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

WITNESS

Oliver Hill, Program Leader, Electric Vehicles, RACE for 2030.

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 that background noise is minimised.

I would like to begin this hearing by respectfully acknowledging the Aboriginal peoples, the traditional custodians of the lands 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 live 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, and we will start down here with Mr Mulholland.

Evan MULHOLLAND: Evan Mulholland, Northern Metropolitan Region.

David DAVIS: David Davis.

Moira DEEMING: Moira Deeming, Western Metropolitan.

Richard WELCH: Richard Welch, North-Eastern Metropolitan.

The CHAIR: Georgie Purcell, Northern Victoria.

John BERGER: John Berger, Southern Metro.

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

Tom McINTOSH: Tom McIntosh, Eastern Victoria.

The CHAIR: Thank you so much for appearing before us today. All evidence taken is protected by parliamentary privilege as provided by the *Constitution Act 1975* 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. You will be provided with a proof version of the transcript following this hearing. Transcripts will ultimately be made public and posted on the committee's website.

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

Oliver HILL: Oliver Hill. I am the Program Leader for Electric Vehicles at the RACE for 2030 cooperative research centre.

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

Oliver HILL: No problem. Thank you all for having me here today. Good morning. I would also like to start by acknowledging the traditional owners of the lands on which we meet today. I pay my respects to elders past and present.

The Reliable Affordable Clean Energy RACE for 2030 cooperative research centre is an Australian government initiative. We began in 2020 and we will run through to 2030, as indicated by the name, and we were established to fund collaboration and research between industry, academia and end users. In my role as Program Leader of the electric vehicles research program, I lead the design and development of research

projects across this portfolio and I also support their delivery and publication. At RACE, we develop innovative research projects with a focus on driving energy innovation across the supply chain to deliver improved, lower cost and lower emissions energy services for energy customers, as well as increased energy productivity.

The mechanism of cooperative research centres, for those unfamiliar, is quite unique to Australia and has a central coordinating role in the design and development of national innovation, the implementation of knowledge and systems change. RACE for 2030 has delivered substantial impact in this role, having a significant role in designing and supporting delivery of a national road map for bidirectional EV charging, including vehicle-to-grid, which was done in consultation with ARENA and enX Consulting, delivered towards the end of last year. We represent Australia as the sole country representative on the International Energy Agency's Task 53 on the interoperability of bidirectional charging, which is V2G. We fund national research into the attitudes and behaviours of future and current EV drivers, and we are designing a number of proposals that go towards the development of frameworks and platforms for capturing the current and future growth and impact of electric vehicles on energy demand and transportation networks. Through all these projects there is a very distinctive key value that CRCs bring to this inquiry that I would like to highlight to members, which is methodology. This is a very complex topic. It sits at the intersection of engineering, economics, consumer behaviour and network regulation, and the quality of evidence and the manner in which it is developed matter enormously. I would really encourage members to look carefully at the methodology behind the views presented to them today and in the future and ask: is it based on representative data, has it been reviewed by industry and by peers, could submissions have been generated by large language models and does it account for the complexity of integrated transport and energy systems? These are the questions that distinguish research from advocacy.

The transition to electric vehicles is going to be fundamental to achieving not just national and global emissions reduction goals but also improving the livelihoods of people every day in terms of their health and wellbeing. It has the potential to create a wide range of benefits for Australia and is an incredibly complex challenge. It is effectively the flashpoint for the integration of two exceptionally large systems, transport and power, both of which are distinct billion-dollar systems of infrastructure and assets that impact every aspect of our day-to-day lives. I would encourage the committee to engage with the work already underway nationally, such as the recently established and launched Vehicle-Grid Network, another RACE for 2030 project, to advocate for Australian representation internationally in programs such as the International Energy Agency's Technology Collaboration Programme and to seek engagement with various national strategies and programs in development by bodies such as ARENA and AEMO.

I look forward to answering the committee's questions as I am able and make an open offer to speak to the committee or individual members at any stage, now or into the future, to share insights on the experience I have gained from sitting at the nexus of this transport and energy transition with the RACE for 2030 CRC. Thanks.

The CHAIR: Wonderful. Thank you. Members, we have a decent amount of time on the clock. I am going to use this timer. I have not used it before, so please bear with me. You are actually our first witness ever in this room, so we are learning all the things we have now. Please keep an eye on the clock when asking your questions, and I can also nudge you. We will kick off with Mr McIntosh.

Tom McINTOSH: Thanks for coming. I am just hoping to pick your brains on what you think will help consumers feel comfortable in adopting EVs most. Obviously range anxiety is a big thing. I think it is probably a bit over-heightened. Whether it is regional or metropolitan towns, most people would not have to charge too frequently – it is different if people are doing long trips. What do you think government focus should be on? One thing I hear in my Eastern Victoria Region is about ensuring that when tourists are out spending money in local economies they can charge on infrastructure and that there is infrastructure. Using eastern Victoria as an example, there is infrastructure – 50-, 70- and 500-kilowatt chargers in most small towns – but when we get influxes of tourists there can be a high demand. As we look to add tens of thousands of EVs on the roads every year, I am interested in your thoughts on where government investment will have the best return for making consumers feel comfortable to transition to electric vehicles. I would be specifically interested in your thoughts on tourist towns or highways in those peak periods, just to make sure we can handle mass consumption, or higher levels of consumption.

