

**Submission
No 75**

**INFRASTRUCTURE FOR ELECTRIC AND ALTERNATIVE ENERGY SOURCE
VEHICLES IN NSW**

Organisation: enX Consulting

Date Received: 2 May 2025

2 May 2025

Submission: The importance of digital public infrastructure in supporting competitive market operation

To whom it may concern

Thank you for the opportunity to make a submission to the Inquiry.

We would like to draw your attention to the important role of digital public infrastructure in supporting EV driver convenience and competitive markets for EV public charging services.

In markets such as EU, US and Korea, where EV uptake is more advanced, industry participants have developed digital infrastructure to support customer 'roaming' between charging networks, like the way mobile phones can roam internationally. This can ease charging anxiety by supporting a more streamlined experience. The core customer proposition of EV roaming is that a driver can charge at any participating network and be automatically charged back to their 'home' charging account.

EV roaming supports increased charger utilisation as charge point operators (CPOs) can signal charger availability and pricing offers to customers, even where they have no pre-existing commercial relationship. This in turn drives more efficient asset operation and industry investment. This is evidenced by the strong and sustained engagement of European charge point operators in commercial roaming initiatives.

EV Roaming can be considered public infrastructure (operating for the benefit of the public as opposed to an individual commercial entity). As such, it faces a fraught journey if left solely to the market to develop. This submission seeks to highlight the benefits of greater government support for EV Roaming initiatives.

Types of EV Roaming

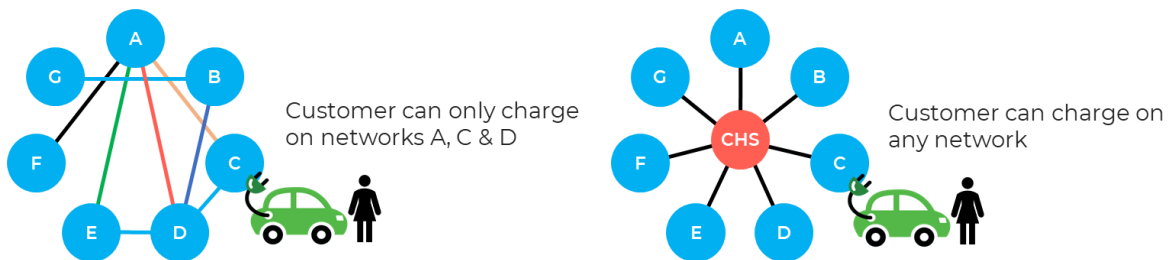
Roaming is associated with the concept of a Mobility Service Provider (MSP) which is effectively the retailer that bills a customer for their charging session. In a Roaming environment, MSPs can have customers with EV charging billing accounts without needing their own EV charging Infrastructure.

The MSP's interact with CPOs, in one of two main roaming architecture models:

1. **Bilateral arrangements** – This is facilitated by point-to-point commercial arrangements whereby CPOs (or other parties) agree to exchange customer information for the purposes of driver identity authentication based on bespoke

- commercial terms. This can involve a mix of standard and non-standard digital communication protocols.
2. **Clearing house system (CHS) arrangement** – This uses a single cloud platform that all CPOs and other parties connect to. It provides a standardised manner for negotiating commercial terms and for data exchange. As shown in Figure 1 CHSs can support EV drivers charging at any participating charge network without the charge network operators needing bilateral contractual or digital interfaces.

Figure 1: Illustration of bilateral (left) vs. CHS-based roaming (right)



Bilateral arrangements are relatively quick to establish but they are complex and difficult to scale. While two networks can be connected using one contractual relationship, connecting 15 networks requires over 100 individual contractual relationships, 30 networks need over 400 contracts etc. This scaling problem provides a significant cost overhead for parties and a spiderweb of potentially inconsistent contract terms that need to be overcome to implement new features. This is how Europe and the UK started, and this model is still dominant in the US.

CHS-based roaming is architecturally simpler, lower cost (at scale) and more secure, but they can result in higher order fragmentation when implemented at a sub-continental scale. There are currently multiple CHS systems operating around the world, with 3 in Europe alone. Having multiple CHSs on a continent means they themselves need to be interoperable. This is especially challenging in the context of cyber security (public key infrastructure (PKI) and the sharing of private information for driver authentication).

What is Plug & Charge?

Plug & Charge is defined under the European standard ISO 15118 and represents the ultimate consumer-friendly end-state for driver authentication at charging stations. No apps, credit cards or RFID cards – drivers can just plug in and charge, with the bill going back to their nominated billing account.

Plug & Charge uses PKI whereby the vehicle contains an encrypted key, issued by the OEM, which is associated with a driver. Plug & Charge is an incremental addition to an EV roaming CHS. It cannot operate independently of a roaming solution. In Europe, Plug & Charge has offered the streamlined 'Tesla charging experience' to non-Tesla owners, however Tesla is now adopting ISO 15118 in North America and cars can now use Plug & Charge on its Supercharger network.

The heart of the PKI ecosystem is the root certificate authority (Root CA) which issues certificates and validates the integrity of all transactions across the ecosystem against a

securely held root certificate. It makes sense to have one Root CA per market (i.e. Australia) as vehicle OEMs have limited ability to store multiple certificates in each vehicle.

Markets with multiple Plug & Charge PKIs, like Europe, are exhibiting quite intractable fragmentations. Even when these ecosystems are nominally interoperable, this fragmentation affects the efficiency of communication exchanges, ultimately slowing down the initiation of each charging session.

Once an EV Roaming CHS is in place, Plug & Charge can be seen as a relatively simple addition.

Government interest in EV roaming

Driven by governments, European and UK industry has converged on a common interoperability protocol: the Open Charge Point Interface (OCPI), a standardised and open-source protocol commonly used in Europe. OCPI capability is now also a requirement of charging networks funded under the US NEVI program and many CPOs in Australia already support this.

Internationally, governments have considered:

- **Roaming supports better customer experiences** – Customers can see the pricing and availability of chargers, and book charging sessions across the roaming ecosystem and make decisions that meet their needs, rather than based on what network they 'are with'.
- **More innovative products** – New entrants can enter the ecosystem without having their own charging network. For example, a rental car fleet operator could get billed centrally for all rental car charging sessions, as could a company fleet operator. An electricity retailer could offer 'back-to-home' billing, bundling EV charging with a customer's electricity supply, regardless of where their customers are charging.
- **Enhanced market competition** – Once interoperable, charging networks can offer their chargers to parties across the ecosystem through a standardised framework for negotiating pricing terms. Alternatively, a network operator can broadcast 'available to all' pricing terms. Within the ecosystem they compete to attract customers based on price and quality of services, rather than just who got the biggest footprint first.
- **Unified Industry data** – CPO interoperability and roaming provides a basis for the standardised industry reporting on key metrics such as price and uptime that can inform industry development policies and consumer protection frameworks.

