Fit-for-55: Emission Trading and Offsetting in EU air transport

(Emissionshandel und Offsetting im EU Luftverkehr)

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Agenda

- **Introduction**
- Background
  - Climate goals in aviation
  - Europe goes ahead – EU ETS
  - ICAO takes a global approach – CORSIA
  - Summary and open issues
  - Green deal
- Elements of the Fit-for-55-Package with Relevance for Aviation
  - Green deal
  - Market-based Measure: Revision of the EU Emission Trading Scheme
  - Sustainable Fuels: ReFuelEU Aviation
  - Energy Taxation: Jet Fuel Tax
- Conclusion

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 and project manager at the **German Aerospace Center** (DLR),
  Institute of Air Transport and Airport Research (www.dlr.de/fw)

- 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 of the Federal Republic of Germany

- 10,000 employees across more than 50 institutes and facilities at locations all over Germany; int’l offices in Brussels, Paris, Tokyo and Washington

- >10 research aircraft (incl. A320)

- Key (research) areas:

Aeronautics	**Defence and Security**
Space Research and Technology	**---**
Transport	**Space Administration**
Energy	**Project Management Agency**

Introduction (3)

DLR-Institute of Air Transport and Airport Research

- Research on the short-to long-term development of the air transport sector at different geographic levels (from global to airport level)
- Air transport economics and policies

Management & Policies
- Airline/Airport business models
- Airport economics
- Organisational theory
- Strategic & operative consulting

Descriptive Analyses
- Market analysis and forecasts
- Economic modelling of demand & supply
- Macro- & regional economic impacts, employment effects

Environmental Economics
- Evaluation of instruments
- Impact assessment
- Monetisation of emissions
- Design and quantitative analysis of scenarios

Scenarios
- Market conduct / behaviour
- Efficiency of policies
- Allocation of resources
- Inter- & intramodal competition
- Infrastructure financing

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  - Climate goals in aviation
  - Europe goes ahead – EU ETS
  - Late but global approach – CORSIA
  - EU ETS – CORSIA: Comparison
  - EU ETS – CORSIA: Conflicts
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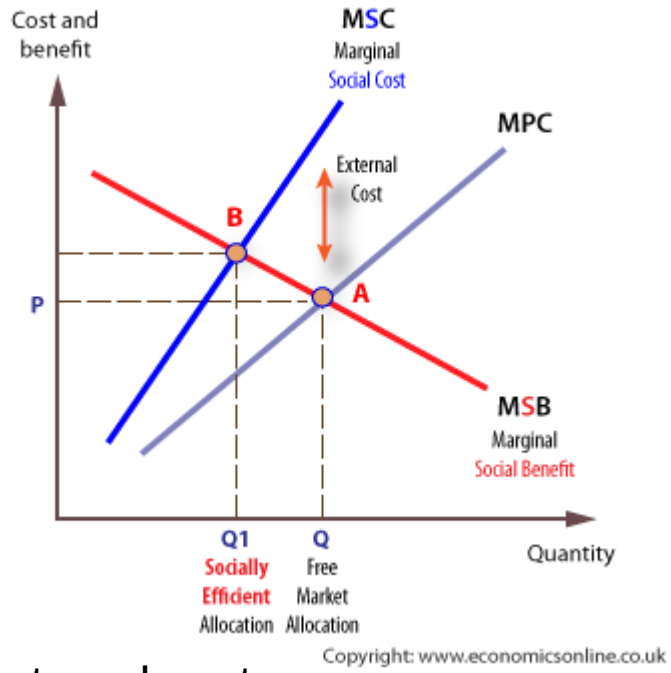
Negative externalities

- **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
  - …

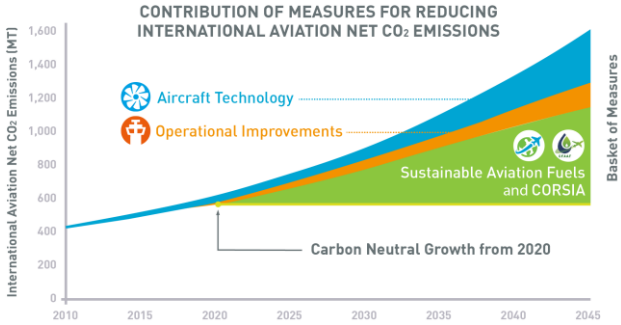


- **Market-based solution**: Measures to internalize external cost
  -> lead to lower quantity and lower externalities
- Less efficient or effective measures: **Command-and-Control policies** like standards, appeals or outright bans of activities…
- Externalities can also be positive (**spillover effects**), and they are usually **difficult to quantify**

