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EV Charging Infrastructure:

The next frontier

January 2024

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**Data used in the report has been collated as at November 2023*

1.0

The uptake of EVs is gaining pace...

EVs made up **8.4%** of new vehicle sales in the first half of 2023, almost **five times higher** than the same period just one year earlier.

EV Share of Autralian market to-date (%)

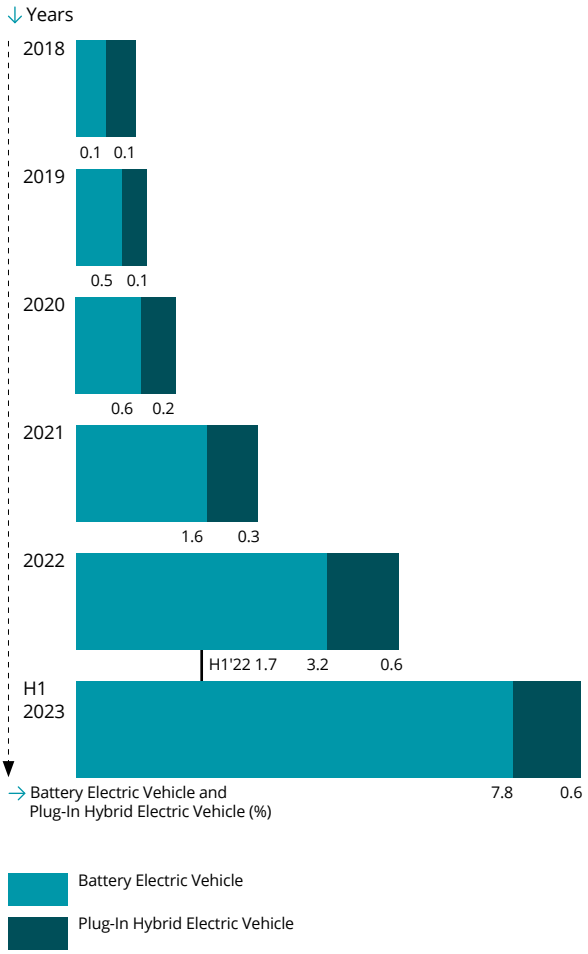

Figure 1 - Source: Electric Vehicle Council (2023).

As of mid-2023, there are approximately 130,000 electric vehicles (EVs) across Australia, representing less than 1% of the total passenger vehicle fleet. It should come as no surprise then that with more affordable EV models available on the market, and the need to decarbonise intensifying, EV uptake is rapidly accelerating. EVs made up 8.4% of new vehicle sales in the first half of 2023, almost five times higher than the same period just one year earlier.

This trend is only expected to continue, with EV uptake projected to increase from **8.4% of new passenger vehicle sales in H1 2023, to 43% by 2033**. This uptake will see a dramatic shift in the composition of vehicles on Australian roads, with the number of EVs expected to rise to approximately 2.5 million within the next 10 years.

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...and so is public charging demand

The rapid transition of the transport fleet from internal-combustion-engine (ICE) vehicles to EVs will dramatically increase demand for EV charging, with the total energy demand from EVs forecast to reach 3,570 GWh per year by FY33.

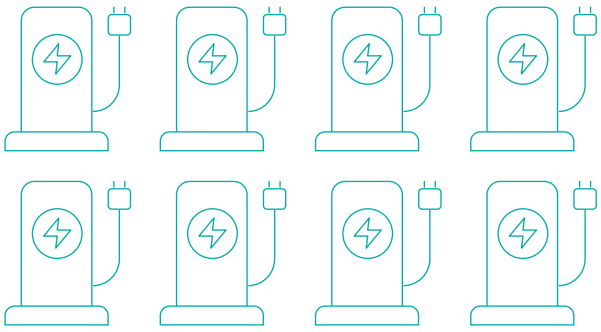
While the majority of charging in Australia is expected to occur in private homes, a significant proportion of EV users will be heavily reliant on public chargers. To service this demand, 27,500 new public EV chargers will be required by FY33, an **eight-fold increase on current public charging capacity**.

