

PARLIAMENTARY DEBATES

HOUSE OF COMMONS
OFFICIAL REPORT
GENERAL COMMITTEES

Public Bill Committee

VEHICLE TECHNOLOGY AND AVIATION BILL

First Sitting

Tuesday 14 March 2017

(Morning)

CONTENTS

Programme motion agreed to.
Written evidence (Reporting to the House) motion agreed to.
Motion to sit in private agreed to.
Examination of witnesses.
Adjourned till this day at Two o'clock.

No proofs can be supplied. Corrections that Members suggest for the final version of the report should be clearly marked in a copy of the report—not telephoned—and must be received in the Editor’s Room, House of Commons,

not later than

Saturday 18 March 2017

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The Committee consisted of the following Members:

Chairs: † JAMES GRAY, JOAN RYAN

† Baker, Mr Steve (<i>Wycombe</i>) (Con)	† Malthouse, Kit (<i>North West Hampshire</i>) (Con)
† Brown, Alan (<i>Kilmarnock and Loudoun</i>) (SNP)	† Marris, Rob (<i>Wolverhampton South West</i>) (Lab)
† Burden, Richard (<i>Birmingham, Northfield</i>) (Lab)	† Matheson, Christian (<i>City of Chester</i>) (Lab)
† Doyle-Price, Jackie (<i>Thurrock</i>) (Con)	† Prentis, Victoria (<i>Banbury</i>) (Con)
† Foxcroft, Vicky (<i>Lewisham, Deptford</i>) (Lab)	† Selous, Andrew (<i>South West Bedfordshire</i>) (Con)
† Fuller, Richard (<i>Bedford</i>) (Con)	† Snell, Gareth (<i>Stoke-on-Trent Central</i>) (Lab/Co-op)
† Hayes, Mr John (<i>Minister of State, Department for Transport</i>)	Stewart, Iain (<i>Milton Keynes South</i>) (Con)
† Hendry, Drew (<i>Inverness, Nairn, Badenoch and Strathspey</i>) (SNP)	† Tugendhat, Tom (<i>Tonbridge and Malling</i>) (Con)
† Knight, Sir Greg (<i>East Yorkshire</i>) (Con)	Ben Williams, Farrah Bhatti, <i>Committee Clerks</i>
† McDonald, Andy (<i>Middlesbrough</i>) (Lab)	† attended the Committee

Witnesses

David Williams, Chair, Automated Driving Insurers Group

David Wong, Senior Technology and Innovation Manager, Society of Motor Manufacturers and Traders

Steve Gooding, Director, RAC Foundation

Denis Naberezhnykh, Head of ULEVs and Energy, Transport Research Laboratory

Marcus Stewart, Head of Energy Insights, National Grid

Robert Evans, Chair of UKEVSE (and CEO of Cenex), UK Electric Vehicle Supply Equipment Association

Quentin Willson, motoring journalist

Public Bill Committee

Tuesday 14 March 2017

(Morning)

[JAMES GRAY *in the Chair*]

Vehicle Technology and Aviation Bill

9.25 am

The Chair: Before we start the formal business, I welcome you all to the first sitting of the Vehicle Technology and Aviation Bill Committee. I want to establish a few ground rules. First, I tend towards the more traditional form of chairing, so anyone seen drinking coffee or speaking into the telephone will be ticked off roundly. I do not really mean it; I sound more ferocious than I really am, but none the less I will be ferocious about it all and take such things incredibly seriously.

We have two or three formal matters to consider, and then we will go into the business of allocating questions before we bring the public in. Technically speaking, we have to bring the public in and throw them out again, but that seems to me to be a bit back to front, so we will try to avoid that. Let us crack on with the formal motions.

Ordered,

That—

(1) the Committee shall (in addition to its first meeting at 9.25 am on Tuesday 14 March) meet—

- (a) at 2.00 pm on Tuesday 14 March;
- (b) at 11.30 am and 2.00 pm on Thursday 16 March;
- (c) at 9.25 am and 2.00 pm on Tuesday 21 March;
- (d) at 11.30 am and 2.00 pm on Thursday 23 March;

(2) the Committee shall hear oral evidence on Tuesday 14 March in accordance with the following Table:

TABLE

<i>Time</i>	<i>Witness</i>
Until no later than 10.25 am	Automated Driving Insurers Group; Society of Motor Manufacturers and Traders; RAC Foundation; TRL
Until no later than 11.25 am	National Grid; UK Electric Vehicle Supply Equipment Association; Quentin Willson, motoring journalist
Until no later than 3.00 pm	The Institute of the Motor Industry; Downstream Fuel Association; Association of Convenience Stores
Until no later than 3.45 pm	Association of British Insurers; Centre for Connected and Autonomous Vehicles
Until no later than 4.30 pm	Civil Aviation Authority; Association of British Travel Agents
Until no later than 5.30 pm	British Airlines Pilots Association; Metropolitan Police; National Police Air Services; UK Flight Safety Committee

(3) proceedings on consideration of the Bill in Committee shall be taken in the following order: Clauses 1 to 16; Schedules 1 and 2; Clause 17; Schedules 3 and 4; Clauses 18 to 24; Schedule 5; Clauses 25 to 27; new Clauses; new Schedules; remaining proceedings on the Bill;

(4) the proceedings shall (so far as not previously concluded) be brought to a conclusion at 5.00 pm on Thursday 23 March.—*(Mr John Hayes.)*

The Chair: The deadline for amendments to be considered for the first sitting where the Bill will be scrutinised line by line was rise of the House yesterday. The next deadline will be rise of the House on Thursday for amendments to be considered in the Committee's sittings next Tuesday.

Resolved,

That, subject to the discretion of the Chair, any written evidence received by the Committee shall be reported to the House for publication.—*(Mr John Hayes.)*

The Chair: Copies of written evidence that the Committee has received are available in the room.

Resolved,

That, at this and any subsequent meeting at which oral evidence is to be heard, the Committee shall sit in private until the witnesses are admitted.—*(Mr John Hayes.)*

9.27 am

The Committee deliberated in private.

Examination of Witnesses

David Williams, David Wong, Steve Gooding and Denis Naberezhnykh gave evidence.

9.37 am

Q1 The Chair: Let me welcome and thank our four witnesses for the first panel. I will let you know that the first panel must end at precisely 10.25 of the clock, and if you are in the middle of a sentence you will stop talking at precisely 10.25, because those are the rules of engagement.

I remind members of the Committee that they may ask questions on any subject, so long as they are within the context of the Bill; they will not be allowed to ask any questions outside that context.

First, I ask our four witnesses to introduce themselves briefly for the record, starting with Mr Wong.

David Wong: I am David Wong. I run the technology and innovation portfolio at the Society of Motor Manufacturers and Traders, the UK automotive industry trade body. I cover areas such as connecting autonomous vehicles, ultra low emission vehicles, and digital innovation and mobility innovation in design engineering.

Denis Naberezhnykh: I am Denis Naberezhnykh. I am head of ultra low emission vehicles and energy at Transport Research Laboratory, and I oversee all our work on electric vehicles, low-emission vehicles, charging infrastructure and related topics.

Steve Gooding: I am Steve Gooding. I am the director of the Royal Automobile Club Foundation for Motoring, which is a small think-tank devoted to research into motoring and motoring issues, as well as into roads and road use. Some Committee members will have come across me in my guise two years ago as a member of the board of the Department for Transport.

David Williams: I am David Williams. I am technical director for Axa Insurance. We are involved in three of the Government-backed consortia looking into driverless cars: Venturer, Flourish and UK Autodrive. I am also chair of the Association of British Insurers autonomous driving insurance group.

The Chair: Many thanks to all of you. We have quite a lot of business to get through, so may I ask that both questions and answers be relatively brief and coherent? Perhaps “coherent” is going too far, but they should be brief and to the point.

Q2 Richard Burden (Birmingham, Northfield) (Lab): Welcome. The Bill was originally being talked about colloquially as the modern transport Bill—a Bill to look at the challenges facing particularly, but not exclusively, road transport in the decades to come. Parts 1 and 2—those dealing with road transport—focus on two main issues: the insurance liability of automated vehicles and the provision of electric charging infrastructure by big retailers. Do you think those are the right things for the Bill to cover, and are there things that should be in the Bill that are not included?

The Chair: Who wants to go first? Not everyone has to answer each question, so please do not feel that the whole panel has to answer.

Steve Gooding: We are pleased to see the inclusion of the provisions relating to autonomous driving insurance, an issue that needs to be gripped. We are also pleased to see that the Government are taking steps to do something about the rather confusing world of recharging electric vehicles—no doubt we will talk about that later. The RAC Foundation would have liked to have seen provisions relating to the creation of the roads fund—a Government commitment that the Chancellor mentioned and that was included in the Budget papers but that is not currently coming into statute. We also support the direction of travel on speed awareness courses and bringing more scrutiny to an area where some of us suspect a bit of an industry has grown up around a bright idea in a way that might have gone slightly too far.

David Williams: From an insurance perspective, we are very pleased to see the Bill. It is essential to have clarity, at this early stage, about the compensation process and about who is going to be responsible in the first instance, so that insurers and motor manufacturers can design their systems, business models and processes ready for it; so we are very pleased. Without that clarity, there is a danger that the public will lack confidence with regards to compensation being available when an autonomous vehicle is involved in an accident. Also, with road transport being a truly global element of our lives, it is good that the UK Government have come up with something at an early stage that hopefully will influence certainly Europe and maybe the US as well.

Denis Naberezhnykh: From TRL’s perspective, we are very supportive of the Bill as it stands, in particular the focus on electric vehicle consumers and users—that is very welcome. Taking steps towards introducing smart charging and managed charging is also very appropriate and timely. Given the forward-looking nature of the Bill, we would like to have seen more consideration for future technologies with regards to charging and vehicles themselves.

