



Mobility • Safety • Economy • Environment

## **RAC Foundation's Response to the Business, Energy and Industrial Strategy Committee inquiry into the role of electric vehicles in the transition to a low-carbon economy and as part of the Government's Industrial Strategy.**

**April 2017**

### **1. Introduction**

1.1 The RAC Foundation is an independent transport policy and research organisation which explores the economic, mobility, safety and environmental issues relating to roads and motoring. The Foundation carries out independent and authoritative research with which it promotes informed debate and advocates policy in the interests of responsible road users.

1.2 The Foundation is supportive of the development of electric vehicles (EV) and other alternatively fuelled vehicles that help improve air quality and reduce greenhouse gas emissions.

### **Response to questions**

### **2. What are the key barriers to development of the UK's electric vehicle market**

2.1 Taking the "UK's electric vehicle market" to include both pure battery electric (BEVs) and plug-in hybrid (PHEVs) power trains, the Foundation believes that key barriers fall into four main categories: (i) Retail, (ii) Range, (iii) Recharging and (iv) Residual value;

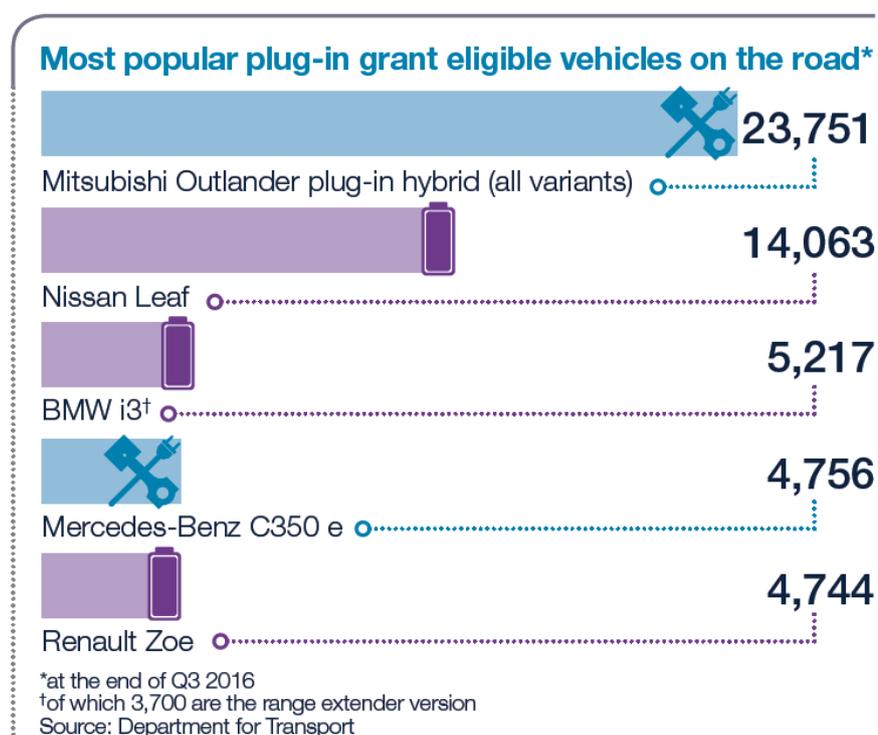
#### **(i) Retail**

2.2 There are two key factors here: the range of EV models available in the showroom and their price relative to conventionally fuelled models. The price of most BEVs, and to a smaller extent PHEVs, is still noticeably higher than their nearest internal combustion engine (ICE) equivalents. The RAC Foundation tracks the number of plug-in grant eligible

vehicles that are on the road in the UK<sup>1</sup>. Figure 2.1 shows that the two most popular plug-in grant eligible vehicles are the Mitsubishi Outlander PHEV and the pure electric Nissan Leaf. The list price of a Nissan Leaf starts at £16,680 excluding the battery. With the battery cost included then the price rises to £26,180, falling back to £21,680 after the government grant of £4,500 is applied<sup>2</sup>. Although there is no conventionally fuelled Leaf, a broadly comparable vehicle such as the Nissan Note starts from a list price of only £11,135 – a Nissan Leaf cost almost twice as much as a Nissan Note<sup>3</sup>. Although it is the second most popular plug-in grant eligible vehicle, the number of Nissan Leafs on the road is only 59% of the number for the Mitsubishi Outlander PHEV.

