About Energy UK

Energy UK is the trade association for the GB energy industry with a membership of over 90 suppliers, generators, and stakeholders with a business interest in the production and supply of electricity and gas for domestic and business consumers. Our membership encompasses the truly diverse nature of the UK’s energy industry – from established FTSE 100 companies’ right through to new, growing suppliers and generators, which now makes up over half of our membership.
Introduction

The Electric Vehicle Revolution is the first of a series of reports from Energy UK on electric vehicles. This report highlights opportunities created for the energy sector by electric vehicles and how the UK as a whole can benefit from a mass uptake, provided that the right policies and partnerships are made now across the transport and energy sector, with both Government and the relevant regulators. With over 105,000 electric vehicles on UK roads in July 2017, approximately 600 million UK vehicle miles per year are now powered by electricity. Recent research has shown that the increasingly decarbonised energy supply has resulted in fuel for electric vehicles being even cleaner than before, using around half the CO2 of the cleanest non-electric car available. The Government’s ambition to ban the sale of petrol and diesel cars in the UK by 2040 means that collaborative working is now even more vital to meeting our shared goals for the UK, but, with the right framework from government and a collaborative approach from industry, there is scope to go much farther and faster.

The energy industry is committed to working in collaboration with other sectors and with Ministers to develop a clear strategy to support holistic decarbonisation, encouraging sustainable supply chains and providing certainty for consumers, investors and industry. This report presents a number of recommendations from Energy UK’s Electric Vehicle Working Group. This group was established in 2016 to provide a forum for the power sector to consider opportunities and challenges created for the energy system by electric vehicle uptake. The Working Group has established relationships on smart charging solutions with the automotive and technology sectors and energy networks, as well as with the Department for Transport and Office for Low Emission Vehicles. Energy UK will continue to work towards a collaborative solution to this issue, but would like to see even greater cross-sectoral engagement in the consideration of options for electric vehicle integration, and for the introduction and adoption of products and services supporting grid flexibility.

The Electric Vehicle Revolution identifies scope for collaborative government and industry action to deliver an enabling customer-centric framework for electric vehicle uptake that leaves sufficient space to innovate.
In order to transform the UK into a low carbon economy and allow the country to reach carbon emission reduction targets, there is a need to develop smart, flexible and accessible systems that deliver efficient energy usage and increase UK companies’ competitiveness.

A holistic set of smarter digitalised systems across power, heat and transport needs to be supported by co-ordinated Government policies. To achieve this, there is a need for greater collaboration between government departments and the energy sector. Smarter digital energy systems will create opportunities for customers to take a more active role in the energy system. This in turn could save customers money on energy bills when using Time of Use Tariffs supported by smart meters, as well as reducing peak demand by shifting the time of charging. Over time, the opportunity to use electric vehicles to earn money by providing ancillary or balancing services to the grid will come into play.

Vision
Executive summary

The Electric Vehicle Revolution is already under way across the UK, with more than 105,000 electric vehicles on the road in July 2017. To provide the enabling regulatory and policy framework for the energy flexibility opportunity created by electric vehicles and for all consumers to reap the full benefits from this developing technology, there is a need for greater co-operation and co-ordination between the energy sector and the government. Energy UK would welcome the opportunity to host a group or regular workshop for government and a range of industries to discuss issues for electric vehicle uptake, for electric vehicle uptake to foster cross sector collaborative consensus.

The UK power sector continues to make significant contributions to emissions reduction, achieving a 13% reduction in carbon emissions between 2014 and 2015. A holistic approach to the rollout of electric vehicles will allow this increasingly low carbon energy mix to further contribute to the Government’s carbon emission reduction commitments through reductions in tailpipe emissions. This will directly assist with improving air quality across the UK’s communities. Long-term certainty in policy and regulation will lay the foundation for the investment needed to create a modern, integrated, efficient and low carbon economy.

The UK energy system is also undergoing a rapid transformation of its structure, with increasing numbers of business and domestic customers installing low carbon energy products such as Solar PV panels and heat pumps. Small-scale battery storage is also being offered as a method of further utilisation of installed domestic generation, for example, being matched with rooftop Solar PV. These changes are creating new system challenges for grid operation and investment at both a national and local level.

