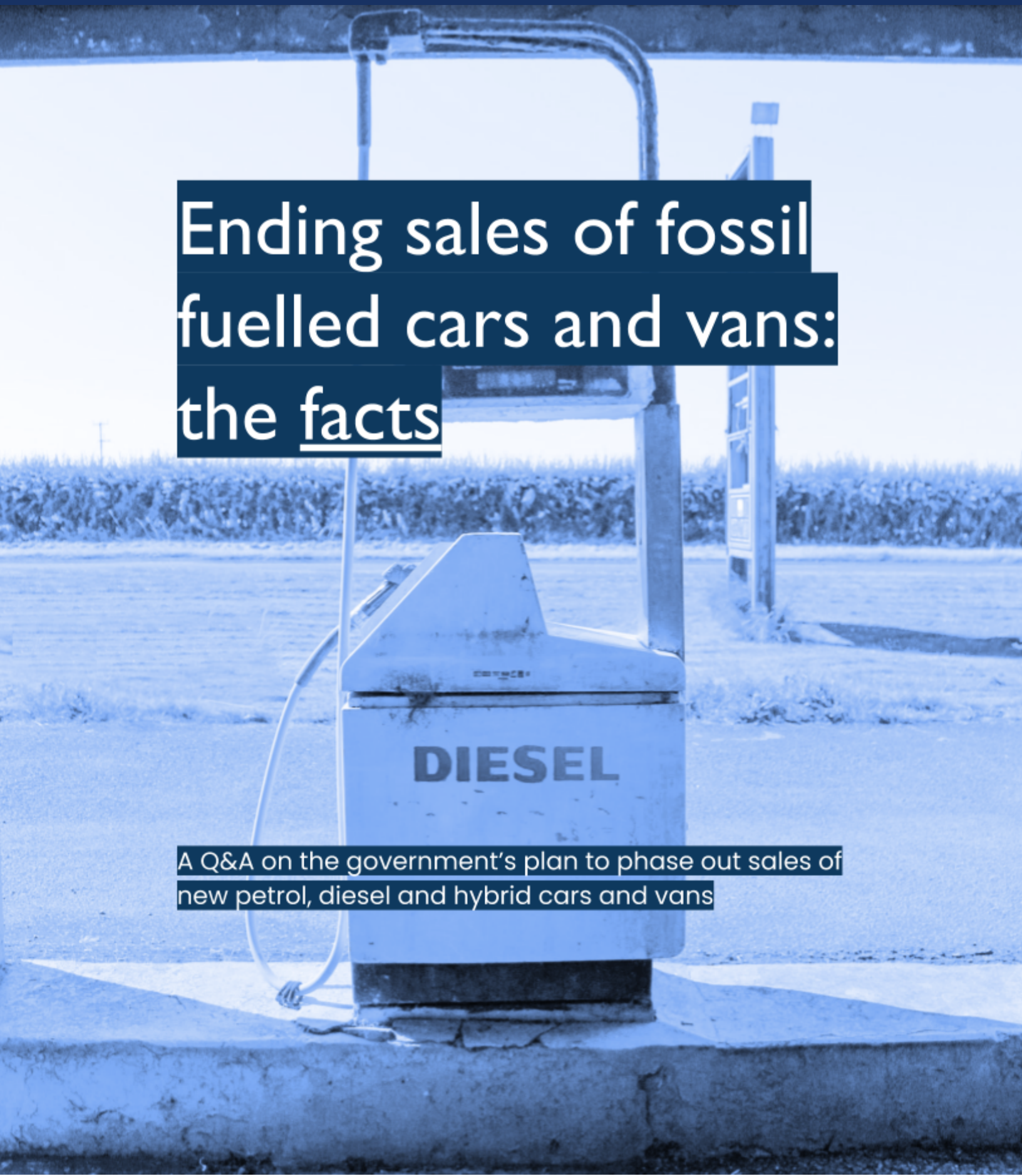
New AutoMotive



Ending sales of fossil fuelled cars and vans: the facts

A Q&A on the government's plan to phase out sales of new petrol, diesel and hybrid cars and vans

Key points

- Bringing forward the ban on sales of new petrol, diesel and hybrid cars and vans will save motorists money, cut carbon emissions in line with the government's commitment to net zero and fulfil a key pledge from the 2019 Conservative manifesto.
- Aligning transport with net zero emissions will save £5 billion a year - these savings will mostly accrue to motorists.
- Many EVs are already an affordable option for those who depend a lot on their car, since the running costs are far lower than petrol or diesel cars.
- EVs have more than enough range for most UK car journeys.
- Most EV drivers will charge at home, and most UK homes are suitable for home charging.
- The UK has a growing network of over 20,000 public charge points and 30,000 connectors - that compares with 8,300 petrol stations. You are never more than 25 miles from a rapid charger on a UK motorway.
- In March 2020 the government committed £500m to expand the UK's charge point infrastructure.
- The sales ban is necessary to reduce emissions in line with the UK's commitment to net zero emissions by 2050.
- The sales ban will help improve air quality in the UK's towns and cities, vastly reducing toxic pollution that comes from burning carbon fuels.
- The grid is well-prepared to cope with extra demand for electricity.

