A step-by-step guide to electric vehicles for fleets

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An electric vision

Electric vehicles (EVs) hold great potential for many fleets. Due to their low running costs, they can make sound financial sense and demonstrate your organisation's leadership on the pathway to a zero carbon society.

When the EV market is developing so quickly and there are competing claims, it can be difficult to keep up or know where to start. This guide offers an impartial overview and lays out practical steps that you can take to integrate EVs into your fleet.

Every fleet is at a different stage of electrification. Some organisations may be considering their first few EVs while others have already trialled or embraced EVs and are now acquiring even more.

One-third of the UK's fleet managers expect more than 50% of their company car fleets will be electric within five years, according to a Go Ultra Low survey of over 500 fleet managers and decision-makers in spring 2020[1].

This guide is intended to help integrate electric cars and vans into smaller fleets (i.e. five to 100 vehicles) but the ideas and principles can be applied to fleets of any size or complexity, whatever your starting point or ambition. It also provides whole life cost examples to illustrate how to build a business case.

The case studies towards the end of the guide showcase the achievements of an SME, a local authority and a large private sector fleet, and the different routes each has taken.

For tailored, one-to-one advice on how EVs could work for your business, including a full analysis of your fleet, see Energy Saving Trust's **Fleet Support** or contact us on **transportadvice@est.org.uk.** With funding provided by the Department for Transport (DfT), our services are provided at no cost to you.

The national picture

The UK market share of battery electric cars has increased from 1.6% in 2019 to 6.3% in 2020. Over 107,900 battery electric cars were sold in 2020, compared to 37,700 in 2019, a percentage increase of 186% despite the disruption caused by Covid-19. The market share of alternatively fuelled light commercial vehicles is steadily increasing but lags behind electric car registrations[2].

Many fleets are already realising the benefits of EVs. In the UK, approximately 70% of new fully electric or plug-in hybrid electric cars were registered to businesses and fleets in 2020, according to the SMMT. 70% of fleet managers are considering purchasing or leasing EVs within two years, according to a Go Ultra Low survey of 500 fleet decision-makers[3].

Every year, vehicle and battery technologies are advancing. Charging infrastructure and aftersales services, such as the number of EV-trained technicians, are also improving. This makes EVs an increasingly suitable option for a wide range of fleets.

In November 2020, the UK Government announced plans to end the sale of new petrol and diesel cars and vans from 2030 and plug-in hybrids from 2035, following a consultation. This effectively means that all new cars and vans will need to be pure electric or hydrogen from 2035 onwards[4]. This will supersede the government's ambition to end the sale of new conventional petrol and diesel vehicles by 2040, as outlined in The Road to Zero[5] in 2018.

1. Energy Saving Trust, 2020. https://energysavingtrust.org.uk/about-us/news/third-fleet-managers-set-electrify-uk-fleets
2. SMMT, Car Registrations, November 2020. https://www.smmt.co.uk/vehicle-data/car-registrations/
3. Energy Saving Trust, 2020. https://energysavingtrust.org.uk/about-us/news/third-fleet-managers-set-electrify-uk-fleets
4. https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030
5. UK Government, 2018, The Road to Zero, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739460/road-to-zero.pdf

A step-by-step approach

Integrating EVs into your fleet is likely to happen in stages, reflecting the maturity of the market for different vehicle classes, purchase prices and operational requirements.

At the heart of a successful transition to EVs is identifying which vehicles would be straightforward and cost effective to switch to electric equivalents within the next couple of years, and those which need to wait until the EV market further matures. It is then useful to link this to your fleet's replacement cycle or contract renewals. This will give you a roadmap to support investment decisions and milestones for your organisation's sustainability and fleet strategies.

Electrifying your fleet in stages also helps build confidence of drivers and the opportunity to resolve any operational issues that arise. Leasing EVs initially or undertaking a trial (ideally three to six months) before placing a larger order can also help verify your predicted running cost savings.

Key sections of your fleet to target initially include company cars, especially given the changes effective from April 2020 to benefit-in-kind tax rates, pool or shared cars, and smaller vans up to 3.5t Gross Vehicle Weight (GVW).

To make charging easier, it is recommended that you focus on vehicles which return to base each night or if they are taken home, where the employee has off-street parking so that a dedicated home chargepoint can be installed.

You may find it helpful to set targets to define your vision or track progress. These could be expressed as the number or proportion of EVs within your fleet, or you could aim for an average g/km CO_2 target across the fleet.

When developing your EV strategy, you may find it helps to go through a series of steps:

1. Research the types of EVs and the models available
2. Identify which vehicles have suitable mileage profiles
3. Think about your charging requirements
4. Build the business case
5. Engage with your drivers
6. Monitor and share your success

Step 1: Research the types of EVs and models available

Electric vehicles can be an excellent choice for fleets because they have lower running costs and zero tailpipe emissions when being driven on electricity. Battery electric vehicles are always powered by electricity, however plug-in hybrid and extended rage electric vehicles may also be driven by an internal combustion engine. In this driving mode they would emit CO_2 and other emissions which can affect local air quality.

Battery EVs vs plug-in hybrids

There are several different types of EV, the main types being battery electric vehicles and plug-in hybrids, as described in Table 1.

BEVs or pure EVs have zero tailpipe emissions and are eligible for various government grants and tax incentives. They are also the cheapest to run and the most future-proofed option for access to Clean Air Zones and similar air quality management areas. However, the electric range (the distance travelled before recharging is required) needs to be sufficient to meet your fleet's needs and you need convenient access to chargepoints.

Plug-in hybrids allow you to switch between the battery and petrol engine. This offers flexibility but these vehicles still generate CO_2 emissions and air pollution. To reduce emissions and generate savings on fuel, it is important that the battery is recharged regularly and the electric range is used as much as possible.

Following the government's announcement in November 2020, the sale of plug-in hybrid vehicles will cease by 2035.

What are ultra-low emission vehicles?

