25 June 2026

Australian Energy Market Commission
Level 15/60 Castlereagh St,
Sydney NSW 2000

Re: Facilitating EV charging infrastructure rollout under Commonwealth grants rule change

Dear AEMC,

I am writing to emphasise three principles for how decisions are made on this rule change proposal – and the two related proposals – and respond to three specific consultation questions.

These contributions are informed by research conducted at UNSW Sydney in collaboration with Waverley, Woollahra, and Randwick Councils, and Energy Consumers Australia. This research was conducted specifically to inform for these policy and regulatory decisions with transparent insights and evidence.

I strongly encourage the AEMC to draw upon the attached reports and publicly available data as you progress these catalytic decisions.

Kind Regards,

Dr Bjorn Sturmberg
Senior Research Fellow
Collaboration on Energy and Environmental Markets
School of Photovoltaic and Renewable Energy Engineering
UNSW Sydney

+61 434 967 512
b.sturmberg@unsw.edu.au

Decision-making principles

The first principle I want to emphasise is that decision-making must be grounded in clear principles. Because public ‘kerbside’ chargers are foundational public infrastructure for the widespread, inclusive uptake of EVs, **the foundational principle ought to be to deliver public benefit**.

I recognise and commend the articulation of this in the Department’s proposal and AEMC’s initial assessments. Still, this should be strengthened and propagated into further, more detailed principles. In my recent research I propose that there are three necessary principles for delivering public benefit: that **kerbside infrastructure deployment is fast, fair, and future-proof.**

The second principle is that decision-making for public benefit must be i**nformed by publicly available evidence**, **and justified with transparent analysis thereof.** In the kerbside charging space, there is scant publicly available evidence, which fuels the contention of prospective policy pathways. As a modest contribution to addressing this, we have made charging data available from the Eastern Suburbs council’s charging network. Ideally, national policy decisions would have access to a broader range of data – and this may be possible for the AEMC to achieve – but in its absence, this data already provides a rich set of insights and enables transparent analysis by the AEMC and stakeholders broadly.

The third principle is that decisions made at this pivotal, but early, stage in the development of public charging infrastructure needs to **take a broad view of possible options** and make decisions that value and maintain future flexibility. In this regard, the initiatives that are bounded in time and scale may provide excellent value.

Consultation questions

Consultation Question 1: Problem statement

I believe it is absolutely vital to develop this infrastructure in an inclusive manner, including the regions and remote communities. These communities are currently being held back. As our research showed1, this is primarily due to the lack of charging infrastructure. Even back in 2021-22, electric vehicles had sufficient driving range to be effective for all be the most extremely isolated communities.

In terms of the current proposal's problem statement, I see three shortcomings. Firstly, the focus on AC charging misses the opportunities – and different user and commercial propositions – of medium power 30-50kW DC chargers. Our research shows such faster chargers to be all around superior to AC charging – at least in the metro context for which we have data.

Secondly, the approach of top-down identification of sites as either profitable in the near-term or 'blackspots' overlooks all important local contexts. This can lead to the misallocation of limited resources: undermining the social license of EVs, slowing EV adoption, and exacerbating the inequalities between those with off-street parking and those without.

A third, related, point is that local councils are being overlooked and/or mischaracterised as little more than cumbersome approvers of land access. Their incredible insights into, and interactions with, their local communities are underappreciated and their capacity to contribute to the high-quality development of locally appropriate infrastructure is going unrealised.

Consultation Question 4: Contributions from all electricity consumers

I am very supportive of government investment into this critical public infrastructure. Taxpayers provide the largest, most diverse population over which to distribute risks and costs, through the established progressive taxation system and democratic institutions to manage distributional impacts. Furthermore, governments' can facilitate the valuation of the many benefits of electrification, as well as trade-offs with many other national priorities.

I am considerably more wary of placing costs onto all electricity consumers via DNSPs, for reasons explained in the attached research papers.

Consultation Question 5: Proposed DNSP recovery of residual costs

I am open to the prospect of some costs being placed on DNSP's RAB, and thereby being passed on to their customers. However, this should be minimised through cost recovery from EV drivers and government subsidies (that distribute the cost burden more equitably).

It is particularly important to be mindful of how DNSPs are segregated between the city and country, which can worsen the inequalities between these communities.

The analysis in the attached research report raises two particular concerns about the current proposal.

*The results indicate that, **while splitting the network may reduce the number of chargers requiring government subsidies up front, it may exacerbate the need for long-term funding support (from taxpayers or electricity rate payers) because profitable sites can't cross-subsidise unprofitable sites.***

---

[1] https://doi.org/10.1080/00049182.2022.2086720 Free to access preprint https://bjornsturmberg.com/wp-content/uploads/2022/07/202207-Australian-Geographer-Exploring-the-feasibility-of-electric-vehicle-travel-for-remote-communities-in-Australia.pdf

*T**he results suggest that providing access to charging hardware to 'free-of-charge' to retailers** (who would pass on the benefits in reduced pricing) **distributes too much of the benefits to EV drivers, placing too great a cost onto electricity customers and/or taxpayers.** Charging a 'fee-for-use' seems to enable fairer distributions of costs and benefits.*

Key research references

Fast, fair and future-proof: kerbside charging for the public good

https://www.ceem.unsw.edu.au/sites/default/files/documents/202605%20-%20Fast%2C%20fair%20and%20future-proof%20-%20kerbside%20charging%20for%20the%20public%20good.pdf

Executive summary

Public 'kerbside' charging is vital for the mass uptake of electric vehicles (EVs), proving cheap and convenient charging to all drivers. While it is widely agreed that Australia urgently needs more kerbside charging infrastructure, there is fierce debate about who should own it and who should pay.

This discussion paper does not hold the answers, rather it seeks to clarify how these questions should be assessed for the public good. It proposes three principles: that kerbside charging should be delivered fast, fair, and in a future-proof manner.

It presents transparent analysis – backed by publicly available data and code – of two pressing policy questions. Firstly, whether to split charging sites into commercially run networks and non-commercial networks. The results indicate that, **while splitting the network may reduce the number of chargers requiring government subsidies up front, it may exacerbate the need for long-term funding support (from taxpayers or electricity rate payers) because profitable sites can't cross-subsidise unprofitable sites.**

Secondly, it analyses the fairness of two possible pricing models for DNSP owned chargers, were they to be permitted to own them. T**he results suggest that providing access to charging hardware to 'free-of-charge' to retailers** (who would pass on the benefits in reduced pricing) **distributes too much of the benefits to EV drivers, placing too great a cost onto electricity customers and/or taxpayers.** Charging a 'fee-for-use' seems to enable fairer distributions of costs and benefits.

Lastly, the paper presents an overview of five ownership models, assessing their alignment with the proposed principles and analysis insights. These analyses do not define the solution but are intended to inform the trade-offs that regulators, policy makers and politicians must inevitably make. These will determine the impacts on EV drivers, commercial operators, electricity customers, taxpayers, and the greater public good.

I note recent research that further underscores the importance of kerbside charging by finding that incentivising charging during solar hours further increases charging away from home[2].

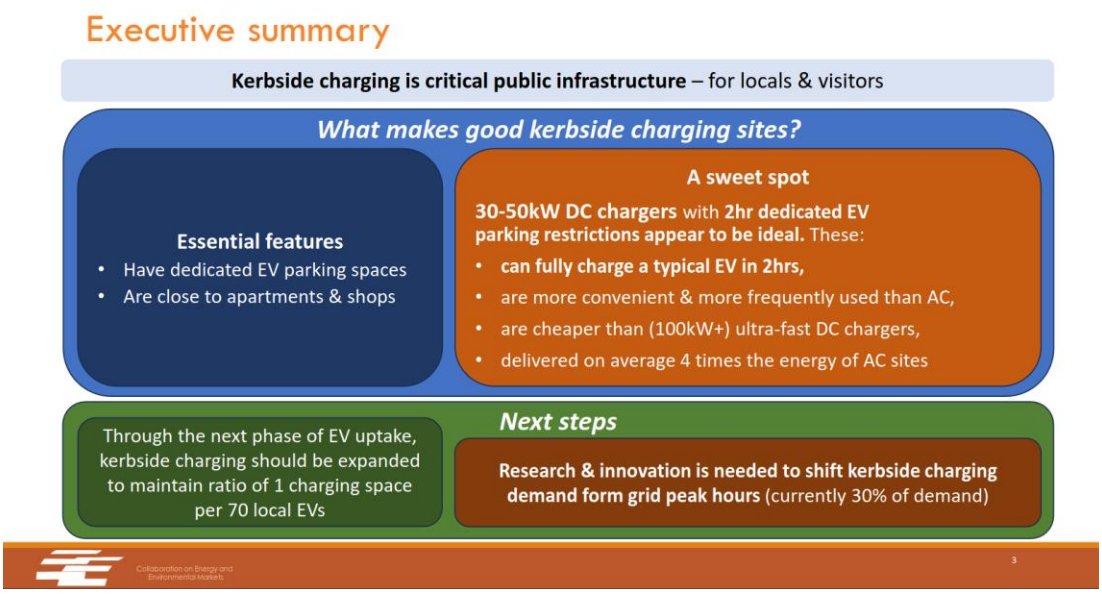
[2] https://doi.org/10.1016/j.jpubeco.2026.105696

How are kerbside chargers used? Insights from the Eastern Suburbs Charging Network

https://zenodo.org/records/19233669

This dataset contains data on the location and usage of kerbside electric vehicle chargers in the Eastern Suburbs of Sydney, Australia, from the start of September 2025 to the end of February 2026. This covers approximately 27,000 sessions.

