FIT FOR 55 -EMISSION TRADING AND OFFSETTING IN EU AIR TRANSPORT

EUROPEAN TRANSPORT MARKET AND EUROPEAN TRANSPORT POLICY
Theodor-Heuss-Akademie der Friedrich-Naumann-Stiftung für die Freiheit, Gummersbach, April 2025

Dr. Sven Maertens, German Aerospace Center, Institute of Air Transport

DLR

Agenda

Emission trading and offsetting in EU air transport – in the context of the Green Deal and Fit for 55

- **Introduction**
- Challenges
  - Negative externalities
  - The Aviation vs. Environment “Dilemma”
  - So what to do?
- Market-based measures in EU air transport
  - Genesis of market-based measures
  - Europe goes ahead – EU ETS
  - Late but global approach – CORSIA
  - CORSIA versus EU ETS
- The Fit-for-55 measures for Aviation
  - The Fit-for-55 package
  - Revision of the EU Emission Trading Scheme
  - Other Fit-for-55 elements: SAF & Jet Fuel Tax
  - Fit-for-55 measures: Potential cost and traffic impacts
- Conclusion & Current view

Introduction

Dr. Sven Maertens

- Studies at the University of Muenster (Business Administration with focus on Transport Economics, Marketing and Controlling)
- Researcher and Acting Vice Director at the Institute of Air Transport (www.dlr.de/lv) of the German Aerospace Center (DLR)
  - Germany's national aeronautics and space research centre
  - 10,000 employees, 50 institutes and facilities, >10 research aircraft
- Skills/Research focus: Aviation industry business models, Environmental economics, Business aviation, Airline and airport competition…
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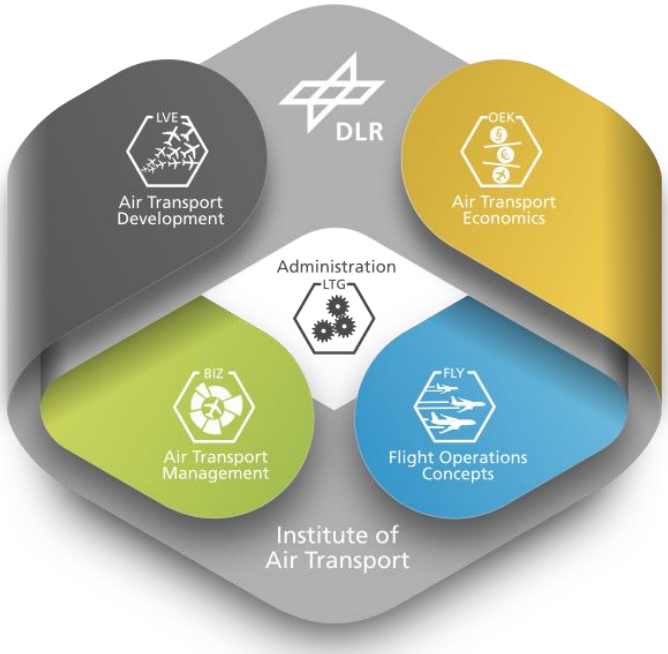
Introduction

Institute of Air Transport: Structure, Location, Mission



- **Development paths** and **drivers** of the **air transport system**,
- **Modelling** and **multi-criteria evaluation** of the **air transport system** and related **measures**,
- **Economic** and **business analyses** along the entire **air transport value chain(s)**,
- **Knowledge generation** and **recommendations** to increase the sector's **sustainability** and **performance.**

An interdisciplinary team forecasts, designs and evaluates the air transport sector as part of the transport system.

