

# EV INFRASTRUCTURE NEWS

## EV Infrastructure Report 2023



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# Foreword

By George Heynes



Welcome to the first edition of the EV Infrastructure Report. The team is delighted to be providing you all with this report which has been produced due to rising interest from across the UK.

The EV Infrastructure Report aims to provide readers with insight into the UK EV market, presenting some of the key obstacles impacting the adoption of EVs in addition to the revolutionary technologies which could shape the industry's future.

One of the biggest instigators for growth within the UK EV sector has been the impending 2035 ban on the sale of fossil fuel powered internal combustion engine (ICE) vehicles. Yet questions still remain as to how the UK will be able to facilitate the growing desire for EVs as a replacement.

This growing appetite for EVs is evident across the UK. According to data released by New AutoMotive, 16,200 EVs had been registered in the UK in the month of August – a remarkable 77.1% increase versus August 2022. This increased adoption is not expected to slow down either and is anticipated to continue its upward trajectory into the coming years. On page 14 you'll read all about a potentially revolutionary technology which is anticipated to have a major impact on both the EV and energy markets – vehicle-to-grid (V2G). In this article, we hear from Octopus Electric Vehicles, Cornwall Insight and OVO Energy, who help paint a picture of what the technology could offer, some of the barriers preventing its adoption and the public's perception of V2G.

Although the decarbonisation of road transportation is vital for the UK to attain net zero, the increased electrification could severely strain the existing electricity network and has prompted several calls to increase investment in this space. Indeed, this topic is explored in depth on page 22 featuring input from engineering company Fundamentals, UK Power Networks and National Grid Electricity System Operator (ESO). This article sets the scene for one of the biggest obstacles impacting EV adoption whilst also highlighting some of the initiatives aiming to tackle this problem.

On page 25, we take a look at the EV market across the pond in the United States. Here you will read about some of the primary legislations being used to spur growth in the sector as well as the potential of the electric trucking market in the States.

On page 26, NTT DATA, Chargetrip, Pod Point and Kaluza, help navigate how companies are using customer data to leverage and optimise their own services, using several case studies throughout.

Thank you to all our contributors, we hope you all enjoy reading the first EV Infrastructure Report.

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## Meet the team



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# Accelerating UK electrification



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## Durham launches pilot scheme to boost EV charging outside homes

Durham County Council is trialling a pilot scheme aiming to boost electric vehicle (EV) charging for those without driveways in the North East of England.

The region is testing Kerbo Charge, a system that is installed on tarmac or stone pavements directly outside a customer's home. This creates a narrow channel with a hinged lid in which users can easily place a charging cable, running it to their car.

The adoption of EVs is facing a number of economic barriers, with disparities in access to cheaper charging rates. Those with driveways and access to home chargers tend to benefit from cheaper rates as opposed to those who must charge at public chargers.

Councillor John Shuttleworth, cabinet member for highways, rural communities, and community safety at Durham County Council, said: "We are delighted to have been selected to pilot this pioneering technology which will make owning an EV accessible to more of our residents.

"We decided to be involved in the pilot after residents living in properties without driveways got in touch with us about seeking a solution to charge their EVs. Their properties were checked for suitability before a programme of installation was planned and a contribution towards the install was agreed.

"County Durham has many terraced streets and properties without driveways. Whilst we have installed hundreds of publicly accessible EV chargepoints in every area in the county, this solution will allow residents to access EV charging at home, making it easier for more people to drive an EV and reduce their carbon emissions.

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## Octopus EV looks to unlock second-hand EV market

Octopus Electric Vehicles, part of Octopus Energy Group, has launched a second-hand salary sacrifice scheme for EVs. The 'Nearly New' leasing offers allows consumers to purchase second-hand (under two-years old) EVs for considerably reduced costs.

Alongside, poor chargepoint experience, the cost of EVs has been numerous highlighted as one of the main deterrent for potential EV drivers.

Under this new scheme drivers can pay an estimated £300 to access a second-hand EV (such as the Renault Zoe or Peugeot e-208) as well as fuel, insurance and maintenance costs. In a similar structure as cycle-to-work, the salary sacrifice scheme allows drivers to save between 30% and 40% per month by paying through their gross salary.

Octopus EV has advertised the scheme as an 'all-in-one' service providing use of an EV, charger and discounted tariff.

"Used cars make up more than 4 out of 5 car sales in the UK, and so to reach net zero transport, we need to build a strong second hand market for electric cars. As with all tech, the early models are expensive but with a growing fleet of second hand cars, you can now run one of these high tech, green, fun cars for half the price of an old school gas guzzler," said Fiona Howarth, CEO of Octopus EV.

"Leasing for EVs is an attractive option for people looking to go electric, allowing drivers to switch to the latest tech every few years and take advantage of low fuel costs. Very few of our drivers ever look back, and now going electric is even more affordable, opening it up to more drivers that may not have previously considered it."

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## Tevva eyes US trucking expansion with ElectraMeccanica merger

UK-based electric truck manufacturer Tevva has proposed a merger agreement with EV designer ElectraMeccanica to expand into US and European markets.

The merger would focus on accelerating the expansion of Tevva's electric medium and heavy-duty commercial vehicles, which according to the companies, is a target market expected to reach US\$67 billion (£52 billion) in value by 2030.

Tevva currently utilises a 110,000-square-foot EV manufacturing facility, which is based in Tilbury, UK. Through the merger, this facility would be complemented by ElectraMeccanica's recently commissioned 235,000-square-foot facility in Mesa, Arizona, which is expected to enable the combined company to scale its production to serve the UK, European and US markets.

Although Tevva focuses primarily on battery-electric trucks, the company has also been exploring the use of a proprietary hydrogen range-extender technology.

Upon the closing of the proposed transaction, ElectraMeccanica shareholders would own 23.5% of the combined company and Tevva shareholders would own 76.5%. The combined company expects to have a cash balance of between approximately US\$70-80 million, with debt of approximately US\$26 million.

The US trucking market could be one of the key drivers for decarbonisation in the US transportation sector. The US government has previously said that although medium and heavy-duty trucks account for less than 5% of vehicles on US roads, they produce over 20% of the emissions from the transportation sector. The merger will look to tackle this issue and capitalise on this growing demand for medium and heavy-duty zero-emission vehicles.

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Steven Sanders, chairman of the ElectraMeccanica board of directors, added: "By partnering with Tevva, we are providing our shareholders with a unique opportunity to participate in the accelerated and technology-driven growth prospects of the combined company in ways that also logically extend and leverage ElectraMeccanica's existing assets and strengths."

## New UK government legislation targets 99% reliability for rapid EV chargers

The UK government has introduced new regulations to help rapid EV chargers to achieve 99% reliability. The new rules aim to tackle issues like payments, pricing, data and reliability.

The regulations state that “the reliability requirement is that the network of rapid chargepoints is, on average, reliable for 99% of the time during each calendar year”.

Already challenges around chargepoint availability are emerging, with one example provided by Techniche highlighting a hub that saw a queue of over 40 cars forming and some waiting over six hours to charge over the Christmas period of 2022/23.

The tools used to manage maintenance of EV chargepoints are often immature, with maintenance usually carried out manually, allowing inaccuracies to creep in and taking a significant amount of time to inform all the relevant parties needed to begin to fix the asset.

The new regulations include the requirement for new public chargepoints to incorporate contactless payment within one year from the date of the regulations coming into force.

Existing chargepoints will also need to introduce contactless payment within one year of the legislation's introduction. Moreover, rules will be imposed to introduce payment roaming to reduce the number of apps, improve pricing transparency and open chargepoint data.

Commenting on the announcement, Edmund King, AA president, said: “This is a welcome step and are pleased that the government has listened to our requests to create more confidence when charging away from home.

“A 99% reliability requirement and live chargepoint information will help show drivers in real-time the benefits of driving electric.”

## Zapmap statistics show EV chargepoint installation up more than 80%

EV chargepoint mapping service Zapmap has published mid-year statistics showing that the rate of chargepoint installations has increased by 82% since the first half of 2022.

In the first half of 2022, an average of 891 chargepoints were installed each month, a figure which has increased to 1,622 in the first half of 2023, an increase of 82%.

Zapmap calculates that there will be more than 50,000 chargepoints across the UK by the end of 2023, a 36% year on year increase on the 44,000 today.

Almost 20% chargepoint installations were rapid or ultra rapid chargers, with 8,680 of these installed at the end of June. Ultra rapid chargers showed the biggest year on year growth with 1,803 ultra rapid chargers located across the UK at the end of June 2022, growing to 3,493 at the end of June 2023, a 94% increase.

Ultra rapid chargers are also well distributed across the UK, with 9/12 geographical regions in the UK seeing more than 100 new ultra rapid chargers installed, with the most in the Southeast with 269. However, the Northeast and Wales saw only 61 and 62 new chargers installed, increases of 81% and 161% respectively. Northern Ireland had the smallest increase in ultra rapid chargers with only 16.

36% of all new chargepoints were installed in Greater London and the Southeast over the past year, with most of the chargers installed in Greater London (83%) being on-street chargers.





## UK's 'largest' EV charging hub unveiled at the NEC Birmingham

Electric vehicle (EV) charging business bp pulse has unveiled a public EV charging hub at the NEC Birmingham, which its developers have called the largest in the UK.

Opened on 7 September 2023, the EV charging site - which has been developed with support from The EV Network (EVN) as well as the NEC Group - is capable of charging 180 EVs

The "Gigahub", as it has been named, utilises ultra-fast 16x 300KW DC chargers, two of which are designated accessible bays, alongside a further 150 points for 7kW charging. The ultra-fast chargers are capable of charging 30 EVs simultaneously.

