

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

Mr Daryl Budgeon, Victorian Branch Secretary, and

Mr Bryce Gatton, Executive Committee, Victorian Branch of the Australian Electric Vehicle Association.

The CHAIR — The committee is today hearing evidence in relation to the inquiry into electric vehicles. This evidence is being recorded and is also being broadcast live on the Parliament’s website.

Welcome to the public hearing 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. I would ask you to say a few words to begin with to the committee, between 5 and 10 minutes would be good, and then we will open up to questions. Could I ask you to begin by stating your name, your organisation and the suburb or town in which you are based.

Mr BUDGEON — Firstly I would like to thank everyone for having the opportunity to give evidence to this inquiry. My name is Daryl Budgeon. I live in Noble Park in Victoria. I have 15 years experience in automotive manufacture and the last 10 years in communications infrastructure, and I hold a degree in transport from RMIT. I was national secretary of the AEVA for nine years and gave it up two years ago. It went to a younger and more dynamic man. I will pass over to Mr Gatton.

Mr GATON — Thank you again for the opportunity. My name is Bryce Gatton, part of the state committee of the AEVA and the national newsletter editor. I have been working with EVs for about the last 10 years now in both writing and working on EVs — working around them. I am actually an electrical contractor here in Victoria, so I have some background in installing domestic EVSE. I can answer questions about that if you are interested. Some of the things were brought up in the last slide about the difficulties. I am actually writing an article for *ReNew* magazine about that particular issue right now. I currently work with the University of Melbourne at their school of engineering as an electrical safety trainer and supervisor for their Formula SAE electric car that they are building for the first time this year. I am an EV daily driver. I have owned an EV for five years now — in fact two of them. I have my daily drive in a Nissan Leaf and my converted Citroen Berlingo van, which I use for electrical work and EV work.

The CHAIR — Over to you.

Mr BUDGEON — We are a bit gung-ho. We hope that is okay. The Australian Electric Vehicle Association, or the AEVA, is a not-for-profit body that has in its charter the promotion, education and support for the development of electric vehicles. Formed in 1973 — there was a global fuel crisis in 1973 — it is the third oldest continually active organisation in this sphere of activity in the world. From the original member bases in Melbourne and Sydney it has grown to a national organisation, with active branches in every state except the Northern Territory. Activities include participation in and contribution to numerous conferences and events nationwide. The association also hosts an annual electric vehicle conference and vehicle show, the location of which rotates around state branches. Victoria last hosted the event in 2014. Last year was in Tasmania and next year is Brisbane.

In Victoria we partner with the ATA — that is the Alternative Technology Association; I am sure you are aware of its work — for an annual event. This year it is on Sunday, 18 February — that is next Sunday coming — at Port Melbourne. The association also provides a representative for the Australian standards committee, concerned with standards involving electric vehicles. It is also involved in various government and private initiatives, including the Victorian and West Australian EV trials and the RAC electric highway in Western Australia, for which AEVA members planned, identified sites and negotiated local commissions and the RAC financed and built it. Routes are also planned for construction in Queensland — up the coast, isn’t it?

Mr GATON — I will mention that.

Mr BUDGEON — And in Sydney, Canberra, Tasmania and South Australia. AEVA has also supported and helped finance the round Australia charging route, which makes available charging points at a maximum 100-kilometre intervals around the entire coastline of Australia. The association has also made numerous submissions to government, the most recent being to the Productivity Commission on transport efficiency, the impact statement on light vehicle emission regulations and this Victorian government inquiry.

Mr GATON — I will briefly just sort of mention some of the points that were brought up by the previous speakers about EV suitability for replacing —

Mr BUDGEON — Electric motorcycles. Harley makes one.

Mr GATON — They are planning to release that I think next year.

Ms DUNN — I wonder how they are going to trademark their sound on their EV motorcycle.

The CHAIR — How quickly can we make that mandatory?

Mr GATON — Yes. That would be nice.

Mr BUDGEON — Every Harley has to be electric. Just pass the law.

Mr GATON — There are probably about half a dozen or more electric motorcycles available now, probably more so than electric cars in Australia at the moment. I was just going to mention in passing that it was mentioned that the 150-kilometre range in the early EVs was found not to be much of a problem in the EV trial, and the latest crop of them have around 300 to 400-kilometre ranges now. The battery ranges are improving immensely. Tesla's are 500 kilometres now. The new Tesla Roadster is reputed to have 600 kilometres. Coming out in 2020, the Tesla truck will be that or more. So the ranges are definitely getting into ICE territory.

