Guide to Electric Vehicles

Autumn 2020

INTRODUCTION: A NEW START FOR ELECTRIC VEHICLES

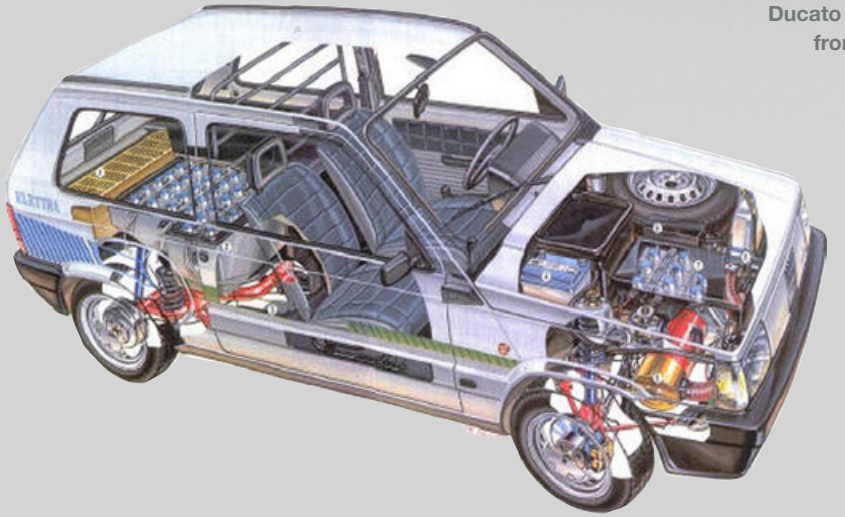
Electrification stands to be one of the most transformative automotive trends of the next decade, but it's more familiar than it seems.

Fiat has long seen potential for the technology, exploring the concept of battery-powered urban mobility with the 1974 X1/23 prototype. In 1990, the Panda Elettra was one of the earliest series-produced electric cars, followed by the Ducato Elettra van, which was enabling local deliveries with zero tailpipe emissions almost 30 years ago.

In 2020, FCA is embarking on a new electrification era with the first of a series of hybrid and electric models that will grow to 30 global nameplates within three years. This guide explores the opportunities and challenges of making the switch to electric mobility.

Right: the new Fiat 500e Battery Electric Vehicle (BEV) will launch later in 2020 and offer an all-electric range of up to 199 miles

Below, left to right: 1990 Panda Elettra, the 1974 X1/23 prototype and the Seicento pioneered Fiat's electric car development. In 2020, the new E-Ducato van range will follow in the wheeltracks of the Ducato Elettra from 1990



*Please refer to 'The FCA 100% Electric Vehicle Range' on page 7 to view all-electric emissions statement

INCENTIVES FOR PLUG-IN FLEETS

Electric cars are seen as vital in the Government's pursuit of zero net carbon emissions by 2050. Combustion engine sales could be phased out by 2035 amid progressively tighter CO_2 emission controls, and fleets can already benefit from incentives to choose the cleanest, most efficient vehicles.

ACQUISITION INCENTIVES

Passenger cars with zero tailpipe emissions of CO_2 qualify for the Government Plug-in Car Grant and are eligible for up to £3,000 off the price of approved vehicles priced below £50,000. A similar scheme is also available for vans with a grant of up to £8,000 available for models with CO_2 emissions of 75g/km~ or less and an all-electric range of at least 10 miles. This contributes to reduced purchase or lease rates for business users.

COMPANY CAR TAX

On April 6 2020, a new two-tier company car tax scale came into force. Cars registered before April 6 2020 are taxed according to CO_2 figures derived from the New European Drive Cycle economy test.

Registrations after April 6 2020 are taxed using CO_2 emissions data from the tougher World harmonised Light vehicles Test Procedure (WLTP), with a two percentage point reduction in the company car tax bands for 2020-21, rising by one percentage point in the two subsequent financial years. The two tiers align in 2022/23, with rates frozen until 2024/25. See the table, above right.

Above: the new Jeep Renegade 4xe Plug-in Hybrid Vehicle (PHEV) offers an all-electric range of up to 26 miles with zero tailpipe emissions

Right: the Alfa Romeo Tonale PHEV SUV showcases FCA's future vehicle electrification plans

In most cases, plug-in cars registered after April 6 have offered significant reductions in BIK tax for drivers and lower Class 1A NIC for businesses, compared to petrol or diesel versions.

CAPITAL ALLOWANCES

Businesses purchasing outright vehicles with CO_2 emissions of 50g/km~ or less can offset 100% of the cost against pre-tax profits. The cost of lease payments can also be offset for vehicles emitting 110g/km~ or less of CO_2.

