MOVING TOWARDS MORE SUSTAINABLE FLEET MANAGEMENT WITH VEHICLE-TO-GRID SYSTEMS

An industry report on attitudes within the fleet management industry towards electric vehicles, energy provision, environmental sustainability, and vehicle-to-grid technology as a commercially-viable solution in the UK.

January, 2020

e-flex

Foreword

The future of transport is electric.

The UK government has stipulated that all new cars must be "effectively zero emission" by the year 2040.[1]

More recently, it has been suggested by transport secretary Grant Shapps that a ban on sales of new diesel and petrol cars could be brought forward to 2035 to accelerate the uptake of electric vehicles (EVs).[2]

Government grants of up to £8,000 are available to encourage private owners to purchase specified electric cars and vans, or as much as £20,000 for certain trucks and large vans.[3]

The aim is to improve air quality and make transport more sustainable and environmentally friendly.

But this will put new pressures on a National Grid already operating under considerable strain.

All UK coal power stations are set for closure by 2025[4], and while renewable energy provision is growing, it is doing so at a cost that will quickly become unmanageable. An increase of £250m in the cost of balancing National Grid energy systems from 2016-17[5] suggests that alternative solutions will soon become a necessity.

While UK-wide carbon emissions have dropped by 43% since 1990, transport is now the worst-performing sector – with emissions actually rising in the 2013-18 period.[6]

Fleet managers will be on the frontline of the UK's shift to renewable energy and attempts to cut carbon emissions, and will need to work with operatives from across business units – including energy and cyber security staff – to be successful.

This report outlines the current state of EV adoption, and assesses the viability of vehicle-to-grid technology as a means of meeting the energy, environmental, and commercial challenges faced by fleet managers.

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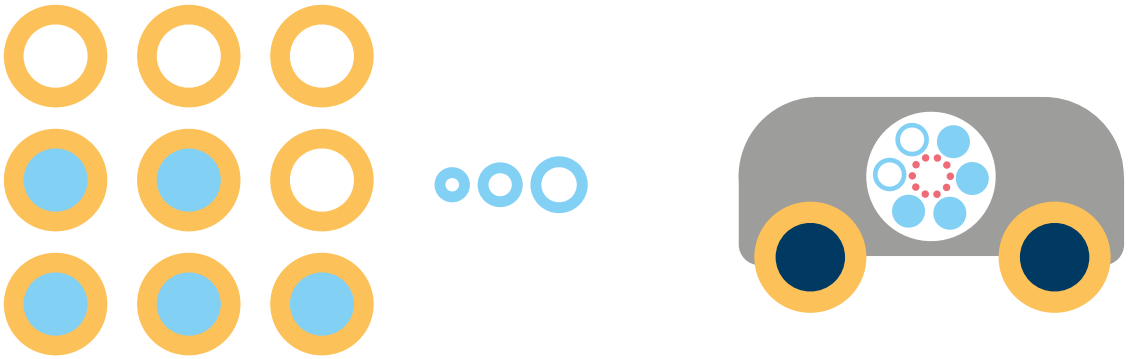


1 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739460/road-to-zero.pdf
2 https://www.thetimes.co.uk/article/ban-on-petrol-and-diesel-cars-could-be-accelerated-wn7q8pshg#
3 https://www.gov.uk/plug-in-car-van-grants
4 https://www.gov.uk/government/consultations/coal-generation-in-great-britain-the-pathway-to-a-low-carbon-future
5 https://www.ofgem.gov.uk/system/files/docs/2017/10/state_of_the_market_report_2017_web_1.pdf
6 https://www.theccc.org.uk/publication/reducing-uk-emissions-2019-progress-report-to-parliament

Executive Summary

Environmental and energy targets have become a key responsibility of fleet managers, and electric vehicles (EVs) are viewed as an effective means of meeting these targets.

There's strong enthusiasm for the technology among fleet managers.

One in four (27%) fleet managers have deployed EVs and 86% would like to in the coming years.

However, despite this enthusiasm, widescale adoption remains slow.

Barriers to adoption such as cost, trust in the technology, and organisational incompatibility continue to impact uptake of EVs.