David Wong: The SMMT supports the principles underpinning the Bill, and we welcome its provisions. In particular, we think this is the right time for the Government to further encourage the take-up of ultra low emissions vehicles and pave the way towards the deployment of autonomous vehicles. This relates to the insurance framework that is set out in the Bill.

What we would like to see more of in the Bill is greater clarity—perhaps going forward in secondary legislation—particularly on smart charging of electric vehicles. In the area of connected and autonomous vehicles, certainly something on infrastructure and connectivity would have been marvellous, particularly with regards to deployment of connected vehicles.

Q3 Richard Burden: Thank you. That is very useful.

The Government’s target is that all new vehicles on the road should be ultra low emission vehicles—zero-emissions, in fact—by 2050. How far do you think this Bill will contribute to that target? On current trends, we are a long way off that target at the moment. What do you think are the other barriers to the take-up of ultra low emission vehicles, or we could also say—more broadly—connected vehicles? There is quite a crossover between those two agendas. How do you think these other barriers can be best overcome?

David Wong: Let me first deal with ultra low emission vehicles and electric vehicles. The Bill is a step in the right direction. Whether or not the targets are achieved depends on the extent to which we can solve what we call the three As. The first A is range anxiety; the second A is infrastructure accessibility; and the third A is vehicle affordability. Insofar as what the Bill is trying to do, it is crucial to address infrastructure issues, to support research and development and to provide continuing support for consumer incentives to create an enabling environment that will see a greater take-up of electric vehicles. If you look at range anxiety, a lot of it is due to the fact that technology has not evolved today to a point at which the electric vehicle can travel as far on a single charge as can a petrol or diesel vehicle. With greater research and development and Government support—not least in terms of, for example, battery technology—that may be an area that should be addressed for the future.

As for consumer incentives, this is particularly crucial in helping to address some of the issues regarding affordability, which is the second A. The technology itself is still very much in its infancy relative to other technologies, so we need to see continued support from the Government, as well as Government and industry working together closely on this.

The third A relates to infrastructure accessibility. From what we can see, this is a pivotal part of this Bill, and this, again, is a step in the right direction. Accessibility to infrastructure has been a key issue. It is the perception of most motorists that it is already not as convenient for people to charge an electric vehicle, which would take at least 30 minutes using a 43 to 50 kW rapid charger unit, compared to filling up a petrol or diesel vehicle at a petrol forecourt. We need to make it far easier for motorists to charge the vehicles. One of the things we need to do is to address the issue of interoperability of charge points. We are pleased to see that there is a provision for this in the Bill. When we consider the infrastructure from the perspective of the standardisation

of multiple connectors and sockets that are available out there, it makes it confusing for motorists. We must not assume that every electric vehicle owner is a tech geek. We want to make electric vehicles as appealing as possible to the mass public. Standardisation is therefore important in making it easy for the average motorist to understand the plethora of technologies available.

The Chair: Thank you, Mr Wong. Could I appeal to all witnesses to do two things? The first thing is to be as brief as possible, as we have a lot of business to get through in an hour. Secondly, Mr Williams led the way in demonstrating how one can speak loudly and clearly. It may be my age and decrepitude, but please could you speak as loudly and clearly as you can?

Q4 Andrew Selous (South West Bedfordshire) (Con): I want to recognise the progress that we have made in this country, but could I press you on the 2050 date, which is 33 years away? A quarter of all of Norway's vehicles are either electric or hybrid. China has, I think, 517,000 new energy vehicles, as they call them, on the road, and last year there were 800,000 charging points, notwithstanding the fact that it is a larger country. Thirty-three years is quite a long way off. I would like to press both Mr Wong and Mr Naberezhnykh on how we might turbo-charge this, perhaps adding a bit more to the three As that Mr Wong has told us about.

Denis Naberezhnykh: It is important to consider vehicles more broadly in the separate categories of vehicle types and vehicle users. When we think about the 2050 target for almost decarbonising the transport sector, we have to not treat private car owners in the same way as fleet and commercial vehicles. That is missing a little from the Bill at the moment. It focuses on overcoming short-term barriers—the problems and challenges that private car owners experience when attempting to use electric vehicles, such as clarity of data available on charging points, accessibility and the availability across the motorway network. However, what needs to happen to achieve the 2050 target is consideration of a broader picture, and recognition that there are other vehicle types—not just cars, but vans, trucks and buses—so what do we need to do to encourage those? They could create a growing proportion of the vehicle population as vehicle trends change over time anyway.

There is also a danger in comparing the UK situation to that of Norway and China, because the two have taken very different approaches in reaching their success. In Norway they have employed subsidy schemes and taxation schemes that I do not think we would find appropriate in the UK. In China they have taken the approach of simply saying, “You must buy these vehicles under any conditions,” and “You must install these charging points.” Unless we are willing to take steps like that, we have to be much more aware of what the market needs, or what the users need, and then tailor the products to suit those needs. That is where the transport sector needs to pay more attention: to focusing this Bill and future activities not only on targeting the near-term shortcomings, but on what we think might be the challenges in 10, 15 or 20 years from now, and preparing for those.

Q5 Tom Tugendhat (Tonbridge and Malling) (Con): I will move on to the mixed use of roadways in the intervening period. Clearly one of the challenges is the

new technology coming on to the roadways while the old technology is still using them. Has anybody done any thinking about the regulatory implications of that?

David Williams: We think it is less complicated than it first appears. The Bill means that somebody involved in a road accident does not need to establish which insurance regime is in place; we are going to have the Road Traffic Act, and insurers are going to be dealing with claims in the first instance. Regardless of the fact that it will take a long time for manual vehicles to be replaced with safer vehicles, we also think, from looking at the modelling we are doing, that statistically the roads will become safer. Some people have expressed concerns that manual vehicle insurance might become incredibly expensive as the prices for autonomous vehicles plummet, but the reality is that if, say, 50% of the vehicles on the road are autonomous and much better at avoiding accidents, that makes driving in a manual vehicle safer. We are confident that the way the Bill sets things out means that establishing the claims process will be relatively straightforward, and that roads will become safer.

Q6 The Minister of State, Department for Transport (Mr John Hayes): A couple of things have arisen from what witnesses have said. If I can call you David 1 and David 2, on insurance, David 1 helpfully used the word “compensation”. Presumably the key is to make sure that any injured party enjoys the same circumstances as they do now, and then anything else that happens does so invisibly to them. The injured party in any circumstance essentially gets what they get now; is that right?

David Williams: Absolutely. We are very pleased with the way that discussions developed and the Bill came out, because initially the conversations were that liability would move from RTA motor to products liability. You can imagine a situation where an individual was involved in a little accident—a small dent or something like that—and then, because people are talking about products liability, you get a motor manufacturer's high-powered lawyers arguing for two years about a little dent, just because they are concerned about creating a precedent. What will now happen is that an insurer will deal with the claim in the first instance, as is the current state of affairs. Yes, there will be circumstances where the motor manufacturers are held responsible, but that can take three or four years; it does not matter.

The other advantage we have is that it will be based on existing legislation, case law and precedent. The rules of negligence and defences available to motor manufacturers are still there unless the Government choose to amend them at a later stage. I really welcome the Bill, because it focuses on continuing to protect road users.

Q7 Mr Hayes: Quite. So, the delayed dispute disadvantage that you described, which might affect the ordinary motorist, pedestrian or whoever is involved in the incident, will effectively be invisible. My next question is to the other David. We have been talking about charging infrastructure. Should we have included powers for refuelling points for other low-carbon infrastructure? That came up in earlier consideration of the Bill. The technology is still developing and emerging. There are several competing low-emission technologies. What do you think about that?

David Wong: Certainly, there should be a positive mix of technologies taken into consideration, particularly if we are looking at co-location within certain infrastructure environments. For example, last month there was the launch of the first co-location of a petrol forecourt and hydrogen refuelling station in Cobham, on the Shell site. That was very much welcomed by industry. Looking at the provisions in the Bill, we could do the same for electric vehicles, with charging points being installed—or co-located, to use the industry parlance—at large petrol forecourts or motorway service stations. One must not forget, in terms of the wider energy mix, that hydrogen may also come into the picture.

Q8 Kit Malthouse (North West Hampshire) (Con): I want to ask about that specific point. There are obviously at the moment two competing power vectors for electric vehicles—hydrogen and batteries—and the Government are rightly saying that they are agnostic. Much of the Bill is agnostic, with much of the emphasis on battery-charging points. Is there a danger that industry could be compelled to spend a lot of money plastering the country with battery-charging points only to realise that battery vehicles are the equivalent of the fax machine—a temporary technology—and that fuel cells will overtake them within a fairly short period and the infrastructure will become redundant?

David Wong: I think it is fair for the Bill to take into account the reality, which is basically what is proportionate to the number of fuel-cell electric vehicles on the road. The number of fuel-cell electric vehicles on the road is very small but growing. We certainly need consideration of how the two can be factored in, because hydrogen not only is a fuel for transport but could be a medium of energy storage, particularly for the sort of energy that is being generated during off-peak hours and not used. Rather than wasting energy that is being generated and not used, it could be stored in the form of hydrogen and used for various purposes, including transport.

Q9 Kit Malthouse: As the owner and driver of a semi-autonomous plug-in hybrid, I get incredibly frustrated at the lack of a battery-charging network. It strikes me that the hydrogen fuel cell requires the minimum of behavioural change from the consumer. I would fill up my fuel-cell car the same as I would fill up my current car. A hydrogen nozzle would just be another nozzle on the fuel dispenser. Is the development of that technology accelerating? Some countries are way ahead of us, right? On that basis, is your view that the slow uptake of fuel cell vehicles in this country is because of the lack of technology or because of the lack of fuel? If there was a fuelling infrastructure across the UK, would it be the natural uptake for the consumer, given the lack of behavioural change required?

