



ELECTRIFY 2545

community pilot

LESSONS LEARNT 1

August 2024 – November 2024

ELECTRIFY 2515 COMMUNITY PILOT LESSONS LEARNT REPORT NO. 1 August 2024 – November 2024

Report Date: 29 November 2024

Author: Calum Harvey-Scholes (Rewiring Australia)

Contributors: Kristen McDonald (Rewiring Australia), Kate Minter (Rewiring Australia), Elsa Evers (Rewiring Australia), John Buchelin (Rewiring Australia), Romele Constantino (Endeavour Energy), Sam Cawthorne-Kitching (Brighte)

Contact: Nigel Freitas, Head of Government and Enterprise | Enterprise@brighte.com.au

Project Contact: hi@electrify2515.org | www.electrify2515.org

This Project received funding from the Australian Renewable Energy Agency (ARENA) as part of ARENA's Advancing Renewables Program. The views expressed herein are not necessarily the views of the Australian Government, and the Australian Government does not accept responsibility for any information or advice contained herein.

(2024/ARP762 (PRO-236))

Contents

1	PROJECT BACKGROUND	2
2	EXECUTIVE SUMMARY	4
3	KEY LEARNINGS	5
3.1	Topic: Households	5
3.1.1	Lesson: Long-term engagement has bolstered recruitment	5
3.1.2	Lesson: Household understanding and education of electric upgrades	7
3.1.3	Lesson: Strata and rentals need targeted recruitment	8
3.2	Topic: ‘HEMS’ technologies	9
3.2.1	Lesson: Using ‘Smart energy device’ instead of ‘HEMS’	9
3.2.2	Lesson: HEMS product maturity	9
3.3	Topic: HEMS installation	11
3.3.1	Lesson: HEMS installation market	11
4	Conclusion	12

1 PROJECT BACKGROUND

The Electrify 2515 Community Pilot aims to create the electric future in a real community today. This innovative research project will empower a community to create efficient, electric homes. Initiated by a group of passionate locals in the 2515 postcode area and driven by Rewiring Australia, Brighte, and Endeavour Energy, householders will be offered subsidies, support and technology to help reduce their emissions and energy bills. By studying the installation journey closely, and gathering energy data and feedback, the pilot will provide critical research to accelerate Australia's transition to a smart, electric future. The insights gained will be crucial in shaping policies and practices for a smart and efficient energy system nationwide.

Project objectives

1. Demonstrate capability with currently available 'home energy management system' (HEMS) technology (aka 'smart energy devices') and the level of integration possible with consumer energy resources (CER).
2. Study and evaluate the household electrification journey to understand supply chain readiness and opportunities for cost efficiency.
3. Evaluate consumer behaviour towards electrification, including purchasing decisions, degree of energy literacy and willingness of households to transfer varying levels of CER control.
4. Demonstrate the value of CER across device types and level of CER orchestration (self-managed vs aggregator or VPP controlled).
5. Quantify the impact of electrification on the local network to better understand future network augmentation investment needs and tariff structures.

This is the first of five Lessons Learnt reports for the project. The lessons in this report are based on activity to deliver the following outputs: establishment of the project, installation of ten HEMS, recruitment of seven installers, and initial household recruitment (15 October). This report focuses on the recruitment and the installation of HEMS. Below is an overview of the process and devices that were installed during this milestone.

The initial phase of recruitment has involved launching a [website](#) with an application form. Publicity has centred on a media launch with the Federal Minister for Climate Change and Energy and a community launch event attended by 600 local residents. Over 250 applications have been received as of 14 November, more than enough for the 50 places in Milestone 3.

Project achievements to date

The selection of ten trial participants:

- Ten households with electric appliances (no gas on site), rooftop solar and a home battery were selected. Many of these battery and rooftop solar systems and other appliances were between four and ten years old, reflecting older models likely to have reduced functionality compared to newer versions. These were likely to represent more challenging retrofit cases involving appliances with lower interoperability. On the other hand, older inverters could benefit most from the addition of a CSIP-AUS compliant device capable of dynamic export

management – this value is something the Pilot will continue to investigate in future.

The installation of ten HEMS:

- Ten HEMS were installed as a trial for wider deployment. Three different models were allocated across the homes: Clipsal Cortex (x4), Catch Control (x4) and Combined Energy's Energy Management Unit (x2). In addition, complementary controllers were installed where appropriate and applicable, such as infra-red blasters for A/C control (e.g. Sensibo), and relays. These devices allow for fine-grained monitoring of the electricity consumption of devices and individual circuits as well as control abilities, including load control and dynamic export.

