

What's happening in the Alternative Fuel Vehicle space?

A CLM guide for fleet decision makers



What's happening in the Alternative Fuel Vehicle space?

Alternative Fuel Vehicles (AFVs) of all hues are big news. Manufacturers are pumping billions into the development of new model ranges and their take up is being encouraged through;

- Grants off purchase prices
- Investment in charging infrastructure
- and preferential tax treatment.

Following the Government's announcement of a **2040 deadline** for ceasing the sale of cars and vans without the ability to travel, for a least a limited distance, on battery power alone, the growth of AFV registrations is only likely to accelerate.

What does this mean for my fleet?

With around **70%** of all AFV registrations being attributed to fleets, it's clear that a growing number of organisations are making the switch to cleaner forms of transport.

If you are considering how AFVs could work for your business this series of guides will give you a great starting point in understanding what the pros and cons could be.

In this first guide we look specifically at:

- The growth in AFV registrations and the factors driving the increased uptake.
- A guide to the different engine technologies available.
- The factors to consider before including AFVs on your fleet choice list.



How quickly are AFV registrations growing?

While registrations of AFVs of all types are increasing considerably year on year, the percentage of overall registrations remains small.

2017 registrations

Battery Electric Vehicle (BEV) and Plug-in Hybrid Electric Vehicle (PHEV) registrations combined represent just **1.86%** of total registrations while non-PHEV registrations represent **2.85%**. (SMMT Data)

BEV & PHEV
totalled

1.86%
of total registrations
in 2017

NON-PHEV
registrations totalled

2.85%
in 2017

What's driving the uptake of AFVs?

- Improvements to and falling costs of technology
- Choice of vehicles is expanding
- Government Policy
- Public charging points are becoming more widespread
- The availability of Government grants for charge points
 - Home charging
 - Workplace charging
 - Local authority on-street charging
- The availability of Government grants for vehicles
- Tax incentives
 - Company car tax
 - VED
- Capital Allowances



What's driving the uptake of AFVs?

Improvements to and falling costs of technology

The key technological enhancement driving the growth in popularity of EVs is the increasing energy density of lithium ion batteries, which enables greater vehicle range to be extracted from the same size battery unit.

A good example comes from Nissan's projections for the increase in the energy density of batteries (in Watt hours per litre) and consequent range of its Leaf models:

Year	Wh/l	Range
2017	400	c. 150 mile range
2020	700	c. 260 mile range
2025	1,000	c. 375 mile range

Alongside the increase in battery energy density, the cost of production of these batteries has also tumbled as large scale production facilities have come online. This trend is likely to continue as investments from businesses such as Tesla in their Gigafactories will further reduce unit costs.

Choice of vehicles is expanding

The number of manufacturers offering at least one BEV or PHEV for sale in the UK has increased rapidly during the last five years to 19, with new entrants each month.

There are currently more than 60 PHEV and BEV models available in the UK covering all body styles and ranging in price from around £12.5k to £140k.



Projected increase in range of the Nissan Leaf

In the last **5** years **BEV & PHEV MANUFACTURERS** HAVE INCREASED **TO 19**

60+ PHEV & BEV **MODELS AVAILABLE** IN THE UK

Government Policy

In 2017 the UK Government announced that it planned to ban the sale of cars and vans without any zero emission range from 2040, amid fears that rising levels of nitrogen oxides (NOx) posed a major risk to public health.

The commitment is part of the Government's clean air plan, aiming to reduce both the impact that poor air quality has on people's health and the £2.7bn in lost productivity each year.

Public charging points are becoming more widespread

For this policy to be effective improvements in the UK's public charging network are required.

