

**RACE for
2030**



**Scenarios for
Future Living**

**SECTION 3: FUTURE SMART
APPLIANCE AUTOMATION AND
V2G – CONNECTED FUTURES**

HOUSEHOLD AND HOME BUSINESSES RESEARCH: EMERGING LIFESTYLES, PREFERENCES AND PRACTICES

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SCENARIOS FOR FUTURE LIVING

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Acknowledgement of Country

The authors of this report would like to respectfully acknowledge the Traditional Owners of the ancestral lands throughout Australia and their connection to land, sea and community. We recognise their continuing connection to the land, waters and culture and pay our respects to them, their cultures and to their Elders past, present, and emerging.

What is RACE for 2030?

RACE for 2030 CRC is a 10-year cooperative research program with AUD350 million of resources to fund research towards a reliable, affordable, and clean energy future.

Disclaimer

The authors have taken all reasonable care to ensure that the information in this report was accurate at the time of publication. However, they accept no responsibility for any loss or damage that may result from reliance on its contents.

This document presents findings from Section 3 of the main report. To view the complete findings, research design, and sociodemographic overview of household respondents, please refer to the main report. Four section summaries have been produced in total.

Section 1 Consumer Energy Resources (CER) – Homeownership, household type, and income matter

Section 2 Demand-Side Management (DSM) and Household Routines – Home business and working-from-home (WFH) households present opportunities for DSM initiatives

Section 3 Future Smart Appliance Automation and V2G – Connected futures

Section 4 Hardship and Access Inequities – Weak points for resilience

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CONTENTS

Summary of key findings	1
Section 3: Future smart appliance automation and V2G: connected futures	2
Smart appliance futures: automate, but do not take over	2
EV household V2G participation: control preferences matter	3
Overriding smart appliance automation: safety, comfort, and health as key priorities	6
Key implications: desire for manual control shapes automation futures	7
Next steps	8

SUMMARY OF KEY FINDINGS

Section 3: Future smart appliance automation and V2G: connected futures

SMART APPLIANCES: DESIRE FOR MANUAL CONTROL SHAPES AUTOMATION FUTURES

- Most households were open to some form of automation, but the vast majority (84%) indicated they want to retain some form of control or override over future smart appliances. This included the 17% of households who would not use smart systems at all.
- Only 12% preferred automation without override.
- **While households were generally open to automation, a clear majority valued the ability to retain control. It is important to anticipate how override features in future automation policies, programs, and appliance designs will materially impact the grid.**

EV HOUSEHOLDS AND V2G PARTICIPATION: MAJORITY RECEPTIVE, BUT LINKED TO CONTROL PREFERENCES

- Among current and prospective EV owners, 69% were at least somewhat willing to allow third-party control for V2G (43% somewhat willing, 26% very willing).
- However, willingness varied with automation preferences:
 - Households preferring full control over smart appliances were least supportive (22% very willing, 23% not willing).
 - Those comfortable with automation without override were most supportive (46% somewhat, 33% very willing).
- **Recognising that smart tech rejection correlates with V2G resistance, tailored engagement or opt-in schemes may be more effective than default or mandatory approaches.**

OVERRIDING AUTOMATION: SAFETY, COMFORT, AND HEALTH AS KEY PRIORITIES

- Among households favouring automation with manual override, the most common reasons to take control included extreme weather or emergencies (72%), health issues (70%), travel (69%), hot weather (67%), holidays (57%), and hosting guests (53%).
- **Including override features in V2G policy and program design may increase participation. However, it is crucial to anticipate, plan and prepare for what this may mean in practice for grid stability during locally or nationally coordinated events and emergencies (e.g. extreme weather events or significant holidays).**

SECTION 3:

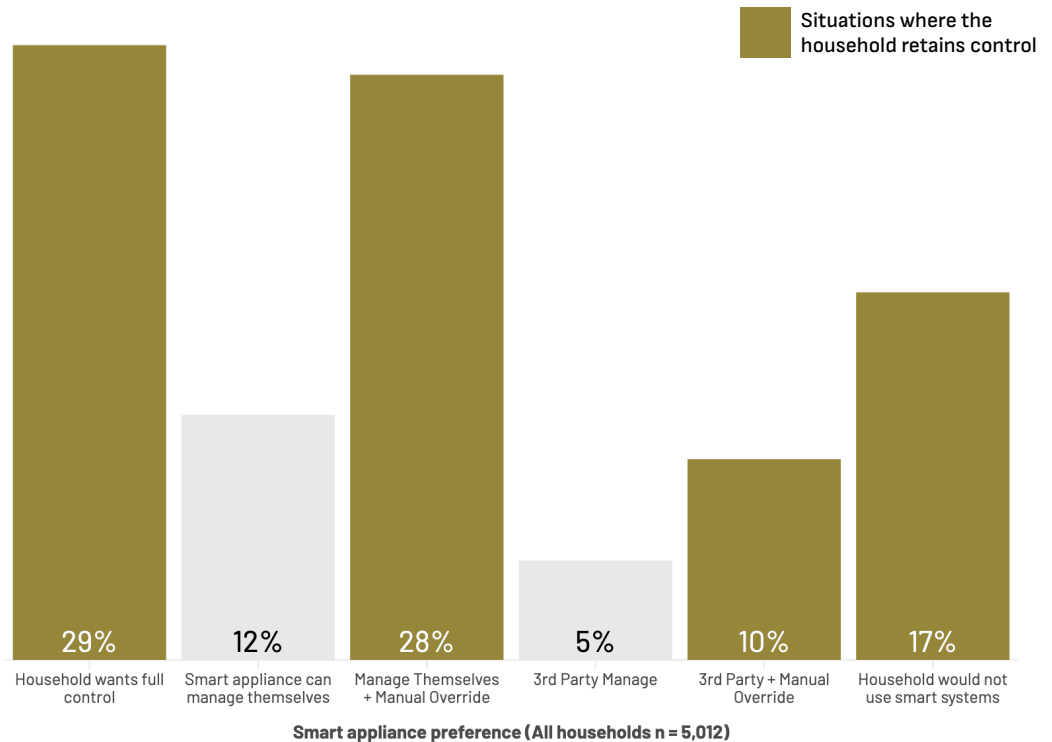
FUTURE SMART APPLIANCE AUTOMATION AND V2G: CONNECTED FUTURES

A household's receptiveness to grid-interactive technologies like vehicle-to-grid (V2G) was associated with how they envision their futures, or lack thereof, with automated smart appliances.

Smart appliance futures: automate, but do not take over

Most households were open to some form of automation, but a clear majority valued the ability to retain control.

Households were informed of a possible future where appliances like hot water systems, EV chargers, and pool pumps may be set to run automatically when electricity is cheaper or greener.¹ The survey then asked households to select an option that best reflected how they would prefer to use smart appliances.



SFL Q21.

- The vast majority of respondents (84%, n=4198) indicated they want to retain some form of control or override over future smart appliances. This includes the 17% (n=873) of respondents who would not use smart systems at all.
- The most common preference was full control and scheduling of smart systems and appliances (29%, n=1458), followed closely by being happy for appliances to manage themselves with manual override (28%, n=1390).
- Smaller numbers preferred automation without override (12%, n=580) or third-party management with (10%, n=477) or without (5%, n=234) override.

¹ The full text provided to survey respondents was as follows: "In the near future, appliances like hot water systems, EV chargers, and pool pumps may be set to run automatically when electricity is cheaper or greener. They could manage themselves (if 'smart') or be controlled by in-home systems such as energy management platforms or AI assistants. These systems may also respond to signals from external providers to take advantage of lower electricity prices or periods of high renewable energy availability. Critical appliances, such as life support equipment, would not be affected. How would you use smart appliances?"

SECTION 3:

FUTURE SMART APPLIANCE AUTOMATION AND V2G: CONNECTED FUTURES

EV household V2G participation: control preferences matter

Most EV households were open to participating in vehicle-to-grid (V2G) programs, but most also wanted to keep control over their future smart appliances.

The survey asked households that currently use or intend to own an EV or plug-in hybrid in the next five years how willing they would be to allow a third party to control their EV to supply electricity back to the grid during periods of high demand.

- A majority of households expressed openness to participating in V2G programs: 43% (n=554) were somewhat willing, and 26% (n=341) were very willing.
- Together, this indicated that nearly 69% of potential EV users were at least somewhat open to allowing a third party to control their vehicle to supply electricity back to the grid during high demand periods.