Contents

About New AutoMotive

New AutoMotive is an independent transport research organisation established in 2020. We are funded by Quadrature Climate Foundation, with a mission to accelerate the switch to electric vehicles in the UK by combining data, policy and mainstream consumer marketing. Unusually for a research institute we will be building consumer products too, to test our thinking in the real-world, with real people.

About this Q&A

We commissioned the digital research consultancy Media Measurement to conduct a social listening report on the topic of EVs. The exercise analysed digital,social, and traditional media data to better understand how UK citizens perceive EVs, detect their key concerns, and highlight widely shared myths and misinformation. This exercise was limited to analysis of social media conversations and media coverage from the UK, in English language.

The analysis period was 1st November 2019 to 31st July 2020. This reporting period allowed us to consider the impact of COVID-19 on the volume and narrative of conversations, and also to start to unpick the 'new normal' as the UK gradually emerged from the first wave of the pandemic.

Social media data was sourced from publicly available posts, with a focus on Twitter data, supplemented by analysis of engagement with content on Facebook, Reddit, and also via comments on news and blog content. Data was analysed using a combination of automated Boolean searches and qualitative human analysis.

News media analysis primarily focused on national titles, including consumer automotive outlets; this was supplemented by a broader analysis of consumer engagement on social media and in comments sections with news articles from the UK. The analysis included only articles with headline or summary/first paragraph mentions of EV to ensure a focus on the most relevant content.

The key findings demonstrated that discussion of EVs focused on three issues, and that discussion of these issues spiked shortly after the government started consulting on bringing forward the ban on sales of new petrol, diesel and hybrid cars and vans. First, and most commonly discussed, was the suitability of EVs for everyday use. 77% of posts referred to batteries and charging, with a particular focus on concerns about where to charge vehicles. The second most common issue was around affordability and cost: including concerns about the affordability of individual EVs as well as the costs of the decision to phase-out petrol and diesel cars. Lastly, there were also concerns about the environmental credentials of EVs. This report was supplemented by a further audience analysis research piece, which profiled the key demographics that engaged in these conversations. We will publish both sets of findings in more detail in due course.

The sales ban explained

What is the petrol and diesel sales ban?

The government is planning to ban sales of new petrol, diesel and hybrid cars and vans. It will come into force during the 2030s.

What will be banned?

The ban will prevent the sale of new petrol, diesel and hybrid cars and vans during the 2030s. No existing vehicles that are already on the road will be banned.

Why is the government introducing the ban?

In 2019 the Conservative Manifesto committed to consult on bringing forward a planned ban on the sale of new petrol, diesel and hybrid cars and vans. The previous Conservative government had committed to ban sales of new petrol and diesel cars and vans in 2040.