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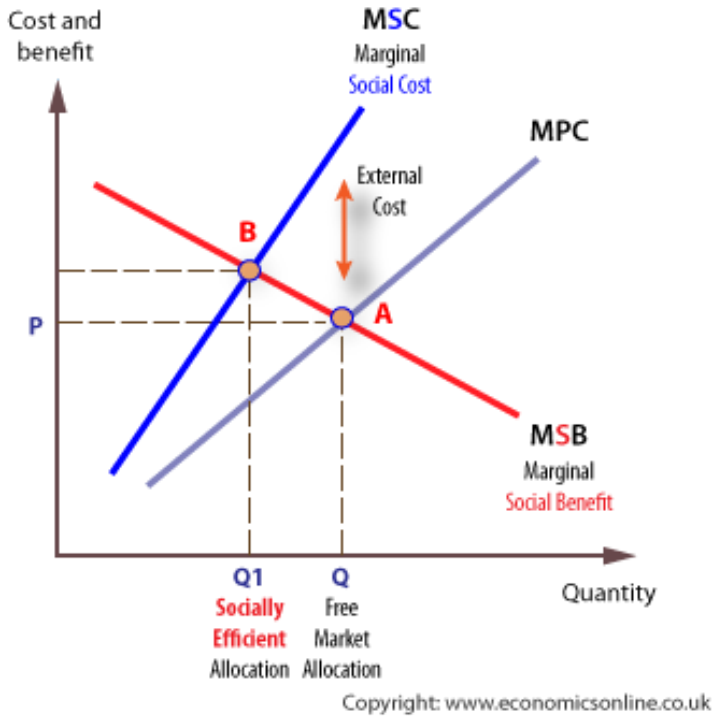
Challenges

Negative Externalities

- **Cost** suffered by a **third party** instead of being (fully) mirrored in the cost function of a producer and/or its client/consumer
- Consequence: **Quantity too high**
- Examples: Waste, Noise, Climate-relevant gases…
- **Market-based solution**: External cost internalization to lower quantities or to incentivize the use of more efficient technologies
- Less efficient measures: **Command-and-Control policies** like standards or outright bans of activities
- Externalities can also be positive (**spillover effects**), and they are usually **difficult to quantify**



Both negative and positive externalities require action to improve welfare – unless such action worsens the outcome!

Challenges

The Aviation vs. Environment „Dilemma“

Pro‘s

- **Global connectivity** – fast international travel
- **Access to remote regions** – vital for isolated communities
- **Boosts trade & tourism** – supports economic growth
- **Disaster relief** – quick emergency response
- **Flexible to demand** – adaptable scheduling, limited infrastructure needs
- **Job opportunities** – wide range across sectors
- **Moderate land use** – airports require less continuous land than roads
- **Low-carbon infrastructure** – less upkeep and less costly than roads/rails
- **High safety & security** – strict international standards

Con‘s

- **CO_2 emissions** – ~2% of global total, ~12% of transport-related emissions[1]
- **Non-CO_2 emissions** – NOx, water vapor, soot increase climate impact
- **Total climate impact** – estimated 3–5% globally[2]
- **Noise pollution** – affects residents near airports
- **Overtourism** – strain on local ecosystems

Long-term air traffic **growth** has so far outpaced **efficiency increase**.
Slow, step-wise innovation due to **high technological path dependencies** (hard-to-abate sector)

[1] https://www.atag.org/facts-figures.html, [2] Lee et al. (2021), icons generated by AI

Challenges

So what to do?

- “**Basket of measures**”
- **Technology** and **operational measures insufficient** to stabilize emissions
  - Strong weight and range restrictions for electric aircraft
  - Hydrogen requires new airframes and infrastructures
  - Slow operational improvements likely to be outpaced by traffic growth
- **Remaining solutions** to achieve **ICAO’s CNG 2020 goal and Long-term global aspirational goal of net-zero carbon emissions by 2050**:
  - **Sustainable fuels (SAF): expensive – have to be scaled up first**
  - **Bans: ineffective, inefficient and (politically) unrealistic**
  - **Market-based measures: readily available**

