



THE BMW GROUP GUIDE TO ALTERNATIVE FUELS.

There are now many alternatively fuelled vehicles with different systems for efficient running, including traditional hybrids, pure electric, electric range extender, plug-in hybrids and hydrogen fuel-cell cars.

Each has its own advantages and disadvantages, and all are generally classed as ultra-low emitting vehicles (ULEV). Choosing the right ULEVs for your business can offer significant savings and also enable a greener fleet.

In this BMW Guide to Alternative Fuels, we explain what complementary mobility technologies are available and how they work, and show the differences between each and what benefits they could bring to your fleet.

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ULTRA-LOW EMISSION VEHICLES

Ultra-low emission vehicles (ULEVs) may be described as those emitting 75g/km of CO₂ or less.

Government incentives and grants

To help stimulate the UK market and support the cost of introducing radical new automotive technologies, Government incentives are in place to persuade motorists to switch to a ULEV in pursuit of wider EU emissions and pollution targets.

The Government Plug-in Car Grant (PiCG), is available for some ULEVs, with the rates guaranteed until at least October 2017.

Before adopting ultra-low emission vehicles (ULEV) as company cars it is important to understand the funding opportunities and infrastructure around them. Only then can you ascertain which types of vehicles best suit your business needs.

ULEV categories and PiCG grants

All ULEVs are placed into three categories depending on their emissions of CO₂ and their zero-emission range.

The categories are summarised below:

- **Category 1** – vehicles with CO₂ emissions of less than 50g/km and a zero-emission range of at least 70 miles benefit from a grant of £4,500.
- **Category 2** – vehicles with CO₂ emissions of less than 50g/km and a zero-emission range of between 10 and 69 miles benefit from a grant of £2,500.
- **Category 3** – vehicles with CO₂ emissions of 50-75g/km and a zero-emission range of at least 20 miles benefit from a grant of £2,500.



ULEV price cap

A price cap for all ULEVs has applied since March 1, 2016.

Category 2 and 3 models with a list price of more than £60,000 are not eligible for the grant, but all Category 1 vehicles with a zero emission range of more than 70 miles are eligible for the full £4,500 grant.

For vans, the PiCG is unchanged, with the amount claimable for eligible vehicles up to 20% to a maximum of £8,000. For motorcycles, the amount claimable also remains at 20% to a maximum of £1,500.

The grants are administered by the Office for Low Emission Vehicles (OLEV), and the process of application is managed by the vehicle manufacturer and its retailer network rather than the purchaser.

There is some paperwork for the fleet, as well as a questionnaire that gives OLEV information on how the vehicle is to be used, all supplied by the retailer.

More information and a link to the Go Ultra Low selector guide is available at www.gov.uk/government/organisations/office-for-low-emission-vehicles



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BENEFIT-IN-KIND TAX

The driver of a company car classed as a ULEV is liable for BIK tax at a lower rate because of its lower emissions.

For a car with CO₂ emissions of 0-50g/km, the rate is 9% (12% for diesels) in 2017/18. From April 6, 2018, the rate rises to 13% (16% for diesels). In April 2019, the rate rises to 16% (19%). Diesel hybrids are exempt from the 3% diesel tax charge.

In 2020/21, a new BIK tax system is introduced with tax bands for the lowest emitting cars starting at 2% (see table), while those for cars with CO₂ emissions of between 1g/km and 50g/km will vary between 2% and 14% depending on the zero emission distance the car can travel.

Ultra low emission vans are not affected by the changes because they are subject to Van Benefit Charge which is not currently emissions-dependent.

The BIK tax bands for ULEVs are shown in the table below:

CO ₂ emissions (g/km)	BIK % 2017/18	BIK % 2018/19	BIK % 2019/20	CO ₂ emissions (g/km)	Zero emissions range ¹	BIK % 2020/21
0-50	9 (12)	13 (16)	16 (19)	0	All	2
				1-50	Over 130	2
				1-50	70-129	5
				1-50	40-69	8
				1-50	30-39	12
				1-50	Up to 30	14
51-75	13 (16)	16 (19)	19 (22)	51-54	-	15

¹ Measured in miles

For company cars that are fuel-electric hybrids or all-electric and have a rechargeable battery, the price of the vehicle for BIK tax purposes must always include the cost of the battery, regardless of whether or not it is leased separately. If an employer leases a battery for an employee's company car, it constitutes a taxable benefit that normally would be based on the cost to the employer.