Oliver HILL: Sure. There are a few points I will pick up on there. There is a project that we have which is currently in progress, so I can share some of the draft findings we have had from that, but it will be published in

March or April this year. It is called 'Consumers at the Heart of the EV Transition'. This project undertook both qualitative and quantitative work into looking at both future and current EV drivers. There was a national survey of 2500 people. There were also interviews conducted across the country, about 120 in total, located both in metropolitan and regional areas across three different states. That is what I would use to properly inform most of these statements. What they found with a lot of that work is that there is a high degree of perceived range anxiety in comparison to actual range anxiety. Although there will be many cases in which there is a lack of charging infrastructure in some locations, the perceptions people have of how much charging infrastructure is available are very different to the reality. That is particularly true when you think of things like perceived range anxiety for people within apartments in metropolitan areas. They may think there is no particular charging infrastructure in front of them or near them.

There is not an enormous amount of accurate, up-to-date information on the availability of chargers and their proximity to people. There are a variety of platforms which are out there at the moment; I will not go into listing them individually, but the methods in which all that data are currently collected and aggregated is quite dispersed amongst each of those platforms. So as a country we do not really have, let us say, a national platform or a Google Maps or something that you would just go and look at that will say, 'This charger is available now.' It depends very much on the charging network provider. There are a number of those across the country; they all own different assets. It depends on how they share their information and it depends how frequently it is updated. So this is an evolving area in terms of how we communicate where charging is, whether it is accessible, whether it is reliable and whether it is actually turned on and working 100 per cent of the time. So that plays into a large degree of people's perception of whether EV charging is available.

On the item of whether there is enough charging infrastructure out there to begin with, I think there are probably others that will appear today that will speak more to that based on their evidence. We do not have an exact project that has looked into that yet, although we do have work in train at the moment where we are trying to develop a good understanding of the types of data that need to be collected nationally so that we can predict where future EV demand is most likely to occur and therefore plan infrastructure based off that predicted demand. That is work that we are hoping to develop with national agencies like AEMO and ARENA. So I would say we are in the early stages in terms of knowing exactly how much EV charging infrastructure we need, but we do know that people have misconceptions when it comes to the infrastructure available to them and that there is also a very large degree of misinformation out there. That is another very major finding of the work that we have done in surveys, that people are very easily misled in terms of what kind of EV charging infrastructure is available, how to use it, whether it is reliable and whether the vehicle is reliable. That has actually stood out as a very core finding of the research work that we have done to date in that both misinformation and misconceptions of both the infrastructure and the equipment are major barriers to adoption of EVs.

Tom McINTOSH: I think there are some out there that make it look like you have got to pull over every 20 k to charge the car when we are talking 300, 400, 500, 600 k. For a lot of consumers, that means they have only got to plug their car in once a week. Granted, there are people that will do more than that, but yes.

Oliver HILL: That is right. I will just finish off with the point that another aspect of addressing misinformation and misconceptions is that, as we learned during public health crises and so on, they are very difficult to address. It is not just a matter of providing an FAQ or an information sheet to people; it requires engagement.

Tom McINTOSH: Particularly if you have got politicians peddling it. Thank you.

The CHAIR: Thanks, Mr McIntosh. I might go next. In your submission you highlighted the need for Victoria to fund real-time EV data infrastructure. What would the first steps to starting that process look like?

Oliver HILL: At the time when I wrote that inquiry – that was October last year, I believe, when we put that through. Since then there has been some decent progress for proposals which are in draft at the moment, but hopefully it will make progress over the coming months. That is looking at developing the digital infrastructure or contributing to the digital infrastructure we need to understand both the current uses of EVs, both public and private, in Australia and also what that demand looks like into the future. A lot of that does sit with the Australian Energy Market Operator. They had an inquiry into the collection and collation of EV data, and there was an industry consultation on that held last year. The findings from that were released, and they have gone

through a period of consultation internally. So we are engaging with AEMO and others on how that could be developed. There has been quite a few steps towards it, but it is predominantly looking at all the different streams of data which need to come in to understand when an EV is charging, where it is charging and how it is charging, finding ways to aggregate that, make it live, turn it into a platform and have it done in a transparent way. Governance is important with this as well. You do not want it to be held with a private operator, because then you continually need to pay and update them or it may be unreliable. So there is a lot of work in the background trying to figure out the institutions which carry and develop these digital platforms in Australia, because it is a new area. It does sit, as I said, between energy and transportation, so how we develop this into the future and make it sustainable is quite important.

The CHAIR: Thank you. What in your view are the most significant legislative or regulatory barriers to equitable charging access across all housing types?

Oliver HILL: I cannot recall if I raised this particularly in the inquiry. I think apartment charging has come up. The ability to put EV charging infrastructure in multi-unit dwellings or apartments is certainly a barrier. I believe there have been some measures at various state levels across the country to encourage people to put in EV charging infrastructure, or the ability to at least do it without there being barriers towards it. I know pauses to the National Construction Code may have affected that, but it is up to the individual states, I believe, at the moment to try and advocate for that. So definitely something which can be done at a state level is to put measures in place so that, at the very least, EV charging infrastructure is not blocked in these residences. At the best, it could be encouraged, but that is obviously up to individual members – whether that is something you advocate for.