EVs are also referred to as ultra-low emission vehicles (ULEVs), defined as any vehicle which emits less than 75g of CO_2/km from the tailpipe. In 2021, the UK Government is likely to tighten the definition to vehicles with emissions of less than 50g of CO_2/km.

As well as the types of EVs listed, hydrogen fuel cell vehicles are ULEVs. However, hybrids which do not plug-in, such as the Toyota Prius, do not qualify as ULEVs. They are fuel-efficient but have very short (usually less than a mile) electric ranges.

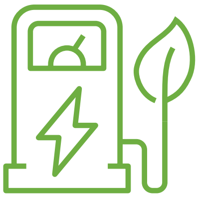
Increasing choice of EV models

The number of EV models on the market is growing rapidly every year. In particular, there is an increasing choice of electric vans with higher payloads and ranges and a greater variety of cars. Car manufacturers continue to launch plug-in versions of popular models and bespoke BEVs to complement the existing line up.

The **Go Ultra Low Car Selector** tool allows you to search and compare EV models between multiple manufacturers, and see what's coming soon. Another way to research your options is to see which vehicles are eligible for the **UK Government's Plug-in Car and Van Grants**.

Table 1 - Different types of electric vehicle (EV)

EV type	Description	Approximate range
Battery electric vehicle (BEV) Also known as pure EV or zero emission EV	A vehicle powered only by electricity. The vehicle is charged by an external power source, generally a dedicated EV chargepoint. Zero tailpipe emissions.	Cars: Between 150 and 300 miles, depending on the model and battery size. For example, the Nissan Leaf (40 kWh) has an official range of 168 miles and the Hyundai Kona (64 kWh) has a 278 miles range (WLTP). Vans: Between 90 and 200 miles, depending on the model, size of vehicle and payload. For example, the Nissan eNV200 has a 124 mile range and the Vauxhall Vivaro 75kWh has a 205 mile range (WLTP).
Plug-in hybrid electric vehicle (PHEV)	A vehicle which combines a battery, electric drive motor and an internal combustion engine (ICE). The vehicle can be driven by the ICE or electric drive motor, or both together. It's important to regularly recharge the battery to gain the carbon and cost saving benefits.	Around 30 miles electric-only range, plus several hundred petrol/diesel miles. The fuel tank capacity of a PHEV is often smaller than the equivalent petrol or diesel model, reducing total driving range.
Extended range electric vehicle (E-REV)	A vehicle which combines a battery, electric drive motor and an ICE. The electric motor always drives the wheels with the ICE acting as a generator when the battery is depleted. Apart from the LEVC TX taxi and VN5 van, there are very few in production.	The LEVC TX has a 64 miles electric driving range and a total of 377 miles with the range extender (LEVC figures).

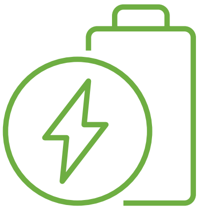


Common EV questions

What about the carbon emissions from generating electricity?

With the UK's current energy mix, carbon dioxide is emitted during electricity generation but even when recharging from the national grid, the emissions per mile for an electric car are much lower (by approximately two-thirds[6]) than a comparable petrol car.

In 2019, wind farms, solar and nuclear energy delivered 43% of the UK's energy[7]. As the share of renewable energy generation increases, the whole-life emissions of EVs will continue to fall. For further information see Carbon Brief's Factcheck: **How electric vehicles help to tackle climate change.**



How long do batteries last?

The long-term life of an EV battery depends on many factors such as the type of battery and the mileage covered. Most manufacturers offer a five to eight-year warranty on their batteries, but anecdotal evidence suggests batteries should last longer and various studies are ongoing on degradation over time[8]. Battery technology, and battery performance, is continually improving.

Vehicle batteries can also be given a second life when they no longer meet high EV performance standards, such as in street lights or as energy storage solutions such as with solar panels. Much work is being carried out to ensure that once large volumes of batteries reach the end of their life, they can be efficiently recycled. For example, take a look at **The Faraday Institute's ReLiB project**.

How sustainable are batteries?

EV batteries are typically lithium-ion batteries, often also containing cobalt and nickel. The growing demand for these materials has raised concerns over the impacts of mining, including the environmental footprint and use of child labour. EV battery recycling is becoming more widespread and will help reduce the reliance on newly mined materials.

Life cycle analysis on the environmental impacts of EV batteries is difficult. However, the non-profit organisation Transport & Environment have developed a tool which shows that electric cars in the UK produce approximately a third of CO_2 emissions of a diesel car over the vehicle's lifetime, after accounting for electricity generation, car production and battery production[9]. Even with the current carbon intensity of electricity generation worldwide, EVs still reduce emissions in almost all world regions[10].

6. UK Government, 2018, The Road to Zero, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/739460/road-to-zero.pdf
7. National Grid, 2020, https://www.nationalgrid.com/britain-hits-historic-clean-energy-milestone-zero-carbon-electricity-outstrips-fossil-fuels-2019
8. Geotab, EV Battery Degradation Comparison Tool, https://storage.googleapis.com/geotab-sandbox/ev-battery-degradation/index.html
9. Transport & Environment, 2020, https://www.transportenvironment.org/what-we-do/electric-cars/how-clean-are-electric-cars
10. Nature Sustainability, March 2020, https://www.nature.com/articles/s41893-020-0488-7

Step 2: Identify vehicles with suitable mileages and usage patterns

Identifying how far individual fleet vehicles currently travel on a daily basis is a crucial step. This data might be available from telematics, fuel cards (this works best where there is one driver or fuel card per vehicle), and expense claims (relevant if you plan to shift grey fleet miles into an electric pool car, for example) or you could consider collecting odometer readings for a short period.

As well as calculating the daily average mileage, it is useful to gather information on journey patterns, for example to assess consistency and how frequently the vehicle is driven over a certain mileage threshold, such as 150 miles. If you need to improve your mileage capture processes, visit our **Manage mileage** webpage within our fleet management toolkit.

Range anxiety remains one of the biggest barriers to EV adoption. This refers to the fear people have about the distance an EV can drive and the concern that the range may not be enough to reach their destination.