Other ULEV benefits include:

- Exemption from London congestion charging for all ULEVs applies in 2017/18
- A 100% First Year Capital Allowance (FYA) applies to all ULEVs until March 31, 2018 (except for leased cars)



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ALTERNATIVE FUEL VEHICLE COMPARISON.

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DRIVELINE	PLUG-IN HYBRID (PHEV) Eg BMW 3 Series iPerformance, BMW 5 Series iPerformance (Parallel Hybrid)	BATTERY ELECTRIC VEHICLE (BEV) Eg BMW i3	ELECTRIC RANGE-EXTENDED VEHICLE (E-REV) Eg BMW i3 range extender (Series Hybrid)	HYDROGEN FUEL CELL VEHICLE (FCEV) Eg Toyota Mirai	TRADITIONAL HYBRID Eg Toyota Prius, Honda Insight (Parallel Hybrid)
DESCRIPTION	A petrol or diesel engine works with a battery to power an electric motor. Both power units can be used together or individually, and the combustion engine can charge the battery.	The car carries a battery to power an electric motor that drives the wheels. It is charged by plugging it into an electricity supply.	A vehicle driven by an electric motor, but also fitted with a small internal combustion engine which recharges the battery but does not drive the wheels.	A vehicle fuelled by hydrogen and oxygen to generate electricity in a fuel cell stack to drive the car via an electric motor.	Uses a combination of petrol or diesel engine and electric motor to reduce fuel consumption and emissions.
PLUG-IN CAR GRANT (PICG) ELIGIBILITY	ULEVs are categorised for the PiCG according to their emissions of CO ₂ and zero-emission range. Category 1 – vehicles with CO ₂ emissions of less than 50g/km and a zero-emission range of over 70 miles benefit from a grant of £4,500. Category 2 – vehicles with CO ₂ emissions of less than 50g/km and a zero-emission range of between 10 and 69 miles benefit from a grant of £2,500. Category 3 – vehicles with CO ₂ emissions of 50-75g/km and a zero-emission range of at least 20 miles benefit from a grant of £2,500. ULEVs with a list price over £60,000 do not qualify for the grant*.	All EVs classified as cars are classed in Category 1 and so qualify for the full £4,500 Government plug-in car grant, subject to approval.	All current range-extender electric cars are classed in Category 1 and so qualify for the full £4,500 Government plug-in car grant, subject to approval.	As the only tailpipe emission is water vapour, all hydrogen fuel-cell vehicles are classed in Category 1 and so qualify for the full £4,500 Government plug-in car grant, subject to approval.	Hybrid cars that don't require an electric plug do not qualify for the Government plug-in car grant.
BIKTAX IMPLICATIONS	Drivers of ULEVs with CO ₂ emissions of 0-50g/km are eligible for BIK tax starting at 9% (12% for diesels) in 2017/18, rising to 13% (16% for diesels) a year in 2018/19, 16% (19% in 2019/20). A new BIK system applies in 2020/21, with tax percentages based on zero-emission mile capability. Diesel plug-in hybrids are exempt from the 3% diesel tax charge.	Drivers of all cars with CO ₂ emissions of 0-50g/km are eligible for BIK tax starting at 9% in 2017/18, rising to 13% a year in 2018/19 and 16% in 2019/20. A new BIK system applies in 2020/21, with Category 1 cars with a zero-emission range of over 130 miles attracting a 2% BIK tax charge.	Drivers of all cars with CO ₂ emissions of 0-50g/km are eligible for BIK tax starting at 9% in 2017/18, rising to 13% a year in 2018/19 and 16% in 2019/20. A new BIK system applies in 2020/21, with Category 1 cars with a zero-emission range of over 130 miles attracting a 2% BIK tax charge.	Drivers of all cars with CO ₂ emissions of 0-50g/km are eligible for BIK tax starting at 9% in 2017/18, rising to 13% a year in 2018/19 and 16% in 2019/20. A new BIK system applies in 2020/21, with Category 1 cars with a zero-emission range of over 130 miles attracting a 2% BIK tax charge.	Traditional hybrids have low CO ₂ emissions, but are more in line with the best-performing diesels for BIK tax and fuel-efficiency.
LONDON CONGESTION CHARGE ELIGIBILITY	The 75g/km CO ₂ emissions threshold for the London Congestion Charge means any car with CO ₂ emissions of 75g/km or less qualifies for a 100% discount on the London Congestion Charge in 2017/18.	The 75g/km CO ₂ emissions threshold for the London Congestion Charge means any car with CO ₂ emissions of 75g/km or less qualifies for a 100% discount on the London Congestion Charge in 2017/18.	The 75g/km CO ₂ emissions threshold for the London Congestion Charge means any car with CO ₂ emissions of 75g/km or less qualifies for a 100% discount on the London Congestion Charge in 2017/18.	The 75g/km CO ₂ emissions threshold for the London Congestion Charge means any car with CO ₂ emissions of 75g/km or less qualifies for a 100% discount on the London Congestion Charge in 2017/18.	Only the entry-level Toyota Yaris Hybrid with CO ₂ emissions of 75g/km qualifies for the 100% discount on the London Congestion Charge in 2017/18.
REFUELLING	Recharging or refuelling – the combustion engine can drive the car and also charge the battery.	Recharging only.	Recharging and refuelling.	Hydrogen refuelling only.	Traditional refuelling only.

