T R A N S C R I P T

LEGISLATIVE COUNCIL ECONOMY AND INFRASTRUCTURE COMMITTEE

Inquiry into Electricity Supply for Electric Vehicles

Melbourne – Thursday 12 February 2026

MEMBERS

Georgie Purcell – Chair
Richard Welch – Deputy Chair
John Berger
Gaelle Broad
Katherine Copsey
Moira Deeming
Tom McIntosh
Evan Mulholland
Sonja Terpstra

WITNESSES

Associate Professor Julie Karel, Deputy Director, Research,

Professor Hai Vu, and

Associate Professor Roger Dargaville, Monash Energy Institute.

The CHAIR: I declare open the Legislative Council Economy and Infrastructure Committee's public hearing for the Inquiry into Electricity Supply for Electric Vehicles. Please ensure that mobile phones have been switched to silent and the background noise is minimised.

I would like to begin this hearing by respectfully acknowledging the Aboriginal peoples, the traditional custodians of the land we are gathered on today, and pay my respects to their ancestors, elders and families. I particularly welcome any elders or community members who are here today to impart their knowledge of this issue to the committee or who are watching the broadcast of these proceedings. I also welcome any other members of the public watching via the live broadcast.

To kick off, we will just have committee members introduce themselves to you first. We will start down here with Mr Mulholland.

Evan MULHOLLAND: Evan Mulholland, Northern Metropolitan.

Moira DEEMING: Moira Deeming, Western Metropolitan.

Richard WELCH: Richard Welch, North-Eastern Metropolitan Region.

The CHAIR: Georgie Purcell, Northern Victoria.

John BERGER: John Berger, Southern Metro.

Gaelle BROAD: Hi. I am Gaelle Broad, Northern Victoria.

Tom McINTOSH: Tom McIntosh, Eastern Victoria.

The CHAIR: We also have Mr Davis here. He should be back soon.

Thanks so much for appearing before us today. All evidence taken is protected by parliamentary privilege as provided by the *Constitution Act* and further subject to the provisions of the Legislative Council standing orders. Therefore the information you provide during this hearing is protected by law. You are protected against any action for what you say during this hearing, but if you go elsewhere and repeat the same things, those comments may not be protected by this privilege. Any deliberately false evidence or misleading of the committee may be considered a contempt of Parliament.

All evidence is being recorded, and you will be provided with a proof version of the transcript following this hearing. Then transcripts will ultimately be made public and posted on the committee's website.

For the Hansard record, could you please all state your full names and the organisation you are appearing on behalf of.

Julie KAREL: Julie Karel, Monash Energy Institute.

Roger DARGAVILLE: Roger Dargaville, Monash University, department of civil and environmental engineering.

Hai VU: Hai Vu, Monash civil engineering.

The CHAIR: Wonderful. Thank you. We now welcome your opening comments but ask that they are kept to around 10 to 15 minutes maximum to ensure plenty of time for discussion and questions.

Julie KAREL: Okay. Good afternoon, Chair and members of the committee. Thank you for the opportunity to contribute to this important Inquiry into Electricity Supply for Electric Vehicles. I am Associate Professor Julie Karel, and I am the Deputy Director for Research at the Monash Energy Institute. Joining me today from the institute are Professor Hai Vu and Associate Professor Roger Dargaville.

The energy institute works across economic, technical and social dimensions of the energy transition through rigorous evidence-based research from world-leading researchers. We are focused on advancing a reliable, equitable and affordable transition to low-emission energy systems.

The submission before you today draws on expertise from the energy institute and reflects a genuine interdisciplinary and diverse perspective. In addition to Hai and Roger here, the submission was prepared with contributions from Professor Yolande Strengers, Dr Changlong Wang and Dr Fareed Kaviani. These researchers are internationally recognised with expertise in electricity systems, modelling sustainable mobility, renewable energy integration and the social dimensions of energy use and consumer behaviour.

Our submission addresses four core questions of the inquiry. First, we examine how electric vehicle charging behaviour affects the electricity system. Using detailed modelling of the NEM out to 2050, we show that unmanaged evening charging, typically when people arrive home from work, substantially increases peak demand and drives unnecessary investment in infrastructure. By contrast, charging aligned with periods of high renewable supply during the day and low demand overnight can halve future peak demand, reduce system costs, improve reliability and increase the utilisation of renewables. Just as importantly, our research shows that charging behaviour is not driven by price signals alone. Household routines, preferences and the desire for convenience and control strongly shape when people charge their vehicles. This means that infrastructure design, default charger settings and consumer engagement are critical to achieving grid-friendly charging alongside pricing and regulation.

