among respondents was for partial control. Analogously, this level of control would approximate what is presented to consumers in the superannuation sector; while they would be able to select a CER utilisation profile that aligned with their needs and risk appetite, they would not control the day-to-day actioning of those profile choices.
+ While baseline preferences for energy-as-a-service offerings were low, these preferences increased significantly once respondents became aware of the CER control vs. energy bill trade-off. Even so, energy-as-a-service offerings remained less preferred than partial CER control.
+ In sum, three main learnings emerged from these findings:
  – Consumers have a baseline preference for maintaining full control over their CER.
  – Consumers will trade-off some CER control if this will reduce future energy bill increases.
  – Highlighting the personal energy bill-related implications of maintaining full CER control will be essential to bolstering support for initiatives that reduce (without eliminating) CER control.

Managing consumer energy resources (CER) imports/exports

Managing CER imports/exports: Policy scenarios

Respondents were randomly allocated to see only one of the following:

[Scenario: Mandated mechanism]

Usage caps based on demand

Imagine that over the coming decades, most households will be able to generate, store, and export some of their own power. However, the amount of power a household could use from – or export to – the grid would be capped, with the size of these caps changing over the course of the day.

For example, when demand for power was high, households would:

+ Export more power to the grid.
+ Be capped in how much power they could use from the grid.

Conversely, when demand for power was low, households would:

+ Use more power from the grid.
+ Be capped in how much power they could export to the grid.

[Scenario: Market-based mechanism]

Variable power prices

Imagine that over the coming decades, most households will be able to generate, store, and export some of their own power. However, the amount of money that households would pay for power from the grid would change over the course of the day.

For example, when demand for power was high, households would:

+ Pay more to use power from the grid.
+ Earn more for exporting power to the grid.

Conversely, when demand for power was low, households would:

+ Pay less to use power from the grid.
+ Earn less for exporting power to the grid.

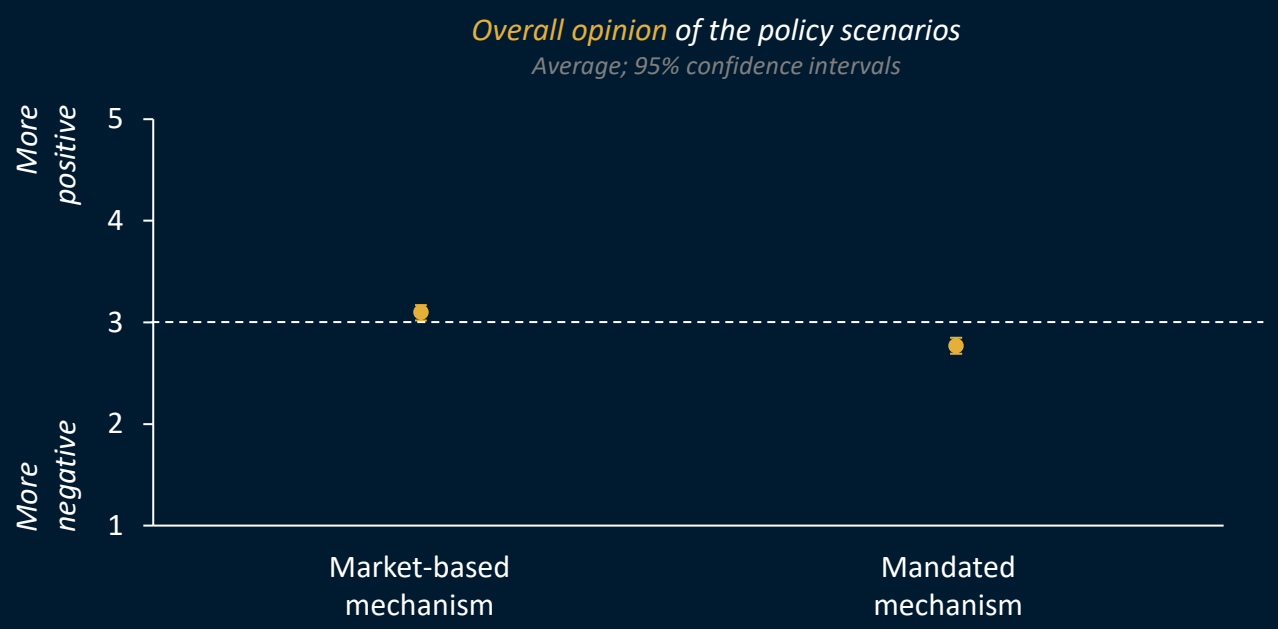
After reading the scenario, respondents completed a set of questions designed to evaluate their perceptions of the scenario to which they had been assigned.

Note: content in square brackets was not shown to respondents.

Managing CER imports/exports: Policy perceptions (opinion)

The market-based mechanism was perceived more favourably than the mandated mechanism

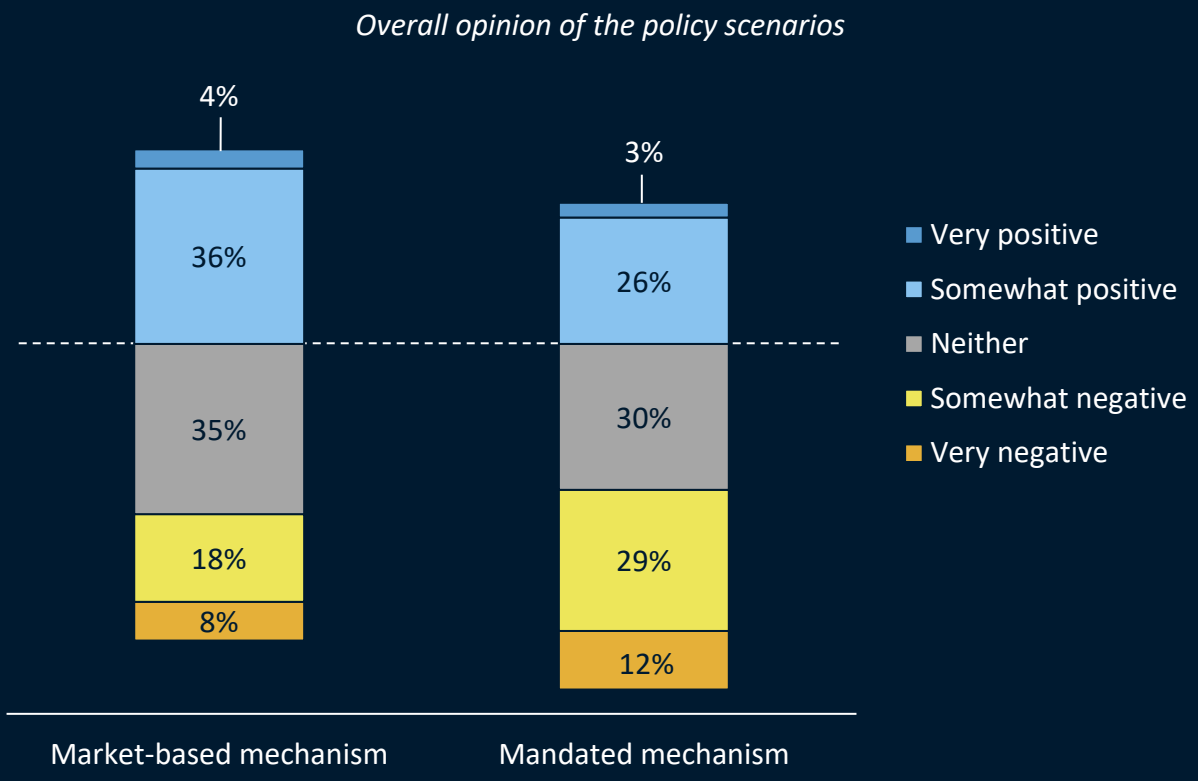
+ Overall opinion of the market-based mechanism was significantly more favourable than that of the mandated mechanism.
+ While the market-based mechanism was perceived in a (weakly) positive manner, perceptions of the mandated mechanism were (weakly) negative.
+ More detailed analyses of how respondents perceived the two mechanisms are reported on the pages that follow.



Managing CER imports/exports: Policy perceptions (opinion)

The market-based mechanism was evaluated less negatively

+ The mandated mechanism elicited significantly more negative opinions than the market-based mechanism:
  - 26% of respondents viewed the market-based mechanism negatively.
  - 41% of respondents viewed the mandated mechanism negatively.
+ The market-based mechanism had a net-positive perception, with more respondents holding a positive opinion (40%) towards it than a negative opinion (26%).



Managing CER imports/exports: Policy perceptions (opinion)

Psychographic segmentation: Adopter category

Only one adopter category viewed the market-based mechanism negatively

+ Respondents in the innovator, early adopter, and early majority adopter categories reported positive opinions about the market-based mechanism.
+ Only laggards viewed the market-based mechanism negatively.

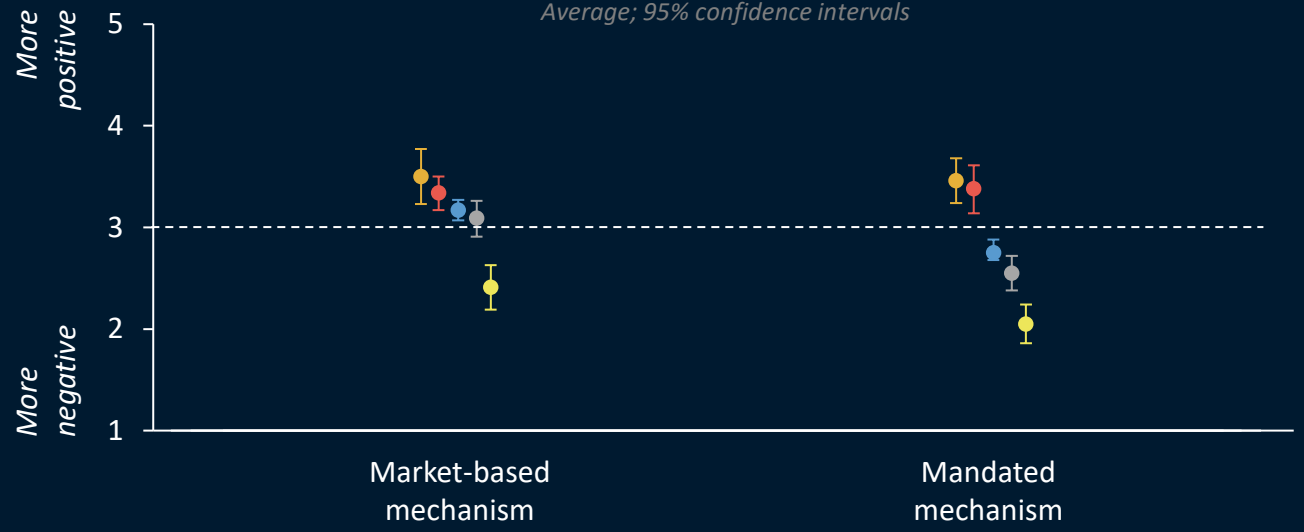
The mandated mechanism caused the greatest variability in opinion across the adopter categories

+ Innovators and early adopters reported significantly more favourable opinions of the mandated mechanism than all other adopter categories, with both adopter categories evaluating it positively.
+ The early majority and late majority evaluated the mandated mechanism significantly less favourably than the market-based mechanism.
+ On average, respondents in the early majority, late majority, and laggard adopter categories perceived the mandated mechanism negatively.

Note: Definitions for each adopter category – along with the size of each category – can be found in Appendix 2.

Overall opinion of innovators, early adopters, early majority, late majority, and laggards towards the policy scenarios

Average; 95% confidence intervals



Managing CER imports/exports: Policy perceptions (opinion)

Psychographic segmentation: Environmental worry

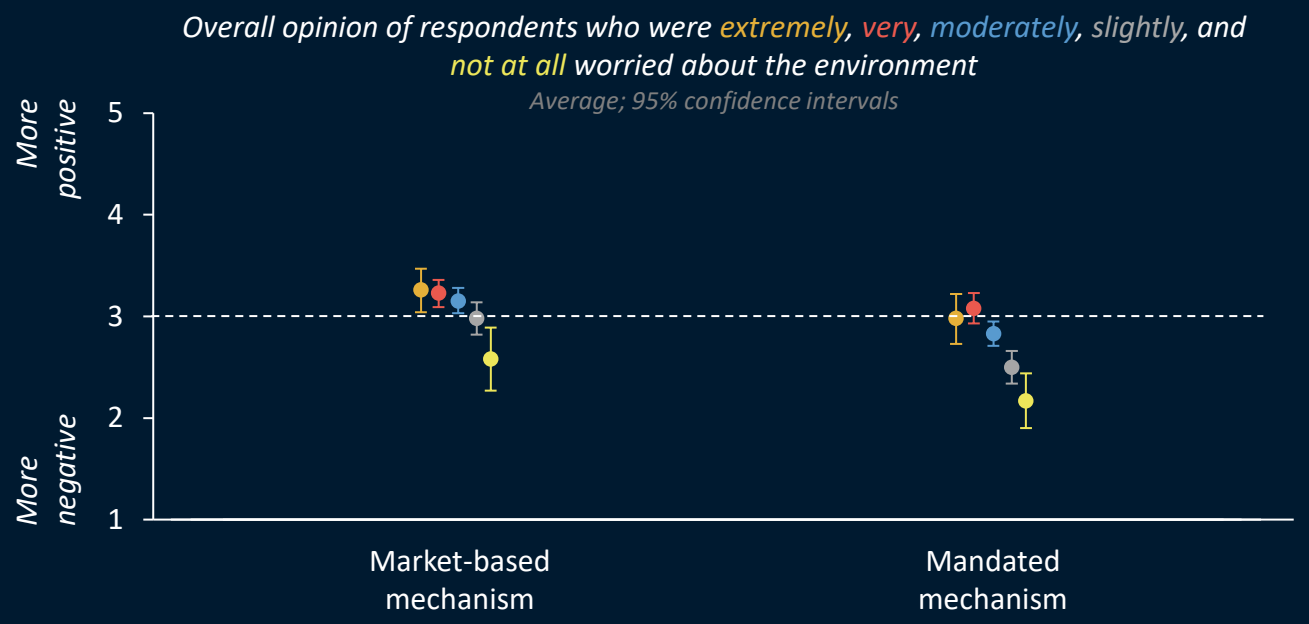
The market-based mechanism was more favourably evaluated among those with greater environmental worry

+ Respondents who reported being extremely, very, or moderately worried about the environment reported, on average, positive opinions about the market-based mechanism.
+ Respondents who were not at all worried about the environment evaluated the market-based mechanism negatively.

