A month of electric driving

Are we nearly there yet?

By Dr. George Beard



Through my work at TRL I have been researching electric vehicle adoption for over half a decade. Notable projects like <u>CVEI</u> (Consumers, Vehicles and Energy Integration), Electric Nation, an exploration of the <u>acceptability</u> of smart charging for Citizens Advice, and a feasibility study for the DfT and OZEV on using <u>behavioural</u> insights to accelerate adoption, have all contributed to the growing evidence base on why some people and businesses have switched to electric vehicles, and why some haven't.

The size of the former group is continuing to grow in the UK – latest figures from the DfT show that at the end of March 2022 there were a bit over 840,000 plug-in vehicles, consisting of about 58% battery electrics and 40% plug-in hybrids, plus a small number of range extenders.

That's a 70% increase in EVs compared with 12 months earlier and an almost three-fold increase from 2020 figures. Some impressive growth - yet this still remains a rather small drop in the ocean when considering the entire 40 million strong vehicle parc; as it stands, just 2% of the UK fleet is electric. We must not, of course, kid ourselves into thinking that a straight like-for-like swap of combustion engine vehicles to electric-powered vehicles represents success. Indeed, we don't actually want to end up with 40 million (or more) electric vehicles on the roads in future; we need many fewer vehicles in total, used for many fewer miles, with the vast majority of journeys catered for by a network of active, shared and zero emission mobility options. Whilst EVs are certainly not a panacea, they are an important part of the mix of solutions, and it is clear there is still more work to be done if we are going to decarbonise transport.

Findings from TRL's research into electric vehicle adoption and use, along with much of the other published literature on this topic, can largely be boiled down to reveal three core barriers to adoption of electric vehicles:

- · Range
- · Purchase price
- Charging infrastructure



1. Range – 'You can't drive very far in an electric car'

This was a significant issue in the early days of EV. According to one article in 'Inside EVs', the median range of EVs in the US was less than 100 miles in 2015 but 250 miles in 2020. In the CVEI project we provided a sample of mainstream consumers with first-hand experience of driving EVs; the VW e-Golf which at the time had a maximum reported range of 186 miles. Whilst overall attitudes to EVs were positive, and experience with the EV improved likelihood to adopt one in future, we found consumers would be most likely to go electric if the vehicles had ranges of at least 200 miles and ideally 300 miles. Today, there are plenty of vehicles available in this <u>bracket</u>. Whilst consumer perceptions of range (and the 'range anxiety' caused by this) still likely plays some role in discouraging adoption by some, I think it is safe to argue we have now largely addressed the technological challenge of offering consumers cars with practical electric ranges suitable for daily use (at least in most cases).

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This latter barrier was a particularly salient issue for me to overcome in my own journey to EV adoption, since I am unable to charge at home and I therefore knew I would be entirely reliant on public (and work) charging infrastructure. I live in a semi-detached house with no driveway or garage. Parking is limited to on-street only – non-reserved, non-permit parking. In fact it is a 'dead-end' street which means no through-traffic, vehicles nor pedestrians. Generally speaking each household parks their vehicle(s) directly in front of their house with no fuss or

2. Purchase price – 'Electric cars are too expensive'

The second barrier is price. Generally speaking electric cars have been, and remain to be, the more expensive option to purchase compared with equivalent internal combustion engine variants. Taking VW as an example, the ID.3 Life 58kWh is listed at £36,195 compared with the Golf 8 Life 1.0 TSI Petrol for £25,340. Yes, there are the reduced running costs to consider with electric, and yes consumers should be thinking about the Total Cost of Ownership (TCO) not just the purchase price – but the challenge is that the purchase price is so darn salient. That is the thing that hits you in the face - 11,000 thousand pounds extra to go electric is a big deal (albeit I realise the ID.3 vs. the Golf is not completely like-forlike, but it illustrates the point). That said, the situation has improved greatly over the last 5 years and some predict price parity will be reached soon.