TAX EXEMPTIONS FOR LOW EMITTERS

All-electric zero tailpipe emission and plug-in hybrid vehicles with ultra-low emissions of CO_2 are likely to be exempt from access restrictions and additional fees imposed in clean air zones, such as the London Ultra-Low Emission Zone (ULEZ). All-electric cars with zero tailpipe emissions also qualify for zero-rate vehicle excise duty in 2020/21.

BIK TAX INCENTIVES FOR PLUG-IN CARS

CO_2 (g/km)	ELECTRIC RANGE (miles)	BIK TAX % 2020/21	BIK TAX % 2021/22	BIK TAX % 2022/23*
0	All	0 (0)	1 (1)	2
1-50	Over 130	0 (2)	1 (2)	2
1-50	70-129	3 (5)	4 (5)	5
1-50	40-69	6 (8)	7 (8)	8
1-50	30-39	10 (12)	11 (12)	12
1-50	Up to 30	12 (14)	13 (14)	14

Source: HM Treasury. Figures in brackets apply to vehicles registered before April 6 2020.
* Rates frozen at this level until 2024/25

CHARGING AT HOME AND WORK

Charging needn't be a challenge. Electric and plug-in hybrid vehicles are commonly charged at home or work, where they're at rest the longest, restoring the range while owners work or sleep. Financial support is available for users putting this infrastructure in place.

FOR BUSINESSES

The Workplace Charging Scheme offers grants of up to 75%, or £350 per socket, against the purchase and installation costs of charging equipment, limited to 40 sockets per company. A 100% first-year allowance for any expenses is available until March 31 2023 for corporation tax purposes and April 5 2023 for Income Tax purposes. Drivers charging at work are also exempt from BIK tax on the electricity used.

SUPPORT FOR DRIVERS

Drivers who are the primary user of an eligible plug-in hybrid or battery-electric vehicle can also apply for funding. The Electric Vehicle Homecharge Scheme provides up to 75%, or £350, towards the purchase and installation costs of a domestic chargepoint.

Since 2016, councils have been able to apply for financial support to install shared on-street chargepoints in residential areas. Funding for 2020/21 was doubled to £10m in January 2020.

CAN THE NATIONAL GRID COPE?

A common myth surrounding plug-in hybrid vehicles is that increased uptake could overload the National Grid or increase reliance on fossil fuels.

However, the National Grid Electricity System Operator has plans for all electricity to be carbon-free by 2025 regardless of demand, and supply is becoming greener all the time. Government reports show 47% of all energy generated in the first quarter of 2020 came from renewable sources – up from 36% a year previously.

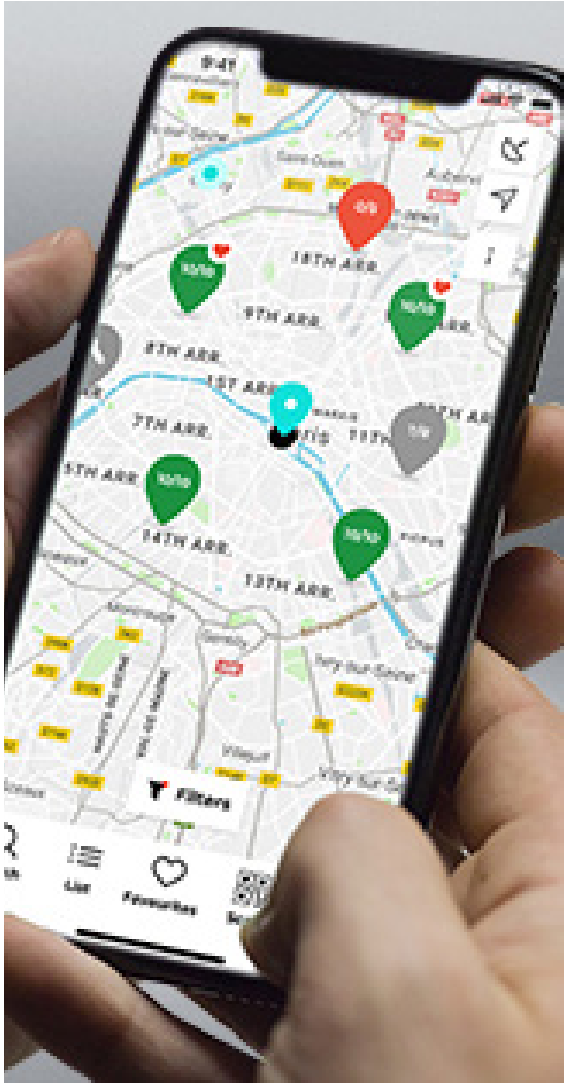
Electric vehicles may also become an active part of the energy system. Domestic charging points are eligible for grant funding only if they can be accessed remotely, which could enable demand to be monitored and controlled, flattening demand spikes.

A pilot project at FCA's Mirafiori factory in Turin, meanwhile, will enable electric vehicles to supply energy from their batteries back to the grid.

