



Universiteit
Leiden

The Netherlands

Enter the CORSIA first phase: aeroplane operators embark on offsetting their emissions for the first time, development trajectory, and what lies ahead for the scheme

Pratama, G.G.

Citation

Pratama, G. G. (2024). Enter the CORSIA first phase: aeroplane operators embark on offsetting their emissions for the first time, development trajectory, and what lies ahead for the scheme. *Chinese Journal Of Environmental Law*, 8(2), 271-283.
doi:10.1163/24686042-12340126

Version: Publisher's Version

License: [Creative Commons CC BY 4.0 license](https://creativecommons.org/licenses/by/4.0/)

Downloaded from: <https://hdl.handle.net/1887/4196492>

Note: To cite this publication please use the final published version (if applicable).



Enter the CORSIA First Phase

Aeroplane Operators Embark on Offsetting Their Emissions for the First Time, Development Trajectory, and What Lies Ahead for the Scheme

Garry Gumelar PRATAMA | ORCID: 0000-0002-1888-4655

International Institute of Air and Space Law, Leiden University, Leiden,
The Netherlands; Faculty of Law, Universitas Padjadjaran, Bandung,
Indonesia
g.g.pratama@law.leidenuniv.nl

Received 22 May 2024 | Received 27 August 2024 |

Published online 22 October 2024

Abstract

The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) entered its First Phase on 1 January 2024. Aircraft operators are required to offset their emissions for the first time in this Phase to mitigate their climate impact. This note chronologises its major developmental trajectory leading up to this Phase. Furthermore, developments of climate initiatives at the regional level are related to CORSIA. It is noteworthy to see CORSIA from a European Union (EU) perspective because of the recent amendment to the EU Emissions Trading System (EU ETS). The European Commission has set a ‘deadline’ to review the effectiveness of CORSIA and made efforts to establish the EU ‘world premiere’ in the monitoring, reporting, and verification (MRV) of aviation non-CO₂ emissions. This indicates a broader scope of the EU ETS than that of CORSIA. With the deadline and regional developments, CORSIA is approaching a juncture for the potential design changes from its sole focus on CO₂ emissions to include non-CO₂ emissions.

Keywords

CORSIA – EU ETS – carbon offsetting – climate change – international aviation – emissions

1 Introduction

Entering the enforcement of the First Phase, CORSIA requires aeroplane operators to offset their emissions from the 2021–2023 compliance period.¹ The ‘final offsetting requirements’ for the period will be calculated this year, and on 31 January 2025,² each aeroplane operator will be obliged to offset its emissions by purchasing CORSIA Eligible Emissions Units.³ It is expected that by buying these units, the international aviation sector will achieve its carbon neutral growth (CNG).⁴ Prior to this first substantive phase aimed at offsetting emissions, CORSIA has undergone significant development trajectories. These include the completion of its emissions baseline calculation and the conclusion of its Pilot Phase. Changes have been made to the design of CORSIA, and it is plausible that further modifications or new Standards may be established in the future, particularly in response to developments in regional environmental regulations and policy and new scientific research on non-CO₂ emissions.

This note on recent developments is structured to provide, firstly, insight into the trajectory of environmental protection measures within the International Civil Aviation Organization (ICAO). It begins by detailing the inception and evolution of ICAO’s Standards and Recommended Practices (SARPs) for environmental protection adopted before CORSIA, charting their progression from addressing localised emissions at airports to a broader scope of global CO₂ emissions. Subsequently, the impact of the Coronavirus Disease 2019 (COVID-19) pandemic is discussed, highlighting the adjustments made within the CORSIA design in response to the challenges faced by the aviation industry in 2020. Reflecting on past changes supports comprehending further developments in the EU in relation to CORSIA. Secondly, as emissions reduction is also a rather crucial element of regional and domestic⁵ environmental policies, the regional trends in the EU are described. With its EU ETS, the EU is considered an example of global environmental leadership accelerating the adoption of

1 ICAO, *Annex 16 to the Convention on International Civil Aviation: Environmental Protection*, Volume IV (2nd edn, 2023) App.1 s. 2.3.

2 or 60 Days after the State informs aeroplane operators of their total final offsetting requirements 2021–2023, whichever date comes first. *ibid* App.1 s. 2.3.