The Gigahub is located less than a mile from junction six on the M42 and 2.4 miles from junction 7A for the M6. Its location means it will help cater for one of the UK's busiest areas seeing an average yearly traffic count of 60 million. Pulse has previously opened Gigahubs in Park Lane, London, at Gatwick Airport, and Kettering.

"The transition to EVs is evolving at pace which is why bp pulse is focussed on accelerating the development of the UK's EV infrastructure, delivering the right charging speeds, in the right locations and investing up to £1 billion to do so," said Akira Kirton, vice-president of bp pulse UK.

The chancellor of the exchequer, Jeremy Hunt MP visited the site for its opening ceremony and said: "This is the biggest private investment in electric charging in the UK and is a huge vote of confidence in Britain's role as a leader in green industries."

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## EV registrations see over 70% increase but ZEV concerns loom

Data from New AutoMotive shows that EV registrations were over 70% higher in August 2023 than in August 2022, but concerns remain over lacking details of the Zero Emission Vehicle (ZEV) mandate.

16,200 EVs were registered in the UK in August, a 77.1% increase from August 2022. The Society of Motor Manufacturers and Traders (SMMT) released similarly positive increases for August, 2023 reporting 17,243 registered battery electric vehicles (BEVs) - a 72.3% increase.

According to SMMT, BEVs secured a market share of 20.1%, plug-in hybrid vehicles (PHEVs) also rose significantly (70%) comprising 7.7% of new registrations in August, whilst hybrid cars (HEVs) increased by 6.8% resulting in a 10% market share. Fully and partly EV registrations held a combined market share of 37.8%. Meanwhile, petrol and diesel car registrations fell to historic lows.

"The government should build on this progress by putting in place a strong California-style Zero Emissions Vehicle Mandate to give car companies and EV charger installers certainty. It is almost two years since this policy was first announced; Ministers should stop dragging their feet and put it in law," said Ben Nemes, chief executive at New AutoMotive.

Despite the promising EV uptake figures, Mike Hawes, SMMT's chief executive, expressed concern of lacking information around the much anticipated ZEV mandate which is set to come into force on 1 January 2024, increasing pressure for the government to delay the mandate.

"With the automotive industry beginning a second year of growth, recovery is underway with EVs energising the market. But with a new ZEV Mandate due to come into force in less than 120 days, manufacturers still await the details. Businesses cannot plan on the basis of consultations," Hawes said.

## FairCharge and RAC call on gov to back UK EV charging charter

Campaign group FairCharge and the RAC have launched a new public EV charging charter to improve customer charging experience and boost EV adoption.

The Charter aims to raise standards and safety, improve access and reliability, and lower consumer costs. FairCharge and the RAC want the charter to become a minimum set of standards for government, local authorities, landowners and chargepoint operators.

FairCharge founder Quentin Willson said: "We've produced this charter after talking to hundreds of EV drivers and it represents their wish list for building a world-class public charging network. government, operators, councils, and local authorities should reflect on what these pioneering drivers of EVs have told us."

The charter's recommendations include a 99% charger reliability guarantee, clear information for consumers on working and non-working chargers and a 48-hour repair target. In July, the Department for Transport published the Public Charge Point Regulations 2023, which also requires chargepoints to be reliable 99% of the time.

The charter also calls for signs on major roads and motorways to show the locations of chargepoints, and for chargepoint operators (CPOs) to make sure the price per kWh is always clearly displayed. Chargers should be located in safe, well-lit areas, and be accessible to all drivers, regardless of physical abilities.

RAC spokesman Rod Dennis said: "it's vital we have enough public chargers in enough locations to make charging as straightforward as possible. But quality is as important as quantity: drivers will quickly become frustrated if they discover chargers that aren't working, or they can't clearly see how much they're going to pay before they plug in. And for those with specific accessibility needs, having chargers that meet the new British Standard is absolutely vital."

Recharge UK, the EV arm of the Association for Renewable Energy and Clean Technology (REA), ChargeSafe and FairCharge have all recently called for all charging sites to have accessible charging mandated. FairCharge and the RAC also continue to campaign for a reduction in VAT on public charging from 20% to five.







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# Overcoming the barriers to increasing the UK's EV charger infrastructure



## **Comments by Alex Chilvers, strategy and EV director and Darren Slade EV operations director at NG Bailey**

The appetite for electric vehicles (EVs) continues to grow amongst drivers in the UK but the charging infrastructure must match this pace. Government statistics indicate that more than 12,000 public chargepoints were installed in the year to July 2023, but this progress needs to rapidly accelerate if we are to meet the UK's ambitious target to end the sale of new petrol and diesel cars from 2035.

As one of the UK's leading electrical installation businesses, we have been helping customers install electrical infrastructure for over 100 years. In 2022, we launched our EV business to use this expertise to support our customers on their net zero journeys and since then, have been offering end to end charging solutions that take our customers from point of connection with the Distribution Network Operators (DNOs) right through to the installation and commissioning of chargers.

From difficulties in accessing power to futureproofing infrastructure, chargepoint operators (CPOs), fleet and property managers can experience various obstacles when deploying EV infrastructure. Based on our experience of constructing ultra-rapid charging hubs and deploying chargers at multiple depot locations across the UK, here's how we've been powering the EV revolution in partnership with our clients.

### **Overcoming grid constraints**

Power is a key factor that needs to be considered from the outset regardless of the charger, and key to this is understanding the charging demand at the site and whether this can be achieved within the existing capacity of the local electricity distribution network. Consideration also needs to be given to how often vehicles will be returning, what their dwell time is and how many vehicles will be using the site each day.

It's a consideration that can often be misunderstood for those at the start of their EV journeys, and the complexity of getting power can ultimately hinder the expansion of many charging networks. Early engagement on the capacity requirements of a site is therefore crucial.

At NG Bailey we are uniquely placed to help our customers navigate the complexities of getting power to their sites. As an Independent Connection Provider (ICP) we work with the majority of the DNO and can use our expertise to help clients understand their required capacity and obtain either an upgrade or point of connection offer from the DNO.

Once this has been agreed, we can design the connection in house and install it, making the whole process seamless from start to finish.

### **Building confidence by ensuring reliability**

As more corporate businesses start to utilise EVs for increasing proportions of their fleets, it's never been more important to install the highest quality infrastructure to ensure the reliability of the charging network.

To continue to build confidence in EVs and encourage wider adoption, we need to make charging EVs as easy and smooth as filling up at a petrol station. For commercial fleets, a more reliable charging infrastructure is critical, while for CPOs, greater reliability will lead to increased revenues and positive customer feedback. Making sure that projects are cost-effective is important, but there must be equal bearing given to the quality of the chargers, engineering and installation to ensure end users can always charge easily and reliably.

At NG Bailey, we have used our vast installation experience to put in place rigorous quality control procedures on all our EV installations, making sure they are right first time.

### **Scaling up**

As we get closer to 2035, we will need to rapidly scale up deployment of infrastructure to meet increasing vehicle demands. This means there will need to be larger deployments of chargers either in large charging hubs or delivering across multiple sites in order to get sites up and running as quickly as possible.

Choosing the right company to work with in these cases is paramount, requiring a partner that can deliver consistently across different regions, consider programme risks effectively. Through our in-house design, ICP and delivery teams, NG Bailey is able to support customers in installing the appropriate EV infrastructure at scale, from design and installation to ongoing maintenance and aftercare. As a principal contractor we use our project management experience to give our clients confidence of delivery.

Overcoming these barriers to supercharge the country's EV infrastructure roll out is vital if we are to achieve the UK's 2030 EV targets. It has never been more important to work with a provider who can understand these unique challenges and install reliable infrastructure that mean your vehicles are always charged and ready to go.

Whether you are a CPO, fleet manager, or property manager, get in touch with us today and find out how we can help deliver end to end EV charging infrastructure and solutions for your business.

# V2G: How the technology could revolutionise the UK energy sector

By George Heynes

When people are asked to highlight what technology they think could have a huge impact on the electric vehicle (EV) industry, one could argue that vehicle-to-grid (V2G) would come up again and again.

Solar Media's EV World Congress in 2022 discussed the topic in depth, and it is anticipated to be eagerly discussed again in 2023's edition of the conference. To kick start the debate, it is important to explain what V2G is and how it could be utilised in not only the GB energy system, but overseas in Europe, the US and beyond. V2G technology works by both managing the time vehicles are charged to use periods of abundant, green electricity on the grid, and then allowing the vehicles to discharge into the grid at times of constraints.

Perhaps one of the most compelling reasons for why the technology is so promising is its ability to reduce the cost of energy and provide a mobile flexibility service for customers. By allowing vehicles to extract energy at cheaper periods in the day, the vehicles can then provide energy to buildings and other applications. This could also reduce the strain on the grid.

Essentially the technology can provide a mobile microgrid that can be used for a variety of uses. The possibility of this entering the UK at mass could be a revelation and bolster efforts to both decarbonise and manage energy demand.

With the clear potential V2G technologies offer society, the biggest question is when we could see this widely deployed around the UK? Due to the complexity of the technology, many have argued that we may not see the V2G available until the 2030s, however Valts Grintals, product marketing lead for Kaluza Flex, speaking previously on the topic, believes it could be much sooner.

"The UK has the potential to be a global leader in V2G thanks to a number of advanced programmes taking place. If the industry can continue to ramp up deployments and engage more automakers around V2G-compatible EVs and charging standards, then V2G will become more accessible and subsequently far cheaper for customers," he said.

"On this basis, and with the right regulatory frameworks, we could see a significant uptick in adoption from 2025."