To meet the projected demand for EV public charging, **we will need to build eight new public EV chargers every day from now until FY33**, on average. The vast majority of this demand is expected to arise in major cities, where EV uptake is likely to be higher and where access to at-home charging is lower.

This presents an opportunity for organisations with an existing parking footprint to provide a significant share of the expected charging demand. Careful consideration and identification of ideal locations which optimise usage, visibility as well as security are particularly important to improve the financial viability and sustainability of these assets. Coordination of infrastructure deployment is also key to building a cohesive and successful charging network while avoiding duplication of resources, particularly while EV uptake is still gaining pace.

An eight-fold increase in public EV chargers

That is eight new public chargers installed per day



Deloitte's EV Charger Commercial Model

Deloitte have developed an **EV Charger Commercial Model**, allowing for rapid, localised demand and financial analysis to be performed for organisations that are considering rolling out EV charging infrastructure anywhere in Australia.

A needs-based investment

Macroeconomic demand analysis, to inform targeted infrastructure investment.

The model provides analysis of **EV public charging demand by SA2**, Australia-wide, helping clients to target the location of their investment in charging infrastructure.

Detailed, site-level assessments, to optimise the commercial model and timing of charging infrastructure rollout.

Site specifics, including customer type, visitor numbers and dwell times, are paired with in-built SA2 demand modelling to provide a **detailed picture of expected charger demand and utilisation at each potential site**. This provides the information required to make unit-specific adjustments, optimise the rollout of charging infrastructure and maximise return.

A strong commercial focus

The Deloitte model provides a unique focus on commercial analysis for EV charging infrastructure, with a range of features helping to inform short, medium and long-term investment strategies.

- **Capture localised challenges and costs:** Installation costs capture site-specific complexity, with varying installation, remediation and procurement costs based on typical industry values, providing a quick yet reliable estimate of capital costs.
- **Optimise the commercial model:** An extensive list of inbuilt cost and revenue models (e.g. subscription, fee for energy, outsource/Charging-as-a-Service) allows clients to easily assess the viability of a broad range of commercial models.
- **An instantaneous financial appraisal:** Integrated demand, charger utilisation, cost and revenue models provide a tailored view of expected return on investment, including key financial metrics such as the Net Present Value, Internal Rate of Return and payback period.

Investing with greater certainty

Navigating both the commercial and technical complexities of the EV transition is a daunting task. **The Deloitte model simplifies the challenge**, informing key decisions for the commercial model, charging infrastructure rollout, and the appropriate charger type for a given location, **ensuring a commercially viable investment in EV charging**.

The next 10 years of EV charging

Now: Strategic rollout

The speed of EV uptake is rapidly accelerating, with the rate of new sales in H1 2023 almost five times what it was in the same period one year earlier.

Starting now in the planning and delivery of essential charging infrastructure will prove critical to responding to this demand and enabling the nationwide transition to EVs, particularly if the location of chargers aim to maximise usage and avoid unnecessary duplication of resources.

Next 2-5 years: Steady rollout

Increasing uptake will see over half a million EVs on Australian roads by 2028.

Without growth in public EV charging, this will result in a shortfall of over 5,300 public chargers nationally. The missing charging capacity is equivalent to a shortfall of approximately 590 years of charging time nationally, or almost 9 missing hours per EV, every year.

NSW alone represents almost 50% of the expected shortfall, with a deficit of 2,574 chargers, followed by Victoria (1,269 charger deficit) and Queensland (809 charger deficit). Tasmania will be the only jurisdiction that still has a charging surplus, with the increased demand being met by existing charging infrastructure.

With a significant public charger deficit projected to emerge by 2028, progress over the next five years will be essential to getting ahead of the demand for public charging.

5+ years: Rapid rollout

By 2033 there will be over 2.5 million EVs nationally, making up a significant share of the national vehicle fleet.

While they will be particularly prominent in the higher-income metro areas that were the vanguard of EV adoption, their appearance will now also be commonplace on roads nationwide, seeing significant use for both day-to-day and long-distance travel.