3 See *ibid* pt. II ch. 4 s. 4.2.

4 The goal of achieving the global net carbon emissions from 2020 at the same level was affirmed by the 37th Session of the ICAO Assembly. See ICAO Assembly Resolution A37-19 (2010) para 6.

5 Benjamyn I SCOTT and Andrea TRIMARCHI, *Fundamentals of International Aviation Law and Policy* (1st edn, Routledge 2019) 258.

CORSIA.⁶ This structure aims to offer a nuanced understanding of the evolving landscape of CORSIA.

2 Past Development of ICAO SARPs on Environmental Protection: from Local Air Quality to Global CO₂ Emissions

2.1 *Noise from Aircraft Engines and Emissions Affecting Local Air Quality*

The ICAO Council has adopted 19 Annexes to the Chicago Convention, each covering a different area of aviation. Annex 16 deals with environmental protection and contains both Standards and Recommended Practices, known together as SARPs.⁷ The first volume of Annex 16 adopted in 1971 addresses noise from aircraft engines. At the time of the Standard-making process, supersonic engines and airport expansion closer to residential areas began to be seen as bringing health threats⁸ to the people living near the airport. This Volume sets noise certification criteria and procedures for aircraft engines so the level of noise they emit can be mitigated. The certification is overseen and granted by the State Registry of the aircraft based on satisfactory evidence to the Standards under the Annex.⁹

The ICAO Council then adopted Annex 16 Volume II as the next Volume to mitigate aircraft engine emissions. ICAO's role in regulating engine emissions is linked historically to the context of the United Nations Conference on Human Environment (UNCHE) in 1972.¹⁰ The conference was the first UN-led world conference to address environmental issues. It generated twenty-six principles

6 See Steven TRUXAL, *Economic and Environmental Regulation of International Aviation: From Inter-National to Global Governance* (Routledge 2017) 79.

7 See Convention on International Civil Aviation (adopted 07 December 1944, entered into force 4 April 1947) 15 UNTS 295 (Chicago Convention) art 54(1). It stipulates that ICAO Council is mandated, 'for convenience', to designate SARPs as Annexes to the Convention. Further explanation of the differences between Standards and Recommended Practices, including their designation as Annexes to the Chicago Convention, see SCOTT and TRIMARCHI (n 5) 71–81.

8 The research examining the health threats posed by airport developments was conducted by the European Environment Agency. See European Environment Agency, *Report on Environmental Noise in Europe 2020*, 6.

9 ICAO, *Annex 16 to the Convention on International Civil Aviation: Environmental Protection*, Volume I (8th edn, 2017) pt. II ch. 1 s. 1.2.

10 UN, 'Report of the United Nations Conference on the Human Environment' (1972) UN Doc A/CONF.48/14/Rev.1.

under the Stockholm Declaration,¹¹ an action plan,¹² and the creation of the United Nations Environment Programme (UNEP)¹³ for harmonising industrial and technological development while preserving the human environment. As a position in UNCHE, ICAO and its Member States admit their responsibility 'to achieve maximum compatibility between the safe and orderly development of civil aviation and the quality of the human environment.'¹⁴

Annex 16 Volume II provides certification standards for smoke, unburned hydrocarbon (HC), carbon monoxide (CO), and oxides of nitrogen (NO_x).¹⁵ Besides setting the standards for emissions levels, the Annex also contains SARPs on vented fuel¹⁶ and non-volatile particulate matter (nVPM).¹⁷ SARPs in the Annex apply to emissions certification for engines fitted to aircraft engaged in international flights.¹⁸ With the certification, greener generations of aircraft engines have been developed and put into operation,¹⁹ improving local air quality in the vicinity of airports.

2.2 *Expanding the Scope of Global Emissions Related to Climate Change*

An assessment of aviation's impact on climate change was introduced in a special report in 1999 by the Intergovernmental Panel on Climate Change (IPCC) and the Scientific Assessment Panel to the Montreal Protocol on 'substances that deplete the ozone layer.' The special report was prepared based on ICAO's request and became the first IPCC report to consider a particular industrial subsector. Among others, this report recognises that the adverse effects of CO₂ emissions on the atmosphere are well understood.²⁰

11 *ibid*, pt. I ch. I.

12 *ibid*, pt. I ch. II.