3. Charging infrastructure – 'There is nowhere to charge an electric car'

The last of the barriers, but by no means the least, is the availability of charging infrastructure. In an early market where the majority of EV owners/drivers live in houses with off-street parking, the majority of charging needs can be met through home charging and so public charging infrastructure is less critical. To accelerate adoption though, and to really build consumer confidence in electric vehicles, robust, visible and widespread charging infrastructure is essential. This is a recognised need; the government has committed to a <u>'ten-fold</u>' increase in public chargepoints by 2030. The state of the market is certainly improving, but there is more to be done. Whilst technological leaps by vehicle manufacturers have largely addressed 'range anxiety', 'charging anxiety' remains a big issue.

bother. As such, I could, in theory, install a chargepoint on the front of my house, and easily stretch the cable across the front garden to the side of the pavement where my car is usually parked. Being a dead-end street, there are very few (if any) passing pedestrians meaning the risk of creating a trip hazard is very low, and one which in my mind I could reasonably overcome through use of a cable cover. Problem solved? Sadly not — if I were to do this it would contravene section 149 of the Highways Act 1980, constituting a nuisance and hazard to others. There have been some

great innovations in this area, for example 'gulleys' in the footway to tidy cables away, lamp-post chargers, kerbside chargers and so on. Unfortunately, it seems I have essentially no influence over whether such things are installed on my street, other than 'expressing interest'. The local council has informed me that they ''intend to apply for funding to the On-Street Residential Chargepoint Scheme'' but they were not hopeful anything could be provided in less than 12 months. So that puts a plug in that one then.

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Despite my failed efforts to enable athome (or at least near-home) charging, I decided to bite the bullet, overcome my 'charging anxiety', and become an EV owner (or leaser, more accurately). After a long wait and several delays, my shiny new electric car was delivered at the start of August 2022. Literally the first words the delivery driver said to me after getting out of the car were "Do you know about these electric vehicles? The range is a nightmare'' (see Barrier 1 above). It was a hot day and he was complaining that the AC reduced the range of the battery. Still, he had made it from the Midlands to Berkshire without needing to stop for a charge - so I considered that a win.

60 miles' range...

The car was delivered with 25% SOC giving approximately 60 miles of range. So for my first outing I decided to drive to my local Tesco for a top-up. This particular supermarket has four Pod Point chargers which are available to Tesco customers to use, for free (for 2 hours at a time due to parking restrictions). Upon arrival at Tesco I found 3 of the 4 chargers occupied – 1 available, hooray!

I proceeded to download the first of what was to become a plethora of apps. I created a new account. I validated my email address. I added a payment method. Finally, I plugged in the car. The app then reported that the socket is 'offline'. Good start.

"Nevermind", I thought, there are some other chargers in town I could use. Since I was at Tesco, I did some food shopping so as not to waste the trip. No harm done.

Onto the next venue – a local leisure centre with a multi-storey car park and a bank of chargepoints by BP Pulse. Five chargers, nine sockets, and all available, good news. All the chargers had lights on them, seemingly promising, but the only instructions available said "Touch 'RFID' card for 2 seconds". I didn't have an RFID card. There were no buttons or other instructions anywhere to be seen on the chargepoints or nearby. In the hope that it would help, I proceeded to download my second app of the day – BP Pulse. I created a new account. I validated my email address. I added a payment method. The app told me all the chargepoints were 'out of service'. No explanation offered. No suggested remedy. A helpline number was posted on the chargepoint itself, which I tried calling but after waiting on hold for 5 mins I gave up.

Two failed charging attempts later, I drove home. Not a great start to my new life as an EV driver. Fifty miles' range left.

50 miles' range...

A new day comes and I awoke determined to top-up the battery whilst minimising impact on family plans. I decided to take my son to a local play park and nature reserve about 10 mins drive away, which I happened to know has chargepoints available in the car park. I got to the park, and all the chargepoints were unoccupied - happy days. I downloaded my third EV charging app - VendElectric by Rolec. I created a new account. I validated my email address. I added a payment method. I'm familiar with this routine now... I selected the designated chargepoint in the app, and I plugged in the car. Could it be? Yes success! Green lights all round and the car was finally charging. I breathed a deep sigh of relief. A few hours of playing, exploring, eating cake and drinking tea and I returned to the car with a bit over 100 miles of range - great stuff.