2.3 By comparison, the Mitsubishi Outlander PHEV list price starts from £31,749 (which includes a £2,500 grant) with a comparable diesel version starting from £27,814<sup>4</sup>, a gap of £3,935.

**Figure 2.1: The most popular plug-grant eligible vehicles on the road in the UK at the end of Q3 2016**



Source: RAC Foundation, ULEV Factsheet (Feb, 2017)

2.4 Turning to the range of choice of electric vehicles, at the end of Q3 2016, 45 cars and vans were or had been eligible for support by the plug-in car and van grants, 37 of which had more than 1 vehicle licensed on the road. This is up from the end of Q3 2015, when only 39 vehicle models were or had been eligible for the plug-in grants with 30 different models having more than 1 vehicles licensed on the road. Go back a year

<sup>1</sup> RAC Foundation 2017

<sup>2</sup> Nissan 2017a

<sup>3</sup> Nissan 2017b

<sup>4</sup> Mitsubishi 2017

earlier and there were 34 vehicle models with 23 having more than 1 vehicle licenced on the road<sup>5</sup>. Currently there are now over 50 plug-in cars, vans and motorcycles eligible for government grants<sup>6</sup>. In February 2017 the UK Automotive sector displayed 26 alternatively fuelled vehicles in London to demonstrate that growing diversity and attractiveness of these vehicles<sup>7</sup>.

2.5 So, the number and variety of EVs is rising year-on-year, but still only accounts for a relatively small fraction of the total product ranges of manufacturers who have tuned their market offer to accommodate the wide range of specific needs and desires of their customers.

(ii) **Range**

2.6 Range anxiety - the worry that an electric vehicle will deplete its charge before reaching a destination or charge point - remains a concern for potential purchasers and is exacerbated by concerns over the adequacy and convenience of charging infrastructure. A recent YouGov survey commissioned by the SMMT showed that the most common reason cited by UK adults for not buying an electric vehicle was charging infrastructure worry<sup>7</sup>.

2.7 On range, it is clear that battery vehicle technology is improving. The new Renault Zoe Z.E 40 has an NEDC<sup>8</sup> range of 250 miles, a significant increase from 130 miles the previous iteration of the vehicle was capable of achieving<sup>9</sup>. Renault say that the new Zoe has a real world estimate of up to 186 miles compared to approximately 80 achieved by the previous version.

2.8 Also relevant here is the rise of PHEVs. At the end of Q1 2014, PHEVs only made up 26% of all plug-in grant eligible vehicles on the road. At the end of Q3 2016, PHEVs made up 57% of the number of plug-in eligible vehicles on our roads (see Figure 2.2), which suggests that purchasers' range anxieties can be soothed with the comfort blanket of a conventional ICE motor on board.

2.9 There have been moves to improve the coverage and availability of charging infrastructure; domestically, in publicly accessible locations and at business locations – see below. Perhaps most relevant to the issue of range is the availability of charge points on the Strategic Road Network (SRN). In the 2014 Autumn Statement the Chancellor committed £15 million to ensure that by 2020-21 drivers in England are never more than 20 miles from a charge point on the SRN. RAC Foundation research

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<sup>5</sup> Calculations made by RAC Foundation based on DfT vehicle licencing data

