

The UK's future electric vehicle charging infrastructure: A new asset class for investors and new business models for market players

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The UK has published its [Road to Zero Strategy](#), a policy roadmap for the UK's decarbonization pathway to zero emission vehicles (ZEV). In this [hoganlovells.com](#) interview, Alex Harrison, an energy partner in the Hogan Lovells London office, explores the crucial role that electric vehicle (EV) charging infrastructure will play in ensuring that the UK is able to meet its 2040 commitment to end the sale of all new conventional petrol and diesel cars and vans by 2040. He also discusses the country's 2050 aspiration that almost every car and van on the UK's roads will be zero emission and how this will create new business models and a new EV charging asset class for investors and lenders.

How is the UK's Road to Zero Strategy supporting the rollout of charging infrastructure for EVs?

Alex Harrison: The UK's Road to Zero Strategy sets out the policy measures that the UK intends to bring forward to support the uptake of zero emission vehicles including EVs. Those measures include ensuring that there is adequate electric vehicle charging infrastructure rollout so that that a lack, or perceived lack, of charging infrastructure is not an impediment to peoples' decision to switch from fossil fuel-driven vehicles to EVs.

One area on which the UK government has been focused is the challenge of rolling out charging points into the built and leased environments. For example, whether to require EV charging points to be installed in petrol stations and large fuel retailers, or in newly built commercial and residential buildings. Also, on the technical side, the UK government is looking at things like the interoperability of EV charging points to make sure they can be used by all vehicles, will function with a range of different users, and will integrate properly into the grid.

So there's a level of technical harmonization, and then a series of carrot-and-stick measures: some "carrot" to incentivize people to play in the market by giving them grants that reduce the cost of putting charging infrastructure on their premises, and some "stick" to require the deployment of EV charging infrastructure in certain circumstances.

In terms of the infrastructure, what is the major challenge? Is it not having the technical harmonization in place, or is it the cost and complex logistics of installing charging stations to meet the demand?

Harrison: I think the challenge of scaling EV charging is one of the most interesting areas in the market, because there is wide recognition that the EV revolution is happening and that the market will grow very quickly. The UK government is envisioning that by 2050 every vehicle in the country will be zero emission. For that transition to work in that timeframe, a big question for me is to what extent will the market be able to deploy the charging infrastructure needed to support those vehicles and to what extent will government need to intervene to make that happen?

This is a new area, a new asset class, a new type of infrastructure. There are a number of people out there now, trying to deploy charging solutions and there's a range of different types of technology, sizes, and speeds for charging infrastructure and a range of revenue streams and business models that businesses can target. At the moment we don't know how many charge points we will need, what type they will be — rapid, fast, or slow — or where they will be located. Nobody has a clear view on that now because it depends in large part on the number of electric vehicles that are purchased and how quickly, how the range of those vehicles increases, how quickly charge times fall, and whether users have access to residential or workplace charging. If we're able to charge our vehicles at home and they have ranges in excess of 300-400 miles, we may need to charge them on the road much less than we currently do.

In simple terms, if you're doing a long journey and you're in need of a refill, you'll want a rapid charging solution, which is going to give you most of a full charge within 20 or 30 minutes. If you're planning to charge at home or in your office while you work, you may be happy to have a slow charge overnight or during the day. Somewhere in the middle is a series of fast charging business models. For example, if you go to the supermarket or a car park, to charge while you're there in one to four hours depending on the speed of the charging infrastructure and your anticipated dwell time.

What we're therefore likely to get is a mix of slow, fast, and rapid charging solutions. The optimal balance of those across the country and the optimal locations is difficult to predict at this stage. That's one of the things that make rolling these models out on a commercial footing more difficult, because you have to predict what level of demand and what type of competitor landscape for supply will evolve.

Why do you view the EV charging infrastructure as a new asset class?

Harrison: Ultimately, we're looking at a multibillion-pound opportunity to deploy capital to support the rollout of this infrastructure. Those people in the market who are looking for investment opportunities in and around infrastructure will see this as a new opportunity to deploy capital into the space. Depending on the risk profile of the underlying investments, that may be private equity, venture capital, or classic infrastructure fund investors such as pension funds or insurance companies. They will be attracted to this sector because of the potential pipeline of projects and because the sector will have many of the fundamentals that core infrastructure assets have, but with a slightly different risk profile.