13 UN General Assembly, 'Institutional and financial arrangements for international environmental cooperation' (15 December 1972) UN Doc A/Res/27/2997.

14 ICAO Assembly Resolution A18-II (1971).

15 ICAO, *Annex 16 to the Convention on International Civil Aviation: Environmental Protection*, Volume II (5th edn, 2023) pt. II ch. 2 s. 2.1.2.

16 Defined as 'discharge into the atmosphere of liquid fuel from the fuel nozzle manifolds resulting from the process of engine shutdown following normal flight or ground operations,' see *ibid*, pt. II ch. 2.

17 Defined as 'Emitted particles that exist at a gas turbine engine exhaust nozzle exit plane that do not volatilize when heated to a temperature of 350 °C.' *ibid*, p. I ch. 1.

18 *ibid*, pt. III ch. 1-4.

19 Mauro MASIOL and Roy HARRISON, 'Aircraft Engine Exhaust Emissions and Other Airport-Related Contributions to Ambient Air Pollution: A Review' (2014) 95 *Atmospheric Environment* 409, 410.

20 Joyce PENNER and others (eds), *Summary for Policymakers: Aviation and the Global Atmosphere, Prepared in Collaboration with the Scientific Assessment Panel to the Montreal Protocol on Substances that Deplete the Ozone Layer* (CUP 1999) (IPCC Report) 12.

Departing from these findings, the ICAO Assembly decided to develop CO₂ Standards.²¹ It was one of the recommended elements within the 'ICAO Programme of Action on International Aviation and Climate Change.'²² The 37th Session of the ICAO Assembly in 2010 adopted resolutions requesting the ICAO Council to develop a global CO₂ Standard.²³ Then, the Committee on Aviation Environmental Protection (CAEP) prepared the draft of SARPs, and after amendment following the usual consultation, the ICAO Council adopted SARPs that regulates the engine certification Standards for CO₂ and designated them as Volume III of Annex 16 to the Chicago Convention.

The constant growth of the aviation industry makes it difficult to rely on emissions certification standards alone to achieve CO₂ neutrality of this sector. Subsequently, the ICAO Council adopted Annex 16 Volume IV on CORSIA, a Market-Based Measure (MBM), to further manifest the target of CNG.²⁴

2.3 *CORSIA as an International Aviation Emissions Mitigation Scheme 'Outside' yet Related to UNFCCC*

Climate change has been linked to emissions at the national level since the mid-1980s, far before CORSIA was adopted.²⁵ The problem was discussed during the Rio Earth Summit,²⁶ where the United Nations Framework Convention on Climate Change (UNFCCC) was signed to stabilise greenhouse gas concentrations in the atmosphere to prevent climate change.²⁷ Later, in 1997, the Kyoto Protocol was adopted under the Conference of the Parties (COP) to implement and further elaborate policies and measures for addressing climate change at the national level.²⁸ The Paris Agreement 2015 sets a new target, which is 'holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature

21 ICAO, *Annex 16 to the Convention on International Civil Aviation: Environmental Protection*, Volume III (1st edn, 2017) 'Historical background'.

22 See *ibid.*

23 ICAO Assembly Resolution A37-19 (2010) para. 24 e).

24 ICAO Assembly Resolution A39-3 (2016) para. 5.

25 Steven TRUXAL, 'The ICAO Assembly Resolutions on International Aviation and Climate Change: An Historic Agreement, a Breakthrough Deal and the Cancun Effect' (2011) 36 *Air & space law* 217, 217.

26 UN, 'Report of the United Nations Conference on Environmental Development' (1992) UN Doc A/CONF.151/26/Rev.1.

27 United Nations Framework Convention on Climate Change (adopted 9 May 1992, entered into force 21 March 1994) 1771 UNTS 107 (UNFCCC) art 2.