The current state of EV roaming in Australia

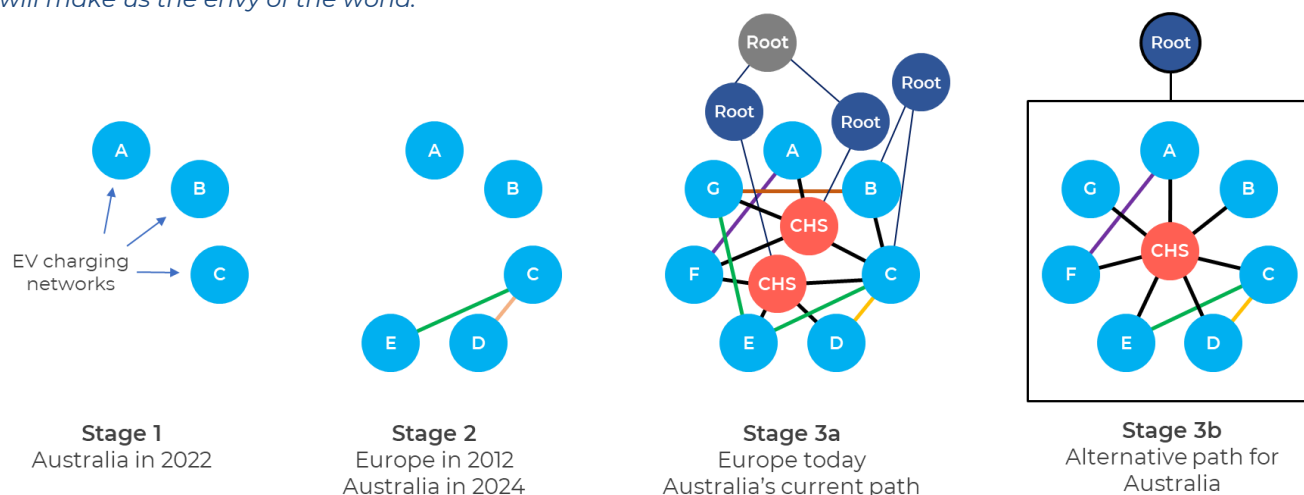
EV roaming can arise organically or be facilitated by government or industry collaboration. Australia is at the earliest stage of an organic growth cycle with a small number of parties entering into bilateral arrangements and some parties considering options for various CHS platform implementations. No significant expenditure has been made to-date.

Our international research and consultations indicate that organic growth inevitably leads to multiple competing ecosystems that are not easily interoperable or adaptable to new features. Bilateral arrangements grow out of large providers seeking to entrench their market position. CHS investments often emerge to counter market power issues, but this results in competing platforms and fragmentation at the market level.

Ultimately, organic growth is not a sustainable path for any market and a market-wide CHS system is considered the most efficient end-state solution. This was acknowledged by all parties we consulted with, including some smaller CPOs and fleet operators in Australia.

Figure 2 illustrates the current path towards fragmentation of the Australian e-mobility digital environment. When we presented this conceptualisation to e-mobility specialists in Europe, the overwhelming feedback was that Australia was extremely fortunate to have almost a 'blank slate' to work with.

Figure 2: The natural evolution of EV roaming. AEVRA delivers an alternative path for Australia that will make us the envy of the world.



Our local and international industry consultations indicate that Australia has a time-limited opportunity to sidestep the quagmire of complexity and fragmentation that characterises European and US markets and implement a unified solution that would be the envy of the world.

Relevance to the Inquiry

A national CHS solution would directly contribute to the objective of the Inquiry: *use of existing infrastructure and measures to ensure a competitive market, including 'ring fencing' policies.*

Over the past 14 months, our team has been working on a project called the Australian EV Roaming Alliance (AEVRA). If successful, AEVRA will implement an enduring, market-wide solution that provides Australian industry and consumers access to a world-class, competitively-neutral CHS and Plug & Charge solution, within a transparent, long-term governance framework that can unlock significant competition and innovation benefits for the Australian community. AEVRA would be run for EV drivers and owners on a not-for-profit basis.

AEVRA has attracted significant in-principal support from consumer groups, industry and government, including the NSW Department of Climate Change, Energy, Environment and Water. This is because governments retain a focus on community interests rather than those of specific commercial interests of parties currently dominant in our e-mobility sector. Governments recognise the problems being faced by charging network operators and EV drivers in Europe and the US in the absence of a unified and interoperable EV roaming solution. Governments have particularly supported the proposed AEVRA operating model of

an industry-governed, not-for-profit organisation which is not constrained by competing commercial interests in the EV roaming landscape.

Several governments have written to us indicating that they consider it beneficial that all public charging equipment be connected via a national EV roaming solution such as AEVRA is proposing.

Initiatives such as AEVRA can take advantage of the current time-limited opportunity for Australia to establish, showcase and operate a global best-practice and nationally unified EV roaming solution designed for the benefit of all public users and charging network operators.

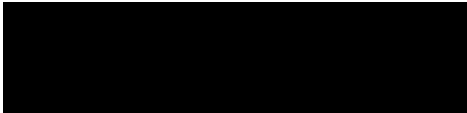
Should DNSPs be allowed to own and operate charging infrastructure, AEVRA would provide the digital interface layer that would ensure that all MSPs, and therefore EV drivers can seamlessly access that infrastructure through their preferred app or billing method.

We recommend that public support for EV charging infrastructure deployments (be it delivered by electricity network operators or otherwise) should be conditional on their use of an industry-governed EV Roaming CHS as is being proposed under the AEVRA initiative.

We have attached a slide deck which further illustrates the AEVRA initiative.

We also appreciate this may be a new area for the Inquiry's consideration and are very happy to discuss any of these point with you further.

Sincerely



Jon Sibley
Managing Director
enX Consulting



The Australian EV Roaming Alliance

A world-class EV roaming and Plug & Charge solution for Australia

Supported by



Energy, Environment and Climate Action



Facilitated by



What is EV roaming?

EV roaming allows EV drivers to set reservations and charge their cars at any charging network and be billed only by their preferred provider.

It is facilitated by CPOs and MSPs working with a **clearing house system** provider to securely exchange driver identity and session information, similar to how credit cards work.