Climate goals in aviation

- States committed to **limit global warming** to 1.5°C above pre-industrial levels
- **All sectors** shall contribute to this objective
- **Air transport climate-relevant emissions**
  - ~2% of total and ~12% of transport-related CO_2 emissions globally[1] (~3.8%/~14% in EU in 2017[2])
  - "non-CO_2" emissions like nitrogen oxides, water vapour, and sulphate and soot particles at high altitudes
  - total climate impact ~4.9% in 2005 (Lee et al., 2009)
- Long-term air traffic **growth** likely to exceed **efficiency increase**[3]
- **Technology** and **operational measures** will be **insufficient** to stabilize emissions
- Need for **new fuels** and **market-based measures** to achieve **ICAOs's CNG 2020** goal
- "**Basket of measures**"

International Civil Aviation Organization (ICAO): Carbon Neutral Growth 2020[4]



[1] https://www.atag.org/facts-figures.html
[2] https://ec.europa.eu/clima/eu-action/transport-emissions/reducing-emissions-aviation_en
[3] https://www.icao.int/environmental-protection/Pages/ClimateChange_Trends.aspx
[4] https://www.icao.int/environmental-protection/pages/climate-change.aspx

Climate goals in aviation: Genesis of measures

Year	World	EU
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)
2016	Assembly Resolution A39-3 on **Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)**	
2021	Inauguration of **CORSIA offsetting**	**Potential conflicts** (Overlapping scope…)