Barriers to EV adoption, according to fleet managers:

- 55% of fleet managers cite high initial purchase price
- 48% of fleet managers identify worries about battery life
- 30% of fleet managers blame inadequate business infrastructure
- 72% of fleet managers are concerned with rising energy costs

Having more EVs on our roads will also increase strain on the National Grid.

Vehicle-to-grid technology, or V2G, represents a means of surmounting these challenges while offering commercial benefits. But as a new technological solution, it also needs to prove its value in the real world.

V2G turns an EV battery into a mobile energy source that can be charged or discharged. This frees up excess energy to power everything from buildings, to other EVs, or even to be sold back to the grid

V2G enables the full potential of EVs to be realised, through a number of possible benefits, including greater energy independence, new revenue streams, and an opportunity to significantly lower carbon emissions.

The true commercial benefits of the technology are yet to be comprehensively proven however, and further evidence of its ability to reduce costs and supply new revenue opportunities will be required before it will be broadly adopted as a first-choice solution. If proven, V2G could represent a strong accelerating factor in the uptake of EVs and the achievement of ambitious cost - and carbon emission-cutting targets.

Meanwhile, the projected benefits of V2G have been enthusiastically received by fleet managers keen to adopt new technological solutions to help them meet these targets.

72%

of fleet managers are concerned with rising energy costs

Meeting environmental and sustainability targets will require investment in smarter energy technologies and a new approach to EV adoption

Fleet managers are tasked with juggling numerous priorities. Key among these are safety and vehicle costs, but increasingly there is an expectation to achieve sustainability and environmental targets too.

More than three quarters (79%) of fleet managers say that meeting these targets is a priority, and 86% recognise the importance of reducing business-wide energy usage. Popular methods include the use of solar panels and purchasing electricity from renewable sources.

This sustainability focus is also expected to deliver commercial value to organisations. More than half (51%) of all fleet managers view a shift to environmentally friendly vehicles as a way to increase their customer base. This is in line with broader public sentiment that favours environmentally-conscious approaches to energy provision. Government research has found that almost three quarters of people in the UK (71%) are concerned by climate change, and just 1% strongly oppose renewable energy.[7]

Global initiatives such as The Climate Group's EV100, which brings together businesses committed to accelerating EV adoption, aim to make electric transport "the new normal" by 2030. Additionally, a number of large corporations have pledged to actively reduce their own carbon emissions:

- **Unilever** carbon positive by 2030
- **HSBC** 100% renewable by 2030
- **Tesco** zero carbon by 2050
- **BT** emissions down 87% by 2030
- **Sky** carbon neutral since 2006
- **Aviva** carbon neutral since 2006

Considering this context, EV adoption represents an opportunity for fleet managers.

Just over a quarter (27%) of fleet managers have deployed electric vehicles already, and almost half (49%) have considered a move to EVs but are yet to make the switch.

Those who plan to adopt EVs see it as an imminent change, with 86% of fleet managers planning to deploy EVs within the next five years.

Only 8% are willing to rule out using EVs altogether.

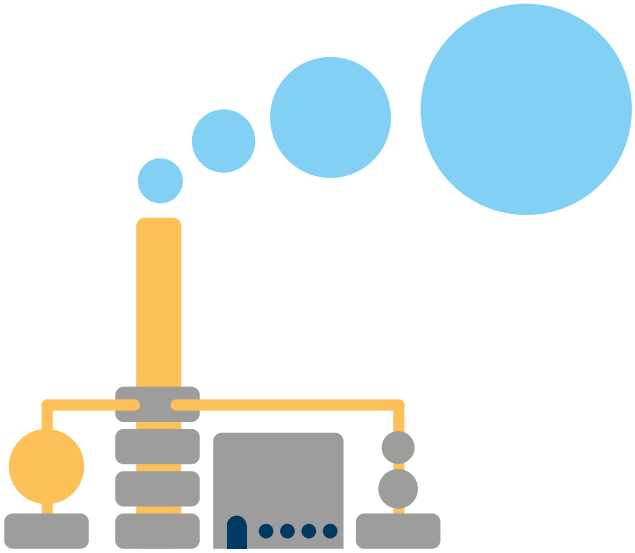
However, given the enthusiasm for sustainable alternatives, one might expect the adoption of EVs to have been faster.

