

# TRANSCRIPT

## 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

Dr Elliot Fishman, Director, Transport Innovation, and

Mr Liam Davies, Transport Analyst, Institute for Sensible Transport.

**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, if I had not mentioned that earlier. Firstly, welcome to the public hearings of the Economy and Infrastructure Committee. 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. Can I welcome you again and ask you to state your name, organisation, position and suburb or town in which you are based, to begin with, and then launch into 5 or 10 minutes of introductory comments and we will take it from there.

**Dr FISHMAN** — Okay, very good. Thank you very much. Thanks for the invitation to present to the inquiry. My name is Dr Elliot Fishman and I am the director of transport innovation at the Institute for Sensible Transport. We are located down the road in Fitzroy.

**Mr DAVIES** — My name is Liam Davies. I am a transport analyst at the Institute for Sensible Transport down the road in Fitzroy.

**Dr FISHMAN** — Just also by way of introduction, we do not have any financial links with anyone in the EV industry, so we do not stand to gain in any way from anything that we say here today. I might start off with the conclusions, just in case anybody gets a little bit drowsy. At least I will get through all of the main parts of my content before people start going to sleep.

**Ms DUNN** — Do not be harsh on yourself.

**Mr LEANE** — You have been very observant.

### **Visual presentation.**

**Dr FISHMAN** — I think the first thing to say really is that whilst it is very easy to get stuck into some of the details with EVs and some of the technical aspects of them, which are all very important, it is also important not to lose sight of the big picture. The big picture really is: what do we want Melbourne and our regional centres to look like in 2040, 2050, 2060; what do we need to do now in order to get there; and what can EVs contribute in terms of helping us get there?

We have been doing some work recently. For the last three months or so we have been working for a client on transport emissions, and so EVs have naturally been an important part of that. We have found a few things that are interesting for today’s inquiry. The first one is that EVs are only as environmentally friendly as the electricity that powers them. So when you have got a dirty grid and you have got an electric vehicle, that electric vehicle does not perform any better from an emissions perspective than a petrol-powered vehicle. We will talk more about that soon.

Electric vehicles do not mitigate any congestion, parking, safety or sedentary lifestyle disease impacts of regular cars. For the last 20 or 30 years we have had a debate about some of the negative consequences of car dependency and heavy reliance on car use. Electric vehicles can do well in terms of tailpipe emissions, but they do not do anything in terms of some of these other issues. So it is important to keep in context electric vehicles with our wider city objectives and transport objectives generally.

We have also found incentives are required to boost the uptake of EVs in conjunction with a wider package of mobility investment. It should not just be about EVs but it should be about how EV is set in with a sustainable mobility investment stream more generally. We should be targeting incentives at the vehicles that do the most driving. If you have got a taxi that does 200 000 kilometres a year, should they receive more incentive than a private vehicle that does 13 000 kilometres a year? Because of the huge impact difference that you get from those two vehicles, we would argue that you do need to do more for the vehicles that drive the most, and we can identify in the fleet the vehicles that drive the most and target incentives accordingly.

We are all aware that Melbourne is a growing city. It has been growing a lot over the last 15 years. By 2051 we are expecting 7.7 million people. If you were to look outside your window today and look at the transport infrastructure, especially if you were on a higher floor, you would be able to see a lot of transport infrastructure, and almost all of that infrastructure will be the predominant infrastructure in 2051. We are not getting major

new transport infrastructure to such a large degree that it is going to offset the increase in population growth. So we are going to have to start doing more with less.

There will be 7 million extra daily trips by 2040. Thinking about current transport patterns, if you apply the extra number of trips that we are going to get by 2040, that is not going to work from a congestion perspective. So we are thinking about that not just in terms of EVs but in terms of wider transport initiatives. In terms of 1 billion passenger kilometres, this is where we are headed. We have been going up. The big segment of that graph is passenger cars. Passenger cars account for the bulk of our vehicle kilometres travelled.

When you look at the carrying capacity of a 3.5-metre road — width, that is, not length — and you look at over the course of an hour how many people can travel down that section of road, depending upon what mode of transport they are in, you can see that there are some very space-inefficient and some very space-efficient modes of transport. A general car with the average occupancy of 1.1 people per vehicle is not a very space-efficient way of moving people compared to some of these other modes of transport. We are keeping this in mind as well when we are thinking about EVs and not just thinking about it in terms of a driver only, driver-owned motor vehicle.