28 Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted 11 December 1997, entered into force 16 February 2005) 2303 UNTS 162 (Kyoto Protocol) art 2(1)(a).

increase to 1.5 °C above pre-industrial levels, recognising that this would significantly reduce the risks and impacts of climate change.²⁹

The UNFCCC and the Paris Agreement do not explicitly include international aviation in its target or scope. Instead, Article 2(2) of the Kyoto Protocol refers to Annex I Parties, consisting of Developed Countries and Countries undergoing the transition to a market economy,³⁰ to discuss emissions from international aviation through ICAO,³¹ while excluding Chlorofluorocarbons (CFCs) and Halons, which have already been covered under the Montreal Protocol 1987.³² The Kyoto Protocol's provision wording uses 'emissions' rather than 'international aviation emissions.' Even so, given that the ICAO's mandate, as defined by its constituting treaty, is limited to international aviation,³³ its role is confined to serving as a forum dedicated to pursuing the limitation and reduction of greenhouse gases from international flights.

2.4 *CORSIA Adoption and COVID-19 Adjustment*

CORSIA is not a new development in mitigating international aviation emissions, as the SARPs on this scheme were adopted by the ICAO Council in 2018. Starting in 2024, it enters in the 'Compliance Period 2' of CORSIA. During this period, the emissions calculated by participating States in the previous period, the 'Compliance Period 1' of 2021–2023, will be offset using emissions unit cancellation.³⁴ No offsetting was required in Period 1 but only MRV. The verified emissions at the end of Period 1 will be offset in Period 2. In terms of participation, Compliance Period 2 goes on together with CORSIA's 'First Phase' of implementation.³⁵ States are voluntarily participating in the First Phase before moving to mandatory participation in the Second Phase from 2027–2035.³⁶

During these phases, aeroplane operators covered by the scheme must reconcile their offsetting requirements every three years. The triennial cycle is referred to as the 'Compliance Period.' Therefore, in its emissions offsetting calculation, CORSIA has five compliance periods, with the years from 2021 to

29 Paris Agreement to the United Nations Framework Convention on Climate Change (adopted 12 December 2015, entered into force 4 November 2016) 828 UNTS 305 (Paris Agreement) art 2(a).

30 UNFCCC (n 27) art 4(2), Annex I.

31 Kyoto Protocol (n 28) art 2(2).

32 Montreal Protocol on Substances that Deplete the Ozone Layer (adopted 16 September 1987, entered into force 1 January 1989) 1522 UNTS 3 (Montreal Protocol) Annex A.

33 Chicago Convention (n 7) art 44.

34 ICAO Annex 16 Volume IV (n 1) App. 1 s. 2.3.

35 ICAO Assembly Resolution A41-22 (2022) para 9(b).

36 ICAO Annex 16 Volume IV (n 1) App.1 s. 3.1.1.

2023 being the first cycle.³⁷ While the CORSIA Phases relate to States' commitment to participate, the Compliance Periods represent operators' reporting and offsetting cycles.

CORSIA is a policy tool intended to achieve emissions mitigation with lower cost and more flexibility in relation to other options of MBMs.³⁸ CORSIA utilises 'carbon offsetting,' where the emissions are reduced in another sector or location instead of directly reducing emitters' emissions at the source through emissions certification.³⁹ An aeroplane operator of a State that participates in CORSIA is required to meet certain offsetting requirements by buying CORSIA-eligible emissions units from the carbon market. The emission units are generated from emission reduction in several sources, such as reforestation.⁴⁰ The aeroplane operator should 'cancel' the emissions units they buy to avoid double claim.⁴¹

The ICAO Council developed Annex 16 Volume IV in response to the ICAO Assembly Resolutions A39-3 and A38-18.⁴² The objective is 'Carbon Neutral Growth,' which means to keep the global net CO₂ emissions from international aviation from 2020 onwards at the same level.⁴³ Using CORSIA, aeroplane operators are required to offset⁴⁴ any growth in CO₂ above the calculated sectoral baseline from 2019 emissions.⁴⁵

37 ICAO Assembly Resolution A41-22 (2022) para 15. See Annex 16 Volume IV, *ibid*, App. 1 s. 2. CORSIA Compliance periods:

- (1) Compliance period 1 – 2021 to 2023.
- (2) Compliance period 2 – 2024 to 2026.
- (3) Compliance period 3 – 2027 to 2029.
- (4) Compliance period 4 – 2030 to 2032.
- (5) Compliance period 5 – 2023 to 2035.

38 Including levies and emissions trading systems with cap and trade. ICAO Environment, Air Transport Bureau, 'An introduction to market-based measures (MBMs)' (2015) <https://www.icao.int/Meetings/EnvironmentalWorkshops/Documents/2015-Warsaw/6_1_An-introduction-to-market-based-measures-MBMs.pdf> accessed 9 June 2024.

