The Extraordinary Climate Agreement on International Aviation: An Airline Industry Perspective

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Summary

The Carbon Offset and Reduction Scheme for International Aviation (CORSIA), adopted by the International Civil Aviation Organization (ICAO) in October 2016, addresses the growth in total CO_2 emissions from international aviation above 2020 levels. Prior to the scheme, there was a high risk that states would introduce climate policies that would lead to a costly patchwork of overlapping and distortive measures. The International Air Transport Association (IATA) played a crucial role in developing workable solutions that helped secure a global approach to addressing CO_2 emissions from international aviation. (ICAO is an international governmental organization, and IATA is a business association.)

No other sector has a climate policy that places an absolute global cap on net CO_2 emissions. A key design feature of CORSIA is that it incorporates the concept of shared responsibility for managing CO_2 emissions. The offset responsibility of individual carriers is, initially in full and later in part, determined by the industry CO_2 growth factor. Furthermore, the scheme is phased in a way that addresses the special circumstances and respective capabilities of developing countries while ensuring uniform treatment of aircraft operators.

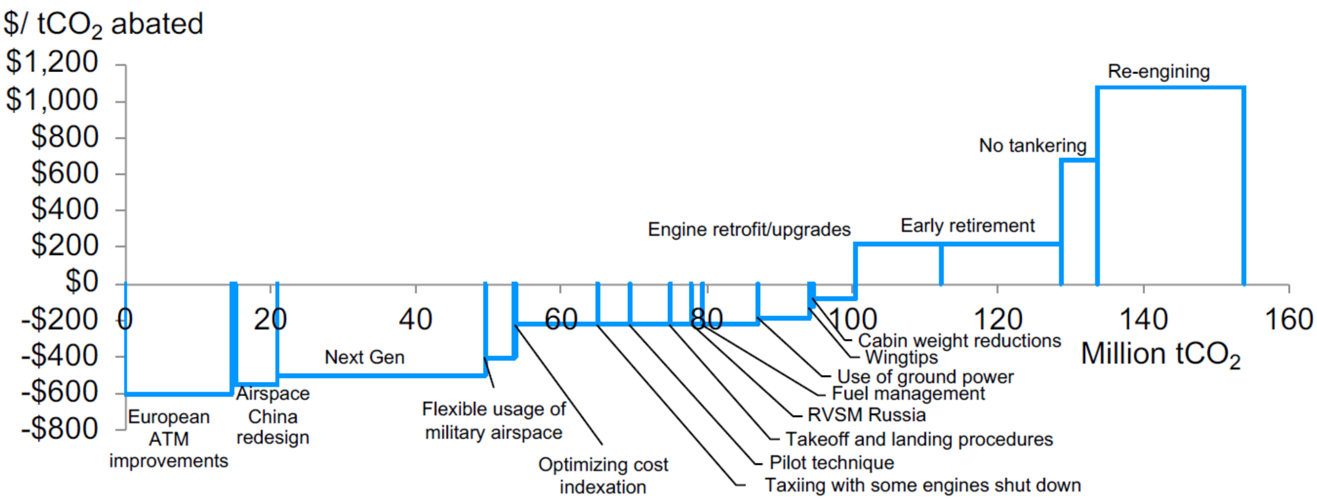
This paper has six sections. It starts by introducing the key relevant characteristics of air transport. The second section provides historical context in which the industry climate change strategy was developed. The third section provides an overview of the technical work of the IATA Climate Change Task Force. The fourth section highlights the key industry decision points taken by IATA members. The fifth section explains the key design features of CORSIA as adopted by ICAO. The last section highlights next steps for CORSIA implementation.

Introduction

The aviation industry offers a critical service in the modern economy. In 2018, the sector enabled over 4.4 billion passenger journeys and delivered over 63 million metric tons of freight. In performing these services, airlines emitted 905 million metric tons of CO_2, which is equivalent of about 2% of global greenhouse gas emissions. International aviation corresponds to about two-thirds of total commercial aviation CO_2 emissions.[1,2] ICAO's twenty-year traffic forecast (2010 - 2030) for international aviation projects a compound average annual growth rate of about 5.3% per year, with low- and high-bound estimates of 4.2% and 5.7% respectively. Most ICAO scenarios for estimating the scale of aircraft fuel-efficiency improvements point to a range of 1% to 1.5% improvement in fuel efficiency per year. Based on these parameters, CO_2 emissions from international aviation are expected to double in 15 to 26 years.