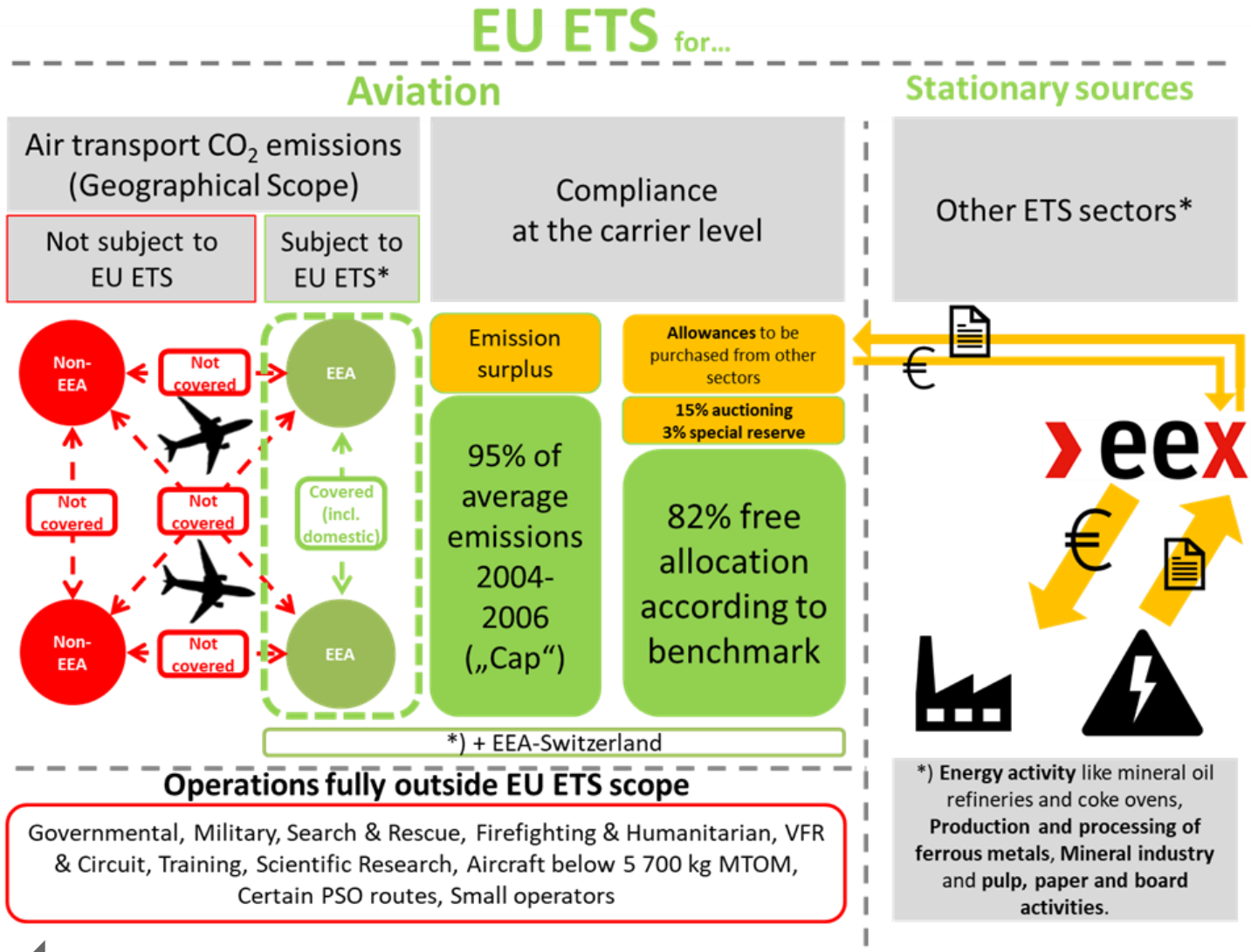
Europe goes ahead – EU ETS

- **EU Emission Trading Scheme** (EU ETS) **for aviation** in place since 2012
- **Limitation of CO_2 emissions** from flights between European airports to **95% of 2004-2006 average**
- **Free allocation** of 82 % of initial allowances – due to aviation growth the actual level of free allocation is in the order of 30 %
- Option to **purchase additional allowances** from other industries
  ⇨ **no hard constraint** on aviation growth
- Strong **carbon price surge** in recent years

Source: Financial Times

- **Idea:** Reaching an **environmental goal** at the **lowest possible cost** (as firms with low marginal abatement costs will switch to cleaner technologies and sell their allowances first)

Europe goes ahead – EU ETS



Relatively ambitious (early base years = low cap)

Inclusion of domestic flights

Limited to EEA-flights

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

Late but global approach - CORSIA

- **Carbon Offsetting and Reduction Scheme for International Aviation**
- **ICAO state level**
- Agreed on in 2016 (A39-3)
- Airlines required to buy **offsets** to **compensate for emissions exceeding 2019/2020 levels**
- **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

Participating in CORSIA

Within CORSIA-Scope

Not participating in CORSIA

Fully outside CORSIA-Scope

Country level

STATE A — Offsetting + MRV — STATE B

MRV only — MRV only — MRV only

STATE C — MRV only — STATE D

Pilot Phase (2021-2023)	Phase 1 (2024-2026)	Phase 2 (2027-2035)
Voluntary participation of some 88 states representing almost 77% of int'l RTK*		**Mandatory participation** of all states whose carriers account for >0.5% of global RTK in 2018

Carrier level

Offsetting requirement @ carrier level = Operator's individual emissions on covered routes X Growth factor

Growth factor
CO_2 emissions growth on CORSIA-routes since 2019 (from 2024: 2019/2020) baseline

2021 - 2029	2030 - 2032	2033 - 2035
100% sectoral	Min 20% individual Max 80% sectoral	Min 70% individual Max 30% sectoral

Emissions from...

... domestic flights*

... small operators (<10,000 t CO_2 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

References: Assembly Resolution A39-3, Paragraphs 10/11/13; ICAO CORSIA website ("CORSIA States for Chapter 3 State Pairs")
**) Participating states as of 6 May, 2019*

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CORSIA versus EU ETS - Comparison

Covid-19: Amendment of baseline - now 2019 only

Scheme		EU ETS	CORSIA
Fundamental similarities and differences	Aim	Reaching a fixed envirnmental 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 implemen-tation and application	Cap/Baseline	95% of avg. 2004/2006 emissions; stepwise further reduction of cap envisaged	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)	

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"