David Wong: As with most technologies, it is a chicken and egg issue. In economic parlance, you would call it a network effect. Should you have hydrogen refuelling stations or vehicles first? Obviously, the gas companies that are building hydrogen refuelling stations will need to be confident that there are cars on the road, but vehicle manufacturers will want to be confident that there are hydrogen refuelling stations so customers can refuel. We are seeing a collaboration between industry and the Government in that regard. The Society of Motor Manufacturers and Traders, our vehicle manufacturer

members, the British Compressed Gases Association and its gas company members are working hand in hand with the Office for Low Emission Vehicles through the UK H2Mobility consortium to chart a road map. We need to accelerate that collaboration, and the Government need to provide continued support for the building of more hydrogen refuelling stations.

Q10 Kit Malthouse: I get that chicken and egg point. For the Committee's information, I used to be the chairman of the London Hydrogen Partnership, preparing the capital for this economy in the future. The same assumption does not seem to apply to battery electric vehicles. The Government are willing to put in the recharging network for battery electric vehicles, but not, seemingly, for hydrogen.

Denis Naberezhnykh: We should not think of them as competing technologies, because they are not. They are both technologies that electrify decarbonised transport. I do not think it helps to think about the solution from a technology point of view. We should think about what we are trying to achieve, which is reducing CO₂ emissions, and then look at the facts. The fact is that, right now, battery electric vehicle technology is far more market-ready than fuel cell technology, in terms of cost, availability and production capacity. If we are trying to identify measures for accelerating our progress to the 2050 target, we need to pick technologies that we are already confident can achieve the result.

The other point is about infrastructure and fuel. From a fuel and energy perspective, a fuel cell vehicle is far less energy efficient than an electric vehicle because you have to take it through more conversion steps from generating hydrogen to converting the hydrogen to electricity. Very few pathways exist in the world right now for producing a low-emission fuel cell electric vehicle that is anywhere near comparable, in energy efficiency terms, to an electric vehicle.

Q11 Kit Malthouse: I understand that viewpoint. There are obviously large original equipment manufacturers that have made a decision about batteries and are therefore lobbying heavily on that, but some large ones—Toyota and Hyundai—have made a decision to go down the route of fuel cells. Given that the Government should be agnostic on these issues, should they also be agnostic about the regulations in the Bill for taking the power to compel providers of charging points, for instance at motorway service stations? In other words, when they compel someone to provide a fast charging point for a battery, should they at the same time compel them to provide hydrogen refuelling? If they just compel a battery recharging network, it will be a VHS or Betamax situation.

Denis Naberezhnykh: That goes back to my earlier point. We need to take the end use into consideration, and we need to think about which types of vehicles and users are likely to be using electric vehicles and where the infrastructure is required to support them.

Q12 Kit Malthouse: So you think the Government should predict and provide, rather than be agnostic about technology.

Denis Naberezhnykh: Yes. I do not think being agnostic, in the sense of saying, "We don't care which technology it is. We just need to invest in putting all of it up" is

particularly helpful to the industry and the users. We need to recognise that some technology can achieve things that other bits of technology cannot. Some have strengths and weaknesses, and we need to pick out those strengths and weaknesses and emphasise them for implementation in infrastructure appropriately.

Q13 Rob Marris (Wolverhampton South West) (Lab): I cannot see anything in the Bill that would change who is licenced to drive a vehicle. In terms of future-proofing, one can envisage that people under the age of 17 or people with significant visual impairment could be, to use the current verb, “driving” automated vehicles. Should that future-proofing be provided for in the Bill, Mr Williams, and if so, what insurance issues would there be, say, for a seven-year-old alone in an automated vehicle?

David Williams: A major benefit of autonomous vehicles will be bringing mobility to people who currently do not have that benefit. We are very much looking forward to that. In Flourish—one of the Government-backed consortiums—we have Age UK as one of the critical partners to make sure that we understand the implications. I am not sure whether it needs to be in the Bill, because that establishes the insurance regime among other things. It will be complex for some vehicles. With the pods that UK Autodrive is going to put in Milton Keynes, there will be no way that you can intervene, so I see no reason why somebody in one of those vehicles would need to comply with any test or have any form of licence.

The majority of vehicles in the early stages of market development will probably be ones—for example, a level 4 vehicle—that you can switch from manual to automatic. You then get to the situation where people think, “An autonomous vehicle can bring me home when I’m drunk from a party, so I won’t need a taxi.” My thought is that you will not be able to do that if you have a vehicle that you can switch between the two modes, because you would still be in charge of a vehicle that could be driven manually.

At some point work needs to be done on licensing and testing, but for fully autonomous level 5 vehicles, the insurance aspects are covered in the Bill and we have no concerns there. We want to see the adoption of these vehicles because we think that they will make the roads generally safer and we therefore want them to be available appropriately, as widely as possible.

Q14 Rob Marris: The insurance provisions in the Bill would be sufficient to cover what I think you call a level 5 vehicle, which could be carrying a seven-year-old on their own.

David Williams: Absolutely.

Q15 Drew Hendry (Inverness, Nairn, Badenoch and Strathspey) (SNP): I want to explore some issues of public confidence in the potential uptake of autonomous vehicles and get your views on whether the Bill goes far enough to set the scene. Given that the technology is available, what measures are required to make the public accept it and want to take it up? We have heard about the confusion and resistance, perhaps, because of the different approach to electric vehicles, but what do you think is required for the future in the Bill?

Steve Gooding: First, the Government are right to focus on the insurance angle, because that strikes me and the foundation as the first thing that needs sorting for all the reasons that the Committee is thinking about. Following that, what will affect the public’s willingness to accept the technology is their sense that it is genuinely safe. It is understandable that the Bill is silent on such things as construction and use standards, because they will need to be negotiated in an international forum. That is definitely something—the Minister knows we have flagged this up—to get on with thinking about. How you move away from a construction and use safety regulation system that is very much based on traditional mechanical engineering to one that is based far more closely on one that we apply to human drivers, because we are dealing with artificial intelligence, needs a bit of a boost.

David Williams: I think that we need to be vocal about the capability of the technology. We often quote statistics: for instance, automated emergency braking systems reduce accidents by 15% and injuries by 18%, so even if they do not avoid the accident completely, they slow the vehicle faster than a human would and reduce injuries. That is one small component of what will be the driverless cars of the future.

We need to show people the testing regime that these vehicles will undergo before they are let loose on the road, but it is natural to expect some nervousness and resistance. I do not know if any of you have seen the trailer for the new “Fast and Furious” movie, “The Fate of the Furious”, where robot cars get taken over. That will not help and, therefore, we need to be particularly vocal about the positive benefits. I fundamentally believe that we will see fewer deaths on the roads and much safer roads and, therefore, we need to do whatever we can to encourage adoption.

There is also a massively positive business case in the haulage industry for the adoption of connected and autonomous vehicles. I think we may see more rapid adoption in the commercial vehicle space. People will then get used to being around autonomous vehicles, even if they are commercial vehicles and that will make the adoption at a personal level easier.

Denis Naberezhnykh: I would add that some excellent work is happening in the UK now. A project called MOVE-UK compares and contrasts the different styles of vehicle automation and how an autonomous vehicle would perform in the same situation that a human driver performs in. That kind of comparison and learning will enable those automated vehicles and semi-autonomous functionalities to be as palatable to users as possible, so that there is the least amount of discomfort or worrying about the functionality when they try those vehicles out for the first time. It will be the first early adopters—early users—who will form an opinion and then spread the word about whether it works or whether they feel comfortable or not. Getting that right is important and some great work is already happening in the UK to try to do that.

David Wong: I have four brief points on increasing acceptance. One is on messaging. In addition to what Steve has just mentioned about showing the public that the technology is genuinely safe, we have to be very careful, particularly with regard to the Bill, with public messaging in relation to insurance, to assure the public that this will not result in a hike in insurance. The

public will rightly expect that the lowering of risks and fewer accidents will mean that insurance premiums should come down.

The second point is about convincing the public through public demonstration projects. We are pleased that the Government are backing a number of these collaborative R and D and demonstration in live trial projects. We would like to see some of the learning coming out of these projects on how the public might interact with autonomous vehicles.

Thirdly, on public demonstration projects, going forward, perhaps the consumer can pay, not unlike the very successful Go Ultra Low campaign for ultra low emission vehicles. It may be useful for connected autonomous vehicles at the right point in time, and particularly at the point when vehicle manufacturers are ready to deploy these vehicles on UK roads.

Lastly, we think as an industry that the gradual escalation of the levels of automation can perhaps help Joe Public to be more comfortable with the technology, as opposed to asking Joe Public to jump straight into a vehicle with no steering wheel from day one.

The Chair: We had better get a move on. Briefly, if you can.

Q16 Drew Hendry: Very briefly, in terms of public confidence and liability issues, you mentioned safety. Do you feel the Bill should address public confidence in the maintenance of vehicles? How will that be conducted across the different standards?

Steve Gooding: We need the construction of new standards for whether a vehicle is judged road-worthy in the first place, to the subsequent—as we call it—MOT system, which continues to verify over time that that road-worthiness is being maintained. We need both systems to cope with the new technology.

Q17 Mr Steve Baker (Wycombe) (Con): I am conscious that cars can be converted to use LPG if they are petrol. It seems to me that potentially they could be converted to use hydrogen, as well. Mr Wong, is that something that the industry has considered?

David Wong: It is certainly in the mix. Cars today are being retrofitted as dual fuel vehicles, so, hydrogen in an internal combustion engine. For example, a company in the north-west called ULEMCo is doing that with a good degree of success. It is important to look at the outcome from such a conversion. Will it help to achieve the targets? Will it be below 75 grams of carbon dioxide per kilometre? The jury is still out on that, to be honest. We need to see whether technologies can help over a period of time to decarbonise road transport, not simply the conversion of any sort of technologies or even the hybridisation of any of these fuels.

