T R A N S C R I P T

STANDING COMMITTEE ON THE ECONOMY AND INFRASTRUCTURE

Inquiry into electric vehicles

Melbourne — 13 February 2018

Members

Mr Bernie Finn — Chair
Mr Mark Gepp — Deputy Chair
Mr Jeff Bourman
Ms Samantha Dunn
Mr Khalil Eideh
Mr Shaun Leane
Mr Craig Ondarchie
Mr Luke O'Sullivan

Participating members

Mr Cesar Melhem
Mr Gordon Rich-Phillips

Witnesses

Ms Fiona Calvert, Director, Transport Analysis and Assessment, and
Mr Paul Salter, Director, Policy and Regulation, Transport for Victoria.

The CHAIR — The committee today is hearing evidence in relation to the inquiry into electric vehicles. The evidence is being recorded and is also being broadcast live on the Parliament's website, which I understand is a first.

Mr LEANE — The reins are off.

The CHAIR — Mr Leane is just excited beyond belief with regard to that. Can I extend a welcome to members of the public and also to any media. I do not know if there are any media here, but if there are, we welcome them as well. We have two committee members here at the moment and we have at least another one in the traffic somewhere, which is not unexpected given the extraordinary circumstances out there on the roads today.

All evidence taken at this hearing is protected by parliamentary privilege. Therefore you are protected against any action for what you say here today, but if you go outside and repeat the same things, those comments may not be protected by this privilege. My advice would be not to try.

I will invite the witnesses to address the committee. Please keep your statements, if you would, to about 5 to 10 minutes, and then we will take up the rest of the time with questions. If I could ask you to open up by stating your name, organisation and the suburb in which you are based, that would be marvellous. Over to you. Thank you.

Ms CALVERT — Fiona Calvert. I am with Transport for Victoria, which is part of the Department of Economic Development, Jobs, Transport and Resources. Were you after my residential —

Mr FINN — No, just where you are working from.

Ms CALVERT — We work from the CBD.

Mr FINN — Right.

Mr SALTER — I am Paul Salter, also from Transport for Victoria and also based at 1 Spring Street.

Visual presentation.

Ms CALVERT — We have prepared a presentation. Given you would like us to keep this to a relatively short period, we probably will not go through absolutely all of the detail here, but we are happy very much to leave that with you as additional information.

Transport for Victoria commenced in April 2017 and brings together the planning, coordination and operation of Victoria's transport system and its agencies. Transport for Victoria is responsible for planning for the future of Victoria's transport system in support of economic growth and in response to economic, social and environmental challenges posed by population growth. Technology changes and advancements do give significant opportunities to improve transport outcomes, and it is very timely that this particular inquiry is underway in relation to how some of those issues can be addressed.

We particularly wanted to let you know about some of the work that was done as part of the Victorian electric vehicle trial and findings that came from that trial. The trial was undertaken between 2010 and up to 2014 and involved multiple people and industry players from across the Victorian community. It was unlike other trials underway in the world at the time in that it did have multiple providers of vehicles — different brands of vehicles and different charging infrastructure suppliers and so on. Most of the other trials around the world at the time had a single brand of vehicle and a single charging supplier. This one was trying to look at more of the market implications of bringing all of those things together. Significant data collection was part of what the trial was doing so that there was good information available to people to be able to use both within government but also within, for example, the academic community. CSIRO was one of the major partners in the trial and undertook most of the data collection elements of the trial for us.

Some of the key findings, just very briefly — and we will go into the findings in relation to the terms of reference of the inquiry in a bit more detail as we keep going through — that we did find were that up-front people absolutely loved driving electric vehicles. There were many opportunities for households to participate through having cars, which was organised through the RACV, and they would have that car for a period of

time. But there were also opportunities for people to do short test drives and that sort of thing. Universally the responses were that people loved the vehicles; they loved driving them. Fleets were a little bit different in that fleets were also part of the settings for the trial. People who drive vehicles in fleets were less familiar with the vehicles. They did not go through the same sort of exposure to understand the vehicle and were much more wary of what it might be like and therefore reluctant to get into the driver's seat, but the normal reaction once they did start driving the vehicle was very similar in that they also enjoyed the experience. I think most of the other things we will come to as we go through.