To meet this demand there will need to be at least 31,500 public EV chargers, the equivalent of **8 new chargers** every day for the **next 10 years**.

NSW alone will need over 11,600 new public chargers, an eleven-fold increase on the current number of public chargers. Demand will also significantly outstrip the existing supply in every other jurisdiction, with a national deficit of 27,500 EV chargers.

With the EV transition well and truly underway by this point, the uptake rate of EVs is projected to reach 43% of new sales by 2033 and only continue climbing from there. **To meet the demand for public EV charging in the following year, an additional 5,600 chargers will need to be built in 2033** alone to meet the expected annual growth in demand.

Public EV Charger Availability and Demand, by State

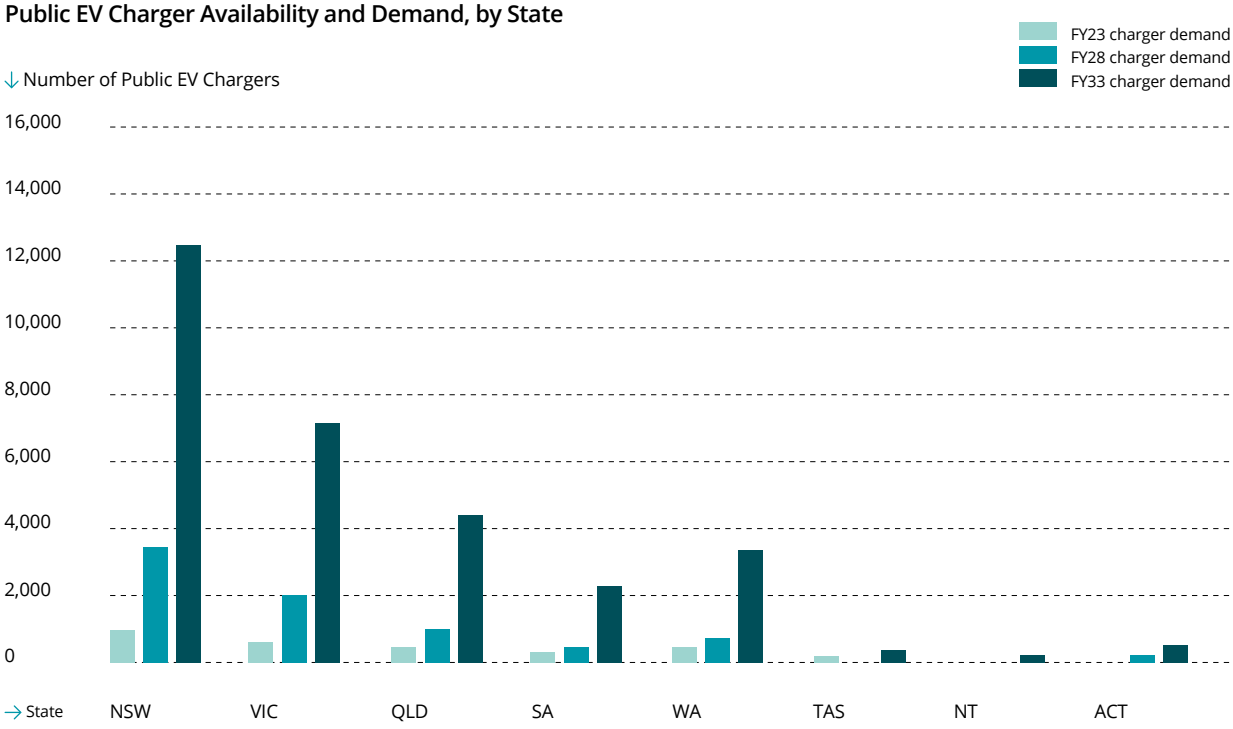


Figure 2 - Public EV Charger Availability and Demand. Source: Deloitte (2023).

Increasing uptake will see over half a million EVs on Australian roads by 2028.

At–home charging

At-home charging is assumed to provide 95% of the charging needs for the roughly 70% of the Australian population that reside in detached dwellings.