On the way home from the park I decided to try to continue my luck and went to a rapid charger in a local council car park which is available to the public. The charger is about 10 mins walk from my house, so I decided to park there, plug-in, walk home, and return to the collect the vehicle later once it was at 100%. The facility has one rapid charger with three tethered connectors (2 x CCS and 1 x CHAdeMo) but two EV parking spaces. One of the spaces was in use - another family with a young child. I pulled into the one remaining empty space and prepared myself for the now familiar ordeal. Happily though, I discovered this chargepoint is operated by one of the apps I already had – VendElectric, round two. Familiar with the app, I selected the corresponding chargepoint, plugged in the car, and hey presto – electric energy was hurtling in at a rate of 50kW. Feeling chuffed, I said a friendly hello to the other family who seemed to still be struggling to get their charge to work. It transpired however that the rapid charger is only able to charge one vehicle at once - that vehicle, being mine.

Charge theft!

I felt terrible! I had come in second and stolen their charge. Despite repeated offers to stop my charge, they kindly said to leave it and instead went on their way, luckily they had enough charge for the time being. Amidst my apologies and guilt I couldn't help but think this was a completely idiotic design - there are two clearly marked EV bays in front of this charger – why on earth would you mark two bays if only one vehicle can charge at once? Maybe you can do one CCS and one CHAdeMO simultaneously? I'm sure someone will tell me the technological reasons why two charges wasn't possible, but the reason is frankly irrelevant. As a piece of basic human factors, it is shocking. Humans need simple messaging. Don't con us into thinking we can do something when we can't – it leaves a sour taste.



I have painted a rather negative picture of EV ownership so far. In fact, that is not the experience I have had on the whole. The vehicle itself is a joy to drive, smooth, quiet, relaxing. I have also now settled into a fairly regular weekly/fortnightly charging routine using the Rolec chargepoints at TRL's head office in Crowthorne, Berkshire. The experience here has been faultless – a simple fob activates the chargepoint, you press one button, and plug the car in. Job done. There is no app to download. The instructions are clear. It just works.

There is one last poor customer experience to add to the list, however. Incidentally, at the same play park/nature reserve I mentioned earlier, there are two sets of chargers. Two operated via the VendElectric app, and two operated by Flowbird. In the case of the former, you have to pay for parking separately, but with the latter – parking is included in the cost of charging. Another great example of confusing messaging for consumers! What is going on? Because of this mix of systems, the car park management has posted paper signs in front of the respective chargepoints trying to stop people from inadvertently paying for parking twice, or not paying for parking at all and getting a fine. Why are two different systems being used for one medium-sized car park? No part of this provides a good customer experience.

Working in the industry, I can tell you these experiences are very typical. In fact, when my wife and I were discussing whether or not we should make the switch to electric, I felt a duty to warn her about such experiences. "We will be inconvenienced at some point", I said, "There will be many times when the technology just won't work". Now, one month into electric driving and we have already had what feels like a fair share of terrible customer experiences, but this won't be the end of it.



I am still waiting for the day when the charging cable gets stuck in the chargepoint and we will have to make a choice between leaving our cable stranded and continuing our journey, or waiting for help.

What can we conclude from all this? Well, that this is not good enough. Why should consumers have to accept inconvenience as a compromise for a more sustainable option? Surely we can do better than this? Yes, the market is still fairly young, but a lot of this is really basic stuff. There really is no excuse now for poor customer experiences. Much of the sector has demonstrated that it is possible, in fact, to deliver fantastic experiences – with many great chargepoint manufacturers and operators installing simple, easy-to-use chargepoints which just work. While this shiny new stuff is great, and we need more of it, we can't paper over the cracks that already exist. If we are going to convince more people to ditch fossil fuel vehicles, more must be done to address the poor guality kit which is already out there, and it must be done as rapidly as possible.

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George's background is in psychology, human factors, research methods and statistics. George leads studies of road user attitudes and behaviours to understand how to encourage greener travel whilst also ensuring transport is safe and accessible for all. George is a Chartered Member of the British Psychological Society, and a member of the International EV Policy Council.

