

Electric Vehicle Charging

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Introduction

In June 2019 the UK became the first G7 nation to make a legally binding commitment to reaching net zero greenhouse gas (“GHG”) emissions in order to honour commitments made under the 2015 Paris Agreement. The commitment was to do so by 2050.

Statistics published by the Government in March 2020¹ report that in 2019 the UK’s GHG emissions were 45% below 1990 levels, demonstrating that significant progress has been made on the path to decarbonisation. However, in contrast to energy supply, for which an estimated reduction of 63% of CO2 emissions has been achieved since 1990, emissions from transport have fallen just 5%. As a result, the transport sector has been the largest contributor to the UK’s domestic GHG emissions since 2016², overtaking the energy sector.

In that context, the UK Government is due to publish its Transport Decarbonisation Plan ahead of COP26 in Glasgow November 2021. Consistent with the Road to Zero strategy paper it published in July 2018, this is expected to reiterate the importance of transitioning road traffic to battery electric and other low emissions vehicles. This is not only to reduce GHG emissions but also to address the harmful levels of noxious emissions inhabitants of many towns and cities are exposed to.

It is also in keeping with a broader global uptake of electric vehicles (“EVs”) and a systemic shift that is underway in the automotive sector. The International

¹ “2019 UK greenhouse gas emissions: provisional figures – statistical summary”, Department for Business, Energy & Industrial Strategy (UK Government), March 2020

² “Decarbonising Transport – Setting the Challenge”, Department for Transport (UK Government), March 2020

Energy Agency reported³ that the number of EVs continued to expand rapidly in 2019, reaching a total of 7.2m worldwide, up 40% on 2018. Europe was the second largest (after China) EV market in 2019 with new sales representing 3.5% of total annual car sales. Whilst this proportion is still low (when measured as a total proportion of the vehicle market), year on year sales growth increased to 50% from 32% the previous year. The same accelerating growth trend is being witnessed in the UK, where 3.1% of new vehicle sales in 2019 were EVs according to the Society of Motor Manufacturers and Traders. Looking to the future, BloombergNEF forecast that EVs will hit 10% of global passenger car sales by 2025, 28% by 2030, and 58% by 2040⁴.

The acceleration in EV uptake observed in recent years is attributable to a number of push and pull factors. Governments are creating a supportive regulatory environment through both financial and non-financial EV purchase incentives. Significant progress has also been made in terms of reducing the overall cost of EVs, steadily breaking down the affordability barrier to mass uptake. This decline in cost of production is closely linked with the decline in cost of batteries and the ramping up of EV supply chains. The acceleration in EV uptake is also driven by (or at least is becoming less prohibited by) widespread availability of charging infrastructure.

One of the key barriers to EV uptake to date has been insufficient coverage of EV charging infrastructure and the associated 'range anxiety' that deters drivers from switching away from conventionally fuelled vehicles. That is why the UK Government put the vision of current and prospective EV drivers being able to 'easily locate and access charging infrastructure that is affordable, efficient and reliable' at the centre of its Road to Zero strategy paper⁵. Interoperability across these networks is also important, with the Government wishing to protect the interests of the consumer, recognising that having multiple subscriptions and multiple charging cards is not practical and will not lure the mass market of drivers into making the switch.

Another key barrier has been the relative scarcity of choice of models available to drivers when looking to purchase an EV. However, the doubling over the last 2 years of the number of plug-in vehicles eligible for the UK Government's Electric Vehicle Home Charge Scheme is evidence of the rapidly expanding number of EV models available on the market. Importantly, with declining battery prices, more and more models are coming to market at the affordable

³ "Global EV Outlook 2020", International Energy Agency, June 2020

⁴ "Electric Vehicle Outlook 2020", BloombergNEF, 2020

⁵ "The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy", UK Government, July 2018

end of the pricing spectrum. Vehicle manufacturers were already being ushered towards EV production by tightening emissions standards, but the transition is being accelerated as more and more countries introduce bans on new petrol and diesel vehicle sales at specific dates in the future. In the UK, the date was originally set at 2040 but subsequently brought forward to 2035. In November, the Prime Minister announced that it will be brought forward further still to 2030 as part of a wider 'Green Industrial Revolution' initiative⁶.

With significant progress being made in terms of consumer choice and affordability, the onus is all the more on the deployment of a charging infrastructure network with nationwide coverage to pave the way to mass EV uptake.