The CHAIR: Wonderful. Thank you. That is all from me. I will go to Mr Welch.

Richard WELCH: Thank you, Chair. Good morning, Oliver. Thanks for coming in. Hopefully I can get through a couple of questions here. On the first one, you just sort of mentioned the placement of charging infrastructure and you said that AEMO and others have got to choose where that is going to be. When combustion cars came along, we did not have petrol stations, and we did not need a government to say where they were going to be. The marketplace did; businesses set up and said, 'Well, we need a petrol station here, we can make money from a petrol station there.' How is it different with electrical charging? Shouldn't the private sector just be saying 'There's demand here. We can invest and create the infrastructure because there is demand'? Why would it be a government function?

Oliver HILL: Yes. The first point I would probably raise on that is the pace of the change. With internal combustion engine vehicles, the period of time which we had to develop the infrastructure, refuelling and so on, was considerably different to the pace of change that we are experiencing with electric vehicles. I am sure if you were to go back 50 or 100 years, you would find some places where it was difficult to refuel. Maybe they had jerry cans in the back of the car and so on – you know, other ways and means by which people topped up rather than just having filling infrastructure within every 20 kilometres. The pace of change to EVs is happening much faster than that. The predictions following on from both national data and international data in terms of the uptake of EVs suggests that we could reach parity – that is, the same number of electric vehicles and internal combustion engine vehicles within the national fleet of 20 million by as early as 2035 to 2040. Now, those are obviously predictions, but an important thing to note about that is that pace of change is not just your residential, everyday customers; it is your commercial operators, it is your freight operators and it is people who look at the total cost of ownership and the product itself and choose what is best for them economically.

Richard WELCH: So is that not an investment opportunity then for business?

Oliver HILL: It is an investment opportunity for their infrastructure.

Richard WELCH: So why wouldn't they invest?

Oliver HILL: It depends very much on the incentives available to them. As I said, it is kind of early days, so like any industry, sometimes incentives are provided or sometimes certain policies are provided to subsidise things so they get kicked off. We did it with other industries as well. We subsidise mining and we subsidise other industrial activities as well. It is something which in my view does need to be nurtured in order for it to

grow quickly and meet the need. But it is something which, if you are going to look at it at a total market perspective, may take a little bit of time to get going. So it is about matching the support to the pace of change.

Richard WELCH: And in creating that infrastructure, is it your recommendation that the government subsidise the companies that are going to install it, or that the government or government agencies actually do the installing itself?

Oliver HILL: I probably would not make specific recommendations just due to the nature of the research we do, but my preference would be to work with government agencies to give clear signals. At the moment we do not give clear signals in terms of where that infrastructure needs to be. If you were to, for example, look at a distribution network service providers capacity map – that shows where there is capacity on the grid for them to install infrastructure – it is not clear where you can do that. So making it clear where you can install charging infrastructure and where the opportunities are, that sort of national mapping work has not been done.

Richard WELCH: And just in the time I have got, it is a grid capacity constraint as opposed to 'Well, this is where the traffic's going. This is obviously where the demand will be.'

Oliver HILL: It is a matching of the two. There are constraints in the grid. Some of that can be overcome with technical fixes. There are things that you can do to manage that. There are things that you can do by managing the charging time and the demand itself through financial mechanisms. There are lots of ways to address that, but the information that we have is lacking. We do not quite know or have a clear picture of where that capacity is. We do not have a clear picture of exactly where that demand is going to grow.

Richard WELCH: And when it will get there.

Oliver HILL: And when it will get there. Yes, exactly.

Richard WELCH: Very good. I will try and sneak one in. We have got 1 minute, Oliver. Let us work together. In terms of the barriers to having charging in residential apartment blocks. Now ultimately the big barrier is ultimately insurance. It is considered a risk.

Oliver HILL: It is a significant one, yes.

Richard WELCH: And so it is not trivial. It is not an obstacle that is just a bit stubborn, it is actually quite a significant, serious constraint. Above and beyond just acknowledging it, do you have any thoughts on how that is addressed?

Oliver HILL: I would like to have thoughts on how it is addressed. We have had proposals developed in that area, but it is something that we have not got up and running just yet. There is the quick answer. I would say that internationally you do not see the same insurance constraints in the UK, so there is definitely something there which needs to be communicated to Australian providers – perhaps a research exercise.

Richard WELCH: Great. Thank you. Cheers. Thank you, Chair.

The CHAIR: Thanks, Mr Welch. We might go to Mr Mulholland.

Evan MULHOLLAND: No worries. Thanks for coming in today. I just wanted to speak on the bidi road map, which obviously pushes for bidirectional charging, yet there is research to show that it can accelerate battery degradation by around 15 to 20 per cent. Should the Victorian taxpayer be involved in any sort of way, signalling or with money, in subsidising the rollout of a technology that might significantly reduce the life span of the most expensive component of the vehicle?