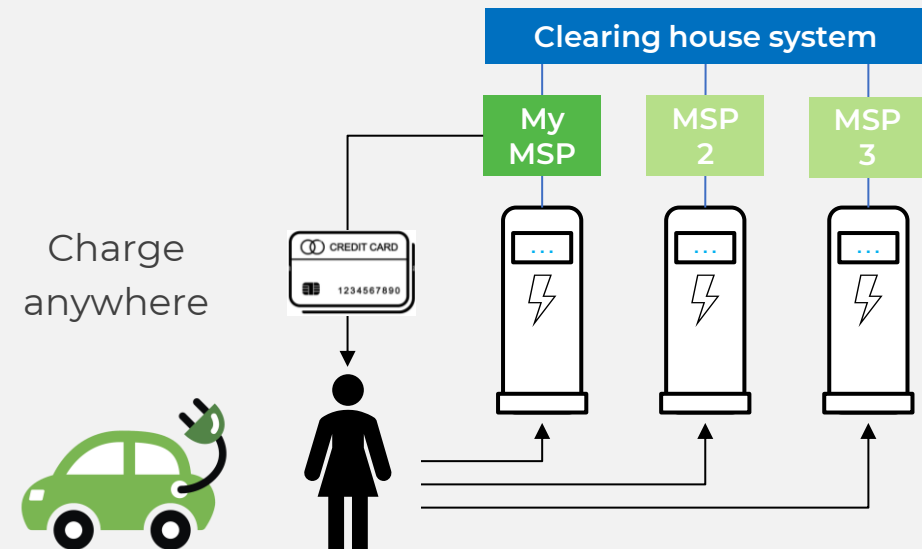
CPO = Charge point operator

MSP = mobility service provider
(can be an electricity retailer)

EV roaming is ubiquitous in Europe.

It enables EV drivers to more seamlessly charge across countries and networks.

It improves charge station utilisation and encourages EV uptake.

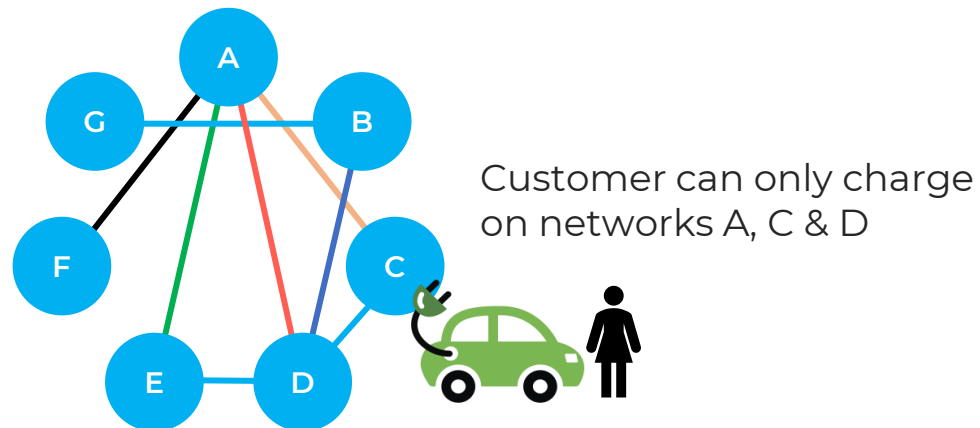


Bilateral roaming

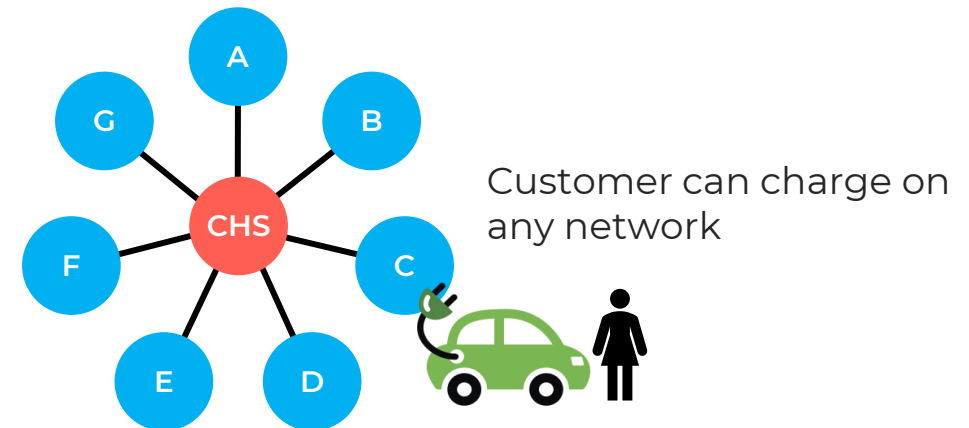
vs.

Platform roaming

A network can enter **bilateral contracts with another operator** to support inter-network customer roaming. This can involve a range of communication protocols.



Platform roaming allows network operators to communicate with a **clearing house system (CHS)** using a standardised roaming protocol (i.e., OCPI).