The data is accompanied by a report providing initial analysis of the data. Clear findings are that dedicated parking is essential, and that 30-50kW DC chargers are greatly superior to AC chargers. **By far the best infrastructure** (within the data sample) **is 30-50kW chargers with 2hr dedicated parking restrictions.**



UNSW SYDNEY NSW 2052 AUSTRALIA
T +61 (2) 9385 1000 | F +61 (2) 9385 0000 | ABN 57 195 873 179 | CRICOS Provider Code 00098G

May 2026

Fast, fair and future-proof: **kerbside charging for the public good**

Principles and evidence to inform policies for Australia's long-term interest

Dr Bjorn Sturmberg
Collaboration on Energy and Environmental Markets,
UNSW Sydney

In partnership with

Executive summary

Public 'kerbside' charging is vital for the mass uptake of electric vehicles (EVs), proving cheap and convenient charging to all drivers. While it is widely agreed that Australia urgently needs more kerbside charging infrastructure, there is fierce debate about who should own it and who should pay.

This discussion paper does not hold the answers, rather it seeks to clarify how these questions should be assessed for the public good. It proposes three principles: that kerbside charging should be delivered fast, fair, and in a future-proof manner.

It presents transparent analysis – backed by publicly available data and code – of two pressing policy questions. Firstly, whether to split charging sites into commercially run networks and non-commercial networks. The results indicate that, while splitting the network may reduce the number of chargers requiring government subsidies up front, it may exacerbate the need for long-term funding support (from taxpayers or electricity rate payers) because profitable sites can't cross-subsidise unprofitable sites.

Secondly, it analyses the fairness of two possible pricing models for DNSP owned chargers, were they to be permitted to own them. The results suggest that providing access to charging hardware to 'free-of-charge' to retailers (who would pass on the benefits in reduced pricing) distributes too much of the benefits to EV drivers, placing too great a cost onto electricity customers and/or taxpayers. Charging a 'fee-for-use' seems to enable fairer distributions of costs and benefits.

Lastly, the paper presents an overview of five ownership models, assessing their alignment with the proposed principles and analysis insights. These analyses do not define the solution but are intended to inform the trade-offs that regulators, policy makers and politicians must inevitably make. These will determine the impacts on EV drivers, commercial operators, electricity customers, taxpayers, and the greater public good.

Reference for this report: Sturmberg, B. C. P., 2026. *Fast, fair and future-proof: kerbside charging for the public good*, University of New South Wales.

Disclaimer

The views expressed in this report are those of the author alone.

As part of this research project, Waverley, Woollahra and Randwick Councils only shared usage data about the public electric vehicle chargers which they own and operate. The views expressed do not necessarily reflect the views of Waverley, Woollahra and Randwick Councils.

This project was funded by Energy Consumers Australia as part of its Grants Program to support consumer advocacy and research projects that benefit household and small business consumers. The views expressed do not necessarily reflect the views of Energy Consumers Australia.

Interests and ideology

The debates around kerbside charging are heavily loaded with vested interests and ideology. Let me state mine upfront.

I do not have vested interests in this space. I have partnered with both retailers and DNSPs in previous research and plan to do so again.

My ideology is well expressed by Amory Lovins: "*markets are good servants, bad masters and worse religions*". Practically, I see markets as tools for price discovery. What price will customers pay and suppliers deliver for, for a specific proposition. Where price discovery is the priority issue, markets are likely part of the approach. Where other issues have primacy, or there are trade-offs, other tools are likely better given precedence.

Kerbside charging in Australia

Public 'kerbside' chargers[1] are vital for mainstream uptake of electric vehicles (EVs), proving cheap and convenient charging to all drivers. In our cities, they are largely used by apartment residents, renters and others without access to private, off-street charging. In the regions, they enable locals and visitors to top up while they're in town.

It is widely agreed that Australia urgently needs more investment in kerbside charging, but fierce debates are raging about how kerbside charging infrastructure should be owned and operated. This is reaching a crescendo as major decisions approach from politicians, policymakers and regulators.

Particularly contentious are the questions of who should be (allowed to be) paid to provide this infrastructure, and who should pay how much? Should Distribution Network Service Providers (DNSPs) play a role in this, and if so under what terms?

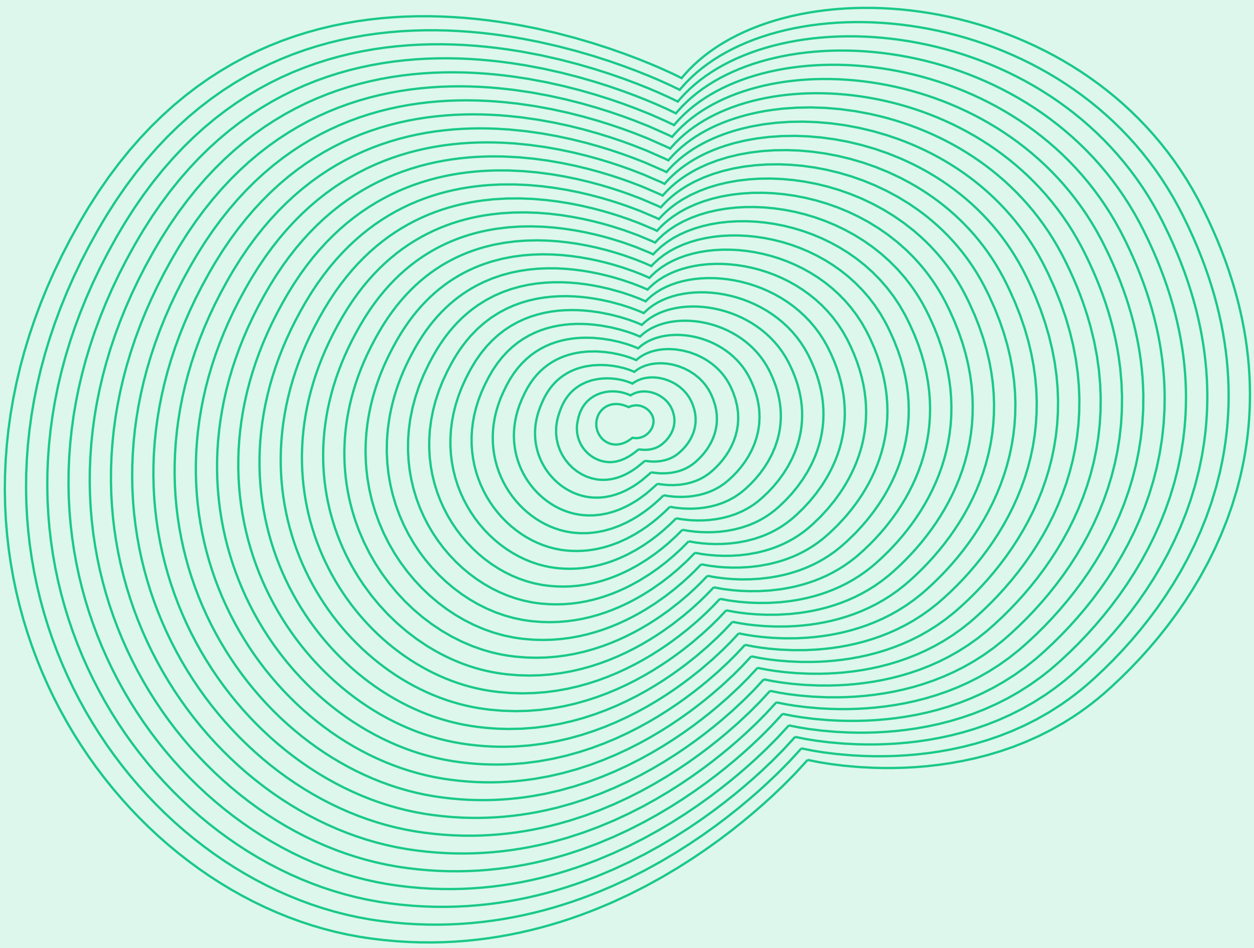
This discussion paper does not propose answers. Rather, it seeks to provide clarity on how to address these questions for the public good. As summarised in Figure 1, it:

- proposes three foundational principles for public good,
- quantifies the impacts of two design variables, and
- applies these principles and analysis insights to five ownership models.

The principles, analysis, and options presented are likely non-exhaustive and are certainly open to debate. To support the quality of this debate, all data and code used in the analysis is freely available[2].

[1] Kerbside chargers can recharge a typical electric vehicle in two to eight hours (depending on the specific charger and vehicle). This paper considers both 7-11kW AC chargers and 30-50kW DC chargers.