Not only could this help stabilise demand, but it would offer mass storage of renewable energy for later use, reducing reliance on fossil fuel sources.

All electric vehicle incentives including: free parking, road tax and congestion charges are subject to change and are in the full control of local and national authorities

CHARGING ON THE MOVE



Above: the new Fiat 500e's onboard 85kw fast charger can charge the battery to 85% capacity in just 35 minutes

The UK is one of the world's biggest markets for plug-in vehicles with a widespread network of chargepoints. According to data aggregator Zap-Map (www.zap-map.com) there are more than 18,000 units nationwide, many of which can charge multiple vehicles simultaneously.

Charging speeds vary by location. Destinations such as hotels and city centre car parks typically have slower AC units which take several hours to complete a charge but enable a top-up while the car is idle.

These are supported by a network of 'rapid' charging units, located at service stations and rest stops along the UK's strategic road network. Designed for shorter mid-route top-ups, most rapid chargers will restore around 100 miles of range in half an hour or so but tend to be more expensive to use than slower units.

Left: Zap-Map app uses smartphone technology to show the locations of over 18,000 chargepoints nationwide

The UK Government sees rapid chargers as a vital enabler of electric vehicles. At the start of 2020, it confirmed a £70m funding round to add a further 3,000 rapid chargers by 2024, more than doubling the current network.

Coverage is already broad, with Highways England data at the end of 2019 showing that 84% of the strategic road network was located within 20 miles of a rapid charger.

Importantly, this is also much easier to access. Rapid chargers feature multiple tethered connectors to suit most electric cars, and vehicles are typically supplied with a cable to suit a standard socket fitted to slower units. Ad-hoc access, using a credit or debit card, has been a requirement for all new public charging points installed since spring 2020, and virtually all units will have been retrofitted by the end of the year.

MANAGING MILEAGE CLAIMS

One of the new challenges for plug-in vehicles is enabling employees to be reimbursed for electricity used for business trips, as this will be part of their domestic utility bills. In September 2018 HM Treasury introduced advisory fuel rates for electric vehicles, currently 4p/mile, while plug-in hybrids are treated as either petrol or diesel models for this purpose. Several fuel card suppliers already offer products enabling drivers to access public charging points and traditional fuel stations within a single account.

BATTERY DEVELOPMENT

Batteries are the heaviest and most expensive part of an electric powertrain so improvements to cell design make a big contribution towards improving the business case for plug-in vehicles.

FCA will soon break ground on its first Battery Hub, adding production and research capability alongside its Mirafiori factory in Turin where the Fiat 500 is built. Development of smaller, lighter designs is ongoing and technology has improved significantly over the last decade.

According to the 2019 Bloomberg New Energy Outlook, the price of battery packs dropped by 87% between 2010 and 2019, from $1,100 (£840) to $156 (£120) per kilowatt-hour (kWh) of energy capacity. By 2023, the same source is predicting costs will fall below $100/kWh (£76), resulting from streamlined and localised production, economies of scale and a reduction in the use of expensive materials.

Concerns about durability have also been disproved. With fewer parts, maintenance costs for an electric powertrain can be up to 35% lower than for a combustion engine. Even after a typical vehicle lifespan, battery cells can contain enough capacity for a second life as static energy storage.

THE FCA 100% ELECTRIC VEHICLE RANGE

CLICK HERE FOR HYBRID RANGE

The new Fiat 500e and Fiat Professional E-Ducato offer CO_2 emission-free all-electric driving with impressive range, thanks to long-range battery packs and on-board fast-charging technology

FIAT 500 BEV

Chic, compact and connected, the new Fiat 500e BEV offers space for four with completely CO_2 emission-free driving. All models include rapid charging to 85% of battery capacity in just 35 minutes, with just a five-minute charge from a rapid charger being sufficient for a 30km range.

Electric range: Up to 196 miles*

CO_2 emissions: 0g/km~ (WLTP)

BIK tax (2020/21): 0%

FIAT E-DUCATO

Designed to cut operating costs for urban fleets, the E-Ducato offers the same load space and body variants as combustion-engine models, with the best payload on the market. A modular battery pack enables users to tailor the range to their duty cycle, while rapid charging offers short top-ups.

Electric range: 78 to 148 miles*[1]

CO_2 emissions: 0g/km~ (WLTP)

Payload: Up to 1,950kg

ELECTRIFICATION EXPLAINED

Mild Hybrid (MHEV)
Eg: Fiat 500: The mild hybrid system uses a compact motor-generator and battery to capture energy that is normally wasted during braking. It uses the stored energy either to power on-board systems while the engine is off, or to improve throttle response while accelerating.

