

**AIRCRAFT DESIGN AND SYSTEMS GROUP (AERO)**

**Review of  
CO2 Reduction Promises and Visions  
for 2020 in Aviation**

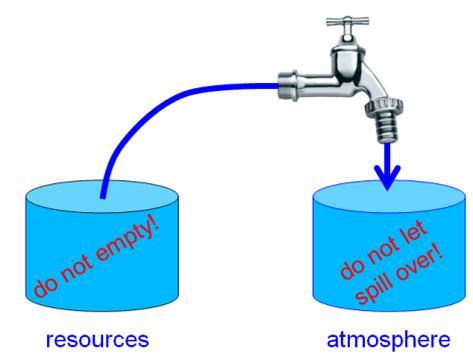
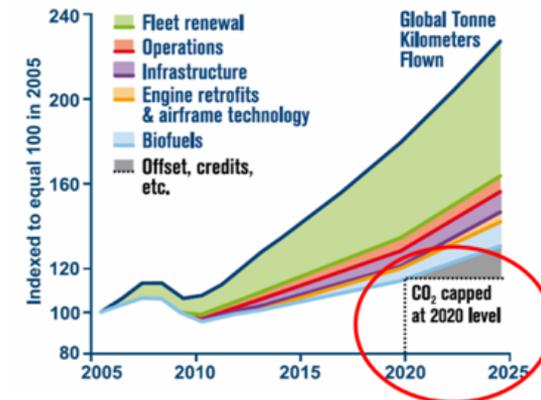
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<https://doi.org/10.5281/zenodo.4066959>

**Deutscher Luft- und Raumfahrtkongress 2020**

German Aerospace Congress 2020

**Online, 01 - 03.09.2020**



## Review of CO2 Reduction Promises and Visions for 2020 in Aviation

### Abstract

**Purpose** – Reach awareness of the fact that environmental goals, promises, and visions in aviation are written first of all to improve business and research conditions and not to improve the state of the environment.

**Approach** – Material (online and from own archive) is reviewed to check what is left of the goals known as "ACARE Vision 2020", "IATA Climate Neutral Growth by 2020", and "ATAG Climate Neutral Growth by 2020". Goals are compared with CORSIA's vision for 2020.

**Findings** – Goals are not well defined, have been withdrawn over the years, and are not reached. Patrons can not be held accountable, because they are already dead or retired and have never signed a legal contract.

**Research limitations** – The underlying information is or was once collected from the Internet. No insider information is used.

**Practical implications** – Learning from past handling of aviation goals may result in a realistic view based on suspicion.

**Social implications** – The discussion about aviation goals is opened up beyond aviation expert circles.

**Value** – This seems to be the first publication with a critical view on goals, promises, and visions in aviation without the tendency to cover up or whitewash the facts.

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# Motivation

# Motivation

**Do not tell me today  
what you will have achieved in x years.**

**Tell me what you told x years ago and  
how much of that you achieved today!**

Dr. Dieter Dey, Airbus, 1988

# Motivation

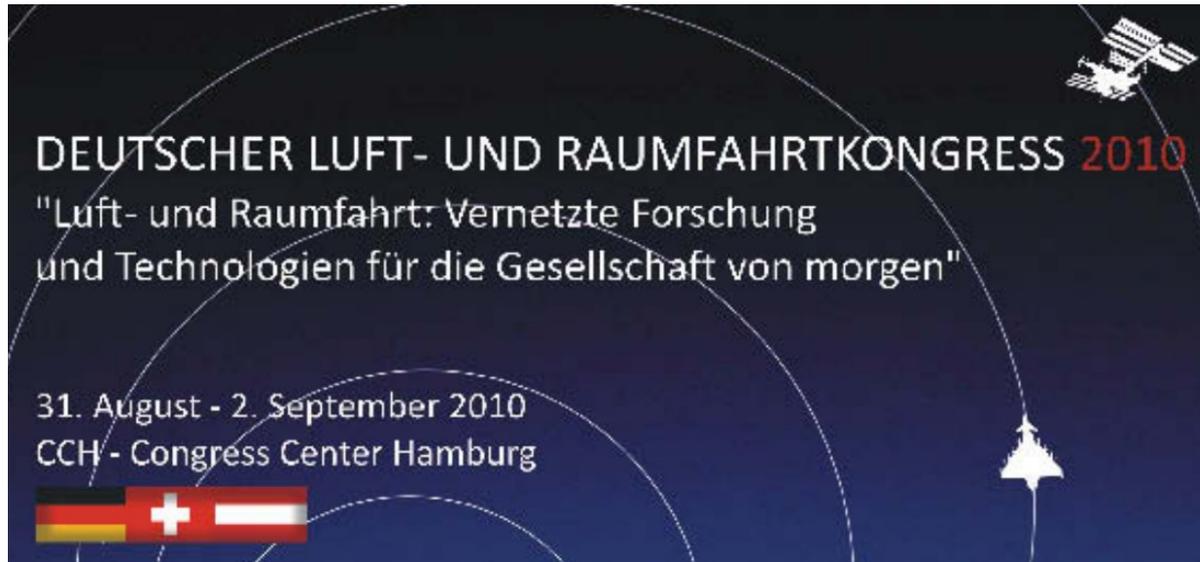


13 NOVEMBER, 2019 | SOURCE: FLIGHTGLOBAL.COM | BY: DAVID KAMINSKI-MORROW | LONDON

**Wizz Air** chief Jozsef Varadi has scorned the pledges of airlines which are committing to becoming carbon-neutral in several decades' time.

"It's great when an airline like **British Airways**, **KLM**, or **Air France** says that in 2050 – we're all going to be dead by that time – we're going to be carbon neutral," he said. "These are the worst-performing airlines."