The recruitment of seven installers

- A scan of local installers identified over 70 based and operating in the Illawarra installing one or more of the technologies in the Pilot.
- These were evaluated based on public reviews, the range of technologies they could provide and whether they identified with the mission of Electrify 2515, including having proactively engaged with the project in the past two years.
- This process identified seven installers. Brighte carried out onboarding, accreditation and training for these seven installers prior to the delivery of the ten trial installations.

2 EXECUTIVE SUMMARY

The project has so far begun the initial round of recruitment of participants, engaged householders and installed ten HEMS (aka ‘smart energy devices’). The lessons reported below focus on learnings in those areas.

Table 1 Summary of lessons learnt

Topic/Lesson	Learning	Category
<u>Topic: Households</u>		
1. <u>Long-term engagement has bolstered recruitment</u>	Community engagement and local messaging builds trust and enthusiasm.	Social/consumer.
2. <u>Household understanding and education of electric upgrades</u>	Households need better access to trusted information and decision support.	Social/consumer; customer offers.
3. <u>Strata and rentals need targeted recruitment</u>	Applications from strata, renters and landlords have been low. Targeted messaging planned.	Social/consumer.
<u>Topic: HEMS technologies</u>		
4. <u>Using ‘Smart energy device’ instead of ‘HEMS’</u>	‘HEMS’ is not widely understood. Pilot will trial ‘smart energy device’.	Social/consumer.
5. <u>HEMS product maturity</u>	Device functionality and integration with other appliances varies between brands.	HEMs; Integration of CER.
<u>Topic: HEMS installation</u>		
6. <u>HEMS installation market</u>	Installers are largely not familiar with installing HEMS. Installation determines functionality. Training needed.	HEMs; industry-readiness and workforce

3 KEY LEARNINGS

3.1 Topic: Households

3.1.1 Lesson: Long-term engagement has bolstered recruitment

Category: Social/consumer lessons.

Engagement and uptake

Interest in the Pilot has been strong:

- Over 1/3 of occupied households (>1,500) expressed interest in the Pilot via a community-run expression of interest prior to the project.
- Over 700 locals registered for the November Pilot launch event in Thirroul.
- Over 250 formal full applications to join the Pilot have been received since launch on 15 October 2024.

Applications so far reflect a balanced mixture of the community.

- The spread of applicants' self-identified income level aligns with census data for the area as does the spread of employment statuses.

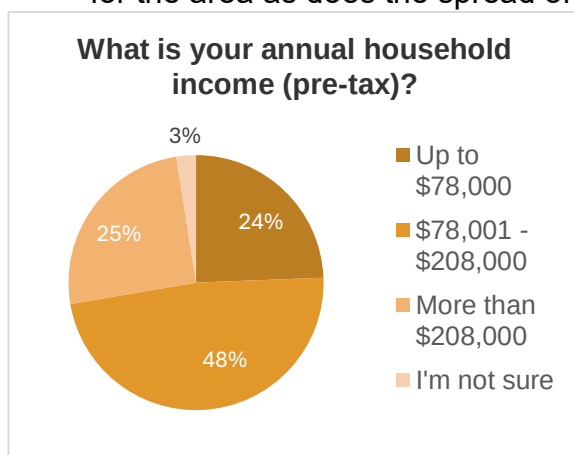


Figure 1 Applicants' self-identified annual household income.

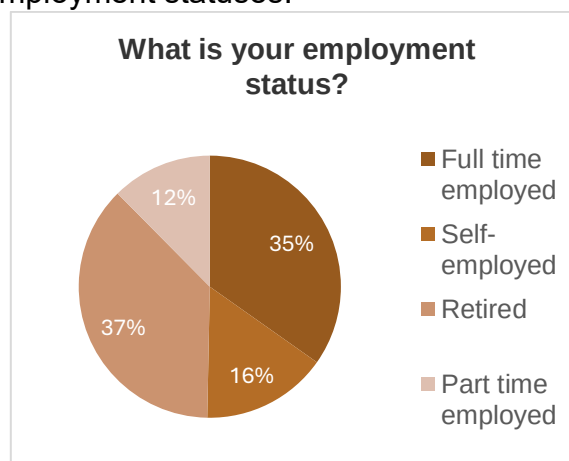


Figure 2 Applicants employment status.

Strong early application rates have been enabled by sustained and well-organised community engagement prior to the Electrify 2515 Community Pilot receiving funding. A volunteer-led community campaign had been running local activities since 2022. These have included:

- Developing and promoting the 'Electrify 2515' brand and setting an ambitious target to become Australia's first electric community,
- Producing a heat pump hot water buyers [guide](#) to provide practical advice on upgrading to an electric hot water system.
- Developing a solar rollout program. This partnership with quality-assured local installers who offered a discount to community members resulted in over 100 solar installations in the 2515 postcode 2023-2024.
- Hosting electric vehicle open days, where the public were invited to try electric cars and bikes with the vehicles' owners available to answer questions.

