

# The Missing Metric

Beyond the ban on sales of new  
petrol, diesel and hybrid cars

# 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.

# Executive summary

- └ The UK government is considering bringing forward the date by which it will ban the sale of new petrol, diesel and hybrid cars, which is currently planned for 2040.
- └ Our analysis shows that even a 2030 ban on sales of new petrol, diesel and hybrid cars will not be enough for the UK to meet its carbon targets.
- └ If the government introduces the ban in 2035, there will still be 10 million polluting cars on UK roads in 2040.
- └ Our analysis highlights the need for a package of measures that reduce petrol and diesel car usage to cut emissions
- └ The UK needs a new measure of progress in the transition to electric vehicles. We are going to build it.
- └ The New AutoMotive Index will be a new tool to track the UK's progress in the transition to electric vehicles. It will track the number of miles driven by electric cars and petrol and diesel cars.

# About this report

In preparing this report we modelled different pathways to an end to sales of new petrol and diesel cars. Using car sales and registration data from the Department for Transport and emissions data from the Department for Business, Energy and Industrial Strategy, we built a logistic growth model to project the effect of changes in the proportion of zero emission and petrol and diesel cars sold in the UK on the composition of all cars. We modelled the effect of different dates of entry into force of a ban on sales of petrol and diesel cars on emissions pathways and generated estimates of the greenhouse gas savings potentials for each option.

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<sup>1</sup> The Committee on Climate Change, Net Zero: technical report p. 152, Table 5.1

# Introduction

The transition to electric vehicles is vital to tackling climate change, improving air quality in our cities, and will bring benefits to consumers in the form of lower running costs. A rapid reduction in transport emissions is vital if the UK is to meet its commitments: The fifth carbon budget requires the UK's greenhouse gas emissions in 2028-32 to be 57% lower than they were in 1990. Meeting that target means emissions from all the UK's cars must be cut from 68MtCO<sub>2</sub>e today to 33MtCO<sub>2</sub>e by 2030. The faster the UK can make the transition, the better for the consumer, climate and all those who live near a polluted busy road.

In order to plan the transition to an electric transport infrastructure properly, it is important to find a measure which takes into account transition issues and the long tail of used combustion cars. This research note sets out how we are going to go about measuring the transition to electric vehicles in the UK.

We will explore in this note why it is more helpful to look at vehicle miles using different forms of power (combustion vs electric) than just focusing on the types of cars being bought.

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<sup>1</sup> The Committee on Climate Change, Net Zero: technical report p. 152, Table 5.1

# The need to tackle transport emissions

Road transport is the single largest source of CO<sub>2</sub> emissions in the UK. Little or no progress has been made reducing transport emissions since 1990. Moreover, the average carbon intensity of new cars is increasing, meaning transport emissions are likely to increase.

Reducing transport emissions is a key part of meeting national UK climate change commitments. The UK government has a legally binding commitment to make sure that total UK emissions are 57% lower than they were in 1990 by 2028-2032. Meeting that target means emissions from all the UK's cars must be cut from 68MtCO<sub>2</sub>e today to 33MtCO<sub>2</sub>e by 2030. The Committee on Climate Change (CCC) has warned that average new car and van CO<sub>2</sub> emissions are not falling fast enough.

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<sup>2</sup> The Committee on Climate Change, Net Zero: technical report, May 2019, p. 152, Table 5.1