## What is the potential for V2G technologies?

The potential for V2G technologies, alongside vehicle-to-everything (V2X), could be huge for the UK industry. Not only can it be used for various means discussed above, such as flexibility, but with the technology being in the possession of customers, it could increase engagement and understanding of the energy industry amongst the public – something that could have a major benefit moving forward.

Oliver Archer, lead analyst at consultancy firm Cornwall Insight explained that the real potential with V2G technologies lie in the value increase it could have for EV charging.

"V2G has real potential to increase the value available from EV charging. Compared to smart charging alone, V2G opens up new benefits such as wholesale arbitrage, as well as a wider range of grid services," Archer says.

"From a system perspective V2G can cut peak demand further than smart charging. There's been quite a range of reported revenues from V2G charging coming out of trials, but what is clear is that if technology costs continue to drop, we should tip over into benefits outweighing the costs in the near future.

"It's not going to be universal, though – there isn't a real benefit in replacing every chargepoint with V2G capable kit. The opportunity is anywhere that the dwell time of the vehicle is long enough to export onto the grid when useful, and still be ready to drive away with enough charge. This includes for example EVs sitting for long periods outside people's homes and workplaces, and commercial vehicles in depots between shifts."

This is a crucial factor to consider for V2G technology. By presenting V2G as a means for customers to earn money due to selling energy to the grid at peak times, this could well appeal to the mass market and collectively provide an abundance of electricity when required.

Claire Miller, adviser and former director of tech and innovation at Octopus Electric Vehicles, also believes that the technology could have a huge appeal not only for customers, but for fleets.

"We can't downplay the potential of V2G. Being able to turn the millions of future electric cars sitting idle on people's driveways into a clean source of energy is a game changer for our future green grid," says Miller.

"And it's not just for individuals, but for fleets too. Any sector that utilises a large fleet will be able to reduce their running costs and tap into the benefits of going electric through V2G."

Another company currently exploring V2G is energy company OVO who has several trials underway. They presented V2G as a complementary technology that is currently being explored as a means of providing flexibility – much like what was highlighted by others previously in this article.

"Since 2020, OVO has been working on flexibility trials which, when scaled, have the potential to revolutionise both the energy system and home energy consumption patterns – a huge step closer to making gas-free living a reality," says Alex Thwaites, director of EVs and renewables at OVO Energy.

"OVO is currently trialling V2X smart charging technology. This will allow customers to power their homes with their car and sell surplus energy back to the grid, decreasing reliance on fossil fuels and reducing energy costs.



"The announcement follows OVO's hugely successful domestic V2G trial, the largest of its kind in the world, which enabled drivers to earn around £420 a year by selling their EVs energy back to the grid, with some earning up to £800.

"OVO data shows that V2G technology helped avoid blackouts last winter. The possibility which this innovation holds is invaluable as we transition to the green energy system of the future, saving carbon and costs for everybody."

#### **Barriers preventing the widescale adoption of V2G technology**

Despite the wide array of benefits V2G technologies can bring, there are certain barriers preventing its rollout and adoption. Two of these, which have already been briefly mentioned above, are availability and cost of the technology.

"The main barriers are the availability and cost of the technology. Bi-directional chargers are more expensive, and the costs need to come down before the business case really stacks up for V2G charging," says Archer.

"An even greater obstacle currently is the cars themselves. There are still a limited number of electric vehicles capable of V2G charging. Although manufacturers are planning to change this, the V2G models won't be delivered overnight. The technology and standards that connect cars to chargers also need to be updated to support V2G.

"CHAdeMO connectors support V2G, but the more common Combined Charging System (CCS) does not. To bring forward the benefits of V2G charging, the energy and automotive industries need to work closely with each other, and with policymakers to overcome these barriers."

Miller however believes that the obstacles lie more with the incentives needed to bring V2G to market, citing a growing appetite amongst manufacturers.

"It's in the hands of the manufacturers. There are now a broad range of manufacturers of these cars that have intent to bring this technology to the market but right now they don't necessarily have a specific incentive to do that," Miller says.

"And I think they are also – particularly those manufacturers who are transitioning from internal combustion engine (ICE) vehicles to EVs – trying to understand, design and explore what a connected fleet of vehicles look like for them.

"It's time for manufacturers, with the help of the government to provide the right incentives, to push the cars with the tech needed to enable V2G at scale in the UK."

One of the ways these incentives can be granted to manufacturers to promote the investment in V2G technologies is via the ZEV mandate.

The ZEV mandate aims to reduce the greenhouse gas emissions emitted by UK transport. Included in the mandate is a target of 22% of manufacturer sales to be electric from its launch in 2024. Despite its potential to spur the growth of EVs in general, the mandate has been called into question and could well be delayed. Miller notes that the current ZEV mandate draft may have missed an opportunity to promote the uptake of V2G technologies.



*istockphoto.com*

"At the moment that ZEV mandate mentions V2G, as something that's maybe going to happen, and we think it's a good thing. But it doesn't go as far as adding any incentive for manufacturers to bring it faster," says Miller.

"They [the UK government] won't give any additional credit to manufacturers to bring it; they will monitor and come back to it if they think that there is a market failure. This is very harsh language.

"If we don't see that credit added to the ZEV mandate now, for bringing those vehicles faster, it also means that there's a potential for the second-hand market to have fewer V2G vehicles in it."

Archer also discusses a key consideration for V2G – and any smart charging technology – cyber-attacks. Cyber-attacks could well wipe the technology out meaning that many are unable to use their vehicles due to an inability to charge.

Archer says: "On security, widespread V2G charging carries the same risks as smart charging, as it relies on chargers being able to receive instructions remotely to turn on or off, opening up the possibility of attack by "malicious actors".



"The government is in the process of exploring different options to guard against this for smart charging, from standards to common systems, and it is likely V2G would follow a similar approach once it has been defined. The tension here is around finding a proportional response that doesn't limit the applications and benefits of smart charging and V2G while still mitigating the risks."

#### **How will the public react to the introduction of V2G?**

There is also another key aspect that must be considered with the technology – education. Although many EV drivers have been described by Miller as "a pretty engaged bunch" there is still an education gap to overcome.

"EV drivers on the whole are a pretty engaged bunch but there is still an education piece to overcome. Once drivers understand that they can make some extra cash, while doing their bit to help balance the grid - all with minimal effort on their end - it quickly becomes a no brainer," says Miller.

"In our own trial, Powerloop, over 85% of the participants said they were likely to use a V2G service in the future and 87% would recommend it."

Powerloop had been conducted in partnership with National Grid ESO and was the first EV-based programme to enter the Balancing Mechanism (BM). The trial highlighted the ability of EVs acting as an aggregated unit to meet many of the requirements of the BM when it comes to data parameters and response to instructions. It was also used to understand the viability of V2G entry in the BM, exploring aspects of its framework and obligations that currently act as a barrier for V2G enabled EVs to enter this market, as well as to demonstrate the capabilities of V2G enabled EVs.

Archer also recognises this as a challenge for the industry. He says: "V2G charging is a new, complex technology. For the general public to embrace it, they need to have confidence in the technology, its benefits, and how it will work for them as drivers. They need to know it will support and not limit the primary purpose of the vehicle: getting where they need to go each day. And they need to not be overwhelmed by V2G as an extra complication in an energy future that could include home generation, storage, and clean heat.

"Energy suppliers need to find ways to package V2G as part of a wider e-mobility offering that is simple, easily understandable and provides confidence in the product. They may also need to be more sophisticated in their relationships with customers, so they can work with a wide range of customers with different needs and preferences.

"Challenges around communication, education, and product design, combined with cost and availability of technology, and some barriers to participation in energy and flexibility markets, mean uptake is at first likely to be slow and limited to certain groups and use cases."

#### **Conclusion**

As discussed throughout this article, V2G technology could revolutionise the way the energy system works in addition to how customers engage with the energy sector. By presenting a financial incentive for people to adopt the technology, it could well take the UK market by storm proving the UK to still be at the forefront of the clean energy revolution.

But of course, barriers do remain and safety concerns including cyberattacks could well set the technology back. However, with the innovation and progress being made within this sector, it is almost impossible to rule out V2G as a technology that could be a staple in the UK energy industry.

It is important to note that V2G is still a relatively novel concept that is yet to be fully understood and explored. Undeniably, utilising the batteries in EVs to contribute to grid balancing and thus enable more renewable energy to be used by the grid is an exciting prospect.

The next steps for the UK to capitalise on this opportunity include continuing pilot programmes for different V2G service offerings, increasing consumer awareness on what V2G is and its benefits and finally incentivising manufacturers to invest in V2G services.

"V2G is really interesting opportunity. It's a technology which will unlock potentially huge grid benefits to increase the amount of renewables on the grid, as well as bringing benefits to individuals and fleets," continues Miller.

"The ability to conduct vehicle-to-grid services actually comes under quite a large number of government departments and it's a tricky one because it's the absolute epitome of mobility coming together with energy – two areas that have not previously really touched each other in this way. This means you're overlaying all kinds of different rules and regulations, grid codes, domestic wiring codes, etc.

"So what I'm observing at the moment I guess the and will continue to do as much as I can, is to bring folks together and try to facilitate that collaboration. But we need to see government departments broadening out their thinking as well and I think V2G is a really good place to start that."





We sat down with Luís Barroso, CEO of MOBI.E to learn more about the EV roll out in Portugal and discuss how using data can optimise the EV charging experience.