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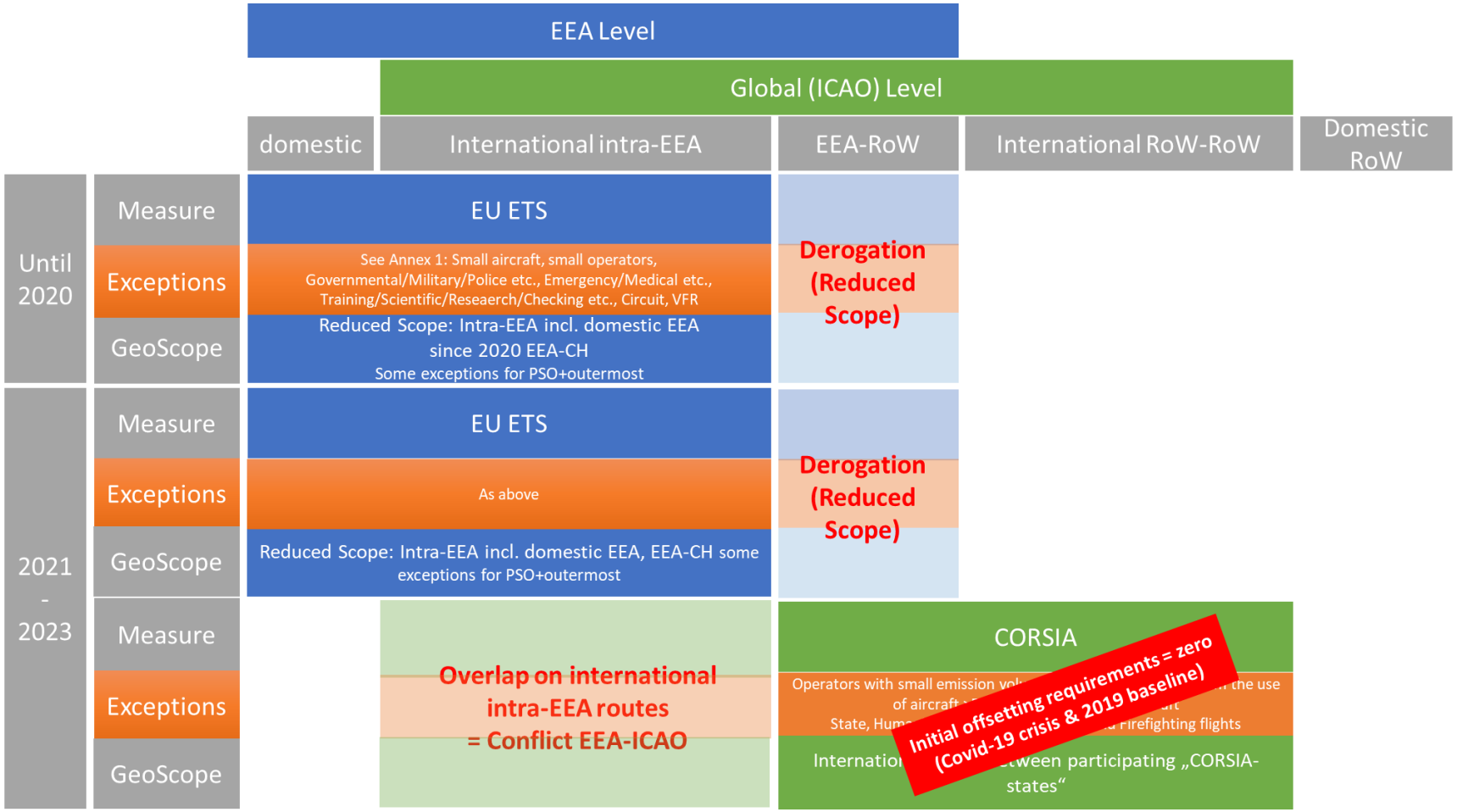
CORSIA versus EU ETS - Conflicts



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

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Green deal

- After the May 2019 European Parliament elections, the new Commission came up with a plan for the transformation of the economy, entitled “**European Green Deal**”
- Emission **reduction by 55%** until 2030 compared to 1990
- Further objectives: “create **jobs** and **growth**”, “reduce energy **poverty**”

⇨Concrete instruments to be implemented in order to fulfil this objective

⇨All instruments described in the following are proposals of the European Commission, subject to the actual outcomes of the **ongoing legislative process** at European Parliament and Member States levels

European Commission

Source: Wikimedia Commons

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

The European Commission proposed in July 2021 **various instruments** with **relevance to aviation**

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

Key Questions:

- How do the exact rules look like?
- What are the economic impacts of the proposed measures?
- Can the political objectives be achieved?
- What will be accepted / changed by Member States?