In 2011 there were just a few hundred public charging points and there are now a total of;

4,972 locations

8,168 charging device

14,174 connections (www.zap-map.com)

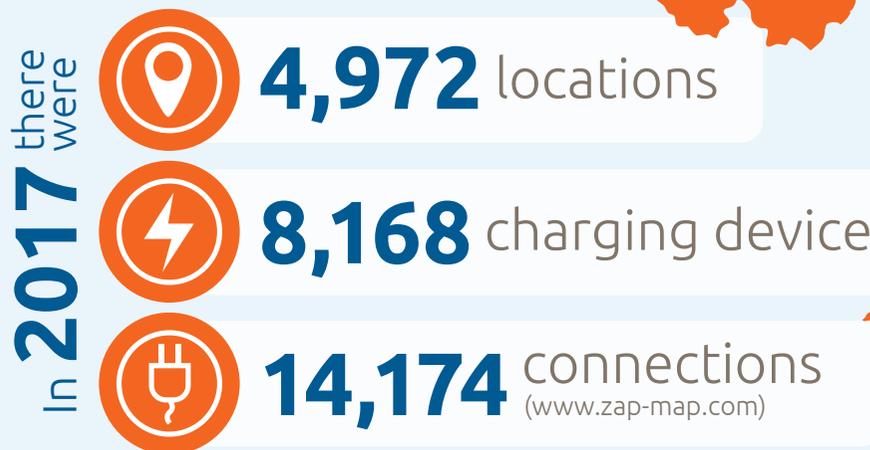
But more are required to provide greater convenience and overcome range anxiety.

The Automated and Electric Vehicles Bill, announced in October 2017, is likely to speed up the growth in availability by requiring the installation of charge points at motorway service areas and large fuel retail sites across the UK.

The bill goes further by setting common technical and operational standards and by ensuring that all installations are 'smart' – capable of interacting with the energy grid to manage demand for electricity across the country.

In the capital, Transport for London has announced that it is making £4.5m available to boroughs for the development of around 1,500 new on-street charging points to encourage take-up of electric vehicles by those without access to off-street parking.

While public charge points expand rapidly, there are currently just 14 sites in the UK where hydrogen fuel-cell vehicles can be refuelled.



The availability of Government grants for charge points

The Office for Low Emission Vehicles provides grants for the building of charging infrastructure, at home, in workplaces and on-street.

Home charging

Through the Electric Vehicle Homecharge Scheme customers who are the registered keeper, lessee or have primary use of an eligible electric vehicle receive up to 75% (capped at £500, incl. VAT) off the total capital costs of a charge point and associated installation costs.

Workplace charging

Government grants provide support towards the upfront costs of the purchase and installation of EV charge points in the workplace. The contribution is limited to £300 for each socket up to a maximum of 20 across all sites for each application.

Local authority on-street charging

The On-street Residential Chargepoint Scheme is designed to increase the availability of plug-in vehicle charging infrastructure for residents who do not have access to off-street parking.

Local authorities can receive support for on-street electric vehicle charge points in residential areas of up to 75% of the capital costs of procurement and installation up to £7,500 per chargepoint installation.



*All data from OLEV (<https://www.gov.uk/government/collections/government-grants-for-low-emission-vehicles>)

The availability of Government grants for vehicles

Grants against the purchase price of plug-in vehicles are available from the Office for Low Emission Vehicles.

The level of the grant available depends on the type of vehicle (cars, vans, mopeds and motorcycles) and, for cars, also on the CO₂ emissions and the distance that the car can travel with zero emissions (i.e. on battery power alone).