Public charging

The 30% of the Australian population that reside in apartments, terrace houses and other semi-detached dwellings are assumed to be almost entirely reliant on public EV chargers. Public chargers are assumed to include all chargers not in detached dwellings, including those that are on-street, in retail and public car parks, and in apartment blocks and semi-detached dwellings.

5.0 Drivers of public charging demand

At-home vs. public charging:

Public charging encompasses all EV charging demand that is not serviced by chargers in private detached dwellings. In our analysis this covers...

- **On-street** charging
- Charging in **shops and other publicly accessible car parks**
- Charging in **apartment blocks and semi-detached dwellings**

Given the composition of housing stock in Australia, the majority of EV charging is expected to occur in private dwellings.

However, public charging will still provide a significant source of energy for EVs, particularly for those without access to private chargers.

33% of the energy demanded by EVs nationally is forecast to be provided by public chargers in FY33. In NSW, where public charging demand is likely to be highest, this increases to 40% of total EV energy demand.

Charging Demand (GWh), Public vs. Private

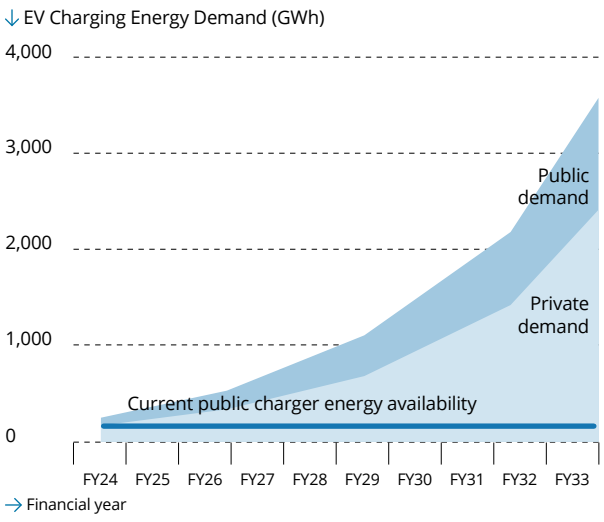


Figure 3 - Charging Demand (GWh), Public vs. Private. Source: Deloitte (2023).

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Metro areas will dominate public charging demand

Major cities across Australia are forecast to be responsible for the vast majority of public EV charging demand over the next 10 years. This demand is largely driven by two factors as below.

The **greater proportion of non-detached housing in metro areas** results in a higher need for public charging than in regional areas.

Higher income earners in city centres are expected to lead the adoption of EVs. Given that average incomes are generally higher in metro areas, they are expected to have a higher initial EV uptake. The impact of this factor will reduce as EVs become ubiquitous.

Public charging infrastructure will also be required in regional and rural areas, and a fast-charging network is essential for medium and long-distance journeys, particularly at strategic or tourist destinations.

The vast majority of public EV charging demand will remain in metro areas and as such, this is where the rollout of public charging infrastructure needs to focus.

Public EV Charger Demand, Major Cities and Regional Australia

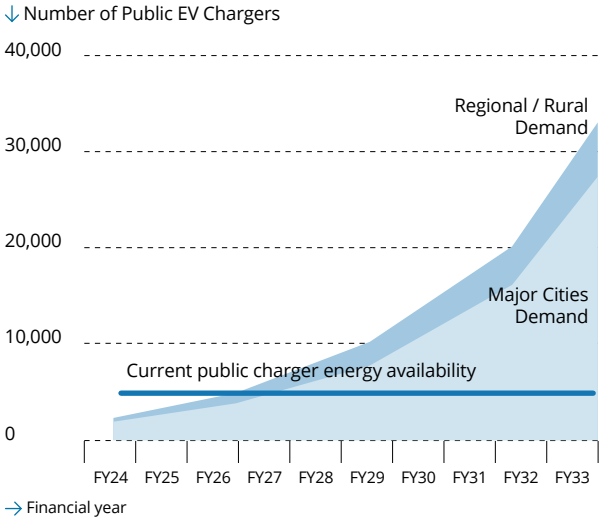

Figure 4 - Split of Public EV Charger Demand, Major Cities and Regional. Source: Deloitte (2023).