The CHAIR — I was actually behind a Tesla this morning, and I thought we were going to test the full range. We sat there for an extended period waiting to try and get into the city.

Mr GATON — It is amazing the number of them you see around now, too.

Mr BUDGEON — You were on the same road as me.

Mr GATON — The battery prices are coming down, and the charging spaces I will mention a little bit later — Daryl will talk about the submission we put in — when I come back to what other states and countries are doing as support for EVs that you may wish to consider or look at just as examples. But the last point on that was that battery prices are coming down that fast that Bloomberg put out a report saying that price parity with an ICE car will be in about 2024, so to some degree subsidies and things may not even be needed. By the time you think about them, it will already be too late. There will not be any need for them. And with EV charging I will also mention that the standards are being settled, and with the new 350-kilowatt standard being developed that is 5 to 10 minutes for a 300-kilometre charge. It was Porsche that released that. It will be 2019, but they are setting it up now.

Mr BUDGEON — Will we run your PowerPoint?

Mr GATON — Yes. I can quickly run the PowerPoint. We were looking at examples from Australia and overseas of what is being done about EVs — things you may consider, and also the fact that here in Victoria we are actually not doing a lot at the moment.

Visual presentation.

Mr GATON — South Australia — Adelaide — have that in the centre of town. Really obvious, really public. It is a really good EV hub and really good advertising for EVs. Tesla owns half of it and provided half of the costing, and the other half, as you can see there, was between the City of Adelaide, SA Power, Mitsubishi Motors, Tesla and the government of South Australia. So it is a really good, prominent way of advertising EVs, let alone providing parking for EVs — just encouraging people to know about them, to learn about them.

Here are some parking spots for you. That is the EV hub. In WA, as Daryl just mentioned, AEVA and RAC together developed the west coast —

The CHAIR — Just before we go any further, that South Australian situation in Adelaide, are you suggesting that there are parking spaces in Adelaide specifically for EVs?

Mr BUDGEON — Yes.

The CHAIR — So for a petrol-operated car, in fact it would be illegal for them to park there?

Mr GATON — Yes. There is EV parking on the signage here.

Mr BUDGEON — We have them in Victoria.

The CHAIR — Oh, really?

Mr BUDGEON — At Dandenong market there are two spots.

Mr GATON — Southland have an EV-charging spot, which is for EVs only whilst charging. There is actually a sign on those saying, 'EVs only whilst charging'. For the fast chargers, there will be —

Ms DUNN — Is that public land, just by the way? I am just wondering about enforceability.

Mr GATON — Yes.

Ms DUNN — Okay; thank you.

Mr BUDGEON — Those two parking spots are a great little earner for the City of Dandenong.

Mr GATON — In WA you have that EV highway that is now being built down south for supporting tourism or what have you, because at the moment the cars are charged more slowly so people will stop and do a coffee stop, cakes, so if you put them in in tourism places they are a really good incentive for encouraging more people to stay. They have great advantages. That is WA. In New South Wales the NRMA and the Electric Vehicle Council are getting together and putting in 40 new stations. That was late last year.

In Queensland, as Daryl just mentioned, that is now up and running. That was with Queensland government support, and it is the world's longest EV highway. They call it the superhighway.

The CHAIR — You wouldn't want to live at Longreach, though, would you?

Mr GATON — It would be a long reach. Although if you had a Tesla, it would not be a problem — 500-kilometre range. Tesla have their supercharger network. They are a separate network with a separate charging system. Melbourne to Brisbane already, Melbourne to Adelaide is almost finished, and they are filling in further up north as we talk.

Mr BUDGEON — They have destination chargers as well, which they finance. They are all over the place.

Mr GATON — Hotels and those types of places; they call them destination chargers. They are often a three-phase charger, and they charge not as fast as the superchargers. But for destination chargers — hotels, overnight stops and that type of thing — they charge within hours. South Australian government EV support: they actually strongly support EVs over there, and there is a major announcement coming this Friday. I will leave it to them to announce that one, but it is to do with supporting EVs and making it a centre for EV development and manufacture.

