

Fit-for-55: Emission Trading and Offsetting in EU aviation

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with Inputs from Wolfgang Grimme, DLR

EUROPEAN TRANSPORT MARKET & EUROPEAN TRANSPORT POLICY

Theodor-Heuss-Akademie der Friedrich-Naumann-Stiftung
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Knowledge for Tomorrow



Agenda

- **Introduction**
- Background
 - Negative externalities
 - The Aviation vs. Environment dilemma
 - So what to do?
 - 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 & Potential socio-economic effects
 - Other Fit-for-55 elements: SAF
 - Other Fit-for-55 elements: Jet Fuel Tax
- Conclusion & Outlook



Introduction (1)

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Curriculum Vitae

- Studies at the University of Muenster, Business Administration (Dipl.-Kfm.)
Principal subjects: Transport Economics, Marketing, Controlling
- Researcher, project manager and Vice Director at the **German Aerospace Center** (DLR), Institute of Air Transport (www.dlr.de/lv)
- Skills/Research focus: Aviation Industry Business Models, Environmental Economics, Business aviation, airline and airport competition...



Introduction (2)

German Aerospace Center (“DLR”)

- National aeronautics and space research centre
- 10,000 employees across more than 50 institutes and facilities
- >10 research aircraft (incl. A320)
- Key (research) areas:



DLR-Institute of Air Transport

- Cologne-and Hamburg-based, interdisciplinary team
- Air Transport Development
- Air Transport Economics and Regulation
- Air Transport Management
- Flight Operations Concepts



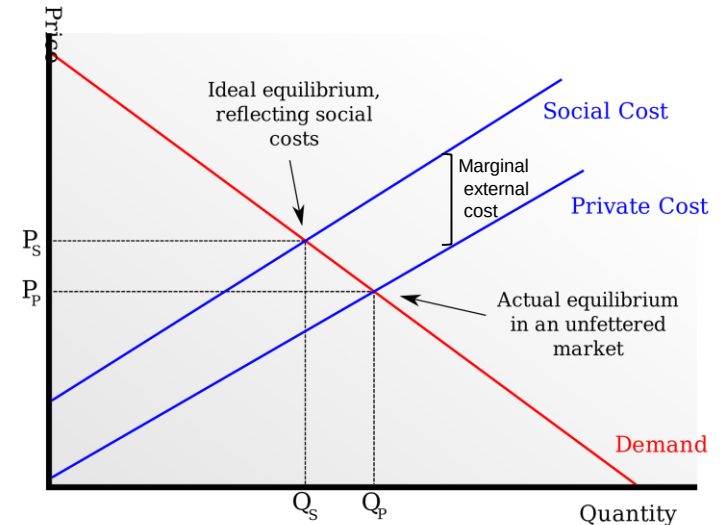
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Negative externalities

- **Negative externality** = **Cost** that is suffered by a **third party** and hence not (fully) mirrored in the cost function of a producer and/or its client/consumer
- Consequence: **Quantity too high**
- Externalities can arise from production and/or consumption, typically:
 - Waste
 - Noise
 - Climate-relevant gases
 - ...
- **Market-based solution**: Measures to internalize external cost
-> lead to lower quantity and lower externalities
- Less efficient or effective measures: **Command-and-Control policies** like standards, appeals or outright bans of activities...
- Externalities can also be positive (**spillover effects**), and they are usually **difficult to quantify**



Source: Bandersnatch, 2011



The Aviation vs. Environment dilemma



Long-term traffic growth
Global connectivity
Safety & Security
Economic growth & Jobs
Trade & Tourism
Disaster relief
Access to remote regions
Flexibility towards demand
Moderate land use / fragmentation
Inexpensive, low-carbon infrastructure

~2% of total and ~12% of transport-related CO₂ emissions globally¹

Non-CO₂ emissions like nitrogen oxides, water vapour, and sulphate and soot particles at high altitudes

Total climate impact 3-5%²

Noise

Slow, step-wise innovation due to high technological path dependencies (hard-to-abate sector)