Second, we consider whether public charging infrastructure is being rolled out at an adequate and equitable pace across Victoria. Our research highlights that while public charging is essential, most households strongly prefer home-based charging, and a lack of access, particularly for renters and apartment dwellers, risks creating new inequities in EV uptake. We therefore emphasise the importance of shared charging solutions in multiunit dwellings, landlord and developer obligations and careful siting of public chargers where people already spend extended periods of time.

Third, we examine strategies to support EV uptake, including the role of bidirectional charging, where vehicles can act as flexible energy resources. Our findings suggest there is a genuine willingness among households to participate in such schemes, provided that the programs maintain transparency, user control and trust. Social acceptance and behavioural realities must be considered alongside technical capability.

Finally, we address the role of electricity distribution businesses and tariff design. Our analysis shows that current tariff structures often discourage charging at the very times that are cheapest and cleanest for the grid. We recommend reforms including midday off-peak pricing, EV-specific tariffs, dynamic network operating envelopes and clearer signals about where charging infrastructure can connect most efficiently. However, tariff reform alone is not enough. Many households are unaware of their tariffs, do not actively respond to price signals and are cautious about automated charging that reduces their autonomy. People engage more readily with simple, intuitive cues such as charging when solar energy is available. This means that distribution businesses play a critical enabling role, not only with smarter tariffs and network management but by supporting simple, transparent arrangements that make flexible charging easy and acceptable for households. In summary, the central message of our submission is that electric vehicles can either place avoidable strain on the electricity system or become a powerful asset to the energy transition, and the difference lies in policy, infrastructure design, tariffs and consumer engagement. Coordinated action across these areas can unlock lower costs, higher renewable utilisation and more equitable outcomes for Victorian households. We appreciate your consideration of our submission, and we are pleased to answer any further questions that you have.

The CHAIR: Thank you so much for that. We will move to questions. We will start with Mrs Broad.

Gaelle BROAD: Thank you very much for appearing today. The Victorian Auditor-General put out a report in December last year, *Managing the Transition to Renewable Energy*, and it showed that the Allan Labor government's own risk framework rates the likelihood of a disorderly energy transition as significant, severe

and almost certain and that it could result in supply disruptions, price volatility for households and businesses, community resentment and job losses. Power outages are a huge issue, particularly in regional areas. I was in Euroa yesterday talking to businesses whose power is getting cut off on a regular basis. When you look at the 1.4 million additional charge points needed to be put in for the demand from EV vehicles, there is some benefit with the battery there but still overall a larger consumption of energy. Do you see that there will be a greater gap between rural and regional areas and what is available in Melbourne?

Roger DARGAVILLE: That is a really good question; thank you for that. It is complicated to give a detailed answer. It highlights the critical importance of having smart charging with electric vehicles so that there is some systemic control of when EVs are charged and when those chargers are put on idle or switched off to avoid putting additional stress on the network. In our submission, we showed that if all EVs charge when they come home at night between 7 and 10 pm – it is not a realistic scenario; it would not happen – it would dramatically increase the cost of the electricity system for all energy users. So on the flip side, if you optimise when EVs charge and it turns out the profile of the optimal shape of charging EVs to match availability of renewables is during the day to match up with the solar profile – if you follow that profile – the cost is reduced, and the cost for EV drivers is about half for charging the vehicles if you do it during the day versus during the night, cost-reflective on the cost of the infrastructure to meet those profiles. So you are right in that if the energy transition is not managed in an orderly fashion, there is a real risk, both on the demand side and the supply side. You mentioned the supply side – that if we do not build enough wind and solar fast enough there is a risk that we will not have enough supply to meet demand as coal-fired power stations shut down. We live in a challenging world where we have commercialised or privatised the energy system, so you are asking private investors to build the wind and solar plant to meet that increasing demand. The federal government has incentives in place to support building renewables, but you do not have direct control over what gets built when. You can incentivise, but –

Gaelle BROAD: I guess I am interested just even in the powerline infrastructure that is in regional areas. I know Euroa has a single line, so there is no back-up, whereas in Melbourne if the power goes off there are numerous other ways that they can still get power. In a regional area it can mean that you have suddenly no septic system in your house, no water, the local treatment plant cannot operate effectively, people cannot get out of their garages, and you have got no mobile because you are relying on a booster that needs the power. So I guess when you are putting cars into the mix as well in a regional area – Euroa, for example, had about 17 power outages in two months last year, and the businesses there are continuing to experience that. I have had residents across the region raise concerns about power outages, including in Huntly, close to Bendigo, where $20,000 worth of stock was lost; the power was just cut off. So I guess there are certain requirements being put in place by the government, particularly in bushfire zones, to sort of limit the power supply when there is an earth fault, but then the result is that an extensive search has to be done of all those lines before they can turn it back on. So it is just a regular issue, but do you think, with that complexity of the power system, and from this inquiry, you would recommend that for regional areas those issues need to be prioritised as well before you start looking at sort of EV charging stations and everything else or that be taken into account with the rollout of the increased demand?