**■ Mobi.E's network has grown to almost 5,000 charging stations (including public and private), with more than 400,000 charges made in August. How does the Mobi.E model work and how does it contribute to accelerating electric mobility in Portugal?**

In 2010, Portugal became one of the first countries to have a specific regulation to serve electric mobility. From the very beginning, we designed a user-centered model which is fully interoperable and integrated with the electrical sector. This allows everyone to access information on locations and availability of each chargepoint in real time, promoting competition that will facilitate both the use and growth of the network.

These are the main characteristics of the Mobi.E model. A user has access to all chargepoints with a single contract, as well as know where the stations are located, who provides the service, the power and the availability of each chargepoint in real time.

This provides greater confidence in the system, increases demand and spurs growth in the number of available chargepoints as well as companies that want to develop their business in the electric mobility market.

**■ What are some of the primary challenges in supporting the rollout of electric vehicle (EV) charging infrastructure in Portugal?**

The Mobi.E network has a strong capillarity. We have already guaranteed at least one charging station in each of the 308 Municipalities in Portugal. More than 36% of Mobi.E network is made up of stations with powers equal to or greater than 43kW, which puts us at around 10% above the power criteria required by the Alternative Fuels Infrastructure Regulation (AFIR). But we have also been trying to be innovative, so since April 2021 we have ad-hoc payments that AFIR will require in the future.

We have already carried out pilots to test the network capacity in vehicle to grid (V2G), we are preparing a pilot with the energy grid operator to support the flexible management of the national electricity grid and the deployment of Plug & Charge.

All of these are challenges with an eye on making the use of electric mobility ever more appealing and functional for the growing number of users. Obviously, the quest to reduce licensing and grid connection times for new charging stations is always a challenge.

**■ How will the recently adopted AFIR impact on Mobi.E's actual model? How is Mobi.E preparing for the AFIR regulation?**

In general, AFIR is very much aligned with the Mobi.E model created in 2010. Mobi.E already works naturally as an

Identification Registration Organisation (IDRO) and as a National Access Point (NAP), collecting and disseminating all the necessary information either by users, market agents or official entities.

We already provide real-time information on location, availability, power and tariffs for each chargepoint. All publicly accessible chargepoints, from different private operators, are connected to the Mobi.E network that acts as a roaming platform, connected to others abroad.

The most challenging aspects will be the creation of a charging infrastructure for heavy duty vehicles and the installation of a terminal for bank card payments. Mobi.E already prepared a study that identifies concrete measurements and investments that are needed in Portugal.

**■ The Portuguese government has a target to reduce emissions in the mobility sector by 2030. Is this achievable with just the decarbonisation of private cars, or will it require trucks and shipping to decarbonise too?**

Portugal was the first country to sign the Paris Agreement aimed at carbon neutrality by 2050, which clearly demonstrates the commitment of the government.

The transportation sector is one of the most polluting ones, whose measures go beyond promoting electric mobility in private cars. The government is committed to boost public transport via a wide range of measures and to promote active and cycling mobility.

**■ Does Mobi.E have plans to expand internationally? And what can we expect from Mobi.E in the future?**

Mobi.E has plans to internationalise its activities with two main objectives: helping other countries in the creation of a fully integrated system, both in terms of making available information in real time and in terms of roaming; and supporting private companies that are acting on the Mobi.E network to internationalise their business.

We define Spain as a priority because it's the country that connects Portugal to Europe and, with an integrated market, we will make electric mobility more attractive and easier for drivers. It should be noted that, while sales of EVs in Spain are around 6%, in Portugal they are already above 30% and all European countries will have to develop information systems identical to Mobi.E to comply with AFIR. But we are also looking to Latin America as an emerging market with incredible potential given the high levels of production of green energy and the size of their population.

We are a partner with unique expertise to serve either States, Regions, Municipalities, or companies on the transition towards a more sustainable mobility.

# Maintenance automation: the key to unlocking charger reliability

The evolving electric vehicle (EV) market continues to face challenges as it navigates the road to net zero. The challenges that pose a threat to increased EV adoption are the most concerning.

The public perception that EVs are still not as easy to own as ICE vehicles is one of the biggest battles the industry needs to address.

For a long time, one of the most significant deterrents for potential EV drivers – aside from the cost of EVs themselves – was 'range anxiety'. Range anxiety stemmed from a combination of an EV driver's concern about the car's range and the widely dispersed nature of public charging infrastructure.

These fears have largely diminished, due to the vastly improved range of EVs and an accelerated roll out of chargepoints.

In the UK, according to mid-year statistics from EV chargepoint mapping service Zapmap, chargepoint installations increased by 80% between the first half of 2022 and July 2023.

But while a growing charger network helps tackle 'range anxiety', it also brings a new challenge – managing EV charging infrastructure reliability.

The Public Charge Point Regulations 2023 draft legislation published by the UK government in July 2023, includes a standard requiring the nation's rapid chargepoint network to be "on average, reliable for 99% of the time during each calendar year."

Maintaining the reliability of chargepoint infrastructure will become more complex and time-consuming as the UK's network expands. This will be essential following the implementation of the 99% reliability standard.

Effective management and maintenance of EV charging infrastructure will be paramount to achieve this standard and accelerate the electrification of UK roads.

We spoke with David Cornish, head of product at Techniche, to discuss the UK's chargepoint infrastructure challenges and hear how Techniche EV addresses them.

## Examining the cracks in the charging infrastructure

Concerns over the distance between chargepoints have been replaced by apprehension as to whether the chargepoint at an intended destination will be functioning. This has been dubbed 'charger anxiety'.

EV drivers are likely to use consumer apps to find out whether a charger is available. Often a charger is displayed as in operation, when in fact it can't be used due to broken display screens or damaged connectors.

According to Cornish, the availability of chargers is the biggest anxiety currently reported by EV drivers and potential drivers.

"Poor charger reliability drives the public perception that owning an EV is still more complex than owning an ICE vehicle. The industry has a lot of work to do to address this."

Until now, EV charger maintenance has been managed manually. This often involves a helpdesk team monitoring a chargepoint management system (CPMS), triaging reported issues one by one, and notifying third-party services or other teams as required, usually by email or phone.

A manual process of triaging faults can cause severe delays in getting chargers back in operation and introduces the possibility of human error which could result in incorrect information being passed to contractors and consequently, further delays.

"In a world where drivers are accustomed to a broken fuel pump being out of action for only a couple of hours, having EV chargers take days, or more likely weeks, to be fixed is going to act as a major deterrent to drivers considering switching to EVs," says Cornish.

Having chargers out of action for longer than necessary should be a major cause for concern for chargepoint operators (CPOs). Gaining a reputation for unreliable infrastructure could have a damaging and direct impact on revenues.

"There's a definite risk for CPOs in not managing charging infrastructure maintenance efficiently and effectively. The EV charging community may still be relatively small, but they are tech-savvy, and charging experiences – both good and bad – are often shared online," Cornish continues.

## Techniche EV

To enable CPOs to manage charger maintenance more effectively, Techniche has developed Techniche EV.

By automating the maintenance management of their EV charging infrastructure with Techniche EV, CPOs can reduce operational and maintenance costs, promote a reliable customer experience, and, ultimately, improve their charger uptime.

Techniche EV integrates with a variety of systems, including the CPMS, allowing it to receive notifications about charger faults and outages directly from the charger. Techniche EV can also manage maintenance for other associated assets, such as canopies, substations and integrated solar panels.

"Techniche EV uses the data fed into it to automatically select the right action for each issue and automate as much as possible, removing the need for a helpdesk agent to get involved every time", explains Cornish.





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"By automating maintenance responses for the bulk of standard charger faults, Techniche EV frees up helpdesk teams allowing them to focus on addressing the more complicated causes of downtime."

Techniche EV provides a range of business intelligence and analytics that are not available via the chargers' CPMS. Charger owners and operators can use this additional data to track charger performance against business KPIs or government requirements.

For example, CPOs can reduce operational expense by pinpointing charging assets or locations needing frequent maintenance intervention, identifying the cause, and taking preventative action, such as installing CCTV to deter theft or vandalism.

Cornish continues: "As we accumulate accurate charger information, we will be able to provide reliability and performance insights across our customer base. Benchmarking different charger manufacturers will allow CPOs to better understand the more reliable models.

"Techniche EV brings a new level of automation to the CPO market. With over 20 years' experience of working with fuel retailers in a similar way, we can help CPOs make sure their charging assets are back online as quickly as possible - helping to keep their uptime, revenue, and customer experience scores up and their maintenance costs down."



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# Exclusive: GridBeyond discusses its EV white paper

Electric vehicles (EVs) are becoming an increasingly attractive option for UK drivers as the cost of fuel continues to skyrocket. The growing public appetite for EVs can be seen in their 60% year-on-year growth, as revealed by the latest data released by New Automotive.

This growth is forecast to continue as the comparison company, Comparethemarket, expects new EV registrations to increase by 13% in 2023. To accommodate the growing number of EVs, the UK has also seen unprecedented levels of EV chargepoint installation this year, according to Zapmap.

Despite these promising figures, industry members have expressed concern over whether the UK is prepared to accommodate the number of EVs required to help the nation's roads become fully electrified.

The Society for Motor Manufacturers and Traders (SMMT) has warned of "softened demand" for EVs due to a lack of charging infrastructure, and the RAC says the UK was not on track to meet its 'six rapid/ultra-rapid chargepoints on every motorway service area in England' target. In light of the growing EV market and emerging hurdles for accommodating the shift, the AI-powered energy services provider GridBeyond has released an EV white paper.

## Turning UK roads electric

"EV fleets are expanding at a fast pace in several of the world's largest markets. This is being driven by governments and automakers who are promoting electricity powered vehicles as a key technology to curb oil use, whilst fighting climate change and air pollution. With significant potential to mitigate emissions and decarbonise energy supply chains, electrification is an important strategy to reach net zero goals," said a GridBeyond spokesperson.