¹ <https://www.atag.org/facts-figures.html>

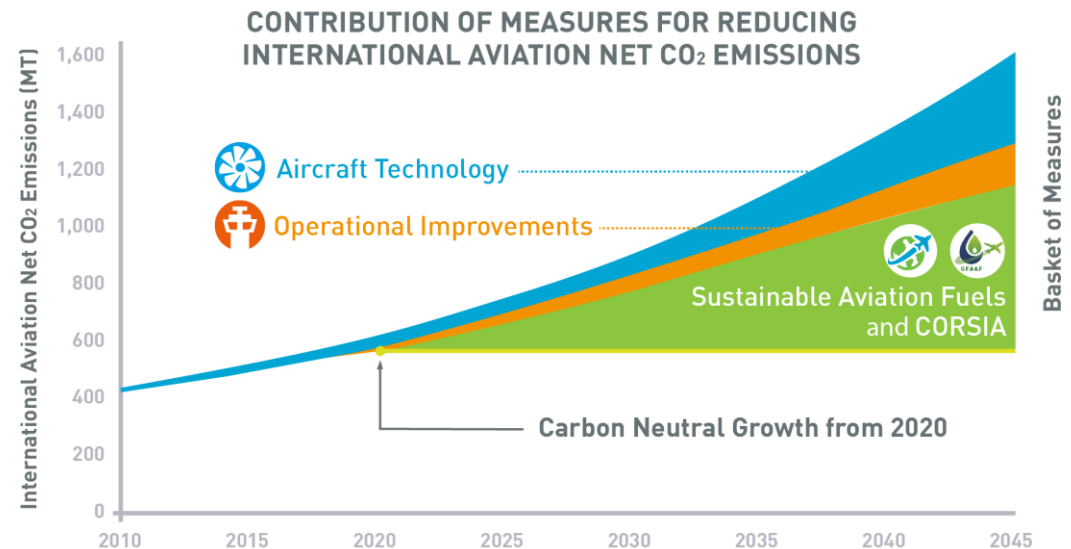
² Lee et al. (2021)