This is some work that we did recently for a client where we looked at the grams of CO<sub>2</sub> per kilometre. These are some of the vehicles, both petrol and electric, that are available in today's market in Australia. We have categorised it in terms of the CO<sub>2</sub> from electricity for vehicles that have an electric component versus the red, which is CO<sub>2</sub> from liquid fossil fuel. What you can see there is that when you are charging from the Victorian electricity grid, which is what we are assuming when we round these calculations, the electric vehicles are not performing as good as you might think. In fact in many cases they are performing quite a bit worse than petrol-powered vehicles because our grid is reliant on brown coal.

Finally, just by way of introduction, the other point that I wanted to raise is the relationship between dirty and clean transport modes and also the space requirements of those modes. The black balloons represent the amount of pollution in terms of grams of CO<sub>2</sub> per person kilometre, and then the size of the foot on the bottom of this slide is the space in square metres required per occupant. When you move to a Tesla model S, for instance, that is powered by green power, that is excellent from an emissions perspective, but it still consumes the same amount of space. As I mentioned at the beginning of this presentation, space is going to be a big constraint in the Melbourne and regional centres of our future.

This is the transport situation that many people find themselves in in Victoria, especially in Melbourne. This is obviously a photo that a lot of people might be familiar with, coming in from the Eastern Freeway into the centre of Melbourne. This is any day, Monday through to Friday, at about 8.20 a.m. This was taken 10 years ago, but it looks exactly the same now. None of these cars are electric vehicles, but if you could imagine just for a moment what it might look like if, dramatically, the Victorian motor vehicle fleet transformed to electric vehicles, it would look roughly like this, which is exactly the same slide, of course. The only difference is that some of the tailpipes that you see in this picture would not be present in the vehicles if they were all EVs. But otherwise it is exactly the same. It is important to keep that in mind when we are thinking about what benefits might come from EVs. Yes, they can provide substantial reductions in CO<sub>2</sub> if charged from renewable energy, but thinking about EVs as a kind of panacea that will fix all of our transport problems is probably not the right way to go about it. Now I am going to hand over to Liam.

**Mr DAVIES** — I just want to talk about some of the effects of moving towards an electric vehicle future. Some are positive, and some are less positive. If all of the Victorian fleet were converted to electric cars tomorrow, they were all running on the average electricity usage of around 162 watts per kilometre, they had stable ownership rates of 1.8 cars per household and car usage was the same at 13 800 kilometres per year, residential electricity consumption would go up by 84 per cent. That is how much electricity these vehicles will use. That is not going to happen. There is not the market demand, and there are not the vehicles available —

**The CHAIR** — There is not the electricity, either, I have to point out to you.

**Mr DAVIES** — The electricity is a slightly different matter. It depends on how you get it. That is certainly a problem, and the distribution network is most certainly a problem, but it is also a potential. This will not happen. AEMO are forecasting about 4 per cent of our electricity in the forward estimates to about 2030 to be consumed by electric cars, so it is a very small increase. They also estimate a very small percentage of the fleet being electric cars.

There are also broader aspects to this. As you mentioned, there is not enough electricity, which means that new renewable energy plants that come online, instead of displacing carbon-intensive fossil fuel plants, may be required just to keep up with the level of electricity demand required. So the transition may extend the lifespan of existing polluting plants across Australia, and it may make the challenge in transitioning to renewable energy more difficult.

There are pros, though. These electric vehicles can have substantial batteries, as our ABB friends were saying. Some of them can travel hundreds of kilometres. The Tesla model S has a 100-kilowatt battery in it. That is enough to power the average Victorian home for about eight days. If you can move only a few thousand of these vehicles into a city and you can have them plugged into charging infrastructure during the day, you now have a mobile version of the power bank that Tesla have just installed in South Australia. The capacity of 1000 electric model Ss is roughly the same, so it can be used to lever demand in the city electricity network. It can also be used to store surplus electricity in periods of excess demand. For example, we are capable of generating far more electricity at night than we use. That could be stored in electric car batteries. And, unlike a petrol vehicle, it is possible to run an electric vehicle on 100 per cent renewable energy. You need a clean grid to do that, but it is possible.

As Elliot said, we have been doing a lot of work focusing on vehicles that travel a lot, and taxis are one of these. They drive a lot of kilometres. In Amsterdam they have been focusing on trying to get taxis converted to electric because every taxi drives 35 times that of a normal passenger car. So if we think about that in relative terms, a subsidy to get one taxi replaced with an electric vehicle has the carbon emission benefits of replacing 35 private vehicles for a lot less cost.