<sup>6</sup> DfT 2017

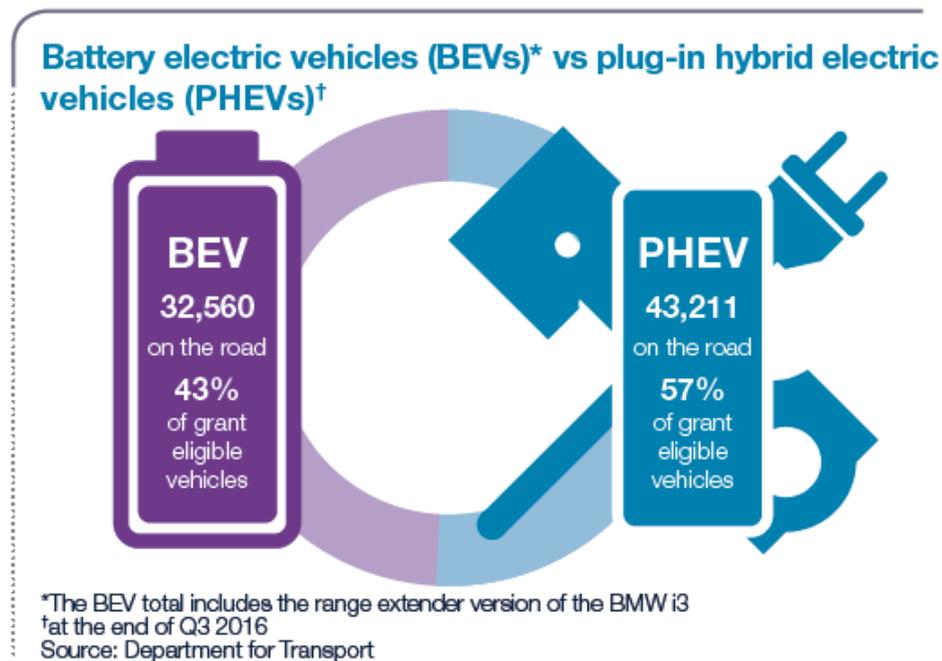
<sup>7</sup> SMMT 2017

<sup>8</sup> The New European Driving Cycle (NEDC) is a system designed to assess the emissions and fuel economy of passenger vehicles.

<sup>9</sup> Renault 2017

showed that, at the beginning of 2016, 82% of the SRN in England and 98% of all motorway roads in Great Britain were already within 20 miles of charge point<sup>10</sup>. While this might help, it is likely that consumers will need to see extended range across the EV fleet before their concerns subside.

**Figure 2.2: BEVs vs PHEVs on the road in the UK at the end of Q3 2016**



Source: RAC Foundation, ULEV Factsheet (Feb, 2017)

### (iii) Recharging

2.10 There are currently three broad choices in regards to where to charge a BEV or PHEV vehicle; at home, at work or to use a public charging network. A survey of EV users in October 2016 showed that 80% had access to a charger at home but only 25% had the ability to charge at their workplace<sup>11</sup>.

2.11 For people with off-street parking, home charging can be a convenient option, indeed, trickle-charging a battery overnight can even be an attractive alternative to the need to visit a conventional refuelling station. But many properties do not benefit from off-street parking, or have allocated parking (e.g. in apartment blocks) some way distant from their own home mains supply. This puts more emphasis on the need for adequate public charging infrastructure.

2.12 A Zap-map (the UK's leading EV charge point platform) survey of EV drivers showed that 90% use public charging infrastructure and over two thirds use a public charge

<sup>10</sup> RAC Foundation 2016

<sup>11</sup> Zap-map 2016

point at least once a week, despite the majority having access to home charging<sup>12</sup>. It is unknown if EV users also use charge points as dedicated parking.

- 2.13 As of April 2017, there are just over 4,300 charge points in the UK providing almost 12,500 connectors from which a vehicle can charge<sup>13</sup>. An RAC Foundation in-depth study of the Scottish public charge point network (ChargePlace Scotland) found that in August 2016 that 75% of the public charging network was used at least once compared to 55% three year earlier<sup>14</sup>. These numbers would suggest that the current level of public charge point provision may be sufficient to support some limited growth in the market, but currently falls far short of what would be needed to support a mass take-up.
- 2.14 However, the current public charging system also leaves much to be desired when it comes to ease of use, burdened as it is with multiple types of plugs and sockets and multiple different charging networks with bespoke payment systems and pricing regimes.
- 2.15 This situation is not helped by the limited information available on charge point location and availability (i.e. whether the charge point is working and whether it is already occupied). Even using a rapid charger, an electric vehicle is likely to remain at a charge point for at least 30 minutes - ChargePlace Scotland usage data in August 2016 suggests that the average charge duration at a rapid charge point (43/50kW) was 47 minutes, almost 6 hours for 22kW charge points and almost 10 hours for 7kW charge points. Charge point locations should have appropriate rate of charging given their location and use. Data analysis of historical usage will be valuable in aiding the location of suitable charge points
- 2.16 Evidence from the Electric Nation<sup>15</sup> trial suggests that electric vehicle home charging is likely to increase electricity demand in evening peak hours and that smart home charging systems will be required in the future. The implications for the electricity grid of a growing UK electric vehicle market supported by public charging capacity is unclear, but is likely to involve significant investment.
- 2.17 The Government currently offers business, charities and local authorities support to install charge points through the Workplace Charging Scheme. The scheme allows organisations to claim up to £300 per socket up to a maximum of 20 sockets<sup>16</sup>. There is scope for this incentive to be tied in with company car schemes which also incentivise the choice of ultra-low emission vehicles, and with company fleet vehicles.
- 2.18 A key issue both for public and for workplace charging infrastructure is the rate of charge available. Whilst standard or 'trickle' charging might be appropriate for domestic