Long-term air traffic **growth** likely to exceed **efficiency increase**.



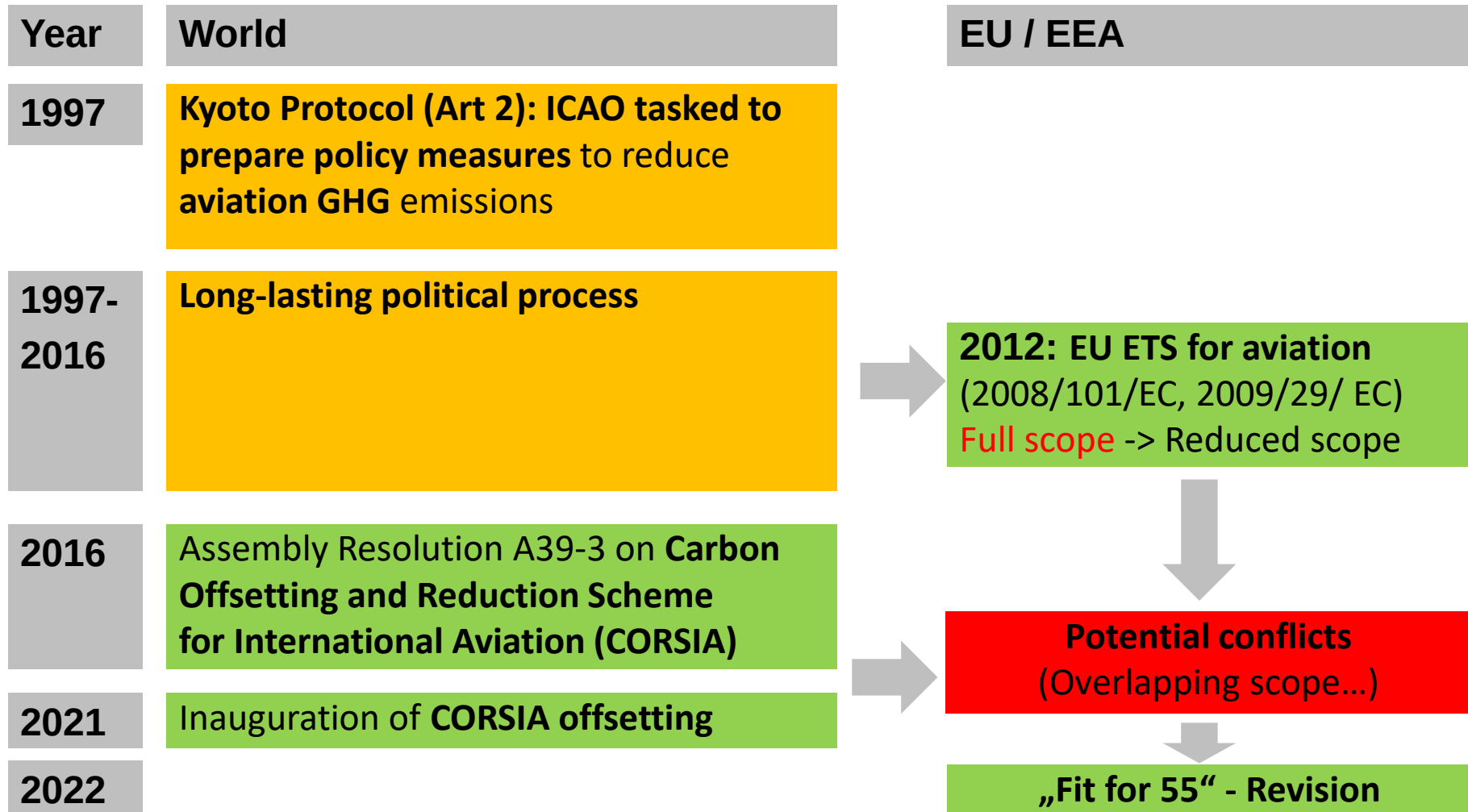
So what to do?

