Transport: Light Vehicles - Hydrogen

This lever controls the sub-levers listed in the table, and ambition levels are for the end year shown on the right-hand side.

Light Vehicles refers to cars, vans and light lorries (rigid HGVs). In 2015, almost all the UK's light vehicles were powered by fossil fuels (petrol or diesel) although other lower carbon options, such as hydrogen powered vehicles, were technically feasible. Light vehicles fueled by hydrogen are likely to be powered by fuel cells rather than internal combustion engines.

Hydrogen (H2) powered vehicles, in common with electric vehicles (EVs), have zero emissions at the tailpipe.

However, the challenges for widespread H2 vehicle adoption are the high upfront costs of vehicles and producing enough low-carbon hydrogen of sufficient purity for the fuel cells. A lack of hydrogen refueling infrastructure, including storage (on and off the vehicle), also poses a challenge.

The base year selected is 2015. Four ambition levels are assumed as below.

Key interactions

The carbon intensity of H2 production would need to be significantly reduced for example through carbon capture, in a scenario in which H2 vehicles play a large part in reducing Kenya`s CO2 emissions.

Level 1

Efforts to increase uptake of hydrogen vehicles are abandoned and the share remains at current levels.

Level 2

1% of cars and vans are hydrogen fuelled along with 1% of small lorries.

Level 3

20% of cars and vans are hydrogen fuelled along with 1% of small lorries

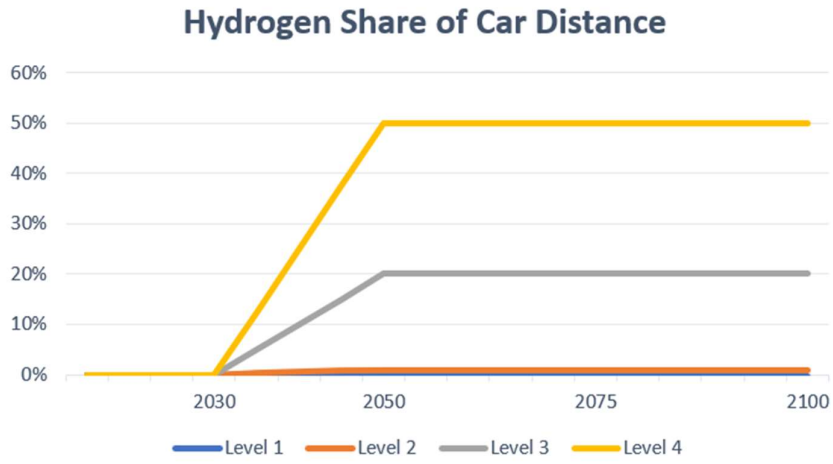
Level 4

Choice for light vehicles. Technological developments, policy and public engagement all align to allow limitations around the carbon intensity of H2 generation, and refuelling network and costs, to be overcome thus allowing a higher adoption of hydrogen fuelled.

Default Timing

Start year: 2020, End year: 2050

Sub-Lever	Units	2015	Level 1	Level 2	Level 3	Level 4
Car	share	0.0000026	0.0	0.01	0.2	0.5
LGV	share	0.0	0.0	0.01	0.2	0.5
HGV Rigid	share	0.0	0.0	0.01	0.1	0.5



Ministry of Energy

Transport: Light Vehicles - Hybrid

This lever controls the sub-levers listed in the table, and ambition levels are for the end year shown on the right-hand side.

Plug-in hybrid electric vehicles (PHEV) are like hybrid electric vehicles since they have both an engine and motor for propulsion. The main difference is that PHEV batteries have a higher energy capacity and can be externally charged by connecting to a power outlet. In addition, the battery can be charged using the internal combustion engine while driving. This enables the PHEV to use the electric motor for longer periods when driving. A PHEV can drive on electric mode for most of the city commutes and the Internal Combustion Engine (ICE) engine steps in on depletion of battery hence eliminating range anxiety.

HEVs could potentially be rolled out faster than EVs or H2 vehicles. They could also act as a gateway technology as we transition to full EV.

The base year selected is 2015. Four ambition levels are assumed as below.

Key interactions

Low-carbon electricity must be generated to maximize emissions savings from hybridized transport.

Level 1

Efforts to increase uptake of PHEVs are abandoned and the share remains at current levels.

Level 2

One third of cars and vans are PHEVs along with one fifth of rigid trucks.