To give you one example, motorway service stations have historically been thought of as quasi monopolistic infrastructure assets with stable and predictable footfall. It's not clear at this stage

what the impact of EVs will be on that footfall and therefore it's harder to predict the long-term demand for the charging and retail services in those locations. On one view, demand may increase if EV ranges are low and charge times are higher than conventional refueling. On the other hand, demand may fall if EV drivers have access to alternative chargepoints, for example, at home, if EV ranges are high and if there is a material price differential between the cost of rapid and slow charging.

Who are the key players in the EV charging market?

Harrison: There's a wide range of corporates developing and manufacturing the charging infrastructure itself; a wide range of charging solution providers delivering slow, fast, rapid, and integrated energy management solutions; and a wide range of customers looking to purchase one-off charging solutions or seeking to partner with preferred suppliers to deploy charging solutions on their behalf. Then there are those who will finance the growth of the market from an equity and debt basis. There's a huge energy market interface, and opportunity, with the distribution and transmission network and a technology interface around the development of smart charging, charge point aggregation, and vehicle-to-grid (V2G) services. And ultimately there's the automotive interface with the vehicles themselves.

One of the most exciting places where the EV charging market may grow rapidly is through the deployment of charging solutions for fleet operators, for example, for last mile deliveries or ride sharing providers that have a captive set of vehicles that they are electrifying and need to charge overnight, during the day, or otherwise out on the street. The private sector is well placed to deploy and finance charging hub solutions on behalf of these operators.

What is the relationship between connected cars and autonomously driven vehicles and the evolution of EV charging infrastructures?

Harrison: There is a big part of this journey that focuses on what we call ACES, the automation of a driverless future, the car's connectivity, its electrification, and the fact that an increasing number of users will share rather than own their ride.

There is a big role for the charging infrastructure that's needed to support the transition — particularly the energy market and the electricity infrastructure that is needed. There are a number of energy market-specific aspects to that, like the impact on the grid from the charging infrastructure. Is there a risk that all those charging points threaten the stability of the grid or increase the cost of balancing the grid? Could they contribute to actually improving the balancing of the grid by smoothing and time-shifting demand and providing balancing and frequency control services through vehicle-to-grid electricity supply? That is definitely an area of opportunity and risk.

Can you say a bit more about the role EVs could play in supplying power?

Harrison: One of the really fun energy aspects of this is what can be done with this charging infrastructure to provide power and balancing services to the electricity grid or to corporate consumers behind the meter.

Most people, when they think of EV charging, think of the power flowing in only one direction — from the grid into the cars. But there's a huge economic opportunity to flow power in both directions — not only to charge the battery when needed, but also to dispatch power from the battery to the grid or behind the meter at times when the car doesn't need the battery.

A good example of the behind the meter potential is a long-stay car park at an airport, where vehicle volumes and dwell time are known in advance. The airport or a local business could use the power from those cars at times where there was system stress or peak load on the system. And in doing so, those businesses could save themselves money by avoiding being exposed to the highest electricity prices that occur at the peak and also to the highest system costs that are charged for being on the system at those peak times. So there is an arbitrage opportunity for businesses to effectively go off grid, to some degree, at those points of peak by relying on self-generated power.

That's one reason why there's such a fundamental energy component to the charging story, because it's not just physical infrastructure that is "dumb," in the sense of providing power in one direction at a static point in time. Smart charging will allow sophisticated demand and supply management, both when to charge the car but also in terms of possibly pushing power the other way and back onto the system or behind the meter. This will create revenue generating opportunities that could subsidize the cost of the battery, the car, or the power.

And if I look forward into the near future, what's going to happen is that instead of buying electricity from an electricity supplier, as we do now, we are likely to be buying a managed electricity service from an integrator, aggregator, or utility. This will connect power supply, with power storage, power generation through for example solar panels and energy efficiency management through smart appliances and devices. The market is getting much more sophisticated in terms of plugging all those devices together and creating energy efficiency and saving consumers money by doing so.

About Alex Harrison

Alex Harrison is an energy partner at Hogan Lovells in London. He advises clients on power generation, greenfield and brownfield project development, project and structured financing, electricity regulation, electricity and emissions trading, and acquisitions and disposals across the renewables, low carbon, and thermal power sectors. He also advises clients in relation to energy transition, aggregation, and digitalization issues; on the electrification of vehicles (EVs), transport and heat; and on the development, financing, and regulation of grid network infrastructure assets. He is profiled as a "rising star" by *The Legal 500*, which commented that he "tips the scales in transactions."

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