

# The Future of Offsetting Carbon Emissions in the Aviation Industry

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***Abstract***

Without any doubt, the CORSIA targets are set below the original EU ETS targets. Compared to the original EU ETS approach, the baseline set by CORSIA is not very ambitious; consequently, the targets are more focused on stabilising and not reducing emissions. However, CORSIA is international and it is up to national regulators how the enforcement practices under CORSIA will develop. According to the proposal of the European Commission flights within the European Economic Area (EEA) continue to be covered by the EU ETS and the number of free allowances allocated to aircraft operators will be reduced progressively to reach full auctioning by 2027. In parallel, CORSIA will be implemented for extra-European flights.

# 1 Offsetting Carbon Emissions

## 1.1 Status Quo

Carbon offsetting allows anybody to compensate for CO<sub>2</sub> emission output by buying an emissions credit from a mitigation project, which reduces CO<sub>2</sub> emissions. Flying is a highly controversial topic in climate debates since the aviation industry overall used to account for about 2.5% of global CO<sub>2</sub> emissions. One might ask, whether emission reduction in air-traffic emissions is still an actual problem since the pandemic did a great job in this regard;<sup>1</sup> however, with the widespread start of vaccination campaigns private and business travel will recover.<sup>2</sup> Therefore, the interim period should be used to optimise the existing regulations. Keeping in mind the financial losses due to the COVID-19 shock, the sector might not be able to invest in technological mitigation options at the same level as originally planned. On the other side the baseline above which offsets are required is set in a way that it will take some years now before the majority of the airlines have to purchase any reduction unit.

Several international, regional and national measures were established to foster carbon offsetting as a tool to slow the airline sector's emissions growth. Next to market-based mechanisms, direct taxation is an alternative. While passenger or departure taxes have been imposed for many years, carbon eco-taxes,<sup>3</sup> which do not guarantee emission reductions are more and more en vogue. Essentially, no matter what one might name it, at its core, the effect is likely to be the same, and the results depend on what the government revenues generated by such a tax are spent on.

Since internationally accepted standards and systems are more effective than regional activities, CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) comes into play. In 2016, the ICAO's general assembly (International Civil Aviation Organization)<sup>4</sup> introduced a global market-based measure for compensating CO<sub>2</sub> emissions, namely CORSIA<sup>5</sup>.

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<sup>1</sup> ICAO (2021) reports a drop of over 50% in 2020.

<sup>2</sup> ICAO (2021) expects that the demand for air travel might return to its pre-pandemic level within two to three years.

<sup>3</sup> E.g. the Swiss parliament decided to impose an environmental tax on airline tickets, as part of efforts to reduce greenhouse gas emissions; a proposal for a levy of between CHF30 and CHF120 (\$32 and \$126) per ticket for flights departing Switzerland was approved in June 2020.

<sup>4</sup> The ICAO is a UN specialized agency, established by 54 signatory states in 1944 to manage the administration and governance of the Convention on International Civil Aviation; this convention, commonly referred to as the Chicago Convention, later established ICAO and the core rules governing aircraft safety, security and sustainability.

<sup>5</sup> See <https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx>.

Airlines will have to buy emissions reduction offsets from other sectors to compensate for any increase in their emissions.<sup>6</sup> The primary idea was to offset all growth in international flights after 2020 based on the average emissions during 2019/2020, which establish the baseline. However, the remarkable slowdown in air travel due to COVID-19 impacts that period significantly; in June 2020 the ICAO dropped the 2020 emissions from the CORSIA baseline and set 2019 alone as the baseline year because including the emissions from 2020 would have resulted in a significantly lower baseline. However, using 2019 emissions as the basis for carbon-neutral growth might result in a situation, where most aeroplane operators will not be confronted with any offset requirements for the next years of the program as air travel and corresponding emissions will not reach pre-pandemic levels in the near future.<sup>7</sup>

## 1.2 Emission Trading Systems

An emission trading scheme parallel to or instead of carbon taxes is an economic instrument to achieve pre-defined domestic, regional or international emission reduction targets.<sup>8</sup> Since the world tries to enhance global greenhouse gas (GHG) mitigation efforts, many countries are interested in upscaling emission reduction programmes and foster private sector investment in mitigation technologies. Effective use of emission trading systems could be one of the most efficient ways to reach ambitious reduction targets. The use of a market-based instrument is derived from the economic idea that emission reductions should be achieved where it is cheapest to realise them.

Any polluter A realises that it is too costly to reduce their emissions further to compensate a potential gap towards a given target by buying emission allowances on the market. Therefore, such a system requires that a polluter exists to abate emission at lower costs and “sells” his not generated emissions. The economic principle behind a market economy that everything is based on supply and demand shapes such a mechanism; in consequence, in an economically

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<sup>6</sup> Alternatively, airlines can opt to use low carbon, CORSIA eligible fuels like sustainable aviation fuels and lower carbon aviation fuels; the ICAO Secretariat detailed certification and implementation requirements in its supporting document *Overview of CORSIA Eligible Fuels*, [https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Supporting%20Document\\_CORSIA%20Eligible%20Fuels\\_LCA%20Methodology.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Supporting%20Document_CORSIA%20Eligible%20Fuels_LCA%20Methodology.pdf).

<sup>7</sup> COVID-19, International Aviation, and Climate Change: How Airlines’ Proposed Re-Write of International Civil Aviation Organization Rules would Undermine the Carbon Offsetting and Reduction Scheme for International Aviation, Analysis, May 2020; [https://www.edf.org/sites/default/files/documents/Impact\\_of\\_COVID\\_on\\_International\\_Aviation\\_Analysis.pdf](https://www.edf.org/sites/default/files/documents/Impact_of_COVID_on_International_Aviation_Analysis.pdf).

<sup>8</sup> OECD, Environmentally Related Taxes and Tradable Permit Systems in Practice. 2008; <Microsoft Word - GD-com-env-epoc-ctpa-cfa\_2007\_31-final\_SSSmith\_.doc (oecd.org)>.

perfect world, the market operates in a way that the costs of reducing an additional unit of emissions are equalised while the total costs of reaching a given environmental target would be minimised.<sup>9</sup>

Most of the existing trading systems are either “Cap-and-trade systems” or “baseline-and-credit systems”. In a cap-and-trade system, a pre-defined maximum level of emissions is set based on policy decisions.<sup>10</sup> Depending on political considerations, a certain level of emission allowances is often distributed for free according to specific criteria (grandfathered). Moreover, emission permits are auctioned, allowing polluters to evaluate whether the cost for measures achieving own emission reductions is higher than the price of emission allowances. By contrast, a baseline-and-credit system defines a reduction target in relation to a baseline and polluters achieving higher reductions than their obligation earn credits represented through emission allowances; they can sell these allowances to other polluters whose high emission urging them to comply with the target. The Kyoto protocol promotes international trading systems, including cap-and-trade aspects as well as baseline-and-credit aspects.<sup>11</sup>

### 1.3 Specific Features for the Aviation Industry

Globally, before the pandemic aviation produced between two and three per cent<sup>12</sup> of total CO<sub>2</sub> emissions.<sup>13</sup> This figure used to grow faster than other sectors. Next to the emission of CO<sub>2</sub>, global aviation contributes to the anthropogenic climate change by emitting nitrogen oxides (NO<sub>x</sub>), water vapour, soot and sulfate aerosols.<sup>14</sup> A high percentage of aviation emissions affect the international airspace and, therefore, it is difficult to attribute the pollution to an individual nation. Generally, different from other transport sectors, due to the

<sup>9</sup> OECD, Emission Trading Systems: <<https://www.oecd.org/environment/tools-evaluation/emissiontradingsystems.htm>>.

<sup>10</sup> International Energy Agency, Implementing Effective Emissions Trading Systems - Lessons from international experiences, July 2020; <<https://www.iea.org/reports/implementing-effective-emissions-trading-systems>>.

<sup>11</sup> OECD, Environmentally Related Taxes and Tradable Permit Systems in Practice. 2008; <Microsoft Word - GD-com-env-epoc-ctpa-cfa\_2007\_31-final\_SSsmith\_.doc (oecd.org)>.