6.0

Example Case Study: Hammer Barn

The hypothetical hardware chain Hammer Barn is establishing EV charging facilities at their stores, with investment informed by the EV Charger Commercial Model.

Hammer Barn operates three retail hardware stores in NSW, located in Fairfield, Merrylands and South Wentworthville. Each store is located on a major road, sees relatively high daily visitor numbers, visitor dwell times averaging 45 minutes and has a large existing parking footprint.

Given their existing site availability and the significant charging demand expected by FY33 (see Figure 5), **Hammer Barn decided to be an early mover in establishing EV charging facilities at their sites**.

Their chargers are available to all members of the public and operate on a simple fee-for-energy model. Longer term, Hammer Barn intend to link their loyalty membership points with access to EV chargers at their premises to encourage more frequent and longer patronage at their stores.

In FY24 Hammer Barn made their initial investment in EV chargers for each site. **The rollout included 1 DC fast charger and 1 AC charger at both Fairfield and South Wentworthville and 2 DC fast chargers and 2 AC chargers at Merrylands**, due to higher total public charging demand in the Merrylands local area.

Hammer Barn started to see an uptick in charger use in FY26 and FY27, the first two profitable years for their EV charging network based on charging revenue. Hammer Barn have also been seeing additional customer attraction and retention, as well as incremental purchases and add on sales from EV charger users (not included in this analysis).

In response to rapidly increasing demand, **they made the decision to invest in doubling their charging capacity in FY29**.

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Public Charging Demand Forecasts (FY33) for Hammer Barn Store Locations