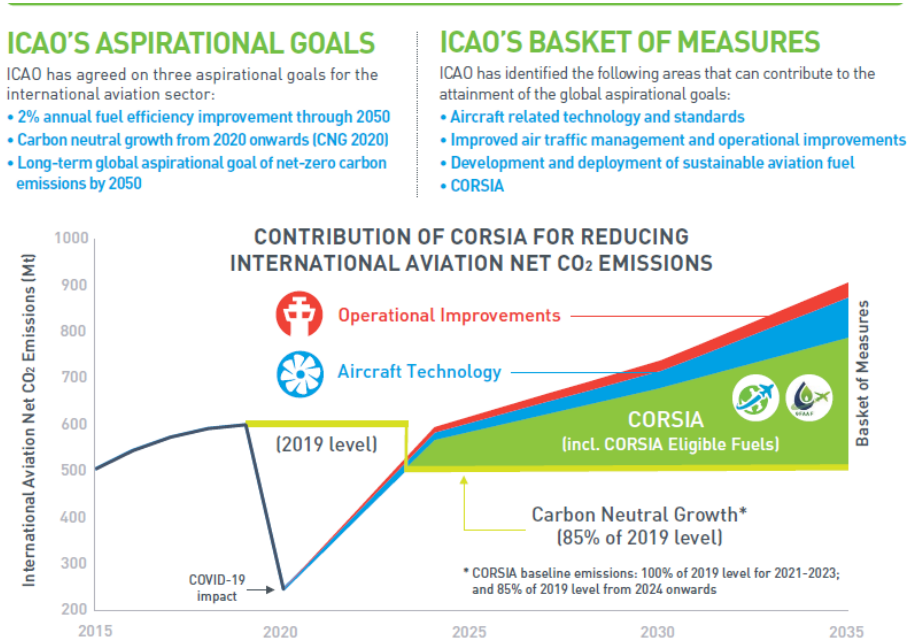


Image: ICAO

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Market-based measures in EU air transport

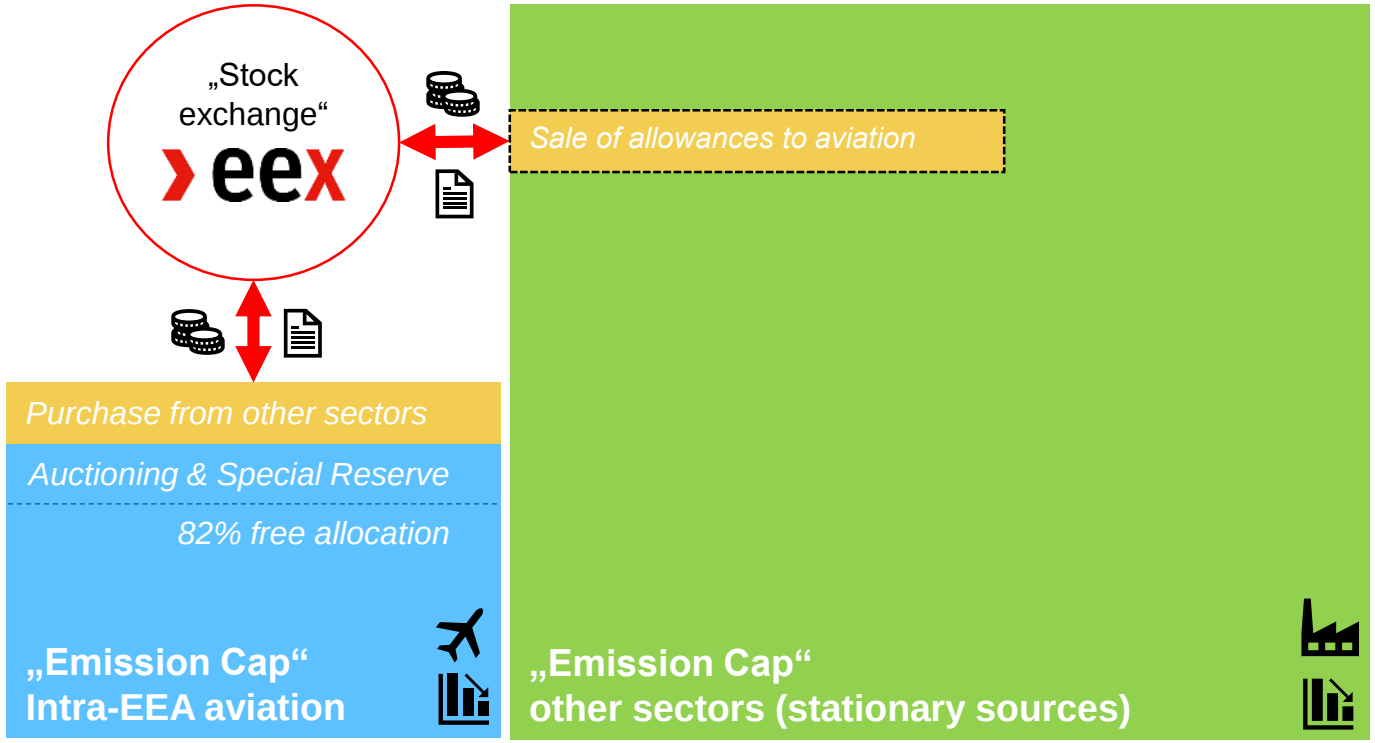
Genesis of EU and global market-based measures in air transport