In Victoria it is not that high. It is a bit hard to get an exact figure on it, but we are estimating that a taxi would do about 10 times that of a passenger vehicle. Taxis will also rotate much quicker than Victorian cars, so the average Victorian fleet age is about 9.8 years. Taxis are generally retired after six and half years, so fleet turnover is much quicker.

The taxi industry may at least initially be concerned with charging and range. These vehicles need to be on the road for long periods of time and they cannot run out of electricity. In the meantime, though, plug-in hybrid electric vehicles may form a very attractive proposition to them. Charging infrastructure can be put in in key locations in the inner city, especially in areas that taxis are known to do a large amount of travel. At taxi ranks the taxi would be able to pull in, it would be able to get a quick free charge, then that could maybe take it 100 to 200 kilometres of its travel, and when it runs out of electricity it can revert to its internal combustion engine. As the network of charging infrastructure got larger their reliance on petrol would go down and eventually they could potentially convert to a pure plug-in electric vehicle.

That is one way that governments could, in a very small, targeted way, incentivise electric vehicles, and that would also get people used to the idea of these vehicles being on the street. Every taxi rank electric charging station could potentially also be a publicly accessible one that members of the public would be able to pay to use, and that would cause a more distributed network of charging stations.

Eventually it could also be that taxi ranks become available only to electric vehicles. That means that if taxis want to use the lucrative spots they have to have electric or plug-in hybrid electric vehicles. This could be a carrot-and-stick approach. Obviously any change like that would need a long lead-in because you need to give time to alter purchasing habits. We cannot say what the transport landscape will be in 10 years, but the advent of mass movement as a service will definitely mean that any incentives aimed at our taxi industry should be scalable to other industries.

The next issue we would like to talk about is car share. This is firmly within the terms of reference, and I know that some car share operators have already spoken and they have some concerns about the infrastructure. But in the same way that a large fleet of electric cars operating on our roads can act basically as a backup battery, having cars within the inner city being converted to electric or plug-in hybrid electric could allow a large-scale rollout of charging infrastructure which could yet again be utilised by the public. It could also be used as a drawback of electricity. In times of energy demand AEMO and other regulators would be able to request that car share fleets be locked down and their batteries be drained back into the grid to keep services going and to keep the economy chugging over, which would stop the type of blackouts — or maybe not stop but mitigate the type of blackouts — that have been experienced in South Australia.

We think this has a huge potential, as I said earlier. With a 100 kilowatt battery in these vehicles, 2000 vehicles, which is the target that the City of Melbourne want of car share vehicles within their municipal boundaries within the next 10 years, would provide double the capacity of the SA power bank. It would also act as a way for people to test drive electric cars to see how they like them, and it would act as an advertisement to get them into people's psyche.

Next is buses. This may look like a standard trolley bus, but it is actually a battery bus that can charge off overhead lines. This essentially brings together the main advantage of traditional trolley buses, which is an unlimited operational life through the day because they do not need to charge, and the flexibility of an internal combustion bus that can move off-road whenever it needs to.

Diesel buses have to go back to the depot at least once a day to refuel. This creates a dead running situation where buses must end a journey short of where it could otherwise be logical — that is, at the end of the terminus — to go back and refuel. The solution could be to install larger tanks in buses, and this has happened, but there are of course weight limits to this. This style of design removes that problem. It means that they can run like the trams or the trains, essentially for a full 18-hour service, charging as they need to. In this particular example the bus is running up a steep hill. The hill would drain the batteries too hard, so it will put its trolley poles up, draw electricity off the grid to get it up the hill and charge its batteries at the same time.

**Mr LEANE** — Where is that?

**Mr DAVIES** — That is in Prague. That is a DPP city-owned bus. It is currently under test, but they aim to roll out a fleet of these as that halfway measure.

**The CHAIR** — How far into the tests are they?

**Mr DAVIES** — It is taking passengers, so it is a functional public transport vehicle.

**Mr O'SULLIVAN** — Could they use our tramlines — above the tramlines?

**Mr DAVIES** — Conceivably. It would be something you would have to talk to Yarra Trams about. We have a single overhead tramline that is rated at 600 volts, about 400 amps. They can go a lot higher with the two rails on the ground proving earth return. An electric bus will need two: it will need a trolley pole for the earth return above ground, because of the pantograph that would have to be set higher to stop arcing, and it would be dependent on the way the trolley pole moves around corners and through junctions. But certainly we already have an enormous tram network, the largest by distance in the world, which has an enormous supply system, so the electrical supply system could certainly be drawn upon to provide electricity for electric buses.