<sup>12</sup> Brandon Graver/Kevin Zhang/Dan Rutherford, CO<sub>2</sub> emissions from commercial aviation, 2018, September 2019; <[https://theicct.org/sites/default/files/publications/ICCT\\_CO2-commercl-aviation-2018\\_20190918.pdf](https://theicct.org/sites/default/files/publications/ICCT_CO2-commercl-aviation-2018_20190918.pdf)>. Counting only international aviation activities, the 2020 release of the International Energy Agency database “CO<sub>2</sub> Emissions from Fuel Combustion” indicates total CO<sub>2</sub> emissions from fuel combustion of 33,513 million tons for the year 2018, including some 604 million tons (or 1.8%) from international air transport.

<sup>13</sup> IATA, Aviation & Climate Change Fact Sheet; <<https://www.iata.org/en/iata-repository/pressroom/fact-sheets/fact-sheet--climate-change/>>.

<sup>14</sup> David S. Lee et al., The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018, 244 Atmospheric Environment; <<https://www.sciencedirect.com/science/article/pii/S1352231020305689#!>>.

long aircraft development time and the usually long fleet turnover period, aviation will largely depend on liquid fossil fuels for many years.<sup>15</sup>

The International Air Transport Association (IATA)<sup>16</sup> accepts the need to address the global challenges resulting from climate change and adopted targets to mitigate CO<sub>2</sub> emissions from air transport in 2008.<sup>17</sup>

- An average improvement in fuel efficiency of 1.5% per year from 2009 to 2020<sup>18</sup>
- A cap on net aviation CO<sub>2</sub> emissions from 2020 (carbon-neutral growth)
- A reduction in net aviation CO<sub>2</sub> emissions of 50% by 2050, relative to 2005 levels

The IATA approach to reach the targets is based on a four-pillar strategy:

- (1) Improved technology, including the deployment of sustainable aviation fuels (SAF)
- (2) More efficient aircraft operations
- (3) Infrastructure improvements, including modernised air traffic management systems
- (4) A single global market-based measure, to fill the remaining emission gaps

The potential of all four pillars is challenging to assess. Currently, (1) SAF is still quite expensive to produce compared to actual kerosene price levels. Due to uncertain developments in the near future, there is a lack of investment in necessary capacities.<sup>19</sup> In the last decades, the efficiency of new aeroplanes (2) increased significantly. Therefore, there might be not much potential left to reduce fuel consumption further.<sup>20</sup> There might be some potential to realise a reduction in fuel consumption based on improved air traffic management systems (3).

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<sup>15</sup> According to current knowledge, in the near future fully electric planes will only be able to fly relatively short distances, therefore, long-haul flights - accounting by far for largest share of emissions - by large aircraft are not going to become fully electric any time soon.

<sup>16</sup> IATA represents about 290 airlines in 120 countries and carries 82% of the world's air traffic; <<https://www.iata.org/en/about/members/>>.

<sup>17</sup> IATA, Working Towards Ambitious Targets; <<https://www.iata.org/en/programs/environment/climate-change/>>.

<sup>18</sup> This target was met with an average of 2% fuel efficiency gains; < [<sup>19</sup> IATA, Sustainable Aviation Fuel Roadmap, 2015; <<https://www.iata.org/contentassets/d13875e9ed784f75bac90f000760e998/safr-1-2015.pdf>>.](https://www.iata.org/en/iata-repository/pressroom/presentations/environment-briefing-gmd2020/#:~:text=Fuel%20efficiency%20gains%201.5%20percent,2.>.</a></p></div><div data-bbox=)

<sup>20</sup> Technological advances, such as lighter more aerodynamic planes and more efficient engines reduce emissions. And since about one-third of an airline's costs stem from fuel, there is a high motivation to invest in new aeroplanes to lower consumption.

However, such a process involves political commitments, the collaboration of competitors and the acceptance of consumers. Chapter 2.3 and 3 will further discuss the details of (4) CORSIA.

After a closer look at the development phases of EU ETS and CORSIA, this article will analyse the different approaches of the two systems, evaluate the gaps and discuss further concerns that could be addressed.

## 2 Analysis of EU-ETS vs CORSIA

### 2.1 Overview

In the past, the relevant international climate agreements such as the Kyoto Protocol<sup>21</sup> did not address the aviation industry directly.<sup>22</sup> In this context, a look at Article 2 (2) of the Kyoto Protocol, which provides for a ‘transfer of responsibilities’ to specialised organisations, is helpful.<sup>23</sup> It is discussed whether this excludes unilateral measures.<sup>24</sup> However, the broader context of the agreement encourages individual reduction policies. The international aviation sector is also not included in the Paris Agreement on climate change.<sup>25</sup> All signature states adopt long-term economy-wide<sup>26</sup> emission reduction targets with no explicit reference to any specific industrial sector.<sup>27</sup> Aviation emissions could be included in the nationally determined

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<sup>21</sup> United Nations Framework Convention on Climate Change (1997), Kyoto Protocol to the United Nations Framework Convention on Climate Change; <<https://unfccc.int/resource/docs/convkp/kpeng.pdf>>.

<sup>22</sup> In the Kyoto Protocol, the International Civil Aviation Organization (ICAO) was tasked to prepare policy measures for the reduction of greenhouse gas emissions (GHG) from aviation, but only after a long-lasting political process, Assembly Resolution A39-3 on CORSIA resulted in the October 2016; <[https://www.icao.int/environmental-protection/documents/resolution\\_a39\\_3.pdf](https://www.icao.int/environmental-protection/documents/resolution_a39_3.pdf)>.

<sup>23</sup> While domestic aviation emissions are included in the national targets, emissions from international aviation are treated separately in Article 2 (2) of the Kyoto protocol: “Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively.”

<sup>24</sup> Erling Uwe M. (2018), How to reconcile the European Union Emissions Trading System (EU ETS) for aviation with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)?, 43 Air Space Law Journal, 371–386; <<https://kluwerlawonline.com/journalarticle/Air+and+Space+Law/43.4/AILA2018026>>.

<sup>25</sup> United Nations Framework Convention on Climate Change (2015), Adoption of the Paris Agreement, Conference of the Parties, Twenty-First Session (COP 21); United Nations Framework Convention on Climate Change: Paris, France; <<https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>>; Emissions from domestic flights are covered by the UNFCCC Paris Agreement and do not fall under CORSIA: ICAO, Top 3 Misconceptions about CORSIA; <[https://www.icao.int/environmental-protection/Pages/A39\\_CORSIA\\_FAQ6.aspx](https://www.icao.int/environmental-protection/Pages/A39_CORSIA_FAQ6.aspx)>.

<sup>26</sup> Article 4 (4) of the Paris Agreement: “Developed country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets. Developing country Parties should continue enhancing their mitigation efforts, and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances.”

<sup>27</sup> Dobson Natalie L. (2020), Competing Climate Change Responses: Reflections on EU Unilateral Regulation of International Transport Emissions in Light of Multilateral Developments, 67 Netherlands International Law Review, 183–210; <<https://link.springer.com/article/10.1007/s40802-020-00167-2>>.

contributions (NDCs) and the Paris agreement's climate pledges. Therefore, one could argue, the main push factor for the aviation industry to reduce emissions is the fear that regulators will find ways to increase the cost of emissions without a transparent plan and system, e.g. via the collection of eco-taxes such as airfare<sup>28</sup> or kerosene tax.<sup>29</sup>

In the meantime, there are two crucial CO<sub>2</sub> trading schemes for aviation established to limit aviation emissions. In 2012, aviation emissions had been included in the EU Emissions Trading Scheme (EU ETS).<sup>30</sup> In 2016, the *Carbon Offsetting and Reduction Scheme for International Aviation* (CORSIA) was accepted at the *International Civil Aviation Organization* (ICAO) level. In the beginning, the EU ETS was covering all flights to and from EU airports. Due to significant international and industry pressure, the scope was reduced covering intra-EU flights only, exempting all flights to and from Europe;<sup>31</sup> this waiver was later extended until 2024. It is likely that in the future, the EU-ETS remain its reduced scope and international flights will be covered by CORSIA.<sup>32</sup> However, it is codified in the 2017 revision to the EU ETS Directive that the European member states will participate in CORSIA after an evaluation by the European Commission whether the scheme has the potential to be environmentally effective.<sup>33</sup>

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<sup>28</sup> Airfare taxes are collected by many states mostly in form of a flat amount and, therefore, the percentage declines on long (and more expensive) flights.