Year	World	EU / EEA
1997	**Kyoto Protocol (Art 2): ICAO tasked to prepare policy measures** to reduce **aviation GHG** emissions	
1997-2016	**Long-lasting political process**	→ **2012: EU ETS for aviation** (2008/101/EC, 2009/29/ EC) Full scope -> Reduced scope
2016	Assembly Resolution A39-3 on **Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)**	
2021	Inauguration of **CORSIA offsetting**	

While the ICAO had been discussing policy measures to tackle aviation's CO_2 emissions for more than a decade, the EU introduced the EU ETS for aviation as an actual measure in 2012.
In 2016, ICAO agreed on CORSIA, its own global offsetting scheme, to be introduced from 2021.

Market-based measures in EU air transport

Europe goes ahead – EU ETS: Idea



- Polluters for whom a reduction in emissions is relatively expensive reduce their emissions indirectly by purchasing certificates that securitize the savings of those actors for whom a reduction is relatively cheap.
- **Welfare maximization**: Cheapest way to achieve a given emissions target in the economy

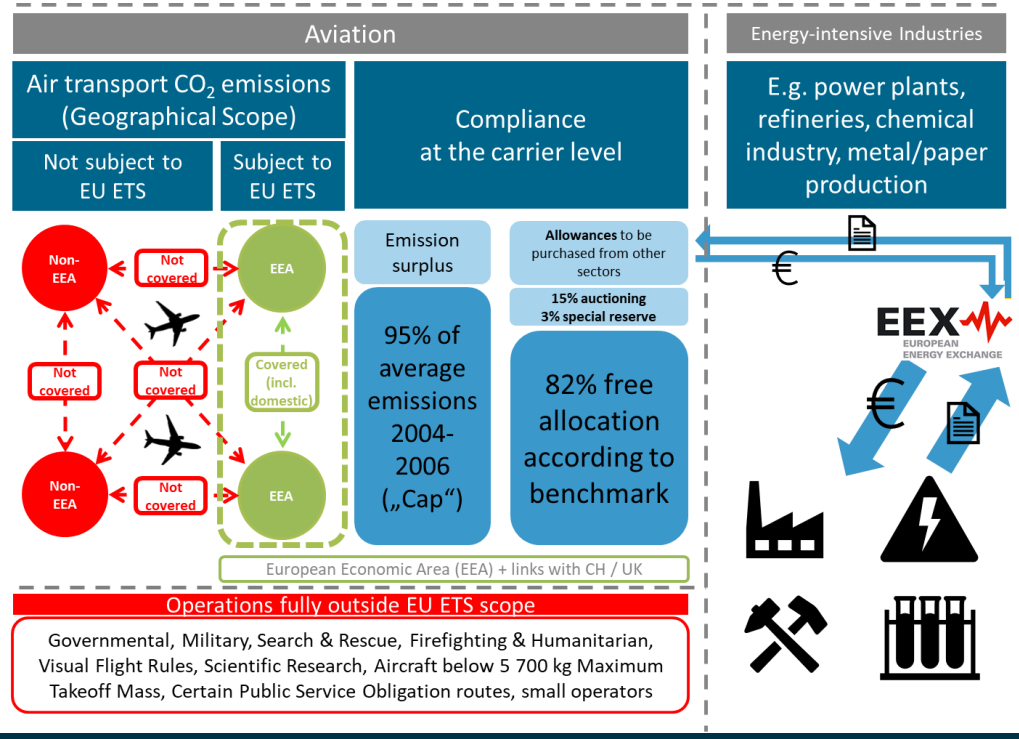