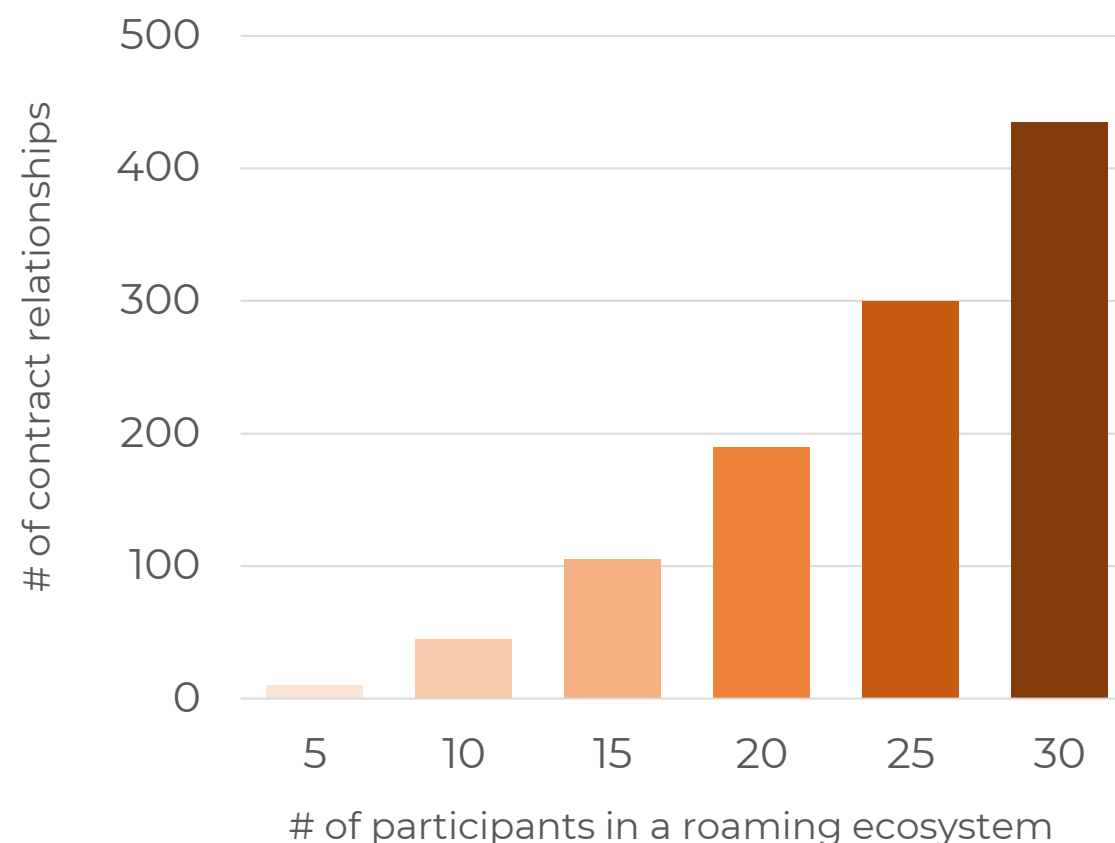


Bilateral roaming relationships are easier to initiate, but hard to scale.

In Europe, charging networks commonly have hundreds of bilateral roaming contracts, as well as CHS relationships.

New features also face a log jam of contract complexity and businesses face high costs of contract maintenance.

Ultimately, a reliance on bilateral arrangements is not aligned with positive industry outcomes.



Solving the organic growth problem

Organic growth leads to multiple competing ecosystems that are not easily interoperable.

Governments in UK, EU and the US are now struggling to ‘unscramble the egg’.

The UK All-party Parliamentary Group says *the fragmented system for charge point transactions, involving multiple cards, apps and accounts, is putting off fleet operators from adopting EVs.*

It says **“there is now an urgent need for industry-led collaboration to simplify the experience”**.¹

¹. [*Charge point anxiety is new barrier to EV take-up, say fleets*](#)

What is Plug & Charge?

Plug & Charge allows an EV to identify itself without the need for driver intervention. It uses encrypted digital certificates stored in every vehicle.

A well-governed national Plug & Charge ecosystem will provide automakers confidence to embed certificates in vehicles bound for our market.

Once an EV roaming platform is in place, Plug & Charge is a simple add-on.



A PnC connector need not have any consumer interface

Plug & Charge is *the* end-state solution



Under PnC, EVs self-identify at any charge point, like Teslas do at Superchargers.



PnC uses Public Key Infrastructure (PKI). A digital certificate is stored in the car.

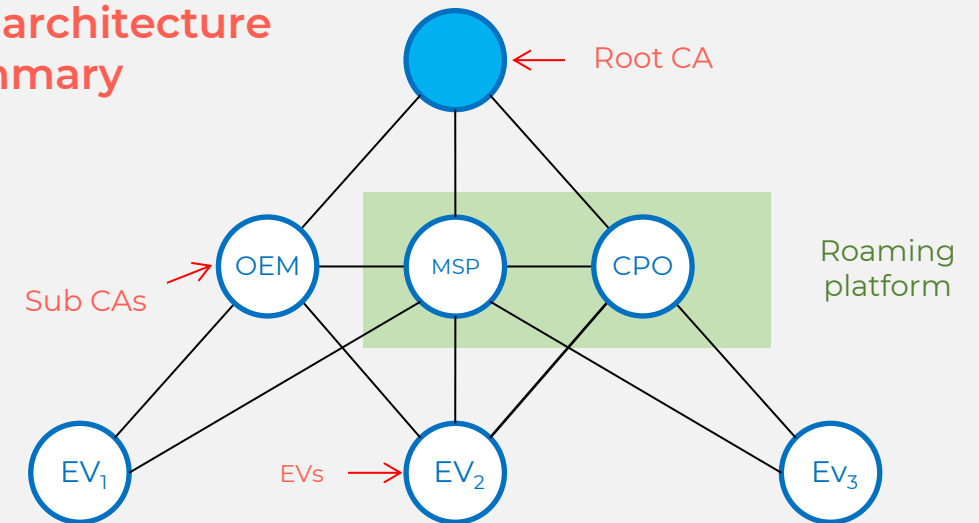


DNSPs are using a similar system to secure Dynamic Operating Envelopes.



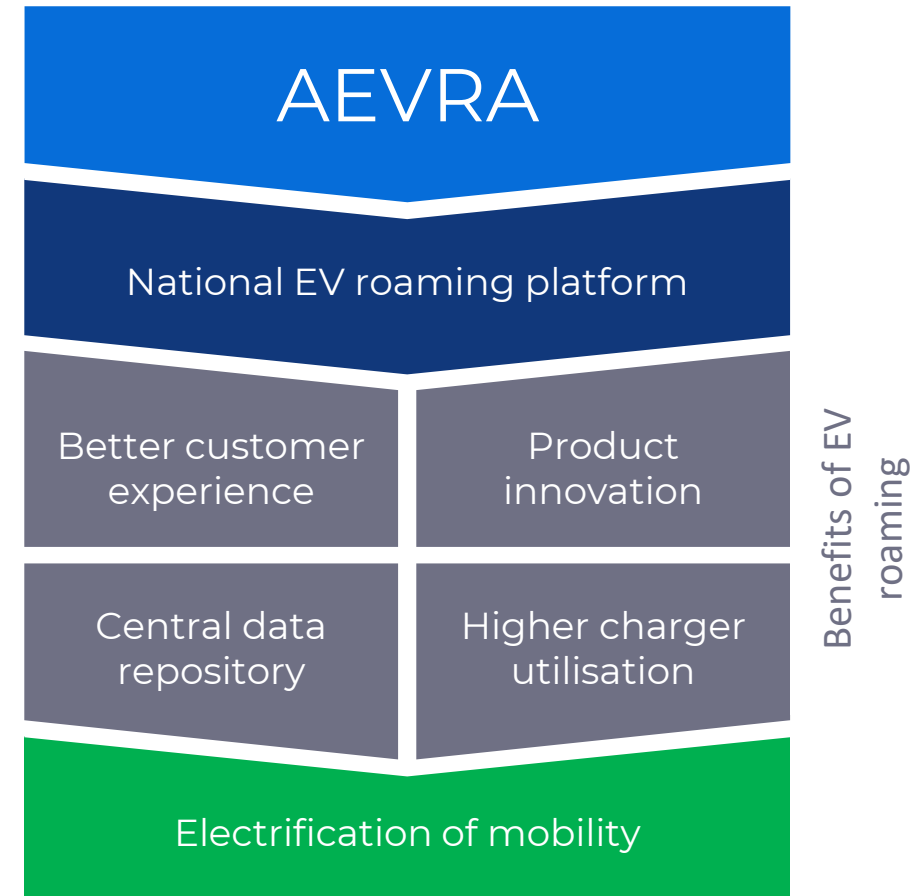
Automakers will require one PKI per end-market, (i.e., Australia)

PKI architecture summary



The Australian EV Roaming Alliance (AEVRA) is a not-for-profit industry collaboration committed to supporting Australia's transition to electric mobility.