The idea here could be that along high traffic routes, such as through the city along Queen Street or Lonsdale Street, there would be overhead wires, and maybe even along the Eastern Freeway. But then once they get out into a suburban setting they would put their poles down and then travel on battery for the rest of their journey. So high-intensity areas could be electric and the rest could be battery. That would remove a lot of dead running. It would provide an operational saving in fuel costs and an operational saving in dead running.

The last issue we would like to talk about is freight. This is an area that is a little bit more of the unknown. This is an area that is moving quite quickly, but it is also very challenging. The greenhouse gas emissions from freight are high because these vehicles consume a lot of diesel — a lot of diesel — per kilometre travelled, and they also quite old. The average age of an articulated truck on Victorian roads is about 16.9 years. In recent years there has been some movement towards it, so last mile delivery transport has been improving within Europe and they are now moving towards smaller electric vehicles that then distribute from larger articulated vehicles. As we know, Tesla have made a lorry that they claim is able to do some phenomenal amount —

**Dr FISHMAN** — Eight hundred kilometres.

**Mr DAVIES** — on a single charge, and then fast charge. I mean, there are then problems with this of being able to have a supply network that can fast charge a fleet of trucks in only an hour, but the potential is enormous. In our western suburbs trucks moving through Yarraville are linked to a series of respiratory illnesses, and this would be removed by removing particular —

**Mr LEANE** — And noise.

**Mr DAVIES** — And the noise. Electric trucks do not have the large internal combustion engines but nor do they have the air brakes because they use regenerative braking back into the battery packs, so they are quieter in all modes of operation.

That brings us to opportunities that we see as the key ones to try and improve the vehicle fleet. We think that there needs to be installation of charging equipment within inner areas — requirements that charging infrastructure be powered by renewable energy so that it does not extend the length and life span of dirty power plants. We also want to see moves to encourage the taxi industry to a transition to either plug-in electric or plug-in hybrid electric vehicles, to encourage car share to transfer to plug-in electric or plug-in hybrid electric, and to implement policies that would permit councils to restrict parking spaces to plug-in electric or plug-in hybrid electric vehicles.

There is also potential for registration discounts for EVs or stamp duty concessions, but we also note that any discounts that are given should have a time limit on it so people know they will get a discount initially but then they will be wound back, because we do not want to have a situation where half the fleet is electric vehicles and we are losing all of this revenue through subsidies that are no longer required. There is also the potential to collaborate with the freight industry to permit charging and trialling of electric vehicles.

**Dr FISHMAN** — We have gone through this presentation and we are almost at the end of course, and there is one thing we have not spoken about, which is the elephant in the room — that is, autonomous vehicles. Depending on who you believe, we are five to 15 years away from a reality in which autonomous vehicles are out there on the street. Whether it is five or 15 years, it does not really matter. The point is that is not a very long time away for what is a substantial change in the way that people access and pay for motor vehicle use and transport generally. So we are moving towards this mobility as a service option where people no longer have the need to own a vehicle. They simply summon one with their phone and it is essentially a robot taxi that will come and pick them up and take them where they need to go.

There is also the possibility that people loan these autonomous vehicles and use them to take them into the city perhaps, and then they send them back for cheap parking at home empty while they are at work. Then they summon them back again in the afternoon, so you are doubling vehicle time that is travelled for the same journey. So it is important that anything that is done on EVs in terms of this inquiry is cognisant of the very near future in which autonomous vehicles become a reality and make sure that recommendations take into account that autonomous vehicles will also be really important.

Thank you very much. We are happy to try and answer any questions that you might have.

**The CHAIR** — Thank you very much indeed for that. That has given us plentiful food for thought there. There is no doubt about that at all. It seemed to me, and please correct me if I am wrong — and if you do not, Sean will — that you are suggesting very early on in your presentation that there is perhaps not a lot of difference between what we have now and what we would have if indeed all the cars we have now were converted to electric vehicles. If that is the case, why would we bother?