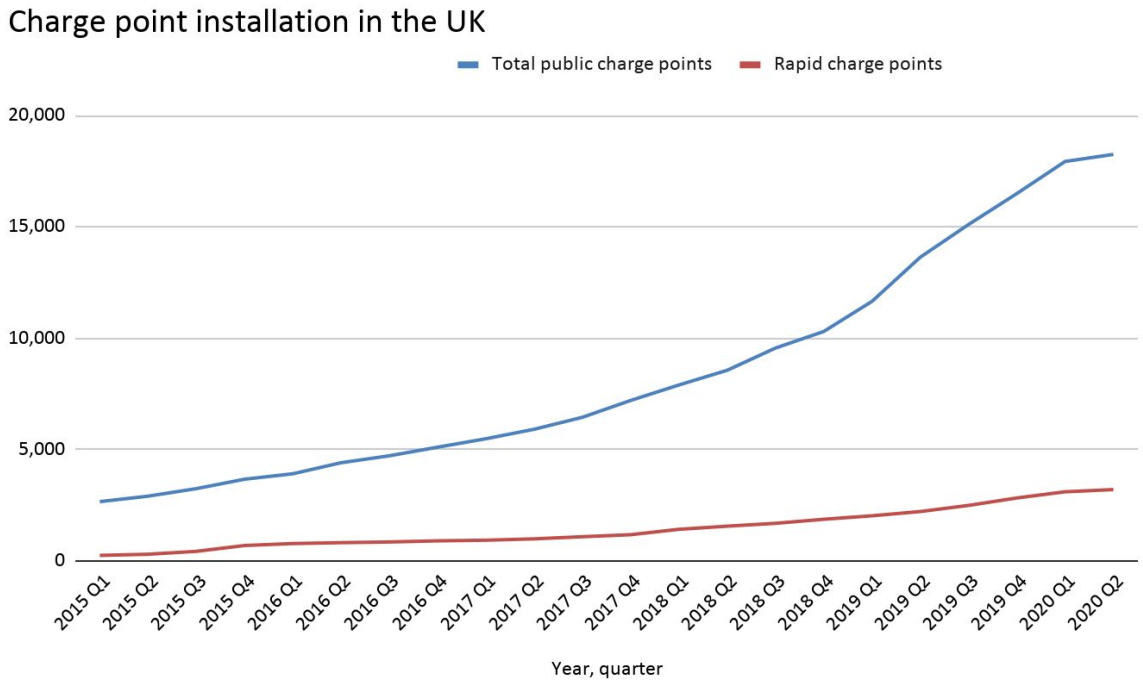
In 2019 the government legislated to commit the UK to ending its contribution to climate change by targeting net zero greenhouse gas emissions by 2050. Achieving net zero requires early and deep cuts in emissions in all sectors, but transport is a key priority. **Transport is the largest emitting sector of the UK economy, and cars and vans accounted for one fifth of UK carbon emissions in 2018**.[1] Electric vehicles will also help the UK meet its legally binding air quality standards.

[1] New AutoMotive analysis of data from the National Atmospheric Emissions Inventory for 2018. Cars and vans accounted for 88.381 MtCO2e in 2018, which is 19.3% of total UK CO2e emissions.

Charging, range & practicalities

Will there be enough public charging points?

Yes. There are currently 20,000 publicly available charge points in the UK, including over 3,000 rapid charge points.[2] On a UK motorway, you are never more than 25 miles from a rapid charger. The pace of charge point installation has accelerated in recent years.[3]



[2] The latest stats are published live by ZapMap, available: https://www.zap-map.com/statistics/ (accessed 28.10.20).
[3] Department for Transport, 'Electric vehicle charging device statistics: July 2020 data tables'. July 2020. Available: https://www.gov.uk/government/statistics/electric-vehicle-charging-device-statistics-july-2020 (accessed 14/10/2020). Installations have slowed during 2020 due to the coronavirus pandemic.

Is range a problem for EVs?

No. New EVs can typically go 150-250 miles on a single charge. Since the average car journey in England is just 8.7 miles,[4] even EVs with a short range are good enough for the vast majority of journeys.

How is the government supporting the installation of more charging points?

The government has committed £500 million to support the expansion of electric vehicle charging infrastructure. Currently funding is available in the form of grants for councils to put chargers in residential areas, for those with driveways to install a charge point at home, and for businesses to put them in workplace car parks.[5] The following grants are available to encourage the installation of charge points.

Scheme name	Who can get it	How much can they get
Electric Vehicle Homecharge Scheme	Keepers of qualifying EVs	Up to 75% of the cost of purchasing and installing a dedicated home charger, up to a maximum of £350.
Workplace Charging Scheme	Businesses, charities and public sector organisations who have dedicated off-street parking provision for use by their staff or private fleet	Up to 75% of the cost of purchasing and installing chargers, up to a maximum of £350 per socket.
On-street Residential Charge Point Scheme	Local authorities	This grant will reimburse up to 75% of the capital costs of procuring and installing charge points. There is no cap, though DfT say they anticipate that individual schemes will not

[4] Department for Transport, 'National Travel Survey: England 2019', table NTS0101, August 2020. Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/906276/national-travel-survey-2019.pdf (accessed 14/10/2020)

[5] HM Treasury, Budget 2020. March 2020.

		receive in excess of £100,000 of funding. DfT has allocated £20m of funding for 2019/20.

Where will everyone charge their cars?

The majority of people will charge at home. 80% of the 130,000 EV drivers in the UK charge their cars at home using a home charging point. This means that around 26,000 EV owners rely on public charge points - at the moment **that works out at around one public charger per EV**.[6] 66% of homes in England have off-street parking, which is where most EV drivers charge their cars.[7] There is an expanding network of residential on-street charge points, too, so that people without driveways can recharge their cars near home.