Revision of the EU Emission Trading Scheme

Political objective in the Fit-for-55 package

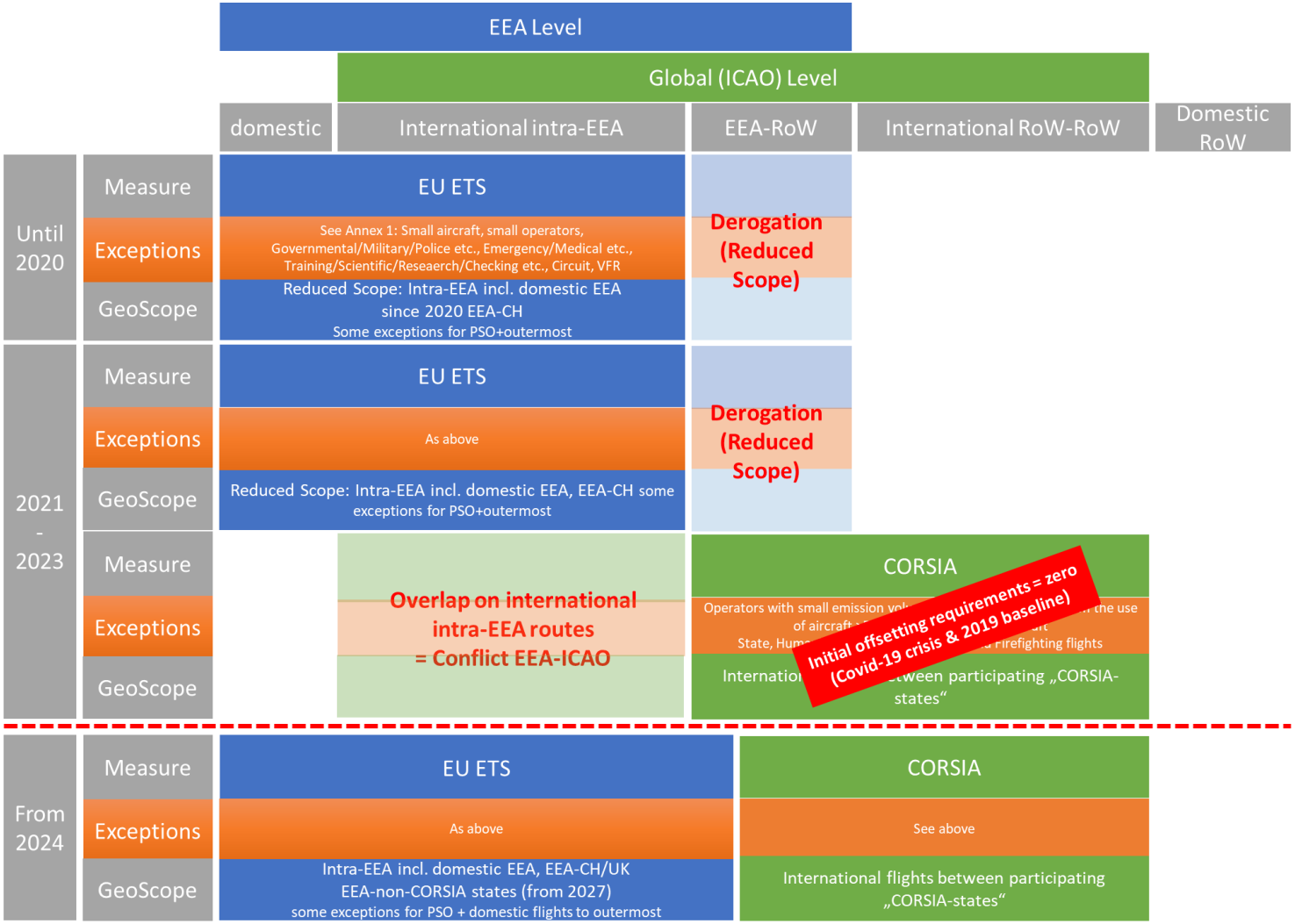
- **Phase-out of free allowance allocation** by 2027
- Introduction of a higher, long-term **linear reduction factor** of 4.2 % per year
- No implementation of CORSIA on intra-European flights (no double counting)
- **Implementation of CORSIA** on most extra-EEA flights
  - EEA: European Economic Area

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

Expected impact

- Substantial **increase in allowance prices** (from today ~50 € to more than 100 € per t of CO_2)
- **Increase of cash operating costs** for airlines ⇨ increase in **ticket prices** and **competitive implications**

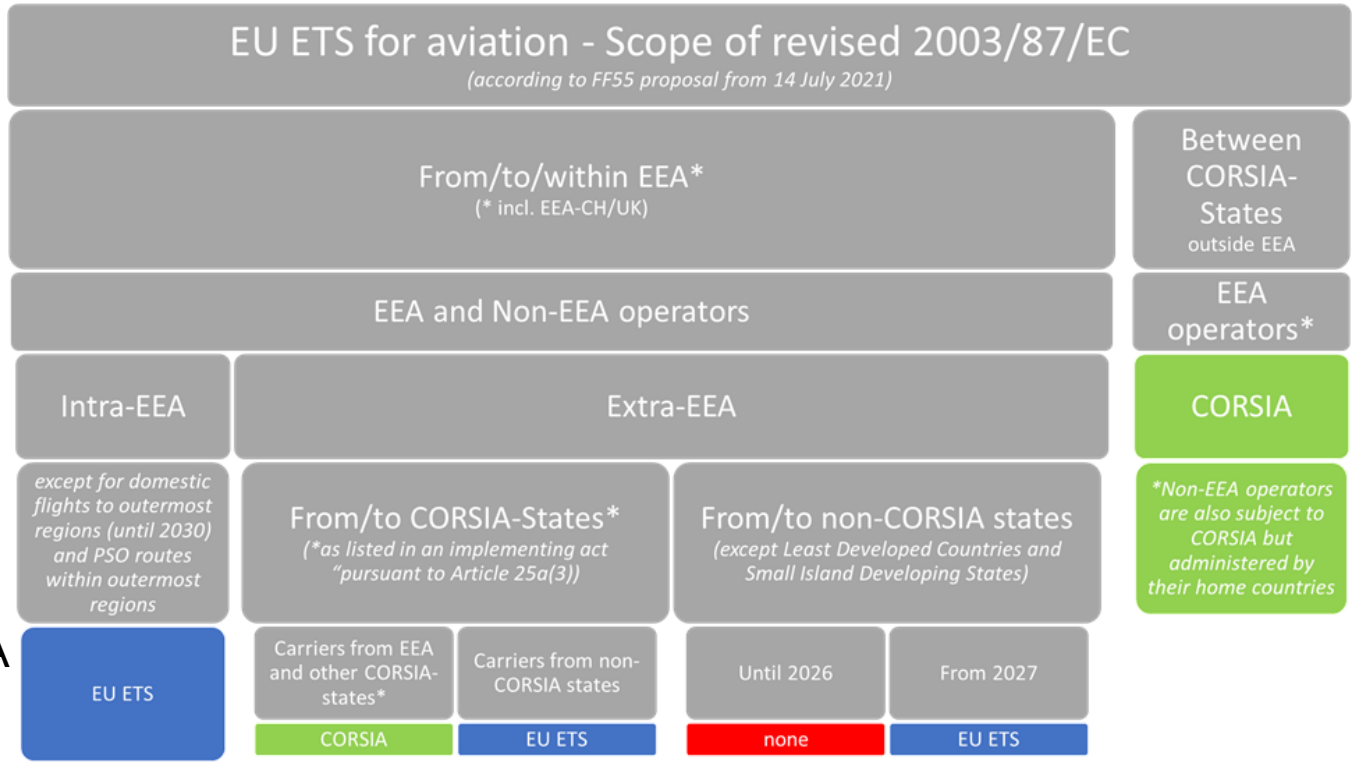
Revision of the EU Emission Trading Scheme