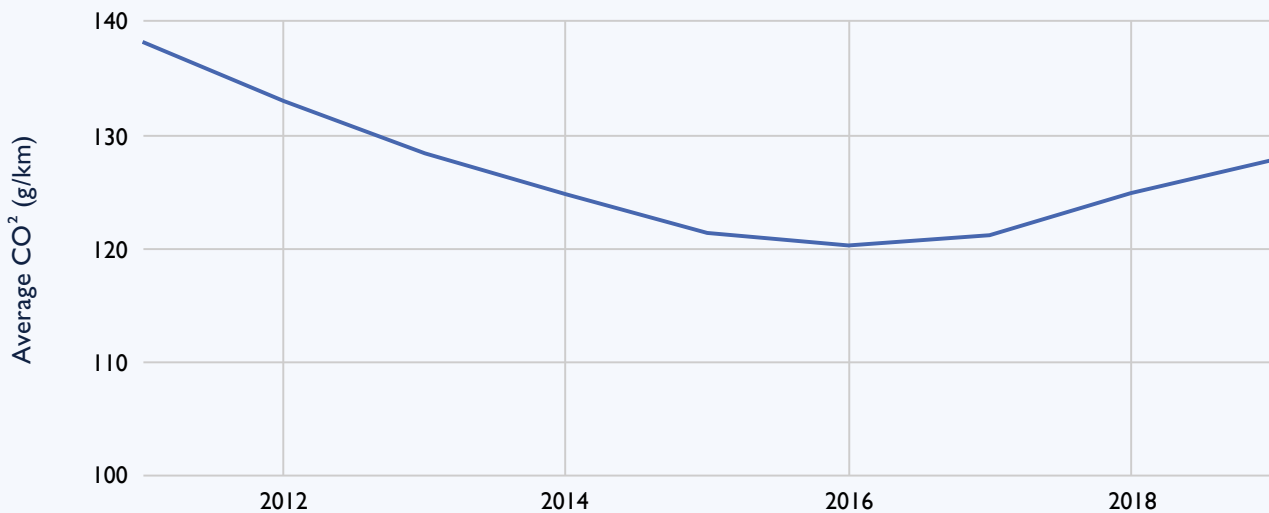
## Assessment of key indicators required to meet carbon budgets

Sector	Measure	2018 indicator	Actual	Unit	Met?
Transport	New car CO2 emissions	107.5	124.5	gCO2/km	✗
	New van CO2 emissions	159.5	167.1	gCO2/km	✗
	Electric car registrations	3.4%	2.5%	% market share	✗
	Biofuel uptake	6.6%	3.1%	% of fuel sales	✗
	Vehicle distance driven	550.6	549.1	Billion-kms	✓

Source: The Committee on Climate Change, 2019 Progress Report to Parliament

Despite the need for rapid reductions in carbon emissions from road transport, the average carbon intensity of new cars is increasing across Europe and in the UK.

### Average UK new car CO2 rating (g/km)



Source: Department for Transport, VEH0256 'Cars registered for the first time by CO2 emissions'.

# Beyond the ban on sales of new petrol, diesel and hybrids

The UK government's approach to supporting the transition to electric vehicles to date has been to focus on sales of new cars. The UK government has previously committed to ban sales of new petrol, diesel and hybrid cars and vans in 2040. Ministers are now consulting on bringing that date forward so the ban comes into force during the 2030s.

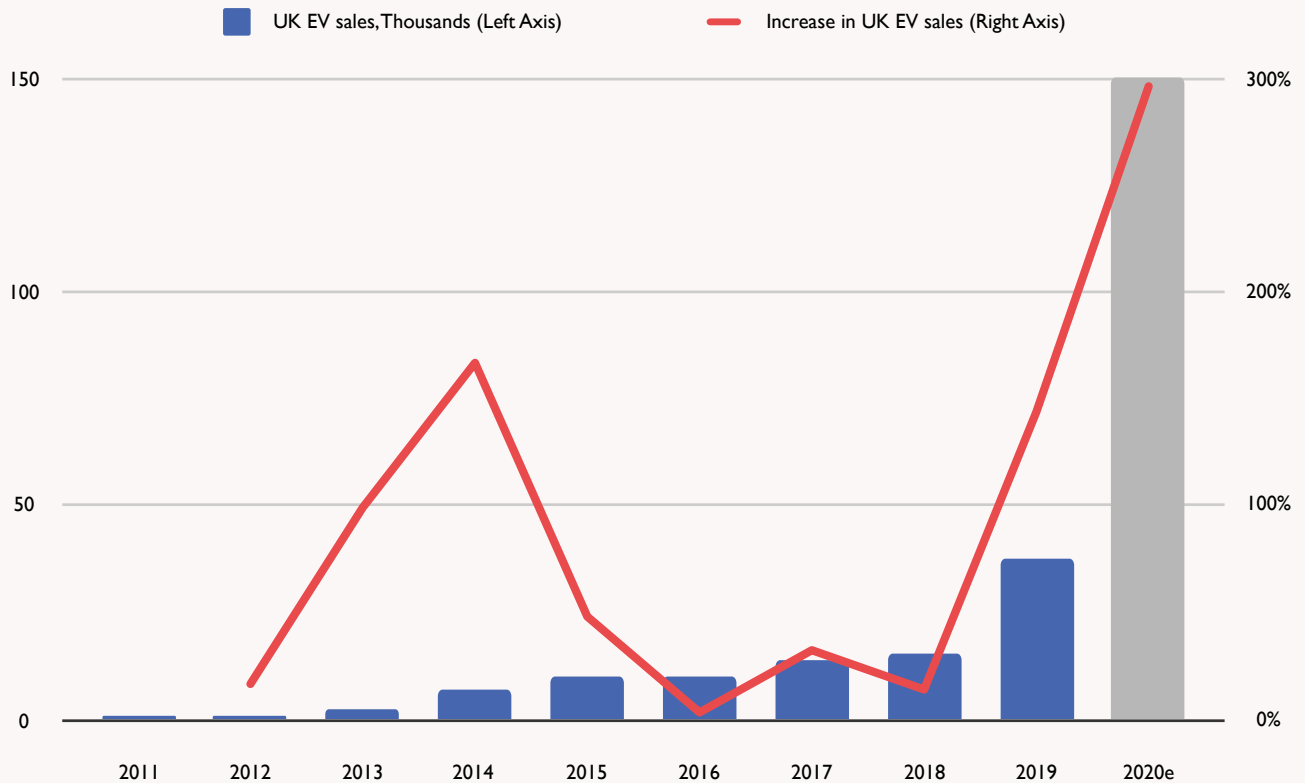
However, a ban in the 2030s will do nothing to tackle the long tail of polluting cars that will be left on our roads for many years to come. The UK should learn from the experience of Norway, in which plug-in EVs make up 60-70% of new car sales, but which has experienced a 10 year delay between rises in EV sales and emissions reductions.