A government grant is available under the Electric Vehicle Homecharge Scheme (EVHS) to reimburse 75% of the costs of purchasing and installing a home charger for keepers of certain EVs, up to a maximum grant of £350.

The number of public charge points is increasing, too. You are never more than 25 minutes away from a rapid charger on the UK motorway network. Workplaces, businesses and public car parks are also installing charge points.

[6] ZapMap estimate that there are currently 20,000 charge points in the UK, and 30,000 connectors.
[7] English Housing Survey 2018-2019: Table DA2201 (SST2.4): Parking and mains gas - dwellings, 2018. Available here: https://www.gov.uk/government/statistical-data-sets/amenities-services-and-local-environments (accessed 14/10/2020)

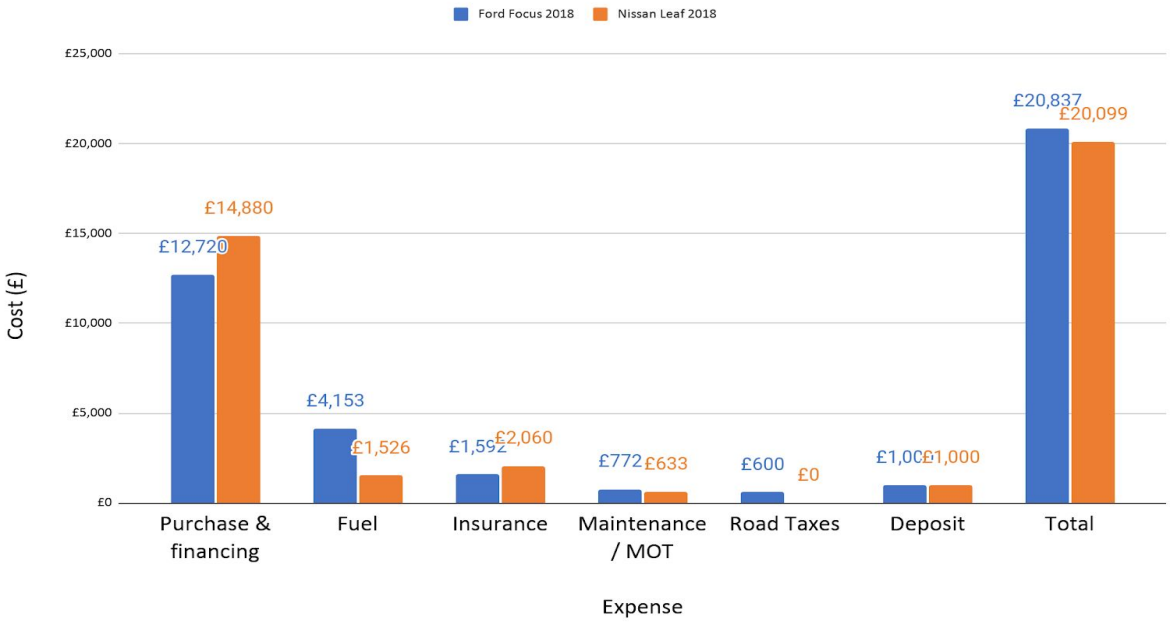
Costs & affordability

Are EVs affordable?

Yes, in many cases they are already affordable when the total cost of ownership is considered. Both new and second hand EVs have a higher upfront cost than conventional cars, but their running costs are far cheaper.

We investigated whether an EV would be a viable option for a car-dependent family who typically buy second hand cars that are not too old and run them for four years. This family would be in the top quarter of car owners for mileage, averaging 10,000 miles a year. We compared a scenario in which they were choosing between a 2018 Ford Focus and a 2018 Nissan Leaf with similar mileage. **The total cost of ownership over four years was £20,837 for the Ford Focus and £20,099 for the Nissan Leaf.**[8]

The total costs of owning a 2018 Ford Focus compared with a 2018 Nissan Leaf over 4 years