Since the launch of the Pilot, community engagement activities have continued with local and national media coverage, a town hall-style launch event, poster in and

presenting to the local community, social media engagement, and a drop-in service at the local library to ask questions.

This sustained engagement has built trust in the organisers and awareness of household electrification. This appears to have generated a neighbourhood effect where an enthusiastic core of locals has propagated greater interest and uptake.

Clear communication of financial payback and support have supported engagement and uptake among households.

- Rewiring Australia has put financial savings and payback at the centre of its national messaging. Pilot communications have also led with these benefits.
- Simplicity and transparency in Pilot subsidies are helping recruitment. Having a straightforward dollar value (capped by percentage) is easily understandable.
- The pilot team built a [subsidy calculator](#) on the Pilot website to help people to understand how the subsidies may apply to their situation. The page is one of the most visited on the website since its launch.
- Responses through the application form show that finance is popular. Around 25% of applicants said that they would consider a loan to help cover the costs of new electric appliances. 24% were unsure if they would consider a loan.

Implications for future projects:

- Community engagement is important. Tailored local messaging and emphasis on local context, collaboration and benefits is effective in encouraging enthusiasm and participation.
- Long-term investment in delivering such messaging from independent sources using local networks to elevate local voices and experiences is valuable to build community understanding and generate trust. This can counter distrust or confusion consumers feel about who they should listen to when making decisions regarding their home and finances.
- The 'neighbourhood effect' whereby householders are influenced and gain confidence by what their neighbours do is impactful and targeted local-based campaigns can be effective to in fostering this norm and shared awareness.
- Local publicity, events and participation campaigns run and fronted by locals have effectively communicated the Pilot and galvanised participation.
- Communication of financial benefits (e.g. bill savings) and subsidies works well when it is clear and straightforward.
- Transparency is essential so that people understand what they will need to pay out of pocket and how much they could receive as a subsidy. This establishes trust and facilitates informed decision-making.
- Many householders are open to finance to help purchase electric appliances – Government and others should explore and experiment with ways to provide low-cost and trustworthy finance to accelerate household electrification.

3.1.2 Lesson: Household understanding and education of electric upgrades

Category: Social/consumer; customer offers.

Households desire simplicity and lack trust

- In our original 'Expression of Interest' survey:
 - The third most common reason reported for not having installed an electric appliance already was not knowing how to go about it, being confused or unaware (cost and renting were most common reasons).
 - Respondents expressed a lack of trust in installers, government and others who they do not perceive as independent.
- Discussions with potential participants to date installing new technologies and electric appliances is complex, involving lots of information, decision points and vendors. Independent advice on electrification is not readily available for householders.
- Many households require education and support to fully understand a HEMS.

Climate and health impacts of gas

- Conversations with the community have revealed that the impacts of gas are often underestimated. Gas is perceived as 'clean' and 'low emissions' despite the toxins released when it burns and its high carbon emissions.

Appliance demand in early applications

- Applications have revealed strong demand for batteries (74%) and electric vehicle chargers (52%) despite the relatively high investment required of batteries and electric vehicles. Battery applications are distributed evenly across income segments. This could be interpreted as a strong understanding of the benefits and the desirability of these electric upgrades.
- Strong demand for hot water heat pumps (n=110) compared to resistance hot electric hot water systems (n=8) suggests a good understanding of the benefits of a heat pump compared to resistive electric heating (despite the higher cost).

Implications for future projects:

- Trusted, independent provision of household advice on electrification is needed. This could come from non-profits, consumer advocates, or government bodies.
- Enhanced public education of the true impacts of gas would be socially beneficial.
- Helping consumers streamline decision making and touch points to reduce complexity of product and vendor choices facilitates electrification uptake.
- Education benefits being maintained for the medium to long-term as electric upgrades are long-term decisions made by householders and information needs to be available before and when people come to replace an appliance.

3.1.3 Lesson: Strata and rentals need targeted recruitment

Category: Social/consumer benefits, challenges, and lessons

Strata and rental properties

- Electrify 2515 has communicated clearly online, in media, and at events that renters and landlords are invited to apply and participate in the Pilot.
- 94 renters in 2515 responded to the 2022 expression of interest in the Pilot, indicating a desire for electrification among renters.
- However, applications from apartments and strata properties as well as renters or landlords are under-represented so far.