The average lifespan of a car in the UK is 14 years. It therefore takes a long time for sales of zero emissions cars to feed through to reductions in road transport emissions. Today there are 32 million passenger cars on UK roads, almost all of which run on carbon fuels. An accurate measure of the UK's vehicle emission problem must capture the lag between increases in EV sales and observed emissions reductions.

The market share of new EVs in the UK is increasing - but not fast enough. In 2019 there were 38,000 new battery electric vehicles registered in the UK, comprising 1.6% of the market for new vehicles. The first six months of 2020 saw significant growth in the UK market for new EVs. 31,000 battery electric vehicles were registered in the year to June in the UK, a 150% increase on the same period in the previous year, despite a huge decline in new car sales as a result of the coronavirus pandemic. But even if battery electric vehicle sales achieve a 10% market share in 2020, that would represent only about 150,000 cars going into the pool of 32 million cars on the road.



# UK EV sales



Source: Department for Transport, Vehicle Licensing Statistics, VEH0253. NB the figures for 2020 are New AutoMotive's estimates.

2020 estimate of 10% market share battery EVs for modelling purpose only and focuses on battery EVs as they produce zero tail-pipe emissions, unlike PHEVs which may produce significant emissions if not in electric mode.

# UK car sales and the composition of all cars on the road

This diagram shows the effect that 10% sales of electric vehicles would have on the composition of all the cars on the road in the UK at the end of 2020. Each car represents 250,000 cars.

## Sales of new cars



- ICE/ hybrid cars
- Fully electric cars

## Composition of all cars on the road in the UK



Source: DfT <https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01>, and NA analysis

# A different view – The New AutoMotive Index

Measuring the speed of the transition to electric vehicles must take account of the following three things:

- └ Cars take a long time to be replaced
- └ Fossil fuel cars emit an amount of CO<sub>2</sub> that is proportionate to how they are used
- └ The UK has to make huge reductions in transport emissions to meet its legal obligations

Reducing transport emissions means reducing the number of ICE vehicle miles in the UK. Cars on UK roads drive a total of 255 billion miles a year. Most of the ICE vehicle miles will need to be replaced with electric vehicle miles driven by electric vehicles, and some of those miles can be replaced through modal shift.

The New Automotive Index will be a new tool that will provide up to date monitoring of the UK's progress moving to electric vehicles, with data publicly available for free. It will track EV miles and ICE vehicle miles. ICE cars produce CO<sub>2</sub> only when they are moving, so, measuring miles driven is an effective way to understand the scope of the challenge of reducing greenhouse gasses and pollution, and measure the progress towards decarbonisation of transport.

It will provide geographical insights, showing which parts of the country are transitioning first, and provide a way to measure the effect of policy changes such as emissions charging zones, congestion charging, emissions-based residents' parking schemes or the availability of public charging points.