Oliver HILL: I will speak to a few examples. The statistic on battery degradation – there are a few different studies out there, so I would say at the moment something like that is not completely conclusive of whether it does degrade the battery to that degree. Some studies have shown that it actually improves the battery longevity, the overall state of health as well. So it can range; more research is required. I think that is why you do see automotive OEMs not wanting to allow bidirectional charging within their vehicles, because there are concerns about the battery health, and that does change very frequently. Battery technology is accelerating exceptionally quickly. For every battery that you put in the vehicle, you need to do the appropriate testing and

understand the different effects it is going to have on it every single time with every new model. So it is a barrier in terms of continuing to improve that understanding.

As to what the Victorian government does, I would say it is a very early-stage technology. I would say it is something that you can engage with by understanding what is happening at a national level in terms of the different programs like Vehicle-Grid Network and what other research projects out there are doing. In terms of things like subsidies, I believe there are other states – New South Wales is exploring an approach to that at the moment. I think both federally and state-wise there will continue to be exploration of how subsidies could be applied to it, but I would say overall that it is important to recognise that it is in the very early stages of growth as an application. It is not even a new technology; it is just effectively making electricity go two ways instead of one. It is something to watch, something to understand when there is the opportunity to let it grow, because it is a significant economic opportunity – potentially billions of dollars of network infrastructure savings if it can be enabled. That is the current evidence I have to present.

Evan MULHOLLAND: I just wanted to speak about your recommendation for dynamic electricity tariffs to manage EV demand. Several studies have indicated, and most people will be aware, that the higher income households tend to be the primary owners of EVs still in Australia. There is a long way to go, and advancement might be teetering that as well. But don't you think that kind of tariff would mean that the lower income households who do not have an EV would be paying the price to subsidise those who can afford it?

Oliver HILL: I think the key point to raise with network tariffs is it should be opt in with these measures. So there has been experience – you certainly should not force customers to have to opt out of a dynamic energy tariff. That is something which is a recipe for disaster, because then they are seeing unexpected rises in their bills without them knowing. Most of the development of tariffs by distribution network service providers in Australia at the moment are looking at some form of either a dynamic operating envelope, so it allows you to dynamically exchange energy within a time period, or basically an extension of time of use, which is just giving different prices at different times. The overall picture I will give is that the more dynamically that you can control energy back and forth from the household or the business to the grid, you will be able to get better value out of things like bidirectional charging, because at the end of the day it is about how you shift energy during a period of time. We have a large amount of solar in Australia. How do we shift that to the period at the end of the day where we have the highest amount of demand? That is what we are trying to solve for.

Evan MULHOLLAND: I think Georgie spoke to this, but just on your advocacy for real-time EV charging data infrastructure, would you share how we overcome the privacy issues that could lead to the surveillance of user data and energy habits of Victorians?

Oliver HILL: That is probably something that I will take on notice, in terms of the technical areas of avoiding that. I would say it is certainly not my intent to be trying to invade people's privacy in terms of their charging habits, but there is a considerable amount of data collected already when you do the charging of your car or when you operate any kind of energy product in your household. So my understanding is that there is already probably enough information there to get that view of what energy demand is within a household and separate it from EVs. There are various optimisation algorithms that can figure that out, so it is not a matter of saying that we want to know exactly when you are charging or discharging.

The CHAIR: Thanks, Mr Mulholland. We will to Mr Berger.

John BERGER: Thank you, Chair. Thank you, Oliver, for your appearance this morning. I am just curious to know if as part of your research you have taken into consideration some of the things that have gone on internationally and how that might integrate with what your current thinking is.

Oliver HILL: In reference to charging infrastructure or –

John BERGER: Yes, infrastructure and things of that nature.

Oliver HILL: Yes. We are undertaking an exercise at the moment with the University of Technology Sydney, which is looking at a large-scale research review of international policies and measures towards charging infrastructure. I hope for that to be available in the coming months. There is probably not a lot of exact findings I can share from it at the moment, other than that it does help to have national coordination and planning in place. When you have coordination between what you do nationally, rather than individual state

roles, it can make a big difference in terms of the efficiencies and in terms of businesses understanding where to invest. It helps you deploy policies which then can affect the wider system and not just the individual states. That is the best I can pass on at the moment, but I would certainly love to share that report with committee members once it is actually finished, finalised and published.

John BERGER: Sure. Also, thinking in the context of road transport and in particular parcel pick-up and delivery and what that might mean for them for an uptake in electric vehicles and infrastructure required for the larger companies like FedEx, TNT and big companies like that, how might that work in a scenario in Victoria?

Oliver HILL: One thing to note is that Australia Post actually has quite a large amount of parcel drop-off electric scooters and the like already, so I think there is already a trend towards that. The thing that I would probably pick up on with something like deliveries is that the charging infrastructure for that is likely to be located at the depot. So we are probably going to see a need for increased charging infrastructure in the urban fringe. In areas around the airports and so on we have major delivery centres. There is probably going to be an increase in the need to charge in those areas, and those are also areas where there is typically a bit of constraint on the grid in terms of capacity. Managing that is something that requires engaging early on with the companies to understand why they are not making those changes yet. Is it because of restrictions to the grid or is it an economic question, and how do we assist something like that? Because to be clear, these are also major opportunities. If you can find ways to manage charging or even use bidirectional charging, you can actually reduce the overall demand on the electricity grid, and by putting forward these innovations and these technological changes early, you can avoid a lot of these costs and problems.