Roger DARGAVILLE: One of the big benefits of the renewable energy revolution we are going through is you have a far more distributed energy generation network, and Australia has the highest uptake of rooftop PV generation. We actually do not have the highest amount of rooftop PV per capita anymore – the Netherlands knocked us off the top of the list, surprisingly – but we still have the highest per capita generation of electricity from rooftop PV. That means that our residents in rural areas actually have access to their own energy generation.

Gaelle BROAD: Yes. That is not benefiting businesses, though, that need to operate an oven or a fridge or, you know, something a bit stronger. They need that.

Roger DARGAVILLE: In aggregate, there is more rooftop PV than we have coal-fired power stations. So it is not small time, it is a really significant contributor to the energy system. When we talk about electric vehicles, if they are coordinated in an orchestrated way to ensure that the EVs are charging when the photovoltaics are available, it actually strengthens the system. It provides a more resilient system. It provides more efficient use of the available infrastructure, because you are using distribution networks at a higher percentage, so they are more valuable. So long as the EV charging is done in a coordinated way and not an uncontrolled way, you should see net benefits, not a net disadvantage.

The CHAIR: Thanks, Ms Broad. We will go to Mrs Deeming.

Moira DEEMING: Thank you. We have heard from you and most of the submissions that we have had today – and that we will be having – talking about the need to incentivise the uptake of EVs. But it seems that everyone is also in agreement that we actually are not ready to cope with a continued uptake and the rate of uptake that is the goal. We are in a lot of debt in Victoria – a lot of debt – and, you know, there are subsidies for buying them, subsidies for basically everything to do with these things, and then we are going to have a levy to cover the costs of the infrastructure. I am just wondering: has anyone thought about letting that slow down a bit for a while, while we get on top of the debt? Just in terms of one of the options, has that been looked at?

Hai VU: Thank you for the question. When we are looking at the uptake of EV, I think we are often looking at that they consume energy. But I think we should also consider that an EV by itself is a battery on wheels. So if we organise it and coordinate it right, it could potentially bring benefits from the energy perspective, and that is actually saving on costs. I just want to reiterate the point that my colleagues made before that at the moment most of the EVs are charging at home. That is based on our understanding and based on the modelling. That is happening overnight when people basically return from work, when the peak periods are. At the same time, the solar and other renewable energy peaks during lunchtime or during the day, and that has not been really utilised. If you still remember, in the past, for the solar rooftops, we were often paid for the solar to actually be put back into the grid. That payback is actually getting smaller and smaller and diminishing.

David DAVIS: It is almost nothing now, that feed-in tariff. It is next to nothing.

Hai VU: It is worth nothing now. Absolutely. That is right. In fact in some areas overseas they even charge if you actually – so it is a negative price in that sense. If you think about that, that is a waste of resources. If we control and design the charging infrastructure right, then in fact more uptake of EVs is actually helping us; it is not putting a burden on us from the energy perspective.

Now, how do we know what is right and wrong? We actually need to look at different scenarios. We need to actually look particularly at modelling different behaviours. Those behaviours can only be done not in reality but through research and understanding how we can incentivise people to do certain things. As an example, at the moment we do not really have a scheme where we incentivise people to charge at work. Or the corporates that have big fleets – what are the incentives for them to encourage charging the fleet during the day? We do not really have those. We are not really looking at that, and we do not really understand what that means. Those batteries are not that small. Similarly, I think also in terms of the consumer, a lot of planning is looking at what the charging patterns are at the moment. But we should actually put it the other way around: how can we change behaviour and change the pattern so that it suits us? We do not know how to do this unless we actually look at modelling it and trying it in different ways. Maybe I will stop there to see if my colleagues have anything to add.

Roger DARGAVILLE: To answer the question about if we are ready for the EV revolution as it is coming and if there is enough infrastructure –

Moira DEEMING: It is more just about the hurrying of it forward and about the cost, basically. It is going to cost a lot of money and there are lots of issues. I am wondering if one option is to change the pace.

Roger DARGAVILLE: It is not going super fast compared to a lot of other places around the world. I think it was 12 per cent of vehicles sold in the last quarter last year that were EVs, whereas if you compare that to Norway or China, EV sales are much, much higher. Australia is a bit of a laggard in uptake of EVs.

Moira DEEMING: But the Victorian government is changing a bunch of our state-owned fleets of vehicles to be electric. You know, we are building in this capacity, we are moving forward, as has been said, and we are all worried about the capacity of the electrical grid to handle it. We are all worried about these things and we are worried about the costs. For me, I am just sort of wondering if we are being really one-eyed about this. Is it our only option to keep pushing forward, or is there an option where we actually slow down and move within our means financially and according to the grid?