The Index will also pinpoint local problems, which when correlated with local health data, could assist in the design of localised schemes to encourage switching to EVs. This could take the form of local vehicle scrappage schemes targeted towards EVs, or better grants for the purchase of new or secondhand EVs in particular areas, or among particular demographic groups.

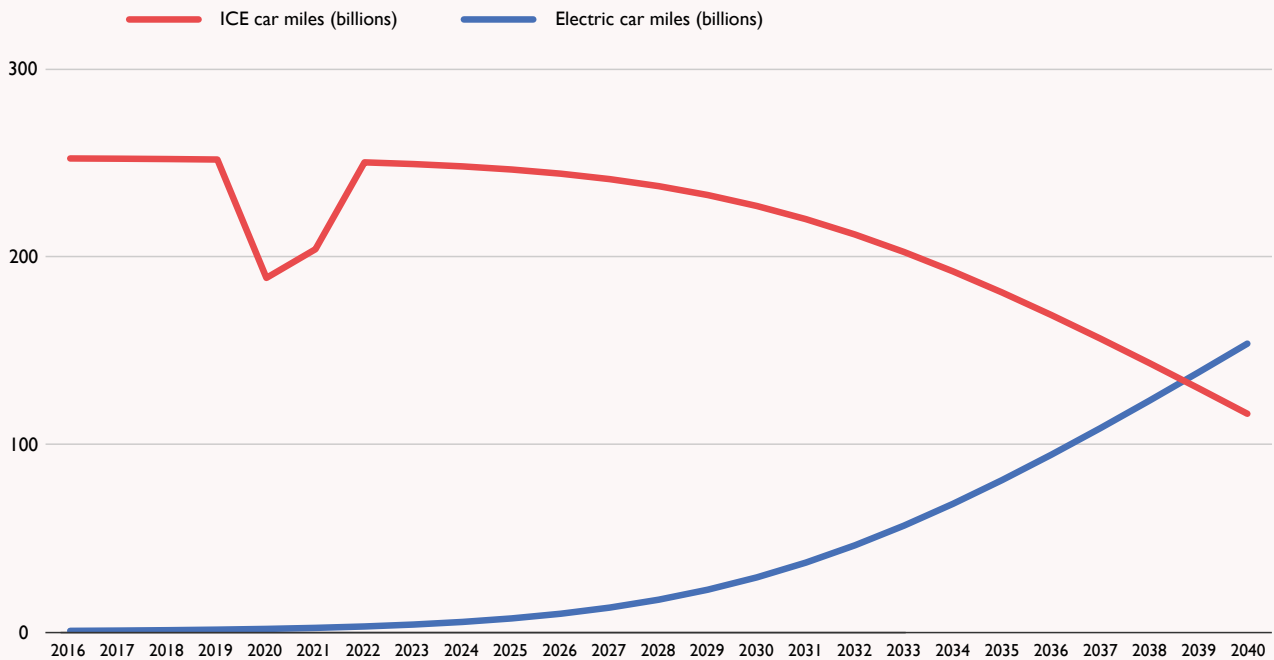
# Vehicle miles and carbon budgets

To meet the UK's legally binding carbon reduction targets, the New AutoMotive Index likely needs to show that EV miles are equal to ICE miles by 2030.

Using an early draft of our index, we analysed the effect of different options for the UK government's proposed ban on sales of new petrol, diesel and hybrid cars and vans. We compared four scenarios in which we looked at the effect of different sales bans on car miles in the UK:

- └ **Scenario One:** Business as usual (2040 Ban)
- └ **Scenario Two:** An ICE sales ban in 2035
- └ **Scenario Three:** An ICE sales ban in 2032
- └ **Scenario Four:** An ICE sales ban in 2030