Revision of the EU Emission Trading Scheme

Detailed route analysis & open questions

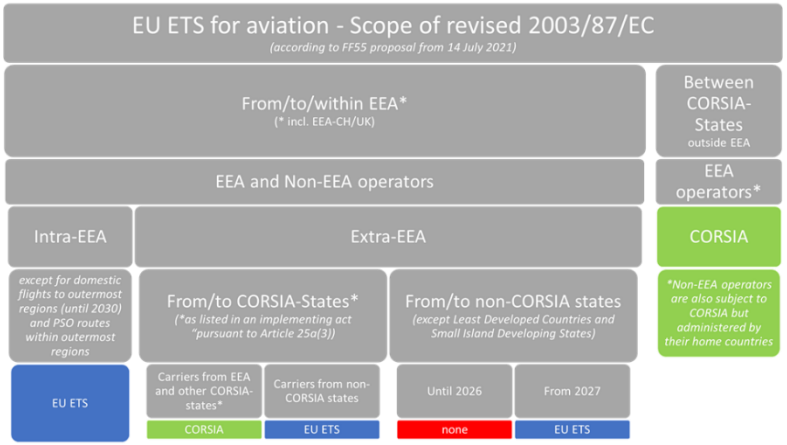
- Intra-EEA
- Extra-EEA to CORSIA-states
- Extra-EEA to non-CORSIA states
- Between CORSIA states (non-EEA)



- Only domestic PSO (Public service obligations) routes exempt

Revision of the EU Emission Trading Scheme

Detailed route analysis: Potential areas of conflict

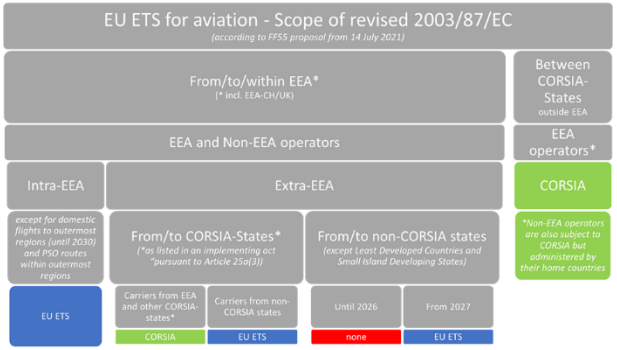


- **Intra-EEA: EU ETS obligation**
  - Double-counting for extra-EEA carriers which are formally subject to CORSIA in their home countries?

- **Extra-EEA routes to CORSIA-states**
  - Application of CORSIA
  - Art. 25a(4) only exempts carriers from CORSIA countries from requirements to cancel units towards the EU: Operators from non-EEA countries not implementing CORSIA have to surrender allowances for CORSIA-routes!
  - E.g. Russian cargo airline flying 5th freedom EU-USA
  - Risk of double-counting as ICAO requirements to cancel offsets according to the route-based approach would formally remain

Revision of the EU Emission Trading Scheme

Detailed route analysis: Potential areas of conflict



- **Extra-EEA routes to non-CORSIA states**
  - No regulation until 2026 only (Article 25a, Paragraph 5)
  - Re-introduction of EU-ETS from 2027!
  - Does this apply to states failing to implement CORSIA, or will the EU ETS also be introduced (from 2027) on routes to countries formally exempt from CORSIA?
  - The latter would affect many countries representing less than 0.5% of international RTK which have not (yet) volunteered to participate, such as Egypt, Morocco…

- **Rotorcraft not exempt in EU proposal**

Revision of the EU Emission Trading Scheme

Potential socio-economic effects

- 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.