The mandated mechanism was perceived negatively by those with moderate to low levels of environmental worry

+ Respondents who reported being moderately, slightly, or not at all worried about the environment held negative opinions about the mandated mechanism.
+ Those who reported being extremely or very worried about the environment viewed the mandated mechanism more favourably than those who were slightly or not at all worried about the environment.

Note: The size of the groups holding each level of environmental worry can be found in Appendix 2.



Managing CER imports/exports: Policy perceptions (opinion)

Demographic segmentation

Political orientation and financial vulnerability predicted opinion toward the market-based mechanism

+ Relative to those who felt financially stressed, those who felt financially stretched had a less positive opinion of the market-based mechanism.
+ Politically progressive respondents had a more positive opinion of the market-based mechanism relative to political centrists.

Younger, politically progressive respondents were more likely to have a favourable opinion of the mandated mechanism

+ Respondents aged 18-39 years had a more positive opinion of the mandated mechanism relative to those aged 40-59 years.
+ Once again, respondents with a progressive political orientation held more positive opinions about the mandated mechanism.

Demographic predictors of having a positive opinion toward each policy scenario

	Market-based mechanism	Mandated mechanism
Male [Ref: Female]	-	-
Age (18-39) [Ref: Age (40-59)]	-	Small ↑
Age (60+) [Ref: Age (40-59)]	-	-
Regional [Ref: Metro]	-	-
Postgraduate [Ref: High school]	-	-
Undergraduate [Ref: High school]	-	-
TAFE/Diploma [Ref: High school]	-	-
Financially comfortable [Ref: Financially stressed]	-	-
Financially stretched [Ref: Financially stressed]	Small ↓	-
CALD [Ref: Non-CALD]	-	-
Politically conservative [Ref: Centrist]	-	-
Politically progressive [Ref: Centrist]	Small ↑	Small ↑

Small ↑ and Small ↓ denote a small but significant positive and negative, respectively, influence (standardised β = 0.10-0.29) relative to the reference (ref) group

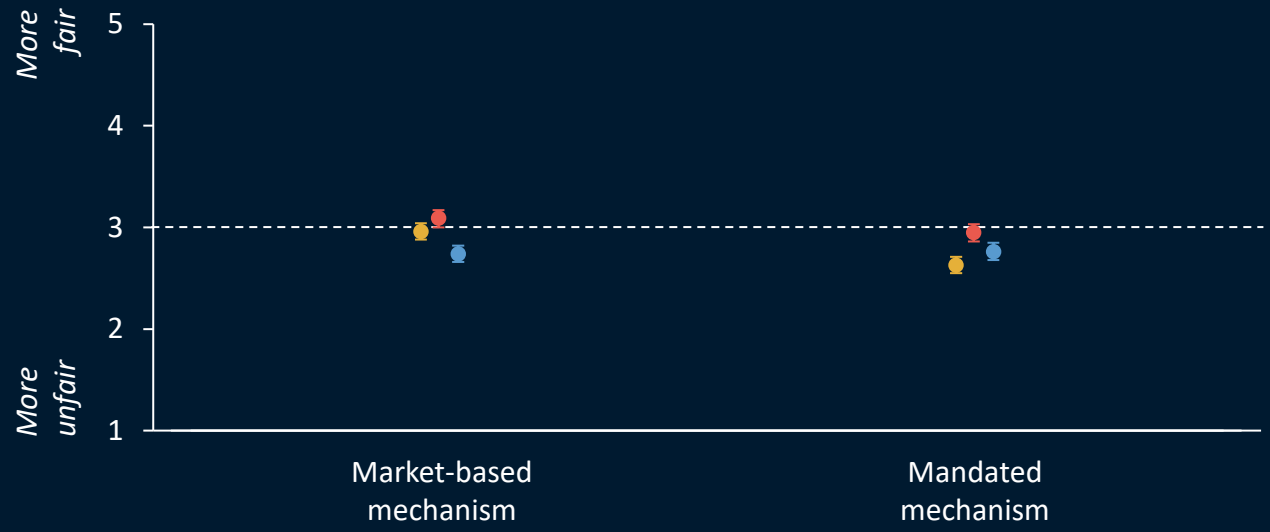
Managing CER imports/exports: Policy perceptions (fairness)

The mandated mechanism was seen as less fair overall than the market-based mechanism

+ Three dimensions of fairness were examined: overall fairness, perceived equality, and perceived equity.
+ Of the three dimensions, only one was found to significantly differ on average across the two mechanism: overall fairness. More specifically, the market-based mechanism was perceived as being fairer overall than the mandated mechanism.
+ More fine-grained differences in how respondents evaluated the fairness of each mechanism are reported on the pages that follow.

Overall fairness, perceived equality, and perceived equity of the policy scenarios

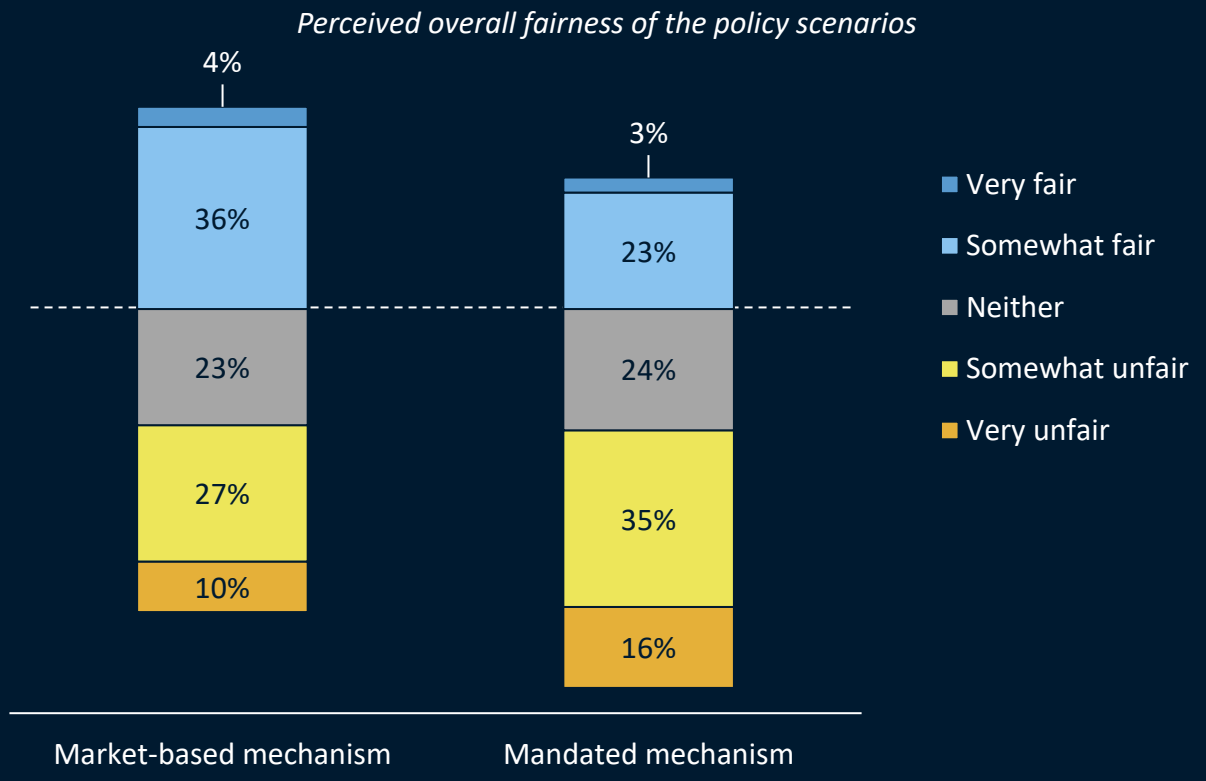
Average; 95% confidence intervals



Managing CER imports/exports: Policy perceptions (fairness)

The market-based mechanism was seen as being fairer overall

+ The proportion of respondents who perceived the mechanism as being somewhat/very fair was significantly higher for the market-based mechanism (40%) than for the mandated mechanism (26%).
+ Net perceptions of fairness varied across the two mechanisms:
  - The proportion of respondents who saw the market-based mechanism as fair (40%) was similar to those who saw it as unfair (37%).
  - More respondents saw the mandated mechanism as unfair (51%) than fair (26%).



Managing CER imports/exports: Policy perceptions (fairness)

Perceived equality

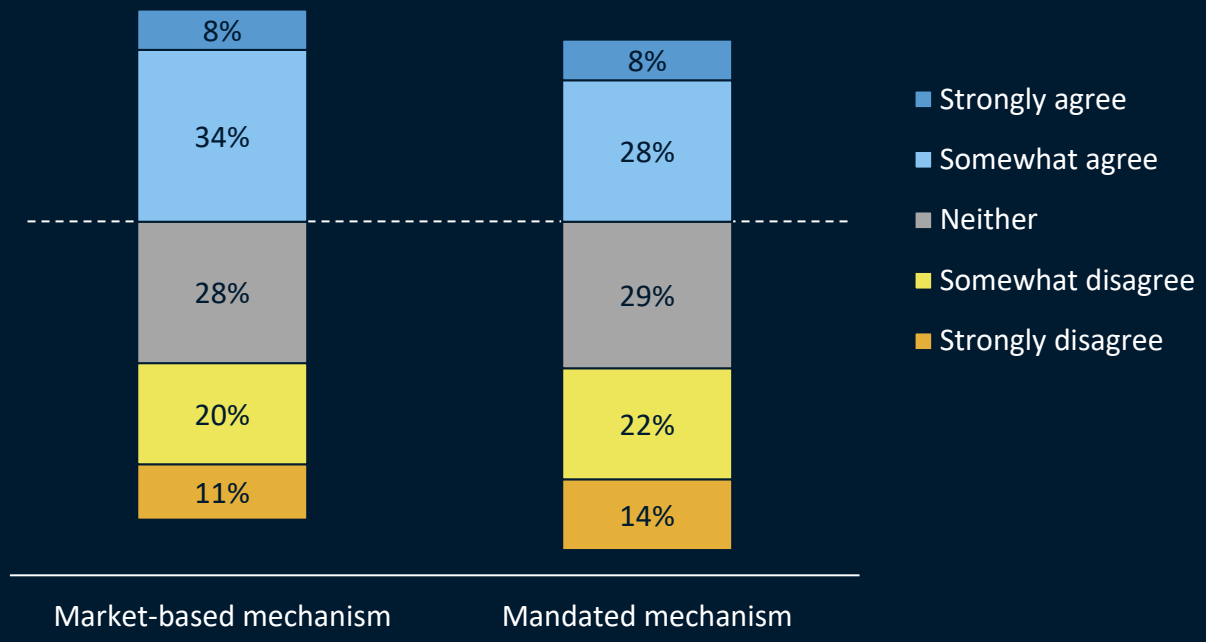
+ Before completing this question, respondents were presented with the following definition:

  Equality is about treating everyone equally, no matter their background.

Slightly more respondents believed that the market-based mechanism had equality

+ Net perceptions of equality differed slightly between the two scenarios:
  – More respondents agreed (42%) than disagreed (31%) that the market-based mechanism would generate equality.
  – For the mandated mechanism, the proportion of respondents who believed that it would generate equality (36%) was the same as the proportion who believed it would not (36%).

Perceived equality of the policy scenarios



Managing CER imports/exports: Policy perceptions (fairness)

Perceived equity

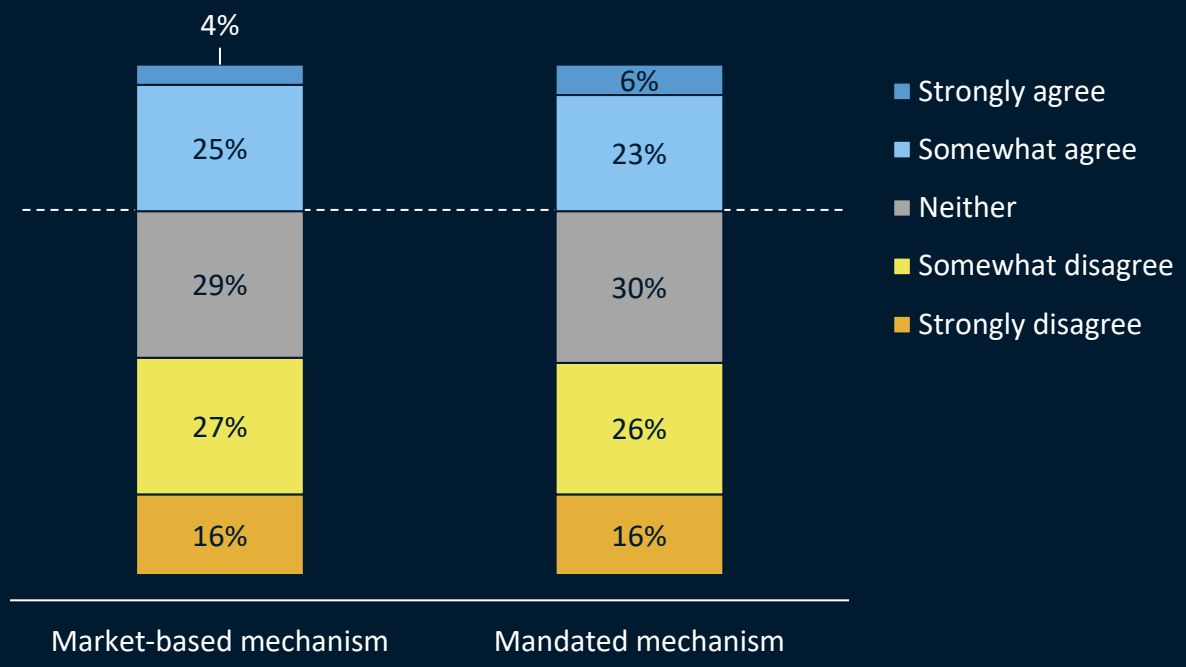
+ Before completing this question, respondents were presented with the following definition:

  Equity is about taking people's backgrounds into account, such as how much money they earn and where they live.