Mr SALTER — It is worth making the point that during the undertaking of the trial there was modelling undertaken on the types of benefits we might see in due course in relation to greenhouse gas emissions, noise, amenity, air pollution and air quality. As you can imagine, certain assumptions were made at that point in time, some of which we are starting to see come to fruition in terms of the improved capability of batteries. We had to make certain assumptions about fuel prices and electricity prices and the greenhouse gas intensity of energy production. The results at that time really showed that electric vehicles would not necessarily save greenhouse gas emissions because of the nature of how energy is generated in this state and the type of energy that we use. It was also based on assumptions about when the recharging activity takes place and what power is available at that time.

Improvements in air quality were expected, as were small reductions in vehicle noise. I suppose the main thing that we looked at at that time, which I think is very relevant in the current circumstance and is becoming increasingly relevant, is that the trial found that as the purchase price falls electric vehicles will become capable of delivering significant economic benefits in terms of ongoing operational costs and maintenance costs, and that, in itself, should really drive the uptake of electric vehicles beyond anything else.

I suppose we just wanted to flag — and I was going to talk to this in a bit more detail, but I think with the amount of time we have got we will not talk about it too much — there is a very complex array of different factors, complex factors that impact on ultimately what is the greenhouse gas outcome in relation to this. One of the points we were going to make was that the terms of reference for the inquiry are perhaps a little bit artificially constrained in the sense that if you read them, on face value, they exclude looking at hydrogen cell based approaches to powering electric vehicles. In that case, it is probably more clear that there would not be greenhouse gas emission reductions. With renewable energy, we would certainly expect that to be the outcome, but it does depend somewhat on behaviour and the availability of that power. If most people are charging at night, then there is limited scope to make use of renewable power. Most of the new renewable power sources coming online, particularly solar, obviously are not available at night. Having said that, there is obviously new investment in hydro-electric and there is new investment in wind. The changes in the mix of the power is happening all the time. These things are all very much dynamic, but the point of this slide is really just to point out that some of the things are quite complex in terms of that end outcome.

I suppose one of the main things that we found during the trial that continues to be relevant is that if you do most of your charging at night, then you are using essentially the baseload of what is coming out of our coal-fired power systems, and a lot of that goes to waste, really. So to the extent to which you are using that power up until you are expending that load then you can get greenhouse gas emission reductions, but to the extent to which you push over that, and you are not changing the mix of power sources, then you are not necessarily achieving any benefits. I suppose it just keeps on emphasising the importance of changing the mix of different power sources. It also emphasises the need to continually look at ways of storing that electricity so it does not go to waste and can be used more productively for these types of purposes. Perhaps I will move on from that slide.

Air quality is a major concern in other jurisdictions. That has led to quite ambitious targets in other countries, particularly in Europe but in China in particular. They had a target for shifting a lot of their fleet over by 2018. They put it back from that by a year but it is still very ambitious, to say the least.

That air quality imperative in Australia, though, is not as strong, given that our air quality is generally very good in a relative sense. Much of the air quality problems with transport in Australia are really linked to the use of diesel trucks and buses. Really the first best approach to dealing with those sorts of issues in the short term is to actually improve the standards that are applied in Australia. In a lot of respects the standards that apply in Australia come from the Commonwealth level down. They are not up to speed with what is happening in most of the other jurisdictions. It is generally the case with left-hand drive versions of vehicles that are brought into

the country that they are not up to the same standards in terms of their emission output and emission quality as we have in other parts of the world, even if it is notionally the same version of the car. The Victorian government and Victorian officials over a long period of time have really argued for improving those standards, and while we move to electric vehicles in the medium to long term we still believe that there are benefits in actually improving those standards here and now.

Electric vehicles produce far less engine noise, of course. Everyone knows and appreciates that, and we do expect to see some noise benefits associated with moving to electric buses, and moving to electric trucks in particular.