# Scenario One: BAU 2040 ICE Ban

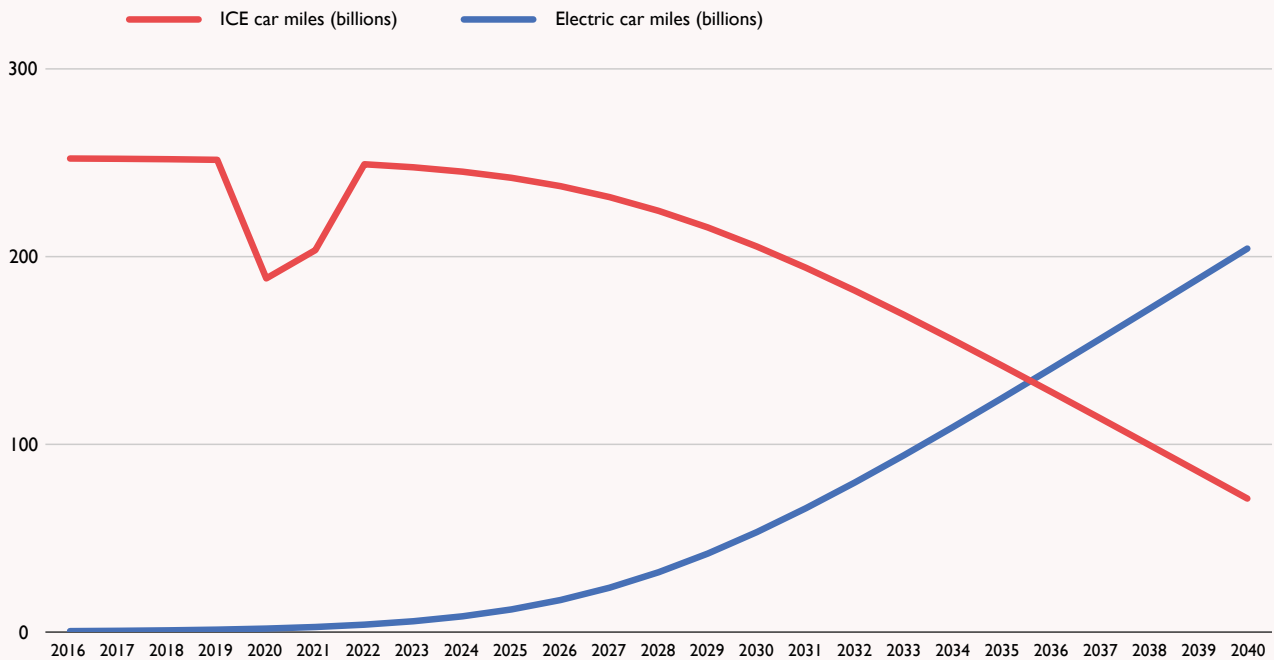


In the business as usual scenario we assume that the government sticks to its current plans to ban the sales of new petrol, diesel and hybrid cars and vans in 2040. In this scenario, we project that in 2030:

- └ 11% of all car miles would be driven in an electric car.
- └ There would still be 28 million ICE cars on the UK's roads, down from today's figure of 31 million.
- └ CO2 emissions from cars would be 61MtCO2e, far above the 33MtCO2e target implied by the UK's legally binding carbon reduction targets, and barely reduced from today's figure of 68 MtCO2e.

Under this scenario, in 2040 just under half (43%) of all car miles would still be driven in ICE cars, and carbon emissions from cars would be 31MtCO2e.