In line with the UK Government's push to accelerate the move to EV, there is a sense that the regulators will be keeping a careful eye on how the market develops. From a regulatory perspective there has been relatively limited legislation put in place to facilitate the roll out of EV Charging, but there is scope for Ministers to provide regulations where they feel the market is not developing holistically, including via the powers afforded to them by the Automated and Electric Vehicles Act (2018). In that context it is particularly interesting that the Competition and Markets Authority recently announced an inquiry into the EV charging market in the UK to ensure that motorists are treated fairly both now and in the future. The stated aim is to instil confidence and provide support to the industry as it moves forward. Clearly, this will be a delicate balancing act in a sector that is still finding its feet.

We recognise that responsibility for decarbonisation and achieving net zero rests not only with governments but with all members of industry and society. In that context, we investigate in this report what role investors and lenders are playing (and could play) in facilitating the deployment of EV charging infrastructure in order to expedite the electrification of the transport sector.

Interested Stakeholders

Investment in EV charging has attracted interest from a variety of different types of stakeholders driven by contrasting incentives.

First and foremost, Governments, Municipalities, Local Authorities and other public entities have strong vested interests in either funding or facilitating the roll out of EV charging, not only to reduce GHG emissions, but also to protect against the public health risks associated with roadside air pollution

⁶ "PM outlines his Ten Point Plan for a Green Industrial Revolution for 250,000 jobs", UK Government, November 2020

and stimulating the emergence and growth of a green economy.

In its Road to Zero strategy paper, the UK Government stated that it intends to ‘monitor market developments to determine whether any significant gaps in charging infrastructure provision appear over the medium term, and consider whether there may be a case for direct central government support in areas of market failure’. This might be interpreted as saying that the strategy at this stage is to allow the private sector to deliver a nationwide charging network helped by a supportive policy framework.

Two notable financial commitments made by the UK Government to date, alongside various grant schemes targeted at prospective EV drivers, businesses and local authorities, have been the Charging Infrastructure Investment Fund (“CIIF”) and the Rapid Charging Fund (“RCF”). Zouk Capital was selected to manage and invest the CIIF, on a commercial basis, with the Government committing to match up to £200m of private sector investment. Through the RCF, announced in the 2020 Budget, the Government pledged a further £500m specifically to support businesses with the cost of connecting charge points to the grid. Such a commitment suggests that there is concern that the cost of such connections, which can be significant from the perspective of a viable standalone business case, could be a cause of market failure. Both of these funding schemes are intended to ‘crowd in’ private sector investment.

Alongside targeted grant funding schemes the UK Government has made available two pots of capital to support EV charging roll out:

Charging Infrastructure Investment Fund

- Aim: ‘to catalyse the rollout of electric vehicle charging infrastructure’
- £200m of funding to be matched by the private sector and to be invested on a commercial basis
- Zouk Capital appointed fund manager

Rapid Charging Fund

- Aim: ‘to assist where the electrical connection costs of upgrading sites to meet future charging demand is not commercially viable’
- £500m of funding to be made available to meet a ‘portion’ of grid connection and upgrade costs

A wide range of private sector participants have been drawn to EV charging as an investment opportunity, not only by the potential for market expansion but also by the strong alignment with ESG objectives. Various oil and gas companies, including Shell, BP and Total have been making strategic acquisitions of charge point operators (“CPOs”) to create their own e-mobility businesses, perhaps with the aim of future proofing their own business models. In November 2020, Total was named as the winning bidder for a concession

tendered by the Council of Paris to expand and modernise the city’s EV charging network over a 10 year time frame. Many utilities have made similar moves with the likes of Engie, EDF, Fortum, Vattenfall, Iberdrola and others acquiring CPOs, perhaps recognising that offering EV charging could be an important way of protecting the longevity of their customer relationships and remaining competitive. Vehicle manufacturers are also strongly incentivised to ensure a sufficiently wide reaching charging network is rolled out in order to unlock demand, given the sums of money they are investing in developing new EV supply lines.

In recent years the EV charging sector has attracted capital from a wide range of investor types, including:

- **Infracapital’s** investment in Zenobe (Nov-20) and acquisition of Fortum Recharge (Apr-20)
- **EDF’s** acquisition of Pod Point (Feb-20)
- **Cube Infrastructure Fund II’s** investment in Engenie (Jul-19)
- **Engie’s** acquisition of Charge Point Services (Jun-19)
- **BP’s** acquisition of Chargemaster (Jun-18)
- **Meridiam’s** acquisition of Allego (May-18)
- **Shell’s** acquisition of NewMotion (Oct-17)

Financial investors have also taken an interest in EV charging infrastructure. As with most industries a lot of the early stage funding has been sourced from venture capital and similar sources but more traditional institutional investors, including infrastructure funds, are beginning to deploy capital into EV charging. For example, Infracapital recently acquired a majority stake in Fortum’s Nordic EV charging business Fortum Recharge. Similarly, Meridiam was among the early movers with its acquisition of Allego.