The CHAIR — Would we be able to have electric motorcycles?

Ms CALVERT — You can get them now.

The CHAIR — Can you really?

Mr SALTER — Yes.

The CHAIR — I wish we had some. They are the noisiest things on the road, I would have thought.

Mr SALTER — Mind you, I suppose a lot of the people who have those particular motor vehicles and use them often intend that to be the case — but we digress.

I think the main point I wanted to make in relation to noise is that a lot of traffic noise is really associated with rubber hitting the road, and that is not going to change. There are obviously some noise benefits but it is by no means a panacea.

Ms CALVERT — The trial also was looking to see whether there were barriers to the uptake of electric vehicles, and there are a number of things that were identified that are noted on the left-hand side there. But some of the important findings were that there were no real regulatory barriers to electric vehicles. Best practice regulatory approaches suggest that you really need to find whether there is some sort of market failure that warrants intervention in the marketplace and that it is beneficial to do so — that the benefits of that intervention outweigh the costs — and that then you do have a regulatory solution that addresses the market failure that you are trying to fix up. We did not really find a significant case for anything of that sort through the electric vehicle trial.

As Paul said earlier, we did find that the economic and commercial benefits of the electric vehicles are potentially very significant for the community and that those benefits are likely to outweigh costs somewhere in the mid to late 2020s. In terms of the issues that Paul was just talking about, directly addressing emission and CO_2 standards would be the best approach to addressing air quality and greenhouse gas issues rather than focusing solely on electric vehicles, but looking at the vehicles that are other sources of problems as well.

Availability of charging infrastructure was found to be a potential issue for uptake of electric vehicles. Some of the modelling found that with greater availability of charging infrastructure you would potentially get greater or faster uptake. However, we did find that there really was not a clear case for anything such as subsidies. Some of the issues that were noted were that most people charge where they park the car, and that is their very, very strong preference in most of the cases, which the chart indicates as well. It also indicates that there are people who would go out of the way to locate a charging point if they needed to do so. Some people would not, some people would.

Probably the most important factor that was found through the trial was that the actual installation costs of charging infrastructure — not the charge points themselves but the cost of cabling and so on — were a much bigger factor than anything else. The logistics of that were complex, and the costs of it could be quite significant, particularly where you are retrofitting into circumstances that no-one ever expected — having to lay cables to reach an underground car park or a place that is distant or inaccessible from electrical supply.

The other thing that was really important was misinformation about charging was an issue. So people did not really, until they started to have to charge the vehicle that they were borrowing through the trial activities, understand how charging was going to work. They were not sure what sort of plugs they would have to have

and how that would all operate. So the educational aspects were found to be quite an important element of getting people able to use electric vehicles.

The other big potential barrier is about perceptions of the range of the vehicles. This was found in fact to actually not be an issue. The very vast majority of driving activity in Victoria was well within the capability of the ranges of the vehicles at the time of the trial. Since then new generation electric vehicles have significantly increased their range, to the extent that really we would not see the range of vehicles as an issue. Perceptions of that are a different factor to the reality of what the vehicles would actually be able to do.

Things that are underway at the moment: there is a registration discount for electric vehicles and requirements for registration plate identification from 2019 onwards, and we will continue proposals for our national regulations and various aspects of vehicle emissions.

Mr SALTER — Obviously one of the terms of reference very much focuses on the use of electric vehicles in public transport and in government fleets, so we just wanted to make some comments about that. Obviously in public transport we have already got electric trains and electric trams. Recent initiatives are really aimed at shifting the source of the electricity that powers that part of the public transport fleet. The government announced it will run a tender process to help build a new 75-megawatt large-scale solar farm, and around 35 megawatts of that new solar farm will be linked to powering Melbourne's tram system — over 400 trams in operation at the moment. It is expected that this will result in a reduction of about 80 000 tonnes of greenhouse gas emissions each year.