<sup>29</sup> ICAO's Chicago Convention disallows taxing fuel already on board an arriving aircraft, but would allow taxing fuel taken on board prior to departure. However, intergovernmental air services agreements often prohibit taxation of kerosene. Aviation fuel used in Europe has been tax exempt despite such taxation being permitted on European domestic flights and intra-EU since 2003. As part of the European Green Deal ([https://ec.europa.eu/info/sites/info/files/european-green-deal-communication\\_en.pdf](https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf)), the EU Commission will propose to revise the Energy Taxation Directive (Directive 2003/96/EC); a harmonized EU-wide tax on kerosene used in aviation could be part of the revision.

<sup>30</sup> Under the EU ETS, all airlines operating in Europe (European and non-European) are required to monitor, report and verify their emissions, and to surrender allowances against those emissions: Directive 2008/101/EC of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community, OJ L 8 3–21, 13.1.2009. ; European Commission (2016), The EU Emissions Trading System (EU ETS); <[https://ec.europa.eu/clima/sites/clima/files/factsheet\\_ets\\_en.pdf](https://ec.europa.eu/clima/sites/clima/files/factsheet_ets_en.pdf)>.

<sup>31</sup> "Stops the clock": European Commission Memo, Stopping the clock of ETS and aviation emissions following last week's International Civil Aviation Organisation (ICAO) Council, Brussels, 12 November 2012; <[https://ec.europa.eu/clima/news/articles/news\\_2012111202\\_en#:~:text=Stopping%20the%20clock'%20on%20the,from%20the%20EU%20during%202012](https://ec.europa.eu/clima/news/articles/news_2012111202_en#:~:text=Stopping%20the%20clock'%20on%20the,from%20the%20EU%20during%202012)>.

<sup>32</sup> European Commission, Reducing Emissions from Aviation; <[https://ec.europa.eu/clima/policies/transport/aviation\\_en#tab-0-2](https://ec.europa.eu/clima/policies/transport/aviation_en#tab-0-2)>.

<sup>33</sup> Regulation 2017/2392 envisages a review once there is more certainty about the nature and content of the ICAO legal instruments for the global scheme and the steps taken by third countries for its implementation (recital 11 and 12, art. 28 lit. b and c); Regulation 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, OJ L 350 7–14, 29.12.2017.



## 2.2 EU-ETS

### 2.2.1 Status Quo

In principle, the Kyoto Protocol tasked the ICAO to develop policy measures to reduce greenhouse gas emissions stemming from aviation. Unlike the slow progress at ICAO level, the EU introduced the EU ETS<sup>34</sup> parallel to the emergence of an international carbon market<sup>35</sup> and included aviation. In consequence, based on the initial legal frameworks for the EU ETS for aviation (EU Directives 2008/101/EC<sup>36</sup> and 2009/29/EC<sup>37</sup>) a regional market-based measure regulating CO<sub>2</sub> emissions was established.

Following the principles of international emissions trading under Article 17 of the Kyoto Protocol, the EU ETS is an example of a cap-and-trade system, where a defined total amount of units – the “cap” – limits the aggregate emissions allowed from all participants covered by the system.<sup>38</sup> Each emissions unit – known as EU Allowances (EUAs) – is equal to one metric ton of carbon dioxide equivalent. While the EU ETS gradually lowers its cap following a defined reduction factor, polluters are forced to drop their emissions over time. Most EUAs were initially assigned to covered entities according to their actual (historic) CO<sub>2</sub> emissions. Gradually, auctions come into play, and a growing share of covered entities had to buy additional EUAs in order to comply with their obligations. Entities reducing their emissions more than required create a surplus and the EUAs they do not need for their own compliance purposes, can be sold to other covered entities, creating an incentive to invest in mitigation measures. Accordingly, a higher carbon price promotes a more significant investment in mitigation technologies.<sup>39</sup> The tightening of the cap, the exclusion of most international credits, and a shift in focus from historical to attainable emission levels reduced the number

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<sup>34</sup> Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, OJ L 275/32, 25.10.2003.

<sup>35</sup> See Axel Michaelowa, *Evolution of international carbon markets: lessons for the Paris Agreement*, 10 Wiley interdisciplinary reviews: Climate Change 2019.

<sup>36</sup> Directive 2008/101/EC of 19 November 2008 amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community, OJ L 8/3–21, 13.1.2009.

<sup>37</sup> Directive 2009/29/EC of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community, OJ L 140/63–87, 5.6.2009.

<sup>38</sup> See regarding Art. 17 Sebastian Oberthür/Hermann E. Ott, *The Kyoto Protocol*, Berlin, 1999, 187-205.

<sup>39</sup> Every year a World Bank report presents the latest developments in carbon pricing around the world: World Bank, *State and Trends of Carbon Pricing 2019*, Hune 2019; <<http://documents.worldbank.org/curated/en/191801559846379845/pdf/State-and-Trends-of-Carbon-Pricing-2019.pdf>>.

of EUAs in circulation.<sup>40</sup> The limit on the overall number of EUAs generates scarcity, which in turn underlies the value of EUAs revealed in the market.<sup>41</sup>

If a covered entity fails to comply with the obligation to surrender EUAs for its GHG emissions during a compliance period, it will suffer the imposition of a penalty. A system of registries tracks and records ownership and transfer of EUAs.<sup>42</sup> Because account creation and maintenance were not regulated appropriately, undesirable participants could access the market, and several fraudulent activities affected the EU ETS.<sup>43</sup>

## 2.2.2 Current Developments and policy options

In order to implement CORSIA, a revision of the EU ETS Directive is underway. The proposal, planned for the second quarter of 2021, will be part of the broader Green Deal<sup>44</sup> and will increase the number of allowances being auctioned under the system as far as aircraft operators are concerned. Under the EU ETS, around five million aviation allowances are auctioned, and about 30.5 million aviation allowances are allocated for free to airlines.<sup>45</sup>

Under Article 28a of the EU ETS Directive, only flights within the EU/EFTA are addressed; however, if no amendment to the EU ETS Directive is adopted by December 2023, the EU ETS for aviation automatically reverts to its initial scope to cover all flights departing and arriving in the EU/EFTA States; exemptions in a delegated regulation are possible. Looking at policy options addressing CORSIA, various alternative ideas are discussed:

- Status quo: EU ETS application only on emissions from flights between aerodromes located in the EU/EFTA;

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<sup>40</sup> Patricia Buckley/Suzana Carp/Dave Jones/Phil MacDonald/Charles Moore, Half Way There - Existing policies put Europe on track for emission cuts of at least 50% by 2030, March 2019; <<https://sandbag.org.uk/wp-content/uploads/2019/04/Halfway-There-March-2019-Sandbag.pdf>>.

<sup>41</sup> For further details see European Commission, EU ETS Handbook, 2015; <[https://ec.europa.eu/clima/sites/clima/files/docs/ets\\_handbook\\_en.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/ets_handbook_en.pdf)>; A. Denny Ellerman et al., Pricing Carbon The European Union Emissions Trading Scheme, Cambridge 2010.

<sup>42</sup> See <[https://ec.europa.eu/clima/policies/ets/registry\\_en](https://ec.europa.eu/clima/policies/ets/registry_en)>; Regulation 389/2013 of 2 May 2013 establishing a Union Registry pursuant to Directive 2003/87/EC, Decisions No 280/2004/EC and No 406/2009/EC and repealing Commission Regulations 920/2010 and 193/2011, OJ L 122/1, 3.5.2013.

<sup>43</sup> See Bonnie Holligan, Commodity or Propriety? Unauthorised Transfer of Intangible Entitlements in the EU Emissions Trading System, 83 Modern Law Review, 2020, 979-1007.

<sup>44</sup> European Commission, A European Green Deal - Striving to be the first climate-neutral continent; <[https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en)>.

<sup>45</sup> European Commission, Inception impact assessment - Ares(2020)3515933; <[https://eur-lex.europa.eu/legal-content/EN/PIN/?uri=PI\\_COM:Ares\(2020\)3515933](https://eur-lex.europa.eu/legal-content/EN/PIN/?uri=PI_COM:Ares(2020)3515933)>.

- CORSIA only: CORSIA application to international flights, non-domestic intra-EU/EFTA flights, flights to and from the EU/EFTA States and third countries;
- EU ETS-CORSIA “clean-cut”: EU ETS application to the current intra-EU/EFTA scope and CORSIA for extra-EU/EFTA flights;
- EU ETS-CORSIA “mix”: CORSIA application as well as EU ETS application regarding non-domestic intra-EU/EFTA flights up to each operator’s emissions not covered by CORSIA.