Roger DARGAVILLE: I am stepping outside my area a bit. I do not know exactly how much it is going to cost the state government to accommodate electric vehicles, but electric vehicles are cheaper to run than petrol-powered vehicles. The costs that you will save from not running internal combustion engines will more than

offset the costs that you outlay to charge electric vehicles. Now, they are probably coming from different budgets or entirely different parts of society, so some people will be paying more and some people will be paying less, but overall electric vehicles are more cost effective than internal combustion engines, so there should be a net saving to society.

Moira DEEMING: I think I am looking at it in terms of all these subsidies, funding and research, funding of basically market research, promotion and all these kinds of things, and then a levy on top – plus we are in debt. One final one, if that is okay.

The CHAIR: Yes, that is fine.

Moira DEEMING: In all the research that you have done, and I apologise if I missed it, is there a defined exit strategy from public support? When is that point where we will not need to subsidise this anymore?

Roger DARGAVILLE: Electric vehicles are already more cost effective over their lifetime. They do not need a subsidy. Which subsidies in particular are you talking about?

Moira DEEMING: Sorry, that was unclear. Sorry about that. I just mean everything that goes into providing the infrastructure. I do mean the whole entire concept, so all the upgrades that you are thinking of doing or that we are thinking of subsidising through the government. There are parts that are for the government and parts that are not. What is our exit strategy from funding this?

Roger DARGAVILLE: It is once it is an established technology that has been de-risked. Because it will make sense on its own once it is well established, but it is new technology that consumers are not accustomed to, so there is a relatively high risk in the early stages. Early adopters will take the risk, but the mainstream public do not know much about EVs and need a bit more help to be pushed along. But once it becomes the norm – and maybe I should defer to you on this one a bit – it becomes much easier and does not need subsidies anymore.

Julie KAREL: Yes, and I think the other piece of it is related to consumer behaviour. That is something that we are working to understand better because, as I mentioned in my opening statement, it is not just about designing the tariff structures to motivate people to charge their vehicles at the right time, it is also about understanding their connection with energy. What we are finding in our research is that there are a lot of people that do not know what tariff structures they are on. They do not know what time their electricity prices are reduced. So it is thinking about other incentives to get them to have an EV and to charge it at times that are more favourable for the grid.

Moira DEEMING: I just do not want to disincentivise a whole entire industry from becoming profitable on their own, but anyway, thank you so much.

The CHAIR: Thanks, Mrs Deeming. We will go to Mr Berger.

John BERGER: Thank you, Chair. Thank you all for your presentation here today. It seems that every question that is asked is answering every question that I have, but I probably want to go back to that home charging position. I think your earlier evidence said that there are more people charging from home than what there would be from any other facility that is available to them. I am just interested to know about the effect on the grid, because I think part of the evidence I heard here today was that people are charging at 7 pm at night. I would not think that that was necessarily right. Not everybody finishes work at 7 o'clock at night. And equally, I pick up your point, Professor, about people not knowing what their bill structures are. I certainly do, when I look at mine, understand that the peak period is between certain times. I certainly would not be charging at 7 o'clock at night. How do you then educate people to plug in a little bit later or set a timer on those sorts of charging arrangements so it is less of an impact on the grid at that particular point in time and cost effective?

Julie KAREL: I can speak a little bit to the consumer engagement piece. There are a couple of different things you can think about. Some of it is about aligning to routines that they already have in their home. People typically tend to charge their phones overnight, for instance, and batteries for tools and things like that. So you can think about having them think about also charging their car. It is much more effective for them to charge their cars overnight when there is not such a peak in the grid. So that is, for instance, one thing that you can think about.

What we are finding in our research is that for people that have rooftop solar, it is maybe less about the cost savings and more that they feel a strong sense of autonomy or self-reliance. You can sort of tap into that because they are already feeling like, 'Okay, I have the ability to power my home without being connected to the grid at all.' You can tap into that to say, 'Okay, well, also you can charge your EV, and you should do it during the day because that's when you have solar.' There are going to be some people where that is a possibility. You might also look for opportunities where, for instance, people are working from home and they can charge during the day. That is an effective time. There are a couple of different strategies and ways to engage with the consumer that are not just about tariffs. I do not know if you want to say a little bit more about that, Hai?

Hai VU: Yes, maybe I can add to that. Apart from understanding people's routine and behaviour, I think it is also important to ask questions. Potentially they charge at home overnight because they do not really have access to recharging during the day, and that is an important question to ask: why not? We need to understand what people are doing with the car and where the car is most of the time. I think the statistics show that if you own a car, then probably you are only using the car maybe less than 5 per cent of the time. The rest of the time it is basically stationary, so it is parked somewhere, either at home or at the workplace or somewhere else. If we provide accessibility and make it easy for people to charge when the car is stationary, then I think we could actually solve part of that problem, if not all.