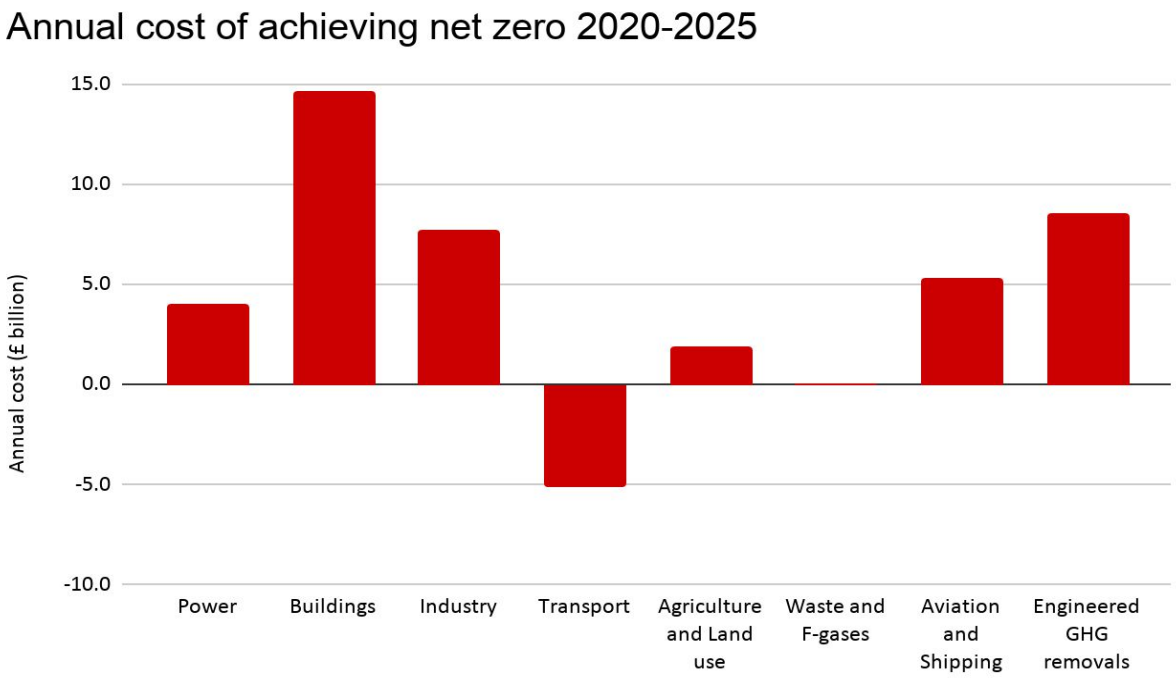
[8] For a full breakdown of our calculations, see Annex A.

EVs benefit from a range of financial incentives:

- A grant of up to £3,000 to buy new qualifying EVs.
- No VED.
- No benefit-in-kind tax (if it is a company car).
- No congestion charge or ULEZ charge.
- Often cheaper residents' parking.

How much will the ban cost the economy and taxpayers?

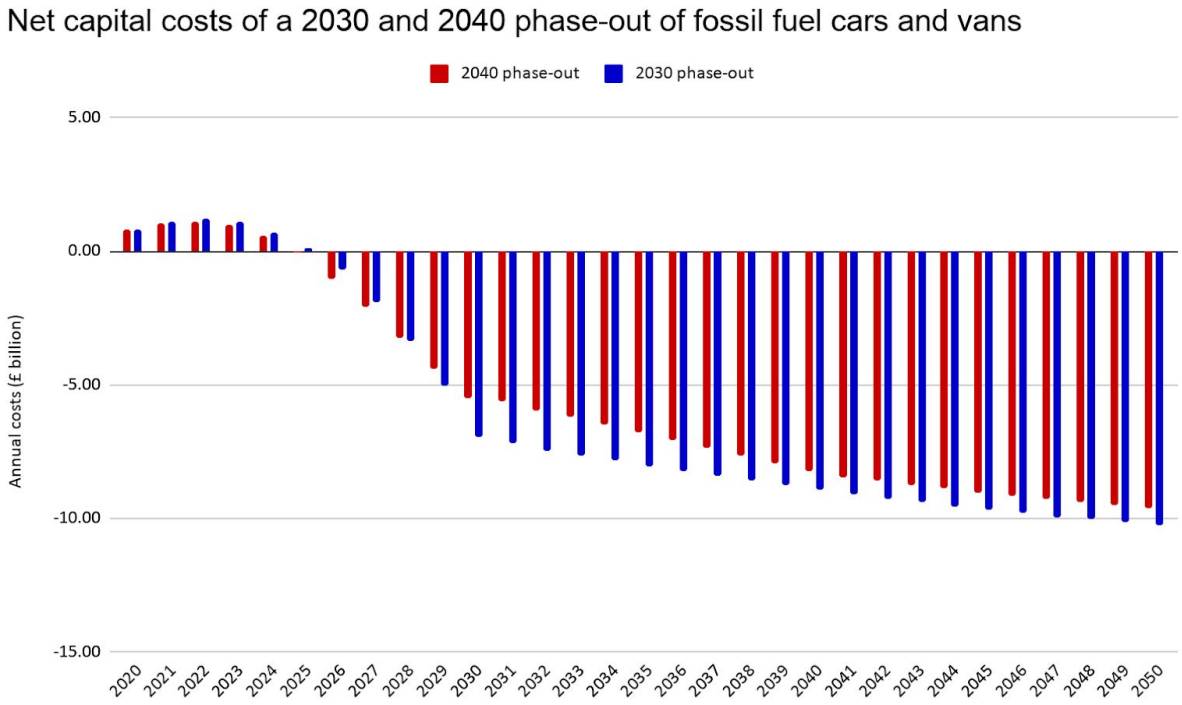
The switch to electric vehicles will incur net savings. The Committee on Climate Change estimates that reducing transportation emissions in line with net zero emissions will **save £5 billion a year.**[9] These figures represent the costs and savings that will accrue in the sectors where action to reduce emissions occurs.