There are a number of initiatives underway to tackle these challenges, but it is clear that there will be implications for the grid that we do not yet understand. In the view of Energy UK’s Electric Vehicle Working Group, a range of benefits that electric vehicles can offer are emerging, and these may play an important role in providing energy flexibility services to the grid. This could lead to reductions in electricity demand at peak times at both a local distribution level and national transmission level. These services could enable electric vehicle owners to provide a range of response services, using their electric vehicle as a mobile battery resource. A mass uptake of electric vehicles could provide the energy system with large much needed geographically distributed energy storage capacity while engaging a large number of customers to participate in the provision of grid flexibility services from which everyone could benefit.

Recommendations for Government:

- An enabling regulatory framework which balances the need for long-term certainty with the need to leave sufficient space to innovate is required. The expected Electric and Autonomous Vehicle Bill creates an opportunity for the energy sector to increase contributions to the development of this framework.

- A longer-term policy framework including electric vehicle charging in existing and future schemes, such as in the proposed amendments to the Motor Fuel Greenhouse Gas Reporting Scheme. Voluntary mechanisms like this could enable rewards for energy suppliers and ultimately customers for contributions to decarbonisation made as a result of the switch to an electric vehicle.

- Increased and continued support for innovation, particularly across the Information Communications Technology (ICT) elements of electric vehicles and smart charging solutions.

- Mitigation of the concerns network companies may have over risks to the energy grid presented by electric vehicle uptake through smart charging arrangements. Industry wide consultation and collaboration is needed in this area in order to support the development of smart/digital charging in a way that allows for innovation.

- Support and engage in discussions and solutions which enable consumers to benefit from providing their electric vehicle as an energy asset.
A Longer-Term Policy Framework for Electric Vehicles

Energy UK’s Electric Vehicle Working Group would like to see a longer-term, cross-departmental policy framework put in place for integrated, decarbonised energy and transport assets including electric vehicles. This policy framework should encourage the development of a timeline of changes from industry, as well as from the Department for Transport, DBEIS, DEFRA, and the Office for low Emission Vehicles to 2030, 2040, and 2050. One area for immediate focus is the Electric and Autonomous Vehicle Bill, which can be utilised by Government to further emphasise continued support for electric vehicles. Energy UK hopes that the imminent release of the Government’s Clean Growth Plan will go some way towards setting out how electric vehicles will contribute to the 5th Carbon Budget and the Air Quality Plan.

We applaud the work of government in creating the Office for Low Emission Vehicles and committing to a 2040 deadline for discontinuing the sale of polluting vehicles in the UK. Given the rate of growth of electric vehicle sales, as well as the increasing number of motoring manufacturers moving towards low carbon vehicles, it is time to move forward with a tangible timeline for this continued growth and ensure measures are developed to enable this industry to contribute to the UKs economic growth.

Another important enabling policy is the Motor Fuel Greenhouse Gas Reporting Scheme, which may be amended to reward energy suppliers for charging electric vehicles. This voluntary Scheme is currently only expected to run for one year in 2020, but Energy UK and our members are looking to learn a lot from the programme. The Scheme does have a downside in terms of its short shelf-life, so government may wish to examine the potential to extend the scheme.

In order to do this government should also indicate what success would look like for this scheme to allow an effective assessment on completion. This would have the added benefit of enabling greater cooperation between environmental carbon emissions schemes and electric vehicle policy overall.

To date the UK Government has provided direct financial support to customers who wish to purchase an electric vehicle or charge point through schemes such as the UK’s Plug-in Vehicles Grant, as well as through exemptions to emission surcharges, Road Tax and Vehicle Excise Duty. Local authorities have also provided support by introducing low emission zones, and it is likely that over time more local authorities will follow suit. Continued Government funding for public charging infrastructure will aid in further improving public confidence in electric vehicles.