Curbing the contribution of aviation to climate change is more cost-effective by tapping into the abatement potential in other sectors. Beyond fleet renewal and improvements in load factors, the sector has high CO_2 abatement costs. There is some scope to achieve negative cost abatement through improvements in air navigation services and airline operations. However, there are non-price barriers that prevent realizing these opportunities. The first positive cost abatement opportunities within the aviation sector start at about $200 per tCO_2 (see Chart 1).

Chart 1: Economics of CO_2 abatement within aviation, cost curve in 2030



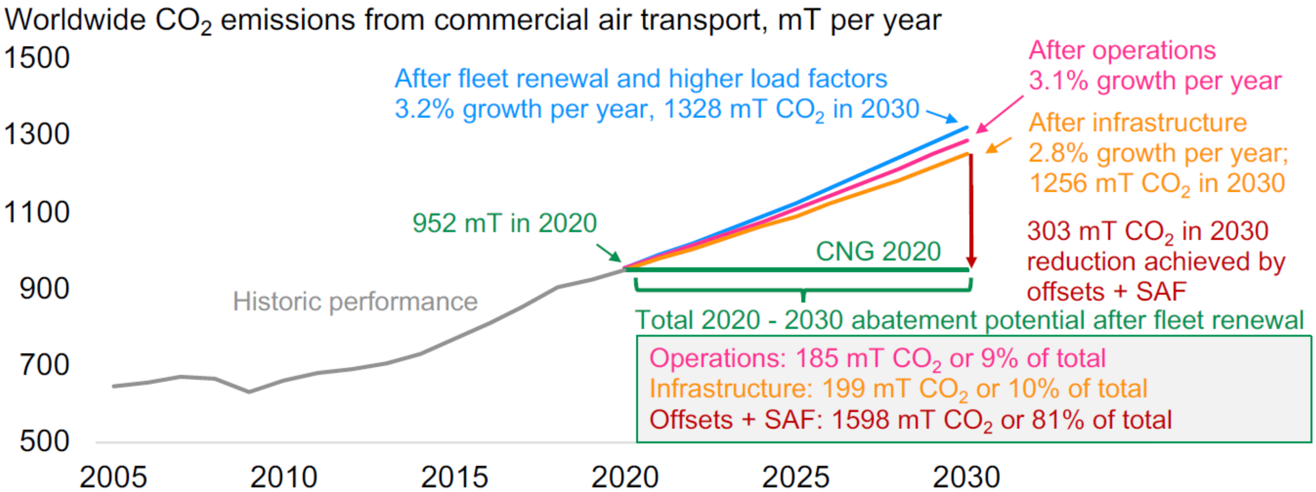
Source: Veritas Global using data from IATA March 2016 presentation (McKinsey & Company, IATA)
Note: Jet fuel price assumption $90 per barrel

Historical context

In 2008, in an effort to secure a global approach for addressing CO_2 emissions for the sector, the industry adopted three climate targets and a four-pillar strategy. One of the targets adopted was to cap net aviation CO_2 emissions from 2020 or carbon neutral growth from 2020 (CNG 2020). The four-pillar strategy focuses on more efficient aircraft operations, infrastructure improvements, improved technology, and a single global market-based measure (MBM). The industry targets and four-pillar strategy can be considered as the genesis of CORSIA. It was at this point that the aviation industry accepted the concept of an absolute cap on net CO_2 emissions and the use of a single global MBM as part of the solution. However, at this point, it was still unclear which MBM would be preferred.

In the short-to-medium term, offsets and sustainable aviation fuels (SAF) are the most important components for achieving the industry target of CNG 2020 (see Chart 2). However, the uptake in SAF has been much slower than expected. Therefore, in the short-to-medium term, the MBM will likely be the most significant contributor to delivering on the industry target of CNG 2020.

Chart 2: Offsets and SAF most important components of aviation climate strategy



Source: Veritas Global using data on growth rates and abatement potential from IATA July 2013 presentation to ICAO and industry-wide CO_2 emission estimates from IATA Economic Performance reports

After adopting the targets and strategy, the industry was keen to put it into action. Up to December 2009, it was advocating to be included in the second commitment period of the Kyoto Protocol. In effect, it wanted to have an allocation of Assigned Amount Units[3] from the United Nations Framework Convention on Climate Change (UNFCCC) for international aviation, but with operational aspects of the scheme designed under ICAO. However, at the UNFCCC Conference of the Parties (COP) in Copenhagen in December 2009, the top-down international climate regime started to collapse.