[9] This statistic and the accompanying graph are taken from figures published accompanying the Committee on Climate Change's report 'Net Zero: The UK's contribution to stopping global warming', May 2019. The figures are available here: https://www.theccc.org.uk/wp-content/uploads/2019/04/07-Net-Zero-Exhibits-Chapter-7.xlsx (accessed 14/10/2020).

Will the ban create more costs for consumers?

No. Short term costs will be outweighed by significant medium and long term savings. The switch to electric vehicles will save motorists money. The chart below shows the CCC's estimates of the total costs to UK motorists of switching to electric cars.[10]



Costs are compared to the continued use of petrol and diesel cars, and are the subsidy free total lifetime (14 years) costs relating to all new vehicles bought in that year. It includes the upfront vehicle cost, refuelling cost (discounted at 3.5%), and costs of charging infrastructure, electricity generation and network expansion. The CCC have assumed that electric vehicles will get cheaper, but also that petrol and diesel cars will get cheaper and more efficient over time, too.

[10] The chart showing net capital costs is taken from figures published accompanying the Committee on Climate Change's report 'Net Zero: Technical Report', May 2019. The figures are available here: https://www.theccc.org.uk/wp-content/uploads/2019/04/05-Net-Zero-TR-Exhibits-Surface-transport.xlsx (accessed 14/10/2020).

Second hand electric cars are currently more expensive than conventional cars, but that is likely to change in the near future. 40% of EVs in the UK are held by commercial fleets.[11] As these EVs are released onto the second hand market, supply will increase faster than it has done in the market for privately owned new EVs. The speed at which these EVs join the second hand market could outpace consumer demand and cause prices to fall, making EVs more affordable.

What effect will charging an EV have on fuel bills?

Switching to an EV will save consumers money on fuel bills. While electricity consumption will increase, the cost savings from no longer buying petrol and diesel will more than offset any rise in electricity costs.

A typical UK driver does 7,400 miles a year. This will cost £960 in a petrol car or £740 in a diesel car.[12] In an electric car charged at home, the annual cost of the extra electricity to do this mileage would be between £140 - £290, depending on whether the vehicle is charged overnight or during the day. The petrol or diesel cost savings will be more than cover the extra cost of electricity for the typical motorist.

[11] Department for Transport statistics prepared for New AutoMotive.
[12] We use figures for the petrol and diesel versions of the Ford Focus, taken from RAC Foundation, 'What are the fuel costs for electric, diesel and petrol vehicles for a given journey?', February 2020, available: https://www.racfoundation.org/wp-content/uploads/EV_cost_per_mile_Feb_2020_Lam.pdf (accessed 15/10/2020).

Energy & environment

Will the grid cope with all the extra demand for electricity?

Yes. The National Grid has been clear that there is sufficient capacity to meet future demand from electric vehicles.

To meet the extra demand that will come from EVs, the electricity system needs to have the ability to generate enough electricity and the ability to transmit the electricity to where it will be required. National Grid is clear that on both these counts, the UK has capacity to meet the extra demand.[13]

The UK has enough electricity generating capacity, and the UK's peak electricity demand has fallen 16% from a high of 62GW in 2002. Moreover, since July 2019 all new home chargers are required to be 'smart' to be eligible for a government grant, which will allow demand for electricity from electric cars to be shifted away from peak and into off-peak periods when electricity is cheaper.