"The aim of this paper was to explore the current landscape across key global markets and explore the policies and incentives sitting behind the drive towards EV adoption."

The report details the results of a poll by GridBeyond which saw respondents highlight energy costs and poor chargepoint connections as main barriers to the uptake of EVs. Other challenges highlighted by the poll include:

- \* **Vehicle and charging costs** – although cheaper to run, EVs are generally more expensive to buy than their fossil-fuelled equivalent. The cost of charging is also dependent on using a public chargepoint or a domestic one.
- \* **Battery technology** – Despite significant improvements in the technology, EV use is still limited by battery range and charging times.
- \* **Consumer awareness** – Many drivers may still be unaware of the significant cost savings offered by EVs.
- \* **Government policies** – Government-backing through new or updated existing policies could significantly bolster the uptake of EVs.

"Addressing these challenges will require a collaborative effort from automakers, governments, and other stakeholders to make EVs more affordable, increase charging infrastructure, improve battery technology, educate consumers, and create supportive policies and incentives," continues GridBeyond.

"The UK has committed to net-zero carbon emissions by 2050 and transport is currently the largest emitting sector of the economy – responsible for 25% of UK greenhouse gas emissions.

"Ultra-low emissions vehicles (ULEVs) – which includes EVs under the UK government definition – represent a small percentage of the overall vehicle fleet but the number is growing fast. The number of ULEV vehicles in the UK has increased from just under 9,000 at the end of Q1 2010 to 991,000 at the end of Q3 2022."

GridBeyond adds that the UK government has used a variety of strategies to encourage the uptake of EVs, notably: the transport decarbonisation plan; the Zero Emissions Vehicle (ZEV) mandate; grant schemes for electric vehicle charging infrastructure; and Taking charge: the electric vehicle infrastructure strategy released in March 2022.

## The V2X revolution

"Vehicle-to-everything (V2X) is the overall term for different forms of bi-directional charging and discharging of the EV battery, including vehicle-to-grid (V2G), vehicle-to-building (V2H), and vehicle-to-load (V2L)," explains the white paper.

"This means that when power supply is low and demand high, connected EVs can release power back into the electricity network or the site on which they are parked."

According to the white paper, this function means that V2X technologies have the potential to revolutionise the way we use and manage energy.

The white paper highlights the consumer benefits of V2H and V2L as a smaller-scaled version of V2G, supplying homes or site power networks with cheap energy during peak times.

"For end users, V2X technology can provide an additional revenue stream. EV owners can sell the stored energy in their vehicles' battery back to the grid during peak demand periods. This can help offset the cost of owning an EV and make this clean energy technology more affordable," says the white paper.

"With the electrification of transportation, EVs – especially fleet EVs with centralised charging depots or office buildings with charging infrastructure – could potentially help the decarbonisation of the grid and earn fleet owners new revenues.



# Facilitating the electrification of UK roads – The road ahead

By Lena Dias Martins

The National Grid ESO's (ESO's) 2023 *Future Energy Scenarios* (FES) predicted that between 20 and 37 million battery electric vehicles (BEVs) will be on UK roads by 2050, depending on the speed of the nation's electric transition.

Already, the uptake of electric vehicles (EV) is accelerating as demonstrated by recent figures released by the Society of Motor Manufacturers and Traders (SMMT) which showed that the number of EVs on UK roads had grown to just over 1 million in April 2023.

SMMT figures also showed that BEVs were the second most popular fuel type in April 2023 with new registrations increasing by over 50% to 20,522 making up 15.4% of all new UK vehicle registrations.

EV popularity grew from there as July 2023 saw a 28% year-on-year increase in EV registrations, the most growth since 2020, according to SMMT.

To facilitate the growing number of EVs, the Department for Transport set a target of 300,000 public chargepoints by 2035 in its *Electric Vehicle Infrastructure Strategy* published in March 2022.

Reaching this target will require a significant acceleration in chargepoint installation rates as, according to the EV chargepoint mapping service Zapmap, the UK had only 45,737 chargepoints in July 2023.

The Zero Emission Vehicle Mandate (ZEV), which closed its consultation in May this year, includes regulation to help accelerate the UK's transition from internal combustion engine (ICE) vehicles to EVs.

The ban on the sale of ICE vehicles was recently delayed from 2030 to 2035 by Prime Minister Rishi Sunak.

Set to come into force in January 2024, the UK government has been under increasing pressure to delay the mandate due to fears of investment reduction and job losses. This has been met with outrage from some members of the industry such as the trade association, ChargeUK, who wrote a letter to Rishi Sunak urging Prime Minister to "stand firm" on the mandate.

Although the UK has begun to build out promising groundwork for the transition to EVs, questions surrounding current regulations and the nation's ability to facilitate the electrification of its roads remain.

## Building an EV-ready grid

"One of the biggest challenges to facilitating EV uptake is that the UK's ageing electricity network was never designed to handle the kind of power flows that will come from private and public

charging points," says Jon Hiscock, director and CEO of the engineering company Fundamentals.

"Rebuilding the whole national infrastructure is not an option as the cost would be unacceptable so change needs to be foreseen and carefully managed to ensure UK infrastructure can manage capacity and demand on the network."

Grid infrastructure continues to be at the forefront of the decarbonisation conversation in the UK. As Hiscock notes, the grid was built to receive energy from a handful of large generators rather than the thousands of smaller generation sites that will be needed to create a net zero future.

Grid connection times were identified as a barrier to the electrification of UK roads by the SMMT upon the release of its June 2023 production statistics. Although the organisation's data showed that EV year-to-date production increased by 71%, SMMT's chief executive, Mike Hawes, warned that the mass switch to EVs is still being held up by a lack of "affordable and fair and timely" grid-to-chargepoints connections, as reported in an article by the Financial Times.

At present there are number of solutions being explored by National Grid, ESO, Ofgem and the government to solve the grid connection conundrum.

According to the Energy Networks Association (ENA) network operators will deliver £22.5 billion of investment over the next five years towards improving grid infrastructure and increasing the capacity that is able to travel throughout the grid.

As the transition to EVs will take place over the next 27 years, the increased electricity demand will also be factored into existing network planning processes, as outlined in ESO's FES.

In its 2023 FES report the ESO outlined potential pathways to form a picture of how Britain might reach net zero. In each pathway the majority of consumers were required to utilise a range of renewable/low-carbon technologies including EVs to help lower costs as well as contribute to grid balancing services; further highlighting the significance of building an EV-ready grid.

Distribution Network Operators (DNOs) are also working on numerous projects and schemes to support the forecast uptake of EVs.

"We are ready to facilitate the electrification of transport and the projected uptake of EVs. We have already facilitated over 400k EVs in our licence areas and our business plan for the next five years includes scalable options depending on Low Carbon Technology adoption rates," said a spokesperson from the UK's largest distribution network operator UK Power Networks (UKPN).



Working across 135 local authorities in its remit, commercial customers, and chargepoint operators, UKPN has said it has updated its forecast according to actual roll-out plans to ensure it builds an “efficient and timely network that can adapt to market changes.” Using AI-powered forecasting tools alongside low voltage sensory data to model existing and future demand on the network, the DNO has also identified hot spots in which network capacity will need to be increased.

“We invest on the network where is required, delivering on our strategic plan for 2023 – 2028. As the country’s biggest electricity distributor, we have invested more than £6.4 billion in our electricity networks since 2011,” says UKPN.

“We are currently delivering upgrades for customers as part of the Green Recovery initiative. This is a £66 million programme fast-tracking charging capacity at Electric Vehicle charging hubs at motorway service stations, fleets of electric buses, community energy schemes and heat pumps.”

As EV numbers increase, energy consumption habits - both domestically and publicly - are going to experience a significant shift. According to Hiscock, voltage control can play a crucial role in supporting operators maximise network efficiency, limit grid reinforcement requirements and maintain service reliability.

“With more EVs coming on stream, the difference between minimum and maximum load will be increasingly exaggerated. This drives the need for increased regulation of voltage deeper into the network than has traditionally been the case,” says Hiscock.

“By better understanding energy usage on the network, providers can deliver optimised voltages, enabling networks and customer appliances to perform more efficiently and free-up additional capacity that can be used to support the growing numbers of EVs being connected.”

One of the keys to unlocking an EV-ready grid identified by Hiscock is building an energy infrastructure that can balance loads.

“To make EV ambitions a reality, several initiatives need to be fast-tracked to ensure energy infrastructure can balance loads from more intermittent power sources (e.g., wind, solar) with the peaks and troughs on the demand side,” continues Hiscock.

“As a starting point, we need to remove all the barriers which make it difficult and expensive to connect renewable generation of every type and size to the grid. And we need to incentivise and reward the people who invest in them. We also need a major push to sign customers up to smart tariffs, which reward them to consume less when demand is high and consume – and store – energy when demand is low. Network operators need to be empowered to do more with their networks, for example deploying energy storage at scale.”

### The smart way to charge

One of the key benefits of increased EVs on UK roads is the ability to use them as “de facto batteries” to store energy and distribute it into homes or back to the grid during peak times thus, providing vital balancing services.

This requires smart charging.



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All the successful pathways suggested by the FSE require increasing the implementation of smart EV charging which, according to ESO could contributed as much as a 60% reduction in peak demand by 2050.