Q18 Mr Baker: To be clear, can you explain why we cannot get carbon below 75 grams when we are burning hydrogen? If we burn hydrogen, we get water. Where does the carbon come in?

David Wong: For a fuel cell electric vehicle, you get zero tail pipe emission, but for a dual fuel vehicle, it depends on the dual fuel.

Q19 Mr Baker: Okay, I see the point you are making. What if one were to convert a car to run exclusively on hydrogen? Would that achieve zero emissions?

David Wong: Yes, if it is a fuel cell electric vehicle, basically you just get water vapour.

Q20 Mr Baker: I did not mean fuel cell, but an internal combustion engine running exclusively on hydrogen. Why could you not do that?

David Wong: You can probably use the fuel cell as a range extender for electric vehicles, but to have an internal combustion engine that basically burns fossil fuels and then you have hydrogen—

Q21 Mr Baker: I don't want to labour this too much because I have other questions. The point I am making—

The Chair: Please don't labour the point too much, Mr Baker. We have five minutes left.

Q22 Mr Baker: The point I am making is that a car with an internal combustion engine could be converted to run on hydrogen as an internal combustion engine, could it not?

David Wong: In principle, yes, but I hesitate to give a straightforward answer because we do not describe a hydrogen vehicle as an internal combustion engine. That is the parlance we use for combustion, which, at the moment, is petrol or diesel. We like to frame hydrogen in the context of clean energy.

Q23 Mr Baker: Okay. I'll move on from hydrogen in the interests of time. My other point is security. I am a former software engineer. I have got two points about software. First, have you considered cybersecurity and the risks of cars being hacked and people finding themselves driving to destinations they did not intend to go to?

David Williams: Absolutely. In the Flourish consortium there is a specific focus on cyber. Also, in the Venturer consortium, BAE Systems is involved and does military-grade cybersecurity. We should be worried about cyber risks, but we should be worried about those generally, not just with regard to vehicles. There are ways to make things safer. It will be a key element of the communication programme and the technological development of these vehicles in making sure that they are as safe as they can be.

Q24 Mr Baker: So is there a provision missing from the Bill in relation to cybersecurity?

David Williams: The only area that we think needs further debate is whether insurers will pay for claims in the first instance where there is an incident, but what if there was a massive terrorist incident that caused a problem with a huge number of vehicles globally? That may need separate consideration. The problem is, even in saying that, it is almost scaremongering about that risk. Clearly, we would rather focus on protecting vehicles. You are used to virus protection and those sorts of things. We are talking about new technology. We need to get to the same state where people have confidence.

Steve Gooding: The Bill recognises the risk of tampering, which is a version of cyber-hacking. The construction and use regime, which says a vehicle is roadworthy, must take into account that it is roadworthy and protected from the risk of cybercrime.

Q25 Mr Baker: Finally, on tampering, the point I made on Second Reading was that that section of the Bill that can exclude or limit an insurance liability after alterations to the vehicle's operating system, or a failure to install software updates to the vehicle's operating system, is a drafting point. The provision should simply state "software" rather than "operating system", because there is firmware and there will be application software. You are nodding, Mr Naberezhnykh. Can I ask you to put on the record whether that is correct and the Bill should be drafted in terms of software and not only the operating system?

Denis Naberezhnykh: My concern is that, were it to be tested in court, the Bill would not achieve its intended aim if, for example, application software had been tampered with or firmware had not been updated. I appreciate it is a technical point.

Steve Gooding: I think you need to ensure that the breadth that you are describing is covered. I suspect that is a question you need to put to the drafting counsel rather than us.

Q26 Mr Baker: You were nodding, Mr Naberezhnykh.

The Chair: Steve, we had better move on, as we have only three or four minutes left.

Q27 Andy McDonald (Middlesbrough) (Lab): I will be very brief. The Bill introduces the new concept we are moving to—the exposure to manufacturers' liability. Has the Bill got it right in terms of the balance between insurers' and manufacturers' liability? Secondly, Mr Wong talked about accessibility cost. The cost of insurance will be key. Is the insurance industry ready for this? Clearly, premiums should be cheaper if we are getting errorless driving, but is the insurance industry sophisticated enough and ready enough to make that offer to consumers in the first instance? Lastly, on the issue of updates, does that present fresh exposures to manufacturers for the duration of the life of that vehicle on every software update iteration? Have you given any thought to how that plays in the context of current consumer protection legislation and issues of limitation? Does that now cause us to revolutionise the way we look at people purchasing vehicles? Are they going to be out there forever with software with little or no control? Any thoughts or comments?

David Williams: I think the Bill does have the balance right. It focuses on the road user. That is why we have got the Road Traffic Act 1988. Therefore the Bill has to focus on the safety of road users rather than insurers and manufacturers. As an insurer, we can price for anything. You have a balance with regard to how much liability finally rests with the motor manufacturer. That can develop over time, and they have definitely got some skin in the game. If they are negligent they will be called to account and will need to indemnify the insurer; so I think the balance is right.

With regard to whether the insurance industry is ready, in the past I do not think we have been, for things like this, but the fact that we already have the Autonomous Driving Insurance Group, which meets regularly and is very well attended, that the Thatcham motor vehicle research institute is all over it, and that AXA alone is involved with three of the Government-backed consortia means we are ready—we will be ready.

David Wong: On software updates, we believe that the "state of the art" defence principle applies here, which means at the point when the vehicle, together with the systems, including software and firmware, are being developed, the manufacturer has done its utmost to ensure that it is completely secure and, based on the scientific knowledge and the technology at that point in time, has done its very best. Of course, software updates are always, basically, a moving target; it changes every hour—but the "state of the art" defence applies in this case.

Steve Gooding: I think the motor industry will have to answer for this, because if you think of your home computer, every now and then you get a message saying "Your software is going out of support". I think we need a bit of reassurance from the auto sector that we are not going to find that a vehicle we buy next year, and then in seven or eight years' time is in the second-hand market, gets the message that "this vehicle is going out of support" and is therefore judged in some sense to be no longer roadworthy.

David Wong: It is reasonable to expect that vehicle manufacturers will continue updating, upgrading and patching the software, as do computer manufacturers and software manufacturers. However, even as Microsoft has decided, after a while, to discontinue the support for Windows XP and Windows Vista, one must not expect vehicle manufacturers to continue supporting particular software 20 years' down the road, even if the vehicle is still roadworthy.

Q28 Richard Fuller (Bedford) (Con): Within its scope, does this Bill do enough to position the UK as a global leader in vehicle technology? If not, what is missing? If you do not have the time to answer, maybe you can email me.

The Chair: Two minutes to cover that favourable topic.

David Williams: From an insurance perspective, yes.

Denis Naberezhnykh: From a research angle on this, no, not entirely, but that is because, as I said at the beginning, we think it could be further-looking, as with what some countries are doing; but it is adequate at addressing the near-term goals.

David Wong: From the vehicle manufacturers' perspective, I think more can be done, particularly with regard to connected autonomous vehicles. The particular area of connectivity and infrastructure is clearly missing in this Bill.

The Chair: Finally and—we have two minutes—very briefly, Drew Hendry.

Q29 Drew Hendry: I wanted to cover the issues of liability a little bit further, but I suspect we are going to run out of time before I can get an answer to those—in particular situations where there might be, for example, someone who is incapacitated in the vehicle. If they are incapacitated because of ill health, or for other reasons such as alcohol consumption, where would the liability sit, with such issues? Does the legislation need to go into more detail about some of those other causes? You mentioned the maintenance regime earlier.

The Chair: Order. Drew, those remarks will form part of the record and part of your contribution to the discussion of the Bill, but we are now at 10.25 am and the rules stipulate that we must stop at precisely 10.25 am. I thank our four witnesses very much for their useful contributions. We got through most of what we wanted to ask you and you have certainly given us some very good thinking points for our further discussions on the Bill. Thank you very much indeed.

Examination of Witnesses

Marcus Stewart, Robert Evans and Quentin Willson gave evidence.

10.26 am

Q30 The Chair: We are now going to hear witness evidence from the National Grid, the UK Electric Vehicle Supply Equipment Association and Quentin Willson, who is a motoring journalist. We have until precisely 11.25 am—one hour from now—for this session. Perhaps the witnesses would kindly introduce themselves for the record.

Quentin Willson: I am Quentin Willson, a motoring journalist and broadcaster and an electric vehicle advocate. I have been ploughing a lonely furrow, driving EVs and supporting them for the last five years.

Robert Evans: I am Robert Evans. I am chief executive officer of Cenex, which is a specialist research and technology organisation that has been active for ten years in developing supply chain and markets for low-carbon vehicle technologies, including hybrid, electric, hydrogen and gas. Today, I am also representing the UK Electric Vehicle Supply Equipment Association, which is the association of suppliers of charge points and charge point network operators for the UK.

Marcus Stewart: I am Marcus Stewart. I am head of energy insights at National Grid, the system operator. My role is looking out into the future to determine what the energy future will look like in terms of electricity and gas, how people will use their energy and what capacity on the system is needed to support that energy. Electric vehicles are a big part of the future from where we can see it.

The Chair: As we discovered in the last session, time disappears very quickly. I ask my colleagues on the Committee, and yourselves, the witnesses, to be brief, to the point, sharp and all those things, to try to get through the quite large number of questions we want to ask you in the hour. I apologise: whoever is speaking at 11.25 am will be told to shut up mid-sentence, if necessary, because we have to stop at 11.25 am sharp. *[Interruption.]* It is unlikely to be me because I can't tell myself to shut up.

Q31 Kit Malthouse: Good morning. Do you think there is too much emphasis in the Bill on the battery as a vector for powering electric cars, as opposed to the hydrogen fuel cell? Should there be equivalence in the Bill from the Government, so that every time they compel, for instance, a motorway service station provider to provide a plug-in charge point, they should also compel them to provide hydrogen?