Already, a study on CORSIA delivered in September 2020 commissioned by the European Commission signaled critical results and establishes justifiable doubts to CORSIA’s ability to be in any way compatible with the European Green Deal.<sup>46</sup> The assessment stated that the objective to deliver carbon neutral growth *“is unlikely be achieved because participation in CORSIA is likely to be partial, rather than complete, and the ability of ICAO to enforce compliance with the scheme is limited.”* Because CORSIA does not guarantee that all carbon credits used *“reflect accurately measured real and permanent emission reductions that would not otherwise have occurred”* it is doubtful that CORSIA can alter the direct climate impact associated with air travel *“as the price signal that airlines will face under the scheme is, on its own, not expected to provide sufficient financial incentives for them to reduce emissions materially”*.<sup>47</sup> The final outcome still remains to be seen, however, the “Impact Assessment Report”<sup>48</sup> and the respective proposal for a directive<sup>49</sup> shows which path the European Commission will follow.

Based on the “Fit for 55” package released by the European Commission in July 2021 a set of policy proposals to achieve emission reductions of at least 55% below 1990 levels, major revisions of the EU ETS form the center part of decarbonization agenda. The preferred policy

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<sup>46</sup> European Commission, Assessment of ICAO's global market-based measure (CORSIA) pursuant to Article 28b and for studying cost passthrough pursuant to Article 3d of the EU ETS Directive, September 2020 [Ares(20211483539 – 25/02/21)].

<sup>47</sup> Ibid. at p. 21.

<sup>48</sup> European Commission, Impact Assessment Report accompanying the document Proposal for a Directive 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, Brussels, 14.7.2021 [SWD(2021) 603 final]; <<https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2021:0603:FIN:EN:PDF>>.

<sup>49</sup> Proposal for a Directive 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, Brussels, 14.7.2021 [COM/2021/552 final]; <<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0552>>.

option for the revision of the EU ETS in respect of aviation is based on the idea that “the EU wants to provide a constructive international signal and wants the CORSIA global emission scheme to succeed and deliver meaningful emission reductions.”<sup>50</sup> The preferred option is that the EU ETS applies to flights inside a member state and between member states while CORSIA applies to flights to/from member states. In the near future a full auctioning of allowances for aviation could be implemented to align the coverage of intra-European flights in the EU ETS with the “Fit for 55” ambition.

## 2.3 CORSIA

### 2.3.1 Overview

CORSIA is an offset scheme while the EU ETS is based on cap-and-trade. Therefore, the systems of setting the emissions caps are different. When analysing EU ETS vs CORSIA, several weaknesses can be detected in CORSIA. The EU ETS requires airlines to surrender emission allowances equivalent to their total emissions under the scheme. From 2013 until 2020, the airlines received<sup>51</sup> tradeable allowances covering a certain level of emissions (95% of the average historical aviation emissions of the years 2004–2006),<sup>52</sup> while the number of allowances issued each year declines.<sup>53</sup> Based on the cap 2004–2006, additional emissions are compensated because the same amount of emissions is reduced via the purchased emission allowances. CORSIA introduces a requirement on airlines to purchase offsets to meet the baseline set in 2019 and credits in addition to the use of alternative fuels.<sup>54</sup>

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<sup>50</sup> European Commission, Impact Assessment Report (fn 48), 91.

<sup>51</sup> Based on the annual cap on aviation allowances for phase 3 of the EU ETS (2013-20) 82% of the allowances were granted for free to aircraft operators, 15% were auctioned and 3% stayed in a special reserve for distribution to fast-growing aircraft operators and new entrants. From 2021 onwards, a linear reduction factor (2.2% annually) is applied; <[https://ec.europa.eu/clima/policies/ets/allowances/aviation\\_en](https://ec.europa.eu/clima/policies/ets/allowances/aviation_en)>.

<sup>52</sup> Dae Ko Young/Jae Jang Young/Dae Young Kim (2017), Strategic airline operation considering the carbon constrained air transport industry, 62 *Journal of Air Transport Management*, 1-9; <<https://www.sciencedirect.com/science/article/pii/S0969699716303490>>; Meleo Linda/Nava Consuelo R./Pozzi Cesare (2016), Aviation and the costs of the European emission trading scheme: the case of Italy, 88 *Energy Policy*, 138-147; <<https://reader.elsevier.com/reader/sd/pii/S0301421515301385?token=25FA1A46886460D3E5E9E9A199BE5D755F5C9A28DC3DCA12F8337C30B039C41219BCEEA2E6DB1B547F68AA9E7CE498A8>>.

<sup>53</sup> Allocated aviation allowances are valid within the aviation sector only; aircraft operators can buy additional allowances on the market; permits from Joint Implementation (ERUs) and Clean Development Mechanism (CERs) are limited up to 1.5 %.

<sup>54</sup> The ICAO Council has decided to disregard data from 2020 when calculating the baseline emissions for the CORSIA global carbon offsetting scheme for commercial aviation, in light of the coronavirus pandemic; therefore, the baseline will be calculated using only 2019 emissions data. Originally, it was planned for the baseline for carbon neutral growth to be derived from the average of CO<sub>2</sub> emissions from covered international flights in 2019 and 2020 (<<https://www.icao.int/Newsroom/Pages/ICAO-Council-agrees-to-the-safeguard-adjustment-for-CORSIA-in-light-of-COVID19-pandemic.aspx>>).

### 2.1.1 CORSIA scope

One feature that is criticised, is the voluntary participation in CORSIA. Starting in 2021 for the first six years of participation will be voluntary<sup>55</sup>. Only routes are covered between two states that are participating; however, the EU member states and many other nations are participating from the beginning.<sup>56</sup> Only from 2027 onwards, all ICAO states with a certain level of aviation activity must participate.<sup>57</sup> During the pilot phase (2021 to 2023) and the first phase (2024 to 2026), only states that have volunteered to participate in the scheme must offset emission above the baseline. The pilot phase will be overshadowed from the reduced air transport following the pandemic. Then in the second phase (2027 through 2035) all States are participating that have an individual share of international aviation activities in Revenue Tonne Kilometers (RTKs) in the year 2018 above 0.5 % of total RTKs or whose cumulative percentage in the list of states from the highest to the lowest amount of RTKs reaches 90 % of total RTKs, except Least Developed Countries (LDCs), Small Island Developing States (SIDS) and Landlocked Developing Countries (LLDCs) unless they volunteer to participate in this phase.

Following the ICAO mandate, CORSIA applies only to international flights. Therefore, domestic routes having a relatively small proportion of the intra-EEA total, however, contributing a hefty share in large countries like the US, India and China are not addressed under CORSIA. These flights are only covered by the Paris climate agreement, depending on the nationally determined contributions (NDC).

Further concerns are based on how CORSIA is being introduced because it is merely based on Standard and Recommended Practice (SARP). In principle, ICAO decisions are not legally binding and there is also no enforcement mechanism in place. While participation in the first

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<sup>55</sup> Participating states: ICAO (July 2020), CORSIA States for Chapter 3 State Pairs; <[https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA\\_States\\_for\\_Chapter3\\_State\\_Pairs\\_Jul2020.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_States_for_Chapter3_State_Pairs_Jul2020.pdf)>; ICAO (2019f), Resolution A40-19: Consolidated statement of continuing ICAO policies and practices related to environmental protection - Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), § 9; <[https://www.icao.int/environmental-protection/Documents/Assembly/Resolution\\_A40-19\\_CORSIA.pdf](https://www.icao.int/environmental-protection/Documents/Assembly/Resolution_A40-19_CORSIA.pdf)>.

<sup>56</sup> Council Decision (EU) 2020/954 of 25 June 2020 on the position to be taken on behalf of the European Union within the International Civil Aviation Organization as regards the notification of voluntary participation in the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) from 1 January 2021 and the option selected for calculating aeroplane operators' offsetting requirements during the 2021-2023 period (ST/8758/2020/INIT), OJ L 212 14–17, 3.7.2020; <<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020D0954>>.

<sup>57</sup> Because China has one of the fastest-growing aviation systems its participation in CORSIA's first phase is seen as critical for the deal. In 2016 China signaled its support for the CORSIA but later declined to commit to a pilot phase. China, along with Russia, issued in 2019 a position paper (<[https://www.icao.int/Meetings/A40/Documents/WP/wp\\_306\\_en.pdf](https://www.icao.int/Meetings/A40/Documents/WP/wp_306_en.pdf)>) stating that CORSIA "lacks moral fairness" and criticizes the one-size-fits-all orchestrated by the developed countries which derail the growth potential of developing countries.

phases is voluntarily anyway, deterrent effects were avoided. Post-2027, a state might not agree to participate<sup>58</sup> when the consequences of non-compliance are not rated as fair and transparent. In this area, future developments need to be assessed to evaluate the potential weaknesses of CORSIA more precisely.

