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. Units of 'Index' are relative to 2015.

In 2015, domestic and international aircraft consumed 193 MJ and 141 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 (around 20% for domestic flights), so there is a role for hybrids.

Main influences on efficiency[1]

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, in line with the 'nominal pessimistic' scenario for the next design cycle in a CCC-commissioned report[2]. No deployment of hybrid aircraft to any substantial level, other than prototypes and perhaps private jets or air taxis.

Level 2

Efficiency improves at a rate equivalent to 1% per year for 30 years, in line with the 'nominal likely' scenario for the next design cycle in a CCC-commissioned report[2].

Level 3

Efficiency improves at a rate equivalent to 1.2% per year for 30 years, in line with the 'nominal optimistic' scenario for the next design cycle in a CCC-commissioned report[2]. Half of aircraft are hybrids.

Level 4

Efficiency improves at a rate equivalent to 1.4% per year for 30 years, in line with the 'best optimistic' scenario for the next design cycle in a CCC-commissioned report[2]. All aircraft are hybrids.

[1] http://web.mit.edu/aeroastro/sites/waitz/publications/AircraftEnergyUse.pdf

[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/785685/ata-potential-and-costs-reducting-emissions.pdf

Default Timing

Energy Intensity: Start year: 2020, End year: 2050

Aviation

Sub-Lever	Units	2015	Level 1	Level 2	Level 3	Level 4
Energy Intensity						
Domestic	Index	1.00	0.85	0.70	0.65	0.60
International	Index	1.00	0.85	0.70	0.65	0.60
Plug-In Hybrid Electric Share						
Domestic	share	0%	0%	0%	50%	100%
International	share	0%	0%	0%	50%	100%