Another thing is that it is also shifting the source of energy from potentially coal-fired energy into renewable energy, because if you charge in different times of day, then you have more access to different types of energy. It is more restricted when you are charging overnight. So it raises a very interesting question. When we are thinking about an EV, we often think it is a thing for people to use and that also it will consume energy, but I think we should also be thinking about why people are using the EV, for what purpose and where they will park the car. Based on that, we could actually come back to the question of how we influence and incentivise people to charge at a time that potentially is beneficial not only for themselves but also for society.

John BERGER: Thank you.

The CHAIR: Thanks, Mr Berger. We will go to Mr Welch.

Richard WELCH: Thank you, Chair. Thank you very much for coming in. It is a very, very interesting topic indeed. I would like to try and get some definitions clear so that contextually we know what we are talking about. When we talk about adoption and say we are in an early adoption phase, what proportion of cars need to be EVs until we are no longer in early adoption?

Roger DARGAVILLE: I do not know.

Richard WELCH: What is the proportion now?

Roger DARGAVILLE: Well, 12 per cent of new vehicles are EVs. But it has only been at that rate for a couple of years. So around about 1 or 2 per cent of cars on the road are electric vehicles at the moment.

Richard WELCH: But you do not have a definitional point where it is no longer early adoption. Is it 20 per cent?

Roger DARGAVILLE: Ten or 15 per cent, I think, once we are at that point.

Richard WELCH: So we are almost there now.

Roger DARGAVILLE: No, 12 per cent of new vehicles are electric.

Richard WELCH: I see. Sorry – yes.

Roger DARGAVILLE: But only 1 or 2 per cent of vehicles on the road are electric.

Richard WELCH: Okay. So we are a long way from –

Roger DARGAVILLE: We are still quite a way from it being mainstream.

Richard WELCH: Yes. Okay.

Roger DARGAVILLE: But we will accelerate towards that point.

Richard WELCH: But I think some of that mathematical stuff is important because we are talking about infrastructure and we are talking about how much you sweat the capital of investment into it. We talk about bidirectional and there is obviously capital investment that enables that. Numerically, how many EVs need to be on that to justify the investment? Where is the tipping point or the cross point where it becomes profitable, how long will it take to get there and how long will that investment have to sweat before you get there?

Roger DARGAVILLE: I am going to put a possibly controversial point, which even my colleagues might disagree with. Vehicle-to-grid bidirectional charging is not cost effective overall, especially not at the home scale.

Richard WELCH: Yes.

Roger DARGAVILLE: The up-front cost of a bidirectional charger is high, and the potential financial benefits of doing it are modest. So at the home level they do not make sense. You can gain 80 per cent of the benefit of having flexible charging through a single-direction smart charger that avoids charging during peak times and that soaks up solar energy during the day or excess wind energy at night. The bidirectional charging provides relatively modest benefits at significant cost.

Richard WELCH: You have taken a weight off my shoulders, because it was like a burning question for me. I could not quite understand the economics of it. But let me –

Roger DARGAVILLE: But it has a lot of appeal, because when you calculate how much potential energy storage is going to be on wheels in electric vehicles, it is enormous, but there is this bottleneck of cost.

Richard WELCH: Yes, but that comes back to where the tipping point is. What rate of adoption has to apply before that becomes economically sustainable – or viable even?

Roger DARGAVILLE: As I said, my point might not be in 100 per cent agreement with my colleagues.

Hai VU: I will not disagree in that sense, but I would advocate that vehicle-to-home, not vehicle-to-grid, is actually a potential. That is because if you charge a vehicle at the right time to store the renewable energy – and over time the batteries and the cars themselves will actually improve in terms of technology – then in fact the car battery can become something that can power the home at night, and that is actually a huge benefit. At the moment, the scenario is that people might have a separate battery that stores solar power during the day, and then when they come home they might be using that to power the home or in fact using that to charge the car. But that is a very inefficient way to do things.

Richard WELCH: I think there are a lot of in-built assumptions in that sort of statement, and that sweeps across a whole lot of complexities: maybe you are going out that evening, maybe you are not back until 12, maybe your kids need to go to sport, maybe you are in an apartment block and there is not a one-to-one ratio relationship where your battery is. So there is a lot of complexity that I do not think is factored in. I think everyone can agree with the principle. With the 30 seconds we have got left, previous witnesses mentioned the fact that some of the constraint in rolling out EV charging points in public spaces is not so much about the economics of whether that point is a profitable point; it is the grid infrastructure that allows energy to get to that point that seems to be the larger constraint. I could be wrong, but I am interested to know your view on that.