Generally, CORSIA is based on eleven programme design elements, but the key features are the eight offset integrity assessment criteria, determining which credits are accepted to offset additional emissions. Table x lists the program design elements which, in principle, set a proper framework for an emission reduction scheme; the future will prove whether the application in practice will be consistent with these elements.

### 2.1.2 Program design elements

In 2019 ICAO published its eleven *Program Design Elements*<sup>59</sup> and eight *CORSIA Emissions Unit Eligibility Criteria*.<sup>60</sup>

#### Program design elements

- Clear methodologies and protocols and their development process:  
Programmes are required to have qualification, and quantification methodologies supervised and monitored based on proper (publicly disclosed) protocols.
- Scope Considerations:  
Programmes are required to define (publicly disclosed) eligibility criteria for each type of offset activity, i.e. define the level at which activities are allowed under the programme.
- Offset Credit Issuance and Retirement Procedures:  
Programmes are required to establish (publicly disclosed) procedures for how offset credits are issued, retired or cancelled, subject to any discounting and the length of the crediting period and whether that period is renewable.
- Identification and Tracking:  
Programmes are required to establish (publicly disclosed) procedures that ensure that units are tracked, units are individually identified through serial numbers, the registry is secure, and units have clearly identified owners or holders.
- Legal Nature and Transfer of Units:  
Programmes are required to define and publicly disclose the process to ensure the unit's underlying attributes and property aspects. Therefore a definition of the underlying attributes and property aspects of a unit is required.

<sup>58</sup> Mendes de Leon Pablo/Correia Vincent/Erling Uwe/Leclerc Thomas (2015), Possible legal arrangements to implement a global market based measure for international aviation emissions; <[https://ec.europa.eu/clima/sites/clima/files/transport/aviation/docs/gmbm\\_legal\\_study\\_en.pdf](https://ec.europa.eu/clima/sites/clima/files/transport/aviation/docs/gmbm_legal_study_en.pdf)>.

<sup>59</sup> ICAO (2018), chapter 4; ICAO (2019e), ICAO environmental report 2019: destination green - the next chapter, 237; <<https://digitallibrary.un.org/record/3837917>>.

<sup>60</sup> ICAO, CORSIA Emissions Unit Eligibility Criteria, March 2019; <[https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO\\_Document\\_09.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO_Document_09.pdf)>.

- **Validation and Verification procedures:**  
Programmes are required to establish (publicly disclosed) procedures for the validation and verification and the accreditation of validators and verifiers.
- **Program Governance:**  
Programmes are required to publicly disclose who is responsible for the program's administration and how decisions are made.
- **Transparency and Public Participation Provisions:**  
Programmes are required to publicly disclose (a) what information is captured and made available to different stakeholders, (b) its local stakeholder consultation requirements (if applicable) and (c) its public comments provisions and requirements, and how they are considered (if applicable). Conduct public comment periods and transparently disclose all approved quantification methodologies.
- **Safeguards System:**  
Programmes are required to establish (publicly disclosed) safeguards to address environmental and social risks.
- **Sustainable Development Criteria:**  
Programmes are required to publicly disclose the sustainable development criteria and any provisions for monitoring, reporting and verification.
- **Avoidance of Double Counting, Issuance and Claiming:**  
Programmes are required to provide information on how they address double-counting, issuance and claims in the context of evolving national and international regimes for carbon markets and emissions trading.

### 2.1.3 Offset integrity assessment criteria

In contrast, the first experiences with the practical application of ICAO's offset integrity assessment criteria can be analysed. While the EU ETS would not allow international credits anymore,<sup>61</sup> the ICAO defined the available offset schemes before the voluntary phase. This evaluation was based on the respective ICAO statement:

*“These principles hold that offset credit programs should deliver credits that represent emissions reductions, avoidance, or sequestration that (i) are additional, (ii) based on a realistic and credible baseline, (iii) quantified, monitored, reported, and verified, (iv) have a clear and transparent chain of custody, (v) represent permanent emissions reductions, (vi) assess and mitigate against (the) potential increase in emissions elsewhere, (vii) are only counted once towards a mitigation obligation, (viii) do no net harm.”<sup>62</sup>*

<sup>61</sup> ICAO invited emissions unit programmes to apply for assessment by the Technical Advisory Board (TAB; <<https://www.icao.int/environmental-protection/CORSIA/Pages/TAB.aspx>>) against the CORSIA Emissions Unit Criteria (EUC; [https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/TAB%202020/TAB%20Procedures\\_April%202020\\_Final.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/TAB%202020/TAB%20Procedures_April%202020_Final.pdf)).

<sup>62</sup> ICAO (2018), chapter 4; ICAO (2019c), CORSIA Emissions Unit Eligibility Criteria; <[https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO\\_Document\\_09.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO_Document_09.pdf)>; ICAO (2019e), 228;; Schneider Lambert/Michaelowa Axel/Broekhoff Derik/Espelage Aglaja/Siemons Anne (2019), Lessons learned from the first round of applications by carbon-offsetting programs for eligibility under CORSIA; <<https://www.oeko.de/fileadmin/oekodoc/Lessons-learned-from-CORSIA-applications.pdf>>.

An analysis conducted on behalf of the German Environment Agency accepts that the ICAO criteria are “*mostly sufficient in covering basic conceptual elements*”.<sup>63</sup> Besides, further elaboration on essential program requirements, procedures, wording and terminology are suggested to ensure that the criteria become a reality in practice. A closer view at the eight offset integrity assessment criteria incorporating the suggestions made on behalf of the German Environment Agency analyses potential areas of improvement.<sup>64</sup>

### **(i) Additionality**

The first eligibility criterion addresses additionality, which is one of the biggest problems when evaluating reductions.<sup>65</sup> While the underlying intention is straightforward, assessing whether an emission reduction is additional is often questionable. The real motivation to initiate an emission reduction project is based on various influential factors. Therefore, it might be in place even without the prospect to generate revenue by selling emission allowance rights; certain projects might be able to operate profitably even without carbon offset revenues. In principle, additionality requires that the generated carbon offset credits represent emissions reductions which exceed any reductions anyhow required by law or regulation or which would occur in a typical scenario. Having only internal procedures in place, stating that a program provides a reasonable assurance that the emissions reductions would not have happened in the absence of the offset program might not be enough. Independent third-party-certification by accredited auditors not paid by the program itself would raise the credibility. For addition, explicitly requiring that programmes be excluded from eligibility project types have a high risk of being non-additional because they are legally required and/or frequently profitable without carbon offset revenues. But often, additionality is hard to assess because projects are not rooted in mono-causal incentives and, in consequence, offsetting projects would be in place either way. Still, by expanding its operations, they create additional reductions.<sup>66</sup>

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<sup>63</sup> German Environment Agency, Options for Improving the Emission Unit Eligibility Criteria under the Carbon Offsetting and Reduction Scheme for International Aviation, October 2020, 39; <[https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2020\\_10\\_27\\_climate\\_change\\_36\\_2020\\_schlussbericht\\_annex\\_1\\_0.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2020_10_27_climate_change_36_2020_schlussbericht_annex_1_0.pdf)>.

<sup>64</sup> German Environment Agency, Analysis and assessment of the design of an offsetting system for international aviation, October 2020; <[https://newclimate.org/wp-content/uploads/2020/11/NewClimate\\_Analysis-and-assessment-of-the-design-of-an-offsetting-system-for-international-aviation\\_Oct20.pdf](https://newclimate.org/wp-content/uploads/2020/11/NewClimate_Analysis-and-assessment-of-the-design-of-an-offsetting-system-for-international-aviation_Oct20.pdf)>.

<sup>65</sup> Axel Michaelowa/Lukas Hermwille/Wolfgang Obergassel/Sonja Butzengeiger, Additionality revisited: guarding the integrity of market mechanisms under the Paris Agreement, 10 *Climate Policy*, 2019.

<sup>66</sup> Larsson Jörgen/Elofsson Anna/Sterner Thomas/Akerman Jonas (2019), International and national climate policies for aviation: a review, 19 *Climate Policy*, 787–7099;



**(ii) Baseline Determination**

A defensible and credible baseline must be defined to assess additionality a realistic (conservative); however, this includes uncertainty because often, this is based on an estimation of potential emissions. When defining parameters, a specific range and sector- and geographic-specific circumstances influence such a baseline. Of course, it is essential to define appropriate crediting periods.