# Scenario Two: 2035 ICE Ban

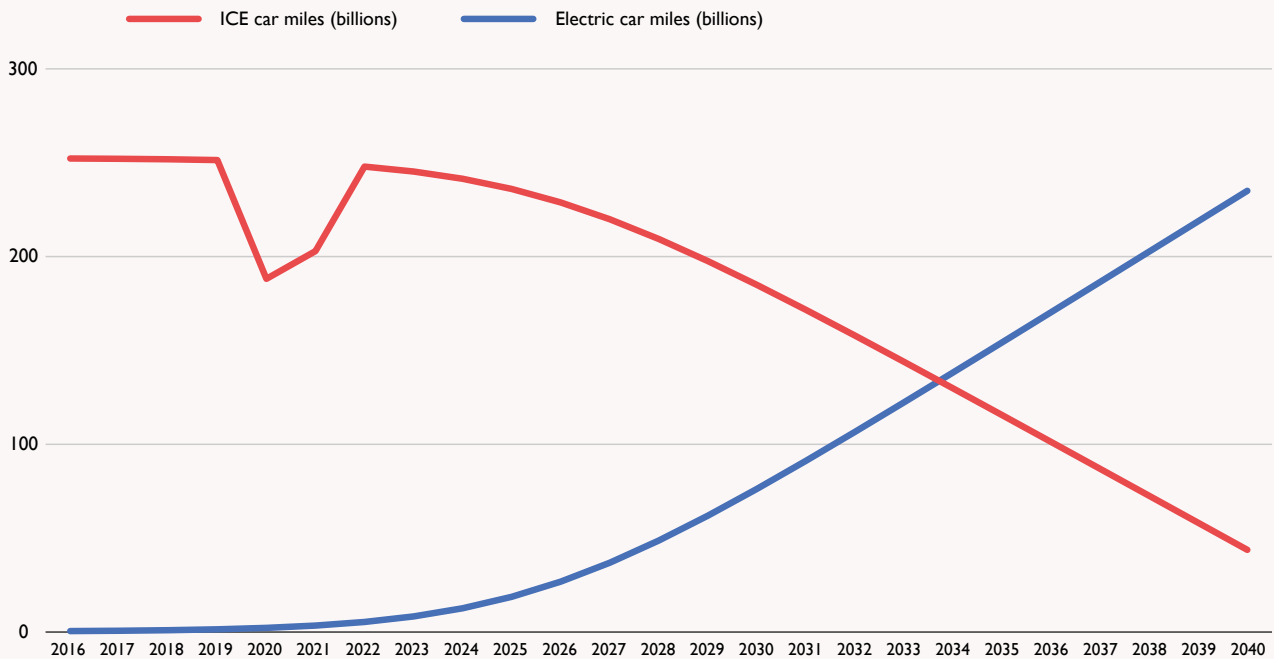


In the 2035 ICE vehicle ban scenario, we project that in 2030:

- └ 21% of all car miles would be driven in an electric car.
- └ There would still be 25 million ICE cars on the road, down from today's figure of 31 million.
- └ CO2 emissions from cars would be 55MtCO<sub>2</sub>e, far above the 33MtCO<sub>2</sub>e target implied by the UK's legally binding carbon reduction targets, and barely reduced from today's figure of 68 MtCO<sub>2</sub>e.

Under this scenario, in 2040 a little over a quarter (26%) of all car miles would still be driven in ICE cars, and carbon emissions from cars would be 19MtCO<sub>2</sub>e.

# Scenario Three: 2032 ICE Ban

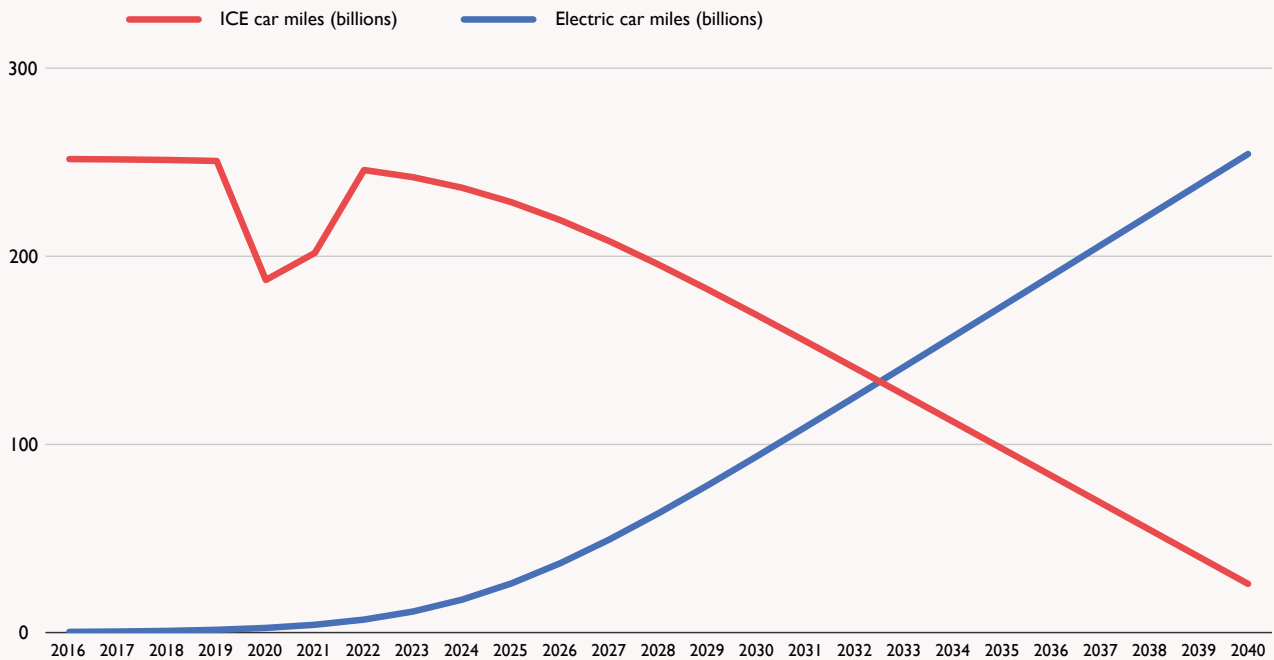


In the 2032 ICE vehicle ban scenario, we project that in 2030:

- 29% of all car miles would be driven in an electric car.
- There would still be 23 million ICE cars on the road, down from today's figure of 31 million.
- CO<sub>2</sub> emissions from cars would be 49MtCO<sub>2</sub>e, down from today's figure of 68 MtCO<sub>2</sub>e, but far above the 33MtCO<sub>2</sub>e target implied by the UK's legally binding carbon reduction targets.

Under this scenario, in 2040 15% of all car miles would still be driven in ICE cars, and carbon emissions from cars would be 12MtCO<sub>2</sub>e.

# Scenario Four: 2030 ICE Ban



Lastly, we looked at the effect of an ICE ban in 2030. Under this scenario, we project that in 2030:

- └ 36% of car miles would be driven in an electric car.
- └ There would still be 21 million ICE cars on the road, down from today's figure of 31 million.
- └ CO<sub>2</sub> emissions from cars would be 46MtCO<sub>2</sub>e, down from today's figure of 68MtCO<sub>2</sub>e, but well above the 33MtCO<sub>2</sub>e target implied by the UK's legally binding carbon reduction targets.

Under this scenario, in 2040 11% of all car miles would still be driven in ICE cars, and carbon emissions from cars would be 8MtCO<sub>2</sub>e

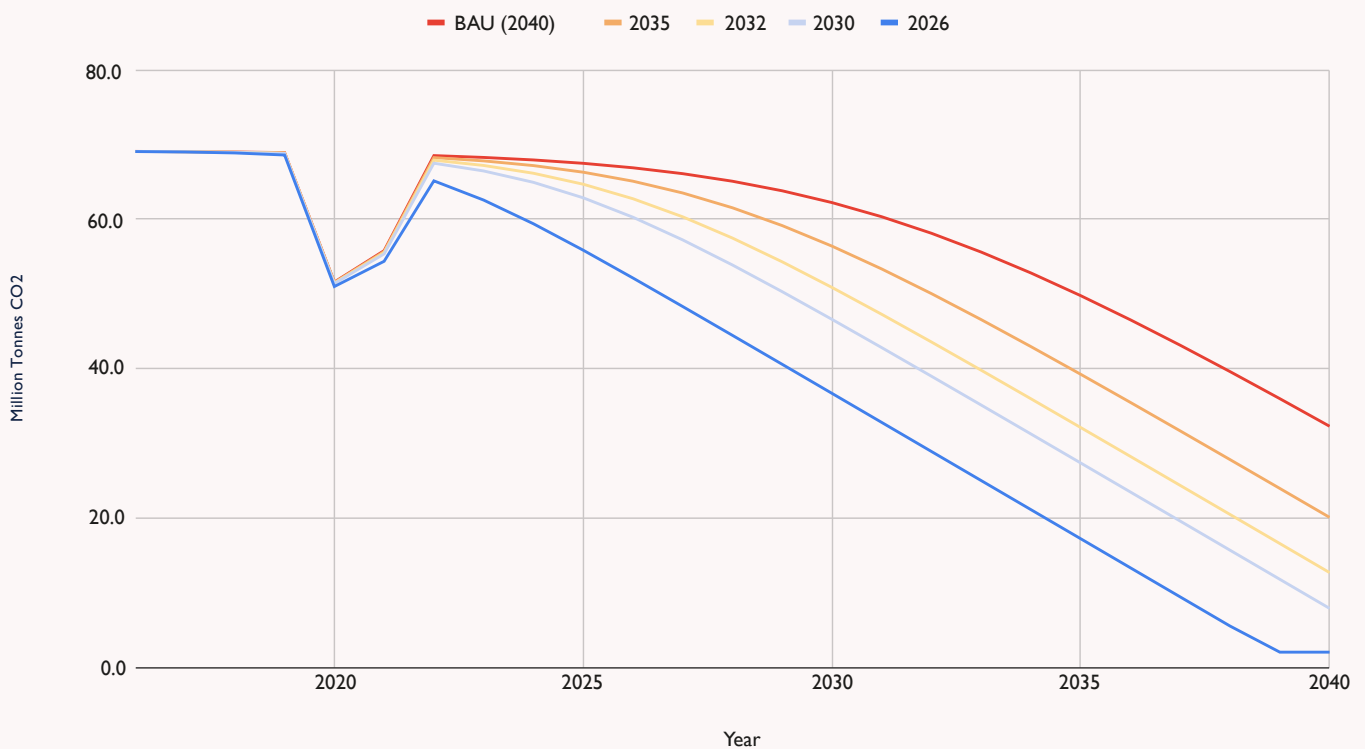


# Achieving the 5th Carbon Budget

In none of these scenarios does the UK meet its 5th carbon budget target for passenger cars: even with an ICE ban in 2030 we calculate emissions to be 46MtCO<sub>2</sub>e of CO<sub>2</sub> in 2030 versus a target of 33 MtCO<sub>2</sub>e.

Our model suggests that the UK would have to ban sales of petrol, diesel and hybrid cars in 2026 to meet its carbon targets, or introduce additional measures to the sales ban.

## Carbon emission from cars under different ICE ban scenarios



# Commentary

In every scenario, we assumed that annual ICE vehicle miles remain constant, as well as average CO<sub>2</sub> emissions per mile. Evidence suggests EV miles are slightly higher<sup>3</sup>. If changes in car use occur that significantly reduce ICE car miles, in conjunction with current and future measures to ramp up sales of new EVs, then the UK's carbon targets start to become more achievable.

For example if the average mileage of ICE cars could be reduced by 12.5% to 7,000 miles per year, beginning now (August 2020), then an ICE ban in 2030 may be able to achieve the carbon emissions target in 2030.

It is our intention that the New AutoMotive index will help policymakers understand the choices facing them about the UK's transition to electric vehicles. Focusing on vehicle miles travelled highlights the need for a broad package of measures to reduce emissions from cars. Central and local governments should consider the following actions:

**Maintain the plug-in car grant until electric cars reach price parity.** Ministers should also consider providing a grant for the purchase of second hand electric vehicles. This would help enable people who do not typically purchase new cars to access electric vehicles. It would bolster second hand electric car prices, potentially reducing the upfront cost of new electric cars bought on a hire purchase contract.

**Use the introduction of green number plates for zero emissions vehicles to give EV drivers greater freedom.** The government has confirmed that electric vehicles will bear green number plates in the future. This gives councils the opportunity to introduce parking schemes that favour EV owners, or access to areas where private cars are not currently permitted to go. The Department for Transport should explore using the smart motorways system to introduce fast lanes for EVs when speed limits are reduced for ICE vehicles.

**Strong supplier obligations that bend the curve well ahead of the ban.** The government should at least match the ambition of the EU's regime for regulating emissions from passenger cars and vans after the end of the transition period on 31st December 2020. Under this regime, manufacturers face obligations to reduce the average carbon intensity of the new cars they place on the UK market. The draft regulations will place an obligation on the Transport Secretary to review this regime in the early 2020s. This review should examine whether the regime is successfully putting the UK on a cost-effective pathway to reducing emissions from cars in line with the UK's carbon budgets.

**Encourage modal shift and change.** Reducing car emissions means reducing petrol and diesel car miles travelled. These miles will mostly be replaced by electric car miles, but they could also be reduced by modal shift including public transport as well as cycling and walking. In some cases, these miles will not need to be replaced, for example through a rise in home working. The Department for Transport must work with departments across government to ensure that policy supports a reduction in petrol and diesel car miles.

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<sup>3</sup> <https://www.racfoundation.org/research/mobility/new-car-mileage>

# Contact

For further information about the New Automotive Index or to partner with us on upcoming research, please get in touch below:

[enquiries@newautomotive.org](mailto:enquiries@newautomotive.org) | [www.newautomotive.org](http://www.newautomotive.org)

Gi Fernando MBE, **Chairman**

[gi@newautomotive.org](mailto:gi@newautomotive.org)

Ben Nelmes, **Policy**

[ben@newautomotive.org](mailto:ben@newautomotive.org)

Harry Benham, **Operations**

[harry@newautomotive.org](mailto:harry@newautomotive.org)

Alice Apsey, **Brand + Consumer**

[alice@newautomotive.org](mailto:alice@newautomotive.org)