Charging plugs and standards are actually settled. FCAI put that out on 18 September last year, to use what is called the Mennekes, or type 2, plugs, which are three-phase AC. All Australian EVs will have the Mennekes, apart from Japanese, which are the J1772. I think there will be some discussions — I am guessing there — because everybody else in the world will be providing Mennekes type 2. DC charging, the fast charging, is either CHAdeMO, which is the Japanese standard, or CCS, which is basically for everywhere else. All the European stuff that we will be bringing in will be CCS type 2, which is a combination. If you see that picture there, that is a CCS. It has the round plug for the first one — that is a type 1, which is what we have had so far. The type 2 is a three-phase.

Mr BUDGEON — There is a debate about tethered cords and bring your own cords. In the European context they are moving towards bring your own cord, which means any specific plug on your car, and you have an adapter and it goes into the plug on the charging station and there are no issues.

Mr GATON — For my cars I have adapters for type 2 or the type 1. So I have either the leads that come with it — there is a tethered lead generally for the type 1s — or if I come across a BYO socket I have a type 2 to type 1 lead, so it is pretty much sorted now. The standards are there now. That was the FCAI late last year.

Where it is going: those 12 cities in their C40 fossil-free streets declaration said they will only buy electric buses from 2025. The movement is happening. They have also pledged to ensure the major area of the city is zero

emission by 2030. Again, the movement is happening. ICE is on the way out, which is what I will bring up in the next slide.

The internal combustion engine era is ending. There are no ifs or buts about it. In Norway 2025 is the end of new car ICE sales. Holland is the same. And in 2030 we are looking at ending all registration renewals for ICEs. That is easy enough to say for countries that do not have manufacturing industries, but India, France and England are all setting dates. China, which is now the world's biggest automotive market, has set percentages and is talking about setting a date, soon to be announced. When they call it, it is pretty much game over for ICE.

I have added a couple of addenda slides just in passing. I actually wrote an article in 2012, and updated it in 2017, looking at the basically well-to-wheel CO₂ emissions in each state of Australia, using the federal government's standards for carbon accounting, and these are the figures that I have come up with for 2017. In Victoria if you replace a BMW i3 with a brand-new Toyota Corolla, so a similar size, it is obviously not the same cost because the availability of cheaper-priced EVs just is not there, but it is for city driving already less even in Victoria. It is only if you replace everything that it is slightly more, and that is only in Victoria. All other states are better already.

Mr BUDGEON — Note the emissions on the 2017 Corolla, as Bryce goes to the next slide.

Mr GATON — Yes. The next slide is 2012, and I did the same thing. I have just updated that — it is about to be republished. In 2012, as you can see, the numbers were quite significantly higher. So the emissions are coming down for both the ICE and electricity, but the next slide will explain why electric cars are improving as well, because that is 2017 versus 2012. We are actually decarbonising our grid as we go. So with electric cars if you decarbonise the grid you have got that opportunity to become emissions free, whereas with petrol cars you do not, and that is what is happening now.

Mr LEANE — It is going to be static, yes.

Mr GATON — That finishes my part of the presentation on what is happening around the world and here.

The CHAIR — Thank you very much indeed. Could I just ask: you mentioned that your organisation was formed in 1973. That was 35 years ago. What drove you — if you will pardon that expression — to set up an organisation of this nature in 1973, because I would not have thought that there would have been too many electric vehicles then.

Mr BUDGEON — There was a fuel crisis in 1973. Remember, they made smaller-sized Commodores. The United States had 55 mile an hour speed limit across the entire nation to conserve fuel, so people started looking at alternatives, and of course electric vehicles have been built and viable since the early 1900s. So they carried on from that point, saying, 'What can we do?'. In fact with the lead acid technology you could actually have a viable electric vehicle. It did not really go very fast, it was pretty heavy but you could have one, and they went on trying to develop this with help from electricity companies and things like this, and running efficiency trials and stuff like that. They had a lot of fun doing that.

The solar car challenge, when that started, people involved in AEVA were also involved in the original solar car trials, which were a big thing at the time. What really happened was the air quality issues in California prompted people into looking at it more literally, and there were a lot of electric vehicles in the late 1990s in California.

Then we got a technology —

Mr GATON — Technological breakthrough, basically.

Mr BUDGEON — Yes, a technological breakthrough with lithium batteries, which is quite astounding when you look at the figures.

The CHAIR — Yes, I would imagine there are some obvious people who have a vested interest in ensuring the electric vehicles do not get up and running to the extent that you would like to see.

Mr BUDGEON — It would not be all the commercial TV stations, would it?

