

Energy Security Board Customer Insights Collaboration, Release Three

Knowledge Share Report





# Contents

Program Introduction and Objectives	3
Methodology	6
Executive Summary	9
Current State Journey Map	19
Personas	20
Current State Journey Map	23
Phase 1: Engagement and Acquisition	26
Phase 2: Installation and Familiarity	27
Phase 3: Operations and Maintenance	33
Phase 4: Retention and Switching	36
Thinking about the Future	38
Future State Journey Map	45
Urgent Solution 1: EVSE Made Easy	46
Urgent Solution 2: Reliability Standards	48
Urgent Solution 3: Charging equipment as appliances '5 Star Label'	50
<ul> <li>Important Solution 1: Regulation and Standards</li> </ul>	52
Important Solution 2: Simplifying the Public Charger Interface	53
Important Solution 3: Standardising Connection Process and Safety Requirements	54



# Program Introduction and Objectives



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# Program Background

Whilst presenting significant opportunities for consumer and industry stakeholders to achieve mutually beneficial outcomes, the infrastructure and policies supporting Electric Vehicle (EV) charging are still in their stages of infancy. Much work is to be done to remove pain points to improve the experience for current EV owners and incentivise uptake for future customers.

As such, the Energy Security Board (ESB) recognised the need to better understand the current customer experience and develop a vision for the ideal customer experience for EV charging, which includes identifying the key interoperability standards and outcomes to achieve this vision.

This process bought customers to the centre of decision-making to develop an evidence base to inform initiative and policy design, through collaboration and iteration with industry stakeholders.





# **Research Objectives and Outcomes**

#### The job to be done

Build a knowledge and evidence base to be shared across the industry on customer perspectives of EV charging to:

 Develop problem statements and recommendations for initiatives and communications to inform the development of future solutions;



 Inform consideration of industry standards that enable interoperability.

#### Program objectives

Engage and collaborate with industry stakeholders to:

- Understand the current EV customer experience for vehicle charging including key pain points and incentives of behaviour; and
- Develop a future-state journey map for the electric vehicle charging experience inclusive of solutions to mitigate pain points and incentivise desired consumer behaviours.





# Methodology



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# Program Overview

The ESB and Forethought worked with industry stakeholders through multiple, varied forums. This process was collaborative in nature and allowed for iteration of the customer journey map, key insights and solutions.



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# As outlined in the program overview, five key forms and forums were used to build understanding of the current customer journey and ideate solutions to improve the future customer journey

#### Literature Review

An international literature review was conducted by ACIL Allen that bought together insights from varied international research studies conducted on EV charging. The insights within this report were leveraged by the ESB, Forethought and Stakeholder Steering Group (SSG) members to develop the current customer journey map and inform the development of solutions to improve the future customer journey. Marianne Lourey, Director at ACIL Allen presented these insights in person at the Second Insights Collaboration workshop.

#### Iterative Journey Mapping

A collaborative whiteboarding tool was used in the development of the current state journey map.

Forethought, ESB and SSG members were able to seamlessly collaborate and review the journey map in real-time and provide valuable input and comments as insights and perspectives on the EV charging journey surfaced.

#### Focus Group

A focus group of eight (8) Australian EV consumers was used as a tool to validate the current and future state journey maps.

During the session, consumers shared their experience with vehicle charging including key pain points, moments of truth, information gaps and key points. Further, potential solutions were tested. This included preferences around off-peak charging and innovative charging propositions – particularly appetite for delegating control of their charging schedule to third-party service providers.

#### Fortnightly Workshops

During these Fortnightly workshops, 26 SSG members collectively examined, discussed, and refined the journey maps, ensuring a shared understanding and consensus.

Additionally, the workshops prompted members to engage in forward-thinking exercises, encouraging them to envision and contemplate the future state journey.

Robert Wilson from Energy Queensland, Nicholas Gurieff from enX consulting, and Grant Stepa an Independent Advisor shared findings on their respective subject matter expertise relevant to EV charging and shared case studies as well as customer research.

#### Collaboration Workshops

Two in-person Collaboration Workshops were conducted which focused on developing the current state journey map as well as a zero-based future state journey map.

The first Collaboration Workshop was conducted in Sydney. During the session, SSG members developed the foundations of the current state journey map.

The second Collaboration Workshop was held in Melbourne where Marianne Lourey from ACIL Allen shared insights on EV charging, drawing from international perspectives. During the session, participants ideated solutions using design principles.



# Foreword from Anna Collyer, Chair, Energy Security Board





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# Customer Insights Collaboration Release Three Electric Vehicle Charging

On behalf of the Energy Security Board, I am pleased to release the Knowledge Share Report about electric vehicle (EV) charging for Release Three of the Customer Insights Collaboration.

This report and the accompanying review of the international EV charging experience contain rich insights that shed light on a range of detailed design issues the ESB and the market bodies are working through as part of the CER Implementation Plan. The window into the issues that EV drivers are encountering today and their expectations for the future that this work provides is helping us form a much clearer view about how people want to charge their EVs, and the use cases and functionalities that should be prioritised as part of work on regulation and standards for consumer energy resources.

Stepping back from the detail, however, the big and enduring message in this work is just how important it is that we get user experience of charging EVs right - whether that is at home, at work, at the shopping centre, or when on a family holiday. Right so that we smooth the way for the mass adoption of EVs to electrify and decarbonise transport, and also right so that we make it as easy and attractive as possible for people to manage when and how they charge in ways that are not just good for them but good for the electricity grid that we all rely on.

While there are only around 100,000 EVs on the road in Australia today out of around 20 million in total, adoption has taken-off this year. EVs outsold petrol in Australia's medium car category in the first quarter of 2023. According to CSIRO's <u>latest analysis</u> of EV uptake, there could be more than 20 million EVs on the road by 2050.

These stunning numbers, and the commitment from the Australian Government through the <u>National Electric Vehicle Strategy</u> in April, as well as the significant investments state governments are making in charging infrastructure and funding to help people buy EVs, should remove any doubt that the electric vehicle revolution is here.