# Motivation



**Dienstag, 31. August 2010**

**1.0 Plenarvortrag I**

**Saal G 1**

Sitzungsleitung: R. Henke, RWTH, Aachen, DE

13:30 14:00

**ACARE / Vision 2020 - Zur Halbzeit**

J. Szodrich, DLR, Köln

# Promises and Visions for 2020

## Promises and Visions for 2020

The year **2020** is pivotal when it comes to environmental goals:

- **ACARE**: European Aeronautics – A Vision for **2020**:  
"A 50% cut in fuel consumption in the new aircraft of 2020"  
compared to 2000
- **IATA**: Carbon-neutral growth from **2020**
- **ATAG**: Carbon-neutral growth from **2020**
- **ICAO**: CORSIA: "the basis for carbon neutral growth from **2020**"

# ACARE: A Vision for 2020



Advisory Council for Aviation Research and Innovation in Europe

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## Vision 2020



 [Vision 2020.pdf](#)

ACARE does not provide a link to this page.

Why?

However: This page can be found via Google.

<https://www.acare4europe.org/documents/vision-2020>

Archived at: <https://perma.cc/XE24-HMWA>

# ACARE: A Vision for 2020

## Noise and Emission Goals:

- Eliminate noise nuisance outside the airport boundary
- A **50% cut in CO<sub>2</sub>** emissions per passenger kilometer (which means a **50% cut in fuel consumption** in the new aircraft of 2020) and an **80% cut in nitrogen oxide emissions**

*Newly available technology in 2020 compared with newly available technology in 2000. Not meant as average in fleet!*



**Hidden PDF:** [https://www.acare4europe.org/sites/acare4europe.org/files/document/Vision%202020\\_0.pdf](https://www.acare4europe.org/sites/acare4europe.org/files/document/Vision%202020_0.pdf)  
**Archived at:** <https://perma.cc/LGZ7-M6FM>

# ACARE: A Vision for 2020

"Commissioner Philippe Busquin invited Personalities"  
 "The result was the 'European Aeronautics: A vision for 2020' report, which was published in January 2001."

"To date, ACARE has made significant contribution towards the overall goals on Vision 2020 and examples of successful research are detailed in "ACARE Success Stories: benefits beyond aviation" published in March 2011."

"Over the same period a number of boundary conditions changed that prompted ACARE members to reconsider the sufficiency of the existing Vision 2020 with the view to extend it to a new horizon towards 2050."



Source: <https://www.acare4europe.org/about-acare>  
 Archived at: <https://perma.cc/93ZZ-PQAB>

We learn: If the time of fulfillment comes near, you better publish more demanding new goals and forget about the old!?

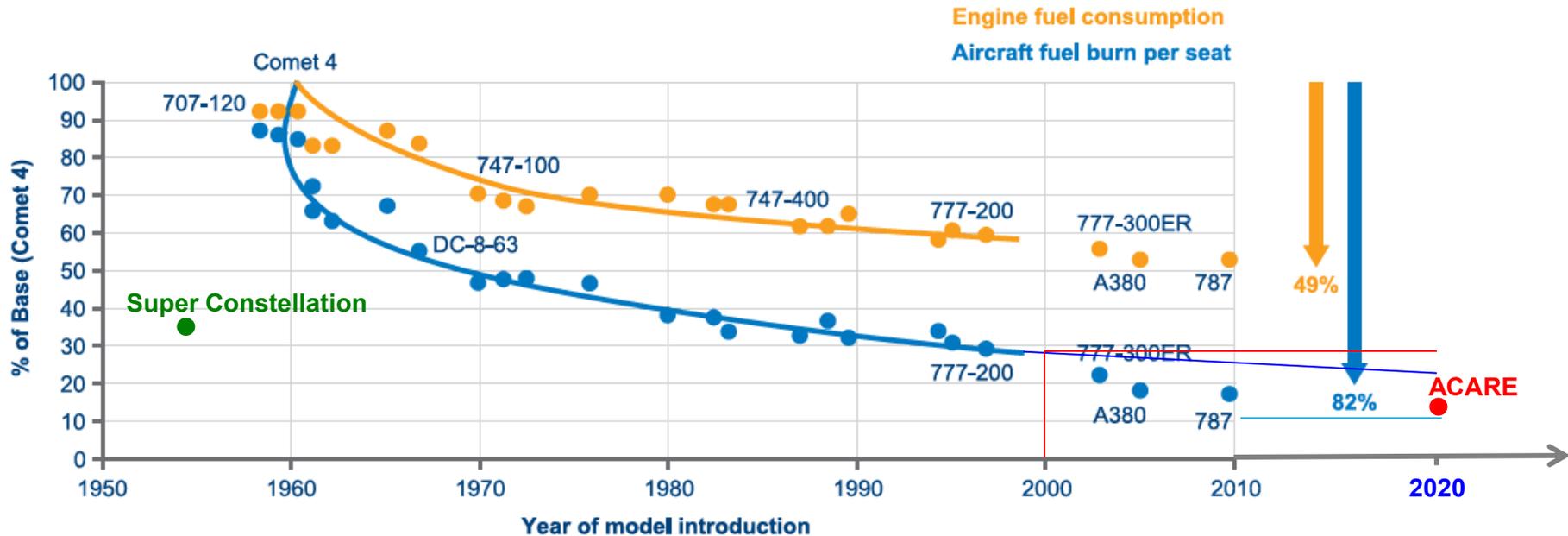
## Flightpath 2050

(successor of "Vision 2020"),  
 Goals for Challenge 3 "Protecting the environment and the energy supply"

1. CO<sub>2</sub> emissions per passenger kilometre have been reduced by 75%, NO<sub>x</sub> by 90% and perceived noise by 65% all relative to the year 2000.
2. Aircraft movements are emission-free when taxiing.
3. Air vehicles are designed and manufactured to be recyclable.
4. ... sustainable alternative fuels ...

# Historic Fuel Consumption

Adapted from IATA



- The ACARE goal for 2020 is ambitious.
- Technology matures. It is more and more difficult to achieve further fuel reductions.
- Starting at 100% with Comet omits the old very efficient piston engined passenger aircraft.