**Dr FISHMAN** — Well, I guess it all depends on what sort of city or regional centre you want in 2050 or 2060. It also depends on what degree you feel as though climate change is an issue. If you take the view of climate scientists that it is an issue —

**The CHAIR** — Well, some anyway.

**Dr FISHMAN** — Sorry?

**The CHAIR** — Some.

**Dr FISHMAN** — So if you take the view of these —

**Mr LEANE** — Most.

**The CHAIR** — Have you taken a poll, have you?

**Ms DUNN** — The peer-reviewed scientists think it is clear.

**The CHAIR** — Oh, the peer-reviewed — here we go.

**Ms DUNN** — The real science.

**Dr FISHMAN** — So it is a climate science issue, and if you take the view of the world's best climate scientists, they say it is an issue so —

**The CHAIR** — Can we name them? Can we name the best ones?

**Dr FISHMAN** — They are in the IPCC report.

**The CHAIR** — Are we talking about Professor Flannery, perhaps?

**Dr FISHMAN** — I think there were over 1400 different contributors to the 2014 —

**The CHAIR** — I think there are about 33 000 in the United States that said it did not exist.

**Ms DUNN** — You might have worked out who our climate denier on the committee is by now, but anyway.

**The CHAIR** — Never let the facts get in the way of a good story.

**Ms DUNN** — Never let science get in the way.

**The CHAIR** — Never let the facts get in the way of a good story.

**Dr FISHMAN** — Climate change science facts aside, if you take the view that it is an issue, and if you look at the transport emissions and the trajectory and what they are expected to do in the future, and that is go up without any other policies to mitigate against them, then you have to move towards EVs as a potential solution and ensure they are powered by renewable energy. Otherwise there is no way that Australia will meet its climate change targets.

**Mr DAVIES** — Could I also add that there are other aspects to having internal combustion engines being the predominant form of vehicle in our city — that is, air quality, noise pollution and we do not have a finite resource of oil or liquid fuels for vehicles. At some point we will run the last well out of economic usefulness and will have to start looking at other sources. Electricity is an incredibly cheap and reasonably mobile fuel. It is reasonably safe. And that is the next logical step, especially with technological advances. I have little doubt that in the next 100 years most of our vehicles will be run by electricity because of these other issues around internal combustion engines.

**The CHAIR** — So if we were looking at a source of power which was totally 100 per cent emissions-free, would we be looking at nuclear power?

**Mr DAVIES** — No, I am not an energy —

**Dr FISHMAN** — It does not make economic sense to do that just in terms of dollars per kilowatt if —

**The CHAIR** — Would that be an option that we would consider down the track though?

**Dr FISHMAN** — As Liam was about to say, neither of us are — I guess, what would you call it? — energy generation scientists. It is kind of outside of our area of expertise, but when you look at the dollars per kilowatt hours for electricity generation and how much that costs by different forms of generation, wind and concentrated solar are starting to come down so much, especially in conjunction with battery technology, you probably do not need to go there.

**Mr LEANE** — Did you get bored or something?

**The CHAIR** — No.

**Mr LEANE** — I suppose, to back up the Chair in a way, what your submission says is that if you replaced every petrol car with an EV then you do not change anything with congestion.

**Mr DAVIES** — No.

**Dr FISHMAN** — That is right. The space requirements are exactly the same.

**Mr LEANE** — I think your submission breaks down, and I think that most submissions break down, that the aspects to look at are environmental, congestion and also cost and, I suppose, future cost, where at the moment an EV is quite expensive up-front to buy compared to a combustion engine car, but then there is a point where that might balance out. There is also a balance in maintenance and also in the life of the car. So that is where markets will kick in and where people's individual choices will kick in into the future. Is that —

**Dr FISHMAN** — Yes. Look, I think what will probably happen will be, as some European countries by 2025 and 2030 are banning the sale of new petrol cars, depending on what country you are looking at — especially countries like France, which is a major automobile manufacturer — that will change what countries like France are producing in terms of vehicles. The economies of scale will mean that that will bring the purchase price of an electric vehicle down considerably from what we are seeing today. So whilst they are a kind of niche product in the current Australian market, by 2025 and 2030 we will start to see the cost start to become comparable between electric vehicles and internal combustion engine vehicles. You will not just have the wealthy households that are able to absorb that high up-front cost from purchasing. It will become more realistic for more families.

**Mr DAVIES** — Yes, I just add that with technological change prices shift. So I remember when I was a kid, which was not that long ago, it was always advertised on a car ad that an automatic was only \$3000 more. Now, if you want a manual car, you have to pay a couple of thousand dollars more. So the way that those global car manufacturing economies work, the more we go down a path of electrical vehicles in a global sense, the more Australia will reap some advantage from that.

**Mr LEANE** — And your submission is that in the short term the real opportunities are more in the mass transit and public transport areas?