As part of the design and execution of the CER Implementation Plan, The Energy Security Board has been developing advice for Energy Ministers about the interoperability and other technical standards needed for Electric Vehicle Supply Equipment (EVSE) in Australia.

The insights gathered through Release Three of the Collaboration - which paint a picture of the customer journeys for electric vehicle charging, from purchasing an EV, to making decisions about which charging equipment to buy, and how to use it - provide a critical real-world context for the detailed, technical, regulatory and market work that needs to be done to make charging equipment and all the supporting systems work seamlessly.





# Customer Insights Collaboration Release Three Electric Vehicle Charging

The insights in this Knowledge Share Report raise a set of foundational questions that can guide us as we go about building the EV charging ecosystem that caters for the diverse needs of Australian drivers, including:

- How can we streamline the customer journey for charging and provide the independent, trusted information consumers need to choose charging solutions that are right for them from an exciting but also complex array of products and services?
- How do we ensure that Australians who face barriers to charging at home because they rent, or do not have off street parking, have good charging options?
- How do we make it easier for consumers to manage their charging at home, integrating the charger with other appliances if they want to and using their own rooftop solar PV if they have it?
- How do we make it easier for EV drivers to locate, use and pay for public charging using their smartphones, credit cards and preferred modes?
- How do we win the trust and confidence of EV drivers to allow service providers to manage their charging on their behalf and try other innovative charging propositions that can unlock the value of flexible demand?
- How do we learn from the experience of countries who are ahead of Australia in the adoption of EVs, while adapting the technologies and services for local conditions?

As with releases one and two, this work on electric vehicle charging has drawn on the expertise of consumer and industry stakeholders, energy ombudsman services, as well as the great work being supported by ARENA and our universities. While it is early days in the EV rollout in Australia, the great work being done by these organisations is providing an invaluable window into what is happening on the ground, and insights about how to answer these big questions.

I would like to thank everyone who participated in Release Three, particularly the members of the Stakeholder Steering Group who gave up hours of their valuable time in the workshops and fortnightly meetings to share their insights about the charging challenge.

The insights from Release Three, as well as the broader learnings from the Customer Insights Collaboration are a critical input into the ESB's and market bodies' advice to Energy Ministers on EVSE matters, as well work on standard setting and consumer protections under the CER Implementation Plan more generally. The insights are intended to serve as an open-source resource for policy-makers and industry developing EV charging frameworks.

As we saw with rooftop solar PV, consumers are (in this case literally) driving the EV revolution and I am optimistic that by putting them at the heart of our work, we can build a charging ecosystem that works for everyone.

Anna Collyer

Chair Energy Security Board





# Executive Summary



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#### Current EV owners are generally heavily engaged, early adopters

We are in the early stages in the development of EV & EV charging products and services in Australia, with only approximately 100,000 EVs on the road today. This early stage is typically associated with highly engaged consumers who are interested in and able to take the time to inform and educate themselves about new technologies and services.

#### Even heavily engaged early adopters are having difficulties with their charging experience

There are indications that even 'early adopter' consumers are finding it difficult at times to navigate the market and manage their charging. It is conceivable therefore that these pain points will increase as more people who are potentially less engaged start driving EVs, as we are seeing internationally (explored by ACIL Allen in the literature review).

#### Charging is generally an afterthought in the EV research and purchase experience

The purchase of an EV represents a large investment to the average consumer. For many consumers it is the second biggest investment they will make after their home. Given how significant the purchase of a new car is, charging options and charging equipment are often secondary objectives in the grand scheme of the purchase decision.





#### Running costs are a key trigger of EV purchase

One key reason people are attracted to EVs is because of lower running costs. That is, that the cost of running and maintaining an EV over the life of the vehicle is believed to be lower than for running an internal combustion engine ('ICE') vehicle.

#### More needs to be done to create lasting charging behaviours

Consumers want the process of charging their car to be as simple and easy as filling an ICE vehicle with petrol, however the required changes to behaviour from ICE vehicle to EV are significant, with some not making decisions about charging until post-purchase of EV or outside of what is provided to them by their car manufacturer/ retailer during the purchase experience. Subsequently, this decision also acted as an initial barrier to adoption.

#### Current preference is to charge at home, which is difficult or impossible for some

The first preference for most people driving EVs in Australia today is to charge their car at home. However, whether they can do so is heavily dependent on whether they have off-street parking with access to power points and the ability to install EV charging equipment. People who do not have off-street parking, rent, or live in apartment complexes face significant barriers to home charging and will rely more heavily on public charging infrastructure.



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#### Consumers are generally opting for cheap charging alternatives

Many consumers are adopting cheaper alternatives to installing dedicated fast chargers at home, such as trickle charging using standard wall sockets (or slightly upgraded wall sockets) and the 'Mode 2' charging cable provided by their vehicle manufacturer. Installing and integrating EVSE in the home may require wiring upgrades and can encounter interoperability issues which can be time consuming and costly to resolve, where significant investment has already gone into the purchase of the vehicle itself. There are differences across the country in the way electrical technical and safety rules, network connection and other requirements are specified that could be streamlined and aligned to enhance the customer journey for installing charging equipment.

#### Incentives to charge at off-peak times are attractive to many consumers

There are a range of Australian studies underway exploring how EV drivers are using their vehicles and their charging patterns. Early insights are showing that there is a diversity of charging behaviour at different times of the day and week, with some but not all consumers charging their EV at peak times. Many consumers are keen to take advantage of low-cost electricity, particularly charging their EVs with their own solar generation. The studies to date do suggest there is potential for price and other signals to influence charging behaviour, and importantly, unlock the value of flexible charging to support energy system outcomes for all energy consumers.