**(iii) Quantification – Monitoring – Reporting - Verification**

Giving rights to polluters, any carbon offset credit must be quantified, monitored, reported, and verified, based on transparent procedures, methods and protocols. Reductions should be measured and verified by an accredited and independent third-party verification entity following specified intervals throughout the crediting period. Offsets should only come from programmes that have ex-post verification procedures in place. Those conducting ex-ante issuance of offset units before the emissions reductions have occurred and verified by a third-party should not be eligible.

**(iv) Chain of Custody**

A clear and transparent chain of custody within the offset program with an assigned and trackable identification number that by issuance through to its transfer or use within a registry system.

**(v) Permanence**

For sustainability reasons, carbon offset credits must represent permanent emissions reductions. Therefore, there should be no risk of a reversal, including holding project owners liable for intentional reversals.

**(vi) Assessment and Mitigation of Leakage**

A program must have measures in place to assess and mitigate incidences of material leakage, meaning that no emissions should be caused elsewhere as a result of the implementation of an offset project.

### **(vii) Double Counting**

A robust accounting of international transfers from any market mechanisms under Article 6 of the Paris Agreement is essential to monitor whether a reduction is only counted once towards a mitigation obligation.<sup>67</sup> However, the diversity of nationally determined contributions under the Paris Agreement often makes tracking difficult. Therefore, measures must be in place to avoid double issuance and double use. Especially on the international stage, double claiming becomes a potential problem when reductions are not only counted by an airline, but also by the host country of the emissions reduction activity. At the COP26 in Glasgow, the last chapter of the rulebook of the Paris Agreement was adopted, setting rules for international carbon markets under Article 6. While the new rules include requirements and safeguards for international carbon markets, there are still loopholes that could undermine climate mitigation efforts. Anyhow, rules alone will not deliver integrity and lead to robust accounting, therefore, the practical application in countries and by companies matters. The Glasgow Package includes rules for implementing Article 6 of the Paris Climate Agreement, especially regarding paragraphs 2 (bilateral carbon trades)<sup>68</sup> and 4 (hub replacing the CDM)<sup>69</sup> of the article. Double counting of emission reductions requires adjustments of national carbon inventories when one country uses Internationally Transferred Mitigation Outcomes (ITMO) to reach a national target. The agreement should also avoid double counting of emissions reductions between nations and CORSIA.

### **(viii) No (net) Harm**

Offset projects should not violate any regulations or obligations. Therefore, a process must be in place to monitor the compliance with social and environmental safeguards, and a report should publicly disclose the results. In addition, the removal of the word “net” from the text

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<sup>67</sup> German Emissions Trading Authority, Robust Accounting of International Transfers under Article 6 of the Paris Agreement, September 2017; <[https://www.dehst.de/SharedDocs/downloads/EN/project-mechanisms/discussion-papers/Differences\\_and\\_commonalities\\_paris\\_agreement2.pdf?\\_\\_blob=publicationFile&v=4](https://www.dehst.de/SharedDocs/downloads/EN/project-mechanisms/discussion-papers/Differences_and_commonalities_paris_agreement2.pdf?__blob=publicationFile&v=4)>.

<sup>68</sup> ; <[https://unfccc.int/sites/default/files/resource/Art.\\_6.2%20draft\\_decision.pdf](https://unfccc.int/sites/default/files/resource/Art._6.2%20draft_decision.pdf)>.

<sup>69</sup> ; <[https://unfccc.int/sites/default/files/resource/Art.6.4%20draft\\_decision.v4.pdf](https://unfccc.int/sites/default/files/resource/Art.6.4%20draft_decision.v4.pdf)>.

could clarify that there should be a minimum tolerance for accepting harm, which is then balanced by corresponding positive impacts or compensation.<sup>70</sup>

#### 2.1.4 Assessment of programmes

In 2019 ICAO established a Technical Advisory Body (TAB) to assess the offset programmes against these criteria. TAB is responsible for determining which offset programmes meet these criteria and make recommendations to the ICAO Council which then approves qualified offset programmes under CORSIA. The TAB report excluded some projects due to missing reporting regarding sustainability. None of the programmes fulfils all quality criteria to the full extent, and some even fail in several criteria.<sup>71</sup> TAB proposed only a provisional approval until programmes meet all EUCs and recommends that the ICAO requests further specified actions. In principle, the double-counting criterion is not within the scope of an offsetting program because it requires the states to act. Still, neither a program nor ICAO has any authority in this regard.<sup>72</sup> Prior to the Paris Agreement, only developed countries had emission reduction targets based on the Kyoto Protocol. Therefore, developing countries had no target, and with only one target involved, there was no risk of double-counting in this respect. Now, checks are needed, to control whether an emission reduction is not counted towards the host country's Paris target as well. Despite the critical aspects of its assessment, the ICAO approved six eligible emissions unit programmes in 2020 that airlines will be allowed to use to meet their offsetting obligations during the initial pilot phase of CORSIA:<sup>73</sup>

- American Carbon Registry (ACR) with some strict exclusions;
- China GHG Voluntary Emission Reduction Program with some strict exclusions;
- Clean Development Mechanism (CDM) with some strict exclusions;

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<sup>70</sup> German Environment Agency, Options for Improving the Emission Unit Eligibility Criteria under the Carbon Offsetting and Reduction Scheme for International Aviation, October 2020, 36; <[https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2020\\_10\\_27\\_climate\\_change\\_36\\_2020\\_schlussbericht\\_annex\\_1\\_0.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2020_10_27_climate_change_36_2020_schlussbericht_annex_1_0.pdf)>.

<sup>71</sup> Dufrasne Gilles, COMMENT: ICAO's carbon market report offers valuable lessons for Article 6 talks, March 2020; <<https://carbon-pulse.com/95618/>>.

<sup>72</sup> See also German Emissions Trading Authority (DEHSt) (2019), Avoiding double counting between CORSIA and Nationally Determined Contributions Options for accounting under the Paris Agreement; <[https://www.dehst.de/SharedDocs/downloads/EN/project-mechanisms/discussion-papers/avoiding\\_double\\_counting.pdf?\\_\\_blob=publicationFile&v=4](https://www.dehst.de/SharedDocs/downloads/EN/project-mechanisms/discussion-papers/avoiding_double_counting.pdf?__blob=publicationFile&v=4)>.

<sup>73</sup> Six emission unit programmes out of fourteen applicants immediately met CORSIA's EUC based on the TAB judgement; <[https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/Excerpt\\_TAB\\_Report\\_Jan\\_2020\\_final.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/Excerpt_TAB_Report_Jan_2020_final.pdf)>.

- Climate Action Reserve (CAR) with some strict and reconcilable exclusions;
- The Gold Standard with some strict exclusions;
- Verified Carbon Standard Program (VCS) with some strict and reconcilable exclusions.

Meanwhile, ICAO launched the 2020 TAB assessment of emissions unit programmes, invited emissions unit programmes to apply for evaluation by the TAB against the CORSIA EUC and received eight responses to the call and two material changes to previously-assessed programmes. ICAO invited the public to submit comments on the reactions to the demand for applications and received 24 public comments available in a consolidated form.<sup>74</sup> The TAB submitted its second report to Council in October 2020.<sup>75</sup> After consideration, the Council accepted the TAB recommendations.

The TAB report states that some programmes lack additionality and permanence of emission reductions. To reduce the potential supply of credits, the ICAO also adopted a restriction on the age of offsets (vintage restriction); based on this restriction, credits from projects whose first crediting period started at the beginning of 2016 and which represent emission reductions achieved until the end of 2020, can be used.

### 3 Further concerns

#### 3.1 Biofuels

In addition to the use of offsetting programs, airlines can fulfil their offsetting obligation through *CORSIA eligible fuels*.<sup>76</sup> The emission reductions resulting from the use of alternative fuel (with lower associated GHG emissions) vary considerably, depending on the type of fuel.<sup>77</sup> When taking the emission during the production into account, the emissions profile could be

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<sup>74</sup> Technical Advisory Body (TAB), Public comments received on the responses to the Call for Applications for assessment by the TAB, June 2020; <[https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/TAB%202020/TAB\\_FullAssessment2020\\_PublicComments.FINAL.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/TAB%202020/TAB_FullAssessment2020_PublicComments.FINAL.pdf)>.

