Transport: Heavy 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. Units of 'Index' are relative to 2015.

This lever controls the sub-levers listed in the table, and ambition levels are for the end year shown on the right-hand side.
Kenya aims to reduce its greenhouse gas (GHG) emissions by 30% by the year 2030 compared to the business as usual (BAU) scenario.
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.
At low levels, they 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 the development 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.requirements in industry. Combustion and process emissions can be captured by carbon capture technologies. This is controlled by the Industry CCS lever.

Level 1
Efforts to increase the amount of biofuel blended with fossil fuels are abandoned and the blend remains close to current levels.

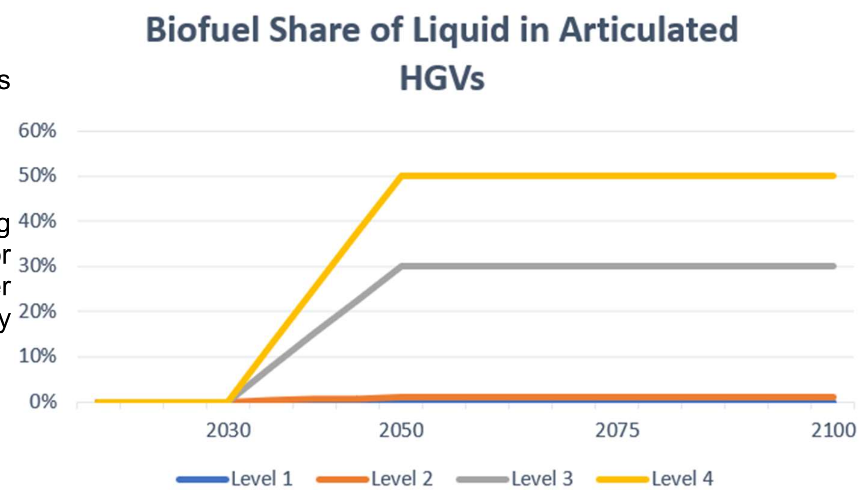
Level 2
Biofuel blend increases to match the current levels seen in more 'biofuel progressive' countries such as Brazil where the ethanol use mandate for gasoline was raised to 27% in 2015 (though many buses would require biodiesel).
This might require engine modifications depending on the type of biofuel.

Level 3
Technological advances in biofuels improve their compatibility with current vehicles allowing 30% of fossil fuel to be substituted for articulated lorries and buses, 1% of passenger rail transport and 50% of non-road machinery usage.

Level 4
Big advances in biofuels with strong public engagement and policy leading to 50% substitution of fossil fuel usage with biofuels for articulated lorries and buses and 100% substitution of fossil fuel usage in non-road machinery to biofuels.

Default Timing: Start 2021; End 2050.

Sub-Lever	Units	2015	Level 1	Level 2	Level 3	Level 4
HGV Articulated	share	0.0	0	0.01	0.3	0.5
Bus	share	0.0	0	0.2	0.3	0.5
Rail Passenger	share	0.0	0	0	0.01	0.0
Rail Freight	share	0.0	0	0	0	0.0
Non-Road Mobile Machinery	share	0.0	0.022	0.25	0.5	1.0
Shipping Domestic	share	0.0	0	0	0.1	0.2
Shipping International	share	0.0	0	0	0.1	0.2



Transport: Aviation Efficiency

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

In 2015, domestic and international aircraft consumed 249.6 MJ and 374.3 MJ of fuel per km flown respectively. This is termed the energy intensity and gives a measure of how efficient an aircraft is (i.e., lower energy intensities mean greater efficiencies).

Currently only one/two-person electric aircraft prototypes exist. Whilst Airbus and Boeing have R&D programs related to electric aircraft, there are no release dates for larger prototypes or proven vehicles. However, many of the ground operations such as taxiing are suitable for electrification, and use a significant proportion of the aircraft's fuel therefore, there is a role for hybrids.

Main influences on efficiency

Operational performance

- Congestion – historical trends have remained roughly the same as improved ground control methods have been offset by an increase in traffic.
- Time spent on the ground

Technological performance

- Design of aircraft – increases in efficiency from using lighter weight, high-strength materials. Engines used at higher temperatures and pressures. Equipment installed on-board (for entertainment, for example) increases weight and therefore decreases efficiency.

The number of seats on board has been increasing and is desirable for increasing efficiency.