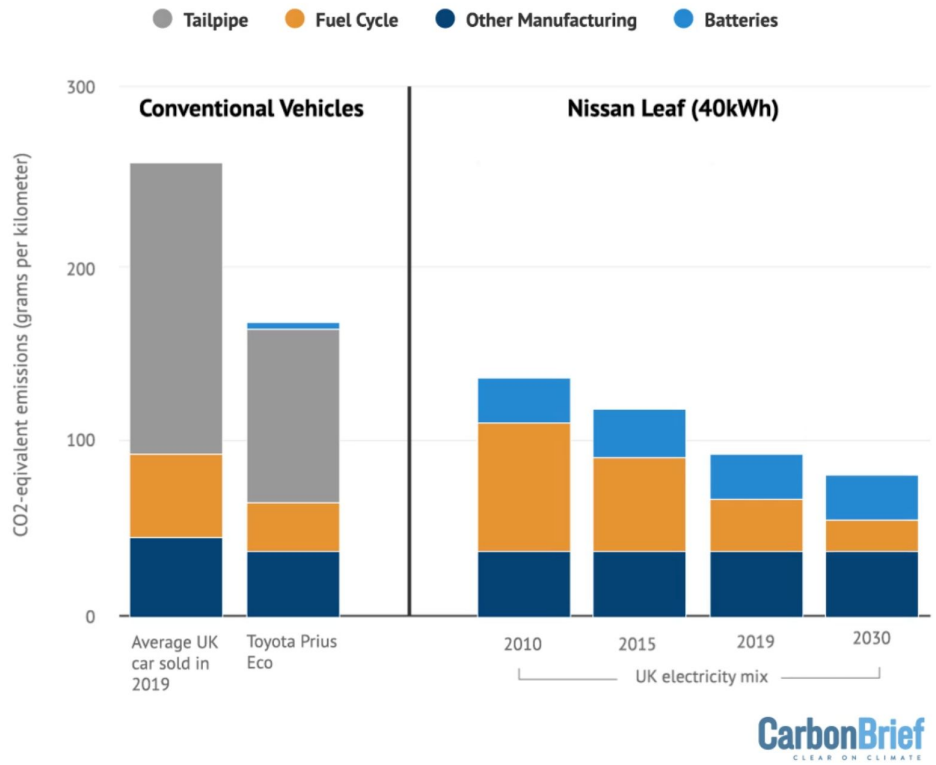
National Grid says that there is likely to be some targeted investment required to ensure that drivers have access to high power charging away from home. One EV doubles household energy demand. Fortunately, the companies who are responsible for the myriad network of underground cables and overhead lines, the Distribution Network Operators, have been working ahead of need since 2012 to ensure that the local energy network can facilitate mass adoption of EVs. Network innovation projects like My Electric Avenue and Electric Nation paved the way for smart charging to be enshrined into law. EV demand management solutions such as smart charging and time of use tariffs will go a long way in helping to 'spread the load' of multiple EVs charging on one street. The future is bright for EVs and the grid.

[13] Source: National Grid, January 2020. Available: https://www.nationalgrid.com/stories/journey-to-net-zero/5-myths-about-electric-vehicles-busted (accessed 14/10/2020).

Do electric vehicles reduce emissions?

Yes. Even considering emissions from production and generation of electricity, electric cars are better for the climate.

Analysis of the lifecycle emissions - which include emissions during production, operation, including how the electricity is generated - of EVs and conventional cars shows that EVs result in significantly reduced emissions. This is largely due to the progress has been made in the last decade in decarbonising the UK's electricity grid. The carbon intensity of UK electricity has fallen from 457 g of carbon dioxide equivalent (CO2e) in 2010 to an average of 241g CO2e in 2019.[14]



[14] Graph and analysis taken from CarbonBrief, July 2020, whose analysis builds on Hall & Lutsey, International Council for Clean Transportation, 'Effects of battery manufacturing on electric vehicle life-cycle greenhouse gas emissions', 2018.

Do electric cars help with air pollution?

Yes. Replacing petrol and diesel cars with electric cars will significantly pollutants which are known to contribute to heart disease, stroke, low birth weight, and adult onset asthma, and which are linked to 40,000 early deaths in the UK every year.

Vehicles contribute to pollution in two ways: exhaust and non-exhaust emissions. Petrol and diesel cars produce exhaust and non-exhaust emissions, whereas pure electric vehicles produce only non-exhaust emissions.

Exhaust emissions contain gases such as nitrogen dioxide (NO_2), as well as particulate matter (PM), such as soot. Non-exhaust emissions consist of PM, arising primarily from brake wear, tyre wear, road surface wear and re-suspended particles of dust, which are stirred up by passing vehicles.

In 2016, the Royal College of Physicians (RCP) estimated that air pollution causes 40,000 early deaths in the UK, with air pollution linked to heart disease, adult onset asthma, stroke, low birth weight in pregnant women, and a range of other health problems.[15] Of the 40,000 early deaths, the RCP estimated that 11,000 were due to NO_2 and 29,000 were caused by PM pollution. There is a significant body of evidence linking carbonaceous PM, which is emitted during the combustion of carbon fuels.[16] Electric cars do not emit NO_2, or carbonaceous particulate matter, but they do contribute to non-exhaust PM pollution.