[2] Data is at https://doi.org/10.5281/zenodo.19233669 code is at https://github.com/bjornsturmberg/analysis_of_kerbside_chargers



Designing kerbside charging for the public good

Figure 1: Designing kerbside charging for the public good.

Principles

Fast

Accelerating the transition to electric vehicles

Fair

Including all. Distributing costs & benefits equitably

Future-proof

Compatibility with full scale electrification

Transparent analysis

Data

Charger usage, electric vehicle registrations, etc

Models

Data analysis, forecasts, financial models, etc

Open deliberation of diverse options

CPOs

Investors deploy where chargers generate commercial profits (with government subsidies).

DNSPs on-RAB

DNSP customers pay, independent of charger utilisation. Hardware is provided to EV drivers 'free-of-charge'.

DNSP off-RAB

DNSP customers benefit from charging a 'fee-for-use' of hardware. Depends on charger utilisation.

Hybrid providers

CPOs in commercial contexts. DNSPs funding through RAB in non-commercial contexts.

Government owned

Direct control of network planning and investment. Deployment and investment. Deployment and operations could be via market.

Principles for public good

The following three principles are foundational for creating kerbside charging that delivers public good. All three must be considered in the development and deliberation of various models and the assessment of preferable options.

1. Fast

Electric vehicles are a key part of transitioning to a cleaner and less volatile energy and transport systems. Their uptake should be enabled and encouraged. This includes through the expansion of high quality, and highly visible, kerbside charging infrastructure.

2. Fair

The transition to electric vehicles poses significant challenges for equity and fairness. These include aspects of vehicles themselves, such as affordability and physical accessibility. They also include aspects of vehicle charging, particularly the disadvantages in cost and convenience facing those who cannot charge at home or work. This mostly affects those without access to off-street parking and renters, though others, such as occupants of older premises with outdated wiring and switchboards, may also face barriers.

To include these populations in the transition to electric vehicles, affordable and high-quality public charging infrastructure is vital. Kerbside charging is widely viewed as the best avenue for serving this need because it is faster than trickle charging and cheaper than fast charging. With the caveat that the role of kerbside charging should be continually reassessed as technology and the transition evolve, it is currently a priority to establish a high-quality kerbside charging network throughout Australia. This network must be tailored to local contexts, including local building stock, tenancy conditions and travel patterns.

A further dimension of fairness is that the costs and benefits of deploying and maintaining kerbside charging infrastructure must be distributed equitably. This affects at least three groups: taxpayers who fund government subsidies, electricity consumers (including those without electric vehicles), and electric vehicle drivers (both those who use kerbside chargers and those who do not).

Principles for public good

3. Future-proof

Australia's adoption of rooftop solar has been rightly celebrated as a world-leading success. It is a journey that offers many lessons. One of which is the importance of designing systems – technical, economic and social – to function at the expected scale of technology adoption.

In the case of rooftop solar, adoption has repeatedly exceeded both expectations and the capabilities of the systems that integrate this technology into the power system and electricity market. This has necessitated complex and controversial modifications to the way rooftop solar operates: shrinking feed-in-tariffs, increases to fixed network tariffs, frequent backwards incompatible changes to technical standards, dynamic export limits, emergency backstop capabilities, to name a few. While the technical reasoning for these is sound and in the public interest, for many solar system owners they are confusing and perceived as detracting from their rights and/or returns. They do not meet consumers' expectations that they power system be capable of handling the connection of new assets, including their solar.

In the case of electric vehicles, there is little ambiguity in the endpoint of the transition: Australia's 20 million light vehicles will all be electric. (The ambiguity is only marginally higher for heavier vehicles). The hiccups experienced with rooftop solar are therefore avoidable – and inexcusable. Every electric vehicle initiative designed today must consider this fully electrified future and either be directly compatible with it or come with clear pathways for compatibility. This includes technical capabilities, economic frameworks and social expectations.

Practically, this means every effort should be made to give customers a clear, future-proof understanding of what they are signing up for – in the near and longer term – at the time they purchase their first electric vehicle. This is a unique moment for shaping expectations and habits, and securing free, prior and informed consent for trade-offs between individual and the collective. For example, customers should be discouraged from charging vehicles at times when the electricity grid is under heavy strain (typically during the early evening) and informed that disincentives for doing so will likely become more sever in the future. This requires stakeholders to develop their long-term expectations, and share these.

For kerbside charging, our recently published research[3] reveals two aspects of current approaches that appear incompatible with future scale. Firstly, roughly a third of kerbside charging is occurring during the evening peak demand period. Sustaining such usage patterns at scale would require extensive and expensive expansion of the electricity system, which could be avoided if usage was shifted to times of lower electricity consumption such as during the middle of the day and overnight. Secondly, our research found that EV drivers strongly preferred to use higher power kerbside chargers, that can charge a typical EV in two hours, than the lower power chargers that are more commonly provided today[4]. The combination of higher usage and higher power delivery while in use makes the higher power chargers far more effective, efficient, and economical for all stakeholders[5]. However, plans to expand kerbside charging in Australia are heavily weighted towards lower power chargers.

[3] Available at https://zenodo.org/records/19233669

[4] Specifically, our data included 30-50kW DC chargers and 7-11kW AC chargers.

[5] Our research only included data for a metropolitan context in the Eastern Suburbs of Sydney. Results may differ in other contexts.

Transparent analysis

Good decision-making builds on good analysis of good information. Where decision-making relates to the public good, analysis, information and decision-making processes should be accessible to the public.

In keeping with this further principle for public good, colleagues and I, in partnership with three councils, recently published data on kerbside electric vehicle charging in the Eastern Suburbs of Sydney[6]. This discussion paper extends on our previously published analysis of charger utilisation by performing financial analysis. This helps quantify the impacts of design choices regarding who plays what role in kerbside charging.

This paper focuses on two choices that are as controversial as they are consequential:

1. Whether or not to divide the network into commercial and non-commercial parts.
2. Whether or not DNSPs charge a fee for the use of charging hardware, if they own it.

The methodology developed for this analysis is outlined in Appendix A. The implementations in excel spreadsheets are freely available[7] for examination and further exploration.

Biased data

It is important to note that our data comes from a concentrated geographic region in which demand for kerbside charging is likely atypically high. This is because 60% of residents in the Eastern Suburbs of Sydney live in apartments or townhouses and 50% rent. By NSW Government estimates, most residents will require access to on-street charging (82% in Waverley, 52% in Woollahra, 42% in Randwick)[8].

The results presented here therefore likely fall close to the upper limit of what will be experienced across the country.

[6] Available at https://zenodo.org/records/19233669

[7] https://github.com/bjornsturmberg/analysis_of_kerbside_chargers

[8] * Eastern Suburbs Electric Vehicle Infrastructure Strategy

To segregate or integrate

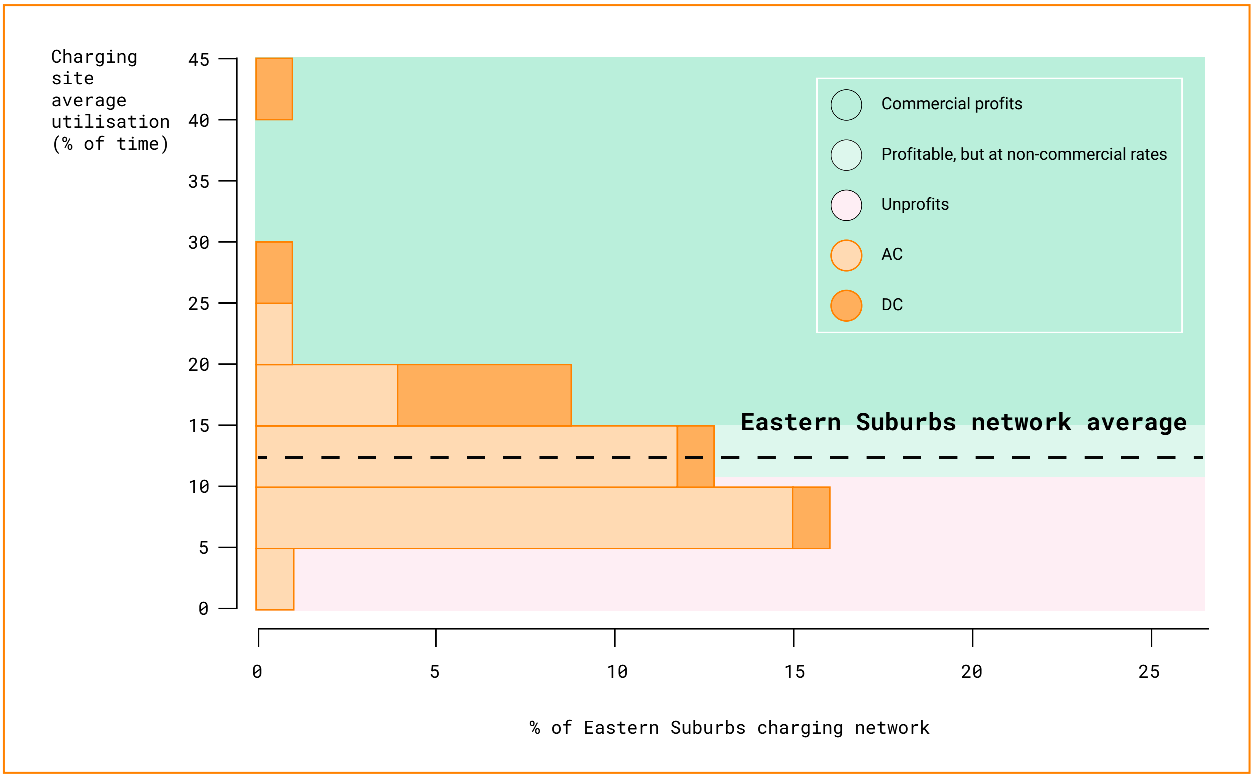
The profitability of kerbside charging sites hinges on how much they are used – the frequency and duration of charging sessions – and how much energy they deliver during their use. For the Eastern Suburbs network, the energy delivered is the most important variable because the network employs a flat c/kWh pricing model.

