



The future of the engine

Reuben Pearson-Warder

Andrew Noble

Wales Institute for Science & Art

BEng Motorcycle Engineering

Introduction

Back in December 2020, the British government announced that all combustion fueled vehicles would no longer be sold in the UK from 2030. From 2035, all vehicles on UK roads must be 100% zero emission from the tailpipe (Pathway for Zero Emission Vehicle Transition by 2035 Becomes Law - GOV.UK, 2024). This has left manufacturers in a predicament as what vehicles to produce, and whether they can continue to use the internal combustion engine. A lot of people initially thought of going all electric, however there may not be the infrastructure in the UK to be able to commit to all electric vehicles.

What options are there?

There are a few options, with these being the most popular:

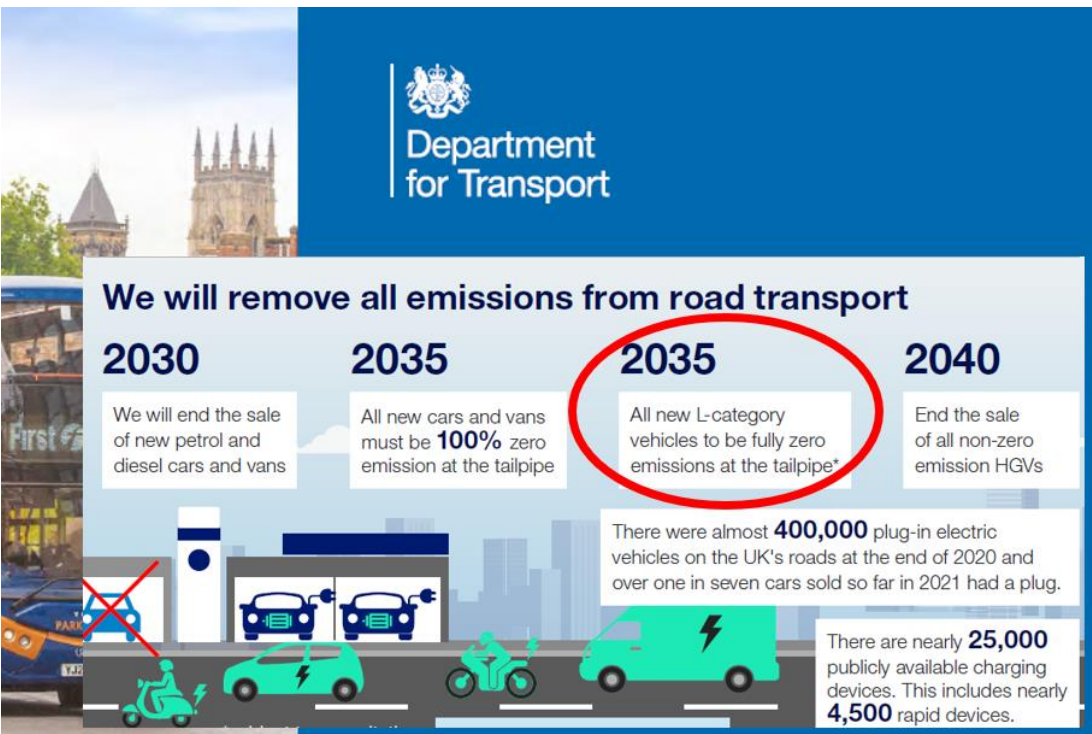
1. Electric
2. Biofuels
3. Hydrogen Fuel

Electric vehicles were first a popular option as several manufacturers, such as Tesla and Smart, have been producing electric vehicles for a while. However, the UK does **not** have the infrastructure for electric vehicles. There would need to be many more electrical grids implemented in the UK, and this would cost the government a lot of money which they may consider taxing drivers of EV's, potentially putting people off EV's.

Another option is Biofuels. Whilst still using the Internal Combustion Engine, this method of fuelling uses substances such as sugar, starch and cellulose to produce fuel. However, they are only carbon neutral and not net zero, and take up a lot of farmland.