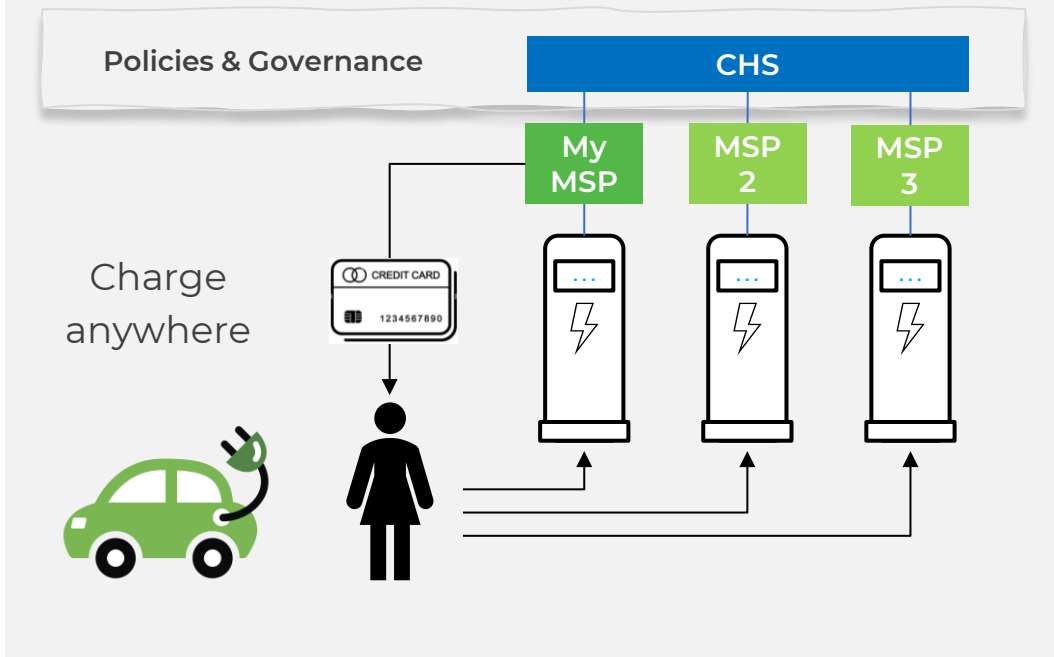
AEVRA is seeking ARENA funding to build a nationally unified, open access **e-roaming clearing house system (CHS)** and **PKI for Plug & Charge** based on established international standards and protocols.



What **digital infrastructure** will AEVRA provide?

1

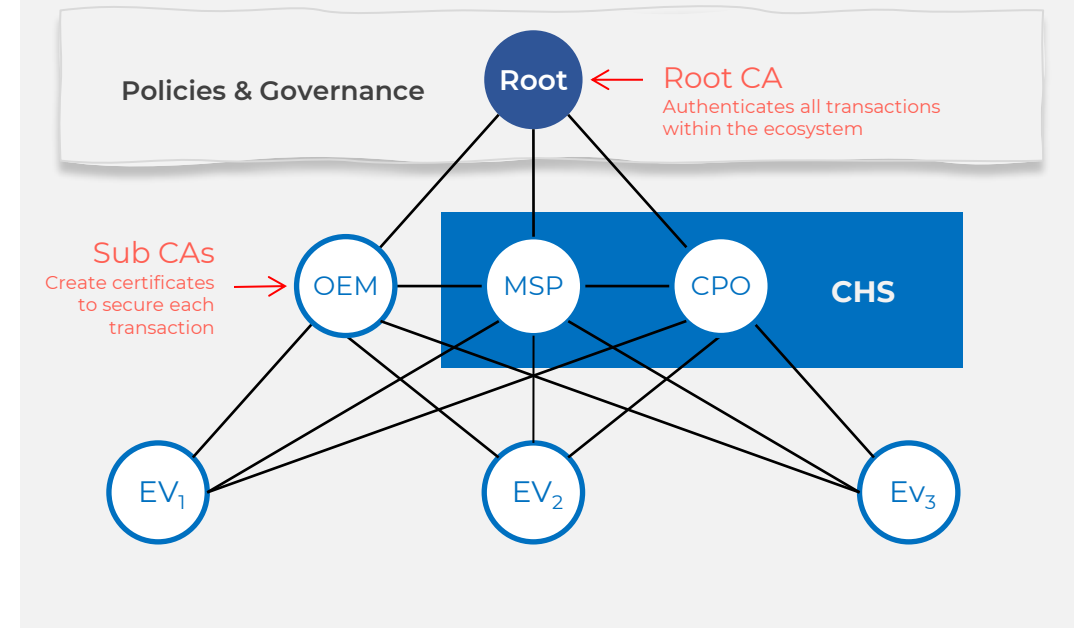
EV roaming clearing house system



MSP = mobility service provider (can be an electricity retailer)

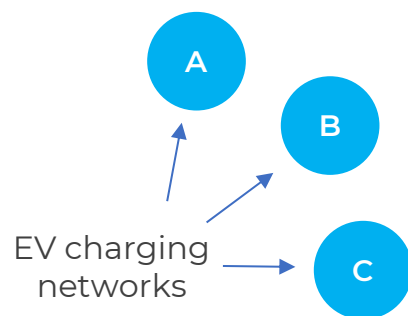
2

Plug & Charge PKI

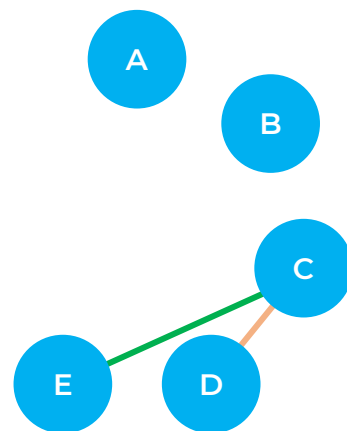


CA = Certificate authority CPO = charge point operator CHS = Clearing house system