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<sup>12</sup> Zap-map 2015

<sup>13</sup> Zap-map 2017

<sup>14</sup> Makwana 2016

<sup>15</sup> Electric Nation 2017

<sup>16</sup> OLEV 2017

charging overnight, or commuter vehicles that are parked for the length of the working day/shift, there is a convenience angle both in terms of charge points being occupied for long periods and for those who need intermittent access to their vehicle during the day. In August 2016, 42% of all charging sessions within the ChargePlace Scotland network took place at rapid chargers despite the fact that rapid charge points only made up 18% of the total number of chargers. Workplace Charging Schemes clearly need to weigh these factors when deciding the most appropriate approach.

2.19 Meantime, the challenge for the electricity grid is the drain on the system made by rapid chargers – the deployment of rapid charge technology will need to involve the electricity network provider to guard against overload.

#### **(iv) Residuals**

2.20 The novelty of EVs has been a factor in contributing to their relatively poor residual values – early models with limited range have depreciated rapidly compared to conventionally-fuelled cars. This issue is also affected by concerns regarding battery longevity and cost. Manufacturers have sought to offer alternative approaches, including separate leasing deals for batteries, but the uncertainty over battery performance in the medium to long term continues to be a worry.

### **3. Does the Government’s Industrial Strategy sufficiently address the challenges and opportunities for electric vehicles?**

3.1 The key pillars to the Government’s Industrial Strategy relevant for addressing the challenges and opportunities for electric vehicles are: investing in science, research and innovation; developing skills; upgrading infrastructure; and the delivery of affordable energy and clean growth.

3.2 These pillars focus on increasing the UK’s research and development in key areas such as the development of battery technologies (including energy storage), developing technical skills, improving infrastructure which includes digital investment and the opportunity to implement smart energy systems. These are all relevant to the adoption of EVs.

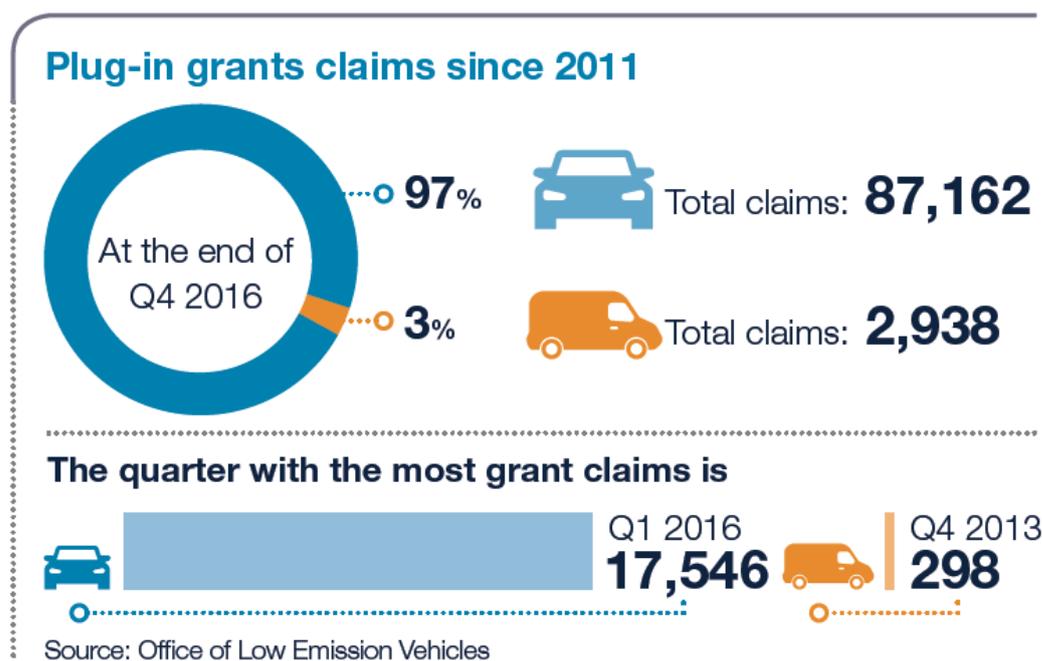
3.3 The key thing, rather than adding more into the Industrial Strategy itself, is to ensure that the Low Emission Vehicle Strategy adequately complements the Industrial Strategy in addressing the issues we set out in section 2. Others (such as the SMMT) will be better placed to respond on the seizing of the industrial opportunity for GB plc.

