TRACKING AVIATION EFFICIENCY

How is the aviation sector performing in its drive to improve fuel efficiency, in line with its short-term goal?

CLIMATE ACTION TAKES FLIGHT

In 2009, the aviation industry agreed an ambitious set of goals for addressing climate change by dealing with its carbon emissions. The first goal is to deliver a global average annual fuel efficiency improvement of 1.5%. In other words, the combined fleet of commercial aviation aircraft would improve its fuel efficiency by an average of 1.5% per year through to 2020, with further goals set to cap net CO_2 emissions from 2020 and to halve them by 2050 (based on 2005 levels).

The aviation sector's short-term goal to improve fleet fuel efficiency by an average of 1.5% per annum from 2009-2020 is on track, with current analysis showing a 2.3% improvement on a rolling average – an efficiency improvement of 17.3% since 2009.

The full set of goals can be found at: www.enviro.aero/climateaction

Fuel efficiency performance of commercial aviation

- Airlines have continued to improve their fuel efficiency performance between 2009-2017, securing an average annual improvement of 2.3% — above the industry goal of 1.5%. The cumulative efficiency improvement between 2009 and 2017 has been 17.3%.
- Since the year 2000, industry fuel efficiency has improved 36.2% and CO_2 tonnes per thousand tonne kilometres performed has improved from 1.35 to 0.86.
- Since 1990, industry fuel efficiency has improved by 52%.
- Improved fuel efficiency has been driven by airlines investing over $1 trillion in 15,086 more efficient new-technology aircraft since 2009; and by improving performance through higher load factors and other operational measures.
- High and volatile fuel costs have also made it economical to retire older aircraft at higher rates further contributing favourably to fuel efficiency performance.
- A current production backlog of over 14,700[1] new technology aircraft from the major manufacturers will be entering the global fleet over the next few years, suggesting continuing improvements in fleet efficiency.
- Weight-based load factors improved by nearly six percentage points moving from 62.1% in 2008 to 68% in 2017, as airlines continued to make better use of space available on aircraft. Passenger load factors now average 81% globally.

	ACTUAL *(ICAO, IEA, IATA - available 22 months after year end)*									**ESTIMATE** *(IATA, ICAO)*			
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Revenue tonne-kilometres performed *(RTK, billions)*	637	609	681	714	739	771	816	866	919	**997**	-	-	-
Commercial aviation CO_2 *(million tonnes)*	667	632	663	682	692	710	733	774	812	**862**	-	-	-
Fuel efficiency *(CO_2 tonnes per thousand RTK)*	1.05	1.04	0.97	0.96	0.94	0.92	0.90	0.89	0.88	**0.86**	-	-	-
Rate of fuel efficiency improvement *(% change over previous period)*		0.8%	6.1%	2.0%	1.9%	1.9%	2.5%	0.9%	1.0%	**2.2%**	-	-	-
Rolling average fuel efficiency improvement *(compound improvement % per annum 2009-17)*										**2.3%**	-	-	-

Current rolling fuel efficiency improvement

2.3%

Fleet efficiency improvement since 1990

52%

Fleet efficiency improvement since 2000

36.2%

Passenger load factors now average

81%

Globally

Commentary

The significant 2010 fuel efficiency improvement number was driven by a rebound in traffic and a large jump in weight load factor performance, with improved load factors on both the passenger and cargo side as part of the recovery from the global financial crisis

Key inputs used to assess fuel efficiency performance

- IEA data[2] is used to determine global jet fuel uplift. The IEA data is only available ~18-22 months after the year ends. This is adjusted to remove military and general aviation fuel use, leaving commercial aviation only. Apportionment of jet fuel uplifted to commercial aviation is based on several industry level assessments on the types of aviation activity, sources include:
  - ↳ Scheduled and charter — sourced from the UN IPCC 4th Assessment Report WG 3 and Allocation of International Emissions from Scheduled Air Traffic[3]
  - ↳ General aviation — Boeing and NASA studies Matlock and Alsyne
  - ↳ Military aviation — Estimates based on AERO2K exercise[4]
  - ↳ The above assessments are combined with bottom-up modelling of commercial aviation to take an informed view of the respective share of the fuel used under each category
- ICAO data on historical traffic performance[5]. IATA estimates for other industry related activity is used to scale up ICAO reported traffic data.
- CO_2 emissions for 2017 are based on IATA estimates and incorporate international airline reporting on fuel efficiency performance.

Data and analysis supplied by IATA Economics: www.iata.org

[1] A combination of backlogs as of end 2018.

[2] Data from the International Energy Agency database: www.iea.org

[3] http://bitly.com/1yz3oCO

[4] http://bit.ly/1uhXxhf

[5] http://bit.ly/1DTWJaX