**Mr DAVIES** — In terms of a targeted government investment, because to have an electric car fleet you need people to have electric cars and you need a way for people to charge them. So if we already have a large amount of vehicles that are travelling vast distances every day, they are the logical ones to convert to electric traction. If by doing so we can encourage industry to build the skeleton of an electric vehicle charging network across our city, that then gives an incentive for private users and less kilometre-intensive drivers to purchase these vehicles and give some places to charge up along the way.

**Ms DUNN** — Thank you both for your presentation today. I just wanted to pick up something you mentioned in one of your answers, and certainly I think it is part of your range of activities. That is talking about oil vulnerability and the fact that there is a likelihood that one day it is going to run out and that that well will no longer be financially viable anymore. I just wondered if you could elaborate on that in terms of it being something we need to prepare for for the future.

**Dr FISHMAN** — Well, obviously oil is a finite resource. I am sure we can all agree on that. It is not so much that we will run out of oil but that we will run out of affordable oil. So while we might run out of \$2-a-litre oil, we still might have plenty of \$5-a-litre oil, but who wants to pay \$5 a litre for petrol when you can avoid that by getting an electric vehicle? At the moment in Victoria the areas of high oil vulnerability are the areas on the fringe of Melbourne and also in our regional centres where the driving distances are high and the average household income is relatively low. So when you start to see petrol prices rise, these are the suburbs in which it will be felt the hardest.

Electric vehicles offer an opportunity, especially in conjunction with household solar, and a lot of these low-income areas actually have surprisingly high levels of household solar, so they can get access to relatively affordable fuel with which they can power their electric vehicle up in terms of charging their battery. So it does protect against oil vulnerability, and when we do get to the next oil shock, it will be the families that have EVs that will be protected. It will be sad, I think, if the only households that have those EVs are high-income, inner-city households rather than those on the outer suburban fringe as well.

**Ms DUNN** — It seems, certainly at the moment, that the only EVs have a very high price tag attached to them, and until that price comes down we are not going to see the take-up that we need to see. Even with reductions in registration the reality is that if you are paying 50 grand for a car, you can probably afford a full rego as well. I am just wondering: in terms of reaching that sweet spot, is it about, as you say, converting taxis?



Is it about converting government fleets and then having that flow of second-hand vehicles into the market? What sort of mechanisms —

**Dr FISHMAN** — I think both those suggestions are very good ones. Especially now that we are not protecting the local car-manufacturing sector, that means that governments have the freedom to make fleet-purchasing decisions that are not based on whether the cars are manufactured locally or not. Mass consumption of electric vehicles might help manufacturers of electric vehicles see Australia as a market, and that might bring them in and make those cars available, obviously not just to the government clients but also to the wider private car market. Then of course, as you mentioned, the second-hand market as well becomes much more viable for electric vehicles than it would have been otherwise.

I think also the idea of differentiating registration for new motor vehicle sales based on the engine size and level of pollution that those vehicles cause might be an option. So that could see a rise in the price of heavily polluting cars in new car purchases and then a discount for those who purchase less-polluting vehicles, and that obviously would include electric vehicles.

Liam, can you think of any other incentives that could be used to encourage the uptake of electric vehicles in the short-term?

**Mr DAVIES** — At a state level there are very few policy levers available. You can subsidise it, but that does not necessarily work that well. We can see how that worked with the LPG conversions — that it just actually increased the cost of LPG conversions.

Another option could be to have stamp duty concessions, but as you pointed out, many of these are more what would be termed luxury vehicles. On that front, I would say that many of the early hybrid vehicles that came out a bit over 15 years ago had the same criticisms levelled against them, and now out of the 10 most popular selling cars, according to the Green vehicle fleet guide, four of them I think are hybrids. So there is now a much higher number of petrol electric hybrid vehicles than there was, and I think the same thing will start to happen with electric vehicles over time. It all depends on how much the government wants to push that along or let market forces do their thing.

**Mr FISHMAN** — One other last thing that would be available for the state government to do potentially would be the congestion levy, which is applied to stationary vehicles in terms of car parks, rather than the moving of vehicles. You could potentially have a waiver for places where an electric vehicle charging station is installed. That would help give people some relief in terms of range anxiety — knowing that they can charge their vehicle when it is parked. That could be an option as well.

**Ms DUNN** — Okay. Thank you.

**The CHAIR** — Mr O'Sullivan tells me that he has no questions, so I thank you very much for coming in today. You will receive a transcript in the next few weeks. I would ask you to have a look at that and get back to us if need be. Thank you very much for coming in.

**Mr DAVIES** — Thank you.

**Mr FISHMAN** — Thank you.

**Witnesses withdrew.**