39 See *ibid*. The emissions certification is used to control the maximum amount of emissions from aircraft engines.

40 Activities related to reforestation, among others, are covered by China Certified Emissions Reductions (CCERs) and Clean Development Mechanism (CDM). See ICAO, 'CORSIA Eligible Emissions Units' (March 2024).

41 ICAO Annex 16 Volume IV (n 1) pt. II ch. 4 s. 4.2.2.

42 ICAO Assembly Resolution A38-18 (2013) para 19; A39-3 (2016) para 15.

43 ICAO Assembly Resolution A39-3 (2016) para 5.

44 The State shall calculate the CO₂ emissions required to offset and inform the aeroplane operators of its total final offsetting requirements. Annex 16 Volume IV (n 1) pt. II ch. 3 s. 3.1.4.

45 ICAO Assembly Resolution A41-22 (2022) para 11(b).

CORSIA should work alongside other methods in ICAO's 'basket of measures', including technologies, operational improvements, and sustainable aviation fuels (SAF) usage.⁴⁶ While other measures still need time to develop and implement, CORSIA has been implemented and is expected to bring down emissions in the timely battle against global warming.

Aeroplane operators and States were concerned about the COVID-19 pandemic's effect on CORSIA's design features,⁴⁷ as CORSIA required the average of total CO₂ emissions for 2019 and 2020 as the offsetting baseline.⁴⁸ The sharp decline in aviation operations makes the baseline plummet compared to the pre-pandemic scenario. Besides, CORSIA calculates its offsetting requirements for aeroplane operators per year from 2022 based on the Annual Sector Growth Factor (SGF), representing CO₂ emissions growth in a given year from 2021. With COVID-19, the SGF calculation for 2021⁴⁹ onwards could be higher or lower than the normal scenario because the SGF depends on the baseline, CO₂ in the given year, and aviation recovery pattern.

Solving this problem, the ICAO Assembly adopted Resolution A41-22 on the offsetting design adjustment.⁵⁰ Now, CORSIA implementation will use 2019 emissions as a baseline for the offsetting calculation during the Pilot Phase (2021–2023) and 85% of 2019 emissions for the First and Second Phases (2024–2035).⁵¹ The Resolution was taken after considering a recommendation from the ICAO Council based on the 2022 CORSIA Periodic Review.

The ICAO Council is obliged to conduct the review of the implementation of the CORSIA every three years, starting in 2022.⁵² This review will include an assessment of the impact of the CORSIA on the growth of international

46 *ibid*, para 3.

47 ICAO Council, 'COVID-19 Impacts and 2022 CORSIA Periodic Review' <<https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-and-Covid-19.aspx>> accessed 9 March 2024. For elaboration on the COVID-19 effect in general, see Thijs ETTY and others, 'Transnational Environmental Law in a Transformed Environment' (2020) 9 *Transnational Environmental Law* 197, 197–205.

48 *ibid*, in the context of the verification of aeroplane operators' emissions reports, site visits are not a requirement as per the SARPs in Annex 16 Volume IV, although they are recommended in the guidance provided in the Second Edition of the Environmental Technical Manual (Doc 9501) Volume IV. Similar to a site visit, the remote verification technique should allow for immediate and direct communication with the aeroplane operator, for example, via video conference with active screen sharing. See ICAO, 'Guidance for Verification Bodies on Remote Verification of CORSIA Emissions Reports' <[https://www.icao.int/environmental-protection/CORSIA/Documents/Guidance%20remote%20verification%20\(VBs\).pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/Guidance%20remote%20verification%20(VBs).pdf)> accessed 9 June 2024.

49 For SGF calculation, see Annex 16 Volume IV (n 1) pt. 11 ch. 3 s. 3.2.3.

50 ICAO Assembly Resolution A41-22 (2022).

51 See Annex 16 Volume IV (n 1) 'Historical background'.

52 ICAO Assembly Resolution A41-22 (2022) para 9(g).

aviation. The review results are the basis for the ICAO Council to consider adjustments and make recommendations to the Assembly for decisions about the upcoming implementation phase or compliance period. The next CORSIA Periodic Review will be held in 2025.