Level 3

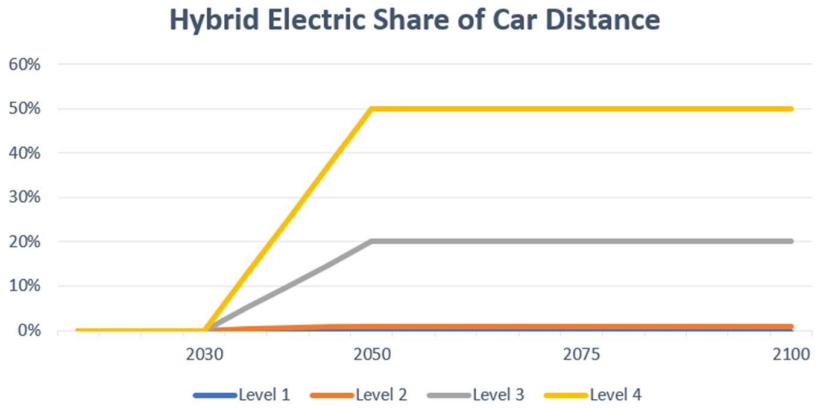
Two-thirds of cars and vans are PHEVs along with half of rigid trucks.

Level 4

Two-thirds of cars and vans are PHEVs along with half of rigid trucks.

Default Timing Start year: 2020, End year: 2050

Sub-Lever	Units	2015	Level 1	Level 2	Level 3	Level 4
Car	share	0.00016	0	0.01	0.2	0.5
LGV	share	0.0	0	0.01	0.2	0.5
HGV Rigid	share	0.0	0	0.1	0.3	0.5



Ministry of Energy

Transport: Light Vehicles – Biofuel

This lever controls the sub-levers listed in the table, and ambition levels are for the end year shown on the right-hand side.

Biofuels have the potential to reduce greenhouse gas (GHG) emissions as the CO2 produced at the tail pipe has been absorbed during the growth of the biomass used. The net GHG emissions impact of biofuel is therefore generally low being just those incurred in the supply chain, although for some crops (such as oil seeds) the impact can be much higher, hence the interest in biofuel production from wastes such as used cooking oil.

Biofuels can simply be mixed with fossil fuels and used in existing engine technologies. However, shares of the fuel mix beyond 10% for bioethanol and 7% for biodiesel require modifications to the engine or development of types of advanced biofuels.

Key interactions

Increasing the use of biofuels in transport has implications for how that increased demand for biofuels will be satisfied. Biofuels can be created from waste and biomass grown in Kenya.

Kenya`s bioenergy production can be controlled through the Land Use & Biofuels levers.

Level 1

The amount of biofuel blended with fossil fuels remains at current levels.

Level 2

Biofuel blend increases to 20% to match the current levels seen in more 'biofuel progressive' countries such as Brazil where the ethanol use mandate for gasoline was raised to 27% in 2015. This might require engine modifications depending on the type of biofuel.

Level 3

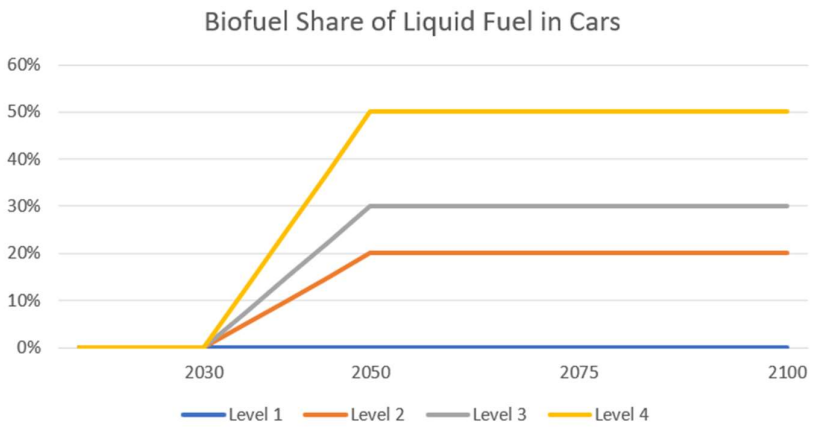
Technological advances in biofuels improve their compatibility with current vehicles allowing 30% of fossil fuel to be substituted.

Level 4

Big advances in biofuels with strong public engagement and policy leading to all fossil fuels used in light vehicles being replaced by biofuels.

Default Timing Start year: 2020, End year: 2050

Sub-Lever	Units	2015	Level 1	Level 2	Level 3	Level 4
Car	share	0.0	0	0.2	0.3	0.5
LGV	share	0.0	0	0.2	0.3	0.5
HGV Rigid	share	0.0	0	0.01	0.1	0.5



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