As it stands, barriers to adoption fall into a few familiar categories: cost, concerns about new technology, and organisational incompatibility.

More than half (55%) of all fleet managers are put off by high initial purchase prices; 48% worry about the battery life of EVs; and 30% cite inadequate infrastructure in their business to cope with the introduction of EVs.

Of these, it's the latter that is most significant. Initial purchase prices will go down in line with supply and demand, and broader uptake will prove (and improve) technological capacity.

But introducing EVs will require buy-in from more than just fleet managers, and operational practices should reflect this.



7 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/611985/Summary_of_key_findings_BEIS_Public_Attitudes_Tracker_-_wave_21.pdf

Implementing environmental and energy solutions is not the responsibility of a single department

Responsibility for tackling environmental and energy challenges has historically been passed onto particular individuals or framed as something to be overcome via small, incremental actions.

This view is increasingly being replaced by the understanding that real impact will only come through broader systemic change achieved via a collective, collaborative response. This renewed stance is one that's popular among fleet managers.

Over three quarters (78%) agree that decisions on environmental sustainability strategy should be made in collaboration with the wider business. More than half (58%) express a desire to work more closely with other decision makers across the business, and two thirds (67%) believe that fleet and energy departments in particular should work more closely on the issue.

However, the reality is that these wishes are going unrealised.

Almost a third (30%) of all fleet managers find themselves alone in making decisions when it comes to environmental and sustainability strategies. This makes implementing new business-wide policies difficult. Fewer than half are able to reach definitive positions on issues such as environmental strategy (42%), energy usage (44%), and choice of fleet vehicles (41%). This presents an obvious hurdle to the adoption of EVs, and specifically the ability for the full potential of EVs – through V2G – to be realised.

Significantly, this impasse doesn't stem from disagreement between energy and fleet departments. A mere 11% of fleet managers refuted the suggestion that energy and fleet departments have the same priorities.

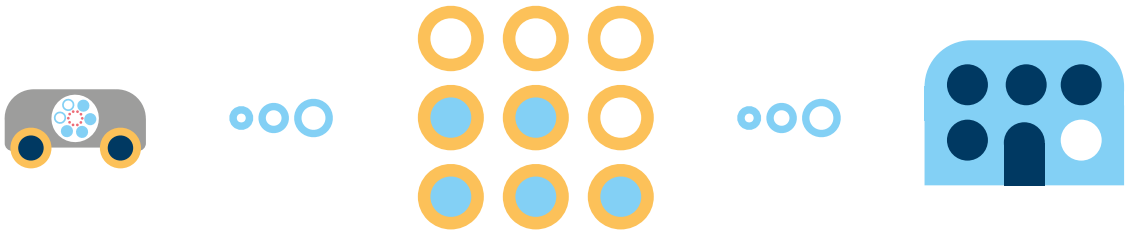
The desire for change appears to be present, and there is some agreement on what this change should look like. But beyond the consensus between energy and fleet managers, organisational and structural hurdles appear to be preventing effective implementation.

Most fleet managers (65%) agree that introducing electric vehicles could help their business as a whole meet sustainability targets, but getting buy-in from further up the chain of command is proving difficult.

Senior decision-makers working across other business units harbour scepticism about EVs. More than two thirds of fleet managers say that this scepticism is unlikely to be overcome without a financial incentive. In fact, as many as 67% argue that being able to offer financial incentives is essential for EV rollout to occur.

67%

of fleet managers believe fleet and energy departments should work more closely on environmental and energy targets



Vehicle-to-grid technology has an important role to play in overcoming barriers to new energy technologies, cleaner fleets and environmental targets

Rising energy costs are a continuing cause for concern for 72% of fleet managers.

Not only that, 49% of fleet managers who took part in our survey surprisingly reported that they are uncomfortable relying solely on the National Grid for all their energy needs. And more than a third of fleet managers have faced disruptions (which themselves represent a cost) as a result of power outages in the last year. Findings are likely to have been influenced by the wide spread outage that occurred in August 2019.