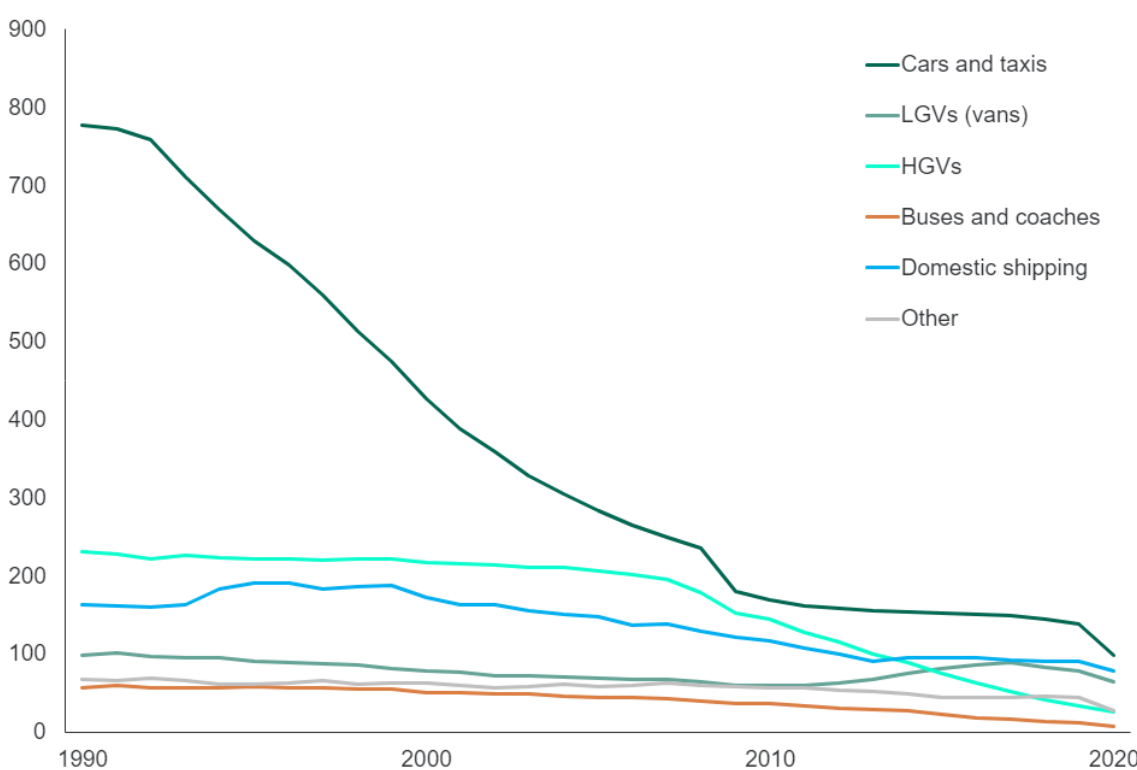
An example of a hydrogen car produced by Toyota. It looks just like a regular car! (Hydrogen Cars | Fuel Cell Electric Vehicles | Toyota UK)



Department for Transports plan to remove all emissions from transport by 2035 (Fundamental Change to Motorcycling Proposed by the Government | National Motorcyclists Council, 2023).