Distance travelled on zero emissions



CATEGORY	CRITERIA	GRANT AVAILABLE
CATEGORY 1 CARS	<ul style="list-style-type: none"> OVERALL CO₂ EMISSIONS OF LESS THAN 50G/KM & CAN TRAVEL AT LEAST 112KM (70 MILES) WITH ZERO EMISSIONS 	<ul style="list-style-type: none"> 35% OF PURCHASE PRICE UP TO £4,500
CATEGORY 2 CARS	<ul style="list-style-type: none"> OVERALL CO₂ EMISSIONS OF LESS THAN 50G/KM & CAN TRAVEL AT LEAST 16KM (10 MILES) WITH ZERO EMISSIONS 	<ul style="list-style-type: none"> 35% OF PURCHASE PRICE UP TO £2,500
CATEGORY 3 CARS	<ul style="list-style-type: none"> OVERALL CO₂ EMISSIONS OF 50 TO 75G/KM & CAN TRAVEL AT LEAST 32KM (20 MILES) WITH ZERO EMISSIONS 	<ul style="list-style-type: none"> 35% OF PURCHASE PRICE UP TO £2,500
CATEGORY 2 OR 3 CARS WITH A RECOMMENDED RETAIL PRICE OVER €60,000 ARE NOT ELIGIBLE FOR A GRANT.		
MOTORCYCLES	<ul style="list-style-type: none"> NO CO₂ EMISSIONS & CAN TRAVEL AT LEAST 50KM (31 MILES) BETWEEN CHARGES 	<ul style="list-style-type: none"> 20% OF PURCHASE PRICE UP TO £1,500
MOPEDS	<ul style="list-style-type: none"> NO CO₂ EMISSIONS & CAN TRAVEL AT LEAST 30KM (19 MILES) BETWEEN CHARGES 	<ul style="list-style-type: none"> 20% OF PURCHASE PRICE UP TO £1,500
VANS	<ul style="list-style-type: none"> OVERALL CO₂ EMISSIONS OF LESS THAN 75G/KM & CAN TRAVEL AT LEAST 10 MILES FOR PHEV AND 60 MILES FOR BEV WITH ZERO EMISSIONS 	<ul style="list-style-type: none"> 20% OF PURCHASE PRICE UP TO £8,000

Tax incentives

In April 2017 new rules came into force that changed the way that company cars are taxed for those that have a cash alternative or take their car through salary sacrifice. Basically, the taxable value of the benefit provided is now the larger of the cash forgone or the value of the Benefit in Kind (BiK). This change led to a tax increase for many drivers.

The good news is that drivers of cars emitting less than 75g/km of CO₂ are exempt from the changes. Treatment of Employer's NI contributions are also unchanged for these vehicles.

While BiK tax rates for all vehicles increase over the coming years, BEVs and PHEVs remain the most tax efficient choices.

Rules change again in 2020 when BEVs will benefit from a BiK tax rate of just 2%. PHEVs with emissions below 75g/km CO₂ will attract new rates of between 2% and 14% dependent on the number of miles they can travel on battery power alone.

Vehicle Exercise Duty (VED)

The changes in April 2017 also impacted Vehicle Excise Duty rates, meaning that drivers of vehicles emitting less than 100g/km CO₂ were charged vehicle tax for the first time. BEVs continue to be exempt.

Capital Allowances

To encourage businesses to take up AFVs, cars and vans with CO₂ emissions of 75g/km or less are eligible for 100% first year capital allowances to 31st March, 2018.

While BiK rates for all vehicles increase over the coming years, BEVs and PHEVs remain the most tax efficient.

For other vehicles the following rules apply:

- Cars with emissions of 76-130g/km and above 130g/km only attract 18% and 8% capital allowances respectively.
- Vans that are not zero-emission qualify for tax relief as capital allowances at the rate of 18%.

Budget 2016 announced that the 100% first year allowance would be extended to April 2021 but the CO₂ emissions threshold for qualifying cars would reduce to 50g/km from 75g/km.

From April 2018 the 18% capital allowance will apply to cars with CO₂ emissions of 51-110g/km with vehicles above 110g/km being in the 8% category.

It's important to note that certain funding methods, such as contract hire, do not allow organisations to claim capital allowances for vehicle acquisition.



What are the different engine technologies available?

Gone are the days when users simply had to choose between the smoothness and performance of a petrol engine or the frugality and tax efficiency of diesel when selecting a company car.

Not only have turbocharging and other technologies massively reduced the gap between the way vehicles powered by these two fuels operate but we now have a whole host of new engine technologies to consider.

While hybrid and battery only vehicles have been around for some time, the last few years have witnessed an explosion in both numbers and variations of these technologies.

Here's a quick guide to some of the current terminology:

The main categories of Alternative Fuel Vehicle are:

BEV – Battery Electric Vehicle



As the name suggests, this is a vehicle powered purely by its on-board battery and has no other means of propulsion. They are plugged in to recharge the batteries and also receive some charging from regenerative braking, which turns the electric motor into a generator when the vehicle is slowing down.

PHEV – Plug-in Hybrid Electric Vehicle



As the name suggests, these are hybrids that can be charged through connection to mains electricity. They tend to have larger battery packs than non-plug-in hybrids and are specifically designed to travel using battery power alone. How far they can travel depends largely on the size of their battery pack. For longer distances PHEVs also have a petrol or diesel engine which can either work on its own or together with the electric motor.