Roger DARGAVILLE: There is a little bit of an obsession with high-speed charging for electric vehicles for public charging infrastructure – so 50-kilowatt DC chargers and above. It is not nearly as sexy, to use possibly an inappropriate term, to look at low-powered 7-kilowatt chargers, but they are actually much more effective. They are much cheaper to install; they put a lot less stress on the grid. The problem – the challenge of why you do not see so many of them – is the car needs to be parked for a significant period of time. But if you put public charging infrastructure where the vehicles are parked during the day, as Hai was saying before, then you actually can get around a lot of the challenges you have with having sufficient distribution network capacity to manage –

Richard WELCH: I have run out of time, and I have probably got a follow-up question if there is time left over at the end.

The CHAIR: Okay, great. Thank you, Mr Welch. We will go to Mr Davis.

David DAVIS: Distributed network service providers, you say, have a critical role in enabling a system as system integrators. There is a tension between that group and potential competition in that frame and connecting in and providing alternative sources of supply. How do we resolve that?

Roger DARGAVILLE: The DNSP is the entity that understands when its network is under stress. It can be quite separate to the supply and demand balance, which the transmission and the market operator, AEMO, is responsible for.

David DAVIS: The distribution network.

Roger DARGAVILLE: A distribution network can be under significant stress because of high localised demand, even when overall the grid is doing fine. When we are looking at distributed resources like electric vehicles and rooftop PV, it is the distribution network that actually monitors its network and knows how to manage that.

David DAVIS: Street by street.

Roger DARGAVILLE: Street by street, so if a particular substation is not coping well, then it is the distribution network provider that is going to send the signal to the EV charger to turn down. If it is the other way around and we have got too much power on the grid, which is actually curiously becoming a problem as well, it can turn the inverter off on the solar system and help rebalance the grid. So it is the natural entity that should be responsible for managing the distributed energy resources within those networks.

David DAVIS: And it may be that they have got a natural interest but might not want competitors there.

Roger DARGAVILLE: Yes, so there is a really strong role for the regulator here to ensure that the distribution network operator –

David DAVIS: That is the ACCC, you would think, or –

Roger DARGAVILLE: AER, the Australian Energy Regulator. I am not sure actually. But you have a challenge that the distribution networks are financed through their investments in the distribution network, so they have an incentive to build more substations, to build more poles and wires, and not to manage what they have got as efficiently as possible. There is a split incentive there that is not ideal, so the regulator is there to manage that conflict.

David DAVIS: I will just ask you something about the regulators, about the AER and AEMO. They are very distant bodies. They are formed essentially as bodies that have got input from states and territories and the Commonwealth. AEMO, for example, is not FOI-able. In a sense, these bodies are – I will try and use a phrase here – floating without proper oversight. Do you believe they need improved oversight? Do you believe bodies of this type should be FOI-able, for example?

Roger DARGAVILLE: Outside of my field of expertise – I could not comment.

David DAVIS: But when you are saying what the regulator should do, I worry about that, because you have got these bodies that essentially are not answerable firmly.

Roger DARGAVILLE: When you have natural monopolies within economies, it is always the role of the regulator to manage that. Now, whether the regulator is well managed is another question.

David DAVIS: That is the question I am asking you –

Roger DARGAVILLE: It is outside of my sphere.

David DAVIS: and you do not know the answer to that. But my point is you want the regulator to deal with these distribution bodies, but we do not have assurance on the quality of the regulation.

Roger DARGAVILLE: I cannot comment.

David DAVIS: Yes. I mean, you are just saying you do not know, so I am making a point here that you do not know about that layer, and you are indicating firmly that we need strong regulation of these distributors.

Hai VU: I guess maybe I can add that I think the distribution is one, but I think another is the managing of the price itself. When you do the load balancing and so on, that is the role of the distribution. But if you design the price right, then it could also regulate the actual energy usage through the incentives and so on.

David DAVIS: So who would regulate the price?

Hai VU: Well, at the moment there are various bodies that actually regulate the price.

David DAVIS: Who?

Hai VU: I cannot name them, but basically there is a market –

David DAVIS: So we have got unnamed bodies regulating the price. How are they to do that? How do they have the information to do that at a local level?

Hai VU: My understanding is that government has certain regulations in terms of how you can set the price, and then it is up to the retailer to actually set the price. Often the issue here is also that when you are talking about different prices, they are very complex to the consumer, and therefore often they are ineffective because consumers cannot understand what they should do in order to actually leverage on those complex price structures, including smart metering. Smart metering itself is very nice, but if people do not know what to do with it as an individual, then –

David DAVIS: There is a role for education?