While energy delivered is the most pertinent financial driver (and is the key variable in the financial model), industry discussions are more commonly phrased around charging site utilisation (as a percentage of time). This is therefore the parameter used to present the statistical spread of utilisation of different charging sites in Figure 2.

Figure 2 shows that some charging sites generate profits at a commercial rate (considered to be an Internal Rate of Return (IRR) above 12%). However, these are the minority of the network's sites, so the network generates a profit (IRR greater than zero) but not at a commercial rate.

As flagged earlier, this finding must be considered in context, with the data coming from an area of atypically high demand for kerbside charging. Kerbside charging networks in other contexts – such as Australia's regional communities and areas with higher availability of off-street parking – are anecdotally reported as having average utilisation rates of 5-7%, making them unprofitable (generating less income than their cost to operate).

Figure 2: Average utilisation of the charging sites in the Eastern Suburbs network, with background shading indicating the profitability of average utilisation ranges. The dashed line indicates the average utilisation of the Eastern Suburbs network as a whole.

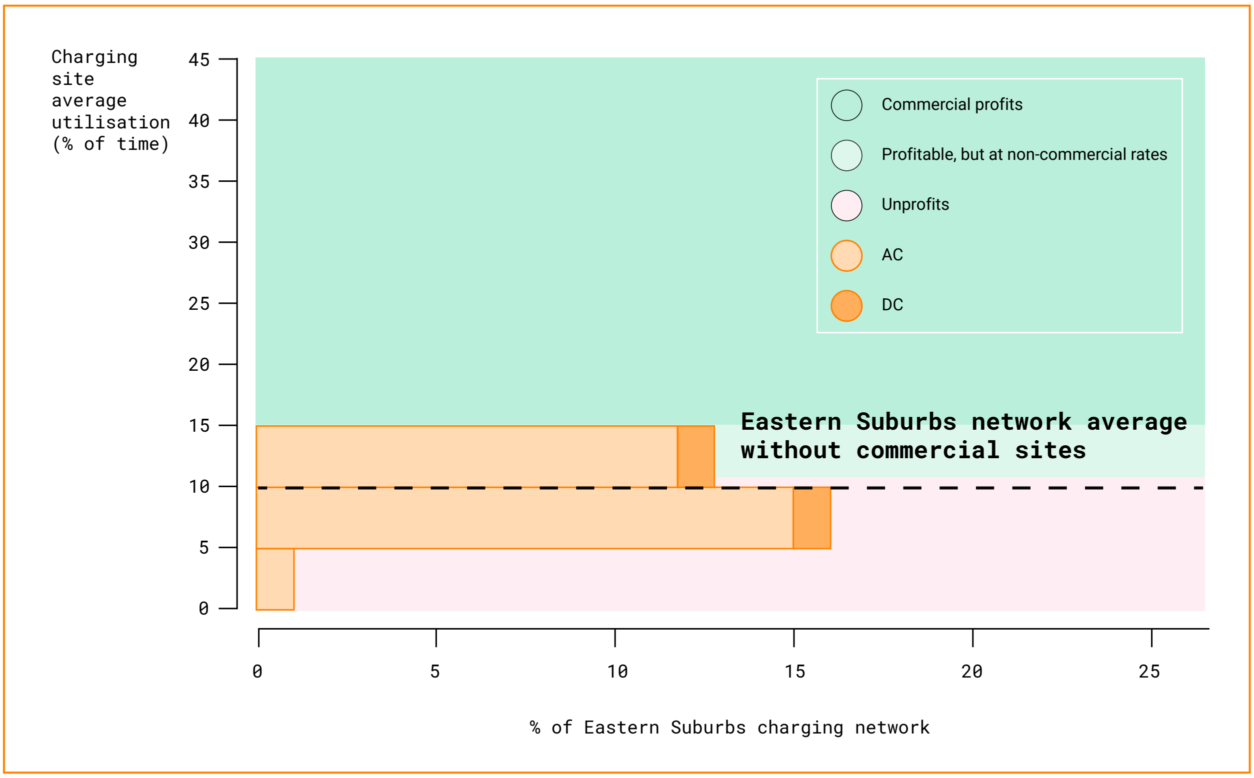


These results provide a quantitative reference point for considerations of whether or not to divide the charging network into commercial and non-commercial parts.

If commercial parties, such as Charge Point Operators (CPOs) are allowed to cherry pick sites that are expected to generate commercial profits, the profitability of the rest of the network – which is still essential for creating a viable electric transport system – will reduce markedly. In the case of the Eastern Suburbs network, this would make the network unprofitable, as shown in Fig. 3. In contexts where there are fewer highly utilised sites – say just in a few larger towns – the disaggregation of networks will likely have an even stronger effect, leaving the non-commercial network requiring significant ongoing external support to remain operational.

While it may, in the short-term, seem attractive to harness any available commercial capital to build out some (attractive) sites, this analysis highlights the risk that privatising profitable sites will exacerbate the social subsidies required, in the long-term, to keep the remainder of the network operating. Put another way, the analysis suggests that there are significant opportunities for cross-subsidisation within kerbside charging networks, where highly utilised charging sites support the sustainability of less utilised – but still important – sites.

Figure 3: Histogram of average utilisation of the charging sites in the Eastern Suburbs network in the hypothetical case where commercially profitable sites have been split out of the network. Background shading indicating the profitability of average utilisation ranges. The dashed line indicates the average utilisation of the Eastern Suburbs network in this hypothetical case.



Fee-for-use or free-of-charge

The second design choice is specific to the fiercely debated issue of DNSP ownership of kerbside charging infrastructure.

DNSPs are proposing to be allowed to deploy kerbside charging infrastructure deployments and be rewarded for doing so by adding these costs to their Regulated Asset Base (RAB), such that they earn a regulated return on these investments over time. Under this model, the DNSPs propose to provide charging infrastructure to electricity retailers 'free-of-charge'. This would reduce the price that retailers charged EV drivers to charge.

For DNSPs, this model has multiple advantages. It avoids any (real or perceived) 'double dipping' through earning returns on the RAB as well as from the infrastructure directly. Furthermore, it completely decouples DNSP revenue from charger utilisation, derisking DNSP investments. This is key to facilitating them to deploy chargers in contexts that are of high social value but will see low utilisation. For EV drivers, it will presumably result in cheaper charging.

For electricity customers, in contrast, the 'free-of-charge' model has multiple disadvantages. Firstly, it means electricity customers take on all costs, forgoing significant revenue opportunities, irrespective of whether they personally benefit from kerbside chargers . Secondly, they take on all risks, including that DNSPs fail to deliver or maintain high-quality charging that maximises usage, and of cost overruns.

An alternative to DNSPs placing kerbside chargers on their RAB and providing access to EV drivers 'free-of-charge' could be for them to keep chargers off their RAB and instead earn returns through charging EV drivers a fair 'fee-for-use'. Such an approach may require regulatory changes; it may involve using asset specific DNSP tariffs; and/or it may leave total DNSP revenue capped but with revenue from chargers offsetting other costs on customers.

Figure 4 quantifies the potential costs and benefits for relevant stakeholders for the case study of a 40kW dual-port DC kerbside charger utilised 20% of the time (approximately the average observed in the data for DC chargers). The figure breaks costs down into operating costs of retailers (including the cost of electricity), and the capital and operating costs of DNSPs (including maintenance and land access fees). On the benefits side, it shows the total revenue generated by such utilisation of a charger under current pricing in the Eastern Suburbs of Sydney. This is broken down to the likely revenue taken by retailers (10% more than their costs) and the remaining potential revenue that could either be passed through to EV drivers through cheaper prices (the 'free-of-charge' model) or secured as DNSP revenues to offset electricity customer costs (the 'fee-for-use' model).

The central conclusion is that:

- if DNSPs provide charging infrastructure 'free-of-charge', DNSPs customers have to cover a substantial loss (the sum of the DNSP operating and capital costs), whereas
- if DNSPs charged a 'fee-for-use' (roughly in line with current pricing), DNSPs customers would receive a material benefit (the difference of the red dashed bar and DNSP costs).