3 Coordination with the EU ETS

The effectiveness of CORSIA in the pursuit of climate change mitigation remains subject to the ongoing scrutiny. If CORSIA is proven inadequate in meeting climate objectives in the Paris Agreement, States are likely going to implement broader measures, surpassing those stipulated within the framework of CORSIA. This likelihood is underscored by the recent developments within the EU, which have signaled a possibility of pursuing emissions mitigation further.

Regionally within the EU, aviation emissions are regulated through the EU ETS,⁵³ which provides a framework for the trading of greenhouse gas emissions allowances. International aviation emissions of flights to and from the EU were about to be covered under the EU ETS in 2012.⁵⁴ However, the EU implemented a 'stop the clock policy' in April 2013, which put a temporary limit for a year to EU ETS coverage of flights departing and landing within the territory.⁵⁵ The EU ETS only applied temporarily to flights within the EU and departing to Switzerland and the United Kingdom, not to all flights arriving at or departing from airports situated in the territory of an EU Member State.⁵⁶ The 'stop the clock policy' offered an opportunity to negotiate international action under ICAO's auspice. Following the adoption of CORSIA, the EU amended the EU ETS by adopting Regulation (EU) 2017/2392 on 13 December 2017.⁵⁷ Further, the EU adopted the regulation extending the stop-the-clock policy to limit EU

53 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the community and amending Council Directive 96/61 [2003] OJ L275/32, art 2.

54 Directive 2008/101/EC of the European Parliament and of the Council of 19 November 2009 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emissions allowance trading with the Community [2009] OJ L8/3.

55 Decision No 377/2013/EU of the European Parliament and of the Council of 24 April 2013 derogating temporarily from Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community [2013] OJ L113/1.

56 Directive 2008/101/EC (n 54) Annex I para 1.

57 Parliament and Council Regulation (EU) 2017/2392 of 13 December 2017 amending Directive 2003/87/EC to continue current limitations of scope for aviation activities and to prepare to implement a global market-based measure from 2021 [2017] OJ L350/7, preamble.

ETS aviation coverage in response to the ICAO Council's adoption of CORSIA under Annex 16 Volume IV.⁵⁸

The amendment to the EU ETS aviation is also part of the 'Fit for 55' package presented by the European Commission in 2021.⁵⁹ This package aims to realise climate neutrality by 2050 and a 55% reduction of net greenhouse gas emissions by 2030 compared with 1990 levels. It consists of 13 interlinked proposals to revise existing EU climate and energy laws and six proposals for new legislation.⁶⁰

The restrained application of the EU ETS to international aviation adopted by the Directive (EU) 2023/958⁶¹ ensure legal certainty for operators in calculating their emissions after the establishment of CORSIA. Specifically, it addresses the problem of the absence of a linked mechanism for CORSIA and EU ETS by acknowledging CORSIA Eligible Units and reducing the risk of double counting for aircraft operators.⁶² While the EU ETS will continue its limitation to apply only for flights within the European Economic Area (EEA) and flights that depart from the United Kingdom and Switzerland, future extension is still possible.⁶³

The recent amendment appoints a 'deadline' for CORSIA on 31 December 2025, after the 42nd ICAO Assembly in 2025. If the ICAO Assembly has not strengthened CORSIA to achieve its long-term global aspirational goal towards meeting the Paris Agreement target, the European Commission should propose the EU ETS application to cover extra-territorial flights to and from third countries from 2027. Also, Recital 30 of the amendments of EU ETS specifies that if 'the States listed in an implementing act to be adopted by the European Commission represent less than 70% of international aviation emissions,' then the Commission should propose the same. Aeroplane operators will be able to deduct costs incurred from CORSIA on those routes to avoid double charging. In parallel, if a third country does not apply CORSIA from 2027, the EU

58 Directive (EU) 2023/958 of the European Parliament and of the Council of 10 May 2023 amending Directive 2023/87/EC as regards aviation's contribution to the Union's economy-wide emissions reduction target and the appropriate implementation of a global market-based measure [2023] OJ L 130/115, art 1(10).

59 See European Council and the Council of the EU, 'Fit for 55' <<https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55/#:~:text=for%2055%20package%3F,What%20is%20the%20Fit%20for%2055%20package%3F,Council%20and%20the%20European%20Parliament>> accessed 3 June 2024.