Both policy mechanisms had similar levels of (low) perceived equity

+ Net perceptions of equity did not substantially differ between the two mechanisms:
  – More respondents disagreed (43%) than agreed (29%) that the market-based mechanism had equity.
  – For the mandated mechanism, more respondents disagreed (42%) than agreed (29%) that it would be equitable.

Perceived equity of the policy scenarios



Managing CER imports/exports: Policy perceptions (fairness)

Psychographic segmentation: Adopter category

The perceived fairness of the market-based mechanism did not differ across most adopter categories

+ Respondents in the innovator, early adopter, early majority, and late majority adopter categories reported statistically indistinguishable fairness perceptions for the market-based mechanism perceptions.
+ Those in the laggard adopter category reported significantly lower fairness perceptions than the other adopter categories.

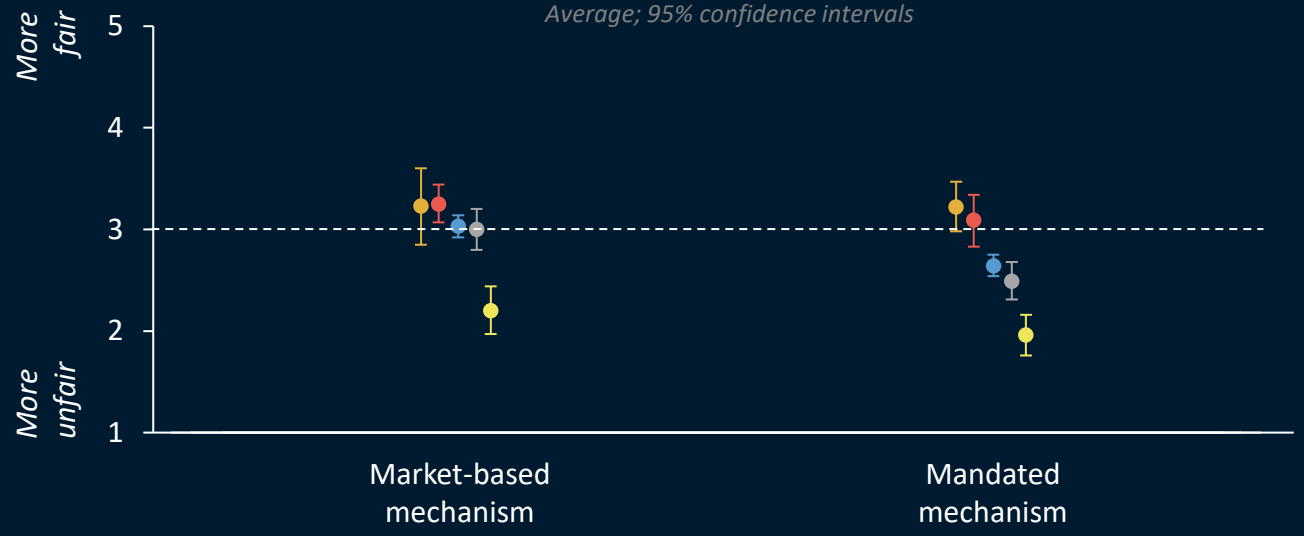
Perceptions of fairness for the mandated mechanism varied substantially across the adopter categories

+ Innovators and early adopters perceived the mandated mechanism as being significantly fairer than those in the other adopter categories.
+ The mandated mechanism was perceived as unfair by respondents in the early majority, late majority, and laggard adopter categories.

Note: Definitions for each adopter category – along with the size of each category – can be found in Appendix 2.

Overall fairness of the policy scenarios, as perceived by innovators, early adopters, early majority, late majority, and laggards

Average; 95% confidence intervals



Managing CER imports/exports: Policy perceptions (fairness)

Psychographic segmentation: Environmental worry

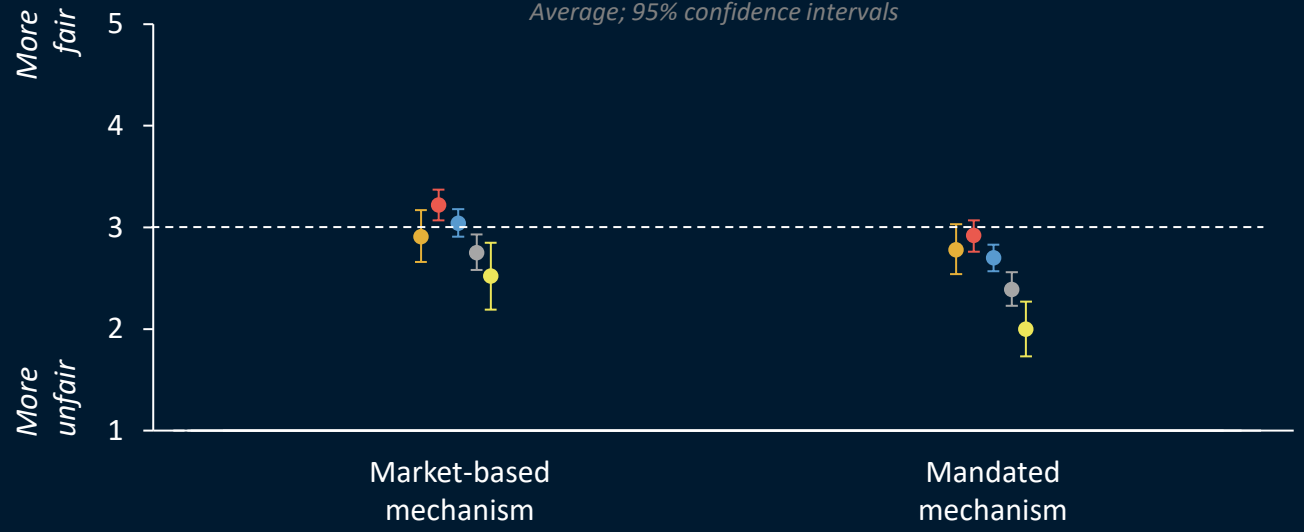
Both policy mechanisms were perceived as unfair overall by those with lower levels of environmental worry

- Respondents who reported being very worried about the environment perceived the market-based mechanism as fair.
- The market-based mechanism was perceived as being unfair by respondents who reported being slightly or not at all worried about the environment.
- Those who reported being moderately, slightly, or not at all worried about the environment also saw the mandated mechanism as being unfair.

Note: The size of the groups holding each level of environmental worry can be found in Appendix 2.

Overall fairness of the policy scenarios, as perceived by respondents who were extremely, very, moderately, slightly, and not at all worried about the environment

Average; 95% confidence intervals



Managing CER imports/exports: Policy perceptions (fairness)

Demographic segmentation

Few demographic differences were found for the perceived fairness of the market-based mechanism

+ The only demographic grouping that predicted perceived fairness of the market-based mechanism was being politically progressive; such respondents saw the market-based mechanism as being fairer than those with a politically centrist orientation.

Perceived fairness of the mandated mechanism varied by age, financial vulnerability, and political orientation

+ Respondents aged 18-39 years were more likely to see the mandated mechanism as fair relative to those aged 40-59 years.
+ Financially comfortable respondents were more likely to see the mandated mechanism as fair relative to those who felt financially stressed.
+ Relative to respondents with a centrist political orientation, both progressives and conservatives were more likely to see the mandated mechanism as fair.

Demographic predictors of perceiving each policy scenario as fair overall

	Market-based mechanism	Mandated mechanism
Male [Ref: Female]	-	-
Age (18-39) [Ref: Age (40-59)]	-	Small ↑
Age (60+) [Ref: Age (40-59)]	-	-
Regional [Ref: Metro]	-	-
Postgraduate [Ref: High school]	-	-
Undergraduate [Ref: High school]	-	-
TAFE/Diploma [Ref: High school]	-	-
Financially comfortable [Ref: Financially stressed]	-	Small ↑
Financially stretched [Ref: Financially stressed]	-	-
CALD [Ref: Non-CALD]	-	-
Politically conservative [Ref: Centrist]	-	Small ↑
Politically progressive [Ref: Centrist]	Small ↑	Small ↑

Small ↑ denotes a small but significant positive influence (standardised β = 0.10-0.29) relative to the reference (ref) group

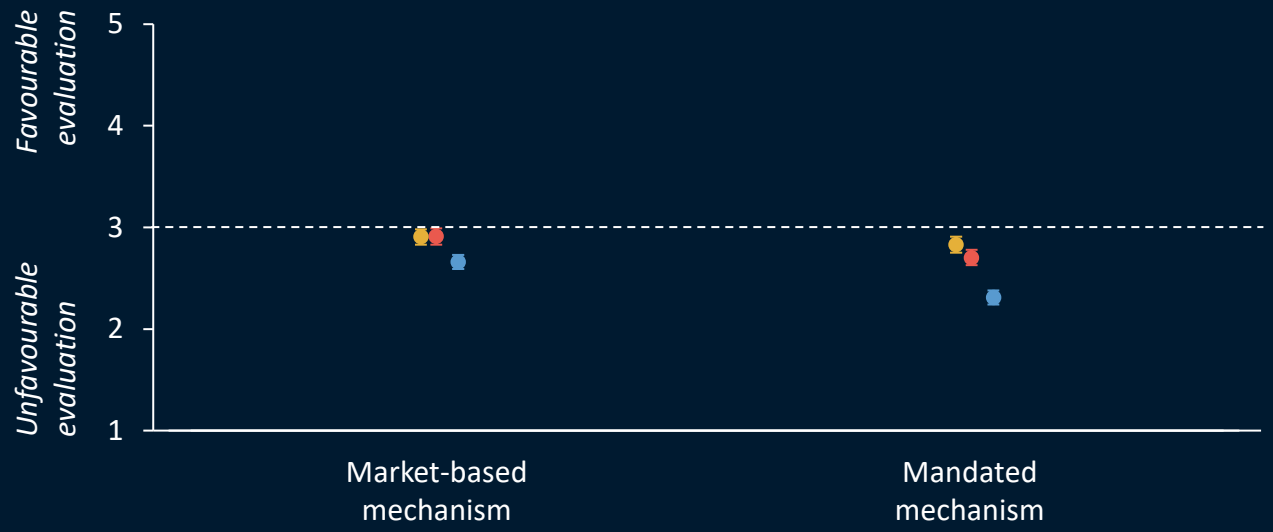
Managing CER imports/exports: Policy perceptions (outcomes)

Both scenarios were seen as having negative societal and household impacts as well as being intrusive

- The perceived societal impact, household impact, and intrusiveness of the two policies were all evaluated unfavourably.
- The market-based mechanism was seen as generating significantly fewer household impacts – and being less intrusive – than the mandated mechanism.
- More detailed analyses for each of these policy-related outcomes are provided on the pages that follow.

Societal impact, household impact, and intrusiveness of the policy scenarios

Average; 95% confidence intervals

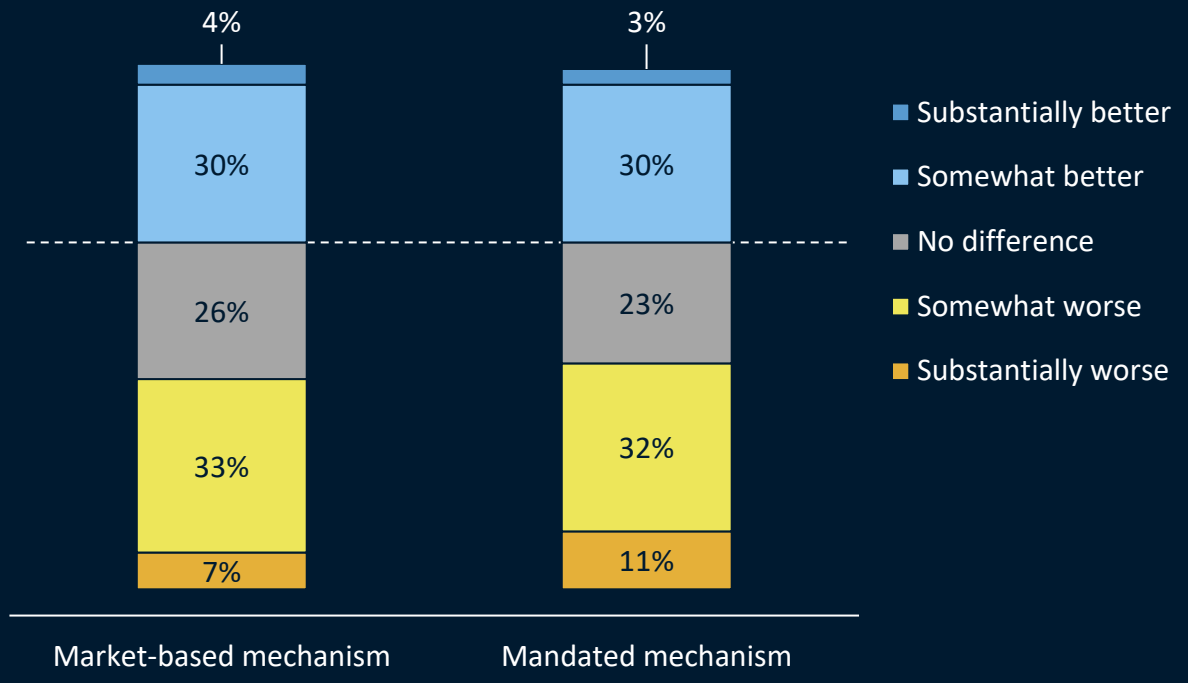


Managing CER imports/exports: Policy perceptions (outcomes)

Both mechanisms were seen to have equivalent societal impacts

+ Perceptions of the societal impact of each mechanism did not significantly differ.
+ Net perceptions of both mechanisms were slightly tilted towards leaving society worse off:
  - For the market-based mechanism, 34% of respondents thought it would leave society better off, while 40% thought it would leave society worse off.
  - For the mandated mechanism, more participants thought it would leave society worse off (43%) than better off (33%).