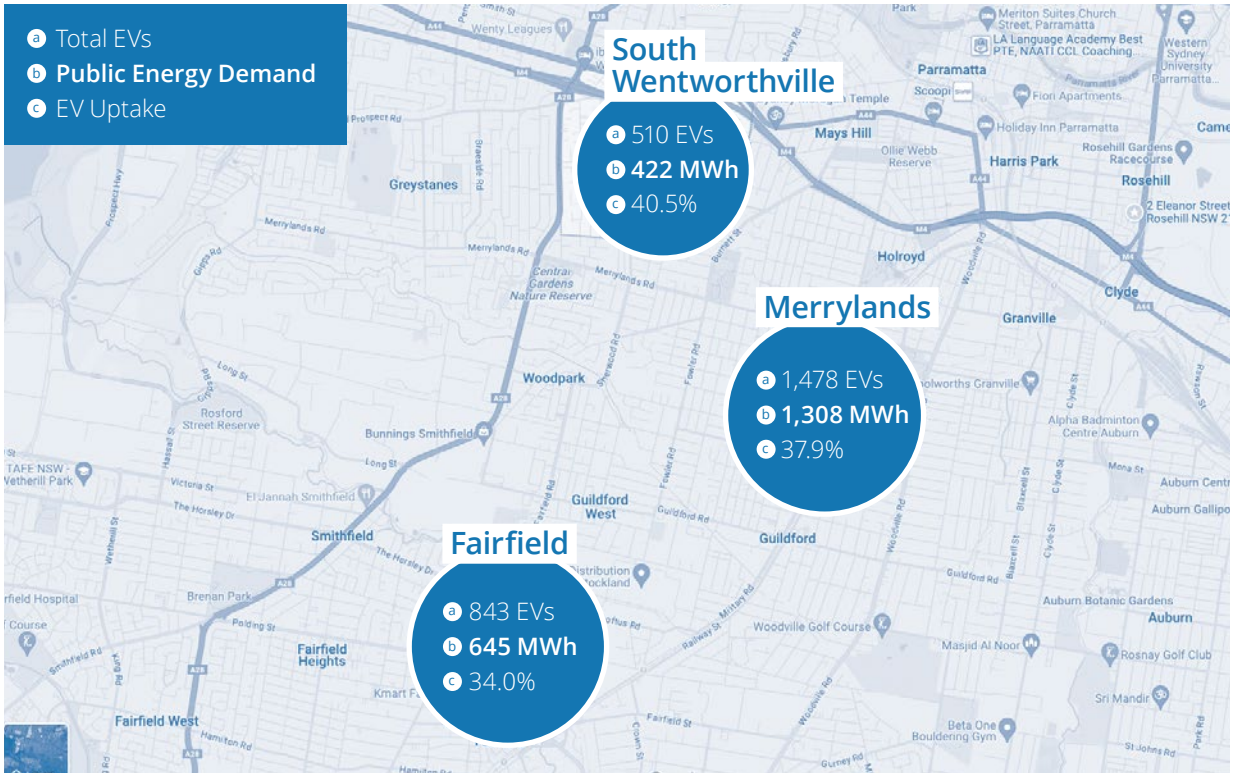
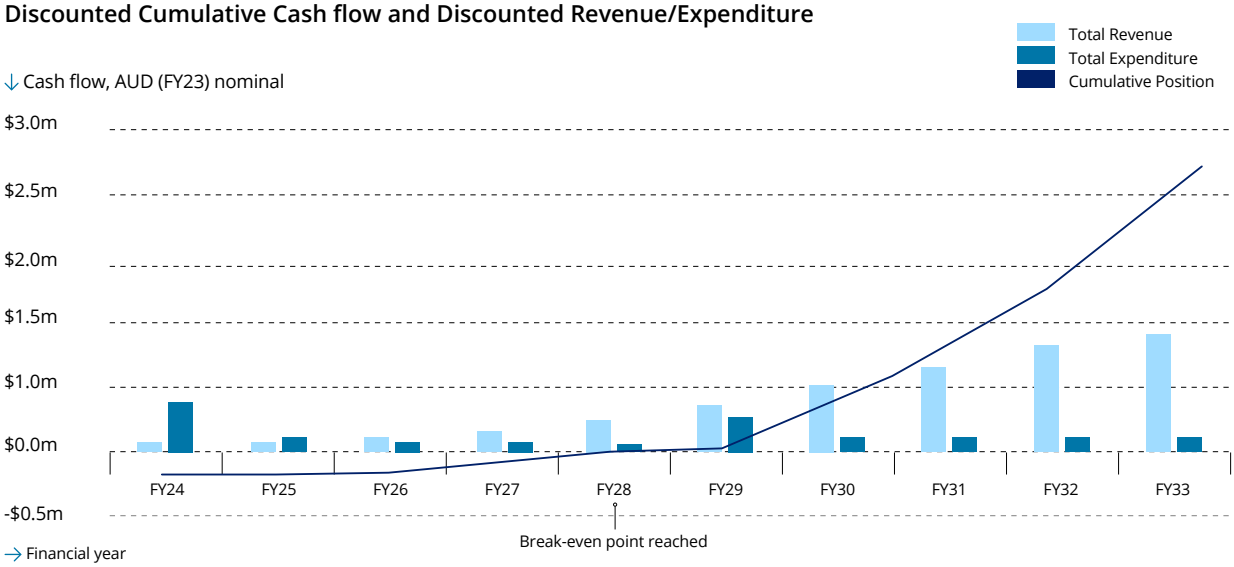


Figure 5 - Public Charging Demand Forecasts (FY33).
Source: Deloitte (2023).

Discounted Cumulative Cash flow and Discounted Revenue/Expenditure



Hammer Barn reached the break-even point on their investment in FY28. With charging demand still increasing, Hammer Barn is planning their largest EV charging investment to-date for FY34.

7.0

Modelling considerations

Key inputs and assumptions for modelling public EV charging demand:

01 **The projected vehicle kilometres travelled per-capita**, split by metro/regional and State/Territory, informs the total energy demand for both EVs and ICE vehicles.

02 **Impact of average household incomes on EV uptake rates.** As there are not yet sufficient observations to identify the location-specific factors influencing EV uptake, it has been assumed that locations with higher incomes have higher initial uptake rates due to their greater ability to pay what are currently premium prices for EVs (versus ICE vehicles). As the adoption of EVs progresses, it is expected that the required evidence base for quantifying location-specific factors will emerge.