Archived at: <https://perma.cc/GF35-8QET>

# ACARE: A Vision for 2020

The "Group of Personalities" in 2020:

Pedro Argüelles: 1950 (age 70 years)  
Manfred Bischoff: 1942 (age 78 years)  
Philippe Busquin: 1941 (age 79 years)  
Sir Richard Evans: 1942 (age 78 years)  
Walter Kröll: 1938 (age 82 years)  
Jean-Luc Lagardère: \* 1928, † 2003  
Denis Ranque: 1952 (age 68 years)  
Paul Reutlinger: \* 1943, † 2010  
Sir Ralph Robins: 1932 (age 88 years)  
Helena Terho: 1948 (age 72 years)  
Arne Wittlöv: 1940 (age 80 years)

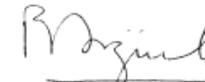


An average age of 77 years (if still alive)

Could we hold them accountable?

No, because no legal contract!

## Group of Personalities

  
Pedro Argüelles

  
John Lumsden

  
Manfred Bischoff

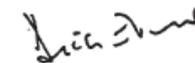
  
Denis Ranque

  
Philippe Busquin

  
Soren Rasmussen

  
B.A.C. Droste

  
Paul Reutlinger

  
Sir Richard Evans

  
Sir Ralph Robins

  
Walter Kröll

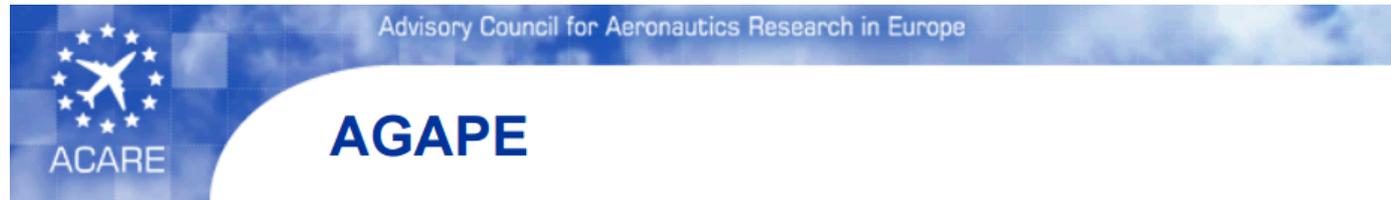
  
Helena Terho

  
Jean-Luc Lagardère

  
Arne Wittlöv

  
Alberto Lina

# ACARE: A Vision for 2020 / AGAPE

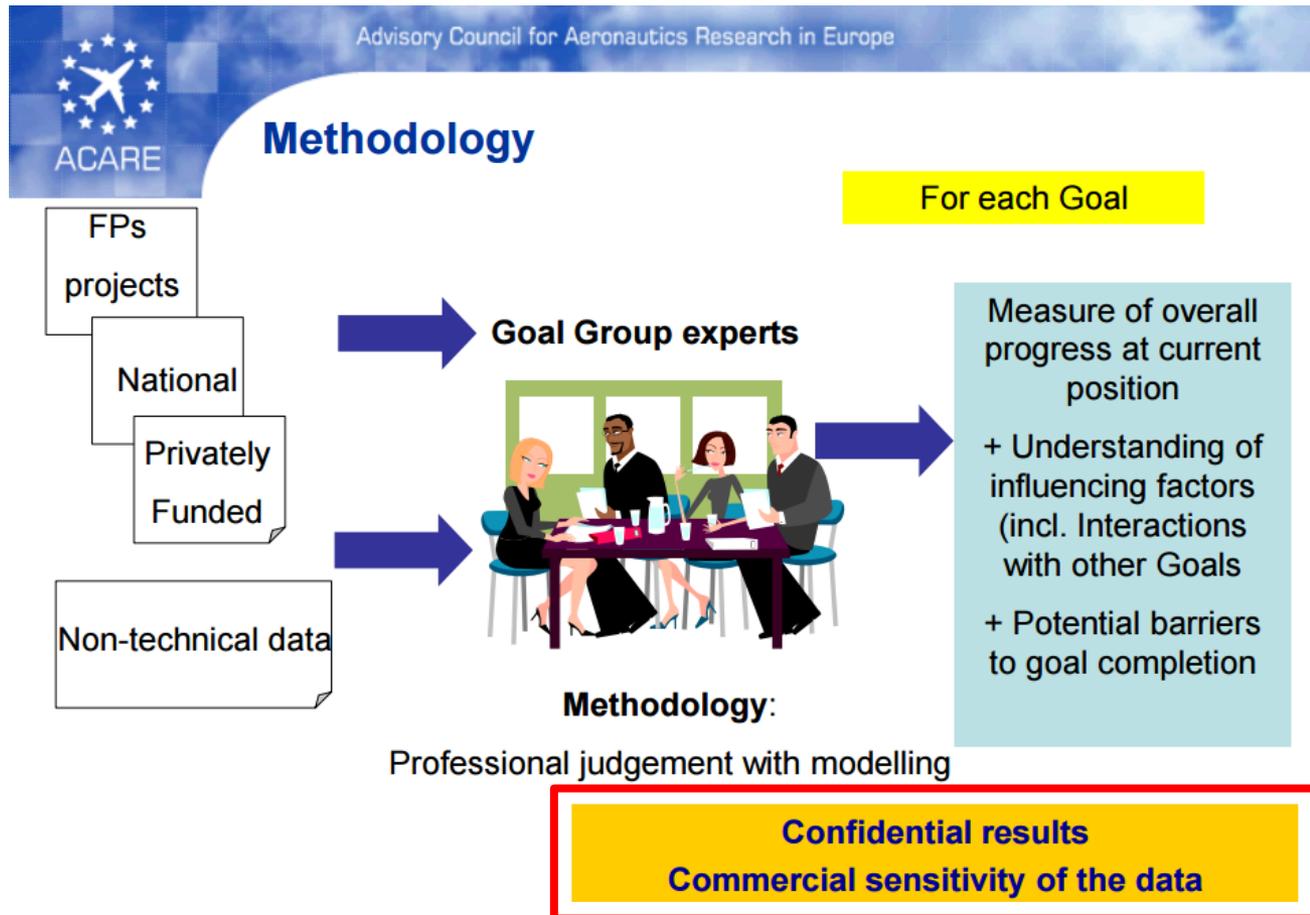


## ACARE GoAls Progress Evaluation

- Provide ACARE with an evaluation of progress achieved in relation to VISION 2020 Goals
- Work performed by a panel of involved experts with one Group per Goal considering Framework Programmes, National Programmes, Privately funded Programmes
- Analysis based on professional judgment supported where possible by modelling to provide indicative measure (quantitative and/or qualitative) of overall progress (achieved and foreseen) based on technology availability
- 100% goal completion = technology available (TRL6) to achieve 100% of the Goal compared with baseline reference products and situations in 2000