60 Heflich ALEKSANDRA and Saulnier Jerome LEON, 'Towards Carbon Neutrality through Ambitious Transformation of the EU Energy System' (2022) 2 <[https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI\(2022\)730346](https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2022)730346)> accessed 5 April 2024.

61 Directive (EU) 2023/958 (n 58).

62 *ibid* Recital (4), (15) and (17).

63 *ibid* Recital (30).

ETS should apply to emissions from flights departing to that third country. This means that the EU and its Member States will 're-restart-the-clock' and return to the original application of the EU ETS for all aviation activities. Therefore, continuing international dialogue and consultation between ICAO and the EU is needed.

4 Trends towards Non- CO_2 Emissions at the Regional Level and What Lies Ahead

CORSIA only addresses CO_2 coming from international aviation, overlooking the diverse types of emissions produced by aircraft. For instance, aircraft engine operation also generates NO_x .⁶⁴ IPCC Report showed that NO_x plays a role in the production of tropospheric ozone (O_3) and contributes to alterations in the atmosphere's oxidising capacity.⁶⁵ The subsequent formation of tropospheric ozone contributes to a positive radiative forcing,⁶⁶ leading to the global warming effect. Yet, the Report also shows that NO_x is expected to decrease the concentration of methane in the atmosphere, which is also a greenhouse gas.⁶⁷ These methane reductions tend to cool the surface of the earth. There is still scientific uncertainty that limits the ability to assess actual NO_x 's role in changing ozone and methane at the time of the Report.⁶⁸ The IPCC Report points out that scientific uncertainty is still found in the effects of contrails, NO_x , and aerosols on the global atmosphere. More recent research shows that, similar to CO_2 emissions, the accumulation of NO_x in the atmosphere also contributes to rising global temperatures.⁶⁹ However, non- CO_2 from the aviation sector remains unaddressed within the existing scheme.⁷⁰

The European Commission aims to be the 'world premiere'⁷¹ in conducting MRV of aviation non- CO_2 . The first stride in achieving this target is addressing

64 NO_x is a collective term for NO and NO_2 .

65 IPCC Report 8 (n 20).

66 See David STEVENSON and others, 'Radiative Forcing from Aircraft NO_x Emissions: Mechanisms and Seasonal Dependence' (2004) 109 *Journal of Geophysical Research* 1, 13.

67 IPCC Report 8 (n 20).

68 *ibid* 12.

69 STEVENSON and others (n 66).

70 As well as emissions from State aircraft and private flights, see Stefan GÖSSLING and Chris LYLE, 'Transition Policies for Climatically Sustainable Aviation' (2021) 41 *Transport Reviews* 643, 645.

71 Opening address by Beatriz Yordi, Director of European and International Carbon Markets, DG Climate Action, European Commission, at the Workshop on Aviation non- CO_2 emissions Workshop organised by the European Commission, jointly with DG RTD, DG MOVE, DG CLIMA, DG ENV, Clean Aviation, SESAR, and EASA, Brussels & online,

the insufficiency of scientific understanding as the background for policy proposals⁷² to address non-CO₂ effects.⁷³ The Commission was obligated under Article 30(4) Directive 2018/410⁷⁴ with further research and analysis tasks.

Accordingly, the Commission tasked the European Union Aviation Safety Agency (EASA) with providing an updated analysis on the non-CO₂ effects of aviation before 1 January 2020. In response, the EASA assembled a project team comprising experts from the EU, United Kingdom, and Norway.⁷⁵ This team effectively completed and published the Report on 23 November 2020. This Report is structured around three primary elements, aligning with the team's initial tasks.⁷⁶

Firstly, it probes into an analysis aimed at updating understanding of aviation non-CO₂ emissions and their contribution to climate change. Secondly, the report updates the knowledge of various factors or variables that have had an impact on non-CO₂ mitigation, including technological advancements, design considerations, operational practices, fuel, and the MBM. Lastly, it explores existing and potential policy actions, along with their implementation strategies, designed to mitigate non-CO₂ emissions from aviation. Moreover, the EU and its Member States must implement regulatory measures to reduce emissions in accordance with the Paris Agreement target.⁷⁷ Consequently, the Commission must establish a framework for non-CO₂ emissions MRV.⁷⁸

13 December 2023–14 December 2023 <<https://webcast.ec.europa.eu/workshop-on-aviation-non-co2-emissions-2023-12-13>> accessed 9 June 2024.