#### Stakeholders preferred incentives, rather than mandates to influence charging behaviour

Importantly though, for incentives and other signals to be effective in influencing charging behaviour, they need to be structured in ways which are aligned with consumer needs, expectations, and values, and supported by good communication and engagement. Indications to date are that incentives to influence charging behaviour would be better accepted by consumers than mandating charging around peak and off-peak charging times.

# Improving accessibility and quality of information is key to reducing anxiety in the research and purchasing journey

Large investment purchases such as a car are often associated with anxiety as well as a significant time investment researching and shopping around. It is therefore critical that information is easy to find, easy to understand and provides comfort in decision making. Many people are seeking advice from friends and family with EVs, as well as social media and internet forums, for information and advice about EVs and charging options. Beyond these sources, there is a lack of independent, easy to access information for consumers about EV charging equipment and services, and how to manage their charging. The Stakeholder Steering Group noted important initiatives to address this gap being developed by Energy Consumers Australia, Standards Australia, and others.



#### Range anxiety still a key barrier to uptake of EV's and a positive customer experience.

A key barrier for buying an EV remains range anxiety. Key ways to address range anxiety include:

- Increasing the availability and visibility of public charging.
- Educating consumers about driving and charging requirements (e.g., range anxiety is often misperceived and unwarranted).
- Making it as easy as possible to charge EVs at home and in other places, including by making it easy to purchase, install and operate charging equipment.
- Streamlining the process of public charging through ease of use apps and payment methods

# Greater transparency to consumers about walled-gardens was considered vital to improving consumer outcomes

It was acknowledged by the SSG that interoperability issues can limit consumer ability to manage their charging and integrate their equipment in the home in a way that is convenient and financially beneficial. At the very least, consumers should be informed about the functionality of the equipment they are buying and are aware about the extent to which it integrates with other equipment and can be supported by other service providers.



# Executive Summary: Achieving the Desired Future State

# It was agreed that Australia must adopt technologies and regulations that have shown success internationally but ensure that we are adapting them to the Australian context

The EV revolution is a global phenomenon, and Australia's position in some respects as a 'technology taker' should inform the way we think about market development and policy but, critically, does not mean we should be passive adopters.

While Australia is well behind many jurisdictions in EV uptake, we should be ambitious about learning and building on what is working overseas such that we are selective about which technologies we take and which we don't. SSG members see merit in Australia adapting and implementing international approaches to interoperability where EV driving and charging experience, and energy consumer outcomes generally, are being prioritised as part of standards, regulation, and policy development. Care must also be taken to ensure that internationally adopted standards are applicable for the Australian context. We also need to make sure we design and implement EV charging frameworks quickly but carefully. Whilst consumers want and need quick and decisive action to lay the foundations for EV charging experience and outcomes into the future, they are unlikely to support any actions that substantially increase prices – particularly if it adversely impacts purchase price or running costs of an EV.



# Executive Summary: Achieving the Desired Future State

#### A key ingredient to integration success is coordination across market participants

There is genuine excitement about EVs and the potential for them to electrify and decarbonise transport, and be successfully integrated into homes, businesses and the grid in a way that works for everyone. SSG members agreed that given the nature of the changes associated with EVs, unlocking this potential would require high levels of collaboration and coordination across industry, government and civil society. The issues around how EV charging is integrated into the electricity grid that are part of the ESB's EVSE-related work are part of a much broader transformation that needs to be kept in view. While the future is uncertain, there was strong support for the proposition that enabling great charging options and experience for EV drivers, and efficient integration with the electricity grid - including unlocking the value of flexible charging - were two sides of the same coin.

There was also a view that coordination across operators in the energy industry is required to ensure ease of implementation for all market participants. The Group agreed that national standardisation across Distribution Network Service Providers (DNSP's) was required to ensure manufacturers did not have to adapt products and services at a state-by-state or region-by-region level.



# Executive Summary: Achieving the Desired Future State

# There was low awareness of future innovations but to achieve the required outcomes for consumers, building trust and improving transparency is required.

Vehicle-to-Grid (V2G) and other charging innovations are not top of mind for many consumers right now, but the technology and services are advancing, and we should develop frameworks to make it attractive for consumers. Visibility about how the charger is being managed, the ability to override external controls and other principles are critical for trust and confidence. For example, there is perceived risk of damage to life of battery with some of these applications and ensuring proper governance and incentives are used to enable V2G and other charging innovations. A non-negotiable for consumers, is that any personal data that is shared is protected.



# Current State Journey Map



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Consumers may have different preferences for their EV charging infrastructure driven by various factors at play within a consumer's life such as their own values, socio-economic status or jurisdictional laws. As such, journey maps have been built with the following personas in mind....



#### The Renter (no off-street parking)



EV consumer who lives in a rental property / no off-street parking. Does not have the ability to home charge and 100% reliant on public charging.

#### **Key Pain Points**

- Too many apps, difficulty in understanding variable cost structures
- Wait-times to charge and lengthy charging times makes it personally inefficient
- Concerns of personal safety (especially when charging on own in the evenings)

#### How might we

- Make the public charging infrastructure easy to find/use and cost effective
- Minimise down-time or increase personal efficiency whilst charging
- Provide security of personal safety whilst charging

The Strata (needs permission)



Whilst they have off-street parking, they are forced to go to lengths for strata permission to install EVSE. They may not always get this permission.

#### **Key Pain Points**

- Too much red tape in installing EVSE in their building
- · Not allowed to install EVSE in their building
- Being the only one in their building with EVSE and stranding the asset

#### How might we

- Ensure that new apartment buildings have easy-access to charging
- Simplify the process of approving EVSE

#### Technically Constrained (as we move into a mature adoption curve)



Consumers may struggle to make sense of the technical language associated with this category and therefore will find it difficult to make decisions without help.

#### **Key Pain Points**

- Not enough information or too much assumed knowledge in the industry as it pertains to charging and charging equipment
- No central source of information or truth in the industry to provide unbiased advice

#### How might we

- Simplify language for new EV owners
- Make information easy to reach and easy to understand





#### Capable but time poor (can understand but don't have the time)



These individuals can make sense of the technical language and aspects but still find it an onerous task that takes more time than they have.