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# ACARE: A Vision for 2020 / AGAPE



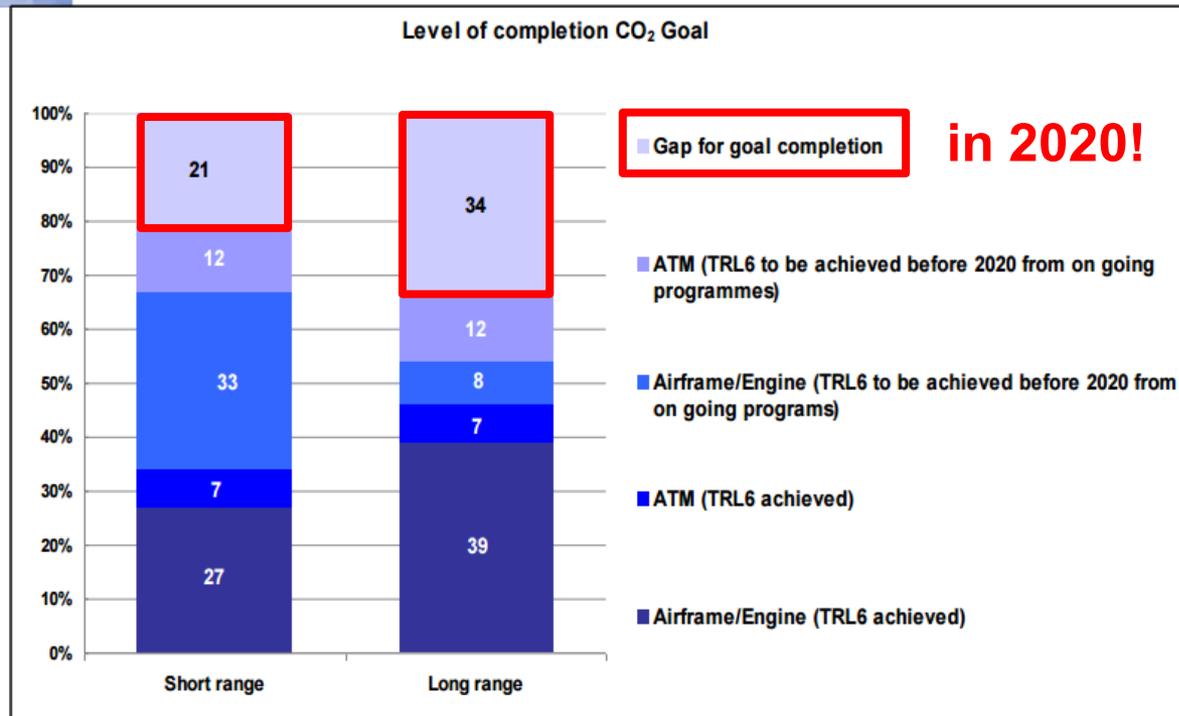
Archived at: <https://perma.cc/2FAZ-GL8Q>

# ACARE: A Vision for 2020 / AGAPE

Advisory Council for Aeronautics Research in Europe



## CO2 as an example



**in 2020! (forecast in 2011)**

Archived at: <https://perma.cc/2FAZ-GL8Q>



# ACARE: A Vision for 2020



"Success" is measured with respect to research money spent by the EU  
– NOT by the achievement of defined goals!

See also: <https://perma.cc/C3FZ-TEPK>

Archived at: <https://perma.cc/JWS5-X5X7>

# ACARE: A Vision for 2020 / **Impact on Publications**

## Goals

are **used** almost universally **as** an **introduction and justification** in research papers. **Example:**

*... In the light of these enormous challenges, the Advisory Council for Aeronautics Research in Europe (ACARE) in 2001 set up the “Agenda for the European Aeronautics’ Ambition” referred to as “Vision 2020”. In this agenda, the two European top-level goals of “meeting society’s needs” and “winning global leadership“ are addressed through a series of goals, such as ...*

SEECKT, Kolja; KRAMMER, Philip; SCHOLZ, Dieter; SCHWARZE, Malte:  
**Mitigating the Climate Impact of Aviation – What does Hydrogen Hold in Prospect?**  
*Klima 2009 - Die weltweite klimaneutrale wissenschaftliche Klimakonferenz*  
(Klima 2009, Online, 02.-06. November 2009). –  
PDF-Download: <http://GF.ProfScholz.de>