- **Technology and operational measures insufficient** to stabilize emissions
 - Strong weight and range restrictions for electric aircraft
 - Hydrogen requires new airframes and infrastructures
- Remaining solutions to achieve **ICAO's CNG 2020 goal**:
 - **Sustainable fuels (SAF): expensive - have to be scaled up first**
 - **Market-based measures: readily available**
- “Basket of measures”



⁴ <https://www.icao.int/environmental-protection/pages/climate-change.aspx>
ICAO = International Civil Aviation Organization

Genesis of market-based measures

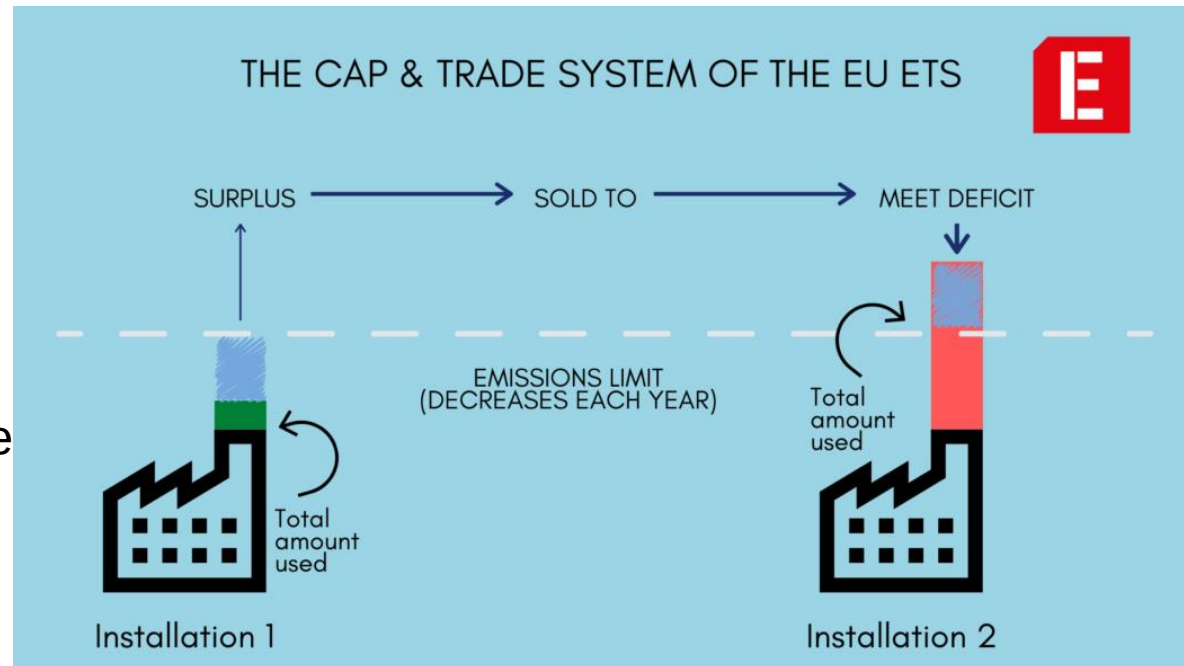


Europe goes ahead – EU ETS

- **Idea: Cap&Trade**

- **Cap:** The total amount of CO₂ is fixed for participating sectors.
- Participants must surrender so-called allowances according to their actual emissions (one allowance = 1 ton of CO₂)
- **Trade:** Firms with low abatement costs will switch to cleaner technologies and sell their unused allowances to firms whose abatement cost exceed the allowance market price. Allowances can also be auctioned directly.

- **Effect:** Reaching a fixed (and politically agreed) **environmental goal** at the **lowest possible cost**



<https://www.investigate-europe.eu/en/2020/eu-emissions-trading-scheme-explained/>

Europe goes ahead – EU ETS

- **EU Emission Trading Scheme (EU ETS) for aviation** in place since 2012
- Complementing **the existing EU ETS for stationary sources**
- **Limitation of CO₂ emissions** from intra-EEA flights to **95% of 2004-2006 avg**
- Option to **purchase additional allowances** from other industries
⇒ **no hard constraint** on aviation growth
- **Free allocation** of 82 % of initial allowances – due to aviation growth the actual level of free allocation is in the order of 30 %
- Strong **carbon price surge** in recent years



Aviation

Not subject to
EU ETS

Subject to
EU ETS*

Compliance at the carrier level

Stationary sources

Other ETS sectors*

Relatively
ambitious
(early base
years = low
cap)

Inclusion of domestic flights

Only Intra-EEA flights

82% + 3%* of
cap = free
allocation
(*special reserve)



***) Energy activity** like mineral oil refineries and coke ovens, **Production and processing of ferrous metals, Mineral industry and pulp, paper and board activities.**

Emission surplus

Allowances to be purchased from other sectors

15% auctioning
3% special reserv

95% of
average
emissions
2004-
2006
(„Cap“)

82% free allocation according to benchmark

*) + EEA-Schweiz

Operations fully outside EU ETS scope

Governmental, Military, Search & Rescue, Firefighting & Humanitarian, VFR
& Circuit, Training, Scientific Research, Aircraft below 5 700 kg MTOM,
Certain PSO routes, Small operators