<sup>75</sup> Technical Advisory Body (TAB), Recommendations on CORSIA eligible emissions units, October 2020; <[https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/TAB%202020/TAB\\_October2020Report\\_Excerpt\\_Section4\\_EN.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/TAB%202020/TAB_October2020Report_Excerpt_Section4_EN.pdf)>.

<sup>76</sup> See <<https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx>> for details.

<sup>77</sup> ICAO (2018), chapter 3; ICAO (2019a), CORSIA Supporting Document CORSIA Eligible Fuels – Life Cycle Assessment Methodology; <[https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Supporting%20Document\\_CORSIA%20Eligible%20Fuels\\_LCA%20Methodology.pdf](https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Supporting%20Document_CORSIA%20Eligible%20Fuels_LCA%20Methodology.pdf)>; ICAO (2019d), CORSIA Sustainability Criteria for CORSIA Eligible Fuels; <<https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO%20document%2005%20-%20Sustainability%20Criteria.pdf>>; ICAO (2019e), 228.

similar to fossil fuel.<sup>78</sup> The ICAO rules ensure that only fuels, which deliver actual emission reductions, are credited and suffer from several shortcomings.<sup>79</sup> For example, the rules require only that alternative fuel used must provide a minimum emission reduction of 10% compared to kerosene.<sup>80</sup>

Critical is also the use of agricultural land<sup>81</sup> and sustainability in general (water rights, biodiversity and food security).<sup>82</sup> The EU adopted a set of sustainability criteria for alternative fuels. Therefore CORSIA could undermine EU standards regarding sustainability. “Feedstocks for SAF production include woody biomass and forest residue, municipal solid waste (MSW), sugar, starch, and cellulosic biomass. SAF production technologies include hydroprocessing esters and fatty acids (HEFA) in the same way renewable diesel is produced, Fischer-Tropsch (FT), and fermentation of sugars to create alcohol-to-jet synthesised paraffinic kerosene (ATJ-SPK).”<sup>83</sup>

It can be said that some challenges need to be solved *“including (the) availability of feedstock, compatibility of alternative fuels with conventional fuels, environmental concern and production and distribution issues.”*<sup>84</sup>

### 3.2 Offsetting/Trading vs Direct Taxation

Carbon taxes and trade programmes both reduce emissions by encouraging emissions reductions and the development of low-carbon technologies. Trade programmes only generate government revenue when emission allowances are auctioned, which is not the case

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<sup>78</sup> Sustainable Aviation Fuel (SAF) – also known as alternative jet fuel (alt jet), biojet, or renewable jet fuel – is a low carbon drop-in fuel made from renewable sources which can be blended and used with conventional (petroleum) jet fuels without the need to modify aircraft engines and existing fuel distribution infrastructure.

<sup>79</sup> Andrew Murphy, Why ICAO and Corsia cannot deliver on climate, September 2019; <[https://www.transportenvironment.org/sites/te/files/publications/2019\\_09\\_Corsia\\_assesment\\_final.pdf](https://www.transportenvironment.org/sites/te/files/publications/2019_09_Corsia_assesment_final.pdf)>.

<sup>80</sup> ICAO, CORSIA Sustainability Criteria for CORSIA Eligible Fuels, June 2019; <<https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO%20document%2005%20-%20Sustainability%20Criteria.pdf>>: “*Criterion 1: CORSIA eligible fuel shall achieve net greenhouse gas emissions reductions of at least 10% compared to the baseline life cycle emissions values for aviation fuel on a life cycle basis.*”

<sup>81</sup> See for details Chris Malins, Understanding the indirect land use change analysis for CORSIA, December 2019; <[https://www.transportenvironment.org/sites/te/files/publications/2019\\_12\\_Cerology\\_ILUC-in-CORSIA.pdf](https://www.transportenvironment.org/sites/te/files/publications/2019_12_Cerology_ILUC-in-CORSIA.pdf)>.

<sup>82</sup> It can be argued that emissions caused indirect land use changes (ILUC) must be taken into account.

<sup>83</sup> Boutwell Megan, Sustainable Aviation Fuel – the key to CORSIA compliance, November 2019; <<https://stillwaterassociates.com/sustainable-aviation-fuel-the-key-to-corsia-compliance/>>.

<sup>84</sup> Kandaramath Thushara Hari/Yaakob Zahira/Binitha Narayanan N., Aviation biofuel from renewable resources: Routes, opportunities and challenges, 42 Renewable & Sustainable Energy Reviews, 2015, 1234-1244; <<https://ethz.ch/content/dam/ethz/special-interest/baug/ifu/air-control-dam/documents/Umweltseminar/Aviation%20biofuel%20review.pdf>>.

with CORSIA's use of offsetting programs; therefore, a state might prefer a tax. However, setting a baseline at international level ensures a given level of emissions reductions. The main problem of offsets is the difficulty to control sources in other countries and predict price developments.<sup>85</sup> Furthermore, the baseline does not encourage emissions reductions below the set level.

Therefore, it is up to each nation to adopt or redefine national measures to reduce CO<sub>2</sub> emissions from aviation. As part of their NDCs, countries can reduce subsidies and VAT exemptions or adjust airport and fuel taxes to foster climate policy changes.

### **3.3 Avoiding Market Entry Barriers**

CORSIA is based on a political compromise, trying to achieve the right balance between the offsetting requirements for established and younger carriers. In the beginning, not the individual growth is relevant because the average sectoral mission growth is applied uniformly to all airlines. This avoids a situation where young and fast-growing airlines, as well as low-cost carriers, would have to offset considerable shares of their emissions. In contrast, the established ones would only have moderate offsetting obligations.

Not before 2030, the individual emission growth determines the offsetting requirements to an increasing extent. Additionally, new market entrants benefit from an exemption from any offsetting obligations for a period of up to three years, provided that their annual emissions do not surpass 0.1% of global emissions in 2019 at an earlier point.<sup>86</sup>

Of course, it is important to avoid climate regulations that could hinder competition and establish some kind of market entry barriers. Since many national carriers are at least partly state-owned enterprises, there are political limitations in place to restrict the principle of grandfathering rules. However, to wait until 2030 to evaluate and offset an individual airline's emissions under CORSIA does not set the right incentives.

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<sup>85</sup> Kaufman Noah/Obeiter Michael/Krause Eleanor, Putting a Price on Carbon: Reducing Emissions 2016, 27; <[https://files.wri.org/s3fs-public/Putting\\_a\\_Price\\_on\\_Carbon\\_Emissions.pdf](https://files.wri.org/s3fs-public/Putting_a_Price_on_Carbon_Emissions.pdf)>.

<sup>86</sup> § 12 of the Assembly Resolution A39-3.

Despite huge public aid packages trying to save especially fully or partly state-owned airlines during the pandemic many commercial airlines have failed.<sup>87</sup> Depending on the national insolvency and corporate laws new airlines might acquire some of the assets and start operation in a new company shell. The question arises whether such a company can benefit from the 2019 baseline figures or is treated like a new market entrant.

### 3.4 Monitoring, Reporting, Verification and Enforcement

Since CORSIA is based on commitments and voluntariness in no small extent while lacking enforceability, it is crucial and decisive whether the efforts are measurable, reportable and verifiable (MRV).<sup>88</sup> Therefore, an MRV system is an essential component of CORSIA implementation (see offset integrity assessment criteria iii). Data collection on international aviation emissions annually is fundamental for monitoring, reporting, and verifying emissions. Then emissions are compared against the set baseline emissions (2019). In theory, it is just the monitoring of fuel use on each flight and based on the calculation of missions.<sup>89</sup> In practice, states and the ICAO must supervise, whether the reporting of emissions information between aircraft operators and a competent authority is performed correctly in the aircraft operator's annual emissions report. The verification of reported emissions data ensures completeness and avoids misstatements. Part of the reporting requirements is the recording of emissions data covered by CORSIA as well as data that is not covered by CORSIA, to provide the basis to calculate the total emissions and annual offsetting requirements of individual aircraft operators. Aircraft operators report their emissions information to the national state authority every year. Then states report the information required to ICAO, where the data is consolidated and published. The next step is to calculate the annual sectoral growth factor. Thereby, third-party verification of emissions data aims to ensure data consistency and identify potential errors.

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<sup>87</sup> See <https://allplane.tv/blog/2020/1/17/airlines-that-stopped-flying-in-2020>; <https://allplane.tv/blog/2021/2/11/2021-airline-bankruptcy-list-now-open>.