Moreover, to achieve the FSE’s most successful pathway, which would see the UK reach net zero before its target in 2046, the UK would require a steep increase in smart energy services

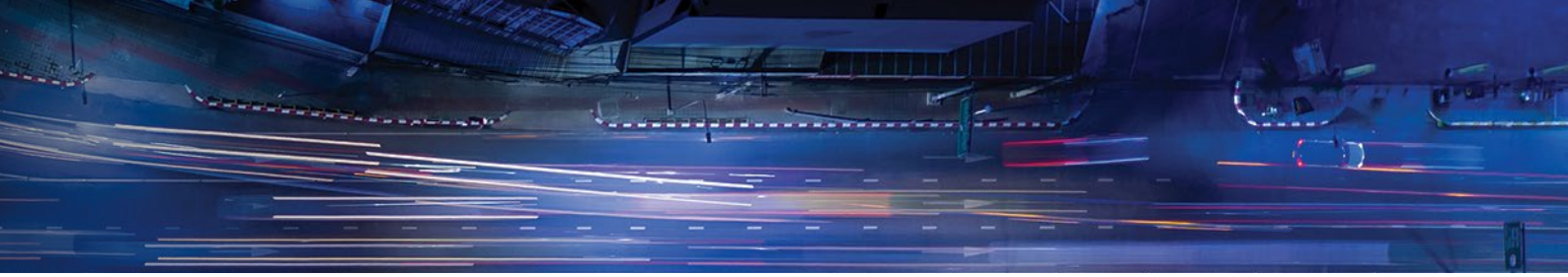
“In our net zero scenarios we expect smart charging to increase as penetration of smart meters and awareness of and access to Time of Use Tariffs increases,” says an ESO spokesperson.

“While we expect the majority of those who can charge at home to do so, their charging behaviour will depend on the technology, incentives and level of automation that is in place.

“Further information and data availability on how to smart charge, its benefits and how to select a tariff could help consumer engagement in this direction.”

UKPN has also launched a new framework to prioritise flexibility and reduce load related expenditure during RII0-ED2 by over £410 million.

The Distribution Network Options Assessment (DNOA) process involves identifying system needs, according to load growth



predictions taken from UKPN's Distribution Future Energy Scenarios as well as the capacity network.

Using this data, UKPN provides stakeholders – such as flexibility providers and Ofgem – to inform of upcoming opportunities to participate in the flexibility market.

Developing network flexibility will then provide additional capacity to enable smart technologies such as EV smart charging to participate in grid load balancing.

"According to UKPN, the DNOA plays a fundamental role as it ensures the DNO delivers new network capacity at the lowest cost, taking into account services that new technologies then provide to the network such as EV smart charging.

"The flexibility market is key to supporting the electrification of mobility, and the DNOA is an enabler of that because it gives the marketplace a transparent, long term view while enables us to plan investment in our network effectively.

"It also provides the transparency, speed and independence needed to unlock the benefits of a thriving flexibility market and deliver more than £400 million of benefits to customers by 2028."

Smart charging requires consumer participation, be that by scheduling to charge during off-peak times, such as at night or distributing energy back to the grid. According to UKPN it has seen "ever-growing" interest from new market participants growing its flexibility market from nothing to 5GW in five years.

In order to increase consumer interest, the DNO called for the continued rollout of smart meters, the Mandatory Half Hour Settlement – part of Ofgem's market reform the settlement will require energy supplier to offer customers a half hourly settlement – as well as increased information surrounding the financial and carbon benefits of smart charging.

Coordinated national and local flexibility markets will also play a role in enabling smart charging by giving domestic consumers clear signals on how and when to charge their EV. Following trials with suppliers and aggregators demonstrating consumer-response to smart charging, UKPN is currently running a project – Shift 2.0 – exploring the potential for such locational and dynamic price signals to develop market-led propositions for smart charging.

"The key is to create an accessible and transparent marketplace that creates opportunities for energy suppliers to incentivise their customers to change charging behaviour," says a UKPN spokesperson.

"We also acknowledge that there's currently a disparity in access to smart charging, with those who use public charging at risk of exclusion. We participated in SmartSTEP, a government-funded

trial for public smart charging, which demonstrated its technical feasibility. We are keen to do more work in this area to find ways to make smart charging mainstream for at-home on-street charging."

Night tariffs are also a viable way for consumers to benefit from smart charging. By charging outside of the core peak demand period (4pm-7pm) EV drivers can lower grid demand whilst being reward with a cheaper charging session.

Smart tariffs are being increasingly popular as consumers become aware of their economic benefits – this is positive news in terms of grid balancing.

There are a number of smart and flexibility EV tariffs available at the moment such as 'Intelligent Octopus' by Octopus EV, OVO Energy's 'Charge Anytime' as well as a new partnership between EV charging infrastructure provider Pod Point UKPN to provide a service allowing EV charging schedules to match renewable generation.

Smart charging could be especially effective when used in EV fleets, as structured responses to energy signals across a fleet of EVs would provide a valuable balancing service. Smart charging also offers a number of benefits to fleet owners. According to UKPN, its electrified fleet trial, 'Our Optimise Prime trials' smart charging could save fleet depots up to £95,000 on the cost of connection and up to weeks on the time to connect.

The next stage of the Optimise project will see these flexible connections with fleet customers implemented to realise benefits for both customers and the network.

### The road ahead

The opportunities presented by electrifying UK roads reach beyond hitting targets. By using EVs as de facto batteries they can offer valuable grid balancing services, critical to enabling a net zero grid, whilst also offering economic benefits to consumers.

Significant steps have been taken to accelerate a nationwide uptake of EVs, there is still a long road ahead to ensure the EVs are as accessible as possible.

Hiscock notes that at present, the UK EV model favours early adopters, drivers who are interested in the transition, keen to be involved and have the resources to afford both an EV and a private chargepoint to access cheaper charging.

"Given that we absolutely must go electric to decarbonise transport, the priority needs to be making the transition as fair and affordable as possible, which will be a difficult balancing act," says Hiscock in his concluding remarks.

"The final thing to consider is that if taxation and fiscal policy does cause sudden changes to the take-up of electric vehicles and accelerate the transition, there is still a question mark over whether the grid will be ready in time."



# The building blocks for a booming US EV industry

By George Heynes

Photo by Tim Mossholder on Unsplash.

The decarbonisation of transportation could be one of the most influential aspects of the net zero journey. With many solutions currently being developed across water, air and land, it is no coincidence that the clean mobility sector is also primed to be one of the most profitable in the coming years.

The UK has always had a rich history with automobile manufacturing and the nation has been pushing ahead with its electric vehicle (EV) strategy which has put it at the forefront to the global EV revolution. This means countries are now looking at the UK's model and learning from it to bolster their own efforts.

One geography looking to take full advantage of the rollout of EVs is the US. The nation has been recognised by the International Energy Agency (IEA) as the third largest EV market in the world, only bested by China and Europe. In 2022 alone, EV sales increased by 55% reaching a share of 8%, according to the IEA's *Global EV Outlook 2023: Catching up with climate ambitions* report. Adding to this, at the end of June 2023, the US hit the 4 million mark for EV sales.

This growth is not set to slow down as we approach 2030. Through the introduction of new policies aiming to spearhead the growth of EVs in the US, it is predicted that the US' market share will double to 20%. Central to this is the Inflation Reduction Act (IRA) which, combined with other policies could help deliver a 50% market share for EVs in 2030, in line with the US's national target.

It's important to highlight some of the policies that are helping to spearhead the development of the US EV market. The IRA is anticipatedly playing a major role in supplying funding for the EV sector and reducing carbon emissions, but the Infrastructure Investment and Jobs Act (IIJA) is also aiming to accelerate the EV revolution in the States.

The IIJA legislation aims to commit US\$7.5 billion (£6.01 billion) to build out the first-ever national network of EV chargers in the US, a White House briefing statement read: "EVs are a critical element in the Biden-Harris Administration's plan to accelerate the adoption of EVs to address the climate crisis and support domestic manufacturing jobs".

A major part of this legislation is supporting the development of the EV charging network along the US' extensive highways networks. For this, the IIJA announcement document stated that the bill would provide funding for the deployment of EV chargers along highway corridors to facilitate long-distance travel and within communities to provide convenient charging where people live, work, and shop. A major emphasis would be placed on rural, disadvantaged and hard-to-reach communities.

The Biden administration is also setting ambitious targets to create confidence in the rollout of EV charging stations across the nation. For this, the government established a target to add 500,000 new EV charging stations across the US by 2030. This a

key aspect with EV charging infrastructure required to be scaled in parallel with EV adoption to cater for the growing uptake. Crucially, it also sends the correct investment signals to the industry.

Despite the growing appetite for EVs in the US, there are various obstacles facing the industry - one in particular is similar to the UK. In order to sustain the projected growth for the US' EV sector and increased electrification, there is a requirement to scale the grid infrastructure and generation capacity.

To solve this issue, the Biden administration launched the "Building a Better Grid" Initiative to catalyse the nationwide development of new and upgraded high-capacity electric transmission lines. Due to increased electrification, the government believe that the US needs to "expand electricity transmission systems by 60% by 2030 and may need to triple it by 2050". Having greater capacity can help rollout EV charging infrastructure and support the EV market.

EV charger reliability also continues to plague much of the US, much like Europe and the UK. A recent report released by J.D. Power indicated that 20.8% of EV drivers using public charging stations in the first quarter of 2023 experienced charging failures or equipment malfunctions that left them unable to charge their vehicles, decreases confidence in the EV market.

It is clear from an international standpoint that the US is well on its way in establishing itself at the forefront of the global EV sector. Although it may still be considered to be in its infancy and is slightly behind other international markets, it would be rash to rule it out as a potential hotspot for the technology. With political movement and legislations bolstering the traction behind the market, the next five years could well see the US EV sector boom.