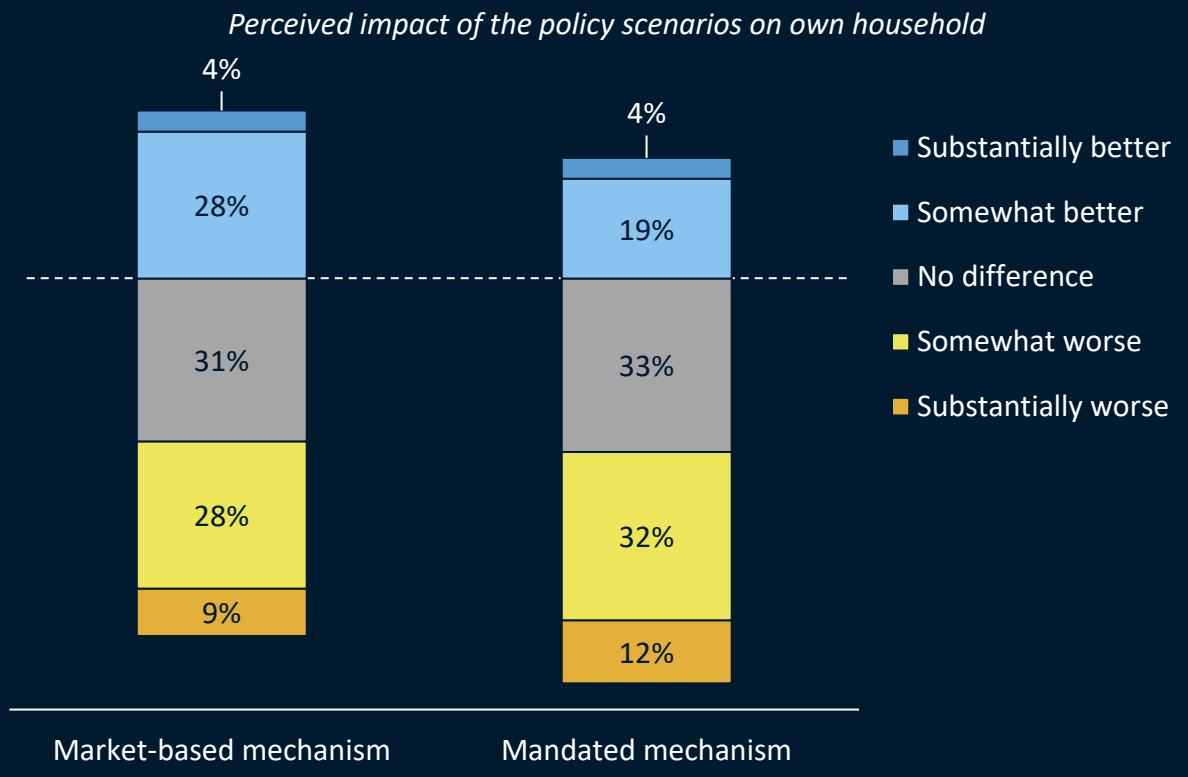
Perceived impact of the policy scenarios on society



Managing CER imports/exports: Policy perceptions (outcomes)

The mandated mechanism was perceived as leaving households worse off

+ Net perceptions varied across the two scenarios:
  - The proportion of respondents who believed the market-based mechanism would leave their household worse off (37%) was similar to the proportion who believed it would leave their household better off (32%).
  - More respondents saw the mandated mechanism as leaving their household worse off (44%) than better off (23%).



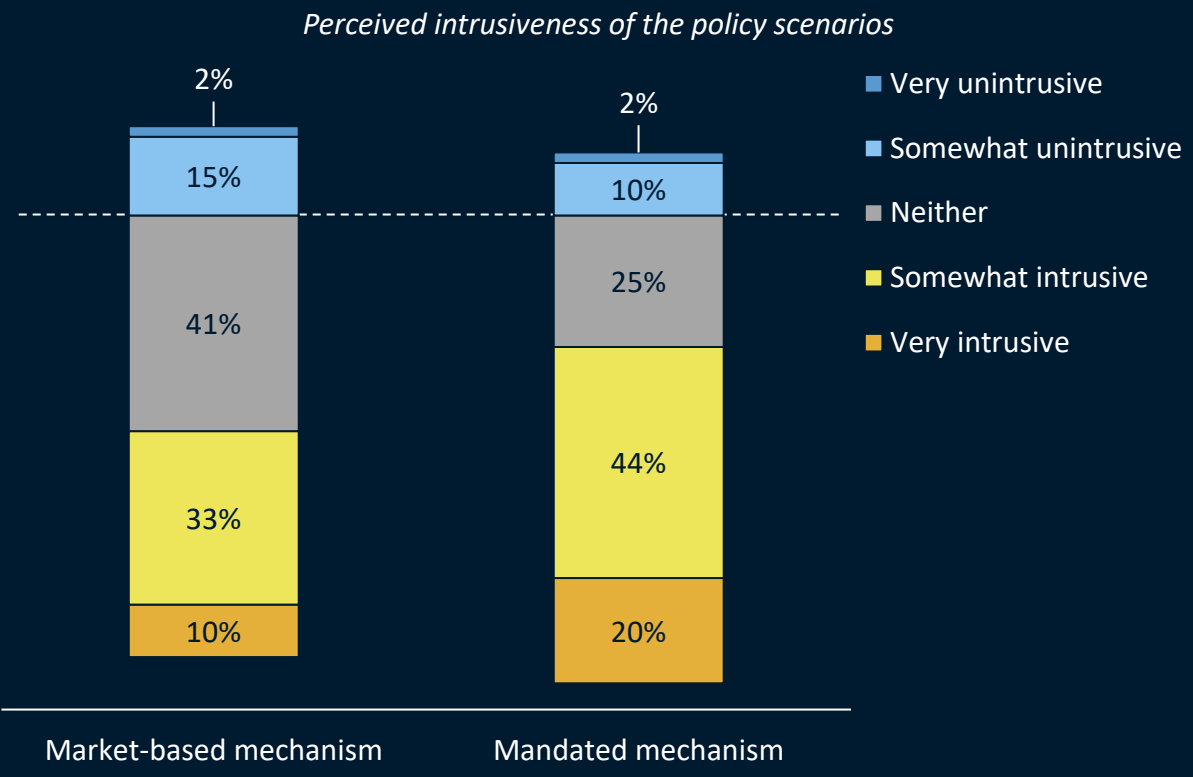
Managing CER imports/exports: Policy perceptions (outcomes)

Both mechanisms were seen as intrusive

+ Both mechanisms had net-negative intrusiveness perceptions:
  - For the market-based mechanism, 17% viewed it as unintrusive vs. 43% who saw it as intrusive.
  - For the mandated mechanism, 12% saw it as unintrusive vs. 64% who perceived it as intrusive.

The mandated mechanism was perceived as more intrusive

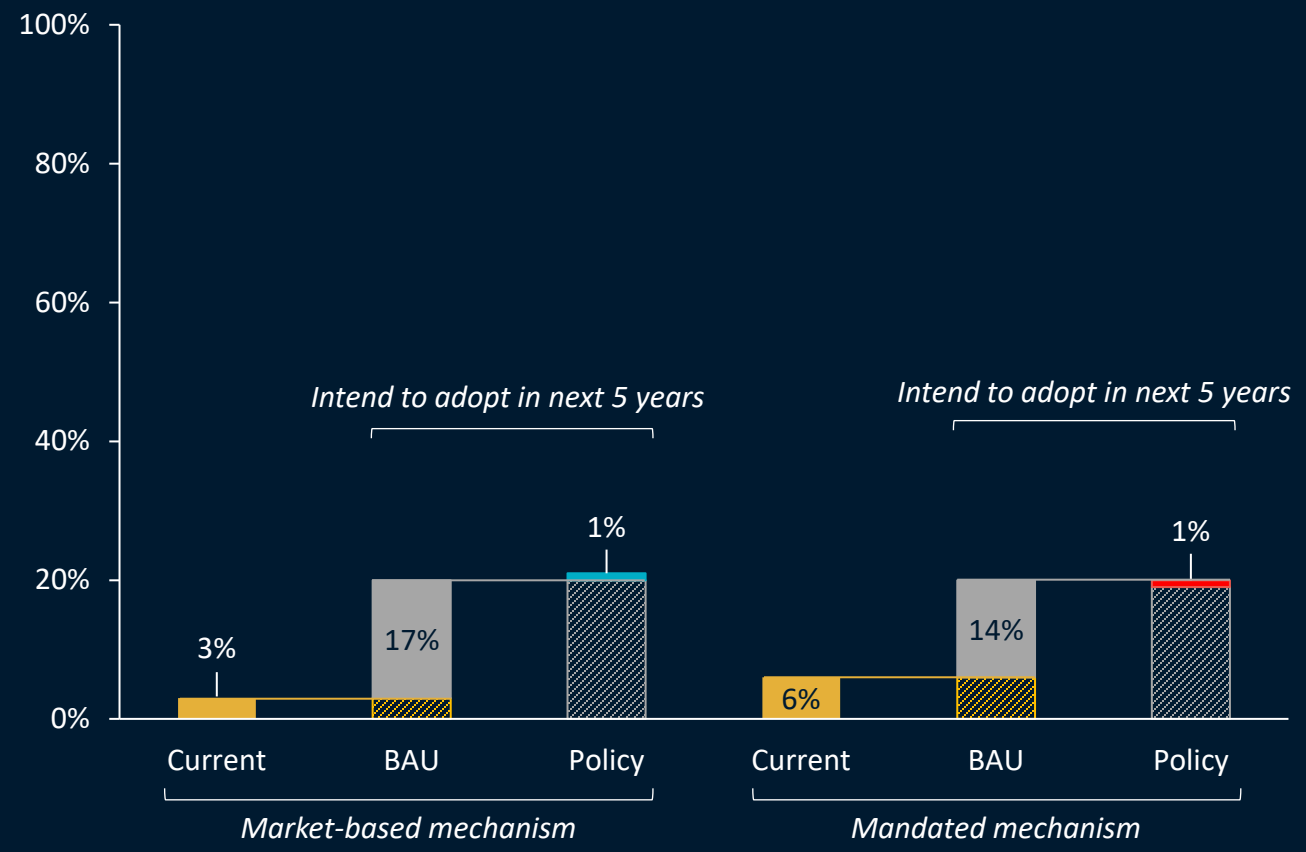
+ The proportion of participants who rated the mandated mechanism as intrusive (64%) was significantly larger than the proportion who viewed the market-based mechanism as intrusive (43%).
+ A significantly greater proportion of respondents were ambivalent about the intrusiveness of the market-based mechanism (41%) relative to the mandated mechanism (25%).



Managing CER imports/exports: Policy impact on adoption (EV)

Neither mechanism would substantially influence BAU adoption intentions

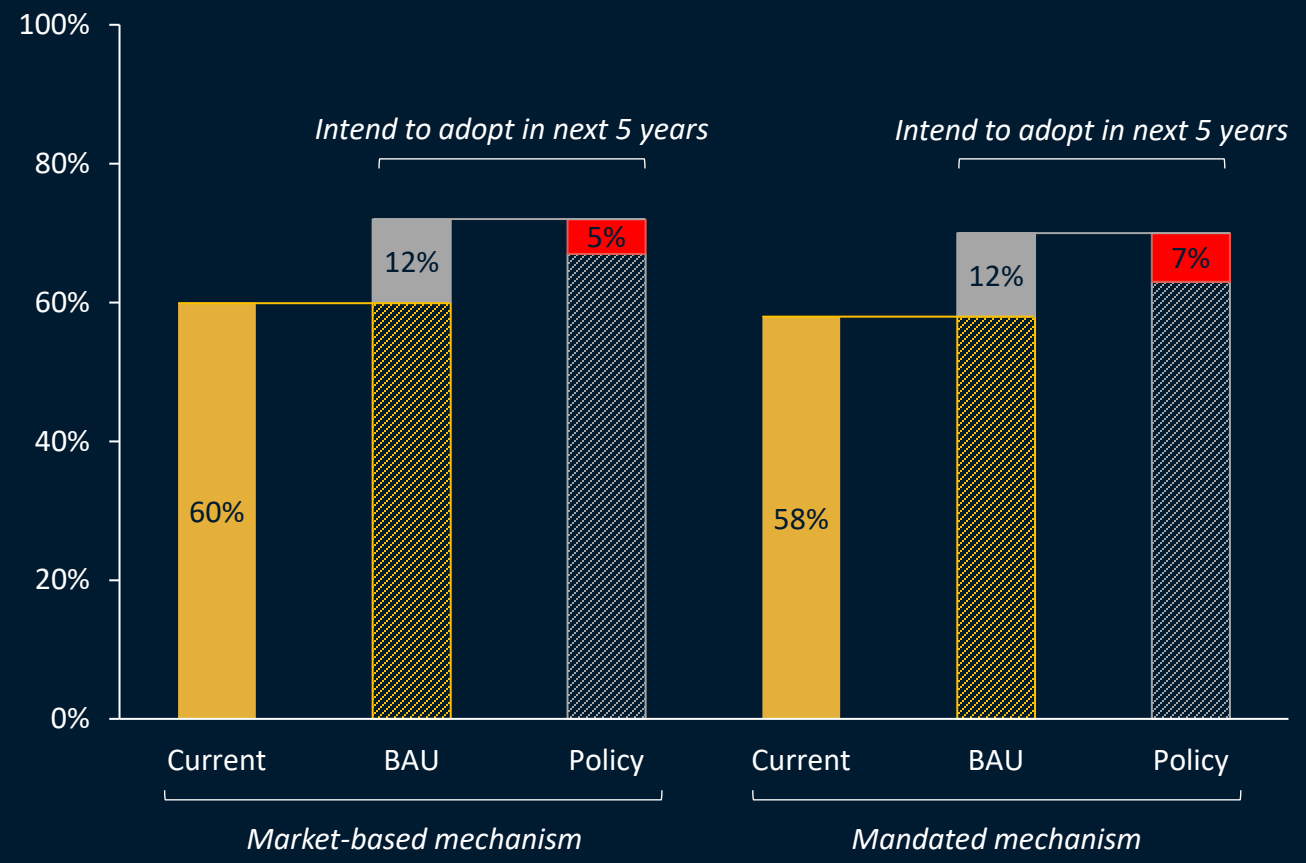
+ Business-as-usual (BAU) adoption intentions for EVs were significantly higher than current adoption rates.
+ Neither policy would significantly affect these BAU adoption rates:
  – The market-based mechanism increased adoption intentions above BAU by 1%.
  – The mandated mechanism decreased adoption intentions below BAU by 1%.