#### **Key Pain Points**

- · Too hard to find public charging
- Information on EVSE too difficult to find online
- Trickle-charging takes too long

#### How might we

- Increase access to EVSE
- Make information about EVSE easy to reach
- Simplify ability to find public charging

Long Drives (Do many km's / could be regional)



Individuals who regularly drive long km's may have EVSE at home but regularly need to top up whilst on the road.

#### **Key Pain Points**

- Not enough public chargers (range anxiety)
- Lack of access to 3-phase power to install EVSE
- Too hard to find public charging

#### How might we

- Increase access to EVSE for regional areas
- Increase the availability of EVSE
- Simplify ability to find public charging

#### Forced to Upgrade (Have to invest additional \$)



Because of geography or age of home, these individuals are forced to invest additional resources. Sometimes this comes as a shock at installation, after they have already invested in a smart meter.

#### **Key Pain Points**

- Frustration of finding out too late that upgrades are needed
- Having to find money for an unplanned large expense
- Feeling forced to pay for upgrades because they have already invested in a smart meter

#### How might we

- Make them aware that this might be a possibility at time of purchasing their EV
- Provide them with an easy way to determine themselves whether this is something they need to plan for





### Current State Journey Map: Potential actions taken by consumers





### Customer Experience Journey Engagement & Acquisition

#### Goals

- · I want to reduce my carbon footprint
- · I want to reduce the costs associated with running & maintaining a vehicle
- · I want a vehicle that provides the optimum driving experience
- · I want my car to reflect my aspirational social status
- · I want to make a good decision about the right EV for me
- · I want the decision process to be simple & easy



#### Pain points

- · Advice I receive is sometimes biased and/or not accurate
- · It's difficult to know where to get information about the EV market
- · Once I find information, it is often difficult to understand
- I'm concerned that if I buy an EV, I won't be able to charge when I need to
- · Information I am able to obtain is inconsistent
- · I have no way of determining which information sources I can trust
- · It is time consuming & effortful to educate myself on what solution will best fit my needs
- Car manufacturers don't provide any or enough information about how to charge my vehicle

#### **Gain points**

- · Help me to easily find the information I need to make a good decision
- Help me to easily find sources of advice that I can trust
- Provide information to me in an easily digestable format that I can understand
- · Reassure me that there will be public charging facilities available if I need it
- Give me a single source of truth in a centralised place
- · Help me to quantify the benefit of buying an EV on the environment



### **Customer Experience**

#### Engagement & Acquisition

#### Goals

I want to reduce my carbon footprint I want to reduce the costs associated with running & maintaining a vehicle I want a vehicle that provides the optimum driving experience I want my car to reflect my aspirational social status I want to make a good decision about the right EV for me I want the decision process to be simple & easy



#### **Upfront Decision Process:**

Like the purchase of any motor vehicle, the acquisition of an EV signifies a substantial investment for the average consumer, often ranking as the second largest investment after purchasing a house. Significant purchases such as these typically evoke feelings of anxiety and fear which is coupled with substantial investment of time and effort. Naturally, consumers strive to alleviate these concerns by seeking information that mitigates risk and provides reassurance.

#### There are various factors that trigger consumers into the purchase of an EV, including:

- Desire to reduce their carbon footprint;
- · Desire to lower the costs associated with vehicle operation and maintenance;
- · Seeking an optimal driving experience; and
- · Owning a car that reflects their desired social status.

Once consumers have made a decision to purchase an EV, they want to feel confident in their choice and be re-assured that the EV chosen aligns with their needs.

# The switch from an ICE vehicle to an electric vehicle does create increased anxiety during the decision-making process due to:

- The nascent nature of the industry and the lack of technology, infrastructure and policy supporting electric vehicles; and
- The lack of information provided to consumers about charging and charging options.

Overall, the upfront decision-making process was time-consuming and costly. This often results in consumers experiencing decision fatigue by the time it comes to selecting and purchasing their charging kit or EVSE.





### **Customer Experience**

#### Engagement & Acquisition

#### Goals

I want to reduce my carbon footprint I want to reduce the costs associated with running & maintaining a vehicle I want a vehicle that provides the optimum driving experience I want my car to reflect my aspirational social status I want to make a good decision about the right EV for me I want the decision process to be simple & easy





#### **Upfront Research:**

Currently, consumers face significant challenges in finding centralised and unbiased information about EV's, charging and charging equipment. The lack of easily accessible sources means consumers are researching on various platforms and sometimes the information they obtain may be inconsistent. Further, consumers are unsure which sources of information are trustworthy. Online research and videos often fall short in providing clear understanding, but reviews and tutorials on YouTube have become a-go-to resource.

#### **Prioritising Provision of Information Related to Charging:**

Many consumers do not actively think about charging options during this phase. EV charging and EV charging options are generally a secondary objective of the purchase decision. Thus, procuring the best value charger and being provided with reassurance that public charging facilities will be readily accessible whenever needed is also vitally important.

Although EV owners have the opportunity to speak to car dealers, there is a growing concern about information coming from car dealers as they may not offer adequate information about charging and even when they are provided with information there are doubts about the value of the advice. Therefore, there are risks that consumers feel that they are not provided with enough information about how to charge their EV's, in general.

Overall, the process can be time consuming and a lot of research needs to be conducted before consumers find the best solution that fits their needs. Even with highly engaged consumers who are willing to take the time to educate themselves, they find it difficult to find the right information they need to make the right decision.