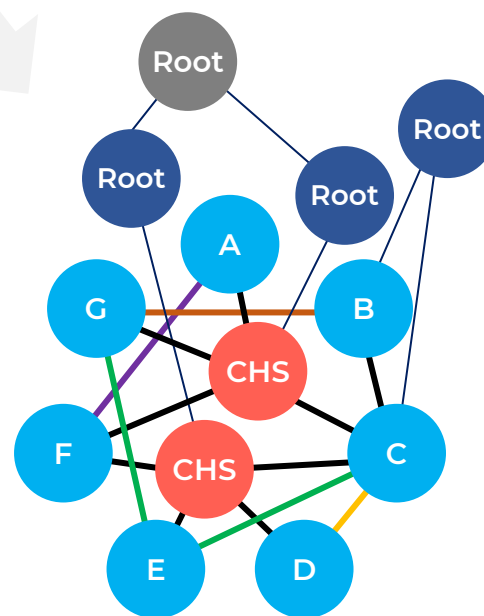
We have an opportunity to avoid the **duplication, fragmentation and complexity** that comes from organic growth



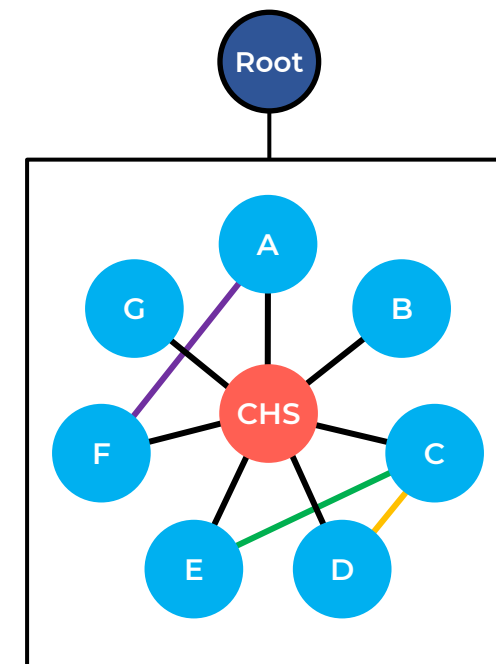
Stage 1
Australia in 2022



Stage 2
Europe in 2012
Australia in 2024

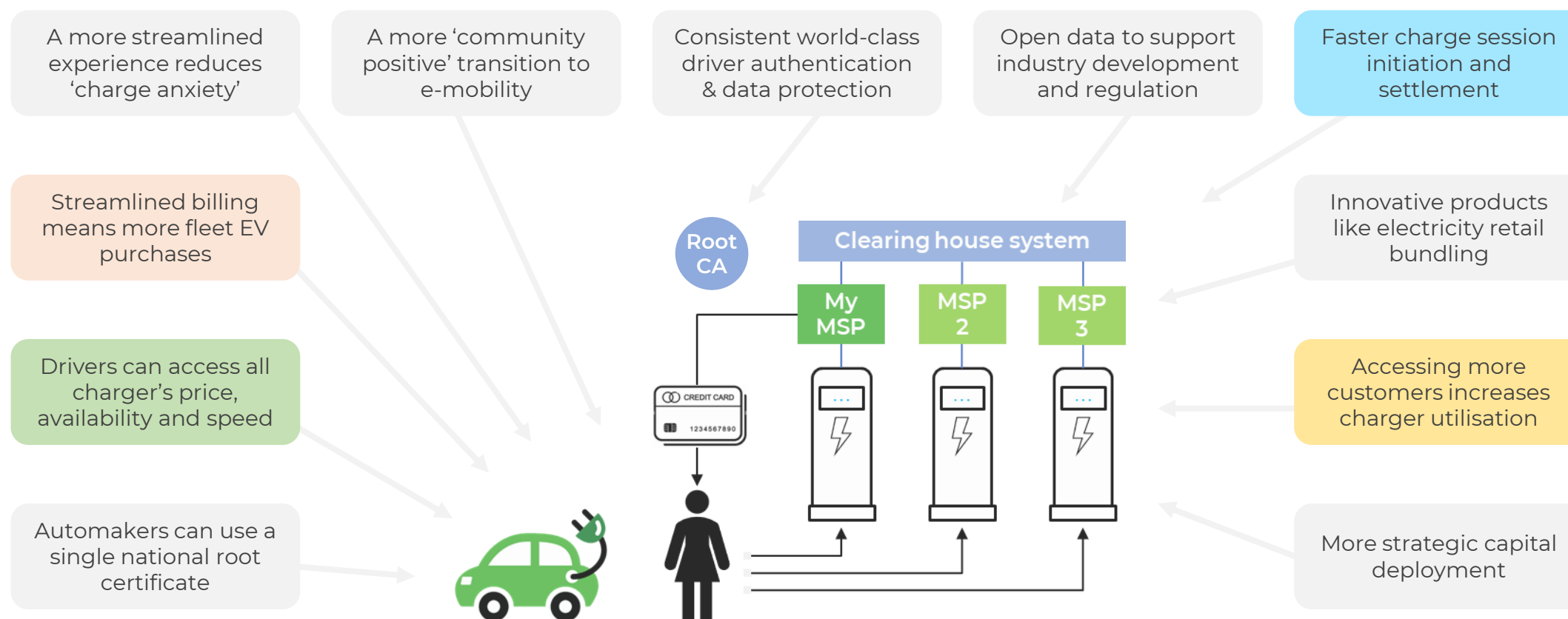