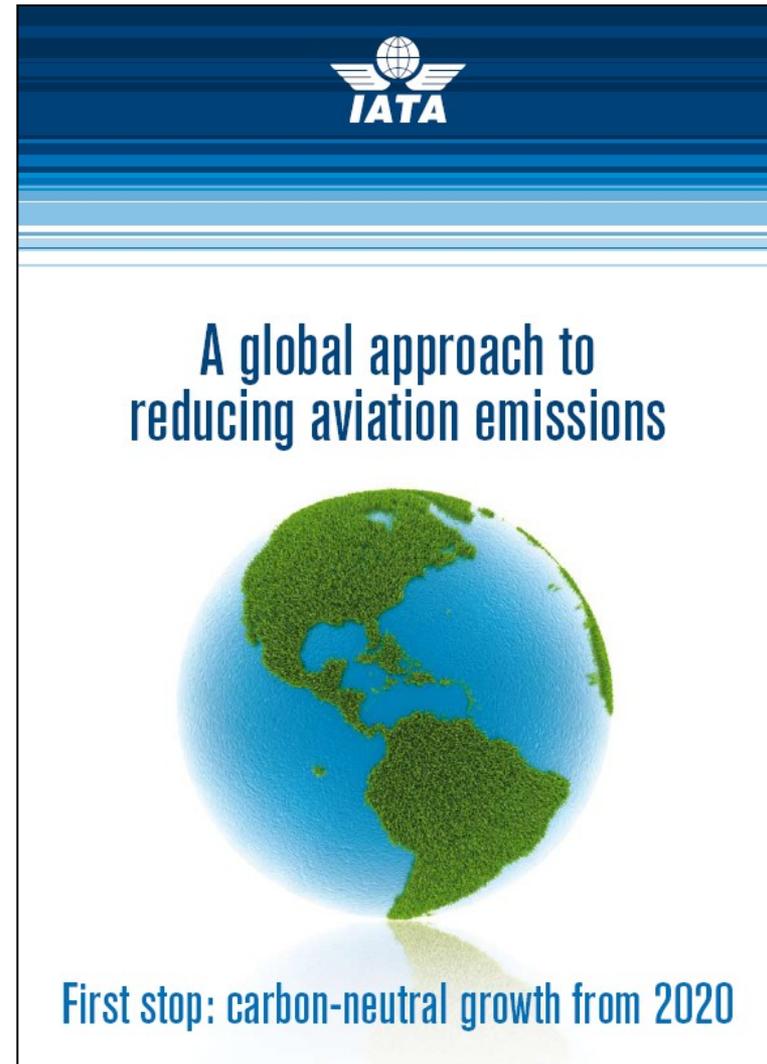
## IATA: CNG from 2020

**IATA: International Air Transport Association.**  
A trade association of airline companies.

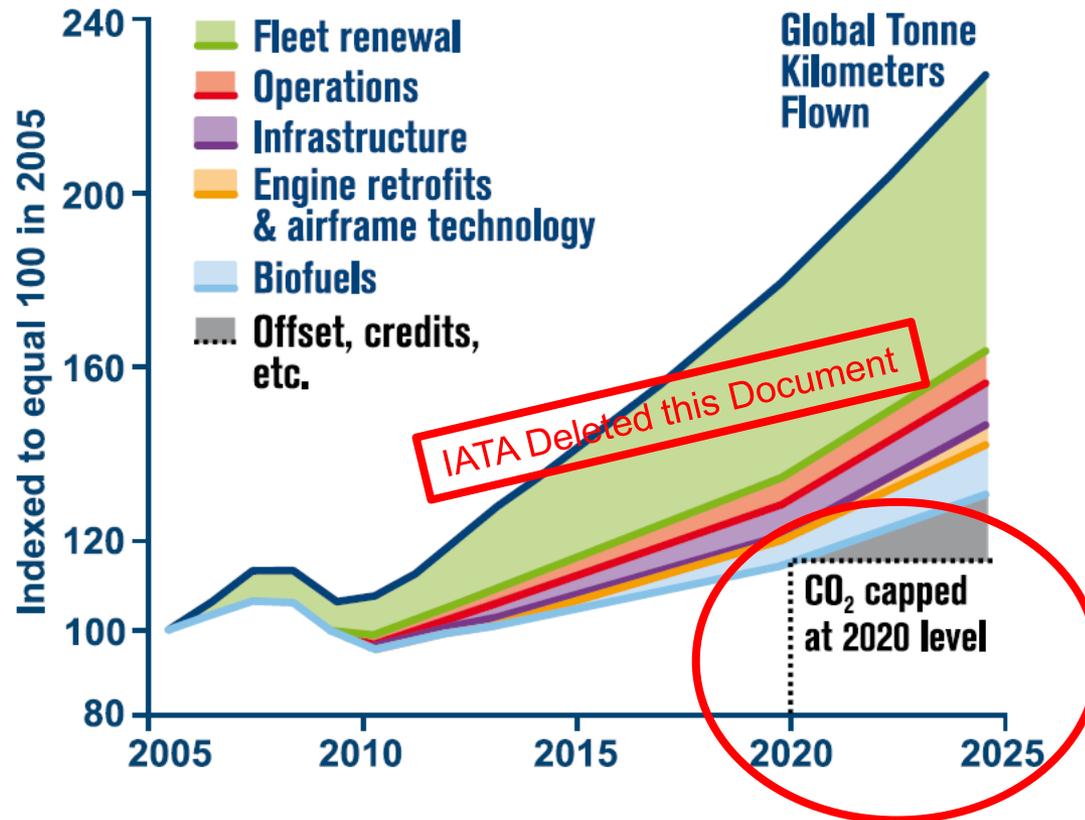
IATA , 2009: A global approach to reducing aviation emissions. First step: carbon-neutral growth from 2020. – URL:  
<http://www.iata.org/whatwedo/environment/Documents/global-approach-reducingemissions.pdf>

**IATA Deleted this Document**

Archived at: <https://perma.cc/42HW-ZTKF>



# IATA: CNG from 2020



2020 is **arbitrary** to start with CO2 compensation.

Compensation could have started earlier.

Why not postpone longer?

Did we notice any change with the 2020 CO2 cap?

IATA (and ATAG) want to achieve zero emission growth from 2020 onwards. This is only possible with CO2 compensation (carbon **offset schemes**).

Archived at: <https://perma.cc/42HW-ZTKF>

# IATA: CNG from 2020

## Carbon-Neutral Growth from 2020: IATA'S FOUR-PILLAR STRATEGY

### Pillar 1 – technology

IATA Deleted this Document

A320: 1988: reference  
 A320neo: 2016: fuel burn: -15%  
 15% in 28 years

This is: 11% in 20 years  
 Much less than 50% in 20 years (ACARE)