John BERGER: Thank you. Thanks, Chair.

The CHAIR: Thanks, Mr Berger. I will go to Mrs Broad.

Gaelle BROAD: Thank you, Chair. Thank you very much, Oliver, for coming today. I am just interested – Mr McIntosh talked earlier about long range being a concern, and I am in a regional area. But another issue that comes up was highlighted in the *Spotlight* program on channel 7NEWS last year. Senior reporter Liam Bartlett went to Indonesia and looked at a facility there that was producing nickel. Their media release says:

> The site churns out 70% of the world's nickel – the critical component for EV batteries – and appears to be operating with no regard for human life and the environment.
>
> Bartlett spoke exclusively to workers facing deadly conditions and exposed how the mines are killing the locals, killing the workers and killing the environment, while also killing the Australian nickel industry.

I am just interested because I feel that Australian consumers want to be conscious of these things and aware. Is there a way that people are informed as to where batteries come from when they purchase an electric vehicle, and would you support that information being shared?

Oliver HILL: I can say there are efforts internationally underway to look at a battery passport mechanism. It is understanding the origin of the battery itself and the materials within it and being able to trace that. It is also very useful for actually recycling the batteries and having end-of-life uses, so it comes in quite handy towards the end there as well. So there are efforts in place to try and go towards those sorts of things. It is not really in the scope of the RACE for 2030 CRC, the batteries themselves, so I cannot provide much more on that, but there have been other CRCs, like the Future Battery Industries CRC, which have probably done some work in that area.

I believe QUT have also done a bit of research in that area as well, if it is of interest. On the battery composition itself, it is constantly changing. We have recently seen the world's largest battery manufacturer look to switch to a sodium-ion battery. It is a completely different chemistry from the ones which are currently on the roads today. It is much more sustainable. It is much safer. It uses materials which are much more abundant. So the manufacturers who make these do know that these issues exist, like in any other industry. My background is actually in the mining industry, in geology – that was where I originally came from. There are certainly issues all over the world with these problems, and we do want to have assurance that our supply chains are not putting anyone at risk. So I would say wherever we can have better information in terms of where the composition and materials and any products that are coming into Australia come from, that is a good thing. But in terms of the work that RACE for 2030 does, unfortunately battery chemistry in itself is not really part of our scope.

Gaelle BROAD: So with a recommendation from this inquiry, you would be supportive of labelling or information for consumers about where batteries are produced?

Oliver HILL: I would not put forward the recommendation itself, as I said, because unfortunately it is not an area of research that we have done, but certainly in a personal capacity I think it is important to know where these materials come from.

Gaelle BROAD: I am just interested. The Victorian government did try to introduce a road user charge for EV vehicles in 2021, but you will be familiar with the High Court knocking that back; it said it was unconstitutional. EVs, I understand, are heavier vehicles and can cause damage to the roads. Do you think that there should be a charge?

Oliver HILL: Again, it is not an area that we have done specifically, so I might just speak in my personal capacity for this one, because it is not work that RACE for 2030 has done specifically. There are a range of vehicles which are heavier than your everyday vehicle on the road, including SUVs and including large trucks. We have very large incentives for large trade utes in Australia as well; they are also very heavy. So my preference for something like this would be to follow the lines of the Australian Electric Vehicle Association, who I think are appearing later today. They can certainly speak to this as well: that if there is something like a road user charge put in it is done based upon the weight of the vehicles itself and it is universal – it is not restricted to drive train type, so it is applied to all vehicles equitably – and that there is actually a clear transition pathway to how that is implemented over time rather than it just being a 'slap one in and done'. I think something like this just needs to be thought out. It needs to be equitable, and it needs to have a path to longevity, not just be a once-off 'We're going to slap a fine on EVs.'

Gaelle BROAD: It is just interesting. Looking at the projections, I think the Department of Energy, Environment and Climate Action talk about how electric vehicle use will increase by more than 1600 per cent by the mid-2030s, and AusNet project that the number of electric vehicles will rise from 11,000 in 2024 to 245,000 in 2031 in Victoria. That does not seem very far away. I guess I am just interested that there have been a lot of rebates and, as we talked about, no user charge necessarily, but I think it was in New Zealand that when they removed that, there was a 40 per cent drop in new registrations – well, it was 40 per cent of new registrations in December 2023, and then that went down to 5 per cent in January 2024. Do you think that this massive projection in sales is dependent on rebates and financial benefits? And if that was removed, what impact would that have?

Oliver HILL: I can share that from the research I mentioned earlier, looking internationally at the different policies and approaches being taken, there is a general trend, I guess you could say, in that when there are policies removed, sometimes there is a slight decrease in sales. From the evidence that we have seen so far it is not a massive decrease. It is not like things fall off a cliff; it is more of a dip. The trend is overwhelmingly up and to the right, so the EVs are being purchased. What these incentives can do, when there is the time and the place for them, is that they can incentivise a push to go through different customer segments. Sorry, I am realising I have got 20 seconds to say this, but when we traditionally look at the adoption of a product, we call it an innovation adoption curve, and there are different stages along this, whether they be innovators, early adopters, late adopters and so on. So the use of incentives and subsidies is one where we can go through those different segments to reach groups that we might not otherwise be able to reach via just standard growth, and that is where they can come in very handy. If we remove them too soon or if we remove them at the wrong time, it can cause things to drop a bit more dramatically than we would otherwise like to see. Sorry, I am out of time.