Stage 3a
Europe today
Australia's current path



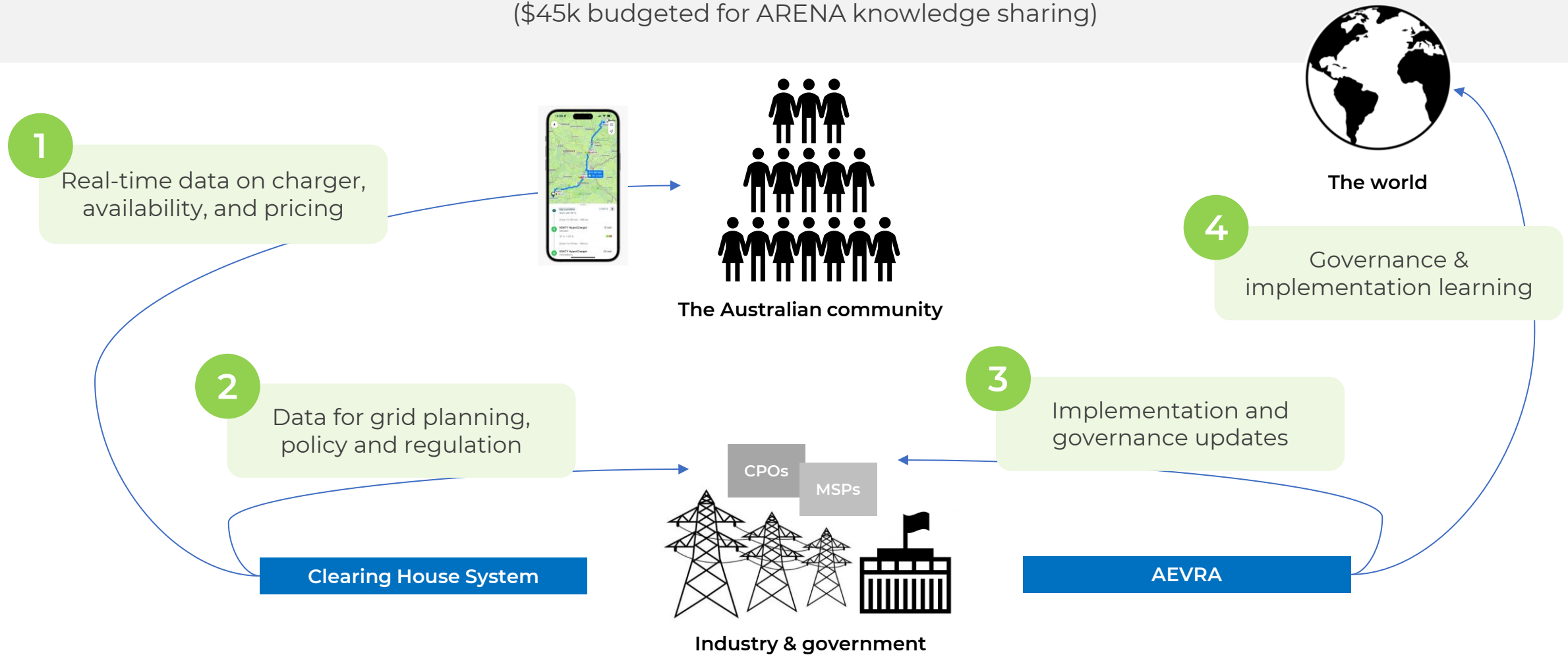
Stage 3b
Alternative path for
Australia

AEVRA creates **benefits** across the entire e-mobility ecosystem



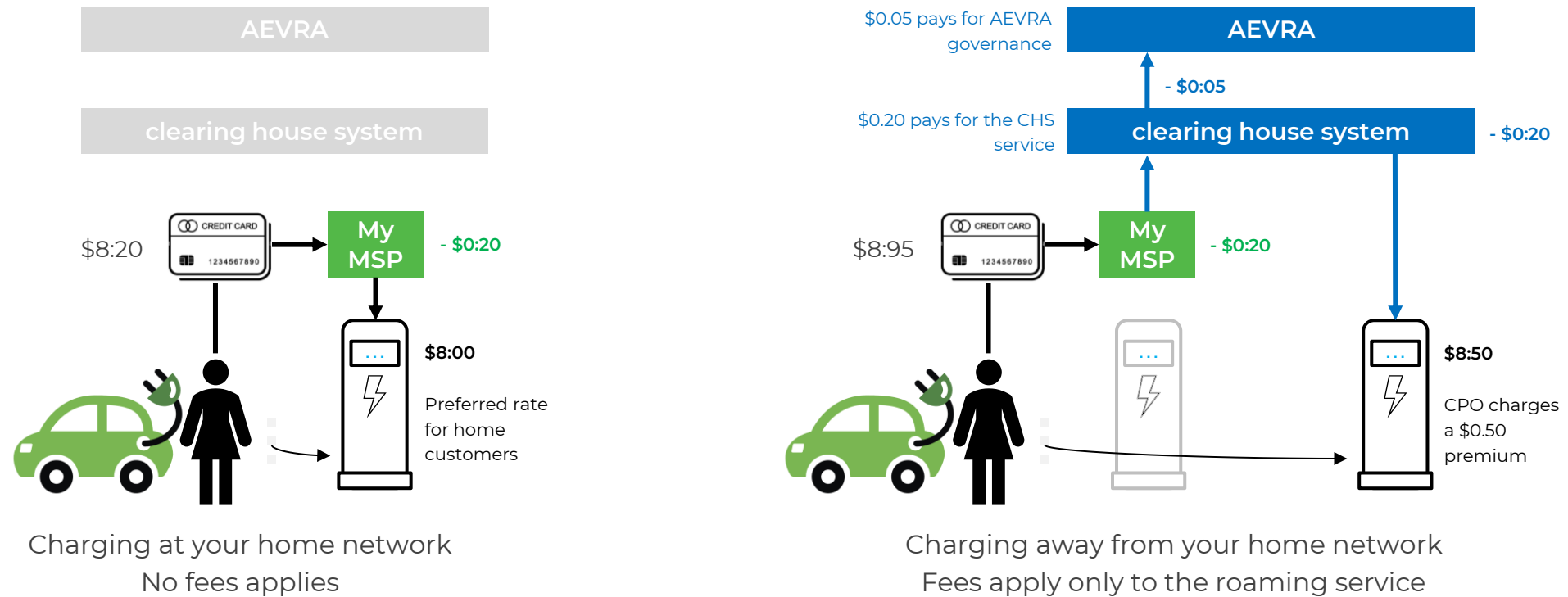
Key knowledge sharing outcomes

(\$45k budgeted for ARENA knowledge sharing)