Managing CER imports/exports: Policy impact on adoption (electric space heating)

Both mechanisms significantly decreased BAU adoption intentions

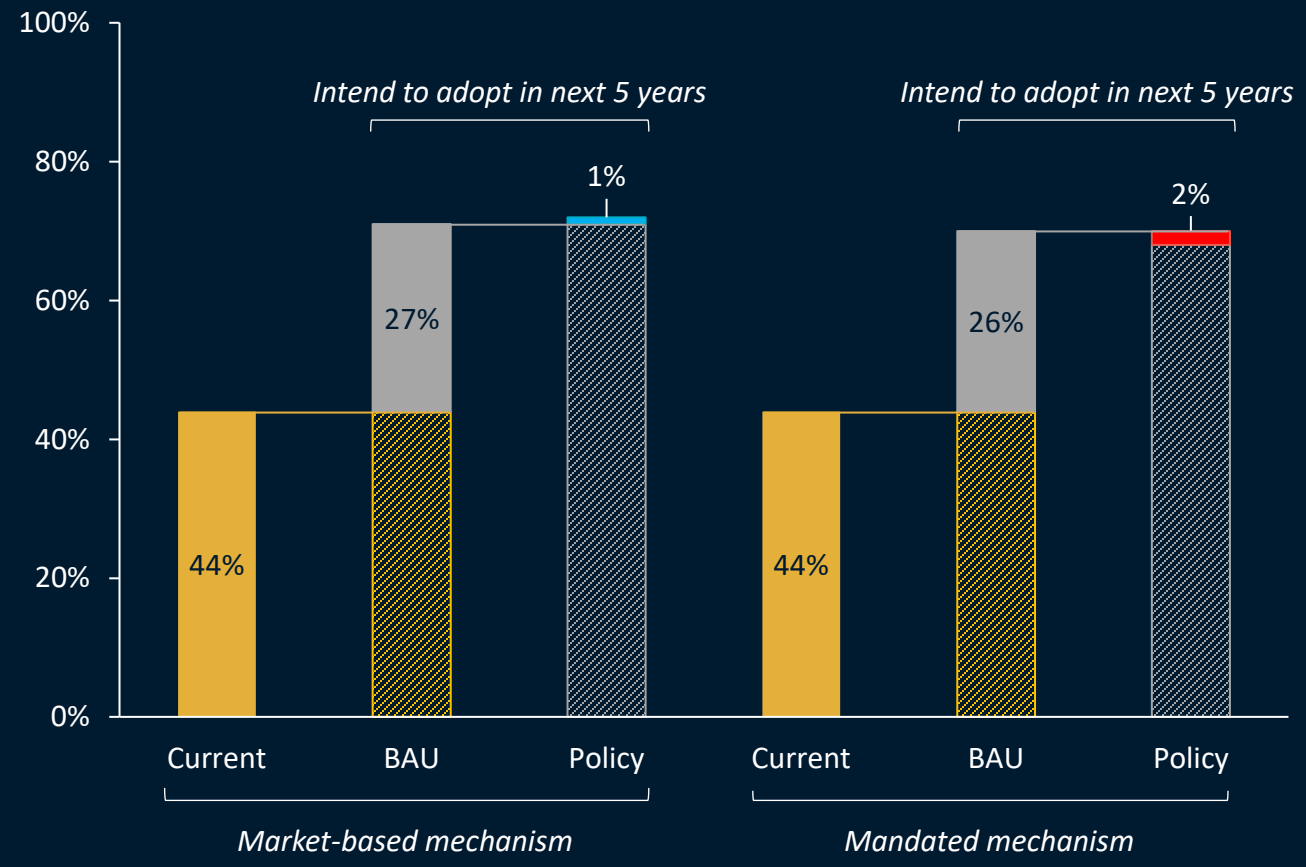
+ Business-as-usual (BAU) adoption intentions for electric space heating were significantly higher than current adoption rates.
+ However, both mechanisms significantly decreased BAU adoption intentions:
  - The market-based mechanism reduced BAU adoption intentions by 5%.
  - The mandated mechanism reduced BAU adoption intentions by 7%.



Managing CER imports/exports: Policy impact on adoption (electric water heating)

Neither mechanism affected BAU adoption intentions

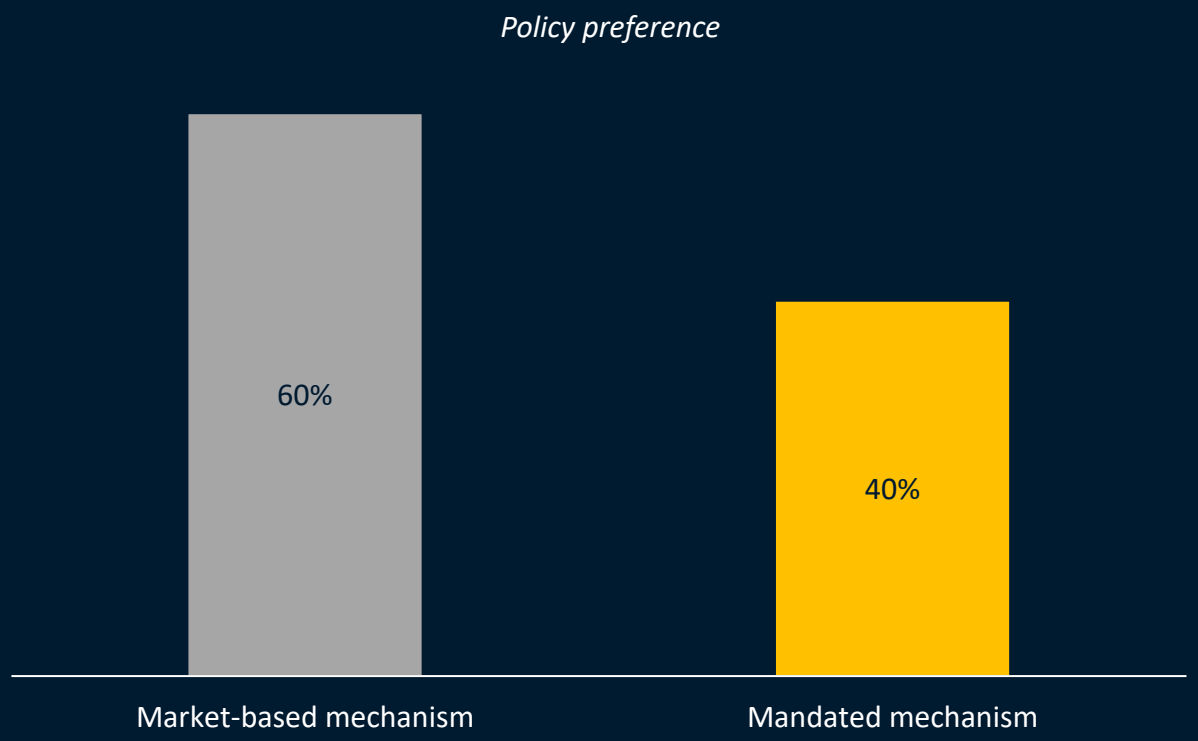
+ Once again, business-as-usual (BAU) adoption intentions for electric water heating were significantly higher than current rates of adoption.
+ The changes in BAU adoption intentions associated with the market-based mechanism (+1%) and the mandated mechanism (-2%) were not significant.



Managing CER imports/exports: Policy preferences

When respondents could evaluate both policies, the market-based mechanism was more strongly preferred

+ Thus far, evaluation has focused on respondents' evaluation of the policy they had been randomly assigned.
+ When respondents were given the opportunity to evaluate both policies:
  - 60% preferred the market-based mechanism.
  - 40% preferred the mandated mechanism.



Managing CER imports/exports

Key takeaways

+ Of the two potential mechanisms for managing consumer energy resource (CER) imports/exports, respondents preferred a market-based mechanism over a mandated mechanism. For example:
  - The market-based mechanism was evaluated more favourably than the mandated mechanism.
  - The market-based mechanism was seen to be fairer than the mandated mechanism.
+ Notwithstanding these *relative* evaluations, *absolute* evaluations of the market-based mechanism were not strongly positive. For example:
  - Respondents held a weakly positive opinion of the market-based mechanism, suggestive of begrudging acceptance rather than enthusiastic support.
  - The market-based mechanism was viewed as being neither fair nor unfair.
+ Relatively few segmentation-related differences existed for the market-based mechanism, suggesting that most consumer segments viewed it in a similar fashion. Perceptions of the mandated mechanism, by contrast, varied more substantively across consumer segments; while some were in favour, others were not.
+ Neither mechanism significantly affected technology adoption intentions for EVs or electric water heating. However, both mechanisms significantly (and negatively) affected technology adoption intentions for electric space heating.
+ In sum, two main learnings emerged from these findings:
  - Market-based mechanisms will likely attract greater support than mandated mechanisms, although consumers are unlikely to be widely enthusiastic for their introduction.
  - Policy makers must remain attentive to the potential for energy market reform to slow the adoption of low emission technologies.

Appendices

Appendices

1. Demographic profile of the study sample
   - Demographics are measures that can tell us about who people are and where they live.
2. Psychographic segmentation profiles
   - Psychographics are measures that distinguish between how people think, how they perceive things, and what they value.
   - The two key psychographics examined in this report were:
     - Adopter category
     - Environmental worry
3. EV adoption
   - Supplementary analyses, focusing on:
     - Current adoption rates
     - Psychographic segmentation of intended adoption: Adopter category
     - Psychographic segmentation of intended adoption: Environmental worry
     - Demographic segmentation of intended adoption
4. Electric space heating adoption
   - Supplementary analyses, focusing on:
     - Current adoption rates
     - Psychographic segmentation of intended adoption: Adopter category
     - Psychographic segmentation of intended adoption: Environmental worry
     - Demographic segmentation of current and intended adoption
5. Electric water heating adoption
   - Supplementary analyses, focusing on:
     - Current adoption rates
     - Psychographic segmentation of intended adoption: Adopter category
     - Psychographic segmentation of intended adoption: Environmental worry
     - Demographic segmentation of current and intended adoption

Appendix 1: Demographic profile of the study sample

Demographic variable	*n*	%
Gender		
Male	622	45%
Female	775	56%
Age (years)		
18-39	505	36%
40-59	493	35%
60+	406	29%
Location		
Metro	1064	76%
Regional	336	24%
Education		
Postgraduate	284	21%
Undergraduate	428	31%
TAFE/Diploma	363	26%
High school	313	23%

Demographic variable	*n*	%
Financial wellbeing		
Financially comfortable	542	39%
Financially stretched	611	44%
Financially stressed	235	17%
Culturally & linguistically diverse		
Yes	201	15%
No	1188	86%
Political identity		
Conservative	332	25%
Centrist	540	40%
Progressive	468	35%

n may not sum to 1406 due to missing/other data.
% may not sum to 100% due to rounding error.

Appendix 2: Psychographic segmentation profiles

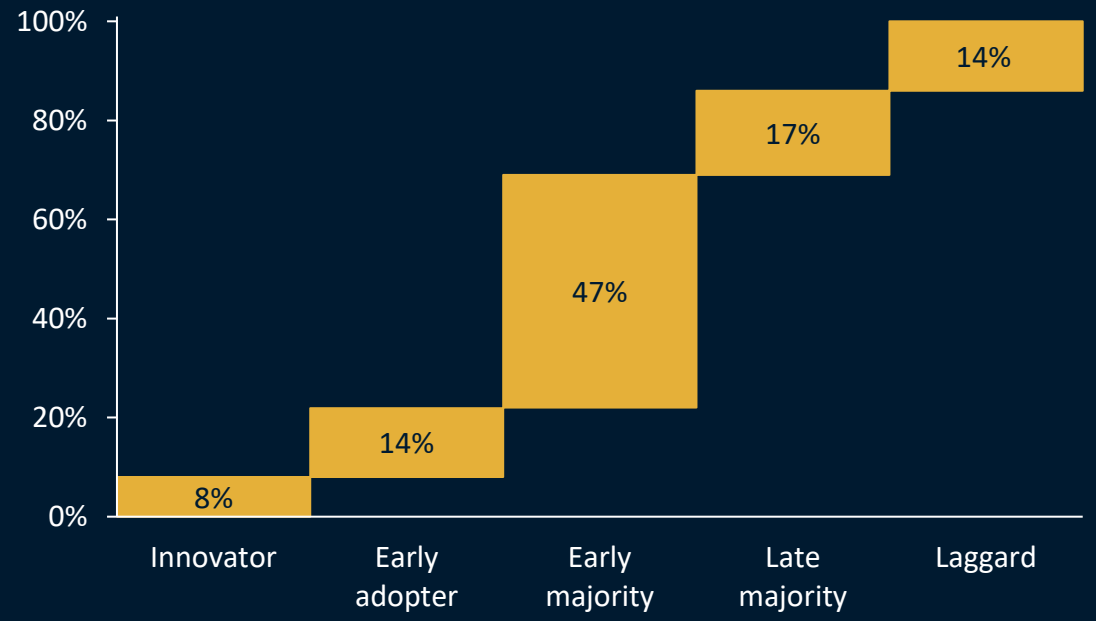
Adopter categories

- **Innovator:** First to adopt.
- **Early adopter:** An adoption leader.
- **Early majority:** Want to hear others' experiences first before adopting.
- **Late majority:** Only adopt once others they trust have done so.
- **Laggard:** Don't see much need in adopting.

Self-identified adopter category

- Adopter categories, first advanced by Rogers (1962), group consumers according to how soon they adopt an innovation relative to the rest of the community.
- Self-identified adopter category – and more specifically, the likelihood of adopting low emission technologies – was assessed to capture respondents' general likelihood of adopting low emission technologies.
- The largest adopter categories were the early majority (47%) and late majority (17%), with increasingly fewer respondents self-identifying as laggards (14%), early adopters (14%), or innovators (8%).