However, most recent models have higher ranges and if the appropriate vehicle is chosen, EVs are likely to meet the needs of many fleet journeys. For example, pure electric models such as the Nissan Leaf e+, with the 62 kWh battery option, can offer 239 miles on a single charge and the Renault Kangoo van has a 143 miles range[11].

The next step is to compare your fleet mileage data with the ranges of equivalent electric vehicles. See Table 2 for some current examples and a selection of what is available.

Bear in mind that infrequent high-mileage days do not necessarily rule out a vehicle for EV replacement. Think about if journeys or tasks could be allocated across a mix of petrol or diesel and electric vehicles, or where the vehicle can be recharged via a public chargepoint en route, during downtime or at the destination.

Table 2 - Example ranges for a selection of electric vehicles.

EV type	Selected examples		Battery size	Electric range (WLTP)[11]
Battery electric (BEV) or pure EV	Cars	Tesla Model 3	72 kWh	348 miles
		Nissan LEAF	40 kWh	168 miles
		BMW i3	42 kWh	182 miles
		Jaguar I-PACE	90 kWh	292 miles
		Volkswagen iD3	58 kWh	263 miles
		Renault Zoe	52 kWh	245 miles
		Hyundai Kona	64 kWh	278 miles
		Kia Niro	64 kWh	283 miles
		Hyundai IONIQ Electric	38 kWh	193 miles
		Vauxhall Corsa-e	50 kWh	209 miles
		Peugeot e-208	50 kWh	206 miles
	Vans	Nissan e-NV200	40 kWh	124 miles
		Renault Kangoo ZE	33 kWh	143 miles
		Renault Master ZE	53 kWh	75 miles
		Fiat e-Ducato	79 kWh	161 to 175 miles
		Mercedes-Benz eVito	41 kWh	93 miles
		Maxus eDeliver 9 (previously LDV)	88 kWh	219 miles (city cycles)
		Vauxhall Vivaro-e	75 kWh	205 miles
Plug-in hybrid electric vehicles	Cars	SKODA Superb iV	13 kWh	32 miles
		MINI Countryman PHEV	7.6 kWh	26 miles
		Mercedes-Benz A250e	15 kWh	40 miles
		Kia Niro PHEV	8.9 kWh	30 miles
	Vans	Ford Transit Custom PHEV	13.6 kWh	33 miles
		LEVC V5 (E-REV)	31 kWh	60 miles

11. The range figures refer to the WLTP range, combined cycle. Actual real world driving results may vary depending on factors such as weather conditions, driving styles and vehicle load.

How driving speed impacts range

All the ranges quoted in Table 2 and by manufactures are based on the new WLTP test, and are an average (or 'combined range') across four test cycles which represent typical city, town, rural and motorway driving. WLTP is designed to be a more realistic and accurate representation of real world driving than the previous test procedure, NEDC. Download the **LowCVP guide 'Know your electric range'** for more information.

However, like petrol or diesel vehicles, various factors influence the range you can achieve in practice for a given model. For EVs, the most important factor is the typical range of speeds the vehicle is expected to drive. There is a greater reduction in range at higher speeds compared to petrol and diesel vehicles due to the higher energy consumption, as illustrated in Table 3.

At high speeds, higher gears in petrol and diesel vehicles counteract the effects of air resistance and friction. However, most EVs have a single gear and although an electric motor is efficient throughout most of its speed range, they are less efficient at higher speeds. Where EVs are likely to be doing mainly motorway or extra-urban miles, you should be aware that you are unlikely to meet the official WLTP range.

Other factors affecting range include the loading of the vehicle and weather conditions. Where possible, pre-heating or cooling the car while it is still plugged in helps to conserve range.

Table 3 - Percentage increase in energy consumption at different constant speeds relative to the same vehicle's energy consumption at 30 miles per hour.

Speed	Percentage increase in energy consumption relative to 30 mph	
	Electric cars	Electric van
40 mph	21%	32%
50 mph	50%	59%
60 mph	83%	98%
70 mph	127%	177%
75 mph	-	213%
80 mph	181%	-

Source: Energy Saving Trust, 2018. The electric car data is an average across tests on three models, the van data is based on one model.

Check operational requirements

As well as sufficient range and access to on-site or off-street charging infrastructure, you need to check whether the proposed electric vehicles will meet operational requirements.

For vans, this is likely to be in terms of payload and carrying capacity. As many electric vans currently on the market are around 2-2.5t gross vehicle weight, it is worth taking the opportunity to see if the identified van could be 'downsized' if needed. Whether a van is fossil-fuelled or electric, you should avoid using them as mobile storerooms. Storing heavy, rarely used, or bulky items at base where possible and installing a well-designed, light-weight racking system may allow you to use a smaller van.

A comparison of electric vans on the market in 2019 can be found in the **Energy Saving Trust guide: Lowering van emissions and costs**. Manufacturers such as Mercedes, VW, Peugeot, Citroen, Vauxhall, Maxus, LEVC and Ford have released several models in 2020 with more to follow in 2021 and 2022. The guide also has further tips on downsizing.

Some manufacturer websites have tools which allow you to experiment with different factors, including speed and temperature, to see the impact on range. For example, take a look at the **Renault Zoe**, **Nissan Leaf** and **Vauxhall Vivaro-e**.

Step 3: Think about your charging requirements

It's important to consider how you will charge your electric vehicles early on in your decision-making process. This is essential to ensure they can fully meet business needs and are convenient and cost-effective to drive. Electricity grid capacity may also shape your plans.

For more information on charging vehicles, see the other guides on the Energy Saving Trust website.

On-site chargepoints

It is most straightforward to replace vehicles which return to base (or are parked off-street in the case of company cars) so they can recharge overnight. Installing on-site chargepoints for your fleet is likely to be more convenient, rather than solely relying on the public charging network. Where there is downtime during a working day, it may be possible to 'top-up' vehicle batteries. The UK Government's **Workplace Charging Scheme** can contribute towards the cost of installing chargepoints.