The subsequent COP, in December 2010 in Cancun, set the groundwork for a bottom-up climate framework that, among other differences from the Kyoto Protocol, no longer utilized Assigned Amount Units. At the same time, the European Union (EU) was moving forward with implementation of integrating all international flights to and from the EU into its Emission Trading Scheme (ETS). Retaliatory measures from other states caused increasing concern, and the likely policy trajectory started to resemble a patchwork of overlapping measures. The industry also faced pressure from other state and non-state actors that targeted aviation as a source of revenue.

In 2011, with prospects of a global ETS seen as highly unlikely, the IATA Climate Change Task Force started to develop a global offsetting scheme that would be taken forward at ICAO. The task force was led by IATA and was comprised of environment directors from leading airlines and directors general of the main regional airline associations.

Technical work of the IATA Climate Change Task Force

Assessing the scenarios

The adoption of a global offsetting scheme would imply additional cost to industry without any observable improvement in service quality. Most competitive industries will resist such measures unless they were necessary to avoid larger cost increases. Therefore, one of the first tasks was to model the policy scenarios of the emerging patchwork of measures.

All modelled patchwork scenarios implied much higher cost to industry, compared to a single global MBM with a target of CNG 2020. For example, one variant of the worst-case patchwork scenario estimated that climate-policy costs would be equivalent of about 10% of industry revenues in 2030. In comparison, CNG 2020 would cost the industry less than 1% of industry revenues in 2030. In addition to higher costs, the patchwork scenarios would have a greater administrative burden and cause distortions in the air transport network. A large airline can use airspace and offer services in over 100 jurisdictions. Having to comply with different climate policies across jurisdictions would be administratively onerous. Furthermore, under some of the patchwork scenarios, airlines would be paying more than once for their CO_2 emissions, whereas under CNG 2020 the industry would need to offset only the growth in emissions after 2020. The scenario modelling proved very effective at securing industry consensus on the urgent need to operationalize CNG 2020. Whenever negotiations got stuck, the scenario analysis was used to remind airlines of the stakes involved and the cost-saving opportunity that a single global MBM presented.

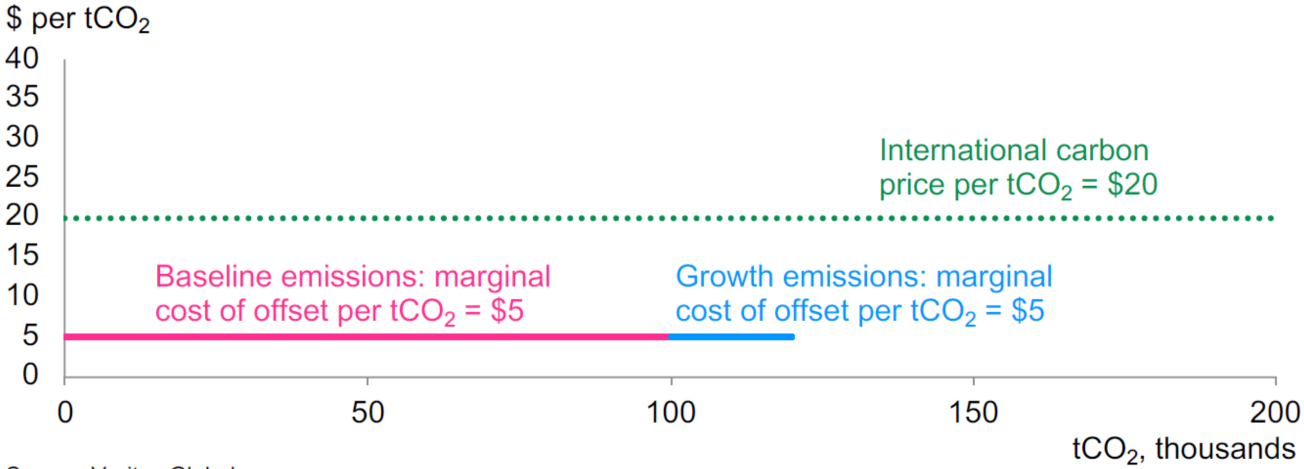
Allocating offset responsibility to individual carriers

The most contentious part of the work was determining how to allocate the offset responsibility to individual carriers for growth in industry CO_2 emissions above the 2020 baseline. From the perspective of carriers, the primary concerns were to have a scheme that would not distort competition, be low in administrative burden and minimize cost. Carriers also wanted to build in provisions that would recognize past and future achievements of individual carriers in reducing aviation CO_2 emissions.