Table 2 Summary of applications for strata and rental properties

	Total applications (out of first 250)	Percentage of applications	Percentage in census data
Apartments	6	2.5%	8%
Townhouse	11	4.4%	10%
Rental properties	6	2.5%	19%

- Among the five landlords who have applied, three report reducing energy bills as their primary motivation for applying, the other two report climate and reducing the upfront costs of appliances (both mention bill reduction as their second or third reason).
- The low uptake is not surprising to the project team; apartments and renters are under-represented in solar uptake across Australia (and more widely). This has recently prompted state and federal government investment in programs targeting strata and rental properties.
- These cohorts face additional barriers to electrification including the well-documented split incentive for rental properties and the challenge of navigating strata processes for rooftop solar and other energy upgrades. Being a renter was the second most reported reason for not having installed an electric appliance in the 2022 expression of interest.

Implications for future projects:

- A tailored and targeted approach is required to engage and recruit both rental and strata households. The Pilot will develop dedicated materials and communications to support this recruitment.
- The project team will engage in targeted engagement with real estate agents to leverage their networks of rental and strata properties. We will also explore reaching out to strata organisations such as local owners corporations.
- The low initial uptake supports broader experience that incentivising electric upgrades for rental properties across the country may require more than education and incentives. Additional options may involve regulation (e.g. bans on new gas appliances, minimum standards, public energy performance ratings) or alternative policy approaches to enable renters to access cheap renewable energy (e.g. plug-and-play solar panels, solar gardens).

3.2 Topic: 'HEMS' technologies

3.2.1 Lesson: Using 'Smart energy device' instead of 'HEMS'

Category: HEMS; social/consumer.

Initial conversations and engagement activity showed that, despite 'HEMS' (home energy management system) being a term used and accepted in the industry, the public do not know what a 'HEMS' is.

- For the Pilot, partners will use 'smart energy device' as an alternative label and a phone icon to explore how well it communicates the technology and its use.

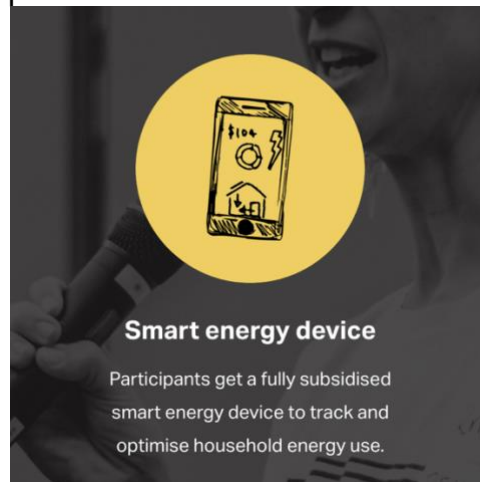


Figure 3 Screenshot from the Electrify2515.org website with 'smart energy device'.

Implications for future projects:

- The Pilot will continue to test and apply the use of this alternative term and report on further learnings or insights.
- This learning offers an important lens for the naming conventions for new energy technologies: Improved household understanding can facilitate recruitment, and therefore easily understandable naming conventions may be important to consider elsewhere (e.g. 'virtual power plants').

3.2.2 Lesson: HEMS product maturity

Category: HEMS; Integration of consumer energy resources.

HEMS functions

The HEMS provide two functions: 1) collecting energy consumption and behaviour data for research (specific to the Pilot) and 2) consumer visibility, control and optimisation of energy use (the core technology design function).

The project team's market review of available HEMS (partly drawing on data from work, in press, by the team at the Institute for Sustainable Futures¹). This review found that most devices are capable of monitoring but not load control.

¹ Daly, M., Langham, E., Tahir, F., Allen, S. and Briggs, C. Residential HEMS and controllers – Global Market Scan. Report prepared for the 4E Technology Collaboration Programme of the International Energy Agency. November 2024.

- Three devices with both monitoring and control abilities and broad interoperability were identified and trialled: the Catch Control, the Clipsal Cortex, and Combined Energy's 'Energy Management Unit' (EMU).
- The design of the latest models for these three manufacturers has converged on 6 current transformer clamps and a single relay (dry contact).
- They have not entirely converged on revenue model: all three charge for the hardware. One has an ongoing monthly subscription fee for use.

Breadth of monitoring and capturing granular data

- One objective of HEMS is to capture and leverage granular electricity consumption data at the circuit or appliance level.
- In addition to the CT clamps, communications integrations with appliances (e.g. solar inverters, hot water systems) can allow monitoring using the inbuilt metrology these appliances have rather than via a CT clamp.
- Three-phase sites benefit especially from integrations.