Late but global approach - CORSIA

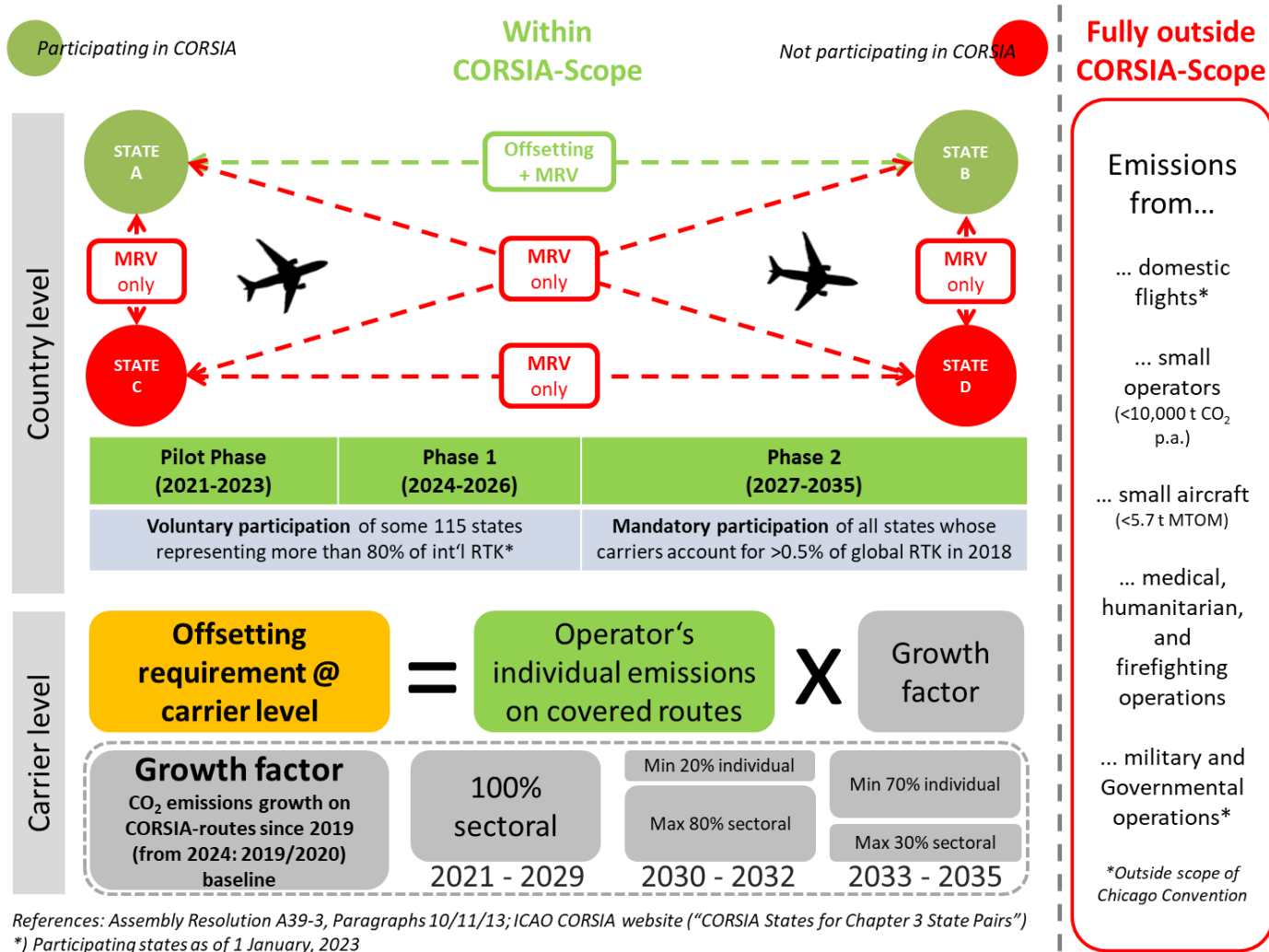
- **Carbon Offsetting and Reduction Scheme for International Aviation**
- **ICAO member state level**
- Agreed on in 2016 (A39-3)
- Airlines required to buy **offsets** to **compensate for emissions exceeding 2019 levels (previously 2019/2020)**, to become relevant from 2024 or so
- **Offsetting projects** shall generate **CO₂ savings** and include afforestation, regenerative agriculture, clean cookstoves, small biogas plants, green energy...
- **Idea:** Reaching an **environmental goal** at the **lowest possible cost** (as firms will invest in the most efficient offsetting projects first)



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



Late but global approach - CORSIA



Fully outside CORSIA-Scope

Emissions from...

... domestic flights*

... small operators (<10,000 t CO₂ p.a.)

... small aircraft (<5.7 t MTOM)

... medical, humanitarian, and firefighting operations

... military and Governmental operations*

*Outside scope of Chicago Convention

Less ambitious (late = high baseline)

Global approach

No inclusion of domestic flights

Baseline emissions „for free“

Offset integrity

CORSIA versus EU ETS

Covid-19: Amendment of baseline - now 2019 only

Scheme		EU ETS	CORSIA
Fundamental similarities and differences	Aim	Reaching a fixed environmental goal efficiently	
	Methodology	Cap&Trade	Offsetting
	Environmental integrity	Not critical because overall cap is fixed	Depending on quality standards of the offsets
	Need for verification	Only at emitter level	Emitter and offsetting project level
Similarities and differences in implementation and application	Cap/Baseline	95% of avg. 2004/2006 emissions; stepwise further reduction of cap envisaged (Linear reduction 2.2% p.a.)	Avg 2019/2020 emissions; no further reduction envisaged
	Scope	Intra-EEA including domestic flights (route-level approach)	Int'l routes between participating states (route-level approach)
	Affected carriers	All airlines operating on affected routes (few exceptions)	

Overlap!