One solution that can help the Grid become a more resilient provider is vehicle-to-grid (V2G) technology. Indeed, one of the goals of the E-Flex project is to ensure the National Grid is resilient enough to meet our carbon-neutral future. That means arming it with solutions to ensure that any future changes in production and supply on the Grid, including an increased number of EVs on our roads, will not cause strain or outages.

Most electric vehicles today offer uni-directional charging. Once you've drawn power from the grid and put it into your battery, that's where it stays until it is used. This lack of flexibility means you inevitably end up storing more charge than you need, which leaves a huge amount of energy sitting unused in EV batteries across the country. V2G technology allows for bi-directional energy transfers. It turns EV batteries into mobile energy sources, freeing up excess charge to power buildings, other EVs, or to be sold back to the grid.

Fleet managers recognise that V2G offers a number of key benefits, including:

- Reduced energy costs for the fleet – 54%
- Reduced energy costs for the business as a whole – 48%
- Additional revenue generation from sales of unused power back to the grid – 43%

More than half of all fleet managers (53%) agree that V2G could help with the transition to EVs, and a similar number (54%) believe that investing in V2G could offset the initial cost of the electric vehicles themselves.

Innovation in EVs has seen support from government too. Former transport minister Jesse Norman has described the improving battery capabilities of EVs as presenting a "huge opportunity" to make "a significant contribution to a smart grid."

The National Grid has recognised the need for a change in how we think about reducing carbon dependence and decentralising generation. V2G, in tandem with smart charging, is expected to "actively support" these efforts.[8]

However, more real-world evidence of V2G's ability to reduce costs, and create new revenue streams will be needed to strengthen the case for fleet managers and their wider business stakeholders.

The majority of fleet managers believe they would be able to accelerate V2G adoption if it was proven to reduce running costs (74%), business costs (72%), and generate new revenue streams (70%).

Additionally, there will be unforeseen concerns to address. Just 9% of fleet managers say they are concerned about cyber security in connection to V2G.

But as V2G technology is rolled out, and the reliance on internet connectivity for its functioning grows, maintaining adequate cyber defences may increasingly fall under fleet managers' remits.

In this instance, and as noted previously in this report, the wider deployment of EVs, along with V2G and smart grids, will require greater collaboration between business units that may previously have operated independently of one another.

53% of all fleet managers agree that V2G could help with the transition to EVs

8 http://fes.nationalgrid.com/media/1363/fes-interactive-version-final.pdf

Applying V2G in a real-world, urban environment

2019 was a landmark one for climate action, with the UK becoming the first developed nation to declare an environment and climate emergency, and the government committing to ambitious decarbonisation targets.

Meeting these environmental targets with minimal disruption will require an innovative approach to energy provision.

August 2019 also saw one of the worst blackouts in the UK, affecting 1.1 million properties and plunging hospitals and transport services into darkness.

Part of our mission at E-Flex is to test the real-world viability of V2G technology, the surrounding commercial models and to explore its possible applications. To do this, we are partnering with a number of organisations with EV fleets, including Fruit 4 London, Gnewt Cargo and Plymouth City Council to trial and test our V2G technology within their fleets.

Fruit 4 London

Founded on bicycles, Fruit 4 London now uses EVs to deliver fruit to homes and offices all over the capital. Deliveries are made in the morning, which means vans are typically sitting idle during the afternoon. Bi-directional chargers will transform these idle vehicles into a mobile energy source, act as a buffer for renewable energy production, and attenuate energy fluctuations on the grid.

V2G provides an energy efficient solution – and a new revenue stream – for a business with sustainability at its core.