Hand over control: ■ Not willing ■ Neutral ■ Somewhat willing ■ Very Willing

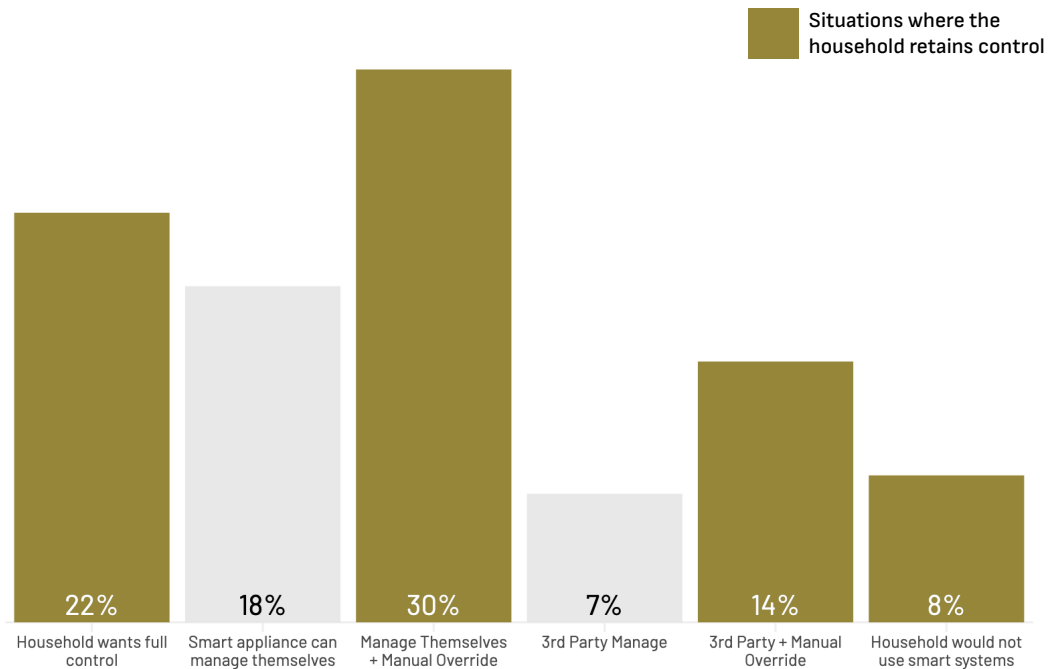


SFL Q15. Base: households that currently owned or planned to purchase an EV or plug-in hybrid in the next five years (n = 1,296) *13 cases excluded from the analysis

SECTION 3:

FUTURE SMART APPLIANCE AUTOMATION AND V2G: CONNECTED FUTURES

While these findings suggest that a significant proportion of future and current EV owners could be receptive to V2G participation, to better understand the context of V2G acceptance, we examined how this cohort's preferences for future smart appliance automation and control related to their willingness to allow third-party control of EVs for grid support.



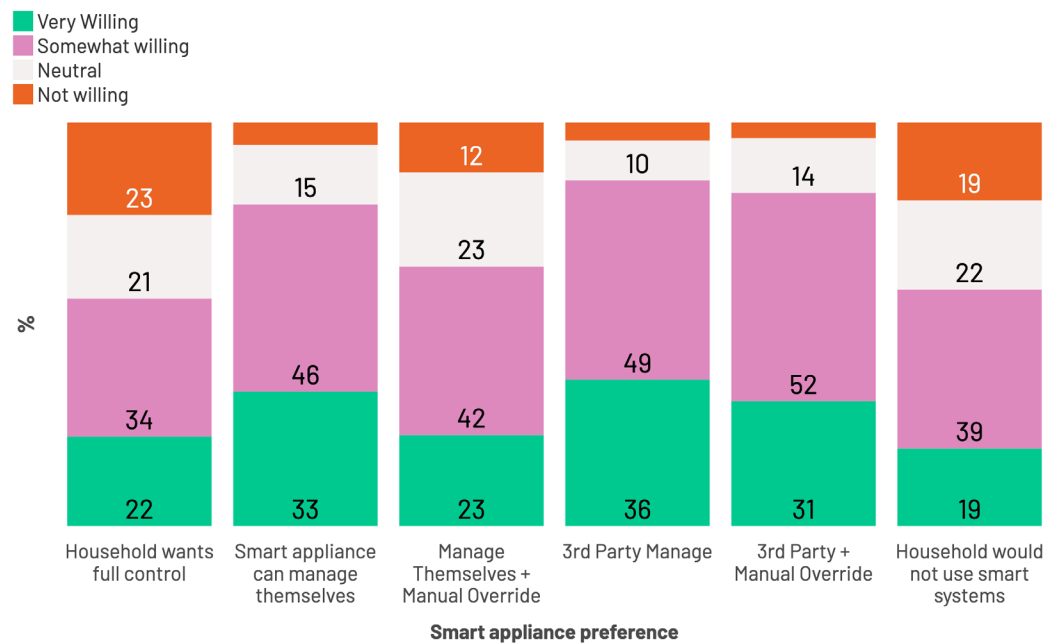
SFL Q21. Base: households that currently owned or planned to purchase an EV or plug-in hybrid in the next five years (n=1,309)