The CHAIR — Well, I am thinking more the oil companies, and particularly some of the people in the Middle East who are doing very nicely out of the oil caper and have done so for a very long time. There have been suggestions from time to time that they have been actively involved in quashing any alternative forms of transport to the internal combustion engine. Do you have any evidence that that has occurred?

Mr BUDGEON — No, I do not have evidence, but there is a story that General Motors — well, it is a fact that General Motors with the first electric car they built for the Californian market did not sell them, they only leased them. When the leases were up they brought them all back and they crushed the whole lot. People were very happy with the cars and would have kept them.

There is also a story that General Motors bought the patents for nickel-metal hydride traction batteries, which were like an interim step. They were twice as good — twice as good, Bryce?

Mr GATON — They were pretty good, but they had memory and other issues.

Mr BUDGEON — Yes, twice as good as lead acid. Of course they did their dough when some idiot came along and developed lithium, which was four times as good.

Mr GATON — And basically now nobody could stop that because Tesla is pretty much pushing the market very hard, so now the rest of that market is trying to catch up. If it was true at all, the days of people trying to quash that are gone.

Mr BUDGEON — But what we find is there is no such thing as free media coverage.

The CHAIR — We usually find the same thing in this caper.

Mr BUDGEON — Yes, Australians can do amazing things with electric cars. We set a number of world records with the fastest time for an electric motorbike at the time. We had the most powerful — I think we still do — electric road-racing motorcycle in the world in Australia. We set the distance record for an OEM car, which was a Tesla Roadster. That was set in Australia. Around Australia — some guy did it and he left off Tasmania, so he did it again. This was in a car he built himself and drove around in 2010, when you did not have the availability of charging points.

The CHAIR — Very good. The sort of revolution that you are predicting would create some problems in terms of employment for people in the automotive industry. There is going to be a lot of people who will find their abilities obsolete and their knowledge obsolete. What do you have in mind to save us from an economic disaster as a result of thousands being put out of work?

Mr GATON — I was about to dive in on that one.

The CHAIR — Please do.

Mr GATON — There is a two-pronged look at it. One is a lot of automotive mechanics are basically being pushed out of the trade because cars are becoming more and more electronic anyway, so that technology has already been taken in-house by the manufacturers far more so than it used to be. To some degree a lot of the private mechanical workshops are being pushed out of the business anyway with electrification of current vehicles. It makes no difference.

The second side of the coin is that you are saving people a lot of money with less servicing, but there is still servicing required on EV. They still need brakes, tyres; they still need an annual check. You would be mad not to have your EV checked annually anyway. So it is reduced, but a lot of petrol cars these days are only annual checks. So yes, there is less work in them. You do not have the waste of oil, oil filters and spark plugs, but you will also still need to have some checks. The training still needs to be provided in automotive EVs. That is part of where I work — trying to train engineers to work with EVs. There is still a lot of work in that area.

The CHAIR — I know my car has to be serviced every 15 000 kilometres. What would be your estimate of electric vehicles? When would they need to be serviced — if indeed serviced at all?

Mr GATON — Two sides to that — one is you must have cars checked annually anyway, irrespective of the mileage. Yours will be 15 000 kilometres or X number of months — sometimes it is 12, sometimes it is 6.

The CHAIR — I have never got to the 12 or six, I can assure you.

Mr GATON — Yes, because your kilometres these days are less than the service intervals; they say it is time or kilometres. It will still need the same annual check. What was the other part of your question again?

The CHAIR — How often would electric cars need to be checked?

Mr GATON — Things wear out a lot less —

The CHAIR — Serviced — not just checked but serviced.

Mr GATON — With braking, you would use your brakes a lot less because with the regenerative motor you use the energy of slowing down rather than wasting it by heating and burning brakes. You actually use that energy as a generator to recharge the battery. So brakes wear a lot less, but tyres are still the same, coolant is still the same and cabin filters are still the same. Those types of things still need to be done as per ICE. It is just you do not have the waste of oil, spark plugs, fuel filters and air filters.

Mr BUDGEON — The handbook on my Mitsubishi says the coolant has to be changed every 20 years. It depends on usage as well. I am only thinking of brakes and running gear.

The CHAIR — Thank you for that.

Ms DUNN — Thank you, gentlemen, for your submission this morning. I just wanted to touch on — in fact this slide is one of them — the charging stations you talked about that are seemingly dotted all over the place. You mentioned one at Dandenong Market and elsewhere, but do you know how many are actually in Victoria?