Infracapital’s most recent activity in transport electrification was its £150m investment in Zenobe who, amongst other things, offer charging solutions to electric bus operators. This investment was cited by Infracapital as representing a ‘significant opportunity to build, deliver and operate essential greenfield infrastructure across Europe’. We believe there is scope for cross-over in future financing opportunities between charging infrastructure and investment in the bus fleets themselves, which is something we look at in a separate ‘Low Carbon Series’ article [‘Zero Emission Buses in Europe’](#).

From a lenders’ perspective finding the right entry point in a developing sector is always a finely judged proposition. Nevertheless, given the stakeholders already mentioned, it is clear that there are companies that would be well placed to manage and stand behind certain risks, such as those discussed below. Particularly where broader relationships already exist, doing business with well-established counterparties could serve as a viable entry point to the market for lenders in the earlier stages of the market’s development.

Key Risks

As to be expected at a relatively early stage in the evolution of a new asset class there are a number of important risks to be considered by anyone looking to deploy capital (debt or equity) into EV Charging. We will touch on two of them – demand risk and technology risk.

From a demand risk perspective the level of charging activity and associated cash flow generation today, in most cases, does not support the levels of investment required to install networks of public charging. Assumptions must therefore be made around, inter alia, the speed of the transition to EVs; charging behaviour and patterns; and the ability to capture market share. If minimising the cost of capital is a primary concern, which it likely will be if an investor has opted to consider bringing debt into a project, demand risk will be a critical consideration.

In terms of technology, lithium ion battery cells are expected to remain the technology of choice in the EV market, at least for the foreseeable future, thanks to lithium's high reactivity and the high energy density of the cell⁷. Whilst, according to researchers⁸, energy density has doubled over the past 10 years in lithium-ion EV batteries, it is believed that there could be a further doubling by 2030. Such advancements in EV battery capacity have been matched by advancements in charging technology. ZapMap, an EV charger mapping service provider, classify EV chargers as either 'slow' (typically 3kW), 'fast' (typically 7 or 22kW), 'rapid' (typically 50kW), or 'ultra-rapid' (typically 100kW+). The ultra-rapid segment in particular is attracting large scale innovation efforts. These are commonly referred to as 'next generation' chargers and the goal of developers is to ensure charging times remain low as EV battery capacities continue to increase. Tesla V2 and V3 Superchargers offer 120kW and 250kW respectively, Ionity has begun installing 350kW chargers in the UK, meanwhile the Fast Charge consortium are reportedly developing a 450kW charger.

Currently there is a degree of future proofing built into the latest ultra-rapid charging technologies given they are currently ahead of the maximum charging speeds that today's EV models can accommodate⁹. However, as EV battery technology evolves CPOs and owners of charging infrastructure must be aware

that EV drivers' expectations will also evolve. Investors must therefore be confident that the technology being deployed is sufficiently future proofed or additional funding is earmarked for potential future retrofits.

Business Models & Funding Solutions

As the EV charging market evolves rapidly a diverse range of business models and funding solutions are beginning to emerge.

Emphasis has been placed by the European Commission and other governing bodies on ensuring that future charging stations offer a minimum level of interoperability. Interoperability concerns the ability of any EV driver to charge at any charging station, regardless of what package or subscription plan they have signed up to. Recognising that this creates a layer of complexity, and therefore opportunity, behind the physical charging itself, certain CPOs have opted to focus on the software and data related aspects of the value chain, harnessing data to enhance monitoring and maintenance services, or to facilitate smart charging. Providers of such services are able to position themselves one step removed from direct EV charging demand risk by contracting with other CPOs on a business-to-business basis rather than EV drivers. Whilst these types of 'asset light' models have the potential to make compelling business cases and potentially ancillary revenue streams, from a project finance perspective it is the 'asset heavy' business models that are likely to attract more attention.

Whilst high upfront capex requirements may cause headaches for certain CPOs looking to form business cases around the provision of EV charging solutions, for certain types of investors such capex requirements represent opportunities, provided there is scope to take a long term view on the assets' cash flow generation.