Identifying HEMS compatibility and integrations with other appliances

Communications connections (e.g. via RS485, Modbus) enable the HEMS to leverage the metrology and even control smart appliances (e.g. inverters, heat pumps). Some use WiFi, other integrations are reliant on physical communications connections; these can vary between brands and even between models. Without consistent communications protocols, bilateral integrations are required which limit interoperability – these are labour-intensive to establish and diverse in their commissioning. Each HEMS has a different constellation of integrations with which an installer must familiarise themselves. There is also no consistent process for presenting this information.

Cloud-based vs local controls

The full functioning of HEMS is hampered by the control architecture of some smart appliances, as reported in other recent field research projects.

- Smart appliances (e.g. home batteries) with cloud-based controls preclude or restrict integration. In contrast, those configured to be controlled locally are more readily harnessed and controlled by a household via a HEMS.

Implications for future projects:

- Open-source communications protocols for all electric home devices should be standardised and enforced to maximise load flexibility and allow for open competition between smart control devices.
- Future standards for home electrical appliances should prioritise open communications and local (rather than cloud) control configurations to empower householders to control their home energy system holistically.
- If available integrations and compatibility are not utilised in the installation, this can severely limit functionality: limited load control and reduced visibility of circuits constrains the demand flexibility and response capabilities. This has implications for household and network optimisation and value.
- HEMS manufacturers are already aware of the need for installer training but further consideration of mass upskilling as well as knowledge management and access and experience will be valuable for scaling this technology.
- A consistent organisation of information materials for HEMS could help both installers and householders to navigate.

3.3 Topic: HEMS installation

3.3.1 Lesson: HEMS installation market

Category: HEMS; industry-readiness and workforce

Installer knowledge

Installers require training and familiarity to get the most out of HEMS.

- Installers are familiar with setting up controls for individual appliances but connecting and coordinating all major energy appliances in a home is new territory for most of the Pilot installers.
- As described in Lesson 3.2.2, each HEMS is compatible with a different constellation of existing appliances. This variety requires significant pre-installation site knowledge and preparation for a smooth installation.

Retrofitting HEMS

Detailed knowledge of the make and model of key appliances (e.g. solar inverter, battery, hot water heat pump, electric vehicle charger) already installed on site prior to installation saves time as well as identifying how they integrate with the HEMS and the materials required (e.g. communications cables and connectors).

- Household-supplied photos can supply appliance nameplate information. But guiding householders to take good quality photos can present challenges.
- Site inspection is a more reliable, but costly, method.
- Within the Pilot, not inspecting the site prior to installation has led to unexpected site characteristics and longer installation times in some cases.
- Even for existing appliances (e.g. solar inverter) which do integrate with the HEMS, 'installer' access may be required to enable communication. The HEMS installer must seek access via the original installer or the manufacturer.

Pricing

The quotes received for ten trial sites revealed highly variable pricing.

- The average accepted quote for supply and installation was around \$1,800 (excluding GST) but there was a range of more than \$2,000 between the lowest and highest quotes received (including those not accepted).
- This reflects:
 1. Variation between sites with some more straightforward than others, and
 2. An immature market where pricing remains unstable.
- More broadly, combining the installation of a HEMS with another site visit (e.g. for service or maintenance) is likely to economise on time and costs.

Implications for future projects:

- The Pilot will investigate the scope for price convergence, cost reduction and service improvement.
- Knowing what models of appliance are on site is valuable. Installers having this information prior to installation may be able to streamline time on site.
- In general, installers' knowledge and capability would benefit from both:
 1. Generic education on the broad motivations and objectives of household energy optimisation and grid flexibility, and
 2. Detailed training on optimal installation for HEMS products.

4 Conclusion

This first Lessons Learnt Report has focused on householder understanding and the functionality and rollout of HEMS.

- Householder awareness and understanding of electric appliances and their benefits requires trusted and reliable information available over the medium and long-term.
- There is a diverse range of homes and appliance configurations and the ability of different HEMS to integrate affordably and effectively with this diversity of existing technologies remains uncertain.
- Installers are largely inexperienced with installing HEMS and ensuring that they are optimised for maximum utility (e.g. taking advantage of any communications integrations). Early experience suggests that electricians can learn quickly (over 2-3 installations).

The Pilot will continue to explore these uncertainties and identify improvements.

The next step for the Pilot is to identify the next 50 households to participate in December 2024. Installations for these participants are anticipated between January and April 2025. The first participant survey circulated around the first 10 households will be analysed as part of an iterative learning cycle before the next installations as well as to inform the broader research.