Quentin Willson: I believe hydrogen is too far away yet to get consumers interested in or excited about it. The costs are always going to be higher as a fuel—it would probably have parity with petrol. I believe for consumers to be interested and to take up wider EV adoption, there has to be a fiscal advantage for them. At the moment, you are asking them for too much concentration. If you put hydrogen as a parallel technology now, I think we might disrupt the really good emphasis we have got on EVs at the moment.

Robert Evans: Our view is that the UK has not been very successful in introducing alternative fuels into the transport sector; we need to be extremely successful with electricity and that will pave the way for the introduction of hydrogen. We need to make this transition phase work successfully. My own organisation is involved in hydrogen fuel cell trial activities. It is a pre-commercial phase. It is a strategic insurance option for the motor industry and the energy sector, where we are looking at the decarbonisation pathway. We need to have hydrogen, but it is going to proceed through strategic niche markets, and that is going to take a short while yet. The Bill does at least outline the same basis for the treatment of hydrogen as it does for electricity in terms of reserving the right to take powers, should that be necessary.

Marcus Stewart: Where technology is today, electric vehicles are progressing rapidly, and the focus should be on electric vehicles at this time, including the impact they have on the system and how people get access. We can take advantage of that. The technology in some respects is leading the legislation, so we should tackle it from that point of view. As an organisation, we are fuel-agnostic, so hydrogen, compressed natural gas and other sources of renewable fuels should be part of the long-term mix, but electric vehicles are happening now and there is more choice for consumers in that area, so we should be dealing with that at this point.

Q32 Kit Malthouse: So all three of you believe that the Government should pick a winner at this stage and put their muscle behind that. Does that not run the risk that in time—as you say, this is a pathway to a fuel cell—we will end up with tonnes of useless copper in the ground within a relatively short space of time as people switch to hydrogen refuelling?

Quentin Willson: I think you can have parallel technologies. The developments that the OEMs—the car manufacturers—are doing on hydrogen and fuel cells, particularly Mercedes, are good, but everyone in the industry concurs that it is possibly 10 years before we get anything like mass production. The speed of electricity is so fast now. The Government should be aware of developments and track them, and they need to understand that there is a parallel technology, but if I was asked to bet on the two horses, I would say that electric is likely to be the mainstream propulsion force over the next 20 years.

Q33 Kit Malthouse: Hydrogen cars are of course electric—it is about the storage of the electricity.

Quentin Willson: Yes.

Robert Evans: That is a very good point. Hydrogen fuel cell vehicles are electric vehicles—they just have a different, alternative powertrain as part of the configuration—so progress with electric vehicles is an

aid to progress with hydrogen fuel cell vehicles. I do not believe that the Government are picking winners per se. I think that the industry is taking a view that electric vehicles are the future. You see that in all of their announcements. They are bringing these vehicles to market, so the job of the Government is to help facilitate the introduction of that technology for the benefit of motorists.

Q34 Kit Malthouse: It is not the entire industry. Toyota are not doing that.

Robert Evans: Toyota are involved in electric vehicles such as hybrid electric vehicles. They are just not necessarily bringing pure battery electric to the market at the moment.

Q35 Kit Malthouse: The Mirai is a fuel cell car.

Marcus Stewart: Hydrogen has its place. From our point of view, when we look at hydrogen, we see that as a very long-term play. We are talking about it being 20 years, 30 years and beyond when hydrogen can have any impact on the whole energy mix. Also, you have got to get your hydrogen from somewhere.

Q36 Kit Malthouse: This is my final question. There are some countries who disagree with that. The Dutch are spending a lot of money on a hydrogen fuel network across their whole country, as are the Germans.

Robert Evans: The Dutch are not spending as much on hydrogen as they are on electric vehicle infrastructure.

The Chair: Can I ask you to speak up just a shade? I am having trouble hearing you.

Robert Evans: The Dutch are spending considerably more on battery electric vehicles than they are on hydrogen fuel cell vehicles. Governments are spending money on hydrogen fuel cells, but they view it really as a strategic option play. In order to have it available for you in the system, you cannot just start from a standing start. You have to have a level of activity, a level of supply chain development and a level of familiarisation, but that is not to be confused with it being something that will make a significant impact within the next five years, for example. We should track international trends and watch what is going on in projects. We should be supportive, but right now there are some bigger issues to be addressed with electric vehicles. I think we are in good health with hydrogen.

The Chair: On this sort of question, Gareth Snell.

Q37 Gareth Snell (Stoke-on-Trent Central) (Lab/Co-op): Thank you, Chair. If the Government were to pick a winner at this stage, do we not run the risk of skewing future research and development investment by saying to developers, "The traditional battery is the route we are going down"? If hydrogen is 10 years away, we run the risk of it becoming further away because we are not putting the investment into it now to ensure that technology is comparable in the future.

Quentin Willson: That is a hard question to answer. If you look at the price of the Toyota Mirai, which is a hydrogen car, it is £60,000. Volume and economies of scale make it an enormously difficult task to get that to a consumer level of £15,000. I think the OEMs will find it very tough to find this fuel technology at a cheap

enough price point to make it viable. In terms of commercial vehicles and buses, I think it has a greater resonance, but in terms of consumers, if I were sitting at the board table of BMW, Mercedes, Audi or VW, I would be looking at electrification rather than putting all my eggs on hydrogen.

Q38 Mr Baker: I think that you just hit on the nub of the matter. A board director has major capital investments to protect, which means that they are inclined to stay within trammels once a technology is established. That is very much the point that my hon. Friend the Member for North West Hampshire has been making: there is a danger that we could end up choosing the wrong technology because a whole system of incentives sets up people to stick with electric.

Quentin Willson: The brutal fact of the matter is that getting hydrogen from point A to point B requires pipework. You can have static hydrogen stations that manufacture it, but they will be the size of shipping containers. If you look down the road, creating infrastructure and points, keeping it cheap and making it not a by-product of refining chlorine are all barriers to entry that are much greater than for electrification, which is simple and understandable; it is a currency that we are familiar with now, and we have the electric network. These are the major barriers to hydrogen uptake.

Robert Evans: To follow up on that point, Innovate UK and the Advanced Propulsion Centre are funding research and development projects involving hydrogen fuel cells, and they have done so throughout the period of the low-carbon vehicle innovation platform. The Office for Low Emission Vehicles recently put forward funding for both hydrogen stations and vehicles in deployment.

I think the challenge at the moment is that you could put a very large amount of money on the table and say, "Here's the money; will you bring the vehicles?", but the supply of vehicles is very limited. Quantities are still small, as has been explained, and they are very expensive, so the car industry is not looking to flood the market with these vehicles. What we are doing in the UK is being ready for the time when the vehicles will come in larger volumes. We will have a receptive market, and we have infrastructure here in London. What London has done is really positive progress that is viewed as a beacon for how the rest of the UK could be ready to deploy hydrogen fuel cell vehicles when they are ready and cost-effective, and when the supply comes to the UK.

Q39 Alan Brown (Kilmarnock and Loudoun) (SNP): I have a few questions from a pre-selected list. It is probably best to ask about electric charging, to follow on from the discussion. The Government say that electric charging infrastructure makes more sense just now, and that hydrogen is still a wee way off. Can the panel advise what has been learnt today about the required structure of the charging network needed? Will the Bill and the current regime ensure that there will be adequate numbers of charging points in each part of the country?

On Second Reading we heard about the gathering of statistics on the current variance in the number of charging points. Orkney, for example, has many more

charging points than some big towns in England. Also, is there a need for a uniform way to access charging points? Is the legislation as proposed sufficient for that? I rolled quite a few questions into one.

The Chair: I am sure that our panel will handle it. You do not all have to answer everything.

Robert Evans: I am happy to make a start. The first thing to say is that the UK Electric Vehicle Supply Equipment Association and the industry support the progress of the Bill and believe that it is an appropriate set of powers for the Government to seek. As the industry views it, the Bill effectively says that the deployment of electric vehicle infrastructure into the market is progressing. The market is working, and it is likely to deliver the solutions for motorists to access those charge points easily, and for those charge points to become a sustainable asset on which businesses can be built. What the Bill recognises is that there is a stage by which the Government will step away from some of the seeding activities that they have done, in terms of creating different schemes such as Plugged-in Places, national infrastructure programmes and funding that it has put in, and let the market progress.

The Bill gives the Government an insurance policy, which is that they can act if the market does not deliver in any particular important aspect that starts to stall the uptake of electric vehicles. The view is that the market is progressing well, and these are reserve powers that the Government might wish to take later. Therein will lie the detail about what the particular nub of a problem might be on which the Government will need to intervene. At the moment we have 11,000 charge points in the UK; we have a lot of private sector finance investment interested in investing in the commercial operation of charge point networks and the further deployment of charge points. That is to be commended. At this stage the Government just need to have this insurance policy in the Bill so that they can act should they need to, but they should expect that the market will deliver.

Quentin Willson: The critical thing is the availability of rapid chargers. Rapid chargers are the game changer. You can charge your car within 30 minutes to 80% of its battery life. Therefore, you can do multiple charges in a day, bringing the feasible range from this notional 130 miles for a Nissan LEAF to as much as 300 miles. I did a journey from Birmingham to Milton Keynes and back, charged twice at a rapid charger and arrived at Milton Keynes with 90 miles still on my battery range. So the Bill must make sure that these rapid chargers are rolled out much more and we see many more at motorway service stations and at key points within cities, because they will enable people to believe that their range is much wider than they are led to believe.

Q40 Drew Hendry: I have a follow-up question on the infrastructure for charging points. Does more consideration need to be given in the Bill to connecting with different modes of transport—an intermodal approach? Or is it sufficient just to say, “There shall be charging points”?

Quentin Willson: What do you mean by “different modes of transport”?