03 **Proportion of detached dwellings.** It is assumed that EV users residing in non-detached dwellings will be entirely reliant upon public charging (including shared charging in apartment blocks and semi-detached dwellings), while those residing in detached dwellings will only use public chargers for 5% of their total EV energy demand.

04 **An average utilisation rate for public chargers of 15%.** This is a conservative 'middle-point' between the industry target for standalone fast-chargers of 20%, and the current US fast-charger network utilisation of approximately 5%.

05 **The future composition of public charger capacity** (the split between slow and fast chargers) will not change from the current composition.

06 **Charging demand excludes highway charging.** For this analysis charging demand is determined by the location of vehicle registration. This provides a focus on daily trips but excludes demand for highway charging.

The model allows us to rapidly investigate a range of commercial strategies for EV charging, helping to optimise the commercial model and infrastructure rollout for our clients and their needs.

International EV charging benchmarks

To test the validity of the modelling, it is useful to compare it with internationally recognised benchmarks for the availability of public EV charging. A commonly used benchmark is from the EU's Alternative Fuelling Infrastructure Regulation (AFIR), which mandates 1 kW per Battery EV.

Figure 6 compares the modelled demand for public EV charging with the expected demand under the AFIR benchmark. Under the AFIR benchmark, 2.6 times the number of public chargers would be required compared to the modelling.

The lower results in our modelling reflect two factors below:

01 Our modelling uses conservative assumptions to ensure it can inform commercially viable EV charging solutions.

02 Our modelling considered the far greater proportion of detached dwellings in Australia compared to the EU, and thus comparatively lower demand for public EV charging.

Notably, Woollahra, Waverly and Randwick LGAs in NSW are targeting the AFIR 1 kW per EV benchmark, reflecting the smaller proportion of detached dwellings in these jurisdictions compared to the Australian average.

National Public EV Charging Demand, Modelled and AFIR benchmark

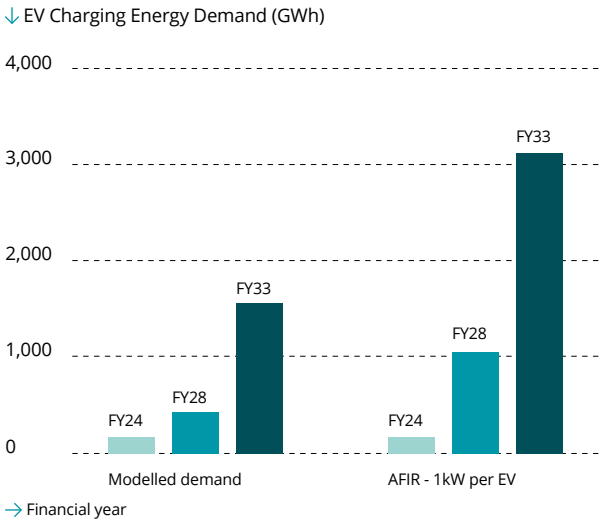


Figure 6 - National Public EV Charging Demand, Benchmark Comparison. Source: Deloitte (2023).

Sensitivity of assumptions

Average charger type

The average energy capacity of public EV chargers in Australia is 29 kW. This modelling has assumed the composition of public EV chargers remains unchanged.

If all new public chargers are instead DC fast chargers (assumed 45 kW energy capacity), 20,030 public chargers will be required by FY33. This is a decrease of 36.4% from the base case.

National Public EV Charging Demand, Varying Average Charger Power

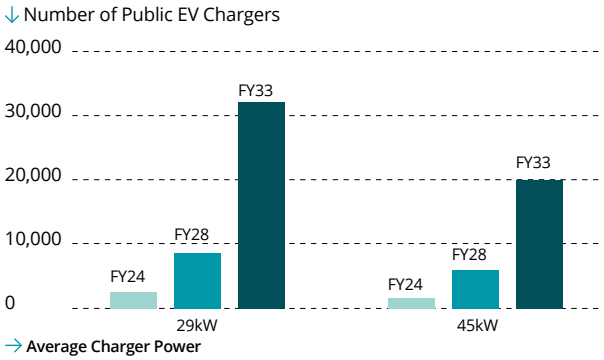


Figure 7- National Public EV Charging Demand, Avg. Type. Source: Deloitte (2023).