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”

EU: How to strengthen or maintain the EU ETS while implementing CORSIA?



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The Fit-for-55-Package (elements relevant for aviation)

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 have been, or still are, in the **legislative process (trilogue)**.

- Market-based Measures (*trilogue completed Dec 2022*):
 - EU Emission Trading Scheme
 - CORSIA implementation
- Sustainable Fuels: ReFuelEU Aviation
- Energy Taxation: Jet Fuel Tax
- Alternative Fuels Infrastructure: Ground Power



Key Questions:

- Which rules can we expect?
- What are the economic impacts of the proposed measures?
- Can the political objectives be achieved?

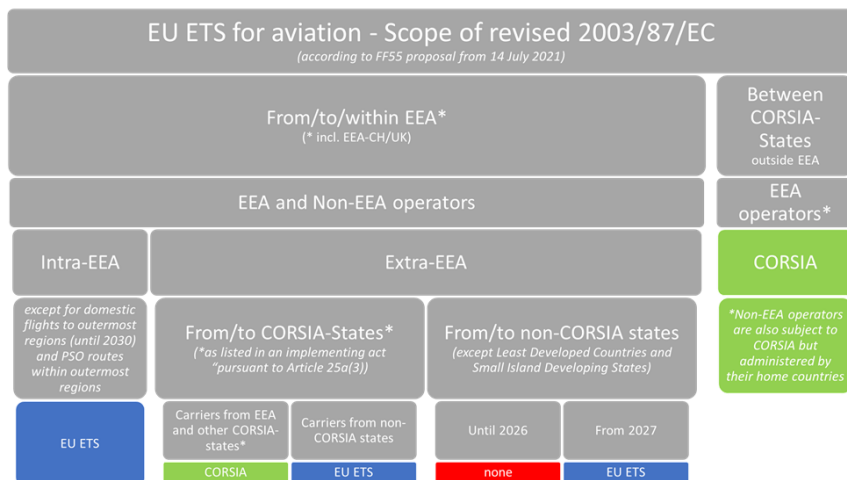


Revision of the EU Emission Trading Scheme

Political objective in the original (draft) Fit-for-55 package

- **Phase-out of free allowance allocation** by 2026
- Introduction of a higher **linear reduction factor** of 4.3 % p.a. (2024-2027) and 4.4 % (from 2028)
- No exception for international flights to outermost regions
- No intra-EEA implementation of CORSIA (no double counting)
- **Implementation of CORSIA** on most extra-EEA flights
- MRV for Non-CO₂ emissions from 2026

[COM\(2021\) 552 final: DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2003/87/EC as regards aviation's contribution to the Union's economy-wide emission reduction target and appropriately implementing a global market-based measure](#)



Revision of the EU Emission Trading Scheme

Potential socio-economic effects (Original Commission proposal)

- **Cost impacts**

- Cost increase: 3 / 6 / 10 EUR per intra-EEA segment pax – assuming future carbon prices of 45 / 83 / 120 EUR
- Fare increase: 2.6% / 5.9 % / 9 % (100% cost pass-through)

- *Competition and employment impacts*

- Intra-EEA and non-stop extra-EEA routes less affected
- Switch to non-EEA holiday destinations?
- Relevant impact on extra-EEA routes via EEA hubs
- Potential loss of 10,000-35,000 out of 633,000 jobs in the EU air service sector (air transport, airport / ANSP, repair and maintenance)