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ALTERNATIVE FUEL VEHICLE COMPARISON. (continued)

DRIVELINE	PLUG-IN HYBRID (PHEV) Eg BMW 3 Series iPerformance, BMW 5 Series iPerformance (Parallel Hybrid)	BATTERY ELECTRIC VEHICLE (BEV) Eg BMW i3	ELECTRIC RANGE-EXTENDED VEHICLE (E-REV) Eg BMW i3 range extender (Series Hybrid)	HYDROGEN FUEL CELL VEHICLE (FCEV) Eg Toyota Mirai	TRADITIONAL HYBRID Eg Toyota Prius, Honda Insight (Parallel Hybrid)
CHARGING INFRASTRUCTURE	Widespread, as PHEVs can top up with fuel at a filling station or recharge using a domestic supply or the charging network.	Growing. There are currently thought to be more than 6,000 public charging points in the UK, although most are located in towns and cities.	Widespread as range-extender electric cars can top up with fuel at a filling station or recharge using a domestic supply or the charging network.	Very limited. There is no established nationwide refuelling network for hydrogen vehicles at present in the UK.	Widespread, using the existing filling station network.
ADVANTAGES	High initial cost offset by plug-in car grant, subject to approval. Capable of electric running for longer than a traditional hybrid. Drivetrain eliminates range anxiety, while engine and electric motor offer strong acceleration together.	Near silent running and smooth acceleration with peak torque from zero revs. No tailpipe emissions, and electricity is less expensive as a fuel than petrol or diesel.	Less 'range anxiety' than a pure electric car as the combustion engine is refuelled conventionally to charge the battery. Power delivery remains smooth from the electric motor.	Ultra-clean operation and silence on the road. Hydrogen is potentially abundant, and refuelling takes only 3-4 minutes. Performance is similar to a conventional car with a range of around 300 miles before refuelling is needed.	Can be less expensive to buy than an electric car or plug-in hybrid. Does not require plugging in, and is refuelled like a conventional car. Many manufacturers offer hybrids and the technology is now well understood after over 15 years on the market.
DISADVANTAGES	Fuel cost savings may take longer to realise than with a battery EV.	Limited range means it is better suited to shorter journeys. Longer journeys require planning with access to rapid charging en route, and charge point distribution can be sparse.	Fuel economy when the engine is running can be disappointing, extra weight can compromise handling and fuel tanks for the range extender motor often tend to be small.	Expensive to buy and, at present, impractical as there is no established refuelling network in the UK. Hydrogen is highly flammable and is stored under high pressure at refuelling sites and in the car.	Zero-emission electric-only driving makes it attractive in town and for short distances, while benefit-in-kind tax can be reduced compared with conventional cars. But motorway economy can be disappointing as the electric motor is used less.
SUMMARY	Likely to be a more popular choice than EVs for fleet operators and drivers, with more electric mileage and better performance available from the combination of plug-in charge and conventional fuel.	Limited because of range restrictions compared with other alternatives, although will be cheap to operate for roles where EVs are suited, eg in-city driving.	Few manufacturers currently offer range extenders, but they have potentially greater appeal than pure EVs.	In its infancy as a practical mobility solution but with great potential. Infrastructure is needed to make it viable, while production and current purchase costs make it prohibitively expensive for most users.	Traditional hybrids have been accepted as an alternative to diesel by some fleets, particularly those based in urban areas.