Source: Financial Times

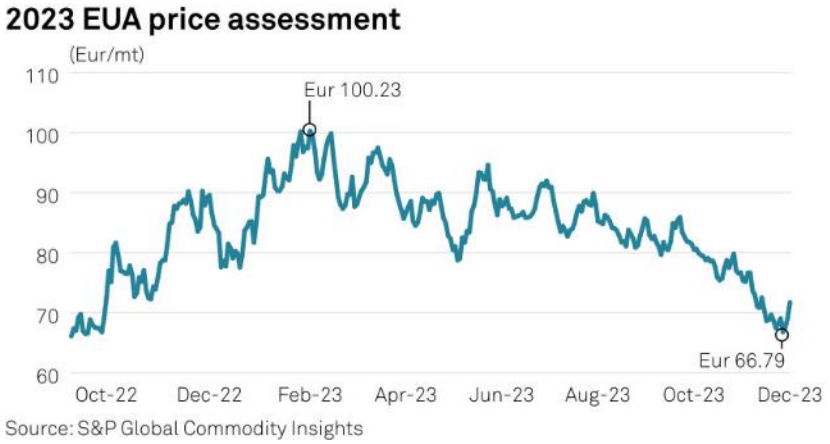
The cap & trade approach of the EU ETS means a fixed environmental goal is reached at the lowest possible cost. However, the scope is limited to intra-European air transport.

Market-based measures in EU air transport

Europe goes ahead – EU ETS: Details

European Emissions Trading Scheme (EU ETS) for…





Source: Financial Times

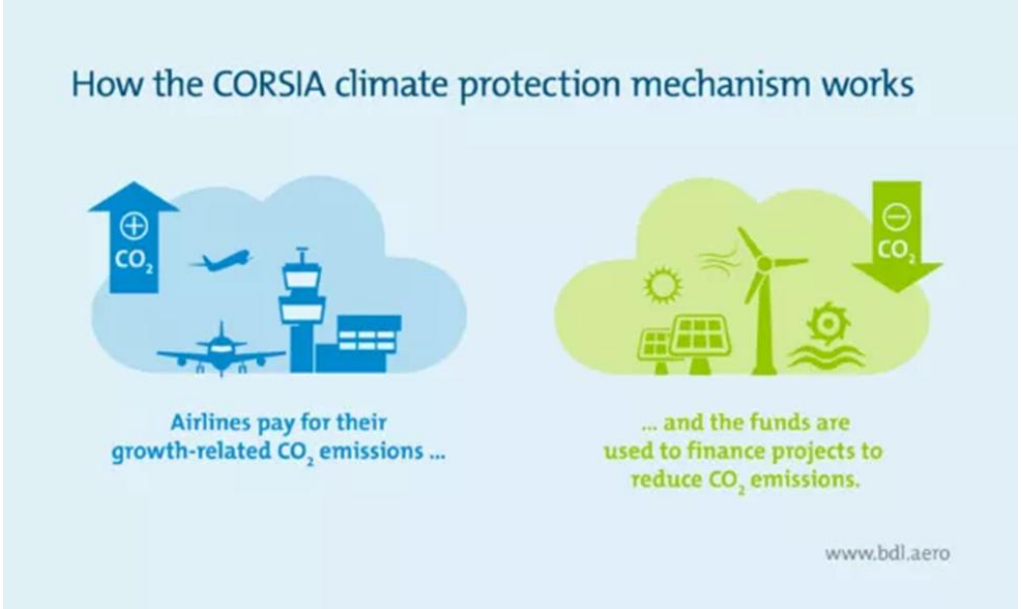
Initially, the EU ETS for aviation had been designed to cover all flights within, to and from the EU. Concerns raised by third-party countries resulted in a reduced scope, covering intra-EEA traffic only.

Market-based measures in EU air transport

Late but global approach - CORSIA

- **Carbon Offsetting and Reduction Scheme for International Aviation**
- **ICAO member state level**
- Agreed on in 2016 (A39-3)
- Airlines required to buy **offsets** to **compensate for emissions exceeding 2019/2020 levels**
- **Offsetting projects** shall generate **CO_2 savings** and include afforestation, regenerative agriculture, clean cookstoves, small biogas plants, green energy…