Proportion of respondents self-identifying in each adopter category



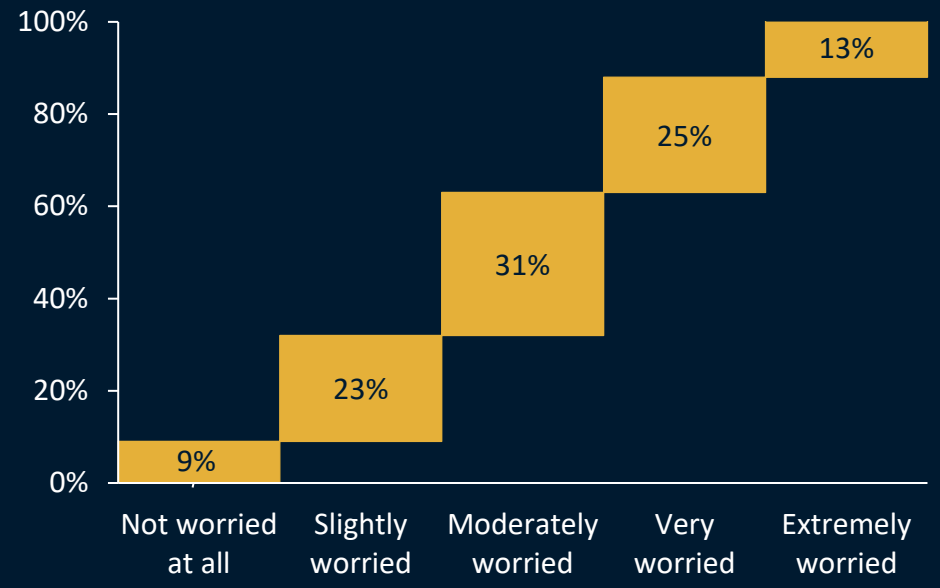
Appendix 2: Psychographic segmentation profiles

Self-identified environmental worry

+ Environmental worry captures the degree to which participants are concerned about the state of the environment.
+ On average, respondents were moderately worried about the environment.
+ The largest groupings were those who reported being moderately (31%) or very (25%) worried about the environment. By contrast, the smallest groupings were those who reported being extremely worried (13%) and not worried at all (9%).

Proportion of respondents at each level of environmental worry

Total percentage exceeds 100% due to rounding error



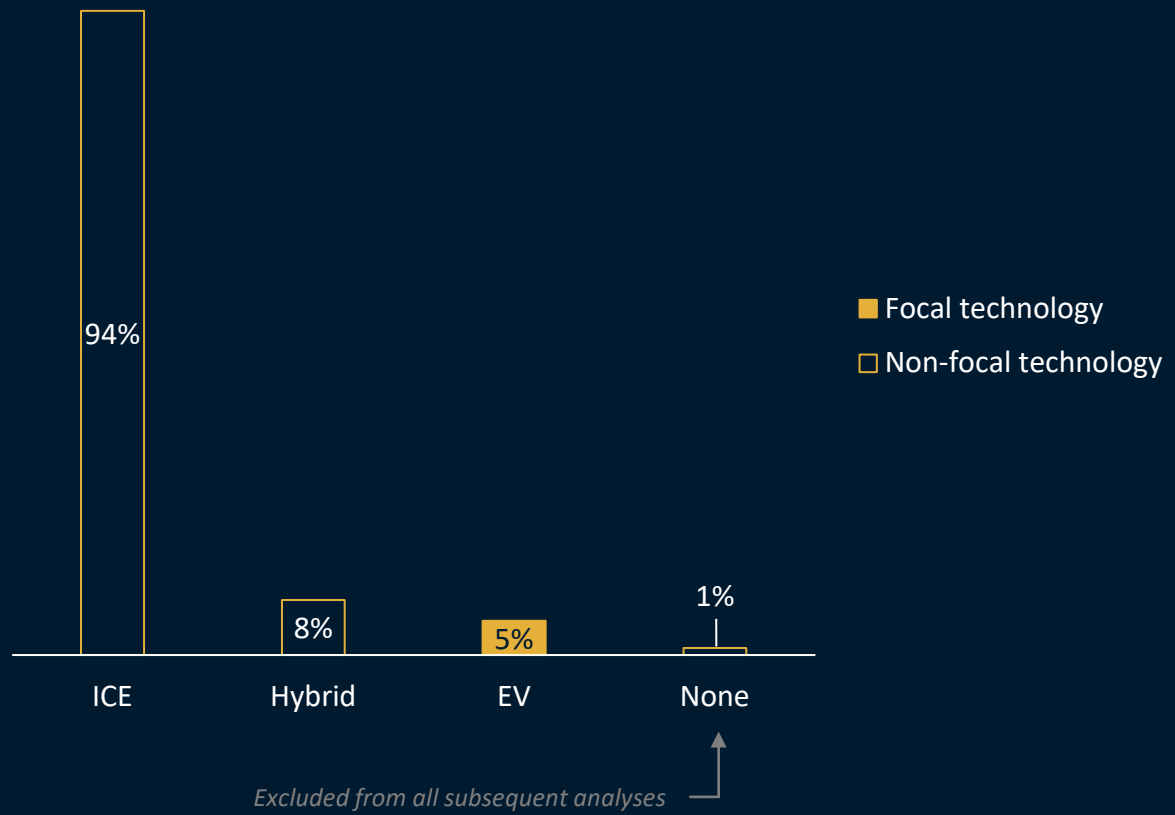
Appendix 3: EV adoption

Car ownership was dominated by internal combustion engine vehicles

+ Most respondents (92%) reported owning at least one internal combustion engine (ICE) vehicle, with only 5% reporting owning an EV.

Type of car currently owned by respondents

Total percentage exceeds 100% because respondents may own multiple types of cars



Appendix 3: EV adoption (segmentation)

Psychographic segmentation: Adopter category

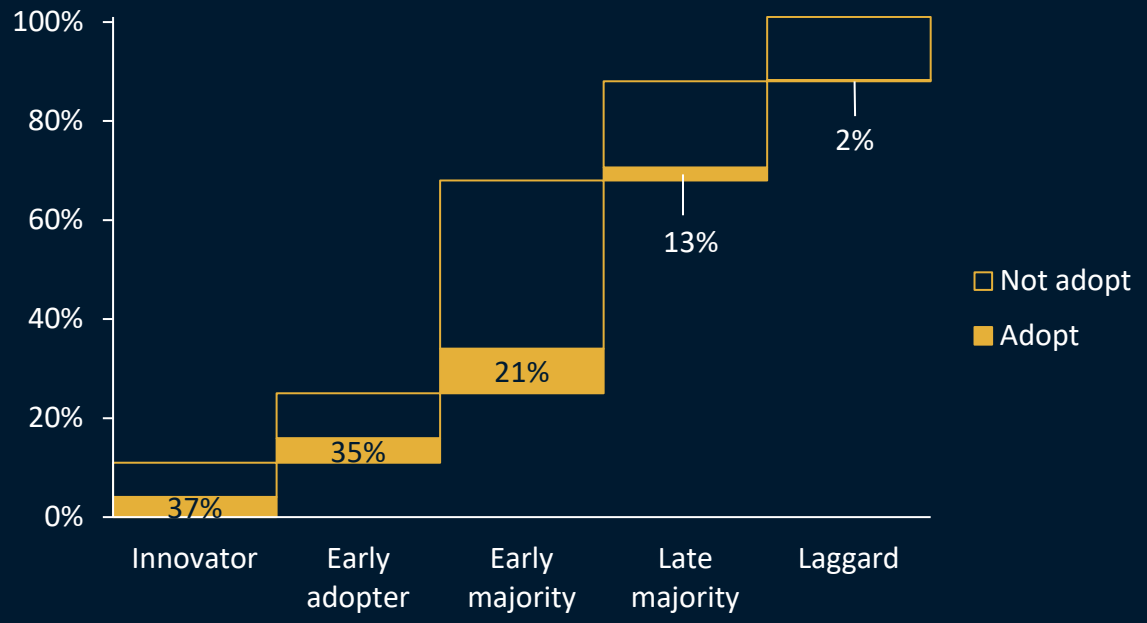
Innovators and early adopters had the highest EV adoption intentions

+ Business-as-usual (BAU) intentions to adopt an EV significantly varied by adopter category:
  - 37% of innovators and 35% of early adopters reported a BAU intention to adopt an EV in the next 5 years.
  - These reported rates of adoption were significantly higher than for all other adopter categories: early majority (21%), late majority (13%), and laggard (2%).
  - The BAU intended adoption rates for the early majority, late majority, and laggard adopter categories also all significantly differed to each other.

Note: Definitions for each adopter category – along with the size of each category – can be found in Appendix 2.

Intended BAU adoption of an EV within each adopter category

Each adopter category is represented proportional to its percentage share of the total sample



Appendix 3: EV adoption (segmentation)

Psychographic segmentation: Environmental worry

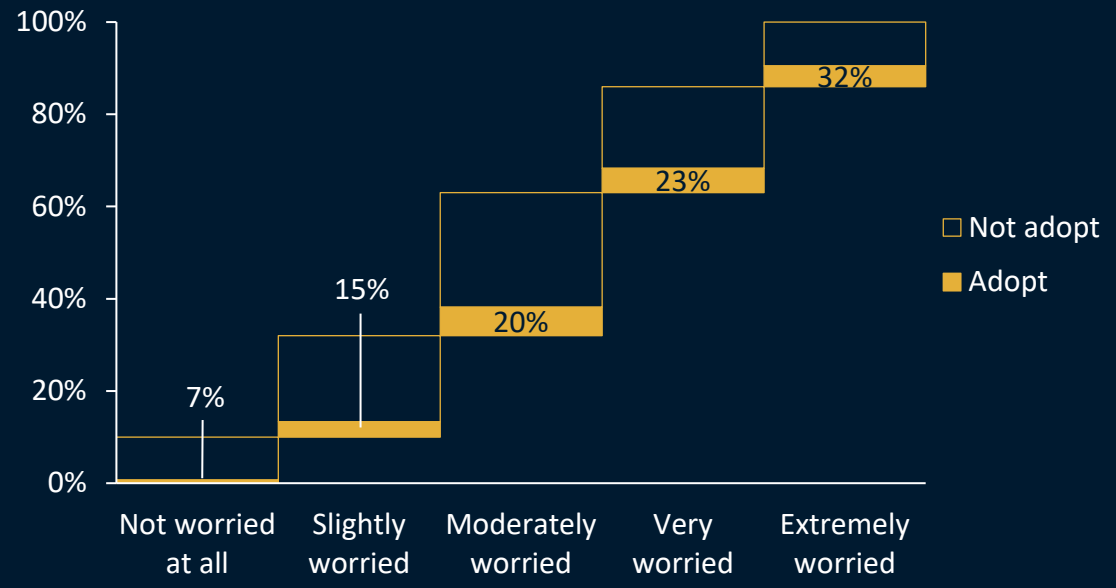
EV adoption intentions were greatest among those who were extremely worried about the environment

- Business-as-usual (BAU) EV adoption intentions significantly varied as a function of worry about the environment:
  - The highest proportion of respondents who intended to adopt an EV was found among those who were extremely worried about the environment (32%).
  - Those who were very (23%) or moderately (20%) worried about the environment reported statistically equivalent EV adoption intentions.
  - The lowest adoption intentions were reported by respondents who were not at all (7%) or only slightly (15%) worried about the environment.

Note: The size of the groups holding each level of environmental worry can be found in Appendix 2.

Intended BAU adoption of an EV at varying levels of environmental worry

Each environmental worry level is represented proportional to its percentage share of the total sample



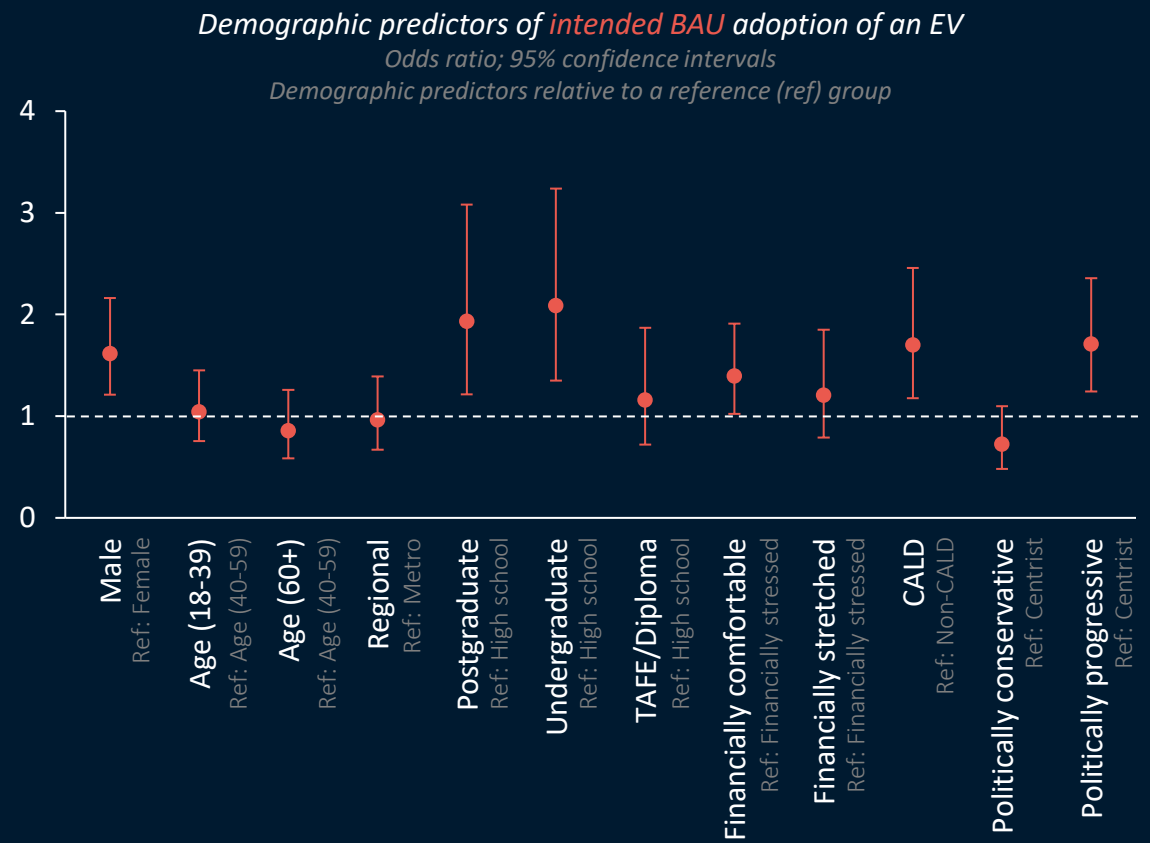
Appendix 3: EV adoption (segmentation)

Demographic segmentation

Educated males who were financially comfortable, CALD, and politically progressive were more likely to report EV adoption intentions

- Males were 1.6x more likely to report EV adoption intentions.
- Relative to high school graduates, those with a postgraduate or undergraduate education were 1.9x and 2.1x more likely, respectively, to report intended EV adoption.
- Those who were financially comfortable were 1.4x more likely to report EV adoption intentions than those who were financially stressed.
- Culturally and linguistically diverse (CALD) respondents were 1.7X more likely to report intended adoption than their non-CALD counterparts
- Relative to political centrists, those whose political views were progressive were 1.5x more likely to report intended EV adoption.
- All other demographic predictors were not significant.