Gnewt Cargo

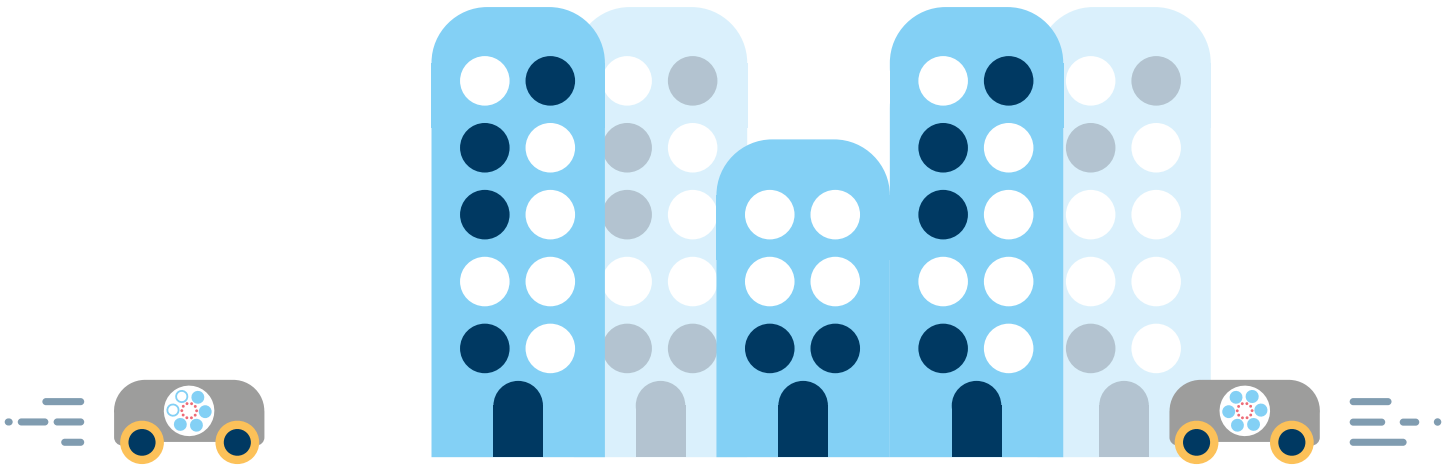
Gnewt Cargo's fleet of 110 EVs has delivered more than 10 million parcels in London over the past decade. The switch to EVs has resulted in a 67% reduction in carbon emissions. But as Gnewt's business grows, so do its charging needs.

V2G means vehicles can be charged during off-peak hours, and that unused energy can be used by their depot during expensive peak times rather than sitting in the car batteries – which can be harmful to the vehicles' long-term health.

Plymouth City Council

Known as Britain's Ocean City, Plymouth has set a target of becoming carbon neutral by 2030. Achieving this will require a transition from fossil fuelled vehicles to EVs. The Council will need to make this transition as easy and inexpensive as possible for the population of Plymouth.

A trial fleet of six vehicles equipped with bi-directional chargers aims to prove the viability of V2G technology and EVs. It's hoped that this initial pilot will eventually form the basis of an enduring sustainable energy infrastructure for the city.



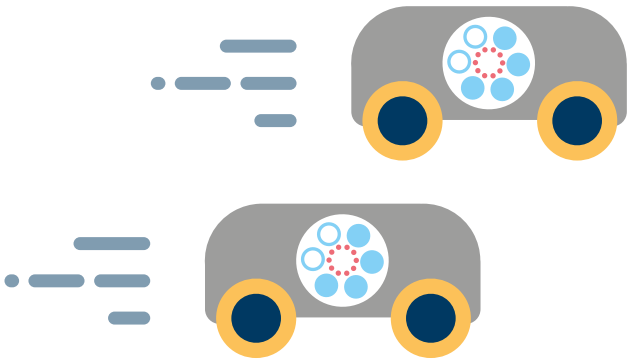
About E-Flex

E-Flex is a co-innovation project, using active electric vehicles (EVs) in real-world fleets to prove the value of vehicle-to-grid (V2G) technology.

The goal of E-Flex is to demonstrate the role V2G can play in reducing the demand that EVs put on the UK's energy networks, while also proving the economic benefits for commercial fleet owners.

The project aims to connect 100 electric vehicles in a real-world V2G testing environment.

This is part of a wider aim of achieving a cleaner, more sustainable world through the reduction of carbon emissions – in line with targets laid out by UK legislators.



Our Partners

Cisco is leading the project and applying its technical expertise and experience to design the computing architecture of the project's smart grids, and enabling microgrids and virtual power plants.