Hai VU: There is a role for education. There is also a role for perhaps trying to find some things that are more simple but effective for the consumer to actually be able to understand and follow.

David DAVIS: Thank you.

The CHAIR: Thanks, Mr Davis. Mr Mulholland.

Evan MULHOLLAND: Thank you, and thanks for coming along today. You recommend prioritising charging infrastructure in dense areas and neighbourhoods with low EV ownership. Given that 81 per cent of apartment dwellers currently lack charging access, isn't it an inefficient use of public funds to, say, build it and hope they come in areas that have really already signalled they are not buying these vehicles?

Julie KAREL: It is a bit of a chicken-and-egg problem. Our data shows that north of 75 per cent of people prefer to charge a vehicle at home, so if they do not have access to charging at home for a variety of reasons – they are apartment dwellers, they live in flats, they are renting – then they are probably not going to buy a vehicle.

Evan MULHOLLAND: I just wanted to touch on something that might be a challenge to that. In the last decade to five years, many councils – in fact most councils, and inner-city councils in particular – have removed local parking permits for residents for on-street parking, particularly those living in apartments. In December last year the Allan government announced rule changes to remove minimum car parking requirements for apartments. Do you think that will be a challenge going forward for charging infrastructure for electric vehicles, particularly those in new apartments?

Julie KAREL: I guess what I can say about public infrastructure and putting charging out in the public is that research has shown that there is some concern about taking away parking places for charging infrastructure. I think it is something that has to be carefully considered, and the siting of infrastructure needs to be in places where people are spending, as we mentioned earlier, reasonable amounts of time, so that they can have enough time to charge their vehicle. I mean, that is all I can say about that.

Hai VU: Maybe I can add to that. I think we should always put in the thinking about how we can change the current situation rather than what we can do with the current situation. When we are talking about apartments and renters, where they do not actually have parking space and also even the street parking is being taken away, we should think about how we can motivate people to charge when they actually are not at home. I refer back to one of the comments that my colleague made earlier. When you think about infrastructure, if you think about fast charging, it is very expensive, but slow charging is cheap and is not putting a lot of stress on the grid either. If they charge at the right time, we could actually utilise the renewable energy, and the battery in the car becomes storage for it. Whether they can use it to power their home or not is a different question. But as long as they are not putting further strain on the street, I think we are already winning. When we are talking about public space, it is not just the street parking. We could also think about parking at stations and public transport. There is plenty of other public space, and it does not need to be fast charging. I think we need to turn around and think about what we can do.

Evan MULHOLLAND: Thank you. I know there are plenty of bunfights over the charging spaces at Parliament House due to increasing ownership among members of Parliament, which I think will go to show the economic indicator of those people that are using electric vehicles. Would it be your view that landlords should be forced to provide electric vehicle infrastructure or greater capacity in their car parks?

Roger DARGAVILLE: I think it should be incentivised. As EV ownership increases, when people are looking for a house or apartment to rent, the existence of an EV charger will be an attractive asset for that property in much the same way that a swimming pool or off-street parking – whatever is – is appealing. I think there will be a natural progression to people advertising that this property has its own off-street parking spot or the apartment building has EV charging bays that are available for tenants. If we can facilitate in the early adoption phase through incentives, in the same way that we are currently incentivising uptake of batteries and heat pump hot water systems, to get the installers familiar and to get the landlords familiar with the process, that would be ideal. But coming back to the question that was raised earlier, I do not think you have to subsidise it for very long, because from a landlord's point of view it pays for itself.

Evan MULHOLLAND: Given that we are charging rental providers the largest land tax in the country, perhaps the government could use a small portion of that to subsidise some –

Tom McINTOSH: Point of order, Chair.

Evan MULHOLLAND: Anyway, just take it as a comment.

The CHAIR: That is the end of Mr Mulholland's time, so we will go to Mr McIntosh.

Tom McINTOSH: I was just about to compliment Mr Mulholland on his questions not being lost in ideology, which a lot of what we are doing is. I want to start off by saying – I was looking for a quote – people who say it cannot be done should not interrupt those who are doing it. I just want to note that we had the hottest day on record for much of our state last month. We had the highest demand on our electricity grid. I entered politics when Tony Abbott was elected because there was a lot of negativity – what cannot be done. I feel like sometimes in the political class there are those –

David Davis interjected.

Tom McINTOSH: Well, no it is. I am starting with this. There are those that are cheering the failure of our electricity grid to try and prove a point. We heard that for subsequent decades. Last week I think 10.7 gigawatts –

David Davis interjected.

Tom McINTOSH: Can you pause my time, please, Chair? Are we right?

The CHAIR: Yes.