#### Installation & Familiarity Goals Find installer I need to understand how to operate my vehicle. I need to understand when to charge and for how long **Buy EVSE** Get quotes I need to understand how public charging works including how I pay for installation I want to be able to take advantage of my home solar to charge my EV I need to figure out what kind of EVSE will suit my needs Upgrade home I need to work out whether EVSE is viable for my circumstances to 3 phase power I need to find someone I can trust to install my EVSE I need reliable advice re: EVSE that I can trust Installation I want to be able to improve efficiency of home charging Yes I need to learn how to use my EVSE No Yes Determine feasibility Speak to strata / landlord Other EV Approval Dealer owners Get quotes for charging kit Strata/Renta Energy plan Online (eq. Forums) subscriptions RESEARCH ESVE Tarriffs and Energy Electrician best times to charge retailer The **EV Charging** Battery Apps range apps retailer LEARNING How to Public Receive car & drive car charging manufacturer kit Decide to upgrade from trickle charge to EVSE Charging times Download apps

#### Pain points

#### **EVSE Purchase & Installation**

- Unless myhome is supported, infrastructure upgrades are needed and expensive
- Finding out after I've bought an EVSE that my home infrastructure needs upgrading
- It was difficult to figure out what kind of EVSE I needed (it's complicated)
- If I live in an apartment, I need to get permission to install an EVSE which is not always possible.
- It's really hard to get clear and consistent information & advice about options
- EVSE systems are not portable which makes it unfeasible if you live in a rental property
- Difficulty in finding someone who can install and upgrade If necessary
- Some charging systems are locked in which means once I buy, I'm stuck

#### Public charging

- The amount of apps required is overwhelming
- There are different apps needed for finding charging locations that are compatible
- with my car
- There are different apps used for paying and using the charger

#### Gain points

- It would be helpful if decisions about EVSE can be made at the same time as buying the vehicle
- I don't want any nasty surprises when I do buy an EVSE
- Help me to easily find the information I need to make a good decision about EVSE
- Help me to easily find sources of advice about EVSE that I can trust
- Provide information to me about EVSE in an easily digestable format that I can understand
- Give me one app that provides information about public charging
- Give me one payment solution that works wherever I go and works for every public charging station





#### Installation & Familiarity

Goals Find installer I need to understand how to operate my vehicle. I need to understand when to charge and for how long **Buy EVSE** Get quotes I need to understand how public charging works including how I pay for installation I want to be able to take advantage of my home solar to charge my EV I need to figure out what kind of EVSE will suit my needs Upgrade home I need to work out whether EVSE is viable for my circumstances to 3 phase power I need to find someone I can trust to install my EVSE I need reliable advice re: EVSE that I can trust Installation I want to be able to improve efficiency of home charging Yes I need to learn how to use my EVSE No Yes Determine feasibility Speak to strata / landlord Other EV Approval Dealer owners Get quotes for charging kit Strata/Renta Energy plan Online subscriptions (eg. Forums) RESEARCH ESVE Tarriffs and Electrician Energy best times to charge retailer 4 Battery The **EV** Charging Apps range apps retailer LEARNING How to Public Receive car & drive car charging manufacturer kit Decide to upgrade from trickle charge to EVSE Charging times Download apps

Range anxiety:

As exemplified in the literature review, range anxiety was identified as a significant concern for consumers. More can be done to provide information to alleviate anxiety.

Specific aspects identified in the learning process include:

- Learning the new features of their EV such as what the displayed range actually means;
- · Learning how range is impacted by traffic; and
- Learning how much charge is required for an average / typical journey

#### Researching about chargers after purchasing EVs:

Many consumers only start learning about charging during this phase and are **investing significant time in understanding**:

- Optimal charging times and durations;
- · How public charging stations work; and
- Public charging payment methods.

This is not necessarily aligned with **expectations** which is for the process of charging their EVs to be as simple and convenient as filling up an ICE vehicle with petrol.





#### **Using Public Charging Stations:**

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Consumers face various challenges when using public charging stations, **spanning across both the Installation and Familiarity Phase as well as the Operations and Maintenance Phase.** 

One challenge includes the discovery of **numerous subscription services available**, rather than a convenient one-stop-shop solution. Finding and accessing these subscription services can be difficult unless consumers are already aware of their existence.

Many consumers are also **disappointed** to discover that contrary to their initial expectation of a universal payment system, **there are separate payment apps for different providers.** 

Furthermore, the **availability of public charging stations** poses another pain point, with **many unaware** of where to charge if they do not have access to apps that provide this information.





#### **Researching EVSE:**

Some consumers may choose to **enhance the efficiency of their home charging setup** and take advantage of their home solar to charge their EV. Consequently, they will start to determine the feasibility of implementing EVSE and explore suitable charging solutions tailored to their requirements.

Once consumers decide they would like to adopt EVSE, they will also start finding a reliable professional who can install the EVSE and provide them with instructions on how to use it.





#### **Consumers Utilising Cheaper Chargers**

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Many consumers are **adopting cheaper alternatives to installing dedicated fast chargers** at home, such as trickle charging using standard wall sockets (or slightly upgraded wall sockets) and the 'Mode 2' charging cable provided by their vehicle manufacturer.

Installing and integrating EVSE in the home may require wiring upgrades and can encounter interoperability issues which can be time consuming and cost money to resolve. There are differences across the country in the way of electrical, technical, and safety rules, network connection and other requirements that could be streamlined and aligned to enhance the customer journey for installing charging.





#### **EVSE Purchase and Installation:**

For consumers who decide to optimise their home charging setup, they may encounter challenges when it comes to selecting the right EVSE. This is primarily due to the current lack of accessible and reliable information.

#### Challenges include:

- Discovering the costs involved in upgrading their home infrastructure;
- Certain charging systems have restrictions which hinders their ability to easily switch to alternative solutions; and
- Finding reliable professionals to handle the installation and upgrades can be exceedingly difficult.

#### Challenges for renters:

- The lack of portability of EVSE charging systems is a potential barrier for individuals residing in rental properties and those that only have access to off-street parking.
- **Obtaining permission** to install EVSE in an apartment or strata setting may also be challenging or even impossible in some cases.
- Installing and integrating EVSE in their home may require **wiring upgrades** which can encounter interoperability issues and is time consuming and costly to resolve. As a result, consumers are opting to install a power point in their garages instead.