There is no clear evidence that shows that non-exhaust PM pollution contributes to the negative health effects of PM pollution. In September 2020, the government's Committee on the Medical Effects of Air Pollutants (COMEAP) published its latest review of the health effects associated with exposure to non-exhaust particulate matter from road transport. COMEAP found that:

> *The limited toxicological studies available suggest that particles from these [non-exhaust] sources could pose a hazard to health. However, it is not clear*

[15] Royal College of Physicians, 'Every breath we take: the lifelong impact of air pollution', February 2016.
[16] See, for example, Janssen, et. al., World Health Organisation, 'Health effects of black carbon', 2012, available: https://www.euro.who.int/__data/assets/pdf_file/0004/162535/e96541.pdf (accessed 15/10/2020).

whether real world concentrations of non-exhaust PM from road transport would have significant effects and also whether it would exert similar harm compared to pollutants from traffic exhaust. [17]

Do electric cars rely on unsustainable mining?

The global battery supply chain currently relies on unsustainable environmental and social practices. But it doesn't have to be this way, and things may be starting to change.

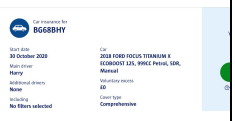
Battery production requires a significant amount of metallic elements such as lithium and cobalt, which are sometimes mined in an environmentally and socially unacceptable manner. Cobalt is currently problematic, whereas lithium can be produced from brine, without mining. But there are solutions, and there are efforts underway to improve the way batteries are made, including engineering difficult minerals out of the battery production process altogether. To find out more about these issues, recommend the following guides and articles:

- Ethical Supply: The Search for Cobalt Beyond the Congo
- Clean energy progress after the Covid-19 crisis will need reliable supplies of critical minerals
- Tesla is nixing one of the most controversial metals from some Model 3 battery production, report says

[17] Committee on the Medical Effects of Air Pollutants, 'Statement on the evidence for health effects associated with exposure to non-exhaust particulate matter from road transport', September 2020. Available here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/917308/COMEAP_Statement__on_the__evidence__for__health__effects__associated__with__exposure_to_non_exhaust_particulate_matter_from_road_transport_-COMEAP-Statement-non-exhaust-PM-health-effects.pdf (accessed 15/20/2020).

Annex A: Comparing the costs of a Nissan Leaf 2018 & Ford Focus 2018

The table below shows the details and sources of our cost comparison of a Nissan Leaf 2018 and Ford Focus 2018, including our data sources.

Expense	Ford Focus 2018	Nissan Leaf 2018	Assumptions / Details	Sources for Ford Focus	Sources for Nissan Leaf
Financing / PCP	12,720	14,880	Focus: £ 265 pm, PCP 4 years 14.9% APR Leaf £310 pm PCP, 4 years, 9.9% APR	Ford Focus 2018	Nissan Leaf 2018
Fuel	4,153	1,526	Focus: 50.4mpg@1.15/litre Leaf - 26.5kWh per 100 miles @14.4p/kWh	AA - Focus	Ev-database-Leaf Average UK electricity price
Maintenance / MOT	772	633	£193 pa Kwik-Fit Nissan quote of £11/month plus 3 years of £35/MOT	Kwik-Fit-Focus	RAC-Leaf
Insurance	1,592	2,060	Quote (£398 pa), no xs, 13E Quote (£515 pa), £200xs, 21E		
Road Taxes	600	0	£150 pa / 107gCO2 / km - Focus £0 / 0gCO2/km -	HMG Website	HMG Website

			Leaf		
Deposit	1,000	1,000	PCP requirement	Ford Focus 2018	Nissan Leaf 2018
Total (4 yrs)	20,837	20,099			
Per year	*5,209*	*5,025*	(Calculation)		
Per month	*434*	*419*	(Calculation)		
Specificat-ions	Focus	Leaf			
Mileage	20,750	19,900		Ford Focus 2018	Nissan Leaf 2018
0-60 (sec)	10.0	7.9		Ford Focus 2018	Nissan Leaf 2018
Power (bhp)	123	148		Ford Focus 2018	Nissan Leaf 2018
Length (mm)	4,378	4,490		Ford Focus 2018	Nissan Leaf 2018
Boot capacity (l)	273	435		Ford Focus 2018	Nissan Leaf 2018
Cash Price	13,650	18,290		Ford Focus 2018	Nissan Leaf 2018