Archived at: <https://perma.cc/42HW-ZTKF>

Timelines and examples of technologies 2009-2020	Impact
<b>Retrofits</b>	7-13%
<ul style="list-style-type: none"> <li>Winglets mounted on the wingtips of aircraft improve aerodynamics and reduce fuel burn</li> <li>More advanced engine components for better combustion and airflow</li> <li>Lighter materials for furnishing in the cabin</li> <li>Less energy-consuming lighting and in-flight entertainment</li> </ul>	1-4%
<b>Production Updates</b>	7-18%
<ul style="list-style-type: none"> <li>More airframe structure components made of lightweight composite material instead of aluminium</li> <li>Advanced engines for current aircraft production series</li> </ul>	???
<b>New aircraft design before 2020</b>	25-35%
<ul style="list-style-type: none"> <li>Geared turbofan engine will reduce fuel burn 10-15%</li> <li>Open rotor engine will reduce fuel burn around 25%</li> <li>Counter-rotating fan will reduce fuel burn 10-15%</li> <li>Advanced turbofan will reduce fuel burn around 15%</li> <li>Laminar flow reduces aerodynamic drag by reducing turbulence on aircraft surface, 10-15% less fuel burn</li> </ul>	ok ??? ??? ??? ???
<b>New aircraft design after 2020</b>	25-50%
<ul style="list-style-type: none"> <li>Blended wing body, rather than the classical tube-and-wing architecture</li> <li>Revolutionary engine architectures</li> <li>Fuel cell system for on-board energy</li> </ul>	no ??? no

# IATA: Obsolete Goals for 2020

[Home](#) » [Pressroom](#) » [Press Releases](#) » IATA Calls for a Zero Emissions Future

No.: 21

Date: 4 June 2007



## IATA Calls for a Zero Emissions Future

**VANCOUVER** - The International Air Transport Association (IATA) issued four challenges to drive the air transport industry towards its vision of zero emissions.

“The environmental track record of the industry is good: over the last four decades we have reduced noise by 75%, eliminated soot and improved fuel efficiency by 70%. And the billions being invested in new aircraft will make our **fleet 25% more fuel efficient by 2020**. This will limit the growth of our carbon footprint from today’s 2% to 3% in 2050,” said Giovanni Bisignani, IATA Director General and CEO.

“But a growing carbon footprint is no longer politically acceptable—for any industry. Climate change will limit our future unless we change our approach from technical to strategic. Air transport must aim to become an industry that does not pollute—**zero emissions**” said Bisignani.

Archived at: <https://perma.cc/JSR2-JC79>

# ATAG: CNG from 2020



## TOWARDS SUSTAINABLE AVIATION

them. We are delivering already on our short-term promises for fuel efficiency of 1.5% per annum improvement through to 2020 and are demonstrate environmental leadership by delivering on our goal to cap net aircraft carbon emissions from 2020 and work to achieve our ambitious goal of a 50% reduction in net carbon emissions by 2050 compared to 2005 levels.

Archived at: <https://perma.cc/6TDN-KGEN>

### Our climate targets:

# 1.5%

We will improve our fleet fuel efficiency by 1.5% per annum between now and 2020.

# Stabilise

From 2020, net carbon emissions from aviation will be capped through carbon neutral growth.

# 50%

By 2050, net aviation carbon emissions will be half of what they were in 2005.

<https://www.atag.org/facts-figures.html>

# ATAG: CNG from 2020



Our climate targets:

1.5%

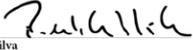
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Stabilise

From 2020, net carbon emissions from aviation will be capped through carbon neutral growth.

50%

By 2050, net aviation carbon emissions will be half of what they were in 2005.

 Angela Gittens Director General		 Paul Riemens Chairman of the Executive Committee		 Tony Tyler Director General and CEO	
 Marion C. Blakely Chair		 Thomas Enders President and CEO		 Jim Albaugh President and CEO	
 Filippo Bagno Chief Executive Officer		 Guy Hachey President and COO Bombardier Aerospace		 THE POWER OF FLIGHT Jean-Paul Ebanga President and CEO	
 Paulo Cesar de Souza e Silva President Commercial Aviation		 David Joyce President and CEO GE Aviation		 Tim Mahoney President and CEO Honeywell Aerospace	
 John Saabas President Pratt & Whitney Canada		 Eric Schulz President – Civil Large Engine Programmes		 Paul Steele Executive Director	

6th Aviation & Environment Summit, 22 March 2012

<https://www.atag.org/facts-figures.html>

# Comparison of Goals

**Working with Growth and Fuel Efficiency increases => Exponential Growth**

$$index = (1 + p)^{(year - 2020)}$$

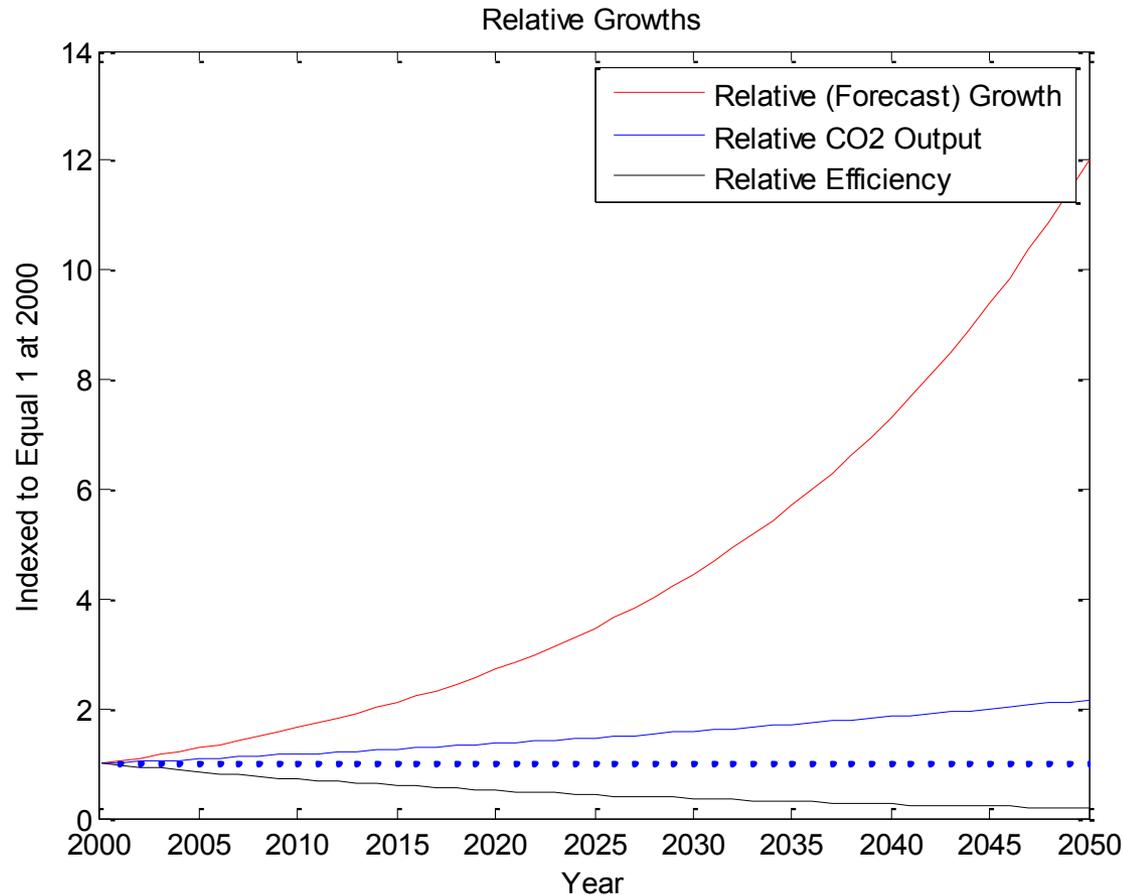
**Example** (for  $p$ ):