Revision of the EU Emission Trading Scheme

Action items at EU level

- Formally **no need to fundamentally amend EC proposal** COM(2021) 552 final, except for clarification on exact ETS and offsetting exemptions (e.g. for post-2026 flights to states exempt from CORSIA), on rotorcraft services and on exemptions for SAF fuels

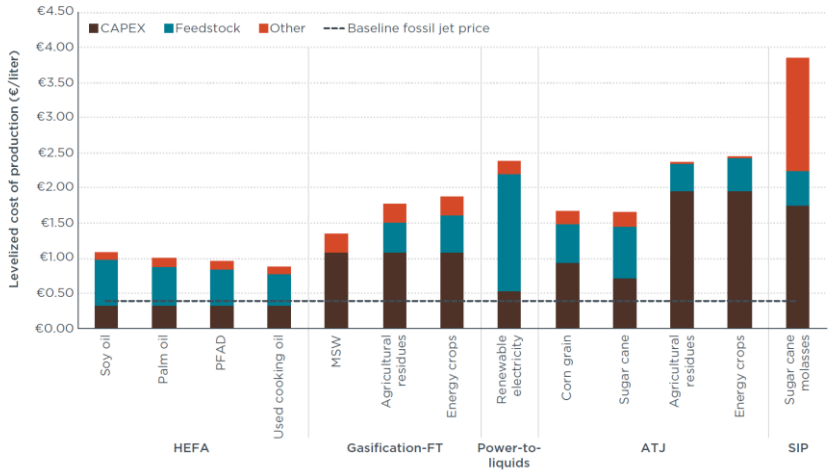
- **Carbon leakage protection** for indirect routings via EEA hubs to non-EEA places (Reduction of ETS-related cost for intra-EEA feeder flights proportionally by the share of non-EEA transfer passengers)

- Stakeholders wish a dedicated **channeling back of auctioning revenues to the development of emission reduction measures** in the sector (e.g. SAF)

ReFuelEU Aviation – Sustainable Fuels

- Sustainable Aviation Fuels (SAF) are considered to be a promising way of reducing aviation emissions
- Various production processes / feedstocks certified, under optimal conditions 70-100 % reduction in life-cycle emissions compared to fossil fuels
- Fuels can be blended with conventional fuel ⇨ allowing for gradual implementation
- Key issues: cost (2x-8x the cost of conventional fuel) & industrial scale production

Source: DLR

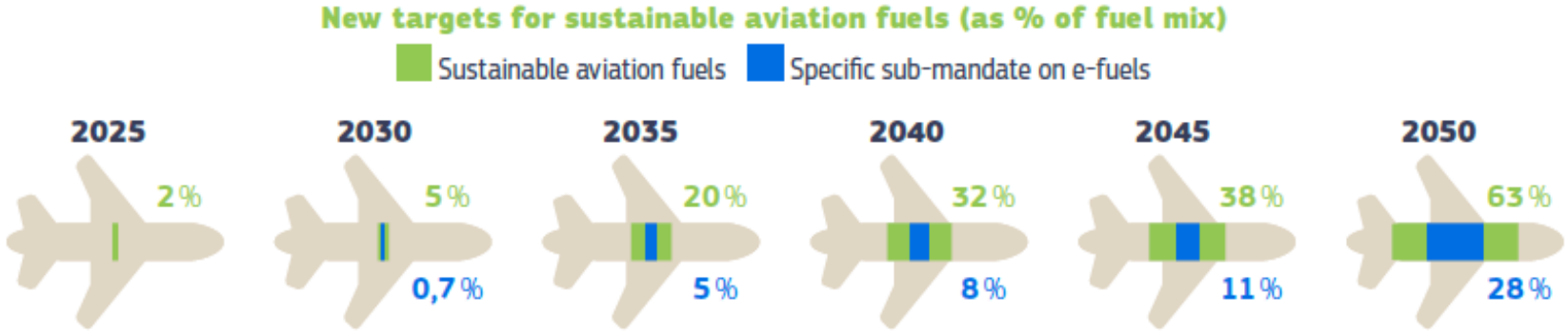


Source: ICCT

ReFuelEU Aviation – Sustainable Fuels

Proposal of the European Commission:

- Obligation on fuel suppliers to distribute increasing levels of SAF at all EU airports
- Obligation on airlines to uplift SAF-blended fuel before each flight from an EU airport / 90 % of yearly average as obligation to refuel locally ⇨ attempt to prohibit tankering / exploitation of fuel price differences by airlines at different airports
- All airlines to be obliged to use SAF, even on flights to non-European