Mr BUDGEON — About 14 were installed as part of the Victorian EV trial. Some of those do not operate any more. I think the ones at Monash University were a big issue because they changed and nobody could access them and stuff like that.

Ms DUNN — That is problematic too if you cannot access them.

Mr BUDGEON — And then there are some private ones that have been installed since then, like Moreland council.

Ms DUNN — I see.

Mr GATON — There is AC and DC charging and different levels of AC charging. The DC fast charging, I think there are three in Victoria.

Ms DUNN — Three in Victoria.

Mr GATON — One of which never works. They are the ones locked up after hours — as is Moreland, I think, after hours.

Mr BUDGEON — There is a company called ChargePoint which coordinates — mostly coordinates, and there are a number of companies involved in the infrastructure area. So there are a few of those that can be accessed. In the metropolitan area it is usually not a problem.

Mr GATON — But they are the AC ones.

Mr BUDGEON — Yes, they are the AC ones. I drive to work and back every day, have done for five years, in an electric car from Noble Park, Dandenong North, into the city and back again. If I want to, I go over and visit relatives who live near the airport — the airport and back with my car, which is a generation 1 car with a range of just over 120 kilometres. There is no problem. The problem is taking country trips.

Ms DUNN — Yes, the AC have the longer charge times.

Mr BUDGEON — Yes.

Ms DUNN — So what are you looking at?

Mr GATON — AC would have levels of 3.6 kilowatt, which is 15, 16 amps, and that would take about 4 or 5 hours for a Nissan Leaf. Yours is a bit less. You can also have AC three-phase, which is 22 kilowatt for a new Zoe, which is a 40-kilowatt battery, 300 real world range, quoted 400 kilometre range. That will be charged in an hour and three-quarters. For the new Nissan Leaf that would be a single-phase AC charge. that is going to be 3 to 4 hours at 7.2 kilowatt. So you can have 16 or 32 amp, single or three-phase for AC — so there are sort of umpteen layers in there. And then DC fast charge is 50 kilowatt. That is the Japanese standard. The CCS is, I think, 120 kilowatt, 200 amps DC.

Mr BUDGEON — That is in an hour. It will supply 120 kilowatts in an hour.

Ms DUNN — This is really a significant barrier then in terms of uptake of electric vehicles.

Mr GATON — For long-range EVs, yes.

Ms DUNN — It is okay if you can get somewhere and overnight charge — it is not an issue. But you talked about the DC ones, and we have got them locked up, not accessible.

Mr GATON — Yes, DC is the issue.

Ms DUNN — That seems to me quite a structural barrier.

Mr BUDGEON — Although I will say that in Europe they are now moving to 22 kilowatt as the standard, 22 kilowatt AC. We think that will be the standard. That gives you a reasonable return of power, and if we were to build a network, we would be looking at putting in what could support that. Of course it is like a petrol pump; you can put in one now, and when it is obsolete, you can replace it with another one. The infrastructure is not that expensive.

Mr GATON — There it is there.

Ms DUNN — So that is what that is.

Mr BUDGEON — Fast chargers are expensive.

Mr GATON — They are fast chargers.

Mr BUDGEON — But the AC chargers are not that expensive.

Mr GATON — And that is the difference. They have more in that one spot in Adelaide than we have in the whole of Victoria.

Mr BUDGEON — Because unless it is a fast charger, the AC chargers are basically a glorified power point. The charger is in the car. It is just supplying power to it.

Ms DUNN — I might come back if there is time later, Chair.

Mr O'SULLIVAN — Your presentation was very interesting, and I want to take it to a different level, if I may. I am a regional MP, and I am off a farm, so I want to take it to a farm context if I can for a moment. I have just gone through a harvest on my farm. I have got headers which require huge horsepower to go up and back to do the harvesting, and trucks and so forth and tractors running around all over the place. If you were to translate this to a farming capacity with the header that currently uses 1200 litres of diesel a day — so it is quite expensive — and obviously requires big horsepower to get up the hills and so forth — quite a big capacity — how would you see in the future that this type of technology could be taken on farm and used for large horsepower implements such as tractors and headers? Obviously trucks are up and down the road a bit more, but the tractors and the headers are on the farm. They stay there.