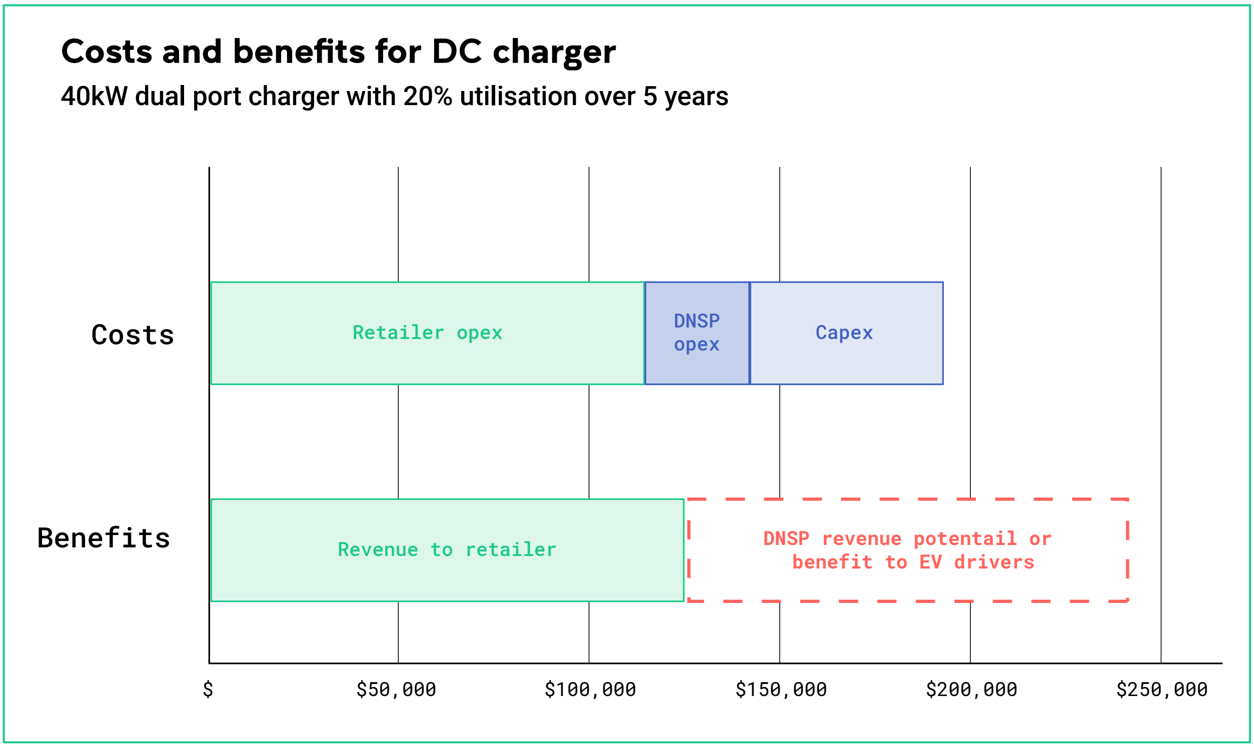
[9] See rule change proposal https://www.aemc.gov.au/rule-changes/enabling-distribution-network-service-provider-led-electric-vehicle-charging-infrastructure

[10] Benefits for EV drivers include direct usage of chargers and reassurance through knowing chargers are availability if needed. DNSPs suggest that a further benefit may accrue to all their customers if increased EV uptake increases the utilisation of their network,thereby reducing their costs per unit of delivered electricity. This possibility hinges on the costs of DNSPs providing kerbside chargers, the effectiveness of these chargers spurring additional EV adoption, and the charging profiles of EVs on the network (at kerbside chargers and more generally). All of which requires further analysis.

[11] Considering a 5-year time horizon (at which point the charger is assumed to need replacing). Excluding financing costs.

Fee-for-use or free-of-charge

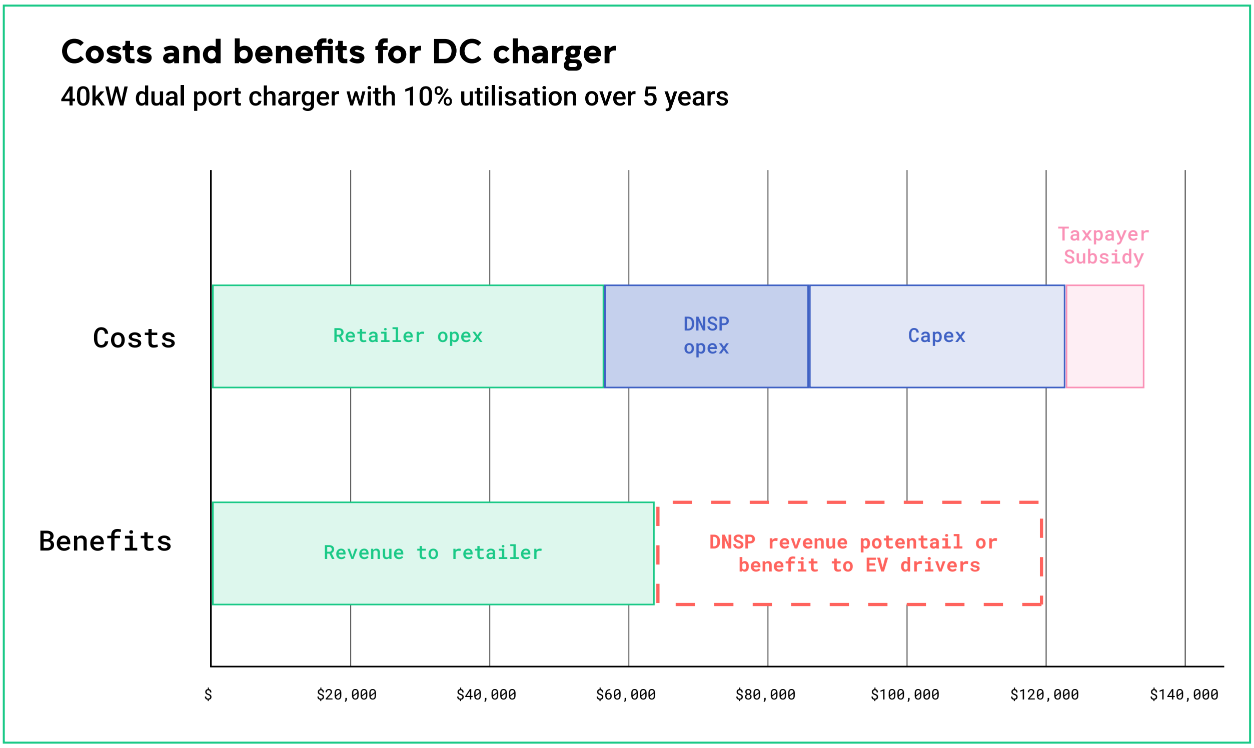
Figure 4: Costs and benefits of a 40kW DC charger utilised 20% of the time with current pricing. The red dashed bar indicates revenue, after retailer costs and profit margin, that can either flow to EV drivers through reduced pricing (in the 'free-of-charge') model or to DNSP customers (in the 'fee-for-use'



If the network is split into commercial and non-commercial parts, the total costs outweigh the revenue potential. Figure 5 shows how an upfront subsidy of 30% almost brings costs down to match potential revenue (under current pricing and 10% utilisation). A modest cost burden remains for electricity customers (comparing the red dashed bar with the total costs for DNSPs once retailers' profit margins are accounted for). This reinforces the potential for cross-subsidisation of high and low utilisation chargers within kerbside networks to improve the sustainability of the network as a whole.

Fee-for-use or free-of-charge

Figure 5: Costs and benefits of a 40kW DC charger utilised 10% of the time with current pricing. The red dashed bar indicates revenue, after retailer costs and profit margin, that can either flow to EV drivers through reduced pricing (in the 'free-of-charge') model or to DNSP customers (in the 'fee-for-use' model). The pink bar shows how taxpayers may contribute to carrying some costs also.