The CHAIR: Thanks, Mrs Broad. We will go to Mr Davis.

David DAVIS: Oliver, thank you for coming in and presenting today. I want to just start with where Victoria is compared to the other jurisdictions in Australia. My understanding is that we are lagging in the rollout of charging infrastructure, both private but especially public. Is that a reasonable description?

Oliver HILL: I would say it is hard to make that assessment based on the current information. In terms of overall relevance to other jurisdictions in Australia, I would say that New South Wales has some excellent programs in place. I have done some work and spoken with them around some of the programs they have for destination charging, so looking at providing incentives for charging infrastructure in regional locations.

David DAVIS: But what I am trying to get to is what is actually on the ground now. There are good programs around the country that I see, and I am interested in that aspect, but I am actually interested to understand what is there now. What has been rolled out? Do we know the number?

Oliver HILL: I would say that is probably back to my original point around needing the data for that. There are probably a few different views as to what the number is. You will get different numbers from different people, and that would suggest that probably we do not have a clear idea.

David DAVIS: But it is true that Victoria has not covered itself in glory in the rollout of charging infrastructure?

Oliver HILL: I would say it is probably not equivalent to maybe the state of New South Wales if you are going to make a direct comparison.

David DAVIS: They are the exemplar, are they, of how to roll it out nationally?

Oliver HILL: I would say if you put it side by side they might be slightly behind – slightly further behind.

David DAVIS: Lagging.

Oliver HILL: I will not use the words.

David DAVIS: Yes? You do not want to say the word, but let us be truthful, we are. We are a long way behind. New South Wales is the case study.

Oliver HILL: I would say yes. Based just upon the discussions I have between different states, I would say that New South Wales is a good case study, yes.

David DAVIS: Yes. The other point I had is one of the issues that we have is that electric vehicles charged with clean energy provide a very clean power source, notwithstanding the points made by Ms Broad about the source of lithium and nickel and so forth. But where the electricity is generated from brown coal, it is actually not a very clean source then, is it?

Oliver HILL: I would say it is not really something that RACE for 2030 looks into in terms of the electricity provided to the vehicle itself. I would probably just make the observation that that applies to any form of electricity used. It is not like it changes from one location to another. We just encourage that people do charge during the middle of the day when renewables are at a high level within the grid, with solar really high and wind really high. That is usually the cheapest time to charge because renewables are the lowest cost form of energy overall. So that is usually when people would be expected to charge most.

David DAVIS: But actually the truth of the matter is that whilst many do charge at that time, many do not, and if you charge at a different time when the source of the power is brown coal, it is actually not that clean then, is it?

Oliver HILL: The source of the electricity might not be as clean as solar or wind, no, but I would say that the overall total life cycle emissions of the vehicle are still lower, regardless of the electricity used.

David DAVIS: What, even if they were primarily sourced from brown coal?–

Oliver HILL: Even if they are using a different source, yes.

Tom McINTOSH: We are getting more renewables, Mr Davis, every year.

David DAVIS: Well, we are, but I think actually a very important transition point here is that if electric vehicles are charged from brown coal it is actually not a very clean source of power.

Oliver HILL: I guess if you are talking about it as a source of power, but I would say that vehicles are a mode of transport before a mode of power.

David DAVIS: They have motors.

Oliver HILL: It is really down to the overall life cycle emissions of the product. So if we are comparing life cycle emissions of the product, if you are comparing an ICE vehicle

David DAVIS: So life cycle emissions would include the source of the power?

Oliver HILL: Yes.

David DAVIS: And that would be less favourable if it were from brown coal?

Oliver HILL: Less favourable but still better than internal combustion engine vehicles.

David DAVIS: I am just trying to get to that point. The other point – I was just a bit troubled with your 'perceived range anxiety'. It is not something I had heard before. If people have range anxiety, they actually have range anxiety. If they are worried about the distance, that is a legitimate point. We cannot devalue the concerns and worries that people have, can we, really?

Oliver HILL: No, I certainly would not want to do that. I would say that perceived range anxiety, as I was referring to, is the perception of where charging infrastructure might be versus where charging infrastructure is, not the anxieties of the actual individual.

David DAVIS: But I am just making a point here that if people have a concern you are saying it might not be legitimate, but it might be legitimate in some cases.

Oliver HILL: It might be a question of language. We could perhaps use a better word, rather than perceptions.

David DAVIS: Yes. I think it is a little bit of an unkind description of people who might have legitimate concerns sometimes.

Oliver HILL: No, we will definitely take that on note.

David DAVIS: Thank you.

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

Moira DEEMING: Thank you. Thank you for coming in. I was interested to hear more about the structure of your organisation, which you spoke about at the beginning, and you talked about the quality of your research. I was wondering if you could just speak a little bit more about that, because people are concerned about conflicts of interest between government-funded research and then contracts and then subsidies and things like that, in transferring, basically, taxpayer money, which did not need to be transferred necessarily, to subsidise private industries and to artificially engineer and influence the private market. I would love to hear what mechanisms are in place to ensure that no such conflicts of interest would influence your work.