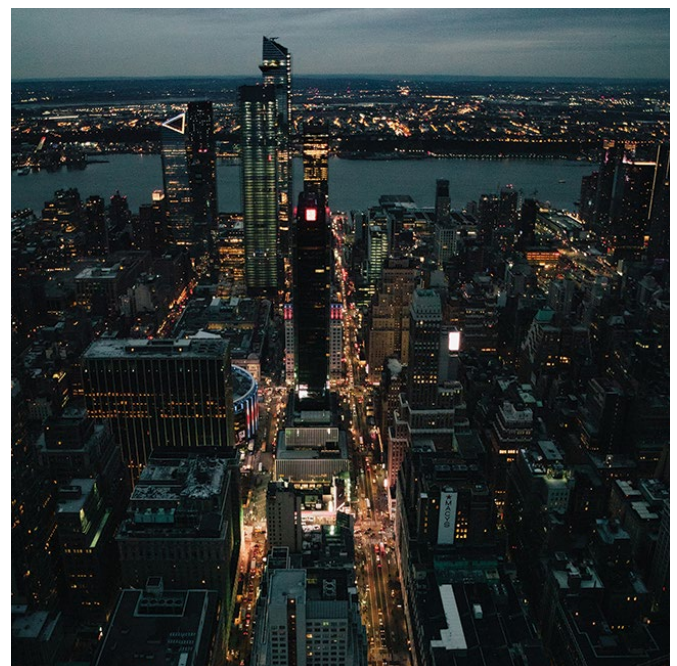


Photo by Nick Night on Unsplash.

# How EV companies are leveraging customer data to optimise their services

By John Lubbock

As more and more devices connect to the internet and send their data back to be collected and analysed, we are creating ever more inventive ways to make use of that data, with the latest developments in AI and machine learning like ChatGPT using huge datasets to create useful text outputs.

The same is true in terms of smart cleantech products like electric vehicles (EVs), battery storage, solar PV and heat pumps, all of which produce data and need to be managed and optimised for the benefit of both companies and customers. However, a recent study has found that renewable energy companies are not using their data to optimise services as successfully as they could be, while 40% of energy companies are finding it hard to hire data scientists.

## What can data help companies optimise?

Within the EV sector, investors and chargepoint companies need to look at data on population demographics and patterns of demand for existing chargepoints to decide where to place new infrastructure. Drivers also want to know how far they can travel on their current electric charge, and where charging infrastructure is likely to be available.

At home, consumers with batteries and EVs who may be on variable electricity tariffs with suppliers like Octopus or OVO need to optimise these batteries to charge when electricity is cheap due to low demand, and discharge when demand on the grid is high and they can receive a higher price for their energy.

The energy grid is becoming more and more complex, with market-wide half-hourly settlement being introduced into energy markets in 2026 to give a much more accurate picture of real time energy consumption across the UK. That relies on the rollout of smart meters reaching saturation.

Oliver Bridges, the head of energy data at NTT DATA UK&I says that half-hourly settlement "will drive huge change within the retail industry. What I believe it will lead to is [that] only those suppliers who are taking advantage of the 'Time Of Use' tariffs will be competitive in the market. We will see lots more innovation in tariffs and things like that."

The implementation of half-hourly settlement and the full smart meter rollout will also enable other technologies like vehicle-to-grid (V2G), a topic discussed in the EV Infrastructure Report, or home-to-grid (H2G) flexibility. Bridges says that V2G is going to help drive further adoption of EVs, as people see the advantages of providing that flexibility to the grid.

There are lots of companies that employ data scientists to work with their data and optimise their services, and we spoke to a number of them: Pod Point (charging infrastructure), Kaluza (OVO's flexibility optimising software), Octopus EV (EV optimisation) and Chargetrip (EV routing and range prediction).

## Chargetrip

Chargetrip is an EV routing and range prediction engine and also offers a variety of services for building e-mobility applications as well as simulating electrification for commercial fleets. Pieter Walker, chief operating officer and founder of Chargetrip recently posted about his company's RangeSpider tool on LinkedIn.

"This is what range really looks like. Anyone with an EV knows that range is not a number. Why are we still acting like it is? So much impacts range. Driving speed, elevation, weather, the list goes on. This is why EV lovers and skeptics alike don't trust range figures. Instead of writing range, we should be showing it. This is why we at Chargetrip built the Range Spider," Walker said.

Chargetrip says it "sources real-time station data, road data, weather data and vehicle data. These are used in combination to understand energy consumption, traffic, road speeds, road closures, amenities, station availability, and other factors in order to optimise routes and accurately predict energy consumption for any EV in any situation."

The company has an in-house data team consisting of both data scientists and data engineers. These data scientists build energy consumption models using external condition and driving style data to give a reliable measurement of what vehicles will consume in any given real-world driving route. This provides a more accurate picture than the numbers given by manufacturers which are measured under perfect conditions.



They also use historical data to understand charge station availability, "so that we route our customers through stations with the highest probability of availability, improving the broken charger problem for drivers," it said.



These tools help EV drivers and fleets plan routes that are designed for the exact vehicle model, driving style, location, and weather. It can also help companies simulate their fleet electrification process by understanding their energy demand, vehicle requirements, charge-scheduling, on-route charging, emissions data, and cost savings.

As the charging network is rolled out and more EVs are on the roads, data from EVs will be used to understand driver patterns, which areas lack infrastructure, and energy price fluctuations, and will be further used to improve routing for drivers and decision making for companies switching to EV fleets.

### Pod Point

For chargepoint company Pod Point, data is vital to know where to place its infrastructure. The company sells chargers for domestic, workplace and destination locations. From these, Pod Point accumulates data which is used throughout the company's business, from sales, to finance, operations, supply chain, sustainability and marketing.

James McKemey, head of policy and public affairs at Pod Point, says that "charging data itself is critical to developing our strategy in terms of deploying charging infrastructure and developing services upon it. Analysing charging data from home chargers is critical to determine the viability of performing demand side response activities to assist grid operators."

The company also analyses utilisation data to determine when customers should provide additional charging infrastructure at their sites, and charge event data to determine product enhancements that improve customers' charging experience.

Pod Point has a data team who field data requests from the wider business as well as in-house marketing insight analysts. The data team's work also includes monitoring and deriving insights from customer feedback to improve product features, and understanding how people feel about and interact with the company online to improve audience engagement.

The Pod Point App has also been integrated into the National Grid Carbon Intensity forecast so as to indicate to EV drivers the optimal times to charge to reduce the carbon footprint of their charging, and of their driving.

### Kaluza and Octopus

We also spoke to two energy companies who use software to optimise EV charging: Kaluza and Octopus Energy.

Kaluza is part of the OVO Group and the energy supplier uses its software platform to automate downstream 'meter-to-cash' operations and optimise behind-the-meter energy consumption for energy retailers. "We offer energy retailers and device manufacturers an out-of-the-box managed charging experience for their customers with connected domestic devices, such as

EVs, to shift energy use to periods when renewable energy is more abundant and demand on the grid is lower," according to the company.

Kaluza's optimisation engine decides when to charge EVs on a minute-by-minute basis, using a range of real-time data inputs from the grid, the devices themselves and the customer app. This exchange of data and commands to devices allows Kaluza to precisely shift charging and maximise the cost and carbon savings for customers.

Kaluza uses data directly from EVs like the car's state of charge, battery capacity and energy readings. Customers tell Kaluza's app their preferences for when they want their car ready to drive. The company also uses data from energy system operators to understand energy price forecasts and demand turn-up or turn-down needs, as well as data from energy retailers such as the customer's energy account details, electricity tariff and meter reads.

"Kaluza is able to unlock value from the energy and flexibility markets and innovate rewarding propositions for EV drivers," says the company. Like the other companies we talked to, they also employ data scientists who "help energy retailers and system operators to forecast load patterns so that they can determine how much dispatchable capacity is available across different time horizons."

"They also do forecasting of short-term energy price trends. Combining all of this data, our data scientists are then able to create simulation models that calculate potential value from flexibility under various scenarios," Kaluza adds.

One of the main themes to the rise of data is therefore in the flexibility it offers, both for the companies managing the supply of energy to the grid, and to the customers using it. This flexibility is becoming more and more possible as battery storage and demand flexibility services are rolled out by companies like OVO and Octopus.

Data enables customers to get better financial value from energy tariffs and propositions that reward flexible charging behaviour. There's also potential value for EV companies in the integration and sharing of data with other domestic connected energy devices, such as solar generation, which can optimise customers' cost and carbon footprint for their household energy use.

Data can also enable a more seamless customer experience through personalisation, while customer behaviour data can be used to upsell relevant products, such as energy tariffs tailored to their unique usage patterns and personalised insurance rates based on their driving behaviour.

NTT DATA's Bridges says that it was good to see companies like Octopus offer tariffs that effectively offer customers free electricity when there is surplus energy.





"That is essentially, you know, getting down to that principle of: where is surplus electricity?", Bridges says. "How does that affect the market? Does it drop the price? Brilliant, then you can do stuff with it, you can download it into battery farms and do whatever."

All this relies on the result of the government's reforms to the energy markets, which are due to be clarified next year.

Octopus Energy also helps its customers optimise the performance of their EVs through its own software platform, Kraken, which the company says processes billions of rows of data per day.

"We use data in a multitude of ways to benefit all sorts of things including forecasting of renewable energy generation, EV charging, tariff pricing and payment plans. One of the most important areas where data has proven to be incredibly useful is in the move to 'consumer demand flexibility' - where we ask customers to use more or less electricity when the grid has periods of high or low supply," says the company.