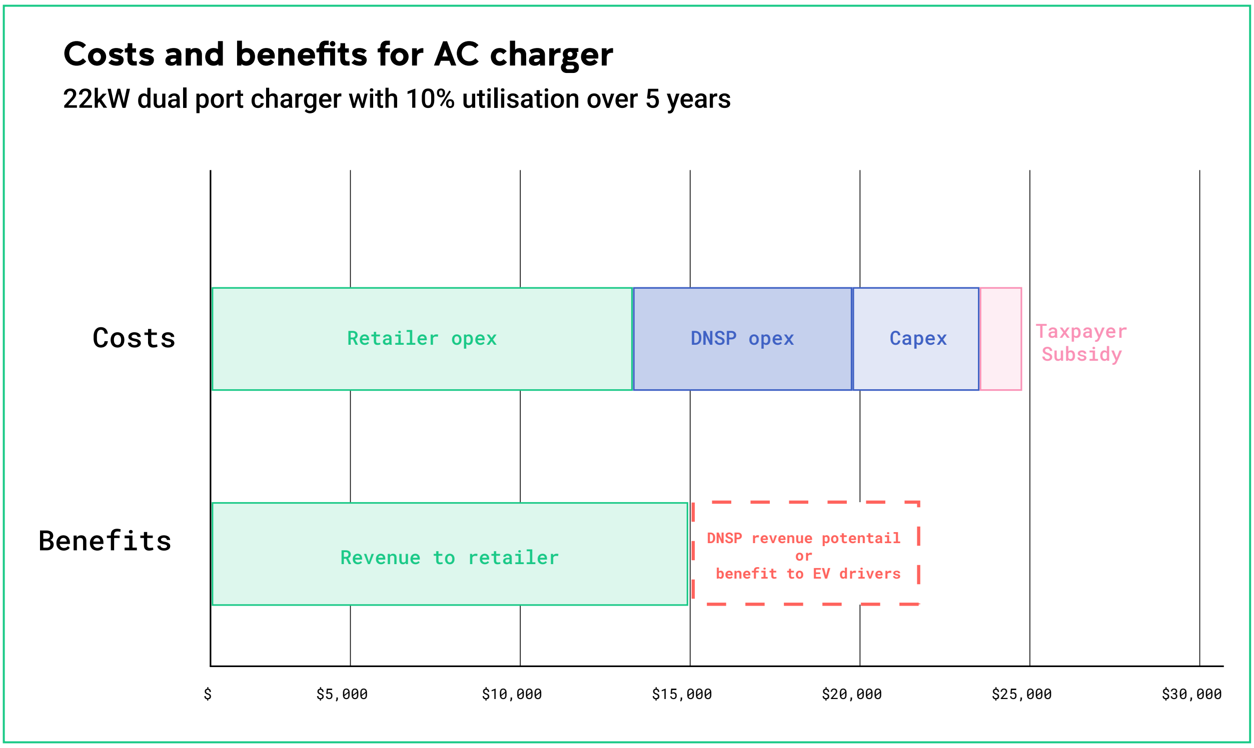


The findings of Figs. 4,5 suggests that the 'free-of-charge' model provides too great a share of the benefits to EV drivers at the expense of too great a cost on electricity customers (and potentially taxpayers). The 'fee-for-use' model – with appropriate pricing levels, potentially tuned to local contexts – seems to enable fairer distributions of costs and benefits.

Figure 6 shows the equivalent results for 22kW dual port AC chargers. It shows how their considerably lower utilisation and power rate makes them considerably less profitability, even though their initial deployment costs are far lower.

Fee-for-use or free-of-charge

Figure 6: Costs and benefits of a 22kW AC charger utilised 10% of the time with current pricing. The red dashed bar indicates revenue, after retailer costs and profit margin, that can either flow to EV drivers through reduced pricing (in the 'free-of-charge') model or to DNSP customers (in the 'fee-for-use' model). For these chargers the revenue is insufficient to cover DNSP costs.



These choices of how DNSPs may be paid to provide kerbside charging, if they were permitted to do so at all, relate not only to the cost/benefit aspect of fairness but also the social inclusivity of where chargers are provided. Where the intent is to provide chargers in contexts where utilisation will be low, one or more parties will have to carry the cost burden that would be unreasonable to place on the local EV drivers using these chargers. As an illustrative example, in regions where kerbside charging networks will have modest utilisation – even if the network includes the most profitable sites – costs could be balanced between EV drivers and taxpayers, such that there is no impact on customer electricity bills.

Options for the public good

The simple analysis presented in this paper brings into focus how four stakeholder groups could contribute to paying for the deployment of a public kerbside charging network:

1. **Electric vehicle drivers** – who receive the unique benefit of the option to use the infrastructure (a valuable option even if not utilised)
2. **Taxpayers** – who may subsidise deployments and provide an avenue for equitable outcomes through progressive taxation
3. **Electricity customers** – some segments of which may benefit from reduced per unit network tariffs as EVs increase demand, however their diversity – including between urban and regional DNSPs – also present risks of regressive impacts.
4. **Commercial investors** – are limited in their ability to fund equity objectives.

Table 1 outlines some of the impacts on these groups under various ownership models, and the alignment of these impacts with the principles proposed in this paper. The table is non-exhaustive and open to debate. It is presented as an input for the deliberations of regulators, policy makers, and politicians, who are ultimately responsible for making the challenging trade-offs between groups.

Table 1.1: Outline of five possible ownership structures for kerbside charging, including relevant insights from quantitative analysis and alignment with proposed principles.

Network owner(s)	Insights from analysis	Alignment with principles
Charging Point Operator (CPOs), possibly receiving government subsidies	Relatively few sites generate commercial rates of return, limiting the number of chargers deployed and contexts served. Substantial operating costs limit the effectiveness of upfront subsidies (see results in Appendix A).	**Fast** – can be fast in attractive locations. **Fair** – many communities will be underserved. **Future-proof** – dynamism and flexibility, but market participants are constrained in planing or acting for the long-term.

Options for the public good

Table 1.2

Network owner(s)	Insights from analysis	Alignment with principles
CPOs for commercially profitable locations; DNSPs for non-commercially profitable locations	Utilising private capital reduces the upfront cost to taxpayers (and/or electricity customers) but may increase the long-term burden on taxpayers (and/or electricity customers) to support chargers in unprofitable contexts because these are not cross subsidised by a network containing more profitable chargers.	**Fast** – two-pronged strategy should assist speed. **Fair** – risks privatising profit and socialising losses, exacerbating public burden of providing essential but unprofitable sites. **Future-proof** – divergence between profit- and loss-making sites may grow with EV uptake.
DNSPs, providing hardware 'free-of-charge', possibly receiving government subsidies	All costs and risks are borne by electricity customers, including those who don't own an EV and/or don't charge in public. Adoption of EVs may improve average network utilisation (depending on EV charging profiles), thereby reducing per unit network costs. The distributional impacts of this on customer segments needs detailed study. DNSPs would likely serve broader contexts because their returns are not dependent on utilisation but guaranteed by the RAB. The drawback of which is that they are not incentivised to deploy in ways that maximise utilisation. Ability to place chargers on RAB doesn't guarantee investment or regulatory approvals, creating uncertainty in speed of deployments. Government subsidies may reduce the cost for electricity customers and sure up DNSP investment decisions.	**Fast** – DNSPs argue they provide a fast path. International experience is mixed[12]. **Fair** – seems overly generous towards EV drivers. Risks placing undue costs onto electricity customers, particularly those without EVs or who don't charge in public. This is exacerbated by city/country division of DNSPs. Regional customers would pay for assets that support visitors. **Future-proof** – may facilitate focused efforts to reduce electricity network peaks.

[12] For example, the Californian Public Utilities Commission pivoted away from utility ownership of EV charging infrastructure in 2022 https://www.publicpower.org/periodical/article/calif-puc-proposes-decision-funding-behind-meter-ev-charging-infrastructure

Options for the public good

Table 1.3

Network owner(s)	Insights from analysis	Alignment with principles
DNSPs, charging a 'fee-for-use', possibly receiving government subsidies	Charging EV drivers a fair 'fee-for-use' could largely cover the costs of deploying and maintaining charging hardware, avoiding cost implications on electricity customers. To really be effective the DNSP network would have to include highly utilised sites to cross-subsidise lower utilisation sites. While this model keeps chargers off the RAB, DNSPs' regulated rate of return continues to be a relevant measure. Because this rate of return is significantly lower than return rates sought by CPOs, DNSPs could make these returns while serving a much wider set of contexts. Government subsidies could be used to expand network coverage to further low utilisation but high value contexts. DNSPs would be incentivised to maximise utilisation rates, which presents a degree of risk to them and may discourage action. Government funding and/or regulation could set guardrails to pursue equity objectives.	**Fast** – risk of returns may dissuade investments. Government subsidies of could counteract this. **Fair** – potential to balance DNSP costs and revenues, and government subsidies, to create zero cost impact on electricity customers and minimise taxpayer burden. Impacts on EV drivers are similarly to current market. **Future-proof** – DNSPs have incentive to innovate on hardware provision, retailers to innovate on market offers.
Government(s)	Government ownership may warrant consideration given: the scale and speed with which kerbside charging needs to be delivered; the strategic significance of this infrastructure for multiple national policy goals; and that this infrastructure appears to be non-commercial for a wide range of important contexts and will therefore be largely funded by governments (and/or electricity customers). Within such a model there would be many parts of delivering charging infrastructure that can and should use competitive markets. Governments' key role is taking on the investment risk of how many chargers to deploy where. They may play this role through grant funding schemes anyway. Direct ownership would allow them to better manage the associated risks, using planning expertise that they will need to develop irrespective. The perceived risk for government may be higher accountability for these decisions.	**Fast** – possibly the fastest approach once mechanisms put in place. **Fair** – taxpayers provide the largest, most diverse population over which to distribute risks and costs, with established progressive taxation system and democratic institutions to manage distributional impacts. Facilitates valuation of the many benefits of electrification, as well as trade-offs with many other national priorities, **Future-proof** – risk of establishing rigid approaches that inhibit innovation and responsiveness to system changes.