#### 4. What support for purchase cost should the Government provide after 2018, in response to the changing cost of electric vehicles

4.1 All the time that BEV and PHEV vehicle purchase costs remain relatively expensive and suffer relatively high depreciation there will be a case for continued Government support, though it will be important to see from the new car registration numbers and take-up of the existing grants whether grants at current levels are high enough to persuade consumers to take the electric option. Based on the current trajectory it seems likely that further Government support will be warranted post 2018.

4.2 Figure 4.1 below shows only 3% of plug-in grants claimed at the end of Q4 2016 were for the plug-in van grant. A key issue for Government, and for the future of any grant scheme, is what vehicles manufacturers bring to market. Current concerns over urban air quality would suggest a strong case for encouraging electric propulsion for buses, taxis, private hire cars and vans, but the absence of vehicles – particularly medium-sized vans with adequate carrying capacity – can be at the root of limited take-up.

**Figure 4.1: Plug-in grants claims since 2011, at the end of Q4 2016 in the UK.**



Source: RAC Foundation, ULEV Factsheet (Feb, 2017)

4.3 Given the concerns raised in regarding infrastructure demands, the Government should also consider that support towards purchase is most helpful if matched with support for installing home charging equipment and/or charging facilities at the workplace.

**5. How best can the Government ensure that there is consistent provision of charging infrastructure across the country**

- 5.1 There is clearly a role for national Government to work with local authorities both on the location of on-street charge-points, on charging facilities in off-street car parks, and on planning requirements for new homes and business premises. More work is needed to establish exactly what a consistent and adequate level of provision looks like.
- 5.2 We support the measures in the Vehicle Technology and Aviation Bill which would give the Government powers to require motorway services and large fuel retailers to provide charge points, ensure data regarding availability and location of charge points becomes easier to obtain, and make it easier to use multiple charging networks.

**6. Is the Government's road transport decarbonisation strategy sufficiently flexible to potentially disruptive market trends such as driverless cars? How might these impact requirements for, and use of, charging infrastructure?**

- 6.1 It is, of course, too early to predict the trajectory for the driverless car, or any other, as yet unforeseen 'disruptor'. There is clearly a risk that too much focus is put on plug-in recharging when it is possible that inductive charging or hydrogen power start to look like more attractive alternatives. The best that Government can do is keep a close 'weather eye' on these potential 'disruptors' and be ready to change tack if need be. But for making reasonably rapid progress we would currently endorse the focus on plug-in technology.
- 6.2 It is worth noting that EVs are not the only form of ultra low emission vehicles. The Government has traditionally taken a technology neutral approach and the role of other ultra low emission vehicles technology, such as hydrogen, should also be considered.
- 6.3 As for the impact of driverless cars, the best we can venture today is that they will need to be zero emission vehicles and they will need to be charged somewhere. It seems unlikely that even on the most ambitious scale we will end up with wholesale redundancy of charging equipment.

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