Like Kaluza, Octopus uses customer data to let grid operators know when and how 'consumer demand flexibility' could help stabilise the grid and prevent blackouts or wind curtailments (turning off wind turbines to reduce supply).

"While it's a relatively simple concept, the tech and data needed to work with the grid operators is extensive, and Octopus' proprietary Kraken system makes it easy. We've even begun implementing changes like this into our own EV tariffs, in the form of Intelligent Octopus (IO)," the company says.

As with OVO's Kaluza platform, customers tell IO when they want their EV charged by, and IO automatically maps out the cheapest times to charge their EV overnight, and decides when to not draw energy from the grid. This saves customers money but also helps to reduce grid system costs, which usually end up being added to energy bills anyway.

As with all the other companies, Octopus employs data scientists who help decide pricing, map renewable generation and developed Octopus's internal AI-based tool for customer support.

### **The future of energy data**

As we connect more and more devices to a digitalised electricity grid, we are creating mountains of new data which can be captured and analysed to provide valuable insights and optimise performance of renewable technologies. Companies like Octopus have these capabilities baked into their platforms, while EV chargepoint operators and smaller companies like Chargetrip are developing innovative data analysis tools which allow them to provide customers better services.

The renewable energy sector is part of the tech sector now, and the use of digital technologies brings home how much more

transparent, customer focused and sustainable the sector is compared to energy production in the past. We can now see where our power comes from and learn to use it in the most optimal way, wasting as little as possible.

This data can be used to empower both companies and consumers, and Bridges indicates that improved energy data will allow network companies to reduce their liabilities by being able to find problems in systems before they arise, as well as using AI to interpret the big data that's coming from all the sensors available.

"The IoT on the grid, bringing that back ensuring that we're fixing things before they do, I think that's already happening. For balancing, there's a lot of automation put in place, but both for maintenance and reliability. I think that will be a big factor, obviously, when you look at the trading that will take place that will all be data driven," Bridges says.

Bridges believes that the result of the government's Review of Energy Markets Arrangements (REMA) will likely suggest a move away from national energy pricing to nodal pricing, which better reflects demand and electricity prices in different areas of the country. He says: "There's a massive opportunity there to understand price differentials and how it's going to work from one node to another. I think we will take learnings from the US, New Zealand that if we do go down the nodal route, they're already doing that."

The demand for data scientists and analysts in the renewable energy sector is even leading to skills shortages, and these will need to be filled by training more people. As more and more data is churned out by smart technologies, the potential for using this to improve services, optimise performance and manage energy grid demand is only going to grow, and the most successful companies will be those that capture this data and use it to provide the best value and services to their customers.

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# EVIEs Category Spotlight



Solar Media's Electric Vehicle Innovation and Excellence Awards (EVIEs) have celebrated innovation and excellence in the EV sector since their launch in 2019.

Following the success of the awards, a number of new categories (listed below) have been added this year to continue showcasing the EV sector's most notable achievements.

All awards will be presented during a ceremony at The Brewery in London on 21 November 2023.

## EV Scale-Up of the Year

This award will recognise companies that have gone from strength-to-strength in recent years, growing beyond start-up scale.

The award is specifically targeted at companies under five years old that have grown by at least 20% (in employee numbers or turnover) in the last three years and have a profitable and scalable model.

## Special Recognition – Company

This category is geared towards companies that have been recognised as inspirational within the sector.

Companies will be assessed on their wider impact on driving forward the industry as much as the success of the company itself. Leadership, dedication and ingenuity will be acclaimed with this award.

## Special Recognition – Person

The Special Recognition award aims to celebrate the achievements of individuals that have truly made a mark on the EV sector. The judging panel will be looking for individuals that show dedication to the sector through resourcefulness, leadership and innovation.

## Fleet Electrification Strategy of the Year (Under 100 Vehicles)

This category is open to both private and public sector companies that have recently undertaken their fleet electrification strategy or initiative and now have their first vehicles on the road (under 100).

Looking beyond the roll out of electric vehicles, this award aims to recognise an excellent wider strategy, which can include anything from power procurement, employee engagement, energy management or the adoption of new technologies.

## Fleet Electrification Strategy of the Year (Over 100 Vehicles)

Aimed at private and public sector companies with over 100 vehicles on the road, this award will recognise an advanced fleet electrification strategy helping transition large swathes of a company's fleet to low-carbon vehicles.

This award will recognise an excellent wider strategy, which can include anything from power procurement, employee engagement, energy management or the adoption of new technologies.

## Best New Product (C&I & Public)

Splitting from the joint Best New Product and Services award presented at last year's ceremony, this category will recognise product manufacturers with best-in-class tailored offerings for businesses, local authorities, councils, charging networks, and any non-residential EV charging application.

All products specifically targeted at use in home settings are encouraged for this award, accompanied by customer testimonials detailing the tangible benefit the product has had for EV customers.

## Best New Services (C&I & Public)

This award is specifically for service providers with excellent tailored offerings for non-residential EV charging application customers.

Splitting from the joint Best New Product and Services award presented at last year's ceremony, the category looks for direct reference to how the service stands out from its counterparts, figures relating to scale and its uptake, as well as customer testimonials.

## Best New Product (Domestic)

The Best New Product award will celebrate outstanding consumer products in the EV industry aimed at home users.

Any product launched between 1 September 2022 and 4 August 2023 is eligible but they must provide customer testimonials, figures relating to scale and uptake to demonstrate its tangible benefit to the EV industry.

## Best New Services (Domestic)

This category aims to celebrate exceptional consumer-facing services targeted at domestic EV users. Any service launched between 1 September 2022 and 4 August 2023 could win this category.

This award will be given to a new domestic service that stands out from its market counterparts, demonstrate a real benefit to domestic EV customers.







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The Electric Vehicle Innovation & Excellence Awards are designed to shine a light on innovation and excellence in the emerging EV sector. Are you interested in sponsoring a category?

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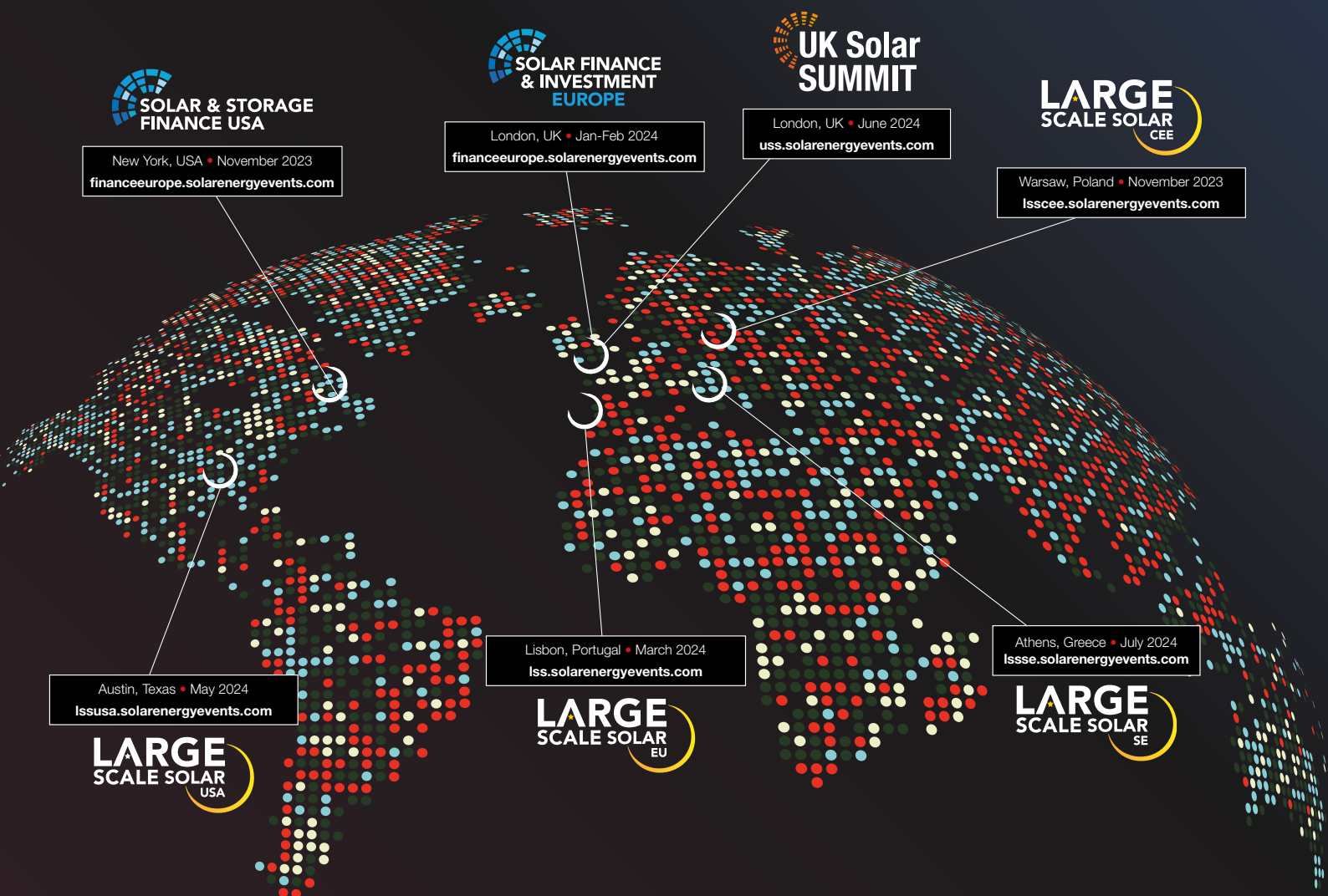
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