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FUEL DUTY

Fuel duty is paid on each litre of road fuel purchased (or per kilogram in the case of gases). Therefore the fuel efficiency of a vehicle, the way a vehicle is driven and the distance driven will determine the total amount of duty paid. Electricity is not subject to fuel duty, so battery electric vehicles are duty-exempt.

GOVERNMENT ADVISORY FUEL RATES

If you have a petrol-hybrid car, AFR petrol reimbursement rates apply; if you have a diesel-hybrid car, AFR diesel reimbursement rates apply. There is no HMRC-set AFR equivalent for pure electric vehicles because electricity is not considered to be a fuel for the purposes of Car Fuel Benefit legislation.

FUEL BENEFIT CHARGE (FBC)

As electricity is not considered a fuel, there is currently no fuel benefit charge. This means that if an employer allows an employee with a company or personally owned car to top

up the battery of their battery-electric vehicle (BEV), plug-in hybrid electric vehicle (PHEV) or electric range extender electric vehicle (E-REV) at work, this does not constitute a fuel benefit and no tax is payable.

The provision by an employer of a charging station for an employee to charge a private electric car gives rise to a benefit-in-kind.

In general terms, a benefit-in-kind is liable for tax and National Insurance contributions. If, however, the employer considers the benefit to be a 'trivial benefit', the employer can apply to HMRC for agreement to exclude the benefit from reporting grounds.

ENHANCED CAPITAL ALLOWANCES (ECA)

Eligibility for enhanced capital allowances (ECA) for cars is based on CO₂ tailpipe emissions. If a car emits 75g/km or less it qualifies for a 100% first-year capital allowance (FYA) until March 31, 2018, but the vehicle must be new and not used. Leased cars are not eligible for the 100% FYA .

From April 1, 2018, the 100% First Year Capital Allowance emissions threshold reduces from 75g/km to 50g/km of CO₂, applicable until March 31, 2021

VEHICLE EXCISE DUTY (VED)

VED exemption in 2017/18 is only for zero emission cars with a list price of £40,000 or less, with an exception made for those with zero emissions costing over £40,000. Other ULEVs costing £40,000 or less are liable for VED of up to £25 in the first year, and £140 a year thereafter. All ULEVs costing over £40,000 attract an additional £310 a year



VAT

Vehicles are subject to standard levels of VAT (20%) regardless of their emissions of CO₂ , but electricity has varying treatment.

Electricity that is supplied for domestic, non-business and charity use attracts 5% VAT, while electricity that is supplied for business use is subject to standard VAT at 20%.

Petrol, diesel and hydrogen are considered to be road fuels and therefore also attract the standard level of 20% VAT while electricity that is used to recharge a wholly battery-electric vehicle (BEV) or plug-in hybrid vehicle (PHEV) at home attracts VAT at 5%.

Electricity for ULEVs that are recharged at work attract 20% VAT. Hydrogen used to refuel fuel-cell electric vehicles (FCEV) will also attract VAT at 20%.



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