Oliver HILL: Sure. I will try to give a high-level overview. The CRC itself was actually set up during 2020. It is a federally set-up program. That was done during the former Liberal government. At the time it gets proposed by a group of industry representatives, academic representatives, the universities and the individuals who are putting the CRC forward, so a bid is made. That bid is looked at by the program, which oversees cooperative research centres in Australia. A decision is made on whether it goes forward, based upon the importance of the work looking to be done. That is how it gets formed.

During the program itself, we develop projects through the academic institutions that we work with. They come from all sorts of universities across Australia, some of which are presenting later as well. Industry – so the organisations which join and contribute to the CRC, which includes government, includes small–medium enterprises, includes distribution networks, includes retailers – can propose projects to the CRC. They are independently evaluated by an internal team. After that, they are independently evaluated by our chief research officer. That is for a first stage of application. After that, there is another stage of application, which also involves our chief research officer, CEO and an independent research advisory committee, which is refreshed on an annual basis and has a number of members from, again, academia, industry and government that participate in it. If they go through all those particular processes and are successful in receiving funding, they go through the research activities themselves, and we go through regular milestones and reporting on that. We also

have regular audits from the government, and we have financial reporting and regular reporting back to the government on an annual basis as well.

Overall, I would say it is a system which has been set up for quite a long time – it has been running, I believe, since the mid-90s – and has launched a number of very successful research centres. Reliable Affordable Clean Energy is just one. A number I could list off the top of my head over the last couple of years include battery industries, fuels, including LNG, mining – all sorts of different topics get covered by a CRC; so it is one of many.

Moira DEEMING: Sure. We are hearing about many of these conflicts of interest costing us billions of dollars, however, of late. I was also interested in hearing about some of the projects that you said you were funding – I think it was internationally; forgive me if I got that wrong – something to do with funding research into changing attitudes regarding EVs and things like that.

Oliver HILL: That is a local project. There is a project called consumers at the heart of the EV transition, where we are looking to understand future and current people who are looking to purchase vehicles and to understand their interest and attitudes towards electric vehicles –

Moira DEEMING: If I may, when you say 'understand', it is not to 'change'?

Oliver HILL: No. We go through full ethics procedures, which the universities have in place, but it is an interview that gets taken to understand how people act day to day, regardless of whether they have an EV or not, looking to just understand how they interact with their appliances, how they interact with their home, how they travel, what their preferences are. We get information about them in terms of what they are interested in, their hobbies – all sorts of behavioural information.

Moira DEEMING: It sounds like very valuable market research.

Oliver HILL: It does not really get given to the market. It is a single, public report that gets presented, which summarises it. But the individual data itself is kept confidential.

Moira DEEMING: Excellent. All right. That is it for me. Thank you.

The CHAIR: Thanks, Mrs Deeming. We have some time left on the clock. I know a few members have one more question, so I am just going to pass it around to those that do. Please do try and keep them brief so we can get to everyone for one more question. I will start with Mr McIntosh.

Tom McINTOSH: Thank you. Labor governments have stated clearly they believe in science and they believe in climate science. We have legislated emission reduction targets and have legislated renewable energy targets. Mr Davis had a bit of a breakthrough moment over there and acknowledged there is coal in the grid, which is correct, but every five years we have seen Victoria exceed its renewable energy targets. I think we have just hit 44.85 per cent of the grid, and it will continue to move until we get to 95 per cent renewable energy. For the cars that we are putting in, cars that are being purchased now – and some of those may be charging on 45 per cent renewable energy – every year that goes by, as the renewable energy within the grid grows, as those cars operate, they will be cleaner and cleaner, and the more of them in the fleet, the less emissions we have from ICE vehicles, hence we are contributing to meeting our emission reduction targets.

Oliver HILL: I think you have covered it perfectly fine yourself. The point I would make to it is that, in addition to that, the idea of vehicle-to-grid, which is another item on the inquiry – bidirectional charging – if we can deploy that at scale, then we can reach potentially up to 16 gigawatts of dispatchable capacity, so it is the same as a battery. That could be up to 30 per cent of the national electricity markets requirements for dispatchable energy storage, by 2050. The opportunity with electric vehicles is not just the switch to the use of electricity itself but the ability to use them as a dispatchable resource, as a battery on wheels. If we can actually enable and support something like that, then you can significantly reduce the overall cost of this transition. It could be up to $2.4 billion in network savings, up to $2.7 billion in wholesale market benefits. This is a study that was conducted independently for us in consultation with ARENA.

Tom McINTOSH: Which I believe would save consumers $2000 to $3000 a year, and particularly for consumers in vulnerable grids with more frequent weather events would give them security on their energy in their home.

Oliver HILL: I would say the exact savings per consumer would differ, because some of that does end up being a saving of the actual transition of network infrastructure itself. But certainly from an energy security standpoint, particularly in regional areas, particularly after major events, the ability to actually use the vehicle itself to power your home, to power your communications, to power health centres is certainly a very real one, and we have seen that being utilised. It was used in Queensland in recent floods, and it gets used all over the world. In the "United States" it is actually used quite frequently.