At the time of the trial there were no electric buses in operation. Hybrids were used as part of the trial. Since then, however, electric buses have been brought into service in large numbers in major cities around the world. Particularly in China in the last couple of years where there have been over 200 000 new electric buses brought into service, so it is certainly possible to make them work. The assertion in some of these other jurisdictions is that it is already cheaper to operate them than conventional buses, but their applicability to the Melbourne circumstance obviously depends on rostering, cycles and how it works. It is very much a logistical issue in terms of how it is done. It might be possible to make them work, but you might need double the vehicles. It has a cost implication. It is obviously something that is being looked at.

Melbourne has an extensive bus network — over 18 000 stops. We travel over 110 million kilometres per year. Government, as part of the current arrangements, maintains a high level of influence and control over the replacement of existing buses, the establishment of new routes and the bringing of new buses into services. Twelve of the 13 metropolitan bus transport service contracts will expire this year. Early in 2017 the government announced it would be introducing more flexibility in new replacement contracts, and it also in particular announced that it would be looking at smaller and more frequent services and possibly introducing electric buses.

The current contractual arrangements include some inflexibilities and impede innovation, and essentially Transport for Victoria is part of that recontracting process, working that through with existing operators. There is consideration at the moment of introducing electric buses now, as you would appreciate, but those contractual processes at the moment are right in quite a sensitive stage. We are not the people directly involved in any case, but we were not given any information at this point in time to pass on exactly where that is at. One thing we can say is if it clears up in the next period of time while the inquiry is still going on, then obviously we can take it on notice and provide further information as that comes to hand.

The next slide just talks about electric vehicles in government fleets. I think one of the reoccurring themes we really wanted to emphasise is that we do expect electric vehicles will provide commercial and economic benefits that will be lower cost to operate and to maintain. For that reason, as well as others, we do expect that electric vehicles will be incorporated into government fleets more so than what they are already. We have already got quite an extensive hybrid fleet in terms of government fleets, but we will certainly be incorporating more electric vehicles in government fleets.

One of the things that needs to be borne in mind right at this minute though, of course, is the nature of the vehicles that are available. Obviously within the government fleet we have got things like ambulances. We have got various types of utes and things like that that are used by the CFA, for example, or all sorts of different authorities across the place. Those vehicles just are not available at the moment to be purchased and brought into service. As soon as those types of electric vehicles do become available, they become something that can

be done at a state level. I think the market is emerging, and when we see a greater proliferation of different types of vehicles, then that will obviously enable a greater uptake of those vehicles within government fleets.

Ms CALVERT — The terms of reference also ask around issues that are associated with employment and local manufacture. Electric buses and trucks, as they become available and in use in Victoria, we would expect to be very similar to existing vehicles, which have a large degree of local assembly and fit-out undertaken on them already. We would certainly expect that the same would apply for electric versions of those vehicles. The Victorian Industry Participation Policy would be likely to apply to bus replacement contracts. That policy requires local contract plans to be prepared and, for high-value strategic projects, puts in place additional requirements of minimum local content elements. We did find through the trial time that already at that point there was some vehicle component manufacturing undertaken for electric vehicle componentry. I am not aware if that is still the case but would expect that it most likely is and that it has potentially extended.

We did not directly model employment implications of electric vehicles but do note that electric vehicles by their nature require less maintenance, and it could be expected that there may be some implications for employment in the vehicle maintenance industry, but there may be offsetting increases in employment elsewhere in the economy potentially.

The CHAIR — I suggest that we might leave it there because I see that the clock is forever ticking toward our expiry time. We might just open up to some questions at this point in time. Could I begin by asking something that I am sure has crossed the mind of a good many people when considering this inquiry: Victoria has experienced over recent weeks a number of blackouts, the latest being yesterday, or overnight and yesterday as well. How realistic is it, given the unreliability, it seems, of the power source at the moment, to expect people to embrace this new form of vehicle when it cannot actually be guaranteed they can turn on their light, much less fire up their car?

Ms CALVERT — One of the things that was found in the trial in terms of the usage of vehicles was that most vehicles actually did not need to recharge every day. The usage patterns of Victorian vehicles fall well within the range of a vehicle so in most cases people would potentially have a car sitting there already with charge in it, so it may not be an issue.