Types of chargepoints

Chargepoints are categorised by their power, ranging from 3.7 kW to over 150 kW for ultra-rapid chargepoints.

Many home and public on-street chargepoints are 3.7 kW (16 amp supply) or 7.4 kW (32 amp supply). For locations with a three-phase supply, it is possible to install 11 kW, 22 kW AC and 20 to 50 kW DC chargepoints. For reference, a three-pin plug charging cable is 2.3 kW (usually restricted to 10 amps).

For most fleets with a mix of cars and vans, 3.7 kW to 7.4 kW chargepoints are likely to be sufficient for overnight charging. Where a site has a three-phase supply, it may seem intuitive to choose the highest power chargepoints available. However, it is substantially more expensive to connect chargepoints over 22kW to the electricity grid and could involve reinforcing the electricity supply. Where overnight charging is possible and practical, it is unlikely the investment for the fastest possible chargepoints will be worthwhile.

The very high-power demand for ultra-rapid chargepoints means they are not suitable for fleet installation.

Additionally, not all vehicles can charge at the higher rates, due to the technology in the vehicle. Many plug-in hybrid vehicles will only charge at 3 kW and a Nissan Leaf 40kWh will only charge at 6.6 kW AC and 50 kW DC. Charging capability above 50 kW is being introduced into the latest models, however very few vehicles can charge at the full 150 kW rate of an ultra-rapid chargepoint. The specification sheets of vehicles will state the maximum charging rates and time required to recharge at different types of chargepoint.

Charging times

Total charging time depends on the power of the chargepoint, the maximum rate that the vehicle can charge at, and the capacity of the battery (in kWh).

Table 4 summarises how long it would take to fully charge an EV with a 50 kWh battery with approximately 200 mile range, if it could charge at each of these charging rates.

Table 4 - Estimates of the time taken to charge an EV with a 50 kWh battery from 0 to 100%.

Chargepoint type	Charging time
3.7 kW Standard	14 hours
7.4 kW Fast	7 hours
11 kW Fast	5 hours
22 kW Fast	2 to 3 hours
50 kW Rapid	1 to 2 hours
150 kW Ultra-rapid (very few available)	30 to 40 minutes

This assumes the vehicle can charge at each of the rates listed in the table, which is not the case for all models.

It is worth noting that although it would take more than an hour to recharge the vehicle at a 50 kW rapid chargepoint, 15 minutes on charge would provide a range of 30 to 40 miles, possibly enough to reach the destination. It is also unlikely that recharging would start from 0%.

Rapid charging times are usually quoted as 'up to 80%' because the incoming power reduces significantly around this figure to protect the battery from damage. Most cars and small vans operated by fleets will drive between two and four miles for each kWh of battery capacity.

A larger battery will allow a greater driving range, but the energy consumption per mile in a similar size and weight of vehicle will be the same. In other words, for a particular journey, a car with a 24 kWh battery will use similar energy to drive 50 miles as one with a 62 kWh battery. It will take the same length of time connected to a chargepoint to 'replenish' the distance driven, regardless of the battery size.

Smart charging

When choosing chargepoints, smart functionality is recommended. This enables more intelligent management of the chargepoint including data exchange, basic load management (reducing the power of the charge during periods of high electricity demand on site or in the home) and the ability to delay charging to off-peak times, which is often cheaper. All home and workplace chargepoints funded by government grants must be 'smart' and it is becoming standard across the sector.

Electricity grid connection

It is recommended you find out the electricity grid capacity of your site and engage with your local distribution network operator (DNO) as early as possible. The DNO will be able to advise you on your grid connection options and the costs involved for grid reinforcement. If your site does not have much spare grid capacity, this may dictate how many EVs you can realistically operate and what charging or load management technology is required.

Public charging infrastructure

The public charging network is growing rapidly. Increasing numbers of chargepoints are available on-street and in car parks in towns and cities, and rapid chargepoints are available at most service stations on the strategic road network (motorways and trunk roads). You can search for chargepoints through various apps and websites, including **Zap-Map** and **PlugShare**.

Step 4: Build the business case

Electric vehicles can be highly cost-effective for fleets, especially where the vehicles are travelling significant daily mileages and vehicles are kept on fleet or leased for several years. The case studies towards the end of this guide offer some great examples. The changes effective from April 2020 to company car tax for EVs have also made switching increasingly attractive to many drivers and employers.

Broadly speaking, the larger the vehicle (i.e. 2.6t plus vans, minibuses or trucks), the greater the cost difference in purchase price between petrol or diesel and electric models. This is due to the maturity of the market and vehicle technology. As a result, this tends to weaken the financial case. However, within a few years' time, the market situation could look very different and today purchases could be justified in terms of the environmental or reputational benefits for the organisation.

Purchase price vs whole life cost

Although EVs cost more than their petrol or diesel equivalents to buy or lease, it is crucial to look at the vehicle's whole life cost (WLC).

A WLC analysis often shows that higher lease or purchase costs of EVs are offset by:

- **Lower cost of electricity compared to petrol or diesel.** For instance, the Vauxhall Corsa-e typically costs £2.70 to travel 100 miles while a petrol Corsa costs £9.50 to travel 100 miles[12].
- **Lower servicing and maintenance.** This can be due to the fewer service requirements including oils and filters and regenerative braking which reduces wear and tear on the brakes.
- **Additional incentives.** There are various government grants and tax breaks as described later in this guide.

It is important that EVs are driven sufficient miles so that the increased lease or purchase cost is more than recouped in running cost savings. EVs become more cost effective with higher mileage.

As a rough approximation, you may find it helpful to calculate the break event mileage point (the price difference between the electric and petrol or diesel equivalent divided by the pence per mile fuel, VED and maintenance saving). If you turn this into the lowest average daily mileage, it can help you find financially viable vehicles to replace. Where vehicles are travelling very low mileages, consider if they need to be better utilised before switching to electric.

12. Assuming Vauxhall Corsa 47.8 mpg, fuel costs 99p/litre, Corsa-e WLTP 3.7 miles/kWh and electricity at 10p/kWh (excluding VAT).