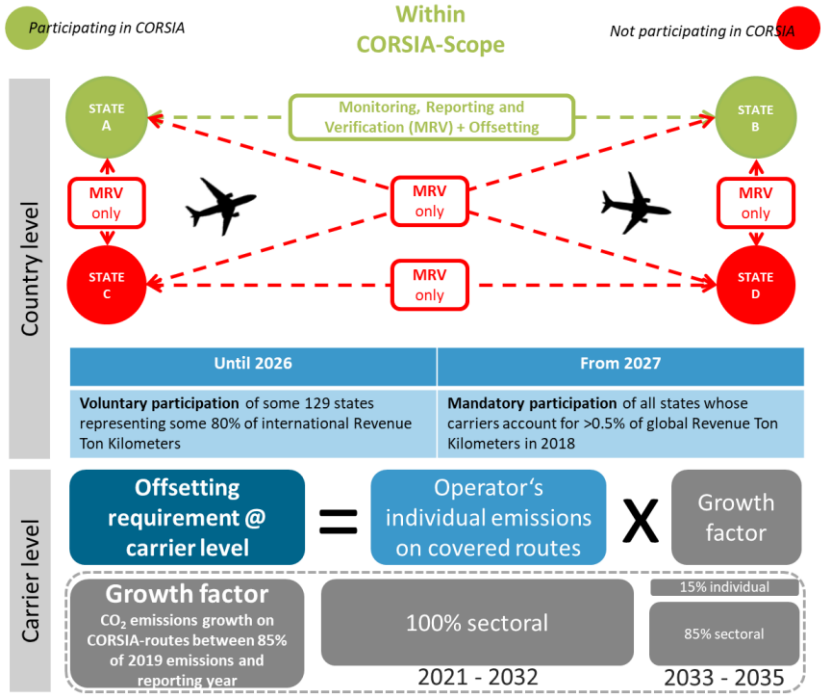
Source: https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx



The idea behind offsetting is that an environmental goal can be reached at the lowest possible cost as firms will invest in the most efficient offsetting projects first.

Market-based measures in EU air transport

Late but global approach - CORSIA



Fully outside CORSIA-Scope

Emissions from...

- ... domestic flights
- ... small operators (<10,000 t CO_2 p.a.)
- ... small aircraft (<5.7 t Maximum Takeoff Mass)
- ... medical, humanitarian, and firefighting operations
- ... military and Governmental operations

- Less ambitious (late = high baseline)
- Global approach
- No inclusion of domestic flights
- Baseline emissions „for free“
- Offset integrity

CORSIA

Source: https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx

Sectoral approach: Individual airline emissions on routes covered by CORSIA are multiplied with a sectoral emissons growth factor to calculate individual airlines‘ offsetting requirements

Operator's annual emissions subject to offsetting requirements **X** Growth Factor **=** **CO_2 offseting requirements**

Cames et al. (2016): “73% of the … Certified Emissions Reduction (CER) supply have a low likelihood” and only “7% … have a high likelihood of ensuring that emission reductions are additional and … not over-estimated”

CORSIA is a global approach, but domestic flights are excluded and offset integrity is a challenge. Unlike the EU ETS, CORSIA also lacks a hard cap.

Market-based measures in EU air transport

Genesis of market-based measures

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2016	Assembly Resolution A39-3 on **Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)**	**Potential conflicts** (Overlapping scope…)
2021	Inauguration of **CORSIA offsetting**	**„Fit for 55“ - Revision**
2022		

Overlapping geographical scopes

EU ETS:
- EEA domestic
- **Intra-EEA international**

CORSIA:
- International between participating states (global, incl. **Intra-EEA international**)

Irrespectively of the political ambition to strengthen the EU ETS, the EU had to act anyway to resolve overlapping scopes of EU ETS and CORSIA.

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The Fit-for-55 measures for Aviation

The Fit-for-55 package

Green Deal: Emission **reduction by 55%** until 2030 compared to 1990

The European Commission proposed in July 2021 **various instruments** with **relevance to aviation** which are currently in the **legislative process**

https://www.socialistsanddemocrats.eu/sites/default/files/styles/header_background/public/2022-04/fit%20for%2055%20eu%20flag.jpg?itok=nJzQ7sRV

- Market-based Measures:
  - EU Emission Trading Scheme
  - CORSIA implementation
- Sustainable Fuels: ReFuelEU Aviation
- Energy Taxation: Jet Fuel Tax
- Alternative Fuels Infrastructure: Ground Power

Which new rules were proposed and eventually agreed on?
Which economic impacts of the proposed measures can be expected?

The Fit-for-55 measures for Aviation

Revision of the EU Emission Trading Scheme: Trilogue results

- **Trilogue** = negotiations between Commission, Parliament and Council
- No intra-EEA implementation of CORSIA (no double counting)
- Implementation of CORSIA on most extra-EEA flights
- Free allocation of 20 million t CO_2 (2024 - 2030) to compensate for SAF use
- Reduction of the EU-ETS-‚cap‘:
  - -4.3 % p. a. (2024 – 2027), -4.4 % p. a. (2028 – 2030) ~~(Commission draft: -4.2%)~~
- Phase-out of free allowance allocation by 2026 ~~(2027)~~
- Non-CO_2 mandatory monitoring, reporting, verification (MRV) from 2025

The trilogue results are stricter than the original Commission proposal. Non-CO_2 emissions have to be monitored, reported and verified in the second half of the decade.