The usage of the batteries within electric vehicles as a form of storage of electrical energy to help address some of those reliability issues was also something that was subject to much discussion but not great conclusion through the trial. The number of vehicles involved was sort of too small to be able to assess anything of that nature. There was a little bit of work done with the households that were involved in the trial to put a number of electric vehicles in the same street to test whether that would add to the load implications for draining the energy supply and causing any additional issues of that sort that might add to any of those reliability concerns, but the results of that found that it did not really pose any particular change to the demand in the street that was tested.

The CHAIR — You mentioned in your report that the people loved — love, in fact, with the emphasis on the word 'love' — driving electric vehicles. Do you have any data or did you do any stats on that as to what people's reactions were?

Ms CALVERT — People undertook a number of surveys as households and as fleet operators at the beginning before they had started using the vehicle and then throughout the course of the time that the vehicle was with them, and those surveys included information about how they were reacting to the vehicles and what they thought of their experiences, so yes, that statement was not based on purely anecdote. It does come from the data collected.

The CHAIR — Would you have any of that data that you would be able to make available to us?

Ms CALVERT — Yes. We will have to dig it out of the data files, but I am sure we can do that.

The CHAIR — I am sure that would be very helpful if we could do that. Just one more from me. The options for supporting the manufacture and assembly of electric vehicles in Victoria, would that involve — and I know that you touched upon this earlier — subsidies from the government to enable that to occur at this point?

Mr SALTER — It is probably a question that is better handled by some of our colleagues in other parts of our department. Obviously we cover economic development and industry support as well, but we are from Transport for Victoria. I think the overriding comment that we are trying to make is that there is very limited justification for intervening in the market and providing subsidies. We think a lot of it is going to be driven by the economic commercial benefits in any case. I think that is similarly the case in relation to the evolution of the employment situation around that in terms of development of componentry or assembly of buses and trucks. All that sort of stuff we expect to be maintained. As to whether or not there are significant opportunities to increase the amount of manufacturing and so forth, I am sure there is, but it is obviously a very competitive world market, and I do not think we are really in a position to pre-empt that. I think that the issue of subsidies is obviously a question for the government of the day, and it is often balanced up against a lot of different factors that are beyond the issues in the immediate sector. I do not know if we can really draw any conclusions about that at this point.

Mr LEANE — I want to refer to your slide around the barriers and options to support the uptake of electric vehicles. One of the dot points in the barriers is having different types of chargers, which to me sounds crazy. So is there an Australian standard for this particular type of charger? Is there something being developed on a standard?

Ms CALVERT — There was work towards developing standards. I am actually not aware of where that has got to. In many cases, international standards usually override — or are more significant a factor than anything that might be done within Australia, in this case. The incompatibility issues that were found during the trial came from the fact that the trial involved different brands of electric vehicles with different brands of charging infrastructure. As I mentioned, that was an unusual feature of the trial. As a result of the issues that were found, there was significant work done between Bosch Australia and their international leaders to address the problems that had been specifically identified as part of this trial so that the issues that they found at that point no longer exist. I think that the significant development of international standards since then has really meant that there are not, I do not believe, any ongoing problems in that space.

Mr LEANE — With the barriers, is there anything that the Victorian government can do to assist in breaking down some of the barriers to make the electric vehicle more attractive?

Ms CALVERT — I guess one of the things we are trying to let you know about is people's understanding and perceptions of electric vehicles really sit behind a number of these barriers. There is potential for work in terms of getting better information and overcoming those information problems that the Victorian government could do to address some of those issues.

Mr LEANE — So when you go through some of them, purchase price is improving with new models being built?

Ms CALVERT — That was occurring even during the time of the trial. The purchase prices went from up here to down there.

Mr LEANE — And your range, was it 150?

Ms CALVERT — Around 150. It depended on the vehicle. But per vehicle, per charge.

Mr LEANE — And reports of vehicles, 600 kilometres now.

Ms CALVERT — Yes, that is right.

