




# How electric vehicles can breathe new life into our cities

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Climate change and accompanying environmental degradations have had tremendous impact on our natural systems and led to new and fatal diseases, as well as decimating our global economy. But as we begin to overcome one of our generation's greatest challenges, the coronavirus, Earth Day and this year's theme of Restore our Earth reminds us of the opportunities ahead of us to make real, tangible changes to care for the natural world and avoid irreparable harm to our environment and health.

We cannot escape the fact that cities around the world face serious air pollution problems. Fossil fuel-based transport emissions can create havoc with our health. Ozone and particulate matter are two of the main components of smog and have been shown to trigger serious health issues such as asthma, chronic bronchitis and emphysema. In 2018 a government report<sup>1</sup> estimated that between 28,000 and 36,000 people die as a result of air pollution every year in the UK.

So how can we tackle transport-based air pollution at pace? One technologically available solution is to electrify our transportation systems. It has been found that electric vehicle adoption not only reduces net carbon emissions, but it also reduces air pollutants.

#### How do electric vehicles work?

Electric vehicles (EVs) do not require petrol as they run efficiently on electrically powered engines. As they don't burn fossil fuels, electric vehicles don't release harmful carbon emissions.

In a conventional vehicle, fuel is stored in a petrol tank, and a petrol engine provides the force to move the vehicle. An EV doesn't have a tank, but instead uses a rechargeable battery to supply electricity to an electric motor that moves the vehicle. As the electricity used to recharge EV batteries can be generated by clean energy sources such as wind or solar, it offers a truly sustainable and environmentally friendly opportunity to reconsider our transportation networks and make the switch to cleaner urban mobility solutions.

#### A smarter solution

If we are to deliver a future where EVs dominate our transport systems, we must

<sup>1</sup> Associations of long Associations of long Associations of long -term term average concentrations of average concentrations of average concentrations of average concentrations of nitrogen dioxide with nitrogen dioxide with nitrogen dioxide with mortality mortality (publishing.service.gov.uk)

work with urban planners and developers to create high-tech infrastructure. We do not need to start from scratch. Existing infrastructure can be redeveloped to align with our EV requirements and future goals.

We must factor clean solutions for urban mobility across our city centres and suburbs, expressway corridors and commercial properties to support this, including easy and regular access to charging facilities. As we evolve our urban landscapes to become truly 'smart', we can use data to inform our understanding of how EVs can best be incorporated into our infrastructures, and where additional support is required.

For instance, when combined with separate LoRa and Bluetooth networks, smart lighting can provide the mesh network to connect smart camera technology that is able to count traffic and identify EV vehicles. As a result, the most 'connected' councils will know exactly where to install EV charging stations to reduce the risk of stranded assets.

#### Leading the charge

As I have mentioned, ensuring we all have access to charging points is crucial. But how



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can we provide these in built-up areas where space is at a premium?

Perhaps the answer is on our own doorstep. Lock-up garages are a common if overlooked part of city landscapes, but their potential to provide a new generation of EV charging hubs is encouraging.

A lock-up garage site could make way for smart charging sites, known as Digital Community Hubs (DCHs) which combine rapid charging with 5G and Edge computing technology. A DCH will consist of 10-20 rapid charging bays and even an onsite coffee van for waiting drivers.

At SSE, we believe this could be key. To explore this potential, we have partnered with InfraTech Property Solutions (IPS) to access hundreds of lock up garage sites across the city of London and hope to pilot one site near Heathrow Airport Terminal 4 later in the year – a prime position to serve local delivery and taxi EVs. Solar and battery technology, as well as distributed energy generation will also be deployed at the hubs to ease pressure on the electricity grid.

The Mayor of London Sadiq Khan has set a target of providing 50,000 charge points across London by 2025. This project could facilitate the mass rollout of EV charging that London is crying out for as more and more consumers switch to EV. Space in the capital to build charging hubs is like gold dust, but thanks to the network of lock up garages across the city we can build a network that could charge a tenth of all EVs in London.