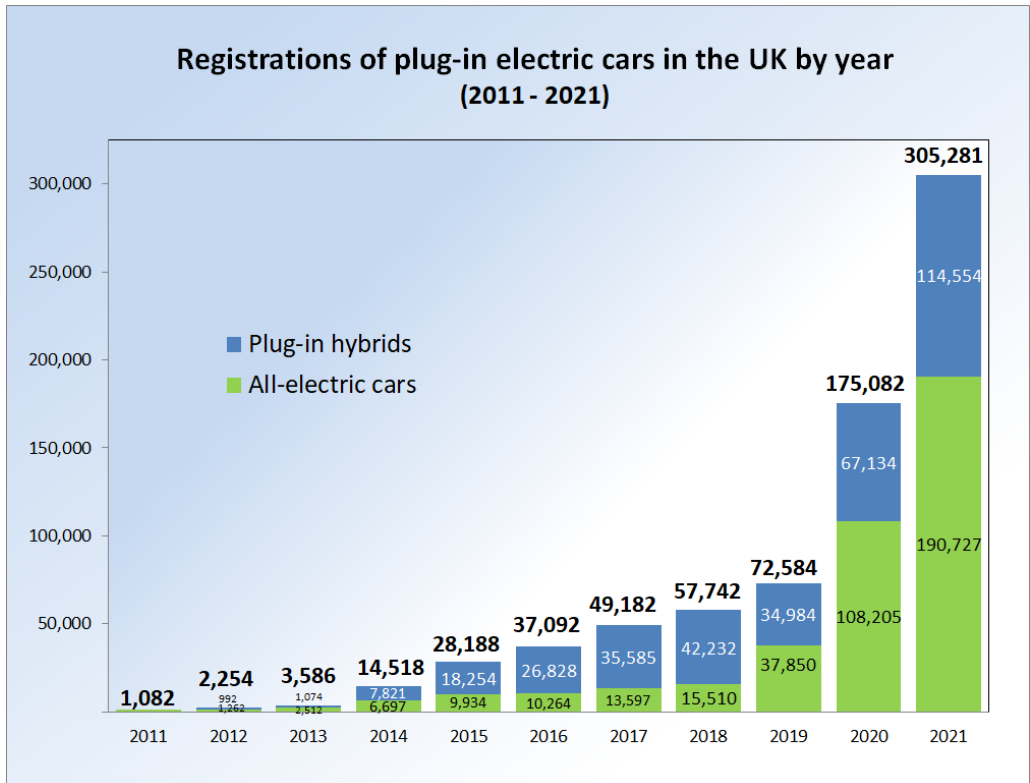


An example of a hydrogen fuel pump, which is not too dissimilar to the current fuel pumps in the UK.



Vehicle emissions in the UK by sector (Transport and Environment Statistics 2022 - GOV.UK, 2022).

Table showing the increase in registrations of plug-in electric vehicles and plug in hybrids from 2011-2021 (The Society of Motor Manufacturers and Traders, 2020).



The next option is hydrogen fuel. This source of fuel produces **zero** emissions and can also easily be implemented into the UK's fuel infrastructure. This source also conforms with the Internal Combustion Engine, meaning manufacturers won't have to produce a massively different idea for a power supply.

Table showing pros and cons of hydrogen and electric vehicles and their differences (Are Battery-Powered Electric Vehicles Greener Than Hydrogen Vehicles?)

Hydrogen-Fueled Cars Vs Battery Electric Cars

Hydrogen-Fueled Cars	Vs	Electric Cars
\$1Mn - \$5Mn	Cost of installing charging station	INR 60K - INR 16Lakh
Highly Inflammable	Flammability	Safe
Twice (to make hydrogen and to power vehicle)	Energy used	Once directly from the grid
Can use renewable energy to charge batteries	Renewable Energy	Only chemical reaction generates electricity
30%	Energy loss in making	No energy loss
Lithium-ion can be repurposed	Repurposing batteries	Cannot be repurposed
Globally widely used commercially	Popularity	Still being tested
High sales in China, Korea	Sales In Countries	Negligible sale in China, Korea
Few options like Toyota (Mirai), Hyundai (Nexo)	The market	Many options including Hyundai Kona, Mahindra e-Verito, Mahindra e20, Porsche Taycan, Tata Tigor EV

Acknowledgements

Thanks to Dr Owen Williams for presenting a PowerPoint on the future of the engine and all the possible future fuel sources.

References

Fundamental Change to Motorcycling Proposed by the Government | National Motorcyclists Council.. Retrieved April 19, 2024, from <https://www.uknmc.org/news/fundamental-change-to-motorcycling-proposed-by-the-government>

Hydrogen Cars | Fuel Cell Electric Vehicles | Toyota UK. Retrieved April 19, 2024, from <https://www.toyota.co.uk/hydrogen>

Transport and environment statistics 2022 - GOV.UK. (2022). Retrieved April 19, 2024, from <https://www.gov.uk/government/statistics/transport-and-environment-statistics-2022/transport-and-environment-statistics-2022>

Are Battery-Powered Electric Vehicles Greener Than Hydrogen Vehicles? Retrieved April 19, 2024, from <https://inc42.com/features/are-battery-powered-evs-greener-than-hydrogen-vehicles/>