Tom McINTOSH: Thank you.

The CHAIR: Mr Welch.

Richard WELCH: Thank you, Chair. It is good to have an extra question. Just on the practicalities of the real-time data for queuing for charging stations, it is actually slightly more problematic than just having the data. In the 20 minutes it takes you to get to that point, to the one that is available, it may well be taken, and then the amount of time that the charging takes can be anything from 5 minutes to 40 minutes. The real-time data is only part of the problem – it is actually just the nature, the characteristic, of charging itself. Is there any thought around how that is managed specifically?

Oliver HILL: I guess, speaking around the actual real-time data, there are various communication layers that go into how the data is communicated from the electric vehicle charger itself to the vehicle. It goes through the charging management provider as well. These are all different interactions that need to occur. If you have the right communication layers set up, then you can effectively have real-time information of whether the charger is on, whether it is working, it is available or it will be available in 20 minutes time. The people who work on this –

Richard WELCH: How do you know it will be available in 20 minutes time?

Oliver HILL: A charging management operator can provide that information, so –

Richard WELCH: That is up to the customer. It is up to the customer about whether – 'I just need to top up. I've got my milk and eggs now, so I am leaving,' or 'Actually, we're going to stay for lunch and we're going to do 2 hours of shopping here or whatever.'

Oliver HILL: I guess on that point there are actually measures that are starting to be used overseas in terms of either slowing down the charge or notifying people of when the car is docked up or when they are expected to leave in certain circumstances. I do not believe we have done it in Australia yet, but overseas they have looked at costing people more when they are charging if they stay too far beyond their allocated time.

Richard WELCH: They do that here already. That already happens.

Oliver HILL: So those sorts of things, all sorts of measures can be put in place to actually encourage people to different types of charging behaviour.

Richard WELCH: Yes. But I think the uncertainty aspect of it, if you are trying to manage capacity – I think the bell curve of availability is there are lots more at the tail that we need to manage.

Oliver HILL: I would probably make the point that a large amount of charging is also done residentially in the home. Something close to 90 per cent of charging is usually just done within an individual's home, so there is no queuing there.

Richard WELCH: Oh, sure. But we are talking about public charging.

Oliver HILL: Yes. yes. Public charging, yes.

Richard WELCH: And range anxiety et cetera.

Oliver HILL: I would certainly say there are things to be worked through. You know, it is an evolving area.

Richard WELCH: Yes. But help us work through it.

Oliver HILL: Yes, I do intend to.

The CHAIR: All right, I am keeping it very open, but I am going to try and wrap this up so we can have a short break before the next witness. I am going to go to Mr Mulholland for a very quick singular question, please.

Evan MULHOLLAND: No worries. I just have a quick question; I will not ramble on like Mr McIntosh. You suggested expanding charging infrastructure at workplaces to move charging loads to the middle of the day. Just talk us through how we balance that with the fact that many employees will still charge their cars overnight for the morning commute.

Oliver HILL: Most vehicles have systems in place where if you are charging at your workplace, then you probably will not need to charge as much in the evening. If you are having incentives in place to get people to charge at their workplace more, if charging is made available to people at their workplace, they are generally going to charge there, because if that is the middle of the day, it is going to be the cheapest time to access energy. That is probably going to top up the vehicle. Your average commuter drive is about 30 kilometres a day – obviously some more, some less. But if that is taking place in the workplace, then they are probably not going to need to charge at night, or at the very least they would charge a very small amount at night.

The CHAIR: Thanks, Mr Mulholland. Ms Broad.

Gaelle BROAD: Thank you. Last question. I understand that there is an issue with the resale value of EVs and people have concerns about batteries because they become less efficient over time. I am just interested: how long do EV batteries last, and can they be recycled in Australia?

Oliver HILL: Yes, they can be recycled in Australia. There are companies. I believe there is someone in Western Australia and some in other places. I can try and find the names; I will take that on notice. But yes, we recycle batteries here. The question in terms of the value itself, there has been battery state-of-health testing, which is starting to be done by second-hand vehicle sellers such as Pickles and others. They are frequent auctioneers of government fleets. A lot of the time they find the state of health of the battery has not decreased substantially in the three- to five-year period since it was first purchased. It usually has something close to 95 per cent of its capacity still there. There are Teslas which were purchased and on the road 10 years ago that are still running today with 80 per cent of their battery state of health. That means that they are only diminishing the overall range by 20 per cent.

This is still an evolving technology. There are batteries being proposed internationally now which supposedly can run for thousands of kilometres. I would say that it is something where we want to encourage people to use second-hand vehicles. People usually only drive 30 kilometres a day. It is obviously different in regional areas, but we want to encourage all sorts of technologies which allow people to drive the distance they need, understand the safety of the battery, understand its health and provide them with the best information to make those choices. I personally believe that the technology will probably evolve to a point in the next 10 years where none of this is a problem.

The CHAIR: Thanks, Ms Broad. That is all we have time for. If members have any other questions, they will provide them to you on notice through the committee staff. Thank you so much for appearing before us today and answering all of our questions. That concludes the public hearing.

Witness withdrew.