Energy UK’s Electric Vehicle Working Group views these support schemes as essential to the early years of the electric vehicle acceptance and uptake. They provide financial assistance in bringing down the cost of purchasing an electric vehicle, and encourage close monitoring of the effects of electric vehicles. The energy industry has an historic understanding of the role of subsidies, which have had an impressive effect on investment across a range of technologies including rooftop Solar PV and Wind Farms. As has been seen in the energy industry in the past, it is vital that the phase out of this support should be gradual, using clear timelines to enable the industry to adjust and thrive.
Integrating electric vehicles into the UK energy system will require innovative smart solutions and ICT frameworks that build on existing technologies. It is important that, where possible, existing platforms and solutions are fully utilised, both to minimise the risk of stranding assets and to manage costs, including for end-customers. It is therefore important for there to be further support for innovation and collaboration between charge point operators, vehicle manufacturers, network companies and energy suppliers in order to work towards design principles and set out requirements for smart charging systems and data management frameworks. The Electric and Autonomous Vehicle Bill will play an important role in ensuring the right infrastructure and processes are set up to ensure that the UK is ready for a wider role out of electric vehicles.

Current information available on charging patterns and behavioural changes in electric vehicle users have been extremely useful, but for effective prediction of demand patterns, industry and government will need continued access to an expanding scale of this data. Data gathered on electric vehicle usage and charging will provide tremendous insight into potential new driving and lifestyle behaviours, as well as the impact on energy consumption patterns. Regulations surrounding ownership, acceptable usage and management of this data need to be clarified to protect consumers whilst this data is collected.

It is important for the wider UK economy that specific data from innovative trials and on wider usage in future be made available, on an aggregate level allowing for anonymization, to multiple stakeholders, subject to the appropriate data protection provisions being in place. For example, this data will be important to planning authorities when considering infrastructure requirements for new housing developments and building developments. Government should consider how electric vehicle data could be collated and made available, and should ensure broad consultation with stakeholders on the requirements and uses for this resource.

To date, there have been a number of innovation funds made available for Vehicle to Grid Charging Projects in the UK. For example, Newcastle University’s trial of a Vehicle to Grid Charger® and Aston University’s Itheca Project, which incorporates Vehicle to Grid alongside district heating networks®. These projects will demonstrate how electric vehicles can be used as energy assets, which can be used to offer grid flexibility services. Given the potentially important role of Vehicle to Grid services in the future energy system, funding for research and development must continue to ensure the UK emerges as a global lead market. Funding should also be made available for trials into Vehicle to Home charging solutions, to further demonstrate the role that electric vehicles can play in supporting the UK energy grid.

Increased Support for Innovation
Electric Vehicle Smart Charging Arrangements

Low carbon technologies such as heat pumps and electric vehicles create new electricity demand, which energy retailers, generators and network companies need to predict in order to ensure that the energy system continues to provide reliable services to customers. A number of projects have been initiated over recent years under the Ofgem-led Low Carbon Network Fund to assist network companies with identifying options for managing this additional demand. Analysis from these projects has indicated that the deployment of electric vehicles onto networks could potentially cause local network outage or other performance issues. Specifically, the My Electric Avenue Project identified that voltage issues are created where a number of customers using 3.5kW chargers charge their electric vehicles simultaneously\(^\text{10}\). The project findings support the view that Smart Charging Solutions would be beneficial to support the energy system by spreading demand from electric vehicles across the day (and night).

Energy UK has already been active in supporting the discussion of solutions with other associations including ENA, SMMT, BEAMA, and have seen significant enthusiasm from Government when we are able to share learnings or raise concerns. Energy UK is willing to commit to continuing work to enable discussions on this and across a range of other issues in this area. Government could provide greater support to this by offering sustained engagement in design discussions and trials at an industry level, and by providing guidance on how to ensure electric vehicles support critical infrastructure as part of a digitally integrated energy system.

Energy UK wishes to work towards a more representative view of electric vehicle impacts on the grid. The need for a proactive effort to demystify electric vehicles can be seen in the widely welcomed Myth Busting document from National Grid\(^\text{11}\). There is a tendency to assume the worst when discussing the actual rate of charge for electric vehicles, and it is important that options for a charging solution are established soon to allow a change in the tone of discourse around electric vehicle adoption.