72 See 'Interview: Reducing aviation's climate impacts should be seen more as an opportunity rather than as a constraint' (interview with Beatriz Yordi, *EUROCONTROL*, 18 December 2023) <<https://www.eurocontrol.int/interview/reducing-aviations-climate-impacts-should-be-seen-more-opportunity-rather-constraint>> accessed 9 April 2024. This was also highlighted at the opening address for the Workshop on Aviation non-CO₂ emissions, *ibid*.

73 'Non-CO₂ aviation effects' means the effects on the climate of the release, during fuel combustion, of oxides of nitrogen (NO_x), soot particles, oxidised sulphur species, and effects from water vapour, including contrails. Directive (EU) 2023/958 (n 58) art 1.

74 Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814 [2018] OJ L76, art 1(30).

75 European Commission, 'Updated analysis of the non-CO₂ climate impacts of aviation and potential policy measures pursuant to EU Emissions Trading System Directive Article 30(4)' (23 November 2020) COM (2020) 747 final.

76 *ibid*, 6.

77 Directive (EU) 2023/958 (n 58) Recital (2), (3). Paris Agreement 2015 (n 29) art 2(1).

78 See Airlines for Europe, 'Non-CO₂ Emissions Monitoring, Verification and Reporting (MRV)-EU Directive 2003/598 (EU ETS)' (August 2023) <<https://a4e.eu/wp-content/uploads/A4E-Position-Paper-and-Recommendations-Non-CO2-MRV-FINAL.pdf>> accessed 9 June 2024.

The findings underscore the significant climate impacts of non-CO₂, indicating that they are now too important to be disregarded or overlooked in climate change mitigation in aviation.⁷⁹ Additionally, in alignment with the targets set by the Paris Agreement⁸⁰ to limit the global temperature increase to well below 2 ° and pursue efforts to 1.5 ° above pre-industrial levels, the Commission must start to take action to mitigate non-CO₂ emissions, starting from MRV.

Currently, as per Article 14(5) of Directive 2003/87/EC, as amended by Directive (EU) 2023/958, aeroplane operators are required to submit an annual report of their non-CO₂ emissions beginning from 1 January 2025. To facilitate this requirement, the Commission shall adopt by 31 August 2024 an implementing act to include non-CO₂ aviation effects in an MRV framework.⁸¹

The European Commission will ensure that tools are available to facilitate and, to the extent possible, automate the MRV. This is needed to reduce any administrative burden. The Commission shall submit annually, starting in 2026, a report on the results of applying the MRV framework. By 31 December 2027, the Commission will submit a report and, if necessary, a legislative proposal to mitigate non-CO₂ emissions by extending the EU ETS's scope based on the result of applying the MRV.⁸²

The developments within the EU to expand its mitigations measures towards non-CO₂ emissions may signal the shifts of focus of ICAO regarding climate governance in the future. Given its proactive stance, it is unlikely that the EU will proceed without negotiations, through its Member States, with other states for regulating non-CO₂ emissions. The 2024 ICAO Symposium on Non-CO₂ Aviation Emissions, which will be held on 16–18 September 2024 in Montréal, Canada,⁸³ reflects a potential opening for future discourse, policy, and SARPs development on climate change mitigation under ICAO's purview.

79 Notion that, even in cases where there is a possible risk but scientific uncertainty regarding the impact of the environmentally sensitive activity, the activity should be avoided, and precautions should be taken. It is enshrined in Principle 15 of the Rio Declaration, see Terje Aven, 'On Different Types of Uncertainties in the Context of the Precautionary Principle' (2011) 31 Risk analysis 1515, 1515.

80 Directive (EU) 2023/958 (n 58) Recital (11).

81 *ibid*, art 1(7).

82 *ibid* art 14(5).

83 See ICAO, 'The 2024 ICAO Symposium on Non-CO₂ Aviation Emissions' <<https://www.icao.int/Meetings/SymposiumNonCO2AviationEmissions2024/Pages/default.aspx>> accessed 2 June 2024.