#### Giving back to the grid

One of the many benefits of EVs is that energy can be stored in their batteries. The very nature of an EV means that transporting this energy is easy. Furthermore, we can

return this energy to the grid using vehicle-to-grid (V2G) technology.

V2G technology enables energy stored in an electric vehicle's battery to be fed back into the electricity network. By recharging when demand is low and putting energy into the grid when it is high, V2G helps manage the peaks and troughs, balance the network and make it more efficient.

Central to the challenge of decarbonising our transport and achieving climate change targets is how we can optimise the existing flexibility within the energy system. Developing a charging infrastructure that operates in two directions so that batteries can give back as well as take from the grid is

an important part of this.

It is not only private transport that plays a part in this. Public transport solutions must also be considered. As an example, the Bus2Grid study recently launched in London could provide the city with a 'virtual power station', generating electricity from buses when not in use.

A fleet of bus batteries harnesses large amounts of electricity and they are habitual, with regular and predictable routes, driving patterns and timings. That means we can easily predict and plan for how we can use any spare electrical capacity they can offer. For example, we could use them as energy storage devices that could add capacity and help us to increase the volume of renewable energy exported onto the network when supply might otherwise be exceeding demand.

If the entire London bus fleet of around 9,000 vehicles were to be converted with the technology being used in the Bus2Grid project, it could theoretically provide enough energy to supply more than 150,000 homes.

Exploiting the potential of electric buses to act as 'mobile power stations' will be critical to the efficient running of the grid once electric vehicles of all types become commonplace.

#### A fleeting chance

Businesses with vehicle fleets have a significant role to play in enabling a greener future. But there is no 'one size fits all' approach when it comes to fleet electrification - every business has different needs and therefore a variety of approaches are required.

Strategy and planning are the fundamental







first steps when it comes to making a transition. Businesses must research the market. Setting solid foundations by understanding the options open to your business is by far the best way to future-proof your fleet for success.

It is crucial that fleet managers without a proper understanding of the EV market enlist the help of businesses or consultants with the relevant knowledge and experience. Experts can dig deep to understand your company's needs and provide a bespoke cost-effective solution to fit your fleet.

Cost is a key consideration for any business. Most businesses that rely on fleet vehicles will have crunched the numbers and understand that transitioning a fleet, regardless of size, will come with upfront costs and the need for potentially sizable investment.

What both fleet managers and business owners need to keep in mind though is that EV running costs can typically offset any immediate financial outlay. For starters, EVs have lower servicing and maintenance costs, a zero rate of vehicle excise duty and are cheaper to refuel than petrol or diesel

vehicles - all of which will drive down operating costs over time.

Organisations can reduce their initial cash-investment size by considering third-party providers to supply energy-as-a-service (EaaS), whereby customers pay for an energy service without having to make any upfront capital investment. This can help fleet managers eliminate the preliminary costs of installing and upgrading the on-site electric infrastructure needed to power an electric fleet and can play a significant role in supporting the smooth operational roll-out of new vehicles.

#### Driving change

Research shows<sup>2</sup> that some of the biggest barriers to EV sales are a lack of supply, limited availability and variety of EV makes and models, and limitations in charging infrastructure. The only thing that can overcome these barriers is public policy.

<sup>2</sup> How policy can build the plug-in electric vehicle market: Insights from the REspondent-based Preference And Constraints (REPAC) model - ScienceDirect

Transport is a key enabler for economic growth that supports productivity by getting people to work and allowing the transfer of goods and services - all keystones of the economy. It is therefore important to reconcile the need for travel with the need to reduce carbon emissions from transport and improve our air quality.

Policy makers must be bold and place the advancement of EV technologies and other decarbonisation solutions at the heart of every decision they make if we are to see success.

We also know that initiatives like these can make a real difference, and fast. While the last year has been challenging, it proved that our environment has the amazing capability to improve and restore itself. We marvelled as water cleared and fish returned to the Venice canals. Air pollution levels nearly halved almost overnight. It is not too late. But we must embrace more environmentally sound solutions now to see real, sustained improvements to our air quality and protect our environment for future generations.

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