Whole life cost examples

The following examples of WLC comparisons of electric and petrol or diesel vehicles for use as a pool vehicle, company car and a van illustrate where an EV may prove to be a worthwhile investment.

While these examples are a useful guide, we recommend that you carry out your own comparisons using quotes for the lease or purchase cost of the vehicles from your suppliers.

Pool car comparison

We compared the Vauxhall Corsa, often employed as a pool car, with the pure electric Corsa-e, over five years and 50,000 miles. The Corsa-e has a 209 miles range (WLTP).

Table 5 - Cost comparison for Vauxhall Corsa and Corsa-e pool car over five years and 50,000 miles.

	Vauxhall Corsa 1.2 SE 5dr	Vauxhall Corsa-e 50kWh SE Nav Premium 7.4 kW
Life cost (purchase, maintenance and resale value) over five years	£7,962	£10,340
Fuel cost over five years	£4,732	£1,326
Total cost over five years	**£12,694**	**£11,666**
Pence per mile cost	25.4	23.3

Life cost calculated using purchase prices from Crown Commercial Service (CCS) public sector framework and KeeResources residual values and maintenance costs. Assumes fuel costs 1.07p/litre (AA average UK petrol price May 2021) and electricity at 10p/kWh (excluding VAT).

Company car comparison

In this example, we compared a Ford Focus to the pure electric Nissan Leaf as a potential company car offering. The Ford Focus is a fuel-efficient petrol car so the fuel cost difference between the Focus and the Leaf would be even greater for a less efficient petrol or diesel company car.

In addition to reducing costs for the company, the Nissan Leaf is cost effective for the driver through benefit-in-kind tax savings of £3,613 over three years and fuel savings of £860.

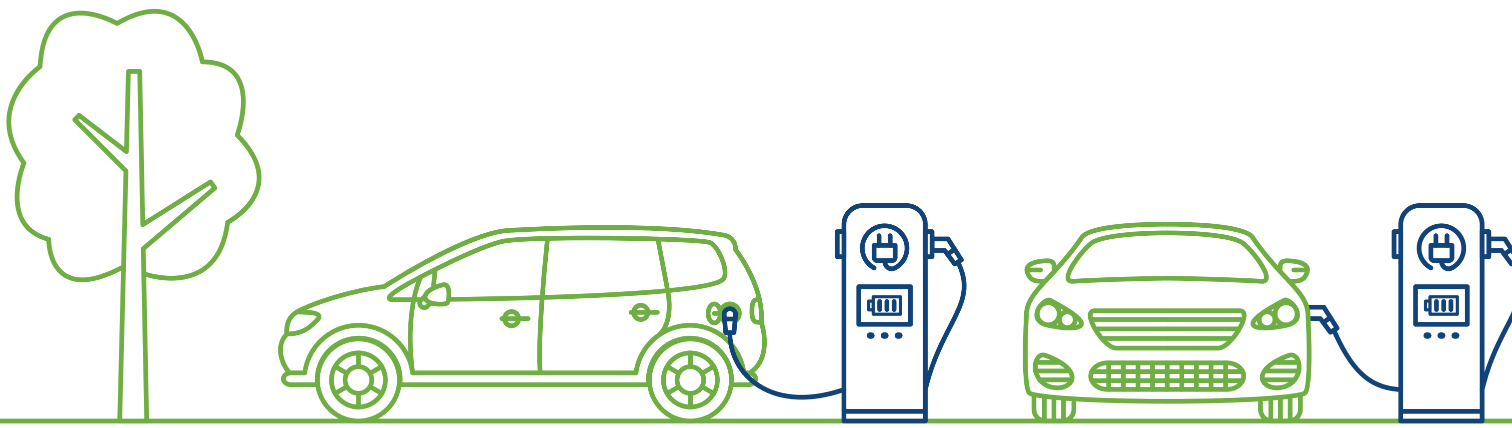


Table 6 - Cost comparison of Ford Focus and Nissan Leaf company car for the company over three years and 60,000 miles (36,000 business and 24,000 personal)

Costs to the company	Ford Focus 1.0 125 Zetec Edition	Nissan Leaf N-Connecta 40kWh
Lease costs, including maintenance over three years	£13,073	£16,398
Fuel cost over three years	£3,475	£1877
Life Class 1A National Insurance contributions	£2,767	£218
Total life cost for the company	**£19,315**	**£18,494**
Pence per mile cost	32.2	30.8

Includes lease cost and service rental costs provided by Alphabet, non-recoverable VAT. Ford Focus has CO_2 emissions of 125 g/km and the Class 1A NI and Company Car Tax are calculated for 2021/22, 2022/23 and 2023/24 tax years. Assumes fuel costs £1.07 per litre (excluding VAT) and electricity is 15.75p per kWh (5% VAT included).

Table 7 - Cost comparison for the driver of Ford Focus and Nissan Leaf company car over three years and 60,000 miles (36,000 business and 24,000 personal)

Costs to the driver	Ford Focus 1.0 125 Zetec Edition	Nissan Leaf N-Connecta 40kWh
Company car tax over three year term	£4,010	£317
Cost of private fuel over three year term	£2,780	£1,252
Total life cost for the driver	**£6,790**	**£1,569**

Ford Focus has CO_2 emissions of 125 g/km and the Class 1A NI and Company Car Tax are calculated for 2020/21, 2021/22 and 2022/23 tax years. Assumes fuel costs £1.284 per litre (excluding VAT) and electricity is 15.75p per kWh (5% VAT included).

Van comparison

In this example, we have compared a Ford Transit Connect and a Renault Kangoo ZE. The pure electric Kangoo ZE has lower lifetime running costs including significantly lower fuel costs.

Table 8 - Cost comparison of Ford Transit Connect and Renault Kangoo ZE over four years and 60,000 miles

	Ford Transit Connect 210 L2 1.5TDCi 100 Leader	Renault Kangoo ZE ML20 i 33 Business
Lease costs, including maintenance, over four years	£14,624	£13,508
Fuel cost over four years	£5,685	£1,765
Total life cost	**£20,309**	**£15,273**
Pence per mile cost	33.8	25.5

Includes lease and service rental costs provided by Alphabet. Fuel at £1.09 per litre and electricity 10p per kWh (excluding VAT).