<sup>88</sup> The Bali Action Plan (BAP) highlighted the importance of "measurable, reportable and verifiable" (MRV) greenhouse gas mitigation actions and commitments; see Ellis Jane/Moarif Sara, GHG Mitigation Actions: MRV Issues and Options, 2009; <https://www.oecd-ilibrary.org/docserver/5k4695890xd6-en.pdf?expires=1607671102&id=id&accname=guest&checksum=E70A8116B5840587D0C2B36AF006DA1B>.

<sup>89</sup> For each flight, airlines need to monitor and report three values, the fuel consumed, the type of fuel and the fuel density.

International carbon markets, such as CORSIA are complex. Consequently, there is an apprehension that this gives space for non-compliance, particularly through offsets or alternative fuels which might be ineffective. The question arises, whether ICAO itself could be a strong, independent and transparent regulator of that market; especially some NGOs perceive this situation similar to letting a fox guard the henhouse.<sup>90</sup>

#### 4 Conclusion and Outlook on the Impact of Covid-19

Without any doubt, the CORSIA targets are set below the original EU ETS targets. Compared to the original EU ETS approach, the baseline set by CORSIA is not very ambitious; consequently, the targets are more focused on stabilising and not reducing emissions.<sup>91</sup> Because CORSIA is international, it is impossible to adopt the same rules as within the EU ETS; nevertheless, it is up to national regulators how the enforcement practices under CORSIA will develop. Another critical point is that in the beginning until 2029, CORSIA requires the acquisition of offsets based on total industry growth figures and, in consequence, is not looking at the individual airline's performance; therefore, airlines might be wrongly incentivised.<sup>92</sup> Since many questions are yet to be answered, snap judgements should be avoided. The public will observe the upcoming developments with a critical eye.

Due to the COVID 19 pandemic, commercial air traffic has declined since the beginning of 2020; e.g. the average number of daily departures from China's 25 busiest airports fell by 80% during the period from January to February alone.<sup>93</sup> In March 2020, global commercial air traffic declined by 63% compared to the same period in 2019.<sup>94</sup> As already mentioned, given

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<sup>90</sup> Andrew Murphy, Why ICAO and Corsia cannot deliver on climate, September 2019; <[https://www.transportenvironment.org/sites/te/files/publications/2019\\_09\\_Corsia\\_assessment\\_final.pdf](https://www.transportenvironment.org/sites/te/files/publications/2019_09_Corsia_assessment_final.pdf)>.

<sup>91</sup> Maertens Sven/Grimme Wolfgang/Scheelhaase Janina/Jung Martin (2019), Options to Continue the EU ETS for Aviation in a CORSIA-World, 11 Sustainability 1–19; <<https://www.mdpi.com/2071-1050/11/20/5703>>; Scheelhaase Janina/Maertens Sven/Grimme Wolfgang/Jung Martin (2018), EU ETS versus CORSIA – A critical assessment of two approaches to limit air transport's CO2 emissions by market-based measures, 67 Journal of Air Transport Management, 55–62; <<https://www.sciencedirect.com/science/article/pii/S0969699717303277>>.

<sup>92</sup> Looking at the average sectoral mission growth in the beginning helps younger carriers because while growing they would have to offset a high share of their emissions. Only from 2030–2032 at least 20% will be individual (from 2033–2035 at least 70% individual). Additionally, new entrants are exempted for up to three years, if their annual emissions would not surpass 0.1% of global emissions in 2019 (Resolution A40-19: Consolidated statement of continuing ICAO policies and practices related to environmental protection - CORSIA, §§ 11 lit. e, 12).

<sup>93</sup> Commercial air traffic down 4.3% in February 2020; <<https://www.flightradar24.com/blog/commercial-air-traffic-down-4-3-in-february-2020/>>.

<sup>94</sup> The total number of flights tracked by Flightradar24 in March 2020 was 4,294,685, down 21.6% from 2019. Commercial flights tracked in March were 27.7% lower than 2019; see Tracking March's historic drop in air traffic; <<https://www.flightradar24.com/blog/tracking-marchs-historic-drop-in-air-traffic/>>.



the unprecedented interruptions to global travel flows due to COVID-19, ICAO decided to use the 2020 emission data only as the baseline figure for CORSIA.<sup>95</sup> The aviation industry has been hit hard by the pandemic.<sup>96</sup> Figures for the end of 2020 showed an overall reduction of 51% of seats offered by airlines.<sup>97</sup> Some organisations have criticised the ICAO's decision for setting a bad precedent which might weaken environmental regulations.<sup>98</sup> Assuming a slow recovery, this could eliminate all offset requirements during the CORSIA pilot phase.<sup>99</sup>

The option to adjust CORSIA regulations as a result of unforeseen circumstances that affect the sustainability of the scheme or an inappropriate economic burden on the international aviation industry was already included in the defining document (ICAO Assembly Resolution A40-19). Undoubtedly, a reduced baseline that includes 2020 would have resulted in higher offsetting costs for the carriers, even though the flight volume would be lower than predicted in 2019. ICAO was worried about a scenario where some countries reconsider their participation in the programme's voluntary pilot and first phases.

Already in June 2020, the ICAO Council stated that future CORSIA phases could also be adjusted depending on the state of the aviation sector's recovery.<sup>100</sup> Nonetheless, CORSIA is subject to a periodic review every three years. Therefore, the potential adjustments to subsequent CORSIA phases are not yet known. ICAO noted that considerations on the need and timing to adjust the CORSIA baseline and other design features above would be based on valid technical data and assessment.<sup>101</sup> There will be an essential milestone set for potential

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<sup>95</sup> See <<https://www.icao.int/Newsroom/Pages/ICAO-Council-agrees-to-the-safeguard-adjustment-for-CORSIA-in-light-of-COVID19-pandemic.aspx>>.

<sup>96</sup> In Europe, according to IATA's research, airlines are set to lose \$21.5 billion in 2020, with 6 million jobs at risk; <<https://www.iata.org/en/pressroom/pr/2020-06-18-01/>>.

<sup>97</sup> ICAO, Effects of Novel Coronavirus (COVID-19) on Civil Aviation: Economic Impact Analysis, December 2020; <[https://www.icao.int/sustainability/Documents/COVID-19/ICAO\\_Coronavirus\\_Econ\\_Impact.pdf](https://www.icao.int/sustainability/Documents/COVID-19/ICAO_Coronavirus_Econ_Impact.pdf)>.

<sup>98</sup> See Annie Petsonk, ICAO Council Bows to Aviation Industry Request to Rewrite First Three Years of Climate Program Rules, June 2020; <<https://www.edf.org/media/icao-council-bows-aviation-industry-request-rewrite-first-three-years-climate-program-rules>>.

<sup>99</sup> Gabriel Gordon-Harper, CORSIA Baseline Adjustment in Response to COVID-19: A Blessing or a Curse?, September 2020; <<https://sdg.iisd.org/commentary/policy-briefs/corsia-baseline-adjustment-in-response-to-covid-19-a-blessing-or-a-curse/>>.

<sup>100</sup> ICAO, June 2020: „In addition to the safeguard during the pilot phase, there could be implications to the subsequent phases of CORSIA in light of how the sector's recovery would take place, and more data and analysis of the situation and impacts on CORSIA will be needed. In light of paragraph 17 of Resolution A40-19 on the CORSIA periodic review beginning in 2022, which coincides with the next session of the ICAO Assembly, States are expected to undertake a review of CORSIA for its possible adjustments to be applied from subsequent phases.“; <<https://www.icao.int/Newsroom/Pages/ICAO-Council-agrees-to-the-safeguard-adjustment-for-CORSIA-in-light-of-COVID19-pandemic.aspx>>.

<sup>101</sup> ICAO, CORSIA and COVID-19; <<https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-and-Covid-19.aspx#:~:text=31%20August%202020%20for%20a,the%20operators'%20verified%20Emissions%20Reports>>.

adjustments since in October 2022, the CORSIA annual Sector's Growth Factor (SGF) corresponding to the year 2021 emissions will be provided to allow for the calculations needed for the 2021 offsetting requirements of individual aircraft operators attributed to them.

It can be assumed that these developments will accompany the legislative process of the European Commission's proposal to reform the EU ETS Directive. Under the Paris Agreement, the EU has included emissions from aviation, excluding the use of international credits. Therefore, a reduction in Europe's climate ambition will contradict commitments under the Paris Agreement.

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