Mr BUDGEON — Any vehicle can be electrified. There is no real difference. The most powerful vehicles in the world — there is a 12 000 horsepower freight train in China; I think that is the most powerful one there is. So it can be done, but with the bigger machinery there are problems because they are very high power use. But they will be more efficient. We have seen farm equipment converted to electric. Someone bought a Triton ute I think for a sustainable farm and just —

Mr O’SULLIVAN — How would you go in terms of charging those? I am just trying to imagine how that would work in terms of charging.

Mr GATON — I will dive in on that. You are at the far end of the supply line so you would have issues if you wanted high-demand charge. The Tesla trucks will have that sort of range and capacity. They are talking about significant ranges on their batteries in large trucks for haulage, but the issue would be very big charging stations required for that, and I still do not understand how they are going to charge them.

Mr BUDGEON — The issue with larger pieces of equipment is there is a cost-benefit relationship between the weight and the size of the batteries in the vehicle and how much power you need to supply to the vehicle. I would think in the case of very high-powered, very energy-intensive farm equipment, if you had to run it electrically, you would be looking at a fuel cell solution, and you would bring in hydrogen and run it through a fuel cell to run the electric on the equipment.

Mr GATON — A little bit on the technology there — hydrogen cars or battery electric cars are essentially both electric cars. It is just the energy storage method is different. They are still both electric cars. Hydrogen fuel cells combine hydrogen and oxygen to create energy and output water in order to put electricity into the motor. So it is exactly the same electric technology. It is just a different fuel system. Hydrogen has its issues in terms of around town delivery and storage, which is why, whenever I do presentations, there has always been the film *Who Killed the Electric Car?*. I would say in about 2080, 2090 there will be a film called ‘*Who Killed the Hydrogen Car?*’, because when the electric car first came out, which was around the turn of the 20th century, petrol could be taken anywhere and used and refuelled, whereas electricity was in the CBDs only so there was just very little access to electricity. So petrol won out then. Nowadays electricity is everywhere and hydrogen has got the same problem.

Given the billions of dollars now being put into lithium batteries, hydrogen — for now — will be a sideline except for niche industries like those where you cannot get large cables at the far end of grids. Electric cars have been a niche area since the 1900s. They have been around every decade. There have been examples of electric cars all the way through. Until they have taken off and grown, I suspect hydrogen may do a similar sort of thing — they will still be a niche area.

Mr BUDGEON — But I personally can still see a use for that in heavy haulage and high-demand equipment. You have got to remember that those big broad dump trucks — the 90, 120 tonne dump trucks — are electric. They are out in the outback digging up the dirt.

Mr O’SULLIVAN — But charged by diesel generators.

Mr BUDGEON — Diesel generators stuck on the side — they are run by diesel generators. If you go to a fuel cell solution, then you get certain gain and efficiency but the hydrogen is pretty expensive.

Mr O’SULLIVAN — So we have still got a way to go in that space.

Mr GATON — In that space, yes.

Mr BUDGEON — It is possible that you can make it yourself, compress it yourself and use it on your farm yourself and internalise those costs.

Mr GATON — But you could also make diesel yourself, and most people do not.

Mr BUDGEON — That is the truth.

Mr LEANE — When you mentioned glorified power points you were talking my language. Bryce, you dobed yourself in as a sparkie that actually installs the chargers.

Mr GATON — Or EVSEs. They are basically a power point. They are not a charger.

Mr LEANE — Okay, so is it too crude a question to ask, what does it cost in a domestic situation for someone to get that installed?

Mr GATON — You can go from anything from a 15 amp socket and use the EVSE that comes with a car. You are looking at an eight-hour charge for that because it plugs in. It is limited to a 10 amp throttle back. If you install a 16 amp EVSE, which is basically an automatic 16 amp power point, you would charge it in 4½ hours. If you put in a 32 amp EVSE and the car can draw 32 amps or 7.2 kilowatts per hour, you can charge it in about 2 hours. It depends on the level and what your house can put in.

Mr LEANE — Are there many electrical contractors that are experts in this area, or is there a niche?

Mr GATON — No, there are only a couple.

Mr BUDGEON — It is a niche.

Mr GATON — It is a niche area. It is, however, no more difficult to put in an EVSE than to put in a stove or an air conditioner.

Mr LEANE — Because of the cost benefit of EVs, I suppose, on fuel and the other advantages to the environment, as someone who is attracted to an EV for environmental purposes, are people starting to package the installation of the charger and solar panels as a package?