Several metrics were assessed for how to allocate offset responsibility for industry growth emissions above the 2020 baseline. These included allocations based on: (i) applying a sectoral CO_2 growth factor to individual carrier CO_2 emissions; (ii) the individual carrier growth in CO_2 emissions; (iii) share of traffic; and (iv) share of capacity. The analysis showed that allocating offset responsibility on the basis of traffic share and capacity share would significantly disadvantage some business models. Using these metrics would accentuate the impact of characteristics such as aircraft configuration and load factor performance, beyond the differences in CO_2 emission performance. Therefore, these metrics were dropped early on in scheme development. Allocation of offset responsibility based on the individual carrier growth rate in CO_2 emissions and applying a sectoral CO_2 growth factor to individual carrier CO_2 emissions both had their advantages and disadvantages and were the central focus of the analysis for the task force.

Determining the offset responsibility by applying a sectoral CO_2 growth factor to individual carrier CO_2 emissions effectively meant having a collective target that was apportioned to individual carriers based on their relative share of CO_2 emissions. This approach had the advantage of being conceptually simple. There was also no distinguishing between baseline and growth emissions. Therefore, there was less of a need to introduce additional provisions for recognizing past and future achievements of individual carriers. However, this also meant that the marginal cost of emitting would be lower than the cost of offsetting (see Chart 3). This is because the offsetting responsibility, calculated based on the sector growth factor, was assessed against a carrier's total emissions and therefore only a percentage of a marginal emission would need to be offset.

Chart 3: Under sectoral, marginal cost of emitting is lower than the cost of offsetting



Source: Veritas Global

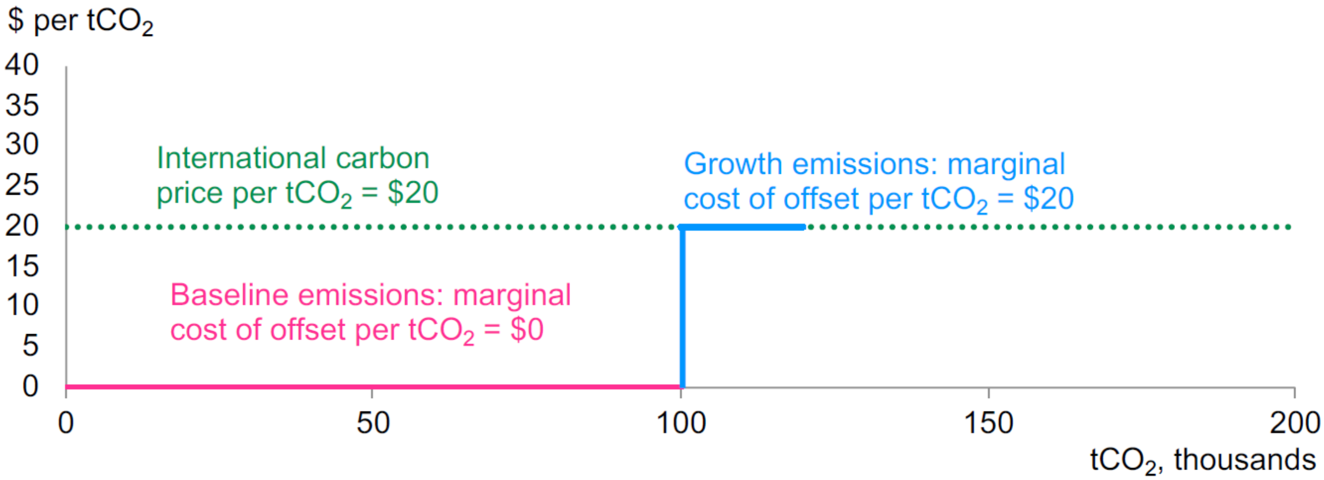
Notes: Example modelled assumes airline CORSIA baseline is 100,000 tCO_2 and grew 20% in CO_2 emissions. International aviation emissions covered by CORSIA are assumed to grow by 25% and the international carbon price is assumed to be $20 per tCO_2 - both are exogenous to individual airline emissions.