Grants and financial incentives

The UK Government's Office for Zero Emissions Vehicles (OZEV) offer several grants relevant to fleets. As of March 2021, these include:

- **Plug-in Car or Van Grant** – Paid to manufacturers and vehicle dealerships, this provides a discount on the price of eligible new ultra-low emission vehicles as follows:
  - Cars – 35% of the purchase price, up to a maximum of £2,500 (for vehicles with a recommended retail price of less than £35,000)
  - Vans – 35% of the purchase price, up to a maximum of £3,000 for small vans less than 2.5 tonnes gross vehicle weight (t GVW) and 35% of the purchase price up to a maximum of £6,000 for large vans of 2.5 to 3.5 t GVW.
  - Taxis – 20% of the purchase price, up to a maximum of £7,500
- **Workplace Charging Scheme** – This provides up to 75% of the purchase and installation costs of chargepoints, capped at £350 per socket, for fleet and staff use, for a total of 40 chargepoint sockets per business, charity or public sector organisation.
- **EV Homecharge Scheme** – This scheme provides funding for up to 75% of the cost of installing chargepoints, up to £350 per unit including VAT at domestic properties. Company car and van drivers are eligible for the grant. This can be valuable for staff considering an electric car for their private and commuting use.

There are also several tax benefits for organisations available for electric vehicles. These include:

- **Vehicle Excise Duty (VED)** – Battery electric vehicles are exempt from Vehicle Excise Duty (road tax). Additionally, they are not subject to the "expensive car" supplement that is payable for five years from the second time the car is taxed. For plug-in hybrid cars (that emit no more than 50g/km of CO_2), no VED is paid in their first year and rates in subsequent years are reduced by £10 per annum.
- **Corporation Tax Liability** – From the 2021/22 tax year businesses can write down 100% of the purchase price for a vehicle that emits 0g/km CO_2.
- **Benefit-in-kind (BIK)** – EV drivers pay significantly less company car tax than those driving petrol and diesel vehicles. For the 2021/22 tax year, BEVs will attract 1% benefit-in-kind rate and 2% in 2022/23. This 2022/23 rate will continue for a further two financial years to 2024/25.

Additionally, EVs can receive exemptions from:

- **Clean Air Zones** – Ultra-low emission vehicles are not charged for entering Clean Air Zones or London's Ultra Low Emission Zone (introduced in April 2019 and set to expand in October 2021). It is worth noting that there are different classes of Clean Air Zones and in some zones private cars and vans will not be subject to a charge, regardless of their emissions. To understand the impact on your fleet, **check the plans for your region**.
- **London Congestion Charge** – In London, Euro 6 compliant vehicles that emit less than 75g/km CO_2 and have a 20 mile zero emission capable range can apply for a **100% Cleaner Vehicle discount**. However, this discount is gradually being phased out. From 25 October 2021 onwards, this discount will only apply to battery electric vehicles. It is expected that from 25 December 2025 onwards, this discount will be discontinued completely.

Electric vans can save you money on fuel and tax, as well as significantly reduce your fleet's emissions. Try our easy to use, **online widget** to see if an electric van could work for your business. For more information on electric vans, **read our FAQs**.

Step 5: Engage with your drivers

While EVs are becoming increasingly common on our roads, they are still unfamiliar to many people. Therefore, engaging with drivers is an important part of a smooth transition. Where EVs have been adopted in a sensible way, drivers are usually overwhelmingly positive about the experience. In a survey of 500 fleet managers, 90% reported they would enjoy the experience of driving an EV[13].

EV myth busting

Think about producing some clear communications or holding a workplace event to explain your EV plans, including the financial, carbon and air quality benefits and charging infrastructure plans. Providing people with the opportunity to ask questions and organising test drives or trial vehicles also helps to bust myths and identify and resolve any operational issues early on.

Especially where you are encouraging employees to consider electric company cars, ensure they are aware of new EV models, the potential benefit-in-kind and fuel savings, and grants for home chargepoints. Some employees who have previously opted out of a company car scheme may be interested in re-joining if possible.

Update your organisation's policies

Depending on how the EVs will be used within your fleet, this may include updating company car lists so the options and benefits are clear, and updating pool car policies and expense mileage claims processes. This is especially important where these policies and processes may inadvertently act as an incentive for employees to continue driving a private petrol or diesel car, rather than booking an electric pool car.

EV driver familiarisation

Electric vehicles have strong and smooth acceleration. Many drivers find them quiet and relaxing to drive, and because there is no clutch or gears, they are ideal to drive in urban environments. Offering a familiarisation or driver training course can help drivers to become more confident in driving and charging EVs, increasing the likelihood that the vehicles will be popular and achieve the cost savings identified. Training can address the changes to driving technique associated with new features such as regenerative braking and the correct use of charging technology.

While they are aimed at driver trainers, you might find Energy Saving Trust's **model-specific EV videos** useful.

A simple, laminated sheet in each vehicle reminding drivers about key EV and chargepoint features with some practical FAQs can also be a good idea in pool cars or vans driven by several drivers.

13. Energy Saving Trust, 2020 https://energysavingtrust.org.uk/about-us/news/third-fleet-managers-set-electrify-uk-fleets

Step 6: Monitor and share your success

Gathering evidence

As EVs are embedded into your fleet, it is crucial to collect and analyse data on their performance, such as mileages, electricity consumption, repair and servicing costs and driver feedback. Investing in telematics and smart chargepoints helps with this ongoing monitoring. This data can help you assess if the predicted savings are being realised and can help build a case for further adoption of EVs.

Share your success

It is likely that your organisation's marketing communications and sustainability teams will be interested in covering your adoption of electric vans. As well as publicising the acquisition of the new vehicles, consider sharing when you reach certain milestones, such as 100,000 electric miles, or similar.