Note: demographic segmentation analysis was not conducted for current adoption due to the relatively low rates of EV adoption observed among respondents.



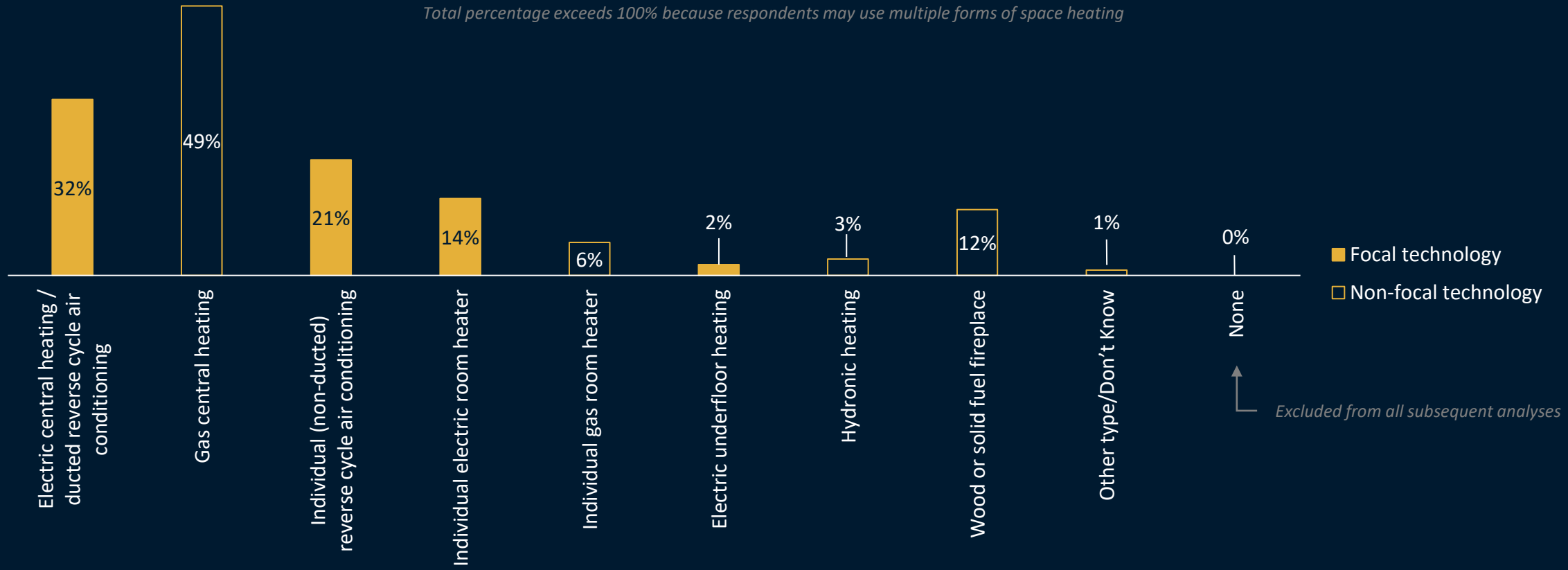
Appendix 4: Electric space heating adoption

Current ownership profile was varied

+ The most common forms of space heating reported by respondents were gas central heating (49%) and electric central heating / ducted reverse cycle air conditioning (32%).

Forms of space heating currently used by respondents

Total percentage exceeds 100% because respondents may use multiple forms of space heating



Appendix 4: Electric space heating adoption (segmentation)

Psychographic segmentation: Adopter category

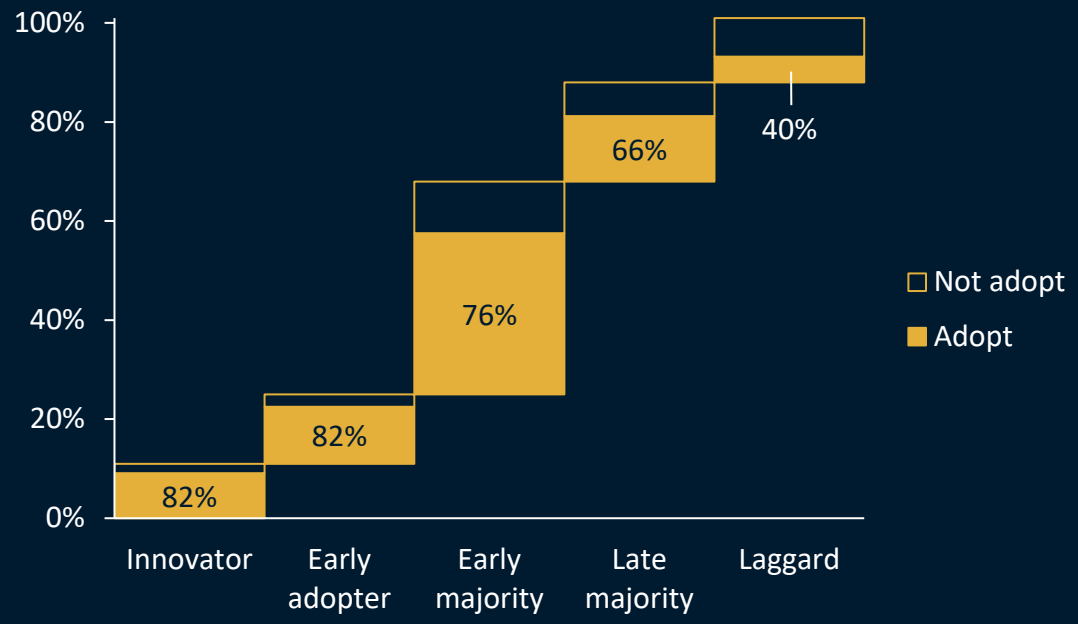
More than three-quarters of innovators, early adopters, and the early majority intended to adopt electric space heating

+ Adoption intentions significantly varied by adopter category:
  - Innovators (82%), early adopters (82%), and the early majority (76%) collectively reported significantly higher business-as-usual (BAU) adoption intentions than those in the late majority (66%) and laggard (40%) categories.
  - Significantly more respondents in the late majority category reported adoption intentions than those in the laggard category.

Note: Definitions for each adopter category – along with the size of each category – can be found in Appendix 2.

Intended BAU adoption of electric space heating within each adopter category

Each adopter category is represented proportional to its percentage share of the total sample



Appendix 4: Electric space heating adoption (segmentation)

Psychographic segmentation: Environmental worry

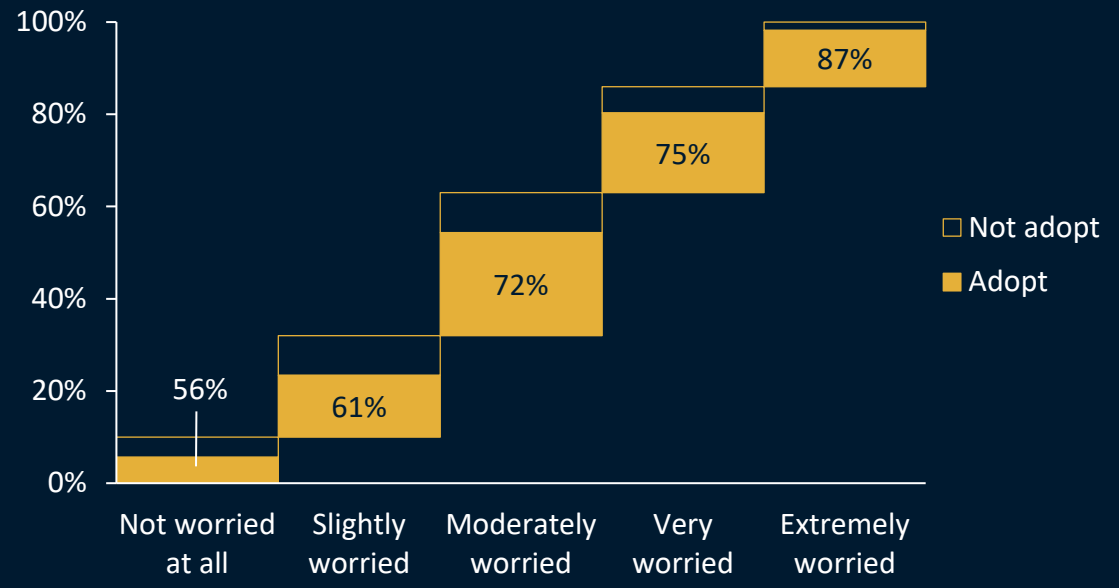
Adoption intentions increased with levels of environmental worry

- Adoption intentions for electric space heating significantly varied with worry about the environment:
  - Business-as-usual (BAU) adoption intentions were highest amongst those who were very (75%) or extremely (87%) worried about the environment.
  - Respondents who were slightly (61%) or moderately (72%) worried about the environment reported statistically indistinguishable rates of intended adoption.
  - The lowest levels of adoption intention were reported by respondents who were not at all worried about the environment (56%).

Note: The size of the groups holding each level of environmental worry can be found in Appendix 2.

Intended BAU adoption of electric space heating at varying levels of environmental worry

Each environmental worry level is represented proportional to its percentage share of the total sample



Appendix 4: Electric space heating adoption (segmentation)

Demographic segmentation

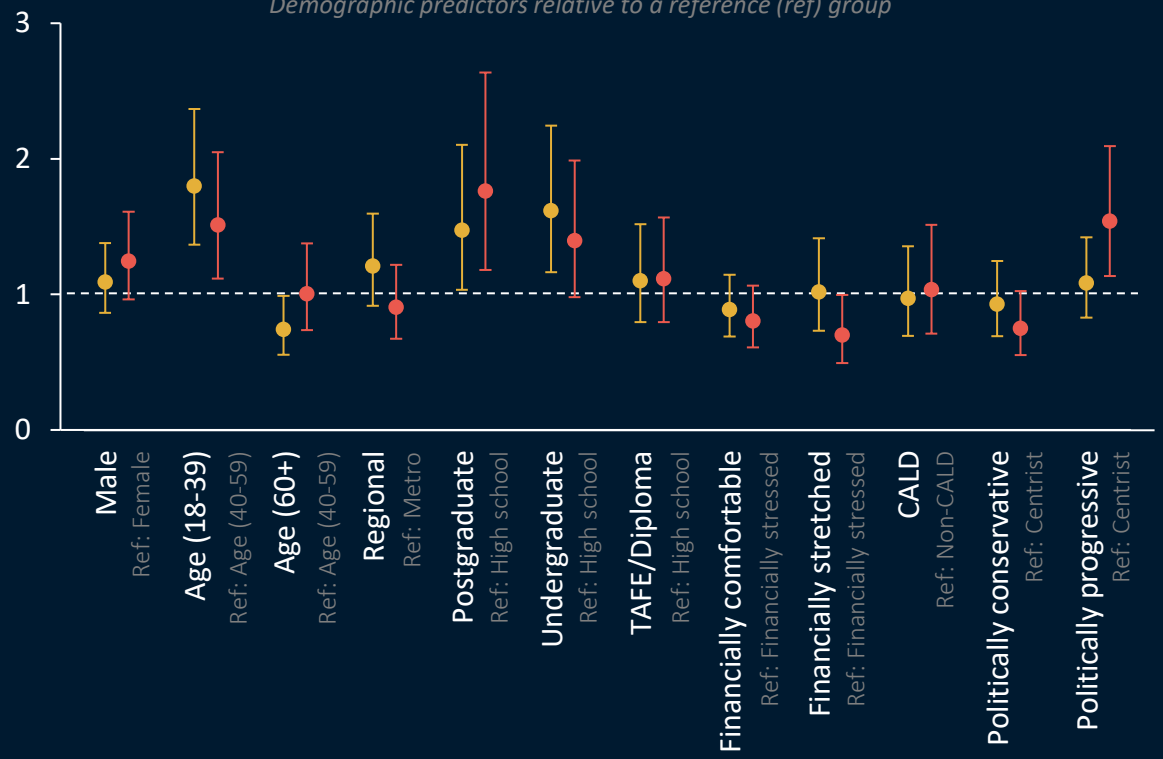
Age, education, financial wellbeing, and political orientation variously predicted current and intended electric space heating adoption

+ Relative to those aged 40-59 years:
  - Younger respondents (18-39) were 1.8x and 1.5x more likely to report current and intended electric space heater adoption, respectively.
  - Older respondents (60+) were 0.7x less likely to report current electric space heater adoption.
+ Relative to those with a high school education, those with a(n):
  - Postgraduate education were 1.5x and 1.8x more likely to report current and intended electric space heater adoption, respectively.
  - Undergraduate education were 1.6x more likely to report current electric space heating adoption.
+ Financially strained respondents were 0.7x less likely to report intended electric space heater adoption than those reporting financial stress.
+ Relative to political centrists, those whose political views were progressive were 1.5x more likely to report intended electric space heater adoption.
+ All other demographic predictors were not significant.