Drew Hendry: For example, electric vehicles being able to connect with hubs at airports, railways, ports and so forth. Is enough thought being given to how the network will develop?

Quentin Willson: We need some intelligence on where these peak points are likely to be. It needs to be spread as widely as possible. Ultimately, the superordinate goal is wireless charging in the roads and as you park. The Bill needs to be aware of that as well. That is a technology that would revolutionise the whole EV market, but it is still some time away. There needs to be a charger in as many places as possible where there is public access—supermarkets, schools, businesses—especially in rural areas.

Marcus Stewart: The evidence we submitted focused on the impact on the electricity system, in terms of capacity and the role of smart charging, and rapid chargers help in that because they help people charge away from peak times. If you have rapid chargers at motorway service stations or supermarkets, where people can charge during the day, rather than charging in the evening at home, that smooths out the impact of the demand for energy. It makes for much more efficient usage of the energy system that we already have and allows us to accommodate more electrical vehicles.

Robert Evans: Charging at train stations is a very good idea, because the vehicle is parked there and they can start to be used for managed charging applications—vehicle to grid and the like. That is a very positive trend. There has been national infrastructure funding for railway stations, and that is an appropriate use. With airports, it depends. For long duration, if you are parked for two weeks while away on holiday, it is less of an issue. The rapid charger becomes a more useful item when you pick up your car, quickly fill with electricity and then move on. So more charge points in motorway service areas is definitely a good thing, and more dwell points that aid intermodal transport, so you take your electric vehicle and get on the train, for example, rather than adding to congestion in a city centre.

Q41 Mr Hayes: I want to ask about the effect of demand on the grid. You dealt with it after I signalled my intention to ask the question, but further to that, does the industry need to think a bit about how it could incentivise people charging at different points? There is a history of this, with Economy 7 and all kinds of other things. Are there ways in which the industry could respond by encouraging people to charge in the way you describe? On the point about the distribution of infrastructure, what about rural areas? The Bill provides powers for the Government to do more. Have we done enough or could we do more to ensure the spread of infrastructure? It is fine to have these things in supermarkets and at motorway service stations, but that does not really help my constituents in Surfleet Seas End or Gedney Drove End, who are a very long way from either. What do you think?

Quentin Willson: Rural charging is an issue that we should look at very hard, because otherwise we will have a disconnected electric community and there will be the connected and the unconnected. Scotland has been extremely good at this—Scottish Enterprise has financed quite a bit of it. We need to look at these rural areas, decide what the best place is and give a concerted route through rural areas where you have rapid chargers so that those communities can run electric cars with the same benefits as people in conurbations.

Marcus Stewart: Going back to the point about how the energy industry can respond, the industry has experience. I am a system operator, but the supply side can offer

different tariffs for charging at different times. That is quite a popular approach. You mentioned Economy 7. I know people who have electric vehicles who use the Economy 7 meter to get a cheaper charge by charging their vehicle at a time when the system is under less stress. There are options like that.

Looking further into the future, when you have many more people using electric vehicles, there will be an opportunity for electric vehicles themselves, through some sort of consolidation, to provide services back to the system to enable balancing—“vehicle to grid” is a term that is used. There could be opportunities for suppliers to offer different tariffs to allow people to participate. There are lots of options there. We would say that the technology in the chargers needs to be smart enough to be able to do that. That allows you to optimise the value of the charging system and the car to the consumer, and also the overall cost to the total energy system. If you can optimise that, the total cost will be lower than it would be if you had effectively unabated charging.

Robert Evans: You raised two points. The first was about rural areas. At this stage, infrastructure follows the deployment of vehicles. The more vehicles there are, the more there is a case to deploy electric vehicle infrastructure to support them. In rural areas, we have a situation where you often have to travel a long distance to get to a petrol station, because there are fewer and fewer in those areas. That is an example of how charging your electric vehicle at home and occasionally using public charging makes an electric vehicle quite a virtuous vehicle to drive.

On your point about incentivisation on the grid management side—smart charging—we have a progression: the benefit of smart and managed charging is that it mitigates investments that the distribution network operator has to make in copper in the ground, for example. We need to work out how the incentives travel from the beneficiary—the reduced investment on the part of the DNO—through tariffs to the EV driver so that the EV driver is effectively part of the smart charging proposition and we do not have a situation where the smart charging proposition occurs without them being involved in the loop.

Q42 Mr Hayes: The essence of your point is that the Bill and the debate that it stimulates will encourage innovation and catalyse the demand management tools that you describe.

Robert Evans: The Bill gives the Office for Low Emission Vehicles and other parts of the Government the ability to keep pushing forward discussion and dialogue between the motor industry and the energy sector to ensure that smart charging is part of our future, because it explicitly expresses a desire to regulate should smart charging not proceed. There is a desire to explore this, but the Bill gives the Government powers to help set an agenda that brings the groups together and moves forward the smart charging agenda.

Quentin Willson: Work is being done in America, notably by Tesla, where consumers charge their cars at smart times and then, when the grid is out of balance, that electricity is sold back to the power companies. These millions of electric cars become energy storage devices. This is another very important cycle of change that we need to look at. Any imbalance would be

negated. Also, a lot of electricity is produced by renewables—wind and solar. In the UK, 41% of the electricity dragged from the grid on Christmas day was from renewables.

Q43 Rob Marris: If, over the next five years, 10% of new vehicles were electric and each of them, on average, did 10,000 km a year, 10,000,000 km per year would be driven in electric vehicles. This is a question for Mr Stewart. What is that as a percentage of UK electricity generation at the moment? You may not be able to reply today, but perhaps you will tell us. I am a bit worried that you will encourage all these electric vehicles and then the grid falls over, so I need to get some idea of proportionality.

Marcus Stewart: I will give you an example. If you have 1 million electric vehicles—you don't need to worry too much about how many miles they are doing; when they are charging is what is really important, because that is what impacts on the supply and demand balance—and you charge them on a 7 kW charger, in theory that could give you 7 GW of demand, and 7 GW is two and a bit very large nuclear power stations.

Q44 Rob Marris: What percentage is that of total UK demand?

Marcus Stewart: Total UK demand today is about 50 or 55 GW.

Q45 Rob Marris: That is 12% or 13% of total electricity generation.

Marcus Stewart: If everyone charged at exactly the same time. Studies have shown that behaviours are such that around about 20% charge at the same time. You immediately, without incentivising people, just with normal behaviour, reduce that down to 1.5 GW. If you then apply smart charging incentives, you can reduce that by a further 84%, and that—

Q46 Rob Marris: Hang on—but we still have to generate the electricity. For shorthand, this is just a kind of Economy 7 approach to the issue.

Marcus Stewart: Let's just look at peak for the moment, and then I will talk about annuals. So you move from 7 GW down to 1.5 GW and to around 400. You can see that, very rapidly, the total system has to deliver a lot less when it is under stress, if you move to a smart world. The system is designed to meet those peaks, so you end up with generation outside those peaks being available. That generation is there to meet the demand you have moved from 6 o'clock in the evening to 8 o'clock in the evening, 10 o'clock or whenever. The electricity system from a pipes point of view and a capacity point of view is designed to meet those very high peaks.

By applying smart charging, you can accommodate a lot of electrical vehicles without necessarily having to increase that overall total capacity at a total system level. If you have clusters of demand at a local level, you would expect there to be local reinforcement to accommodate that—fast charging, for example, can provide heavy loads at certain points on a system, but you would connect that to a slightly higher voltage tier to ensure sufficient capacity. The system has the capability to deal with it if the type of charging is smart. The provisions put forward in the Bill make total sense to us.

Q47 Rob Marris: Do you think that the market will handle it, in terms of a tariff regime that incentivises midnight charging, or do you think that there needs to be regulatory intervention by the legislator—to spread that load, literally?

Marcus Stewart: We have seen in the past that people respond to the incentives of charging tariffs—these natural behaviours where people would plug in—but in the first instance the capability needs to be there. The market then has the opportunity to provide the incentives to do that. I do not think it needs to be fully legislated that you must plug in—

Q48 Rob Marris: No, it is not that. I am saying that one way of doing it is regulation over the power supply and to say that you have got to make these incentives available for midnight charging. Should that be regulatory, to bring it about, or do you think the market will do that?

Marcus Stewart: I think the market will do that. Suppliers would look at the cost to them of securing more energy and they would look at the opportunities to trade that off against their portfolios. The market should provide that.

Q49 Richard Burden: Mr Evans in an earlier answer described the purpose of the Bill being to take reserve powers to allow stepping in to stimulate the right kind of infrastructure where the market does not provide it already. May I press you a little more on what that is, and on whether the Bill is hitting the right target? The stress within the Bill is on the provision of charging infrastructure by what it describes as “large fuel retailers.”

A lot of the discussion we have had so far has been about the importance of having rapid availability of charging points, and sometimes smart charging points, in a much more dispersed area than what might be described as large fuel retailers—typically, the motorway service areas. Is the emphasis on that right? If it is not the right emphasis, do those powers need to be applied more broadly? If those reserved powers are applied more broadly, what safeguards need to be in the Bill to ensure that unreasonable regulatory requirements are not put on a whole dispersed range of potential electricity suppliers?

Robert Evans: That is a good point. The powers that we are looking at are primarily around the provision of information to the user, the ability to have smart charging should you need it, and the interoperability. Those sorts of questions are dealt with in the Bill and are key topic areas for the industry. On the question of where infrastructure is located, supermarkets are an interesting one. We have a situation in which not everybody has off-street parking. When one comes to a place such as London, it is not practical to put charging all down London streets. Supermarkets become an extremely practical, pragmatic place for charging to be accessible, along with retail shopping centres, in a crowded city such as London. The consideration of that, along with motorway service areas, which is about allowing people to travel distances across the UK, are two strategic priorities. That is not to say that there are not other areas. The Government have provided incentives for the deployment of infrastructure in other locations and have obviously taken a view that maybe the market can deliver in those locations.