Plug-in Hybrid (PHEV)
Eg Jeep Renegade 4xe: With a large mains-rechargeable battery, plug-in hybrids typically offer an all-electric range with zero tailpipe emissions of between 20 and 30 miles. Once the all-electric range is depleted, they function as a full hybrid.

Traditional Hybrid (HEV)
Eg Toyota Prius: Also known as self-charging hybrids, the technology features a combination of a petrol or diesel engine and an electric motor to reduce fuel consumption and emissions, and can drive short distances on electric power alone. Cannot be plugged-in to extend the range.

Battery-Electric Vehicle (BEV)
Eg Nissan Leaf: A car which carries a battery to power an electric motor that drives the wheels. It is charged by plugging it into an electricity supply. The BEV is an all-electric vehicle with zero tailpipe emissions, with large capacity batteries offering a range of between 100 and 300 miles, usually extended by rapid charging capability.

Fuel Cell Electric Vehicle (FCEV)
Eg Toyota Mirai: A fully electric vehicle which generates its electricity while driving, using a chemical reaction between stored hydrogen and oxygen from the air. The technology offers a long range and short refuelling times, but is expensive and limited by a lack of fuelling infrastructure.

*The Fiat E-Ducato and Fiat 500e are Battery Electric Vehicles (BEV) requiring mains electricity for charging. There is a new test for fuel consumption, CO_2 and electric range figures. The electric range figures shown were achieved using the new test procedure. Figures shown are for comparability purposes. Only compare fuel consumption, CO_2 and electric range figures with other vehicles tested to the same technical procedures. The values indicated for vehicle range were obtained after the battery had been fully charged and are measured by the manufacturer on pre-approval tests, and may be subject to modification depending upon the definitive homologation. Values may not reflect real life driving results, which will depend upon a number of factors including the starting charge of the battery, accessories fitted (post-registration), variations in weather, driving styles and vehicle load. [1]Values refer to E-Ducato Van 3.5 tonne L2H1 version in WLTP Combined Range

THE FCA HYBRID RANGE

CLICK HERE FOR 100% ELECTRIC RANGE

Fiat Chrysler Automobiles' vision of an electrified future is already here, with the Fiat 500 and Fiat Panda Mild Hybrids and the Jeep Renegade 4xe PHEV now available to order

FIAT 500/500C M/HYBRID

Available as a hatchback or four-seat convertible, the iconic Fiat 500 MHEV system recovers energy from braking and deceleration to restart the engine in Stop&Start mode and assist it during acceleration. New filter systems improve cabin air and the seats are upholstered with plastics recovered from the ocean.

Combined MPG: Up to 53.3mpg~ (WLTP)

CO_2 emissions: From 119g/km~

BIK tax (2020/21): from 26%

FIAT PANDA CITYCROSS M/HYBRID

Rugged, spacious and versatile, with an advanced mild hybrid engine to reduce fuel consumption and offer a smoother, more responsive drive in city traffic. A 12-volt Belt-integrated Starter Generator (BSG) works with the engine to offer 49.6mpg and CO_2 emissions as low as 89g/km.

Combined MPG: Up to 50.4mpg~ (WLTP)

CO_2 emissions: From 126g/km~

BIK tax (2020/21): from 28%

JEEP RENEGADE 4xe PHEV

The Renegade 4xe PHEV is available in Longitude, Limited and Trailhawk trim levels, with up to 240hp available from its petrol/electric drivetrain and a zero tailpipe emission all-electric range of up to 26 miles. Jeep's legendary all-surface capability uses the Selec-Terrain system for impressive 4WD ability.

Combined MPG: Up to 134.5mpg~ (WLTP)

CO_2 emissions: From 49g/km~

BIK tax (2020/21): 12-13%

JEEP COMPASS 4xe PHEV

The family SUV range will soon be joined by the 240hp 4xe PHEV. Luxurious and spacious inside, it offers zero tailpipe emission all-electric driving and an e-Coasting function to reduce fuel consumption on the highway. Selec-Terrain adaptability and 4WD offer impressive performance off the beaten path.

Combined MPG: TBC

CO_2 emissions: TBC

BIK tax (2020/21): TBC

ALFA ROMEO TONALE PHEV

The Tonale compact SUV will take Alfa Romeo into a new, electrified era. Previewed as a concept in 2019, it features striking design cues inspired by Alfa's history and a premium-class cabin. Selectable driving modes unlock efficiency and performance from the plug-in hybrid powertrain.

Combined MPG: TBC

CO_2 emissions: TBC

BIK tax (2020/21): TBC

~Fuel consumption and CO_2 figures are provided in accordance with EU Directives and Regulations for comparative purposes only and may not reflect real life driving results, which will depend upon a number of factors including the accessories fitted (post-registration), variations in weather, driving styles and vehicle load. Only compare fuel consumption and CO_2 figures with other cars tested to the same technical procedure. More information is available at www.vehicle-certification-agency.gov.uk.