$p = 5.1\%$  Growth (p.a.)

$p = -3.6\%$  Efficiency Increase (p.a.)

Resulting in:

$p = 1.5\%$  Net Growth (p.a.)



# Comparison of Goals

## Reduction of Fuel Burn or CO2

in 2012

organization	goal	from	to	per year	level	source
ACARE	50,0%	2000	2020	2,05%	A/C	ACARE: <i>Vision 2020</i> . Luxembourg, EU, 2001 (deleted from www)
ACARE	75,0%	2000	2050	1,13%	A/C	ACARE: <i>Flightpath 2050</i> . Luxembourg, EU, 2011
ATAG	19,6%	2008	2020	1,50%	A/C	ATAG: <i>Towards sustainable Aviation. Summit Declaration</i> . Geneva, ATAG, 2012
ATAG/Airbus	0,0%	2020			fleet	ATAG: <i>Towards sustainable Aviation. Summit Declaration</i> . Geneva, ATAG, 2012
ATAG/Airbus	50,0%	2020	2050	1,36%	fleet	ATAG: <i>Towards sustainable Aviation. Summit Declaration</i> . Geneva, ATAG, 2012
IATA	zero emission	2007	2050	1,63%	fleet	Bisignani, Vancouver, 2007. - www.iata.org (2012-09-10) (not valid anymore)
IATA	build A/C zero emission	---	2062	---	---	www.iata.org (2012-09-10)
IATA	25,0%	2005	2020	1,50%	fleet	www.iata.org (2012-09-10)
historic data	70,0%	1960	2010	1,07%		www.atag.org (2012-09-10)

- Goals are quite **diverse**
- Goals have been **withdrawn** over the years (ACARE, IATA)
- Some goals are **not well defined**
- Some goals may **not be reached** ...

# Comparison of Goals

Flight International, 2014-01-14:

**RESEARCH**

## 2020 CARBON NEUTRAL GOAL INSUFFICIENT TO TACKLE RISING EMISSIONS

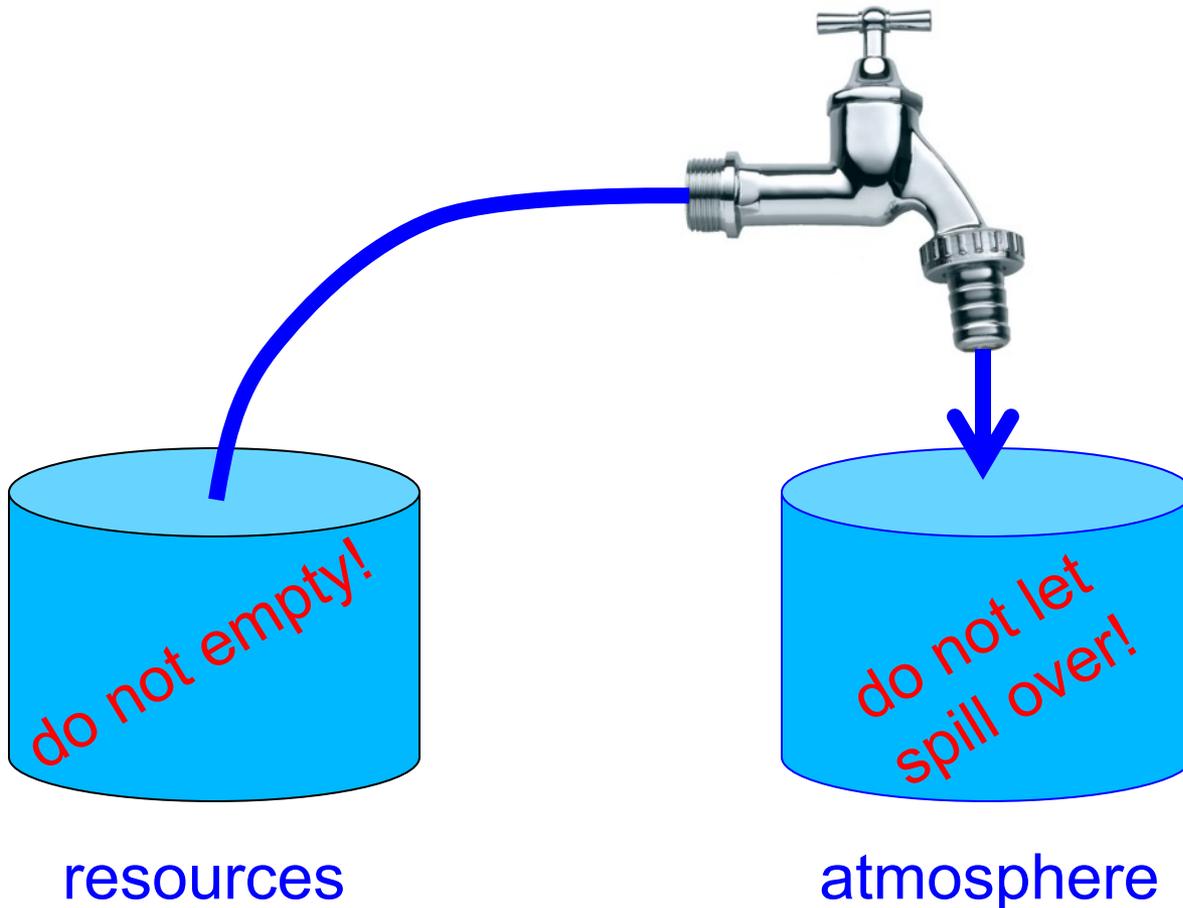
... according to Manchester Metropolitan University's Centre for Aviation, Transport and the Environment (CATE) ... because **CO2 accumulates faster in the atmosphere than it can be removed**. Therefore **CO2 output must be reduced!** IATA: "The science is so uncertain that we really wouldn't know what to do". **Russia** on the other hand **does not even want carbon neutral growth (CNG)!**