Quentin Willson: However, technology does exist that would allow you to charge at a street lamp post, although admittedly that could be for slow charging at night. For people who do not have parking within their house and have to rely on the street, this facility could be available on every single lamp post in the UK.

Andy McDonald: The whole discussion has been predicated on the basis of saving the planet. What about reducing emissions? In the context of automated vehicles and vehicles generally, it is all about their obsolescence, not about sustainability. Given that we have talked about the updating of automated vehicles and the relationship of manufacturers with the end user throughout the duration, are we missing a trick here? Though there is nothing in the Bill that requires software updates, necessarily there will be that relationship.

Should we not be thinking about a new way of using automated and electric vehicles across the piece? Should we be having people owning vehicles, or should we be making the offer for that relationship to be maintained so that it is a sustainable product that can be revisited? At the moment there is going to be an obligation to keep in touch with these automated vehicles for their lifetime. We heard in earlier evidence that there will come a point where that is cut off. Are we talking about an opportunity for a whole new way of using the services provided by an independent, personal mode of transport?

Quentin Willson: This is the big cycle of change now, like televisions, aeroplanes and the internet. We will see car ownership decline and will be buying or leasing vehicles as a service, not a product. The long-term vision is that this is going to be based largely on electricity and some on fuel cell, and that we will be calling driverless vehicles on our phones to come and collect us. They will then drive to our destinations in what is known as a green way; they will be hooked up and connected to junctions, to the road system and to traffic lights. These zero-emission, automated, self-driving cars will drive in platoons and, it is hoped, eliminate congestion and pollution. That is the superordinate goal, which perhaps is as near as 2040. But it will always be powered by electricity. The whole structure of who owns what is changing. As we are seeing with consumer habits now, they are buying cars on personal contract plans; they do not own things anymore. That is what the long-term future looks like.

Andrew Selous: Beginning with Quentin Willson, we are aware of the 2050 date that the Government have for all cars and vans to be zero-emission. My understanding for why that date was picked is that it is linked to the need to decarbonise the UK. To what extent do you think the legal issues that the United Kingdom is having with air quality at the moment mean that there might be a case for revisiting the speed with which we try to electrify the market? At the same time, I would be interested in your comments on what is happening internationally. I mentioned Norway and China earlier. There are different models and approaches that may not be suitable for the United Kingdom, but I would be interested if you could speak to air quality and the international perspective on these issues.

Quentin Willson: I had a meeting with the Secretary of State for Transport in January to tell him exactly this. The brutal fact of the matter is that possibly only 10%

of consumers in the UK have driven an electric car; the vast majority are still hanging on to what I call the Clarkson effect—all that baggage about electric cars being slow, hopeless and driven by people who read *The Guardian* and hug trees. That has set the whole electrification of UK roads back enormously. We do not have a way of connecting with consumers when it comes to electric cars. We are informed, and the respondents to the consultation are informed, but I have been talking to groups of consumers for the past five years at test-drive events, and you would be surprised how few of them have actually even sat in an electric car.

I believe that there is potential here for the Government, and that is what I told Chris Grayling. I believe that there is potential for us to have national test-drive events whereby people can go to supermarkets, drive electric cars and undergo what I call the transformational moment, the damascene moment, when they get into the car with all their accumulated baggage about how bad it is and how unfeasible for their lifestyle, and then they come out as a completely converted person, who goes on to convert other people. It must be an extremely important part of the Government's strategy to talk to the consumers out there who have little or no faith in the electric car industry and obsess about charging and infrastructure, when actually 90% of all EV drivers charge at home. We must not miss this essential point to move forward and to engage people with the process of electric cars.

Q50 Andrew Selous: I think your thesis is a sound one, but may I press you first on the date and secondly on the international question?

Quentin Willson: We will probably make 2050 if we really pull our finger out. Norway has put incentives behind this and really pushed, but there is a different culture there—there is a culture that embraces change and environmental issues more than we have. Selling electric cars on the basis of environmental issues has not worked in the UK—people are interested only in fiscal benefits. Ours is a different model, and we really need to bring the public with us. If we do that and we make special provision to do this, we will make 2050. If we don't, we won't.

Q51 Andrew Selous: Mr Stewart, did you want to come in?

Marcus Stewart: You talked about carbon emissions, but the other benefit of electric vehicles is in relation to NOx emissions, which have moved much higher up the public agenda. These vehicles offer a solution for cities. That is something that in my mind would accelerate the deployment of electric vehicles, particularly with city Mayors taking a view about what transport should or should not be in their city. We could see 1 million vehicles by the early 2020s, according to our latest set of scenarios, and about 10 million by 2040, if there is the support and the infrastructure and if, as Quentin said, the value proposition for the consumer continues in the direction it is going. I think it is continuing—

Q52 Andrew Selous: May I just press you on the numbers? I am very interested that you refer to 1 million vehicles by the early 2020s. Last September, we had 87,000 ultra low electric vehicles on our roads, so it is quite a leap to 1 million in four or five years' time.

Marcus Stewart: But every manufacturer has an electric vehicle on their plan. Hybrids are bridging the gap. Company car drivers are being incentivised to drive hybrid vehicles because of the tax benefits. A market is developing for these vehicles. They are there or thereabouts from a proposition.

Robert Evans: There are two points I would like to make. The first one is from an industry perspective. We have been pressing the Government to have near-term targets for the increased deployment of electric vehicles. In business, we all work to having three-year plans and having an idea about what happens in the short term—about what is a good aspiration for electric vehicle roll-out. Our infrastructure follows the vehicles at this stage, so we are particularly keen that the Government should set near-term targets for electric vehicle roll-out.

Q53 Andrew Selous: What is your near-term target for, say, 2020?

Robert Evans: We want to cross the 5% mark in terms of total vehicle sales and head towards 10%, but I cannot translate that immediately into numbers.

Q54 Andrew Selous: It is quite confusing to talk about percentages of new car sales. What is that in numbers of vehicles on the roads?

Robert Evans: There are two points here. First, it is easier to set targets for new vehicle sales. Secondly, to return to the air quality point, we want to have electric vehicles in our city centres—be they hydrogen fuel cell or battery electric—because they are zero emissions at point of source. We also need to do something about the vehicles that are already out there with petrol and diesel engines.

There is a subtlety in the Bill, which I would be keen to explore, that relates to vehicle testing. At the moment in the UK we have a regime where vehicles are tested thoroughly and certified to initial standards, but thereafter our inspection and maintenance regime is quite lax, in that it is of a static vehicle with an engine probe up the exhaust.

Quentin Willson: And there is no particulates test whatsoever.

Robert Evans: No particulates. In other countries, such as Australia and the US, they have a much tighter regime on inspection and maintenance. They have particular tests where the vehicle is put under dynamic load and its emissions are measured—one test is called the I/M 240. I want to be sure that in the testing section there is carry-over, so that you retain the power, perhaps under proposed section 65B(3) in part 4 of the Bill, to revisit the nature of emissions testing in service, inspection and maintenance in the UK. You should also look at the MOT for electric vehicles, because what happens as the vehicles get a bit older has yet to be fully formalised. That is a request to the Committee to consider those two points.

Quentin Willson: In the MOT test, the MOT inspector will tell you that, for a car to fail on particulate emissions, it must be impossible to see out of the back window because of the smoke—I am not kidding. This is something that we could really do to help to clean the roads of these very, very smoky old cars.

Q55 Richard Burden: To try to get a more rapid pace of development towards meeting the 2050 target, we have talked about infrastructure as part of that mix and about tackling anxiety—Quentin referred to that—and trying to ensure that consumers are not scared about electric vehicles, which can be good to drive. The third element is, in a sense, disincentives to drive anything other than ultra low or zero emissions vehicles through beefing up the MOT test and whatever.

The other thing is the carrot that goes with that stick. What are the right consumer incentives that could be put in place to encourage the take-up of electric vehicles? Let us face it: at the moment, they are pricey, so many buyers—certainly private buyers—will not be able to afford an electric or other ultra low emissions vehicle. What do you think about the changes there have been in Government policy on that, where measures such as the plug-in car grant have come down rather than gone up?

Quentin Willson: On pricing, the general consensus is that an electric car is probably double the price of a conventional car. That is not broadly the case. What we are not doing enough is incentivising and telling people about used electric cars. Your seven-month-old Nissan LEAF, which started with a list price of £25,000 after the grant, is now available for £13,000. All these electric cars are coming off company fleets and going into the market, and consumers do not realise that that is a really effective way of getting an EV at a low price. If you buy a Nissan LEAF or a Renault ZOE for £6,000, which is possible, that investment is paid back within three years in terms of fuel, maintenance and road tax. It is a really compelling proposition.

Q56 Richard Burden: Is that not a double-edged one? For the market in new electric vehicles to take off, the fleet market will be important to that, and one thing that will be important to it is some certainty over residual values. Therefore, the low residual values at the moment, which might be an incentive to the private car buyer, are a disincentive to the big take-up of new EVs by fleets. Is that fair?

Quentin Willson: But if we have volume, the manufacturers' prices will come down, and they are coming down. If you look at a Mitsubishi Outlander plug-in hybrid electric vehicle compared with a diesel hybrid one, they are the same price. Residuals on things like Teslas and Renault ZOEs are quite good. The market is levelling off, and we will find that prices and residual values start to firm up. Price guides and the motor industry still do not value electric cars properly. We will see a strengthening of residuals as demand increases and a lowering of prices as manufacturers get their volume and their supply up.

Q57 Richard Burden: Perhaps you could answer a question about the idea of Government action on consumer incentives. Is there more that could be done? What should be the targets?