Certain investors have formed investment strategies based on facing direct EV charging demand risk. This might be possible if managing higher risk pots of capital or if return on investment is secondary to a more strategic investment incentive. Other investors managing more conservative pots of equity capital, or commercial lenders deploying senior debt, will likely seek opportunities that offer some form of insulation from demand risk. Funding structures where demand risk is mitigated, at least partially, are beginning to emerge. An example is the recent equity commitment by UK listed investment trust SEEIT of £50m to be drawn progressively over 12-18 months to fund the build out of charging assets across the UK as stage 1 of a £200m capex programme being developed by The EV Network

⁷ "The Perfect Cell", Porsche Engineering, August 2020

⁸ "Batteries for electric cars: Fact check and need for action", Fraunhofer Institute for Systems and Innovation Research ISI, January 2020

⁹ "Electric Car Charging Solutions Are Growing And Evolving", InsideEVs, February 2020

("EVN")¹⁰. EVN will reportedly fund 100% of the development, construction and maintenance costs, entering into a long term service agreement with a CPO under which the CPO commits to paying a recurring fee. Others, such as EO Charging and ChargePoint, have launched similar 'charging as a service' offerings whereby an all-in package of upfront funding, installation and ongoing maintenance is provided in return for a recurring fee. In cases where the CPO is (or is owned/guaranteed by) a creditworthy entity such a structure could be attractive from a project finance perspective.

Another structure whereby demand risk can be, at least partially, mitigated from the asset owner's point of view is where funding is provided to meet the capex associated with building charging depots for fleet owners. Examples of fleets include corporate fleets, taxis, last mile delivery fleets or other types of commercial and public transport vehicles (e.g. electric buses). In such cases the fleet owner, who might be a large creditworthy entity, could either offer an availability-type payment or could provide a minimum usage guarantee to provide an element of fixed cash flows. Such structures are beginning to emerge.

Other investors, such as Pivot Power and Gridserve, are taking a more holistic approach where EV charging is a component of a 'hub' that might include revenue generation from co-located assets such as solar generation and battery storage, as well as EV charging. Depending on the nature and diversification of the revenue streams such assets could allow for risk allocation structures that support senior debt deployment, particularly as assets develop an operational track record.

Another approach to demand risk mitigation, in the context of public rapid charging, is focusing on securing the most economically viable sites. For example, EVN's stated strategy is to identify 'premium' sites, being those with high traffic data count (prominent roadside locations, city entry/exit points, major arterial roads or inner city locations), grid capacity and long term (15+ years) lease availability. Given there are a finite number of these sites in existence, such a strategy may allow for a view to be formed by investors and potentially lenders that the risk of 'overbuild' is limited, similar to the view accepted by the infrastructure equity and debt investment market in certain cases in respect of independent fibre optic broadband network developers.

Concession based models are also starting to appear across Europe, such as the aforementioned

¹⁰ "The EV Network signs £50 million investment to develop 'next generation' of EV charging hubs", *The EV Network*, August 2020

Paris concession. In July 2020 a fund managed by Demeter, alongside a CPO owned by Vinci, was awarded an 8 year concession in South Eastern France¹¹. Responsibilities cover the maintenance of an existing network as well as capex to deploy new charging infrastructure across the region. Small scale concessions have also been tendered in the UK, including by Nottingham City Council, Oxford City Council and the London Go Ultra Low Scheme¹². The first wave of these models, particularly smaller scale concessions, will likely be financed by equity but over time opportunities to deploy senior project finance debt are certainly plausible.

Structures are also emerging aimed at mitigating technology risk. One way of dealing with this is to build a 'technology refresh' into the sizing of the concession or service agreement payments. This can be complemented with the traditional project finance concept of reserving whereby cash begins to be set aside at a certain point in time allowing a cash balance to build-up in anticipation of 'lumpy' outlays. This would be akin to the way that major lifecycle maintenance is typically managed in PPP projects. Clearly, there is technical DD required in assessing whether this is feasible from a technology standpoint. Other ways of 'future proofing' sites include ensuring site and grid connection capacity for a charging station of a certain size but beginning with relatively few chargers allowing for additional, perhaps next generation, chargers to be deployed at a later stage on a modular basis.

Our Outlook

The financial sector will play an important role in the decarbonisation of the transport sector on the road to net zero GHG emissions both in the UK and worldwide.