FCEV – Hydrogen Fuel Cell Electric Vehicle



These vehicles are driven purely by their electric motors but the electrical charge comes from the fuel cell. This generates electricity through a reaction between hydrogen and oxygen. The advantage of FCEVs is that they can be refuelled quickly at a pump in the same way as ICE vehicles. They are limited by the small number of refuelling points currently available.

HEV – Hybrid Electric Vehicle



Hybrid powertrains come in many varieties but all have a petrol or diesel engine (Internal Combustion Engine – ICE) combined with an electric motor. Non-plug-in hybrids tend to have zero or very limited capability to travel on battery power alone as they have small battery packs. Their electric motors tend to be used to supplement the ICE to improve fuel efficiency. The batteries are recharged by the ICE and also through regenerative braking.

There are also several sub-categories of Hybrid vehicle:

Parallel Hybrid

Most hybrids (whether they are plug-in or not) are parallel hybrids. This means that the electric motor and ICE are both connected to the vehicle's transmission and can both power the vehicle. Propulsion may come from the ICE, the electric motor or a combination of the two.

The ICE usually also works to recharge the batteries. A variation of this is the Mild Hybrid where the electric motor is not able to drive the vehicle but does assist the ICE. It also replaces the starter motor and alternator to restart the ICE when stopped.

Series Hybrid / Range Extender

Here, drive for the vehicle comes from the electric motor and the ICE is only used to charge the batteries on longer journeys. Series hybrids also tend to be PHEVs.

Through-The-Road Hybrid

This is a type of parallel hybrid where the ICE powers one axle and the electric motor the other. This has the advantage that the vehicle can switch to four-wheel-drive when this is required.

Considerations for including AFVs on choice lists

Despite the tax incentives for drivers and employers discussed above, the case for offering AFVs and for employees choosing them is not straightforward.

As with all company vehicles the best way to assess the suitability is by considering Whole Life Costs. Below we look at the factors affecting whole life costs for AFVs specifically.

Purchase price and government grants

There is an ever-growing range of ULEV vehicles available on the new car market, with prices starting from around £13k. However, within their classes, ULEVs do tend to have higher list prices than their traditionally powered equivalents. This means that while BiK tax rates may be lower, this will be applied to a higher P11D value.

Government grants are still available up to a maximum of £4.5k or 35% of the vehicle's cost dependent on list price, CO₂ emissions and zero emissions range, though how long these grants will remain in place is uncertain.

Funding costs

The key issue here is that the electric drivetrain technology in most AFVs is still very new so many fleet funders will take a cautious view when setting residual values. Shopping around for the best deal or using a fleet management company that works with a panel of funders will unearth the more progressive providers.

Added to this is uncertainty about the lifecycle of batteries in varied usage scenarios, meaning that some funders may include provision for battery condition in their end of contract cost rules.

Servicing, maintenance and repair

This is largely dependent on the type of powertrain in the vehicle. Battery only electric vehicles (BEVs) have a very simple powertrain with few moving parts which should require lower routine maintenance. All types of hybrid vehicle have dual powertrains meaning more complexity and potentially higher maintenance costs.

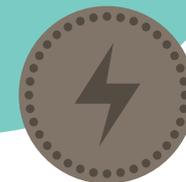
Another factor here lies in the availability of skilled technicians capable of servicing these types of vehicles. Currently, these tend to be the preserve of franchised dealerships meaning little competition and higher servicing prices.

Fuel costs

The overall fuel costs for vehicles running purely on battery power tend to be around

two to three pence per mile

which is much less than running on petrol or diesel. Added to this is the opportunity for employers to offer workplace charging, meaning that the driver effectively benefits from free fuel.



Plug-in Hybrid MPG issues

The official MPG figures quoted for PHEVs assume that the vehicle will be driven on battery power alone to the maximum range of its batteries. This, of course, relies on the vehicle being charged at every available opportunity.