Detached dwellings and charging habits

It is assumed that EV users residing in detached dwellings will only use public chargers for 5% of their total EV energy demand. Actual charging preferences are expected to emerge as EV uptake progresses, with greater demand for public charging possible.

If EV users residing in detached dwellings use public chargers for 10% of their energy needs (instead of the 5% base case), national public charger demand would increase to 34,840 by FY33. This represents a 10.7% increase from the base case.

National Public EV Charging Demand, Varying Detached Dwelling Charging

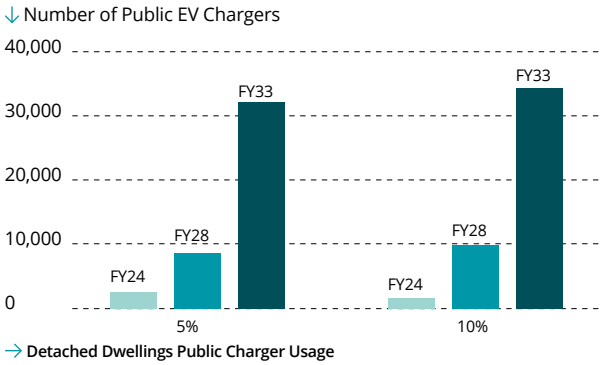


Figure 8 - National Public EV Charging Demand, Detached Dwelling Habits. Source: Deloitte (2023).

Average charger utilisation

Given the low levels of charging network maturity and EV uptake globally, it is difficult to estimate eventual network utilisation. The typical fast charger industry benchmark is 20%, yet the US fast charger network currently averages only 5% utilisation.

An increase in average utilisation from the 15% base case to 20% results in a 25% decrease in the number of public chargers required, to 23,630 by FY33. Decreasing the utilisation to 10% results in a 50% increase in the number of public chargers required, to 47,270 by FY33.

National Public EV Charging Demand, Varying Charger Utilisation (%)

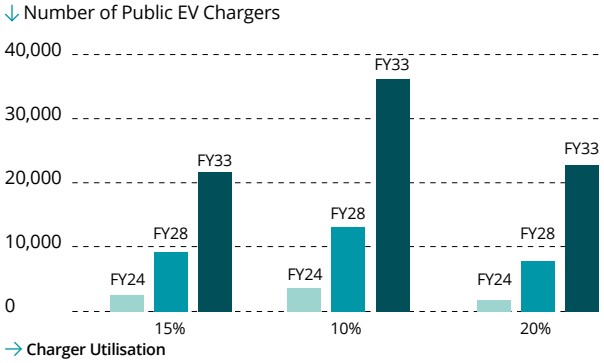


Figure 9 - National Public EV Charging Demand, Charger Utilisation. Source: Deloitte (2023).

Conclusion

Strategic planning for EV charging needs to start now

Deloitte sees the rapid shift to EVs as an integral component of de-carbonising our economy and realising State and Federal net-zero targets. We need to be prepared for the pace at which the transition will occur – a core enabler of which will be EV public charging infrastructure.

With the technology available, and the demand rapidly increasing, now is the time to seize the opportunity and deliver on the demand for EV public charging.

Deloitte's EV Charger Commercial Model can be easily applied to guide the strategic and commercial decision making for infrastructure rollout and operation. It can inform the infrastructure selection, rollout, and commercial model most appropriate for a given organisation and location, ensuring a commercially viable investment in EV charging.

But to seize this opportunity the rollout of EV charging needs to start now...

Contact us

Connect with us to create your strategic journey together.

Eamon McGinn
—
Partner
Deloitte Access Economics

eamcginn@deloitte.com.au

Anna Sawyer
—
Director
Infrastructure &
Project Solutions
ansawyer@deloitte.com.au

Michael Gatto
—
Analyst
Infrastructure &
Project Solutions
migatto@deloitte.com.au

Deloitte.

Deloitte Financial Advisory Pty Ltd
ACN 149 633 116

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