Conclusion

This paper provides principles and quantitative evidence to inform imminent decision making on consequential and controversial[13] aspects of how Australia rolls out kerbside charging. The paper focuses on how this critical infrastructure can create public good.

Its central principles are that kerbside chargers should be delivered fast, fair, and in a future-proof manner. Fast, so it supports electric vehicle uptake. Fair, so all members of society can benefit from electric vehicles. Future-proof, so we avoid the hiccups experienced when the grid wasn't prepared for millions of rooftop solar systems. With vehicles, it's clear Australia's 20 million light vehicles – and almost all heavier vehicles – will end up electric, so we need to prepare for this.

The analysis – made publicly available together with underlying data – concludes that some kerbside charging sites are quite profitable, but there are not enough of these sites, and they are not profitable enough, to make the kerbside networks commercially profitable overall. At least this is the case for the network we studied, which is in an area of high demand, with lots of apartments and renters, but has been deployed with a focus on community benefits, not profitability. Kerbside chargers in most of the rest of the country are expected to be less profitable.

The paper analysed the impact of distributing charging sites into commercially run networks and non-commercial networks (for sites that don't generate commercial profits but are still very important). While doing so may reduce the number of chargers requiring government subsidies up front, the analysis raises the risk that sites will need long-term funding support (from taxpayers or electricity rate payers) because profitable sites can't cross-subsidise unprofitable sites.

Secondly, it analysed possible pricing models for DNSP owned chargers. The analysis suggests that the current proposal – for DNSPs to add the costs of deploying chargers onto their customers' bills and provide the hardware to electricity retailer 'free-of-charge' – would be unfair for electricity customers (and too generous to electric vehicle drivers).

A better option may be to regulate electricity distributors to charge drivers a fair 'fee-for-use' of charging hardware. Doing so may enable electricity distributors to deploy chargers without adding costs to their customers' bills. This may require a degree of government subsidies, but these are reduced through revenue from drivers. Such an approach is only really feasible if the network included commercially profitable sites. If profitable sites are privatised, the ongoing losses of remaining sites would likely have to be socialised to electricity bill payers or taxpayers.

The paper closes with a brief discussion of five ownership models, their effect on stakeholders – EV drivers, CPOs, electricity customers, and taxpayers – and their alignment with the proposed principles. Balancing the trade-offs between these groups is the challenge for regulators, policy makers and politicians.

What is clear, is that kerbside charging is not just another market opportunity. It is critical national infrastructure that should serve the public good. It must be planned, funded and regulated accordingly.

[13] They are the subject of no less than three rule change proposals.

ENA
Nexa Advisory
DCCEEW

Appendix A: methodology

The central concept of the methodology used in this discussion paper is to calculate the relationship between the IRR generated by a kerbside charger (or charging network) and the utilisation of a charger (or average of the network). Note that the financial analysis really focuses on the energy delivered by chargers (not the duration of time they are used) but presents results in terms of utilisation for ease of interpretation.

Doing so allows comparison of the IRR values with the investment hurdle rate of CPOs and the regulated rate of return of DNSPs, and comparison of the utilisation rates with the data collected in the Eastern Suburbs of Sydney.

Figure A1 presents an illustrative example of such a comparison (which was done manually since the two plots were produced in different analysis tools). The top figure in Fig. A1 shows the IRR values for AC and DC chargers as a function of utilisation (sloped curves) and the CPO investment hurdle rate of 12% (flat purple line). The vertical purple dotted line marks the intersection of the IRR curves and the CPO hurdle rate at a utilisation rate of approximately 14%: when utilisation rates are higher than this (to the right of this line in the plot), chargers will generate commercial returns, if utilisation is lower (to the left of the line in the plot), they will not. The dotted purple square highlights the chargers in the Eastern Suburbs network that generate commercial returns (with average utilisation rates higher than 15%).

The bottom figure shows the histogram of charger utilisation in the Eastern Suburbs data. The vertical dashed lines overlaid across both figures are the mean utilisation values for the AC and DC networks. This shows that the DC network averages a utilisation rate of around 16%, therefore generating commercial returns. The AC network has an average utilisation rate of 10%, which generates a positive but non-commercial IRR.

This approach also allows for analysis of the impact of upfront subsidies. This indicates that the substantial fixed costs of operating chargers limit the effectiveness of upfront subsidies. Very high subsidies have diminishing impacts on IRR. This is shown in Figs. A2 and A3, for subsidies of upfront subsidies of 80% and 100% respectively.

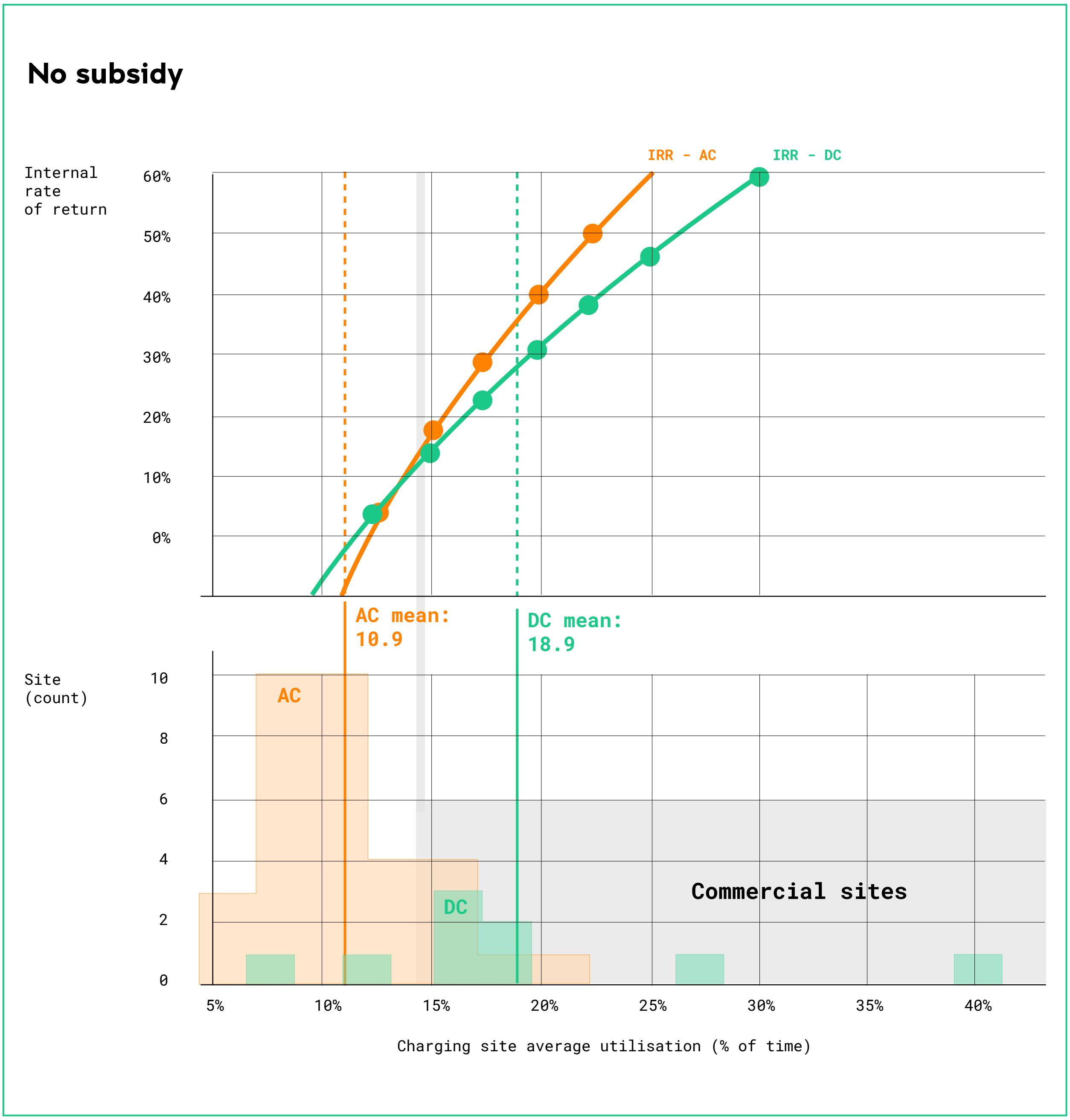
Figure A3 also reveals that there is a minimum utilisation rate for below which chargers are unprofitable, even when 100% of upfront costs are covered by a subsidy. The threshold appears to be around 7% for DC chargers and 10% for AC chargers.

For further details and experimentation with the analysis, see the excel spreadsheets[14].