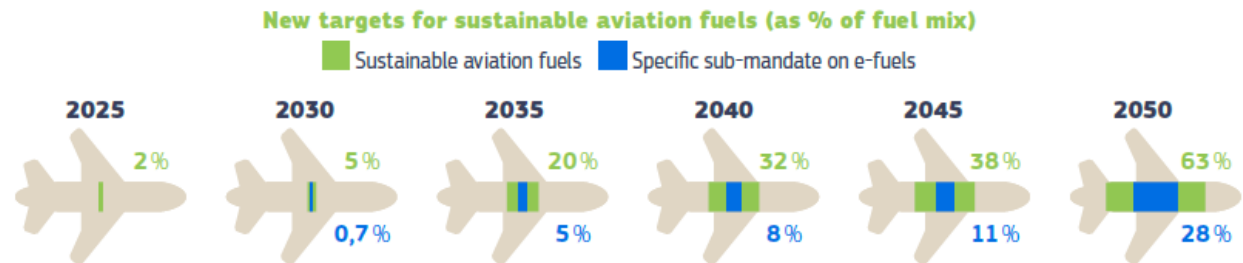


Source: Map generated by the Great Circle Mapper (www.gcmap.com)
copyright © Karl L. Swartz; own adjustments.

Other Fit-for-55 elements: SAF

ReFuelEU Aviation – Sustainable Fuels (SAF)

- Promising way of reducing aviation emissions by 70%-100%.
- SAF can be blended with conventional fuel, allowing for gradual implementation.
- **EU Commission proposal:**
 - Distribution of increasing levels of SAF (incl. e-fuels sub-quota) at EU airports
 - All EU and non-EU Airlines must uplift increasingly SAF-blended fuel before each flight from an EU airport (90 % of yearly average as obligation to refuel locally to prohibit tinkering)



Other Fit-for-55 elements: SAF

ReFuelEU Aviation – Sustainable Fuels (SAF)

- **EU Parliament amendments:** stronger increase to 37% in 2040 and 85% in 2050
- **Trilogue** still ongoing; Council position almost equals Commission proposal

Year	Original European Commission proposal		European Parliament amendments		Council of the European Union amendments	
	Overall SAF target	Synthetic sub-target	Overall SAF target	Synthetic sub-target	Overall SAF target	Synthetic sub-target
2025	2%	–	2%	0.04%	2%	–
2030	5%	0.7%	6%	2%	6%	0.7%
2035	20%	5%	20%	5%	20%	5%
2040	32%	8%	37%	13%	32%	8%
2045	38%	11%	54%	27%	38%	11%
2050	63%	28%	85%	50%	63%	28%

Note: Shaded cells denote where the ambition in the Parliament or Council amendments is the same as the Commission proposal.