Level 1
Efficiency improves at a rate equivalent to 0.5% per year for 30 years

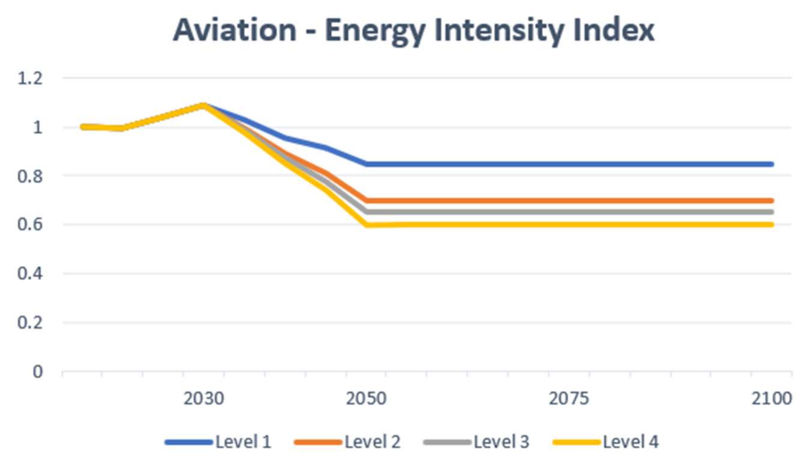
Level 2
Efficiency improves at a rate equivalent to 1% per year for 30 years. The proportion of hybrid planes remain at 0% based on estimates provided by airline experts.

Level 3
Efficiency improves at a rate equivalent to 1.2% per year for 30 years. The proportion of hybrid planes remain at 0% based on estimates provided by airline experts.

Level 4
Efficiency improves at a rate equivalent to 1.4% per year for 30 years and 30% of domestic and international aircrafts are hybrids.

Default Timing
Start year: 2020, End year: 2050

Sub-Lever	Units	2015	Level 1	Level 2	Level 3	Level 4
Energy Intensity						
Domestic	Index	1.0	0.85	0.7	0.65	0.6
International	Index	1.0	0.85	0.7	0.65	0.6
Plug-In Hybrid Electric Share						
Domestic	share	0.0	0	0	0	0.3
International	share	0.0	0	0	0	0.3



Ministry of Energy

Transport: Aviation 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.

Domestic Aviation in Kenya is powered by two fuel types – Aviation Gasoline (AV GAS) and Jet Kerosene (Jet A1).
90% of the domestic airlines use AV GAS and 10% of the domestic airlines use JET A1 fuel.
International Aviation in Kenya is powered by Jet Kerosene (Jet A1) only.

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.

Aviation has fewer options for decarbonization since full electrification of large planes is not thought to be technically feasible.
However, biofuels represent a potentially straightforward way to reduce emissions from air travel.

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 share of biofuels in aviation fuels remains zero.

Level 2

The share of biofuels in aviation fuel is 10% as per the estimates provided by the transport sector experts consulted.

Level 3

The share of biofuels in aviation fuel is 20%, as per the estimates provided by the transport sector experts consulted.

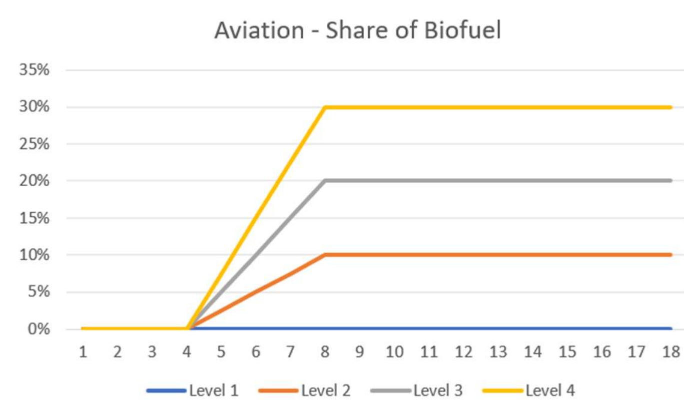
Level 4

The share of biofuels in aviation fuel is 20%, as per the estimates provided by the transport sector experts consulted.

Default Timing

Start year: 2020, End year: 2050

Sub-Lever	Units	2015	Level 1	Level 2	Level 3	Level 4
Aviation Domestic	share	0.0	0	0.1	0.2	0.3
Aviation International	share	0.0	0	0.1	0.2	0.3



Ministry of Energy