However, there is currently limited data available from Low Voltage Networks to demonstrate where constraint issues may arise. There is a need to improve the visibility and monitoring of Low Voltage Networks to improve insight and to support forward planning of activities and investment for networks. Additional network monitoring will assist with providing insight into the options available to manage demand. Industry and government will need to work collaboratively to find the best solution to this issue.

Additional demand created by electric vehicles can be managed in a number of ways to mitigate risks to networks. This includes the use of Time of Use tariffs to encourage electric vehicle charging at specific times to avoid increases in peak demand, as well as technical solutions such as smart managed charging. There is a high level of uncertainty around charging patterns and consumer preferences, including the potential for charging at work or at home, rapid charge points at service stations, the development of mobility as a service (MaaS) and the potential role of fleet operators. Given this uncertainty, Energy UK have been engaging with a range of organisations to gain views on future scenarios. Energy UK is willing to continue to facilitate and broaden this conversation, but would ask for Government input and engagement in the discussion.

An important consideration related to mitigating these risks is; how to ensure that smart charging solutions can be utilised alongside smart meters. The energy industry has been tasked with rolling out smart meters across the country, with a target to install meters in 53 million homes by 2020. Without a smart charging model that is able to integrate with smart metering technology, there is a risk that early adoption of a single smart charging solution may only be used for short period of time before a lack of interoperability and innovation causes issues. Energy UK has facilitated a range of workshops with manufacturers, networks, and energy suppliers on the issue of interoperability, and will continue to feed insights into Government on this.
Any solution must also be simple for a customer to use, cost effective, and must not act as a barrier or disincentive to customers moving to electric vehicles. There are a number of options available to support smart managed charging, and it is important to ensure that all options are considered in advance of any regulatory changes being introduced.

Another important consideration is ensuring that the consumer is given a choice on what level of control they have over the usage of their vehicle. It would be damaging for the electric vehicle market if a solution was imposed that had a limiting impact of the day-to-day usability of the vehicle. There will also need to be an effective consumer engagement model alongside any solution which protects customers whilst enabling customers to allow third parties to access their electric vehicles.

The Energy UK Electric Vehicle Working Group is working to create cross sectoral alignment on a smart charging solution, which works for the consumer, but would like to see even greater cross-sectoral engagement in the consideration of options for smart charging. Government should provide support to this process by providing improved linkages between legislation across energy planning and transport, such as through the Electric and Autonomous Vehicle Bill and the enabling technical changes at an industry level.

This could take the form of an Electric Vehicle Delivery Group shown public support and active engagement from Government, which would drive forward the key enabling deliverables for the electric vehicle roll out. The energy industry is looking to Government for signals on direction of travel to ensure that we are heading in the right direction, and are grateful for the input and engagement seen in meetings with officials to date.
Conclusion

The energy industry sees electric vehicles as critical both to the achievement of the UK’s climate change and air quality targets, and the creation of a holistic framework for a smart flexible energy system. Not only will electric vehicles result in healthier consumers across the UK’s towns and cities, they will also present a useful avenue for consumers to get engaged with their energy usage. Outside of the initial benefits for the consumer and the energy system, electric vehicles also offer a way for the UK to demonstrate leadership in technology and motoring, and create advanced industries rich with jobs.

There is a genuine opportunity to accelerate progress through more active collaboration between a range of industries and the UK Government. The energy sector is ready and willing to work with the Government, consumer groups, and other sectors to ensure that we are able to achieve our shared ambitions in decarbonising transport.

Notes
1. www.smmt.co.uk/2017/08/july-2017-ev-registrations
2. Drax Power Electric Insights
3. Recent trials from Nissan and Enel showed a promising level of success
4. Announced during the Queen’s Speech and Based on the delayed Vehicle Technology and Aviation Bill found here
6. www.gov.uk/guidance/carbon-budgets
8. www.ncl.ac.uk/press/news/2017/01/v2g/
9. www.aston.ac.uk/eas/research/groups/ebri/projects/itheca/
10. My Electric Avenue report
11. Our energy insights - national grid