- Among households that currently used or intended to own an EV or plug-in hybrid in the next five years (n=1309), the most common preference was for smart appliances to manage themselves with manual override (30%, n=395), followed by wanting full control (22%, n=292).
- A further 14% (n=184) favoured a third party with override, while 18% (n=239) selected smart appliances that can manage themselves, 7% (n=91) selected a third party to manage, and 8% (n=107) reported that they would not use automated smart systems.
- Overall, 74% of households (including households that would not use smart systems) indicated they wanted to retain some form of control or override of their smart appliances.

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EV households' preferred level of control over smart appliances was associated with their willingness to allow third-party control of EVs for grid support (V2G).²



Base: households that currently owned or planned to purchase an EV or plug-in hybrid in the next five years (n = 1,309), *14 cases missing from analysis.

- EV households that wanted full control of smart appliances (n=292) showed the lowest overall enthusiasm for V2G (22% were very willing to participate in V2G, 23% were not willing, and 21% were neutral), highlighting a clear link between desire for household-level control and reluctance to delegate energy decisions externally.
- EV households that did not want to use smart systems (n=107) were among the least receptive to V2G (19% were very willing, and 19% were not willing to participate in V2G).

² The association between a household's preferred level of control over smart appliances and their willingness to allow third-party control of EVs for grid support was statistically significant: $\chi^2(15, n = 1,295) = 94.67, p < .001$. Cramér's V = .156, indicating a moderate association.

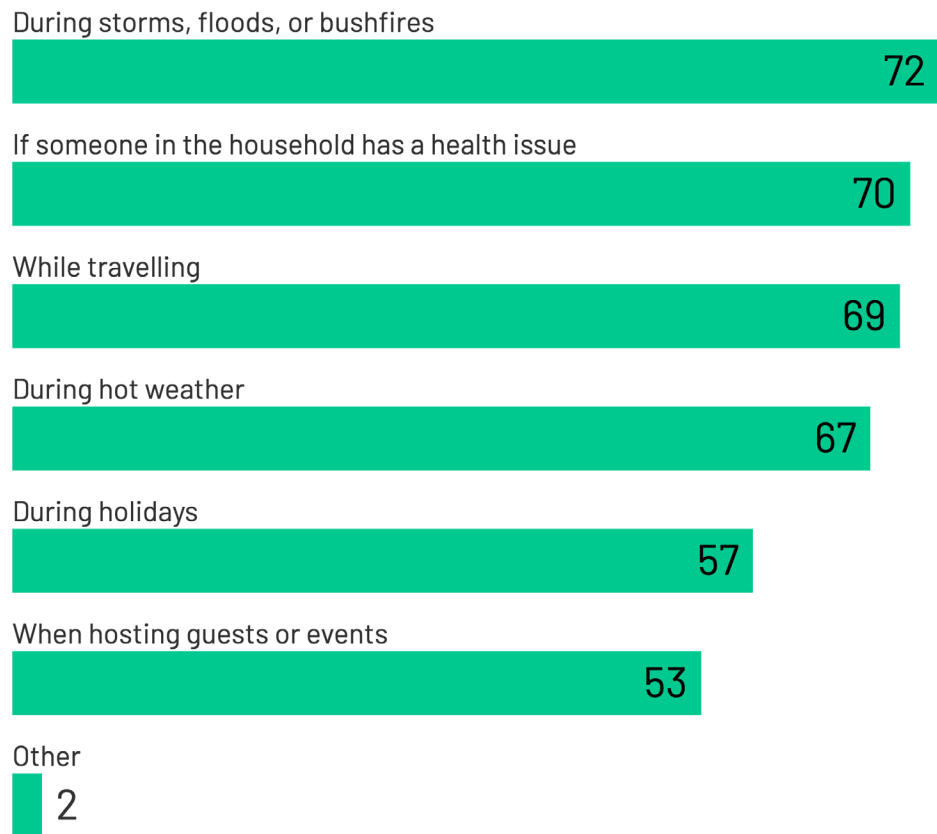
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Overriding smart appliance automation: safety, comfort, and health as key priorities