#### **Operations & Maintenance**

#### Goals

I want my home charging to be effortless and require little thought I want my public charging to be as easy as filling my car with petrol Energy bills are confusing and so it's hard to understand how much money it costs to charge at home



#### Pain points

- Planning my battery charge requirements may be time consuming and inconvenient
- · Planning long trips around charging infrastructure may be frustrating and inconvenient
- Having to consult multiple apps to find public chargers can cause inconvenience
- Occasionally public charging is unavailable (broken or has an ICE taking the place)
- I am sometimes concerned about my personal safety when charging at night on my own
- The time it takes to charge using a public charger may be inconvenient
- I feel like I need to always have enough charge in case I can't find a public charger when I need it
- I worry I won't have enough charge for emergencies
- Public charging pricing is different which makes It is difficult to compare public charging prices (like you do with petrol s tations)
- I might not be prepared for how much my home energy bill would increase when I bought an EV (ie. Bill shock)
- It is sometimes difficult to feel better about my EV purchase when I can't compare what I saved in petrol with the increase in energy costs
- Some public chargers may not work with my car which means I need to buy extra kit
- Not all public chargers will work with my car which means I need to buy extra kit
- Not all public chargers are available 24/7 (eg. The ones in the carparks become unavailable when the car park closes)
- Public charging in rural areas is limited
- Trickle charging is time consuming and expensive

#### **Gain points**

- I want the process of charging my EV to be as simple as filling my car with petrol
- I want to easily find a public charger that suits my needs, is working and available
- I want to understand the costs of public charging before I decide
- I don't want to spend time every night planning for what I need tomorrow
- I don't want to build public charging infrastructure into my plans when taking long trips
- I want to feel safe when I charge my car in public
- I might be willing to give up some autonomy in charging IF I could be reassured that it was in my benefit and I would not be inconvenienced





#### **Operations & Maintenance**

#### Goals

I want my home charging to be effortless and require little thought I want my public charging to be as easy as filling my car with petrol Energy bills are confusing and so it's hard to understand how much money it costs to charge at home



Free public

charging

CHARGING

Develop a charging habit

<u>Currently, the process of planning battery charge requirements can be burdensome for consumers.</u>

#### Planning to charge ahead of long trips:

4

**Range anxiety** emerged as a significant concern, especially for consumers planning long trips. The availability of charging stations during weekends was a crucial factor in their trip planning process. **Consumers were constantly worried about needing to have sufficient charge in case they could not find a public charging station when needed**. Ideally, they would prefer not to be concerned about running out of charge, especially during emergencies.

#### Planning to charge at public charging stations:

Charging is not yet as easy as refilling a car with petrol. Consumers desire the convenience of locating a public charging station that caters to their specific needs, is operational and available when needed, and provides a sense of safety and security. As consumers decide their charging plan, they face several challenges, including:

- Public charging stations, particularly those located in car parks, do not operate 24/7 and are typically closed during non-operating hours.
- · The availability of public charging options in rural areas remains limited
- Compatibility issues arise as not all public chargers are compatible with every type of EV. Therefore, consumers are required to purchase additional equipment or adapters so they can charge at a public charging station.
- Unlike petrol stations where pricing is standardised, obtaining transparent information about charging costs at public charging stations is currently a daunting task. The pricing structures vary significantly, leaving consumers with a lack of clarity regarding the expenses associated with charging their electric vehicles.





#### **Operations & Maintenance**

#### Goals

I want my home changing to be effortless and require little thought I want my public charging to be as easy as filling my car with petrol Energy bills are confusing and so it's hard to understand how much money it costs to charge at home



#### Charging poses several challenges for consumers, both at public stations and at home.

#### Using Public Charging Stations:

As previously mentioned, consumers often encounter several challenges when familiarising themselves with using public charging stations. Further pain points are identified here including:

- Availability of **functional** stations. This is a persistent issue, often compounded by instances where there are no available spaces or non-EV owners occupy the charging spots;
- The time it takes to charge at public stations can be inconvenient, causing delays in daily routines; and
- Safety concerns around using public charging stations which includes lighting of facilities, location of chargers on site and charging equipment not conducive to people with disability.

#### Charging at home

4

#### For those consumers who charge at home, they equally face challenges which include:

- Finding it confusing to understand energy bills and accurately determining the cost of charging an EV as consumers may find it hard to understand how much it actually costs to charge at home;
- · The unexpected increase in home energy bills, often results in "bill shock,"; and
- Lack of ability to compare the savings in petrol costs and the increase in energy expenses.



#### **Retention & Switching**

#### Goals

- I want to make sure that the costs of running my EV are aligned with my expectations
   I want to look after my investment
- I am interested to understand if there are additional ways to save money
- I am interested to understand if there are ways I could reduce my carbon footprint further
- I want to try and find ways that I can maximise the solar my home is generating
- I want to increase the number of EV's in my household (eg. From 1 to 2)
- I want to upgrade my EV



#### **Pain points**

- The investment of purchasing EVSE at home may risk being locked in when buying a new/ another car
- · There is a lack of resell markets for EVs
- If I wanted to buy a 2nd hand EV, it's difficult to understand the battery health

**Gain points** 

- · I don't want the decisions I made for my first EV to control my options for my next purchase
- · I want to know that my EV was a good purchase decision before I choose to buy another



(construction) Service (construction) (construction

#### **Retention & Switching**

#### Goals

- I want to make sure that the costs of running my EV are aligned with my expectations.
   I want to look after my investment.
- I am interested to understand if there are additional ways to save money
- I am interested to understand if there are ways I could reduce my carbon footprint further
- I want to try and find ways that I can maximise the solar my home is generating
- I want to increase the number of EV's in my household (eg. From 1 to 2)
- · I want to upgrade my EV



When consumers are deciding whether they would like to continue using an EV or reverting back to ICE vehicles, consumers evaluate against various factors to understand if their initial EV purchase was a sound decision. This includes:

- Ensuring operational costs of running their EV aligns with their expectations;
- Understanding if there are other ways to further reduce their carbon footprint; and
- · Optimising the utilisation of solar energy generated by their homes.