## Comparison of Goals

With carbon neutral growth (CNG) the tap is left wide open.

Maybe it is time to close the tap a least a little?



# CORSIA

# ICAO: CORSIA: "the basis for carbon neutral growth from 2020"

## CORSIA: Carbon Offsetting and Reduction Scheme for International Aviation



### Multiple Phases

- 2019-2020: Monitoring for determination of the emissions baseline
- 2021-2023: Pilot phase (voluntary participation of the states)
- 2024-2026: Phase 1 (voluntary participation of the states)
- **2027-2035**: Phase 2 (**mandatory** participation for all countries and their aircraft operators more than 0.5% of global air traffic in 2018, in ensuring that 90% of global air traffic is covered).

To begin the pilot phase alone took 5 years and lets CORSIA start in 2021. The statement "the basis for carbon neutral growth from 2020" means in light of the regulations that **carbon-neutral growth may never be achieved** (its only the bases) and that it comes later than 2020 ("from") .

# ICAO: CORSIA: "the basis for carbon neutral growth from 2020"

## Criticisms

- The CORSIA **implementation process is slow** and allows business as usual for too long.
- Offsetting **diverts the focus from reducing emissions**, to trading on emissions.
- CORSIA **does not lead to 'carbon neutral growth'**. It is effective only 8 years (2027-2035).
- CORSIA has **not stated any upper limit to the aviation related emissions** that may be produced by an airline operator or a country.
- CORSIA is likely to result in **massive new demand for biofuels**, which currently would most likely be produced using palm oil, but palm oil is recognized as
  - a leading cause of **deforestation**,
  - **human rights abuses**,
  - results in **more emissions than the fossil fuels they replace!!!**
- Forest offsets would most likely predominate. But **forest offsets have been opposed as ineffective** (see next page).

## ICAO: CORSIA: "the basis for carbon neutral growth from 2020"

- Research shows that **forest carbon offsets consistently fail to meet the majority of the CORSIA criteria.**
- **Forest carbon offset projects have been used by major international airlines** to compensate for flight emissions – despite failing to meet nearly all of the CORSIA criteria.
- If **ICAO** is at all serious about ensuring its own criteria are met, it **must exclude forest offsets from the CORSIA mechanism.**



Archived at: <https://perma.cc/84ML-FXJD>

# ICAO: CORSIA: "the basis for carbon neutral growth from 2020"

## CORSIA & COVID-19

1. CORSIA calculates annual offsetting requirements for individual aeroplane operators every year from 2022 based on an **annual Sector's Growth Factor (SGF)**, which represents the CO<sub>2</sub> emissions growth of international aviation in a given year from 2021, compared to CORSIA's sectoral baseline (average of 2019 and 2020)
2. The calculation of an aeroplane operator's **annual offsetting requirements during CORSIA's pilot phase** (2021 to 2023)
3. CORSIA refers to a certain percentage (0.1%) of global CO<sub>2</sub> emissions in 2020 as **a threshold for a new entrant operator** to be covered by the CORSIA offsetting requirements.

For that reason: The Council agreed that, in order to safeguard against inappropriate economic burden on aeroplane operators, 2020 emissions should not be used for the three CORSIA design features listed above. In this regard, the Council decided that during the pilot phase, **2019 emissions shall be used for 2020 emissions**.

<https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-and-Covid-19.aspx>

# Summary

## Summary – Goals, Promises and Visions **Today**

- **Goals, Promises and Visions** are **used to improve conditions in business**:
  - receive money or reduce payments,
  - avoid or delay unwanted legislation (work slowly!).
- Goals, Promises and Visions **need to be distributed** and **directed to politics**:
  - lobbying, media, research publications.
- Goals, Promises and Visions **need to be irresistible**:
  - supported by VIPs, signatures and logos,
  - supported by technical details supported by experts.
- Goals, Promises and Visions **should have a long time horizon**:
  - discussions about fulfillment are postponed,
  - those who have given the promise are retired or dead.
- Goals, Promises and Visions **can be deleted or replaced**:
  - when their time of fulfillment comes near,
  - when circumstances have changed.

## Summary – Goals, Promises and Visions **Improved**

- **Goals, Promises and Visions** are used to give the environment a real chance:
  - reduce emissions,
  - reduce resource depletion.
- Goals, Promises and Visions need to be distributed and **directed to industry**:
  - **action groups**, media, research publications.
- Goals, Promises and Visions **need to be realistic**:
  - supported by **trustworthy patron**, **enforced legislation**,
  - supported by technical details from **independent experts**.
- Goals, Promises and Visions **should have a medium time horizon**:
  - discussions about fulfillment **constantly ongoing**,
  - those who have given the promise are still **alive and active and held accountable**.
- Goals, Promises and Visions are **archived**.

## Contact

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<http://www.ProfScholz.de>

## Review of CO2 Reduction Promises and Visions for 2020 in Aviation

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### See also:

SCHOLZ, Dieter: *Eco-Efficiency in Aviation – Flying Off Course?* (German Aerospace Congress 2012, Berlin, 10.-12.09.09.2012), 2012 – Available at: <https://doi.org/10.5281/zenodo.4067014>