While households were generally open to automation, many indicated they would take manual control in situations affecting safety, comfort, health, or special circumstances.

- Among all households that were comfortable with smart appliances provided they could override them manually (28%, n=1390), the most common situations where they would want to take manual control involved extreme weather or emergencies.
- Over seven in ten (72%, n=999) indicated they would override automation during storms, floods, or bushfires, and 70% (n=967) indicated they would do so if someone in the household had a health issue.
- Other popular situations for taking control over automated appliances included while travelling (69%, n=956) and during hot weather (67%, n=925).
- More than half of respondents said they would override settings during holidays (57%, n=798) or when hosting guests or events (53%, n=743).



% of households that selected this situation

SFL Q22. Base: households that were comfortable with smart appliances provided they could override them manually (n = 1,390). Multiple selections.

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FUTURE SMART APPLIANCE AUTOMATION AND V2G: CONNECTED FUTURES

Key implications: desire for manual control shapes automation futures

Australia's demand response for appliances is built around the AS/NZS 4755 standards, which set out how devices like air conditioners, pool pumps, and hot water systems must respond to external control signals.

Programs such as Queensland's PeakSmart use these standards with Demand Response Enabling Devices (DREDs) to reduce appliance power use during peak events, offering rebates for participation. While effective in easing grid stress, challenges remain: many appliances are designed to global standards that do not neatly align with AS 4755, DREDs add cost and complexity, and household use depends on maintaining comfort and clear benefits.

Overall, Australia is advancing demand response, and while uptake and integration remain limited by design and market constraints, the results of this survey highlight emerging challenges for future demand response-enabled devices.

Manual control and override functions are central to desired automation futures, but pose potential risks to grid stability.

- Most households supported some level of automation but valued the ability to retain control or override automation, particularly during emergencies, health needs, or special circumstances.
- Future programs aimed at enrolling households in automation are likely to increase participation if they offer some form of control or override.
- Industry forecasting and future planning need to consider the impact of mass manual override of large CER and smart appliances on grid stability, particularly during extreme weather events or other geographically coordinated events and emergencies.
- Demand-side programs and initiatives that attempt to reduce mass override during coordinated events may need to be considered to ensure grid stability in a more automated future.

Recognising that smart tech rejection correlates with V2G resistance, tailored engagement or opt-in schemes may be more effective than default or mandatory approaches.

- Early V2G initiatives should aim to prioritise households that already trust automation, as they demonstrated the highest willingness to participate.
- Including override features in V2G policy and program design may increase participation. However, it is crucial to anticipate, plan and prepare for what this may mean in practice for grid stability during emergencies.

NEXT STEPS

The findings presented in this report are part of a longitudinal evidence base being developed and delivered as part of the Scenarios for Future Living project.

The intention is to run this national survey again in Q2 2026 and Q2 2027 to track these trends over time and to use these findings to inform the ethnographic research, scenarios, qualitative research, living labs, speculative designs, foresighting, and modelling and tool development being delivered across the project's seven work packages.

In turn, subsequent iterations of this survey will be informed by the research from other work packages and consultation with our partners and Industry Reference Group to ensure ongoing relevance and targeted findings which support the project's objectives.





Scenarios for Future Living