Cenex is recruiting trial participants, sites, and vehicles; supporting site infrastructure installation; and baselining network performance on test sites

Transport for London

Greater London Authority is informing strategic policy position in London; and providing Met Police and TfL fleets and facilities Transport for London – installing 20 V2G charging points; serving as a demonstration partner

Imperial College London

Imperial College London is executing and producing research into technologies, markets, methodologies, operations, investment, and regulatory change in support of V2G

NUVVE

NUVVE is aggregating V2G operations to prove viability of two-way energy distribution between markets and the grid

ecar
A Europcar Company

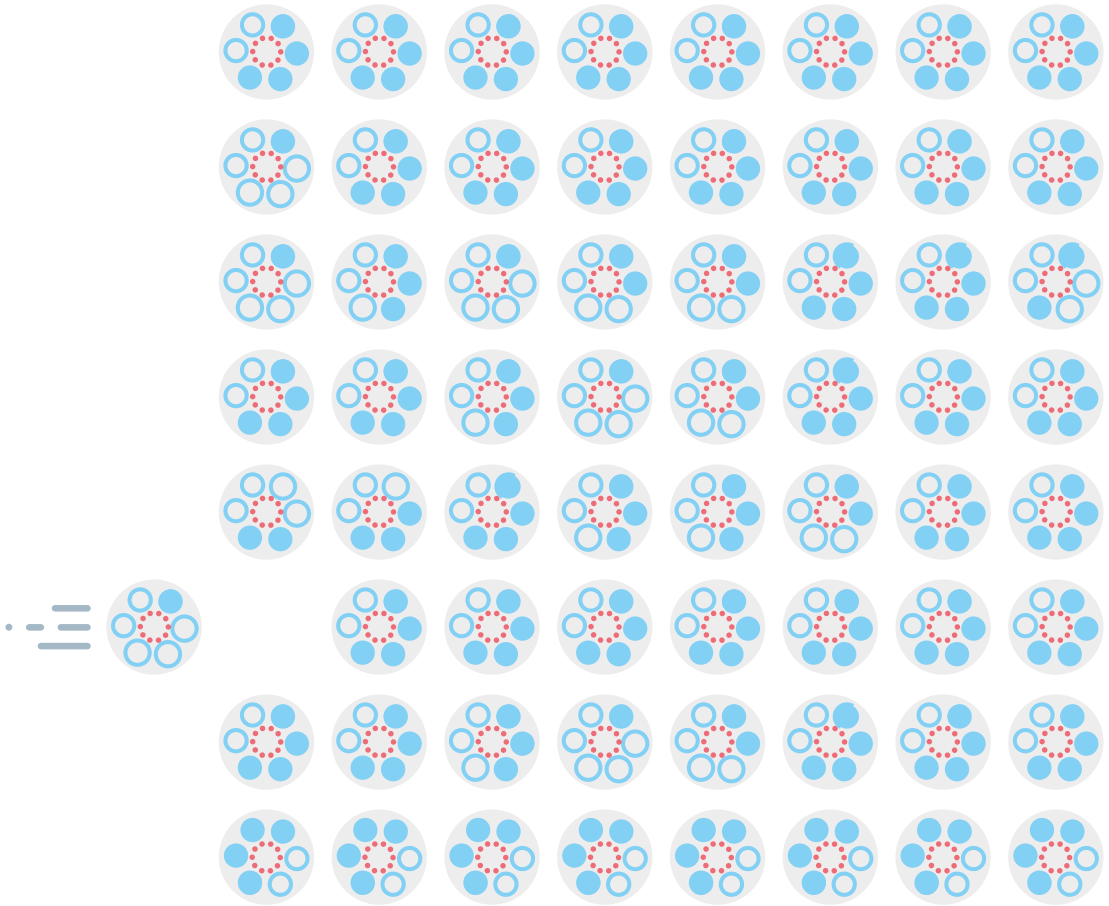
E-Car Club is deploying and testing V2G chargers and providing data for business cases to assess level of interest in V2G for car share and hire industries

Methodology

We surveyed 500 fleet managers within the UK, with an average fleet size of 73 vehicles for their opinions on a range of issues related to the future of fleet management, energy provision, and sustainability.

Research was conducted between September 26th and October 4th, 2019.

The poll was carried out by Opinium, in partnership with E-Flex.

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