Mr GATON — Some people are talking about that and offering it if you want to put in an EVSE for your home. I am actually writing an article on this for *ReNew* this very day — I have actually got a draft of it. I can forward it to you or the committee.

Mr LEANE — That would be great. That would be really good.

Mr GATON — It is being published in April. But in the meantime, you can spend anything from about \$400 and put in a 15 amp outlet to around \$2000 if your wiring is fine for a 32 amp capable EVSE. If, however, your switchboard et cetera is older than about 20 years, you will have to upgrade your switchboard. So you are looking at a few thousand dollars extra there. If you have got a 50-year-old house or older, it needs rewiring anyway and it will need a whole new connection point from the street. So you might be up for up to about \$10 000.

Mr LEANE — I suppose with home builders everything is getting thrown in.

Mr GATON — Yes.

Mr LEANE — So you see a point where, in garages packages, part of the new home builds will have an EV charger in them.

Mr GATON — At the very least they will put a 15 amp outlet in there for you to put your EVs in later. Running a six square millimetre cable is what I advise people to put in now. It is just put in the spot where you think the charger is going to be, and even if you do not use it or just put a 15 amp outlet on it, it is there. It is just literally a five-minute job to swap it over.

Mr LEANE — Fantastic.

Mr BUDGEON — To answer your other question, I think AGL are moving into this space. There are a few specialist operators who do that sort of thing, but they all want to make money of course.

Mr LEANE — Yes, and as I said, money might be the driving force towards the electric car anyway. In your recommendations you suggested that the Victorian government set a percentage of EV penetration in our jurisdiction, I suppose, at least. Do you see that aspiration could be coupled with the aspiration of the VRET, the Victorian Renewable Energy Target, as well?

Mr GATON — You could put in your LED light globes and put in your EVSE and you are saving X amount of carbon, as per the tables I showed earlier.

Mr BUDGEON — I do not have an opinion on that.

Mr LEANE — That is fine.

Ms DUNN — Just going back to where those charge stations are located in Victoria, would you mind providing the committee with where those actual locations are? I do not need to go into that now.

Mr BUDGEON — Yes.

Ms DUNN — That would be great. The other thing I am wondering in relation to electric vehicles is: do they have the capacity to not only generate energy for their needs but also a surplus energy?

Mr BUDGEON — Electric vehicles do not generate energy, except they can regenerate when they slow down.

Ms DUNN — So it is always essentially put back into the vehicle.

Mr GATON — Yes, but you could not generate more than you are using.

Ms DUNN — There is a catch 22 in that.

Mr BUDGEON — One possibility with electric vehicles is that the batteries need to be in good condition when they are used in the vehicle. Once they are no good for traction batteries, they are still usable for storage batteries for perhaps another 10 to 15 years. So there is a possibility, if you get enough electric vehicles on the roads, that after a certain amount of time these batteries start being back on the market and you get cheap storage options.

Ms DUNN — So then if you have got panels, you can potentially use that battery as a storage facility for that power —

Mr GATON — As a buffer for the grid.

Ms DUNN — And then could you potentially, in terms of the battery that you are using for storage, recharge your EV which has a new battery?

Mr GATON — Yes.

Mr BUDGEON — Inefficient, but yes.

Mr GATON — But if you need it as a buffering for the grid, as the penetration of EVs comes in and you are trying to balance out the loads, Renault in Europe are looking at doing exactly that with their roadside charging stations and having high-capacity charges but having container loads of the old Renault batteries to buffer so they slowly charge them up so they do not put a big load on the grid at any one moment. They just draw off those batteries and then as the car comes in and gets a fast charge, lower the batteries and they can gently recharge them.

Ms DUNN — And then that slowly comes back up.

Mr GATON — It has a constant charge rather than this big demand on the grid. People are actually looking at preventing EVs crashing the grid.

Ms DUNN — I have not heard that one yet.

Mr GATON — Quite interesting urban myths have been put out.

The CHAIR — You turn the lights on at the moment and it crashes the grid. That is the way it operates.

Thank you so much for your contribution today. It has been invaluable. You will receive a transcript in the next week or two, if you could have a look at that and see if there is anything that jumps out at you. I am sure there will not be, but if there is just let us know and we will do the rest. Thank you very much.

Mr BUDGEON — I do have examples of the literature we provide if anyone is interested.

The CHAIR — That would be marvellous.

Witnesses withdrew.