Tom McINTOSH: Last week on the hottest day with the highest demand Victoria has seen we had surplus electricity supply. I want to take this opportunity to acknowledge everyone that has worked in that space. I suppose my question to you is if you could make some comments about the skills we have in this state and the skills we have in this nation to roll out some of the changes that we are trying to make that are big changes.

Roger DARGAVILLE: To just come back to your point about the – what are we up to? – 46 degrees or something –

Tom McINTOSH: Yes, 49 up at Ouyen.

Roger DARGAVILLE: depending on whereabouts in the state you were. The grid coped quite well, and thanks to the very large amount of PV that was performing at the time when it was most critically needed. If we go back to 2009 when we had three consecutive days of 43 degrees in a row in Melbourne, I remember watching the grid very closely, terrified it was going to collapse because it was really on the limit, and the coal-fired power stations were barely keeping up. Every single gas-fired station was running at maximum capacity. Diesel generators were being used to meet demand.

Tom McINTOSH: Is it fair to say we should not be fearful of new technology and new solutions?

Roger DARGAVILLE: Well, when we have heatwave high demand, the high penetration of solar is actually really helping us a lot – that is good. It does not mean there are not other challenges. Wintertime demand is going to become the new challenge.

Tom McINTOSH: On EVs, I think we heard earlier about 16-gigawatt capacity. As I said, Victoria might be using 6 to 10 gigawatts at anytime. Peak demand has a massive impact across the month on the energy prices we all pay. So collectively, as you have discussed, batteries give an incredible opportunity to reduce those peak pricepoints and reduce the amount we all pay in electricity. Is that correct?

Roger DARGAVILLE: Yes. It is critical, as we have said a few times now, that electric vehicles are incentivised to avoid charging during peak times. Whether that is through tariff structures – although we have limited belief that consumers really look at tariff structures and respond to prices. It needs to be automated – so having smart chargers that, when you plug them in, will not start charging until your tariff goes to a low off-peak price or the distribution network operator sends a signal to say everything is fine. That will remove a lot of the potential stress on the grid that would come if the transition to electric vehicles is not managed well.

Tom McINTOSH: Is it fair to say that as a state we make investments to improve productivity to make things cheaper? I will note the Bolte government of 1955 to 1972, when the Liberals were state builders – Latrobe Valley, dams, road networks – had a peak debt of 58 per cent of GSP. Now, I am not advocating for that, but it is easy to look at things as cost, cost, cost. Investments we make today – as we are talking about EVs being able to reduce peak demand and also soak up excess when it is available – should not be viewed purely as a cost but as an investment frame. Would you agree or like to elaborate on that?

Roger DARGAVILLE: The overall point of electrifying the vehicle fleet is to reduce our carbon emissions and reduce dangerous climate change. If we did not act to remove dangerous environmental impacts, we would still be using asbestos and lead paint. There will be a cost to the transition, but it is avoiding a greater long-term cost, and if it is done well – you alluded before to our technical prowess, and we have fantastic engineers in Victoria and Australia, often graduates from Monash University, who can tackle these problems and do so in a way that in the long run will actually be beneficial.

Tom McINTOSH: I think America now has $1 billion dollars of storm damage every 10 days, so I definitely agree with that.

Just on the final point, Ms Broad had some questions about regional and rural Victoria. If we look at batteries as generators on wheels, whether it is largely storm events where lines go down, do you see electric vehicles being a good opportunity, particularly for regional and rural homes and businesses, to be able to plug in and keep their operations running for one, two days?

Roger DARGAVILLE: Yes. The vehicle-to-home capability of some electric vehicles will allow around about 2 kilowatts of supply. It is sufficient to run your TV and your fridge and a few other appliances. It is not going to keep your house going for an extended period of time, but in the event of a blackout, it is a great backup for essential services. But as I alluded to before, electric vehicle-to-grid for maintaining the grid is actually really, really challenging. For supplying emergency backup for essential services, they are fantastic opportunities.

Tom McINTOSH: Thank you.

The CHAIR: Thanks, Mr McIntosh. There is just me left, and I just have one question for you. You recommended the creation of a regulatory mechanism to require or incentivise landlords and developers to provide accessible charging options for renters. Did you have an estimated cost for this or any idea of what this will cost?

Julie KAREL: I can take that one, and the answer is no. That is based on our ethnographic research. We are actually going into people's homes and looking at how they think they are going to live in the future and how that will impact energy. We are seeing, of course, that people prefer to charge vehicles at home, so for renters there is an issue there. But I do not have an estimate of costs.

The CHAIR: No, that is fine. It just seems to be the first barrier people bring up whenever we have raised the renting issue. But I appreciate that. That is all we have time for. Some members might have further questions on notice for you, which will be provided through the committee staff after the session. Otherwise that concludes the public hearing.

Witnesses withdrew.