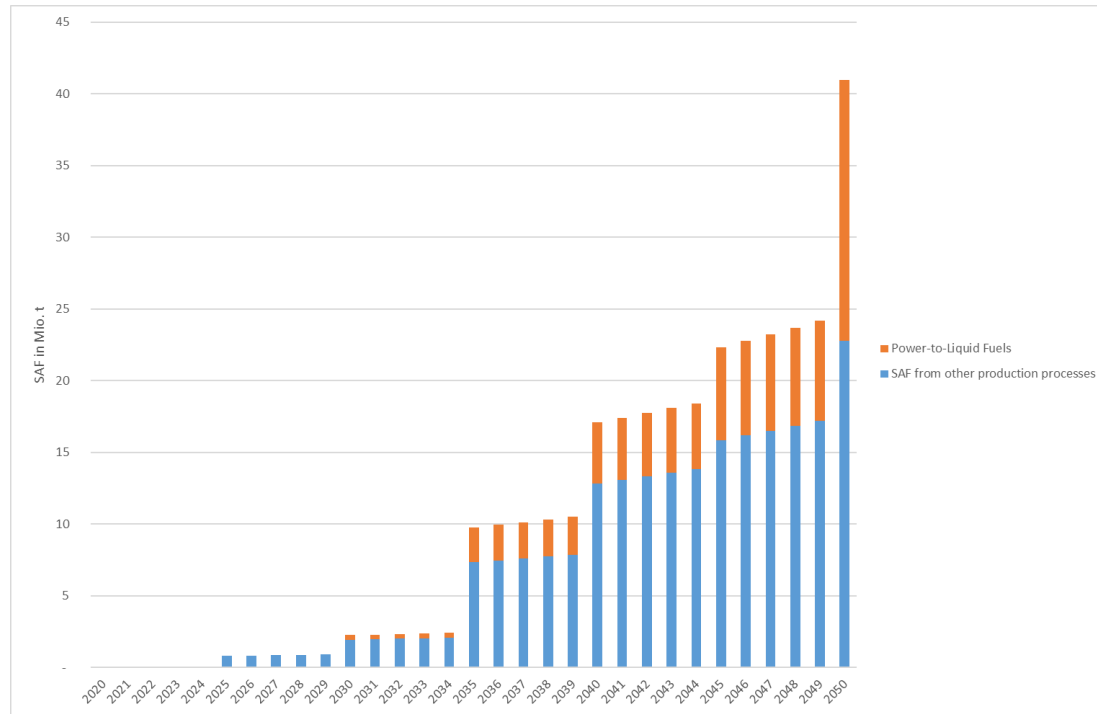


Other Fit-for-55 elements: SAF

Key issues

- Need to build-up SAF capacities of 40 million tons annually until 2050
- Currently, a plan is being drafted to build a plant capable of producing 10,000 t SAF / year in the year 2025 at a cost of about 200 million €
- Massive learning curve effects, economies of scale and investment required

SAF production trajectory according to FF55



Source: DLR



Other Fit-for-55 elements: Jet Fuel Tax

Energy Taxation: Jet Fuel Tax

European Commission proposal:

- Phased introduction of jet fuel tax over 10 years
- Tax to be applied on all fuels to be used on intra-European flights
- Minimum tax level in 2033 of 0.45 € / kg fuel

⇒ this effectively means a doubling of fuel costs from today's level



Conclusion & Outlook

- **Interaction** of the different Fit-for-55 instruments fairly complex
- Airlines fear **competitive disadvantages** in relation to traffic flows of **transfer passengers** with a non-European destination (e.g. shift to hubs outside the EU like Istanbul or Moscow) to avoid (full) energy taxation, ReFuelEU and EU ETS costs
- **Competitive disadvantages** may also arise for **tourist destinations** in the EU, as price sensitive travelers may switch destination (Spain $\Rightarrow$ Turkey)
- EU could implement a **carbon leakage protection** for indirect routings via EEA hubs to non-EEA places (Reduction of ETS-related cost for intra-EEA feeder flights proportionally by the share of non-EEA transfer passengers)
- Stakeholders wish a **channeling back of auctioning revenues to the development of emission reduction measures** in the sector (e.g. SAF)



Backup



Revision of the EU Emission Trading Scheme

		EEA Level					
		Global (ICAO) Level					
		domestic	International intra-EEA	EEA-RoW	International RoW-RoW	Domestic RoW	
Until 2020	Measure	EU ETS			Derogation (Reduced Scope)		
	Exceptions	See Annex 1: Small aircraft, small operators, Governmental/Military/Police etc., Emergency/Medical etc., Training/Scientific/Research/Checking etc., Circuit, VFR					
	GeoScope	Reduced Scope: Intra-EEA incl. domestic EEA since 2020 EEA-CH Some exceptions for PSO+outermost					
2021 - 2023	Measure	EU ETS			Derogation (Reduced Scope)		
	Exceptions	As above					
	GeoScope	Reduced Scope: Intra-EEA incl. domestic EEA, EEA-CH some exceptions for PSO+outermost					
	Measure		Overlap on international intra-EEA routes = Conflict EEA-ICAO	CORSIA			
	Exceptions			Operators with small emission volume of aircraft + ... in the use of aircraft + ... State, Humanitarian and firefighting flights			
	GeoScope			International ... between participating „CORSIA-states“			
From 2024	Measure	EU ETS			CORSIA		
	Exceptions	As above			See above		
	GeoScope	Intra-EEA incl. domestic EEA, EEA-CH/UK EEA-non-CORSIA states (from 2027) some exceptions for PSO + domestic flights to outermost			International flights between participating „CORSIA-states“		