The Fit-for-55 measures for Aviation

Other Fit-for-55 elements: SAF & Jet Fuel Tax

- **ReFuelEU Aviation – Sustainable Fuels (SAF)**
  - (Technically) promising way of reducing aviation emissions by 70%-100% as SAF can be blended with conventional fuel, allowing for gradual implementation on existing engine technologies.
  - Increasing SAF quota (incl. e-fuels sub-quota) at EU airports: 2 % (2025); 6 % (2030); 20 % (2035); 34 % (2040); 42% (2045) and 70 % (2050)
  - SAF uplift requirement before each flight from EU airports (90 % of yearly average to prohibit tankering)
- **Jet Fuel Tax (**Revision of European Union Energy Taxation Directive, EU ETD)**:** No agreement yet

ReFUelEU requires SAF capacities of 40 million tons annually until 2050. Currently drafted plants for SAF production may handle about 10,000 t SAF / year at a cost of about 200 million €. Hence, massive learning curve effects, economies of scale and investment required.

The Fit-for-55 measures for Aviation

Fit-for-55 measures: Potential cost and traffic impacts (DLR simulation results)

- **Airline cost (and fare) increase especially on (intra-)EEA segments**
- Likely shifts to **non-EEA destinations** and to **non-EEA hubs**
- Risk of **carbon leakage**

Source: Map generated by the Great Circle Mapper (www.gcmap.com) © Karl L. Swartz

Unit costs (segment/pax) caused by FF55-measures	Hamburg-Frankfurt-Bangkok v.v. (Euro)				Hamburg-Dubai-Bangkok v.v. (Euro)			
	HAM-FRA	FRA-BKK	BKK-FRA	FRA-HAM	HAM-DXB	DXB-BKK	BKK-DXB	DXB-HAM
CORSIA	-	3.65	3.65	-	2.00	2.51	2.51	2.50
~~*EU ETD**~~	~~*3.66*~~	-	-	~~*3.66*~~	-	-	-	-
EU ETS	3.56	-	-	3.56	-	-	-	-
ReFuelEU	0.86	15.23	-	0.86	8.36	-	-	-
Sum (Segment)	8.08	18.88	3.65	8.08	10.36	2.51	2.51	2.50
Total Sum (O&D)	38.69 – 3.66 = **35.03**				17.88			

* European Union Energy Taxation Directive

Source: Ehlers et al. (2022) Auswirkungen der Fit-for-55-Instrumente auf die Preise in der Luftfahrt - Wirtschaftsdienst

Carbon leakage occurs if passenger flows covered by the EU ETS are replaced by those outside the scope of the measure.

The Fit-for-55 measures for Aviation

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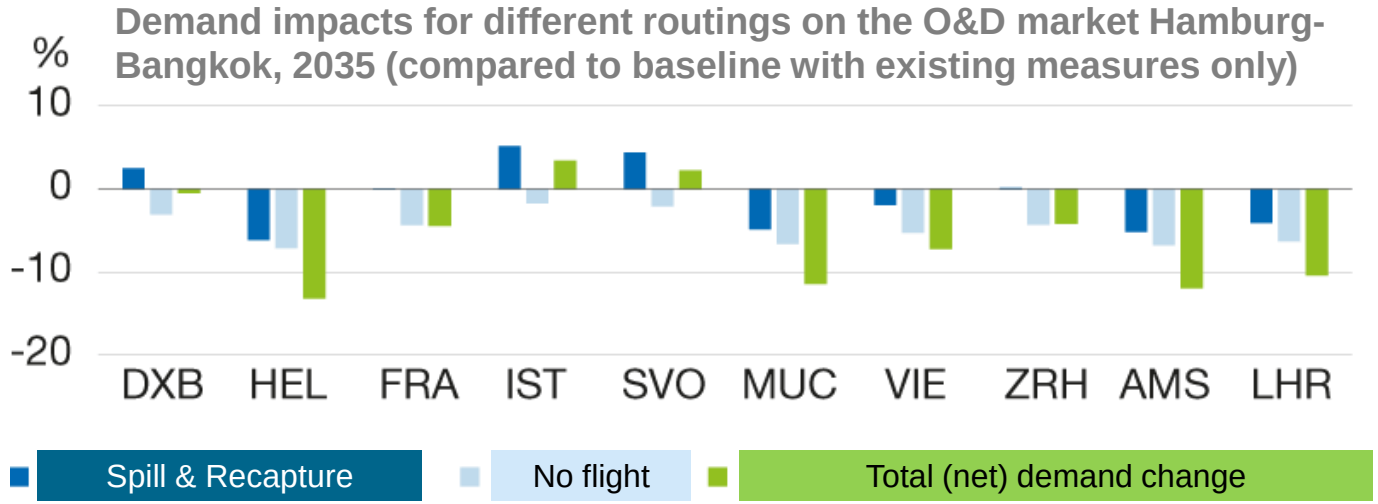