Source: European Union

ReFuelEU Aviation – Sustainable Fuels

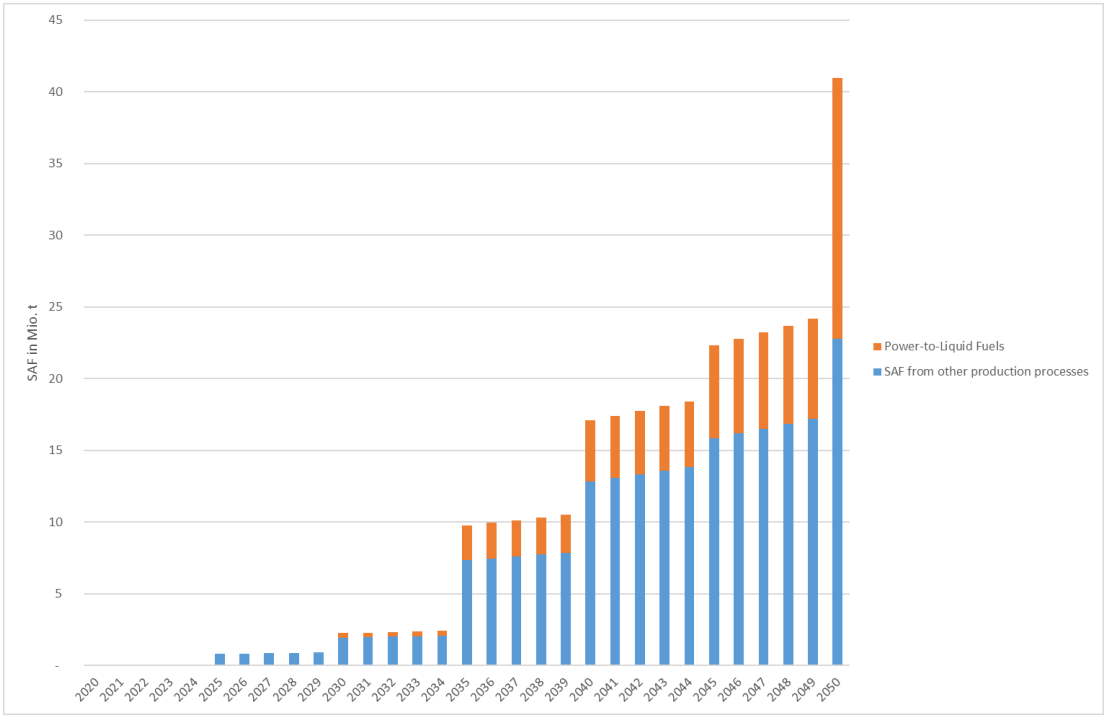
Potential issues:

- Reporting requirements: fuel uplift vs. fuel required ⇨ potentially difficult calculation / treatment of remaining reserve fuel from previous flight segment
- Refueling before each flight is not actually done today ⇨ tankering saves ground handling time, particularly for low cost carriers
- Refueling at each airport / before each flight creates a local monopoly ⇨ today, if fuel is too expensive at one airport, airlines use tankering (uplifting more fuel at another airport than actually required for the next flight segment) / with the proposal local monopolies are created
- Legal issue / potential retaliation by third countries: If EU mandates refueling of 90 % of fuel required at local airports, other countries (for whatever reason) may do the same

ReFuelEU Aviation – Sustainable Fuels

- The proposal will require a build-up of production capacities for SAF in the order of 40 million tons annually until 2050 (18 million tons PtL fuels and 22 million tons other SAF production processes)
- 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

Energy Taxation: Jet Fuel Tax

- Aviation fuel for use on commercial / international flights is regularly not taxed
- In contrast, taxation for other uses / fuels is a substantial source of revenue for the public budget
- 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

- Arguments in favour of taxation of aviation fuel:
  - Reducing demand / emissions
  - Revenue generation for the public budget
  - Fair competition with other modes, which have pay energy taxes

- Arguments against taxation of aviation fuel:
  - Fair competition – aviation infrastructure is mainly user-financed, while other modes receive huge subsidies (high speed railway network)
  - Airlines are stripped of cash that could be invested in fuel efficient aircraft

Conclusion

- The Fit-for-55 package contains a set of various instruments; some details not yet clear
- Interaction of the different instruments fairly complex
- Airlines and aviation lobby groups fear competitive disadvantages in relation to traffic flows of transfer passengers with a non-European destination (shift e.g. to hubs outside the EU like Istanbul or Moscow) to avoid energy taxation and EU ETS costs
- Competitive disadvantages may also arise for tourist destinations (sun & beach) in the EU, as price sensitive travelers may switch destination (Spain ⇨ Turkey)
- Still, a lot of revisions are to be expected – for instance, energy tax directive requires unanimous decision by all 27 EU Member States
- Huge scope for economic modelling and research!