Mr LEANE — Getting back to a point that you made around charging in the evening, which I imagine in a domestic situation, unless you are a shift worker, is probably the trend, but when it comes to fleet vehicles a lot of vehicles will leave their homes in the morning and end up in an office, and all day the car might sit there and then people return at the end of their workday at 5, 6, 7 o'clock. That is where there is real opportunity as far as solar is being incorporated into the charger.

Mr SALTER — Yes, certainly if there is a need to recharge during the day for operational or logistical reasons, then that is where, as it presently stands, there is a lot more capability to make use of renewable energy sources.

Mr LEANE — Yes, and that is where the environmental benefit can really kick in.

Mr SALTER — Yes, but I think it is fair to say — one of the points that was made in one of the later slides that we did not quite get to — that with the car-sharing experience, for example, the trips are very small in distance as a matter of practice. As was shown with one of the graphs that was included in one of the earlier slides, most people do not travel more than 100 kilometres per day. It is only 5 per cent out of 100 per cent that travel beyond that, and getting beyond 150 is an even smaller proportion. If you look at the range of electric vehicles now, they are more than capable of being able to deal with that.

One of the things that is relevant though in relation to all this is what consumer preferences are, and I think that was probably one of the things that was sitting behind Mr Finn's question in terms of, you know, people love the electric vehicles, love driving them, but people's choice of vehicle is not necessarily based on what their day-to-day travel needs are. It is more their once in a while travel needs. A lot of people purchase large SUV vehicles which, day to day, one person might use for a commute, but they have that vehicle so that they can use it with their family on the weekends, every month, for a biannual trip down the Great Ocean Road, to the Gippsland Lakes or up the Murray River — wherever it is in Victoria —

Mr LEANE — Even to the tip.

Mr SALTER — Exactly, the point is that people are making choices about vehicles not based on their day-to-day needs. It is based on —

Mr LEANE — Yes, multiple reasons.

Mr SALTER — So how rational is that? How optimal is that? It does not really matter in some respects. It is just what people want, and the market needs to respond to that.

Ms CALVERT — Some of the vehicle manufacturers are responding to that by considering different offers in terms of when they sell a vehicle. They are moving from selling ownership of a vehicle to ownership of rights to access vehicles. That might mean that you get to drive a small vehicle for most of the time and then once a year you get three weeks of something different as part of your purchase of that vehicle. Vehicle manufacturers around the world are very seriously looking into those sorts of things and considering the supply of vehicles in a very, very different way to the traditional selling of a vehicle as has been done for the last 90 years or so.

Mr O'SULLIVAN — I have just got a couple of questions that I would like to pose this morning. The first one is in relation to, I guess, the current situation in terms of petrol vehicles where, when I go and fill up the tank, there are a range of taxes that go back to the state and federal governments in relation to that petrol component, which then go on for road building and maintenance and a whole range of other things as well. Is there any sort of plan in mind as to how electric vehicles will pay the appropriate taxes that petrol vehicles pay, which then go on to fund other infrastructure? Because at the moment, I guess — and this is not a criticism of electric cars — the greater your take-up of electric cars, the less money there is going to be going back in terms of those taxes that go on to build roads and so forth.

Mr SALTER — Perhaps I can answer that with respect to pointing to the national land transport market reform program that is being undertaken through COAG and through the Transport and Infrastructure Council. Part of the reason why that work is being done — looking at, I suppose, longer term road pricing options and potential institutional arrangements that might be needed to support that and so forth — is driven by the fiscal reality of looking forward in terms of looking and seeing that the fuel consumption from automotive needs is going to drop. We do expect it to drop as a result of uptake, initially through hybrids but then subsequently through electric vehicles, and that, beyond any other good rationale for heading down the path of looking at road pricing, forces the hands of treasuries both at the commonwealth and the state and territory levels.

Mr O'SULLIVAN — So when you say road pricing, you mean make roads cheaper in the future — is that what you are saying?