Source: Map generated by the Great Circle Mapper (www.gcmap.com) © Karl L. Swartz

Source: Ehlers et al. (2023)
Preisinduzierte Nachfrageveränderungen durch Fit-for-55-Instrumente in der Luftfahrt - Wirtschaftsdienst

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Conclusion and Outlook

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Conclusion & Current view

Key issues

- **Complex interaction** of the different Fit-for-55 instruments
- **Competitive disadvantage** of direct routings from the EU, and of indirect routings via EU hubs, to non-EEA destinations (shift to hubs outside the EU like Istanbul or Dubai)
- **Competitive disadvantages** may also arise for (usually directly-served) **EU tourist destinations**, as price sensitive travelers may switch to “non-ETS” destinations (Spain ⇨ Turkey)

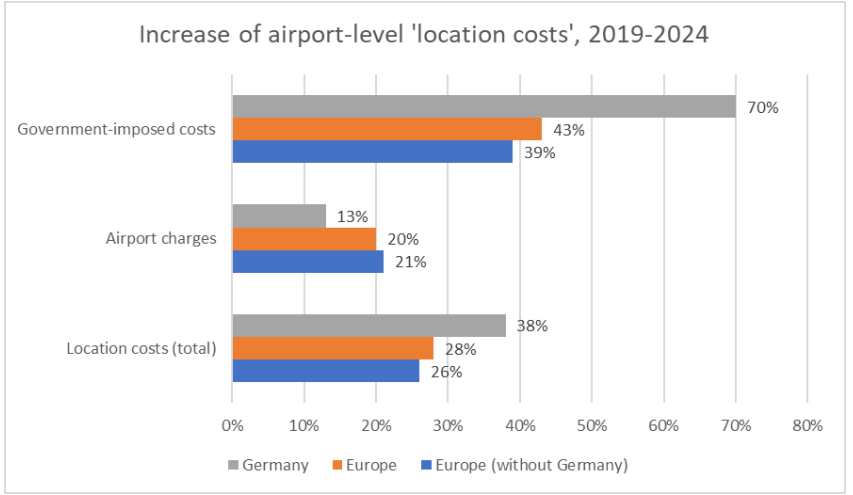
While politically unlikely, the EU could …

- implement a **carbon leakage protection** for indirect non-EEA routings via EEA hubs (Reduction of EU ETS-related cost for intra-EEA feeder flights proportionally by the share of non-EEA transfer passengers on such feeders).
- replace the FF55 measures with a **distance-based aviation tax** (which would only depend on the final destination). However, these would mean less incentive for airlines to reduce total or specific emissions.

Conclusion & Current view

Current issues in Germany (beyond the route-level FF55 impact)

- Low air transport recovery due to…
  - high so-called location costs (driven by the German aviation tax of 15.53 EUR on intra-EEA flights (and more on long hauls)) and by security fees of up to 15 EUR per departing passenger),
  - low GDP increase,
  - and a wide range of additional likely factors (low domestic competition, strong railways, Russo-Ukrainian war, videoconferencing…) (see 2025 DLR study commissioned by the Federal Ministry for Digital and Transport)
- Abolishing the aviation tax could increase the number of passengers flying within Europe from Germany by between 2.55 and 5.09 million.
- Various other measures, including those fostering more competition along the value chain, could also help the sector to recover.



The new German coalition agreement contains some elements to improve the international competitiveness of the German aviation sector.

QUESTIONS?