Consumers often struggle with comprehending their energy bills, making it difficult to determine the exact cost of charging their EVs at home. Additionally, the purchase of EVSE for home charging may create a sense of being locked in, restricting flexibility when considering buying an additional EV.

For those who wish to continue using EVs, a lack of well-established resell markets for EVs poses a hurdle. Moreover, assessing the battery health of second-hand EVs can be a complex task, making it challenging for buyers to make informed decisions about the condition of the vehicle's battery.



# Thinking about the future...



福居用



Marketing Advisory, Strategy and Analytics

# To help inform the future state journey map, five themes were explored during the Second Collaboration Insights Workshop

During the Second Collaboration Insights Workshop, a literature review was presented by ACIL Allen with various customer pain points to be solved for. Across these pain points, five (5) themes emerged:

- 1. Simplifying and empowering choice in choosing charging options.
- 2. Smoothing the installation process
- 3. Integrating charging infrastructure in installations (home & business)
- 4. Finding, using & paying for public charging (incl. data sharing)
- 5. Managing charging at home



# A set of design principles were developed to guide the development of solutions

#### What are design principles?

Design principles are a set of values that act as a compass for developing a solution. They represent the guideposts that keep the entire team on the same path as workshop participants move through the ideation and solutioning process. Design principles should be specific, nuanced, and actionable.

Design principles come from Human Centred Design techniques, an approach to problem-solving that puts the people we are designing for at the heart of the problem-solving process.

During this workshop the Forethought team used their expertise to fuse both advanced research and Human Centred Design techniques to support the development of a strategic roadmap that focuses and prioritises the optimisation of products, services, systems and customer experiences.

#### A collation of design principles developed by workshop participants

Value for money	Simple to understand	Give me confidence	Simple to do
Enables consumer choice (specifically, meaningful choice)	Balancing EV system needs vs all of system needs	Is it fair, equitable, and for everyone? My choice shouldn'timpactothers	Correct information that is adequate, appropriate, accessible, and timely
Allows a competitive market to evolve	Everyone should be entitled to a baseline product, service, fee	Must be safe	Starts with needs
Design with data and evidence.	Learn from past mistakes and relate to specifics of EV charging	Be precise about the specific vulnerabilities relevant to EV charging	Build for inclusion
Leverage existing systems and assets	Give innovation room to move and design for flexibility	What is promised is what is delivered	Celebrate the joy of the car
Grid friendly	Long-lasting (in context)	Versatility	FinanciallySustainable
Visual, Public, Amenity and Safety	Ensure there is a realistic number of choices	Whole of system view (Interaction with other consumers, interaction with the grid, interaction with the environment)	Future mindset



42

# SSG members expressed that there would be significant benefits if Australia was to adopt regulations and practices adopted in international markets

The group acknowledged that Australia is perceived as lagging with regard to EV and EV charging infrastructure, technology, standards and policies and the consequences of this will worsen as the product life cycle progresses. Thus, **there was a shared sense of urgency to act sooner rather than later.** 

# Despite the urgency, SSG members expressed it was crucial to find a balance between swift implementation and careful consideration.

While consumers desire quick and decisive actions to establish a solid foundation for future EV charging experiences and outcomes, they are unlikely to support measures that significantly raise prices, especially if it adversely affects the purchase price or operational costs of EVs. Importantly, consumers have a non-negotiable expectation which is that their personal data will be protected.



### A swift but orchestrated approach to regulation was preferred by SSG stakeholders

#### The international standards adopted must be relevant and suitable for the specific context of Australia

The interdependence of standards and their role in delivering a seamless end-to-end customer journey was recognised. This complexity makes it challenging to implement standards in a phased approach. Therefore, a strategic approach was considered necessary, starting with a comprehensive understanding of how each standard interacts with one another. This may involve adopting an agile implementation approach rather than a traditional waterfall approach.

#### Prioritising Consumer Benefits in Advancing V2G technology

While V2G may not currently be a primary concern for consumers, its advancements warrant the development of frameworks that prioritise consumer benefits. **Trust, transparency, and well-defined controls are crucial principles that need to be established.** Addressing concerns such as perceived risks to battery lifespan and implementing effective governance and incentives are essential for the successful adoption of V2G. From a consumer standpoint, **incentives that encourage desired charging behaviour are preferable than strict mandates dictating specific peak and off-peak charging times.** 



# During the Second Collaborations Workshop, SSG members prioritised the most important and more urgent solutions

#### **Urgency**

#### **Importance**

The most urgent solutions for SSG members all involved ensuring consumers are informed about electric vehicles and charging or the reliability of chargers and charging equipment.

'EVSE Made Easy', which enables consumers' ability to find a charging solution that is right for them, was voted the most urgent solution to be implemented. This indicates that in the short term, increasing reliable information around EV charging will be key to addressing consumer pain points. 'Regulations and Standards' for charging installation was voted the most important solution. However, this solution did not appear high on urgency votes. This could, therefore, be a solution to implement as a longterm remedy to current pain points.

Receiving an equal amount of votes for importance (two votes), the next highest solutions shared a common theme of streamlining the charging process and installation, indicating that this has high importance to consumers.



45



These solutions helped form the basis of the Future State Journey Map



#### **Future State Journey**





nator nment's responsibility, but local government's job to implement, enforce, and monitor.

Role of government or regulator Implementing an interoperability mandate, and setting federal & industry codes.

# Urgent Solution 1: EVSE Made Easy

#### **Engagement & Acquisition**

#### Goals

I want to reduce my carbon footprint
I want to reduce the costs associated with running & maintaining a vehicle
I want to reduce the provides the optimum driving experience
I want my car to reflect my apprational social status
I want to make a good decision about the right EV for me
I want the decision process to be simple & easy



#### EVSE Made Easy (Top 1 solution)

#### **Idea Description**

Where a comparator helps consumers determine what EVSE (as well as Tariff option) best meets their needs and preferences.