Case study: Galliford Try

Galliford Try is one of the UK's largest construction companies and operates a fleet of 1,100 vehicles. As of April 2020, this includes 91 electric vehicles and 96 plug-in hybrid vehicles, together making up 17% of their fleet. They also have 100 hybrid vehicles. Their efforts in electrifying the fleet have reduced their average company car fleet CO_2 emissions from 125g/km in 2012 to 91g/km in April 2020.

Encouraging staff

Galliford Try have adopted a whole life cost approach to selecting company vehicles, highlighting the most cost-effective cars. This saw ultra-low emission vehicles (ULEVs) being introduced to their fleet, reducing cost to the company and driver's BIK tax bill.

In addition, Galliford Try have published the BIK tax payable against each car on the company car choice list. This allows their staff to see the cost savings that can be made by choosing a ULEV for themselves, encouraging rather than forcing them to select these vehicles. This has led to almost 50% of employees choosing ULEVs over petrol or diesel vehicles.

Efficient PHEVs

With a significant number of plug-in hybrid electric vehicles (PHEVs) on their fleet, Galliford Try understand the importance of ensuring these vehicles are used efficiently. In theory, a PHEV driver could run the vehicle on the combustion engine only, which is particularly inefficient due to the added weight of the battery. Galliford Try do not supply a fuel card with these vehicles to encourage staff to use chargepoints as much as possible.

To further incentivise charging PHEVs, and ensure their environmental benefits are realised, a reduced business mileage re-imbursement rate is applied on PHEV petrol or diesel miles.

Next steps

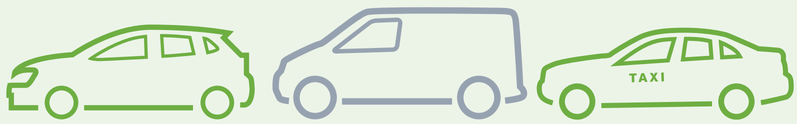
Galliford Try are widening the adoption of ULEVs in their fleet by adding more ULEV models to the company car choice list as they become available, and have 45 EVs and 54 PHEVs and hybrid vehicles on order. They have also identified 750 employees who travel less than 150 miles a day on business for more targeted promotion of ULEVs. For more information, please see **www.gallifordtry.co.uk.**

Case study:
Nottingham City Council

Nottingham City Council (NCC) have transformed their fleet from two electric vehicles (EVs) in 2010 to 142 EVs, 30% of their entire fleet as of April 2020. NCC's fleet includes the first electric street sweepers and cage tippers in the UK and the first electric minibuses to be purchased by a local authority.

142 EVs on fleet:

- 37 cars
- 3 hackney cabs
- 75 SWB vans
- 8 compact sweepers
- 5 nine-seat minibuses
- 14 cage tippers



EVs save per year: **£336,000 348 tonnes CO_2**

NCC undertook extensive research into ultra-low emission vehicles (ULEVs) and found that electrifying their fleet made good business, as well as environmental sense, with the reduction in fuel and maintenance costs offsetting the initial difference in purchase price. Their EVs will save them around £336,000 a year through a reduction in vehicle maintenance and fuel costs.

The financial savings are alongside an annual reduction of 348 tonnes of CO_2, which contributes to NCC's target of being carbon neutral by 2028.

Targeted delivery approach

NCC's fleet is varied and specialised, making it challenging to convert to ULEVs. Committed to realising the air quality and climate benefits that EVs would bring, NCC adopted a targeted delivery approach. This involved purchasing EVs in small quantities to assess their operational capabilities and ensuring they maximised both financial and environmental efficiencies.

Nottingham City Council's electric cage tipper

Nottingham City Council's electric sweeper

NCC initially invested in electric vans for services that were only travelling 12 miles a day on average and were perfectly suited for conversion to EVs. This proved to be a great test case for the council and paved the way for replacing more of their fleet with EVs. The rapidly developing EV market meant that by this time more vehicles could be electric, including compact sweepers, cage-tippers and nine-seater minibuses.

Securing driver buy-in

Drivers initially had concerns over the operational performance and range of EVs, but NCC's staggered integration allowed them to address these concerns in a real-world setting. The policy of purchasing a small number of EVs at first, and leaving the diesel equivalent with the service area as back-up, gave drivers confidence in the EVs and they became the vehicle of choice. This secured ULEV champions in front-line teams, enabling a fast up-scale for that type of EV.

Sharing knowledge

Drawing on their wealth of experience and expertise, NCC have developed a framework for ULEV procurement to assist other local authorities and public sector bodies, helping them to adopt a variety of EVs, from cars to sweepers. The framework is based on specifications that NCC have used to purchase its ULEVs which have proven to work well in a busy local authority. The result is a range of vehicles which are fit for purpose and deliver value for money.

NCC's ULEV Framework will help reduce capital risk, accelerate public sector fleet electrification and use collective buying power to drive down prices and lead times.

For more information, please email:
NEVS@nottinghamcity.gov.uk

Case study:

Oxford Office Furniture

Oxford Office Furniture (OOF) pride themselves on selling new, used and repurposed office furniture and strive to ensure that as little as possible reaches landfill.

With this environmental consideration a pillar of their business, OOF first introduced an electric vehicle (EV), a Tesla Model X, onto their fleet in October 2017. By October 2018, they had added four electric Nissan e-NV200 Combi vehicles to their fleet, to transport furniture and their installation team.

In addition to their EVs, OOF have nine other vehicles that they hope to replace with EVs as soon as possible. These are larger transport vehicles, for which OOF are actively testing EV equivalents.

Financial sense

By looking at the whole life cost of EVs, OOF realised that they made financial sense for their business. They found that the Tesla Model X saved them £300 a month in fuel costs compared to a diesel company car, on top of free or cheap parking for EVs in many places, no Vehicle Excise Duty (road tax), no congestion charges, reduced servicing costs and strong residual values on the vehicle.