Over time, we expect to see many of our clients deploying capital in support of the roll out of EV charging networks, as certain early movers already have. We expect this to be through standalone charging investment opportunities, as well as charging as a bolt-on to other investments, for instance in electric buses. Our role as a leading project finance bank is to support our clients, bringing ideas around structuring and risk allocation to enable them to introduce senior debt into the capital structure of their investments. Particularly in the earlier phases of the roll out of a new technology or asset class, the role of banks in developing an appropriate risk allocation structure is key. The

¹¹ "La gestion et le développement du réseau public de bornes de recharge électrique eborn confiés au groupement formé par Easy Charge et le FMET", *Demeter*, July 2020

¹² "Procuring electric vehicle charging infrastructure as a Local Authority", *Energy Saving Trust*, September 2019

development and evolution of the offshore wind and other now well established renewable energy generation markets can be used as powerful examples in this regard.

In the early stages of EV charging as an asset class, as has been seen in other sectors, export finance agencies and other multilateral financing institutions could play a key role in attracting senior debt. The EIB has been actively supporting EV charging through commitments to trans-European EV charging networks such as Ultra E and Mega-E through its Connecting Europe Facility. In a crowded market consisting of a selection of smaller specialist providers there are also larger and more established technology and hardware suppliers that could have the ability to draw ECA backing. From a UK post Brexit perspective the Institute of Civil Engineers (“ICE”) has suggested¹³ that the formation of a UK Investment Bank with a sustainability mandate to invest in net zero aligned infrastructure could be beneficial in terms of ‘crowding in’ private finance. The recent announcement by the Chancellor of the Exchequer of a new national infrastructure bank being used to invest in green infrastructure projects alongside private sector investors to help create a ‘net zero’ economy by 2050 may be the answer that ICE were seeking. Whilst the deployment of EV charging infrastructure is already well under way with backing from the private sector, as scale increases over time such a concept could help attract longer term and competitively priced capital.

Whilst the scale of investment to date has so far, on the whole, been relatively small, we expect this to change over time. As capex requirements grow, so too will the ability of the project finance market to reduce the cost of capital and accelerate the deployment of EV charging and, in doing so, accelerate the electrification and decarbonisation of transport.

¹³ “State of the Nation 2020: Infrastructure and the 2050 net-zero target”, Institute of Civil Engineers, July 2020

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References

“2019 UK greenhouse gas emissions: provisional figures – statistical summary”, Department for Business, Energy & Industrial Strategy (UK Government), March 2020

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/875485/2019_UK_greenhouse_gas_emissions_provisional_figures_statistical_release.pdf

“Decarbonising Transport – Setting the Challenge”, Department for Transport (UK Government), March 2020

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf

“Global EV Outlook 2020”, International Energy Agency, June 2020

<https://www.iea.org/reports/global-ev-outlook-2020>

“Electric Vehicle Outlook 2020”, BloombergNEF, 2020

<https://about.bnef.com/electric-vehicle-outlook/>

“The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy”, UK Government, July 2018

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739460/road-to-zero.pdf

“PM outlines his Ten Point Plan for a Green Industrial Revolution for 250,000 jobs”, UK Government, November 2020

<https://www.gov.uk/government/news/pm-outlines-his-ten-point-plan-for-a-green-industrial-revolution-for-250000-jobs>

“The Perfect Cell”, Porsche Engineering, August 2020

<https://newsroom.porsche.com/en/2020/technology/porsche-engineering-lithium-ion-cells-technology-21927.html>

“Batteries for electric cars: Fact check and need for action”, Fraunhofer Institute for Systems and Innovation Research ISI, January 2020

https://www.isi.fraunhofer.de/content/dam/isi/dokumente/cct/2020/Fact_check_Batteries_for_electric_cars.pdf

“Electric Car Charging Solutions Are Growing And Evolving”, InsideEVs, February 2020

<https://insideevs.com/news/400305/ev-charging-evolution/>

“The EV Network signs £50 million investment to develop ‘next generation’ of EV charging hubs”, The EV Network, August 2020

<https://www.theevnetwork.com/news2/>

“La gestion et le développement du réseau public de bornes de recharge électrique eborn confiés au groupement formé par Easy Charge et le FMET”, Demeter, July 2020

<https://demeter-im.com/wp-content/uploads/Communiqué-de-presse-eborn-220720.pdf>

“Procuring electric vehicle charging infrastructure as a Local Authority”, Energy Saving Trust, September 2019

<https://energysavingtrust.org.uk/wp-content/uploads/2020/10/Local-Authority-Guidance-Procuring-electric-vehicle-charging-infrastructure.pdf>

“State of the Nation 2020: Infrastructure and the 2050 net-zero target”, Institute of Civil Engineers, July 2020

<https://www.ice.org.uk/news-and-insight/policy/son-2020-infrastructure-and-2050-net-zero-target>