Quentin Willson: There are simple things like free on-street parking everywhere in the UK for electric vehicles, use of bus lanes and some form of priority. The Americans have had huge success with priority lanes for electric vehicles. We need to think about the stuff that you cannot buy, the things that give people an advantage in city centres if they drive an ultra low emission or electric vehicle.

Robert Evans: The other alternative is low emission zones, and we could do that. London's low emission zone, followed by an ultra low emission zone, is the direction of travel that a lot of cities would like to take. They want to do it in a staged format, working to national guidance as to what constitutes the standards you would set for access, so that a motorist travelling in the UK can know whether they can gain access to the low emission zone and the ultra low emission zone as they move from city to city. That is a particularly important activity. It is not covered in the scope of this Bill as such, but low and ultra low emission zones are one of the key ways of incentivising the right kind of behaviour. The second-hand market is incredibly important, and it makes those vehicles more accessible.

Company car taxation is a particular favourite that helps to drive electric vehicles into a market where others would not. The lightbulb has gone on with fleets. Previously, they would operate a diesel-only policy. "You never got sacked for buying IBM," was the traditional term, then, "You never got sacked for buying diesel," and that has now switched. They can see that the motor industry is not going to support that in the long term and that they need to make a change. They are now embracing what they can see is the future that they need to have in their fleet.

Quentin Willson: Any benefits in kind that the Treasury can keep going must be kept going if possible. The plug-in grant has been really significant.

Q58 Tom Tugendhat: Forgive me; in relation to the cycles that we are talking about in introducing new technology, as you correctly identified, Quentin, the way we are going is towards transport as a service rather than as an item. If that is so, then presumably automatic vehicles will, rather like those vacuum cleaners you get in homes, be able to drive themselves to a car park somewhere, charge themselves up during the downtime and come back out again, at which point we are talking about investing an enormous amount of public money into an infrastructure system that will, within 20 years—you were referring to 2040—be redundant. That is quite a short timescale for large-scale infrastructure investment to be redundant.

Quentin Willson: But that infrastructure investment will also be used for this new breed of autonomous cars, because they will all be plug-in. They will all be electric.

Q59 Tom Tugendhat: But presumably they will be plugging themselves in, rather than the current vehicles that require somebody to get up, pick up a wire and stick it into a vehicle.

Quentin Willson: I do not think that is a given at all. You will still have to have manual interference in that process, unless we can get to the stage where we have automatic wireless charging in the roads. To wait for that to come—

Q60 Tom Tugendhat: I am not sure that is necessarily to come. It is not beyond the wit of man to imagine that a car pulls up into a dock, and a little arm goes out. That is not the structure that we are intending to build right now.

Quentin Willson: That is further away than you think. We would have to have a commonality of autonomous cars, and somebody will own these autonomous cars and there will be charging stations. They will broadly resemble the ones that we are lobbying for now. This vision of the arm that comes out and charges your pod, if you like, is still some way away.

Robert Evans: Inductive charging has been referenced today: charging along the motorway as a form of dynamic inductive charging. Static inductive charging is when you drive over a pad and that pad is then able to charge your vehicle. The groundworks for all the current charge points can potentially be adapted to deploy inductive charging, as that starts to come through into the market. I do not think that is so much of an issue. We do not assume that what we deploy as charge points now will be as is in a 20 or 30-year timeframe; they are going to be updated over time as suits the vehicles coming to market.

Quentin Willson: As we are doing now, in effect.

Robert Evans: As we are doing now, yes.

Q61 Tom Tugendhat: What would you change in the Bill to make sure that that level of infrastructure change is more active?

Robert Evans: I do not think it is necessary to change the Bill, in the sense that as the vehicles start to come forward, the charge point infrastructure suppliers will start to bring forward commercially available inductor charging. At the moment, we talk about people having that in their garage for particular vehicles, but at the moment those are not inductive vehicles, other than, say, for some bus operations and the like. It is early pre-commercial.

Q62 Alan Brown: Is the technology used to operate autonomous vehicles safe and reliable at present?

Quentin Willson: That is a difficult question. Where do we begin? There have been some very successful trials of autonomous vehicles in America and Europe, and they have collectively driven many millions of miles with an infinitesimal amount of accidents. Significantly, they have driven in traffic. In Los Angeles, Nissan, Toyota, Lexus and Volvo have had great success in driving autonomous cars in traffic, which have mixed in successfully.

However, it would not be fair of us to say that there is not a great challenge. Ironically, the challenge comes probably not from autonomous cars themselves but other road users, some of whom may just think, “I’m going to have a go here.” All of the insurance legislation needs to be sorted out, but we need to absolutely understand that there will be a period of some pain. More than that I cannot give you.

Robert Evans: It is a tremendous opportunity for the UK motor industry. The industry has sought to progress and be competitive around new technologies, with low-carbon vehicles being one and connecting and autonomous vehicles being another. We have a series of projects in the UK—with both technology development and now with funding set aside in the Budget for demonstration locations—to be able to work through, understand the issues, and test and understand the state of development of the technology. There is something like 1 million lines of software involved in making a vehicle have the

artificial intelligence to be able to progress. It is one thing to go down the motorway at high speed with clear lines; it is completely different to go down Fulham Road at 7 o’clock in the evening on a very busy day. There is a lot of work still to be done.

The good thing about the Bill is that it is the first time that automated vehicles have figured in UK legislation. This is the beginning of a process that makes the UK a potential lead market for the deployment of this technology. It will be hugely beneficial for our motor industry if we are able to be receptive and responsive to what we can all see will deliver huge value societally, in terms of reduced accidents or the ability of people to move when they are older or infirm, or younger people who cannot drive vehicles. There could be huge benefits to society, and this at least starts the process of making the UK ecosystem autonomous vehicle-friendly.

Quentin Willson: And to create literally tens of thousands of jobs, bring billions—that is not an exaggeration—of investment to the UK, and a new product cycle and a new consumption and production. We should be the world leader in this stuff.

Q63 Alan Brown: On roll-out and testing, is further testing suggested? One of the suggestions made on Second Reading was that the vehicles have not been tested in snow conditions yet, and there was a suggestion that different weather variables may need to be looked at. Robert gave the example of a busy Fulham Road at 7 o’clock at night. One example I gave on Second Reading was the single-track roads in Scotland, on which, if two vehicles drive head-on, somebody has to make the decision to back up to the nearest layby. Are there things like that that still need to be robustly looked at?

Quentin Willson: I am afraid I am not an expert in this autonomous technology, but there will have to be algorithms that can solve that and there will certainly have to be a testing regime.

Robert Evans: For connected and autonomous vehicles, there is now funding set aside for a series of demonstrations of different types. Those will reflect the real world as well as the virtual world in which the technology will be speedily developed before being put out into controlled demonstration environments and, ultimately, on to the open road. The UK is well placed, with activities and the announcements in the Budget, to do the preparatory work and the learning to make the UK a receptive environment for these vehicles to be deployed in and to deal with exactly the type of use cases you referenced.

Quentin Willson: However, it is possible to say that with autonomous vehicles you might even reduce the amount of accidents in the UK, because it is 90% human error. The 2,000 fatalities we have in the UK on our roads a year have plateaued and are due entirely to people making mistakes. If we put this technology in, that death toll could conceivably come down significantly.

Q64 Mr Hayes: It is good to hear you make the case for us being pre-eminent in this field. The Government are certainly determined to make this country a world leader. Returning to the issue of infrastructure, what are your views on on-street charging infrastructure? We spoke a bit about petrol stations, service stations, supermarkets and so on. Other places—Paris is a good

example—have done quite a lot of work on spreading on-street charging infrastructure quite evenly across the city. What more could Government do on that?

In that spirit, what about the design of these charging points? Governments have not been entirely hopeless in past decades on that—one thinks of the Gilbert Scott telephone box, the Belisha beacon or the post box. In recent years it has perhaps been not so good, but we can do good things. Should we think more about the design of the charging points and what they look like, to make them instantly recognisable, iconic and widely respected and admired as such?

Quentin Willson: There is a powerful argument for making them iconic as part of this new and very important cycle of change that will make our lives better. In Bordeaux, they have a proliferation of on-street charges because they have a fleet of little electric cars that you can just go up and hire for the day, the hour or the quarter of an hour and then return to a little charging pod. It is a huge investment, but it works extremely well, and of course it limits the amount of traffic coming into cities because those cars are available. It would benefit us hugely if we started to think about urban car club schemes that are just electric cars and the proliferation, as with the Boris bikes, of a recognisable charging pole on the street. It would also help all those people who do not have parking to charge their cars.

Robert Evans: Members of the association take the view that they can produce an iconic charge point that is recognisable as their own brand. They have been in that business and have tried to make the best use of their equipment and make it as attractive as it can be. In the UK, we have quite a dynamic market for the supply

of infrastructure. We now are learning that the major US supplier, ChargePoint, is looking to bring its technology into the UK market. We have had BluePoint, which is the Bolloré scheme, and others. They will bring what they view as the norm in their markets into our markets.

Quentin Willson: We could have a competition, could we not?

Robert Evans: We could, but I think there would be a resistance among the industry to effectively move to one standard shape of pole. You have a post and you plug into it, but the innovation is occurring in the way you access it. That is more about people using smartphones to input information and say, for example, “I want to charge for this period. I’m prepared to pay this. I might be prepared, if you incentivise me, to allow my vehicle to have managed charging, as long as it has so many kilowatt-hours in it by the time I come back.” That type of interface is where there will be a lot of innovation. The poles themselves work to pretty standard methodologies, and motorists are used to using them. The clever bit in the design will be about the user interface on the smartphone app that enables smart and managed charging.

The Chair: Mr Baker, I fear we are now running out of time and so cannot get you in. May I thank our three witnesses for their extremely useful and interesting evidence? I am sure it will help to inform Committee members better in their consideration of the Bill later this week.

11.25 am

The Chair adjourned the Committee without Question put (Standing Order No. 88).

Adjourned till this day at Two o’clock.