Raising awareness

OOF proactively promotes EVs and, in collaboration with others such as Cherwell District Council, educate people about EVs. They are heavily involved as a founding member of Oxfordshire Greentech, a

Oxford Office Furniture's EV fleet

countywide business network to support and grow the low-carbon economy. In October 2018, together they held a popular EV Experience Event for the public and have showcased EVs at numerous other events, including at the Saïd Business School and other prestigious Oxford University establishments.

Sharing their knowledge of EVs has had the added bonus of generating more clients interested in buying furniture specifically because OOF could deliver it with zero emissions.

Forward thinking

OOF are embracing the technology of the future by taking part in Oxfordshire County Council's 'Vehicle-to-grid Oxford (V2GO)' project, trialling vehicle-to-grid (V2G) technology. By collecting data from four of their EVs and two of their diesel vehicles, they also hope to create a widget to help others identify vehicles in their fleet that could be converted to electric.

Whilst awaiting the arrival of an electric Mini, OOF are lobbying for a super charging site at Bicester, innovating with better battery storage solutions and hope to help the market overcome the challenge of electrifying larger vehicles by taking part in trials.

"We are passionate to do our bit to reduce carbon emissions. The bonus is the cost savings we are experiencing using electric vehicles. Furthermore, we have adopted many new clients that share our ethos in making the world a better place."

Oxford Office Furniture, CEO David Beesley

For more information please see:
www.oxfordofficefurniture.co.uk

Thank you to Dave Beesley (CEO, Oxford Office Furniture) and Dale Hoyland (Team Leader, Cherwell District Council / Oxfordshire Greentech) for their contribution to this case study.

Glossary of EV terms

Term	Definition
Battery electric vehicle (BEV or pure-EV)	A vehicle powered only by electricity. It is charged by an external power source and incorporates regenerative braking which helps to extend the available range.
Benefit in kind (BIK)	Employees who receive benefits in addition to their salary, including on company cars which are made available for private use are taxed on the value of this benefit. The calculation for company cars includes the value of the vehicle and its CO_2 rating.
CHAdeMO	A charging protocol for delivering a DC supply to electric vehicles. CHAdeMO is primarily used by Nissan and Mitsubishi. Vehicles with a CHAdeMO connector are particularly compatible with Vehicle-to-Grid (V2G) charging (some AC V2G trials are in progress).
Clean Air Zone (CAZ)	A geographical area, typically a city centre, where targeted action is being taken to improve air quality, which may include charging non-compliant vehicles for entering. London's Ultra Low Emission Zone is a type of Clean Air Zone.
Class 1A National Insurance (NI)	A contribution made by employers for most benefits provided to employees, for example, a company car.
Conventional hybrid	Vehicles powered by petrol or diesel which also have a storage battery charged by regenerative braking. This stored energy is then used to drive an electric motor which can assist the conventional engine or drive the vehicle entirely for a short distance.
Extended range electric vehicle (E-REV)	A vehicle combining a battery, electric motor and an ICE. The electric motor always drives the wheels with the ICE acting as a generator when the battery is depleted.
Euro (3, 4, 5 or 6)	Increasingly stringent standards for the acceptable limits for exhaust emissions of new vehicles sold in EU member states.
Euro NCAP	The European New Car Assessment Programme awards 'star ratings' based on the performance of the vehicles in a variety of crash tests.
Fast charging	Charging an EV at typical rates of between 7 kW AC and 22 kW DC or 22 kW AC.
FCEV	Fuel Cell Electric Vehicle
Geofencing	A software feature that uses (GPS) to define geographical boundaries.
ICE	Internal Combustion Engine
JAQU	Joint Air Quality Unit – a joint unit of the Department for Transport and the Department for Environment, Food and Rural Affairs.
kW	Unit of power
kWh	Unit of energy

Mennekes (Type two)	The recommended standard for public 3.7 kW and 7.4 kW AC chargepoints. It can also be used for fast AC charging at 22 kW or rapid AC at 43 kW.
NEDC	New European Driving Cycle is designed to assess the emission levels of car engines and fuel economy in passenger cars. This has been replaced by the WLTP (Worldwide Harmonised Light Vehicle Test Procedure).
NO_x	A generic term for oxides of nitrogen, including nitric oxide and nitrogen dioxide.
OZEV	The UK Government's Office for Zero Emission Vehicles to support the market for ultra-low emission vehicles. It is part of the Department for Transport and the Department for Business, Energy & Industrial Strategy.
Plug-in vehicle grant	Grant funding to support private and business buyers looking to purchase a qualifying ultra-low emission car or van.
Plug-in hybrid electric vehicle (PHEV)	Similar to a conventional hybrid, but with a larger battery and the ability to charge the battery from an external power source.
PM (10 and 2.5)	Suspended particulate matter categorised by the size of the particle (for example PM10 is particulate matter 10 micrometres or less in diameter).
Rapid charging	Charging an electric vehicle at typical rates of at least 43 kW AC or 50 kW DC.
Regenerative braking	Converting the kinetic energy of the vehicle when braking into electricity which is stored in the battery.
Slow or standard charging	Charging an EV at typical rates of less than 7 kW AC.
Smart charging	A chargepoint technology which enables the time of charging to be shifted (to off-peak) or modulate the power in order to manage the impact of EVs on the electricity system and provide benefits to consumers.
Whole life cost (or total cost of ownership)	The full cost of owning or operating a vehicle, including purchase/lease cost, fuel, tax, insurance and residual value.
WLTP	The Worldwide Harmonised Light Vehicle Test Procedure is used to determine the levels of pollutants, CO_2 and fuel consumption of ICE and EVs. This replaces the New European Driving Cycle (NEDC) and better represents on-road driving conditions.

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saving
trust

Energy Saving Trust is an independent organisation dedicated to promoting energy efficiency, low carbon transport and sustainable energy use. We aim to address the climate emergency and deliver the wider benefits of clean energy as we transition to net zero.

We empower householders to make better choices, deliver transformative programmes for governments and support businesses with strategy, research and assurance – enabling everyone to play their part in building a sustainable future.

energysavingtrust.org.uk