#### Pain or gain points addressed

Trusted source of information, removes retail bias, and streamline goals.

#### **Journey Stage**

- Engagement & Acquisition
- Installation & Familiarity
- · Operation & Maintenance Difficulty in finding someone who can install and upgrade If necessary

#### How will it benefit consumers

It will help them find a charging solution that is right for their needs.

# Urgent Solution 1: EVSE Made Easy

#### About this solution:

Revolves around the concept of utilising a comparator to assist consumers in identifying the most suitable **EVSE and tariff option** that aligns with their specific needs and preferences.

#### During which phase will it benefit consumers?



#### How will it benefit consumers?

- Information that is presented in an • easily understandable format will instil trust amongst consumers
- Serve as a single, reliable source • of truth available in a centralised location
- · Consumers will effortlessly have access to unbiased data. allowing them to make informed decisions with ease. Consumers will also be able to quantify the environmental benefits associated with purchasing an EV.



# Urgent Solution 2: Reliability Standards



#### **Reliability Standards (Top 2 Solution)**

#### Idea Description

Where reliability standards are implemented for public charging.

#### Pain or gain points addressed

Inability to find a working public charger easily.

#### **Journey Stage**

- Installation & Familiarity
- Operations & Maintenance

#### How will it benefit consumers

It will ensure charging is simple to do and gives consumers confidence.

#### Role of government or regulator

It should be the state government's responsibility, but local government's job to implement, enforce, and monitor.

### **Urgent Solution 2: Reliability Standards**

#### About this solution:

Prioritises the establishment of robust implementation of reliability standards for public charging infrastructure. In an ideal scenario, consumers would be receiving comprehensive support and information regarding public charging and EVSE at the time of purchasing their EV. However, the current situation is quite different, where the persistent issue of functional station availability poses challenges for consumers when charging publicly.

#### During which phase will it benefit consumers?

![](_page_50_Figure_5.jpeg)

#### How will it benefit consumers?

- Increase confidence in consumers, alleviating concerns about station availability and functionality.
- Enhance consumer experience using a public charging station so consumers can enjoy a more consistent experience when charging their EVs.

# Role of government or regulator executing this solution:

While the primary responsibility lies with the state government, the implementation, enforcement, and monitoring of polices should be delegated to local government.

![](_page_50_Picture_11.jpeg)

# Urgent Solution 3: Charging equipment as appliances '5 Star Label'

#### **Future State Journey**

![](_page_51_Figure_3.jpeg)

#### Charging equipment as appliances "5 Star Label" (Top 3 solution)

#### **Idea Description**

This involves minimum standards for equipment and uniform labelling, as well as ensuring chargers are covered and enabling equipment is provided.

#### Pain or gain points addressed

Customer confusion, functionality knowledge, and inequality.

#### Journey Stage

- Engagement & Acquisition
- Installation & Familiarity

#### How will it benefit consumers

This will reduce costs, enable a better charging experience, and reduce complexity.

#### Role of government or regulator

Implementing an interoperability mandate, and setting federal & industry codes.

# Urgent Solution 3: Charging equipment as appliances '5 Star Label'

#### About this solution:

It aims to **simplify and facilitate consumer understanding of charging equipment.** Additionally, it involves the establishment of minimum equipment standards, the implementation of uniform labelling, ensuring adequate coverage for chargers, and providing essential features such as smart metering and Wi-Fi connectivity.

#### During which phase will it benefit consumers?

![](_page_52_Figure_5.jpeg)

#### How will it benefit consumers?

- Consumers are already familiar with reading this on other equipment, thus the user experience is streamlined and consistent.
- This will help consumers to navigate the charging processes with ease and convenience.
- Consumers can easily compare different charging options and make more informed decisions based on their specific requirements.

# Role of government or regulator executing this solution:

The government should be playing a role in driving interoperability by implementing a mandate and establishing federal and industry codes.

![](_page_52_Picture_12.jpeg)

53

### Important Solution 1: Regulation and Standards

![](_page_53_Figure_2.jpeg)

This solution involves the development and enforcement of rules and standards to support charging installation. By developing guidelines, this will help streamline the process of installing charging equipment, ensuring consistency, safety and efficiency across various sites.

#### How will it benefit consumers?

Overall, this solution will increase access and protection whilst reducing costs and barriers. Specifically, it will reduce the financial burden and complexity of installation, find viable solutions for charging in multi-dwelling units and promote the use of portable chargers.

#### Role of government or regulator executing this solution:

The government development and enforcement is needed for all regulations.

![](_page_53_Picture_8.jpeg)

# Important Solution 2: Simplifying the Public Charger Interface

![](_page_54_Figure_2.jpeg)

![](_page_54_Picture_3.jpeg)

This solution aims to enhance simplicity and offer consumers great choice when it comes to charging publicly. In particular, it aims to eliminate confusion surrounding payment methods within the existing charging infrastructure.

#### How will it benefit consumers?

This solution provides consumers with the flexibility to choose a payment method that aligns with their preferences and needs. Streamlining the process will also reduce the time and effort required for consumers.

![](_page_54_Picture_7.jpeg)

Outcomes

55

## Important Solution 3: Standardising connection process and safety requirements

![](_page_55_Figure_2.jpeg)

This solution involves implementing nationally harmonised service installation rules that cover electrical contractor licensing, technical standards and certifications, and network notifications.

#### How will it benefit consumers?

This solution aims to mitigate fire risks, enhance interoperability, provide clarity of costs and minimise any negative impacts on others. Further, this solution will also address the pain points around safety risks, inconsistent installations and lack of functionality.

#### Role of government or regulator executing this solution:

The government development and enforcement is needed for all regulations.

![](_page_55_Picture_8.jpeg)

![](_page_56_Picture_0.jpeg)

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![](_page_56_Picture_7.jpeg)

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