Demographic predictors of current and intended BAU adoption of electric space heating

Odds ratio; 95% confidence intervals

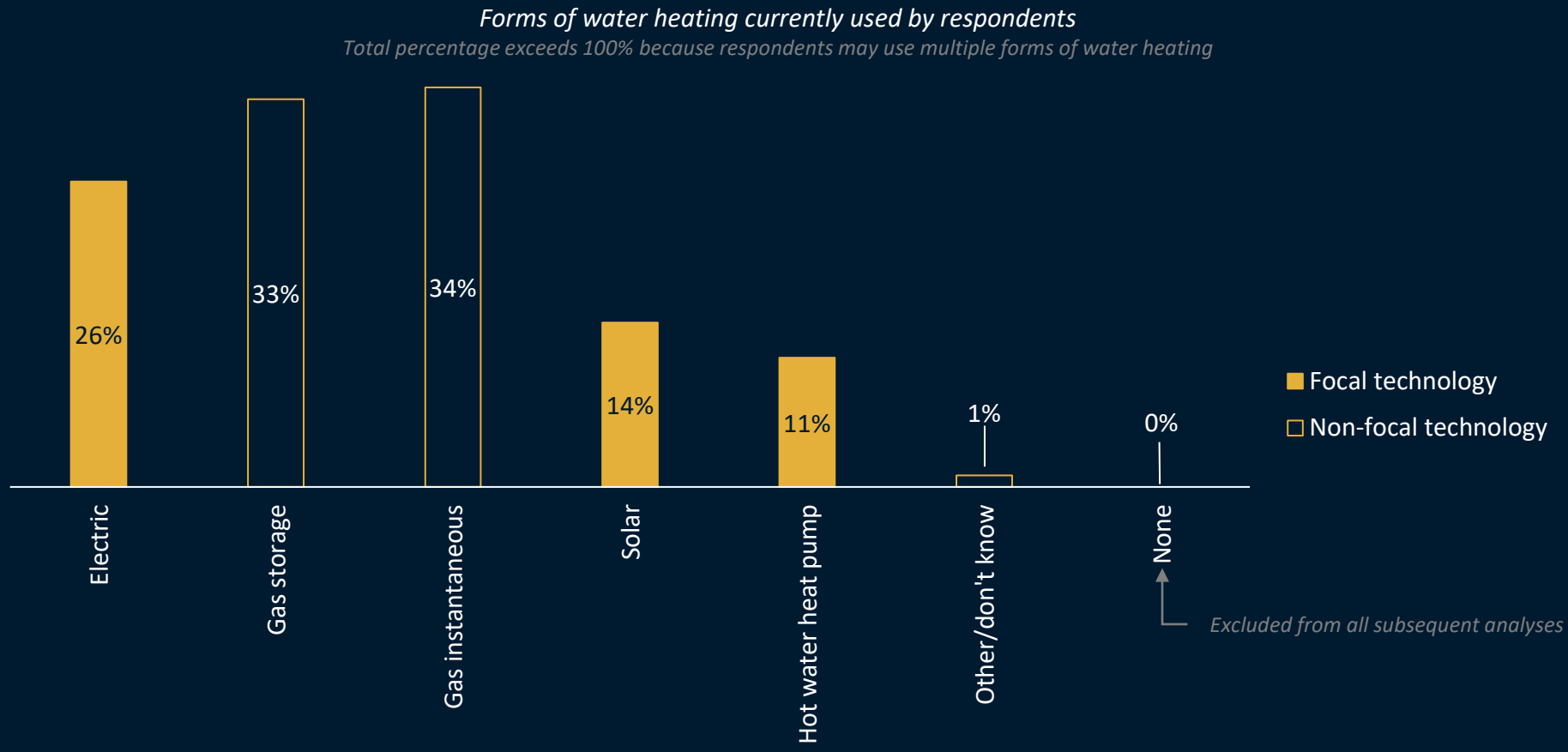
Demographic predictors relative to a reference (ref) group



Appendix 5: Electric water heating adoption

Current ownership profile was varied

+ The most common forms of water heating reported by respondents were instantaneous gas (34%) and gas storage (33%).



Appendix 5: Electric water heating adoption (segmentation)

Psychographic segmentation: Adopter category

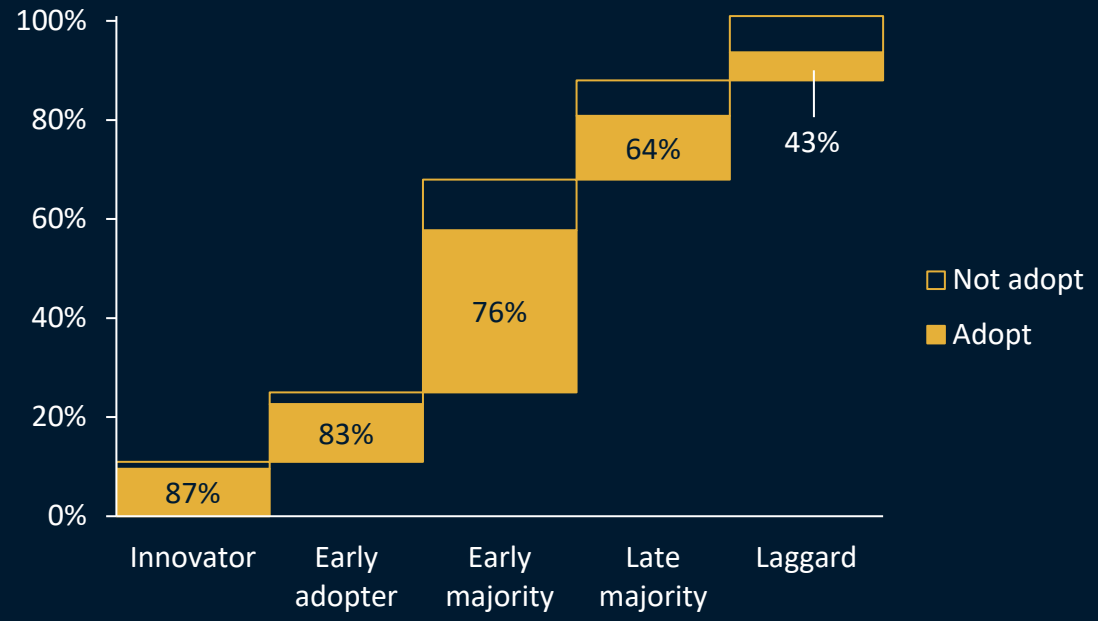
Adoption interest was led by innovators and early adopters

+ Business-as-usual (BAU) adoption intentions significantly varied by adopter category:
  - 87% of innovators and 83% of early adopters reported intending to adopt electric water heating in the next 5 years, and these intended rates of adoption were higher than for all other adopter categories.
  - The adoption intentions of the early majority (76%), late majority (64%), and laggards (43%) all significantly varied from each other.

Note: Definitions for each adopter category – along with the size of each category – can be found in Appendix 2.

Intended BAU adoption of electric water heating within each adopter category

Each adopter category is represented proportional to its percentage share of the total sample



Appendix 5: Electric water heating adoption (segmentation)

Psychographic segmentation: Environmental worry

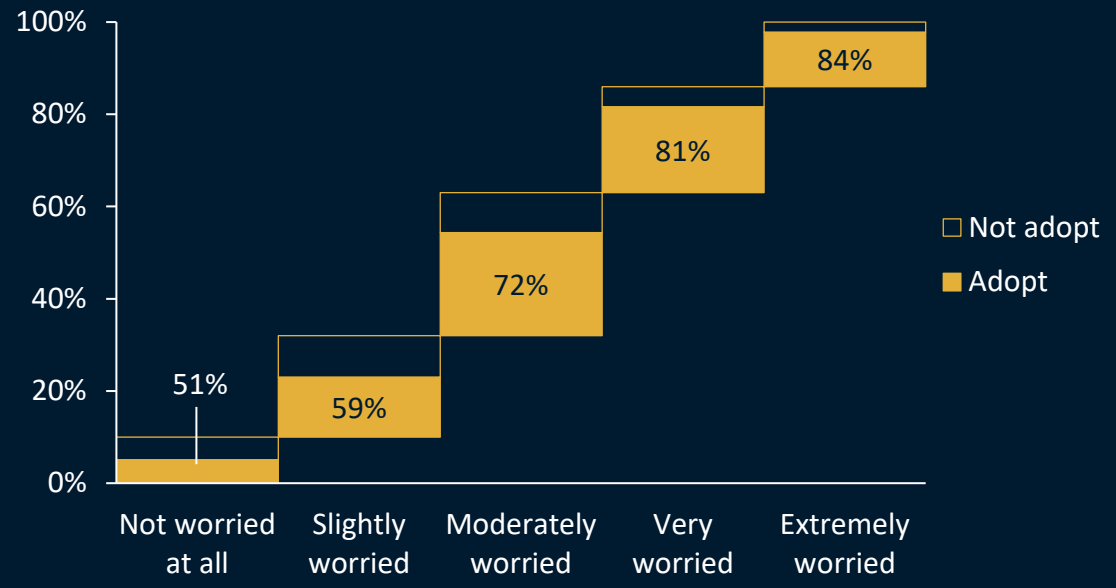
As environmental worry increased, so too did interest in adopting electric water heating

+ Business-as-usual (BAU) adoption intentions significantly varied with worry about the environment:
  - Interest in adopting electric water heating was greatest among respondents who were very (81%) or extremely (84%) worried about the environment, and the level of adoption intention reported across these cohorts was statistically indistinguishable.
  - Those who were moderately worried about the environment reported intermediate adoption intentions (72%).
  - The lowest levels of adoption intention were reported by those who were not at all (51%) or slightly (59%) worried about the environment.

Note: The size of the groups holding each level of environmental worry can be found in Appendix 2.

Intended BAU adoption of electric water heating at varying levels of environmental worry

Each environmental worry level is represented proportional to its percentage share of the total sample



Appendix 5: Electric water heating adoption (segmentation)

Demographic segmentation

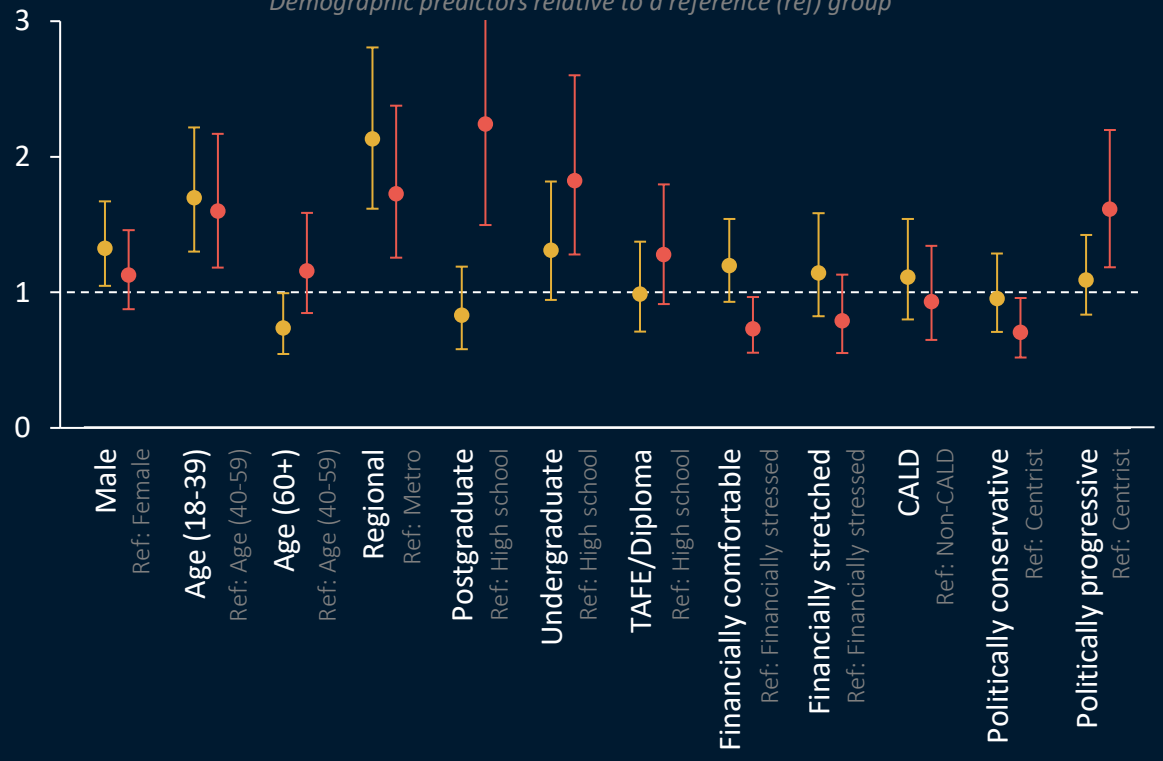
Significant influences were found for all demographic categories except CALD status.

- Males were 1.3x more likely to report current electric water heater adoption.
- Relative to those aged 40-59 years:
  - Younger respondents (18-39 years) were 1.7x and 1.6x more likely to report current and intended electric water heater adoption, respectively.
  - Older respondents (60+ years) were 0.7x less likely to report current electric water heater adoption.
- Relative to their metro counterparts, regional respondents were 2.1x and 1.7x more likely to report current and intended electric water heater adoption, respectively.
- Relative to those with a high school education, those with a postgraduate or undergraduate education were 2.2x and 1.8x more likely, respectively, to report intended electric water heater adoption.
- Financially comfortable respondents were 0.7x less likely to report intended adoption than those who reported being financially stressed.
- Relative to politically centrist respondents, those who were politically progressive or conservative were 1.6x more likely and 0.7x less likely to report intended adoption, respectively.

Demographic predictors of current and intended BAU adoption of electric water heating

Odds ratio; 95% confidence intervals

Demographic predictors relative to a reference (ref) group



- All other demographic predictors were not significant.

References

References

- Newton, J., Weber, V., Rotman, J., Zenkić, J., Jacob John, J., & Gatumu, M. (2023). *Project EDGE: Summarising key customer insights into perceptions of and experiences with Virtual Power Plants.* Available from: https://aemo.com.au/-/media/files/initiatives/der/2023/project-edge---customer-insights-study-summary-report.pdf?la=en
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