Where this doesn't take place MPG figures may be just a small fraction of those quoted, particularly as PHEVs tend to be heavier due to their dual powertrains. The provision of workplace charging facilities and encouraging charging at home can help to mitigate these issues.

This also raises the issue of how drivers of hybrid vehicles capable of travelling for a certain range on electric power alone (before reverting to petrol or diesel for longer journeys) should be reimbursed for business mileage.

This may mean reimbursing at a very low rate for the miles covered within the battery range and then reverting to HMRC approved reimbursement rates beyond this. This has the added advantage of incentivising drivers to ensure that their batteries are fully charged before embarking on longer journeys.

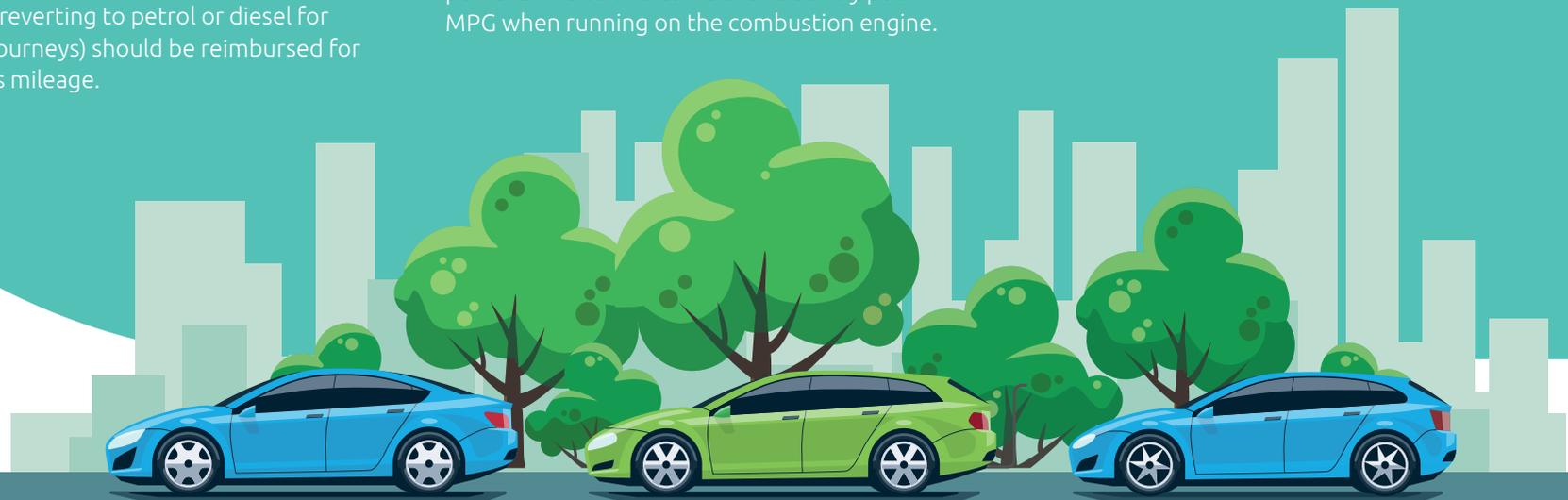
Journey profiling and changes in circumstance

For short journeys BEVs provide excellent overall running costs and as ranges are increasing the practicality of these vehicles is also improving for longer journeys. The same is true for PHEVs though the overall mix of journeys undertaken in these vehicles must be carefully modelled to ensure that sufficient distances can (and will) be covered on battery power alone to overcome the relatively poor MPG when running on the combustion engine.

Changes in an employee's circumstances could have a significant impact on the suitability of some AFVs. For example, if the employee's commute or business travel increases significantly then the range of a BEV could become an issue.

AFV company vehicles handed back when employees leave the organisation can also cause issues for reallocation as their suitability is limited to a smaller group of drivers.

Employees with domestic charging facilities that move home, and second keepers of BEVs and PHEVs, will face higher charges for installing charging points as grants are only available once for the particular vehicle.



About CLM

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- We turn the complex into the clear
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CLM

Corporate House,
Jenna Way,
Newport Pagnell
MK16 9QB

Find out more or talk to us about your requirements
Call us on 01908 210100

email info@clm.co.uk or visit www.clm.co.uk