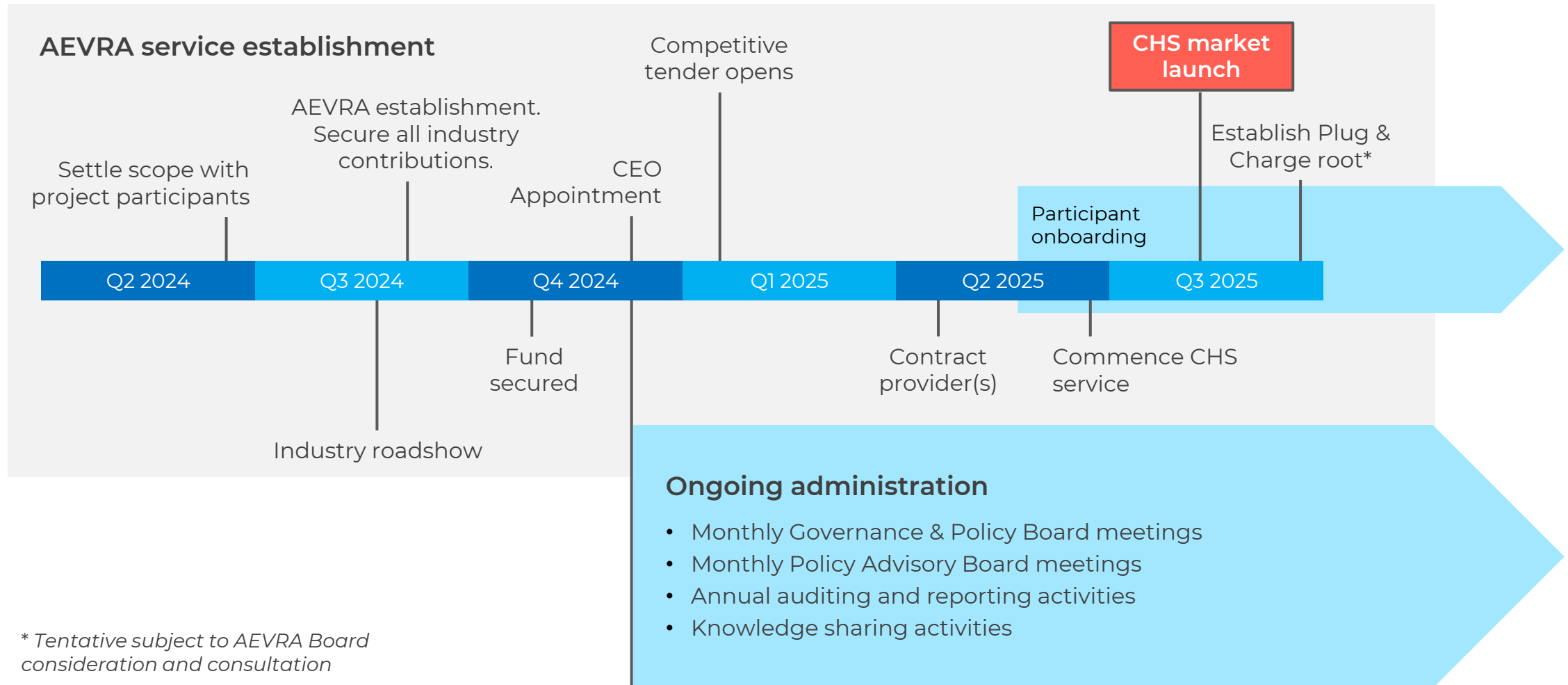


How will these new services be funded?

The CHS charges a fee for the use of its services on an opt-in basis



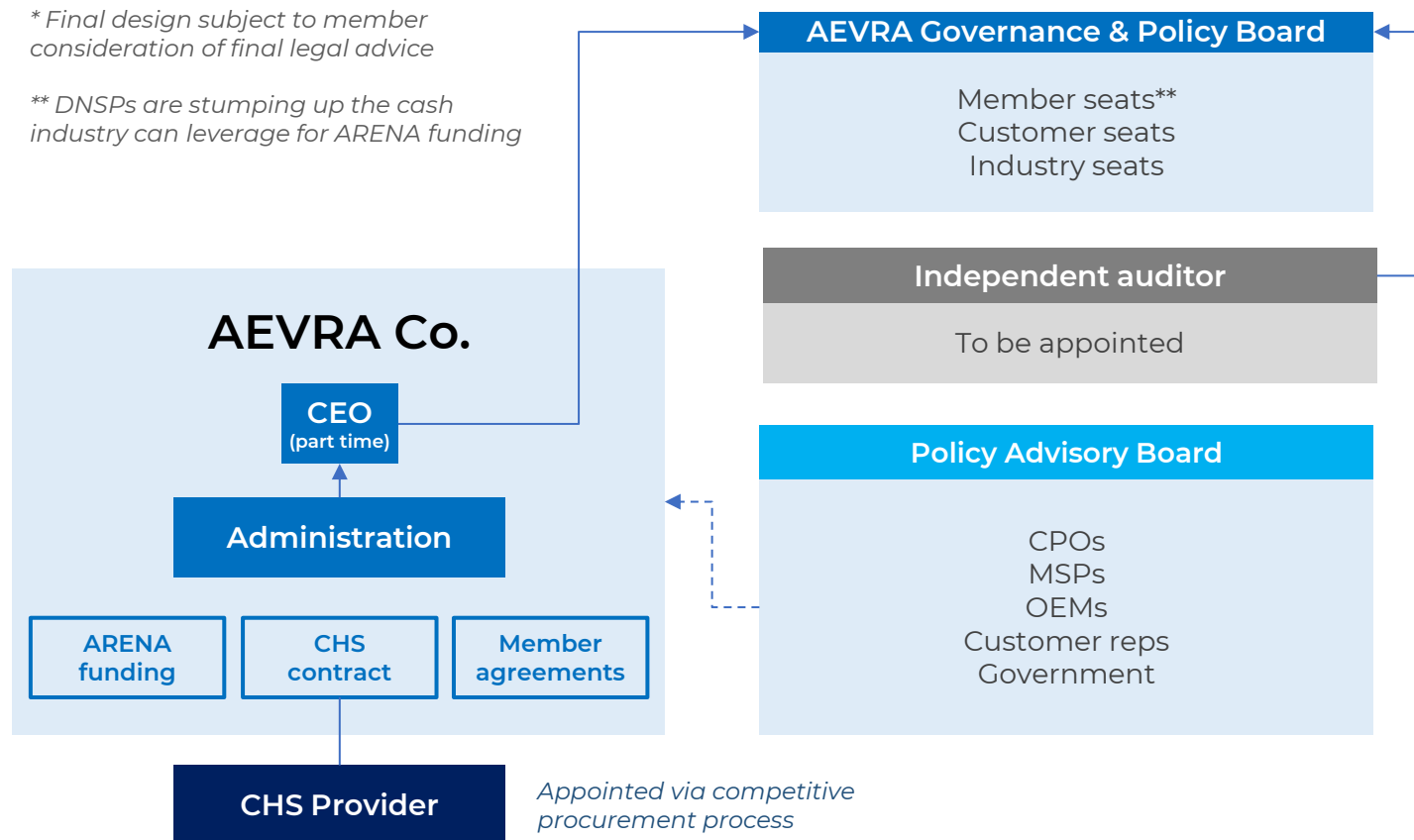
Key implementation activities and timeframes



AEVRA governance arrangements*

* Final design subject to member consideration of final legal advice

** DNSPs are stumping up the cash industry can leverage for ARENA funding



AEVRA Governance

- The AEVRA charter will set out its purpose and its principles of operation and pricing
- Decision-making will be consultative, accountable and transparently communicated to stakeholders
- Decisions will be technology and vendor-neutral
- It will work closely with governments
- It will be resourced to operate independently of member priorities and interests

Australia has a time-limited opportunity to side-step some of the major problems experienced in more advanced markets.

AEVRA will help safeguard our community-positive transition to electric mobility.