[14] Available at https://github.com/bjornsturmberg/analysis_of_kerbside_chargers

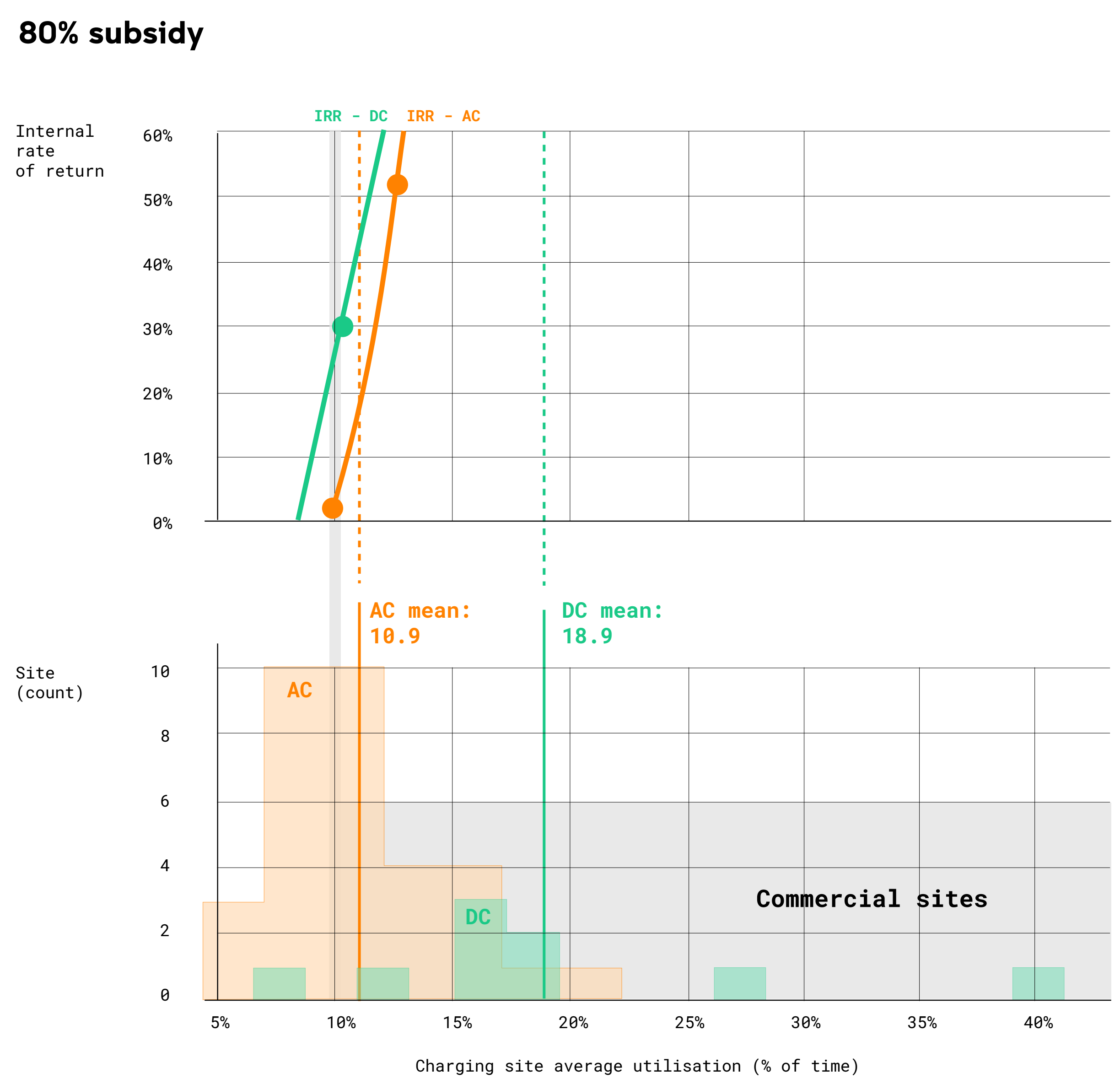
Appendix A: methodology

Figure A1: The relationships between the internal rate of return generated by kerbside chargers and their average utilisation rate (top) and histogram of the average utilisation rates of the chargers in the Eastern Suburbs network (y-axis is the number of charging sites experiencing a given utilisation rate).



Appendix A: methodology

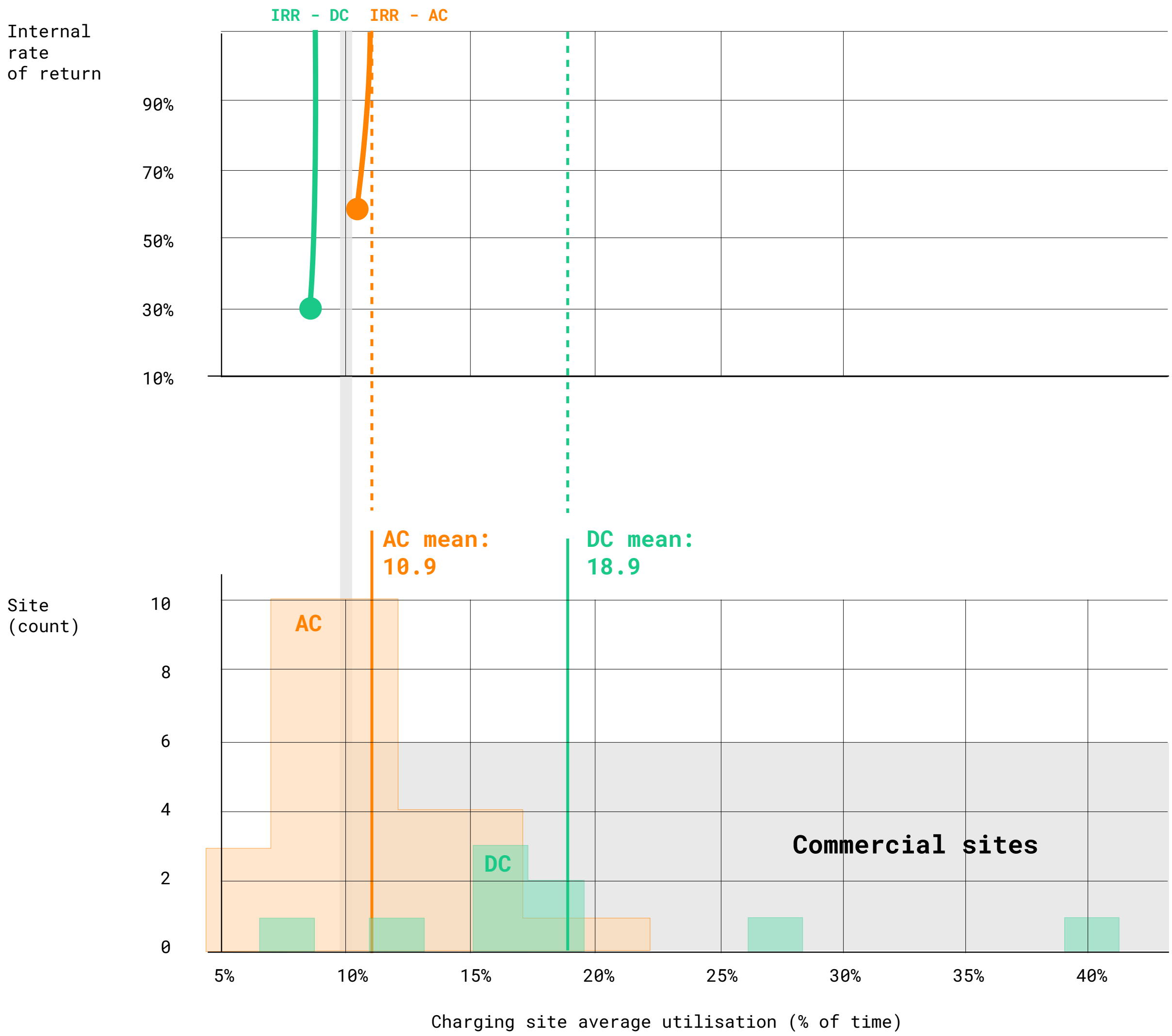
Figure A2: The relationships between the internal rate of return generated by kerbside chargers and their average utilisation rate (top) and histogram of the average utilisation rates of the chargers in the Eastern Suburbs network (y-axis is the number of charging sites experiencing a given utilisation rate). In this scenario, 80% of the upfront costs of chargers was covered by a subsidy, yet utilisation rates must still exceed 8% for DC chargers and 10% for AC chargers in order to generate commercial profit (IRR > 12%). The IRR curves become increasingly steep because revenue is compared against very little upfront costs.



Appendix A: methodology

Figure A3: The relationships between the internal rate of return generated by kerbside chargers and their average utilisation rate (top) and histogram of the average utilisation rates of the chargers in the Eastern Suburbs network (y-axis is the number of charging sites experiencing a given utilisation rate). In this scenario, 100% of the upfront costs of chargers was covered by a subsidy, yet utilisation rates must still exceed 7% for DC chargers and 9-10% for AC chargers in order to generate a profit (IRR > 0%). The IRR curves become increasingly steep because revenue is compared against very little upfront costs.

100% subsidy



Fast, fair and future-proof:
kerbside charging for the public good

UNSW SYDNEY

Contact:

Dr Bjorn Sturmberg
Collaboration on Energy and Environmental Markets

b.sturmberg@unsw.edu.au

CRICOS Provider Code 00098G