Mr SALTER — Your question, as I understood it — correct me if I am wrong — was really about, at the moment we have quite a lot of taxes being collected through the pump. The comment was that obviously that is then used to help fund the infrastructure. I suppose if that source of taxation declines over time because of, for

example, the uptake of electric vehicles, then governments need to consider how they change the mix of different sources of revenue to keep funding the roads, keep them maintained and so forth.

One of the things that is very much being looked at at the national level through COAG and through the Transport and Infrastructure Council — no one state is looking at it in isolation because it ultimately involves a change in the mix of different state and commonwealth taxes and so forth — is road pricing, obviously more in the medium to longer term, as a means of addressing some of the fiscal consequences of reduction in excise revenue, for example.

Mr O'SULLIVAN — Yes, because as we know, the taxes that are paid through the pump go to that infrastructure, and if that does not come from that source, it has to come from somewhere else.

Mr SALTER — Correct.

Mr O'SULLIVAN — So I just wonder, will the taxpayer have to subsidise road building where at the moment it is paid through the pump and, I guess, in the phase up to that point, will petrol car owners who pay through the pump get slugged more to pay for the void that electric cars will leave in terms of not paying that taxation?

Mr SALTER — There are certainly transitional issues there that would need to be managed. I suppose I am not really in a position to give you a definitive answer about that.

Mr O'SULLIVAN — No, and that is all right. I just want to raise that as an issue to get your views.

Ms CALVERT — I probably should just quickly add there that the fuel taxes that are currently collected are all collected by the federal government.

Mr O'SULLIVAN — In terms of the charging of electric vehicles — and I understand it will transition up to a point where it is much more efficient than what it is today — one of the things that I think we need to be very mindful of, I think, at the inception of this industry as it gains momentum, is that we cannot even get the same charger for mobile phones — the same brand of mobile phones. You have to get a different plug every time you get a new phone. Is there any chance that we can have electric cars that have the same charging point? If I am going wherever I am going and I pull up at the bowser and I go, 'I've got the wrong charger', I have got to go somewhere else because that does not supply the universal charger that is going to suit my electric car. That is the first part.

The second one is, will we get to a point where we will be able to charge a car in a five-minute period of time rather than having to wait hours? I think that is going to be a significant barrier. No-one is going to sit down and wait 2, 3 hours for the car to charge again so they can finish off their trip. Do you see in the future that we will get to a point where you can charge your car in 5 minutes?

Ms CALVERT — Perhaps the first question first. As indicated earlier, there were found during the early part of the trial some issues of compatibility of the charge points with different in-vehicle technology, but those were overcome.

Mr O'SULLIVAN — What do you mean by overcome?

Ms CALVERT — It was really software that needed to be adjusted, and those adjustments were made and they fixed the problem so that within the trial the vehicles could all be charged at any charge point that was used and put in place during the trial. No problems were encountered in the trial once that initial issue had been addressed, and I would expect that that would continue to be the case. In terms of the trial and the activities there, the vehicle carries with it a cord — an extension cord, effectively — to plug into the power point, and that was very simple and did not really pose any problems for people.

In the second question — sorry, I have forgotten. The second part of that question was?

Mr O'SULLIVAN — What was the second part of my question? Oh, yes, five-minute charging.

Ms CALVERT — The trial also explored both fast-charge and trickle-charge approaches, and it was found, even at that time, which is quite some time ago, that it was entirely possible to get very high levels of charging

within a relatively short period of time. From memory it was probably around about 20 minutes to get to a substantial level of charge for the vehicle with the fast-charge options available at that time. My understanding is the technology has potentially improved significantly since then. With appropriate fast-charging technologies I think you will find that 5 — maybe a little bit longer — to 10 minutes are certainly levels of time that I have seen reported through that type of approach to charging.

The CHAIR — Thank you so much for your contribution to today's hearing. You will receive a copy of the transcript in a week or two, perhaps — soon anyway. If you would be kind enough to just have a glance over that to see if there is anything that jumps out at you — not that there will be any mistakes, I have no doubt about that at all. But if there are, just let us know and we will rectify that. Thank you very much for coming in today.

Ms CALVERT — No problem. Thank you.

Mr SALTER — Thank you.

Witnesses withdrew.