The offsetting mechanism was not intended to reduce emissions from aircraft operations. Therefore, this design feature (of having the marginal cost of emitting be lower than the cost of offsetting) would not compromise the efficiency of the scheme. As highlighted in Chart 1, the first positive cost abatement opportunities within the sector start at about $200 per tCO_2. As long as other sectors are in a position to deliver offsets at or below $200 per tCO_2, the efficiency of the offsetting scheme will not be substantially compromised by having the marginal cost of emitting be lower than the cost of offsetting. The only exception to this relates to the use of SAF. However, accounting rules can allow the use of SAF to be counted against the offset responsibility (rather than the carrier's CO_2 emissions), which would effectively mean the marginal benefit to the carrier from using SAF will be equal to the cost of offsetting.[4]

The larger issue with the sectoral approach was ideological. Carriers with flat or even declining emissions post-2020 could find themselves with rising offset liabilities, as the offset responsibility would be determined by industry growth dynamics. Ideologically this was a major barrier for making this approach palatable to commercially-minded representatives of a fiercely competitive industry. When this approach was first presented to the task force in October 2011, airlines observed that it was a useful thought experiment but unlikely to work in practice. A director general from a fast-growing aviation region openly stated, "Even though my carriers would benefit from this approach, there is no way an airline CEO will agree to pay for the emissions of his faster growing competitors. What you are proposing is socialism." While the approach remained on the table, the focus of the analytical work increasingly shifted to designing a scheme based on allocating offset responsibility using the individual carrier growth rate.

Determining the offset responsibility based on the individual carrier growth rate in CO_2 emissions effectively meant assigning the target of CNG 2020 to individual carriers. This approach had the greatest conceptual appeal, as businesses could manage their carbon liability based on individual actions. The other major advantage of this approach was that it ensured that for growth emissions, the marginal cost of emitting was equal to the cost of offsetting (see Chart 4).

Chart 4: Under individual, marginal cost of growth emissions is equal to offset cost



Source: Veritas Global

Notes: Example modelled assumes airline baseline is 100,000 tCO_2 and grew 20% in CO_2 emissions. The international carbon price is assumed to be $20 per tCO_2 and is exogenous to individual airline emissions.

In addition to the carrier specific CNG 2020 baseline, carriers wanted to introduce adjustments that would take into account past achievements and ease the offset cost burden on higher growth carriers. To avoid creation of entry barriers, the individual approach also required the introduction of a new entrant adjustment. Introducing these adjustments implied inflating the industry CNG 2020 baseline, as carriers were not open to reducing their individual baselines to accommodate adjustments. The reserves needed to accommodate these adjustments would in part also be sourced from carriers that ceased operation and carriers with declining emissions, since the scheme did not allow for transfer of the baseline allocation. The net result of adding reserves to accommodate adjustments would lead to inflating the CNG 2020 baseline by about 3-4 years. This was considered to be a reasonable accommodation that did not compromise the overall integrity of the scheme.

Approach to phasing and other issues

Several parameters were used to model how the scheme could be phased across states based on measures of economic development and aviation market maturity. Despite extensive modelling and discussion, the industry was uneasy about taking a view on issues that were highly political in nature. Although slower phasing of the scheme would reduce costs for industry, it could also give rise to competitive distortions. A particular concern was that some airlines could benefit from an unfair advantage if they operated international hub networks from exempt states.

Such airlines could indirectly serve markets that were otherwise included within CORSIA. Therefore, the priority for industry was to retain, to the extent possible, the integrity of the CNG 2020 target and limit the scope for exemptions. Instead of proposing specific thresholds for phasing, the industry developed a set of principles. If any states were to be exempt from the scheme, industry wanted to have the exemptions applied at the route level with uniform application to all aircraft operators.

The task force also worked on developing a framework of monitoring, reporting and verification, as well as criteria for identifying quality carbon offsets.

Industry decisions and implications

In June 2013, with the 38th ICAO Assembly only months away, IATA members adopted principles on the key design features of the carbon-offset mechanism that were entirely based on the individual approach.[5] Behind closed doors, a number of developing country carriers and regional associations had expressed concerns with this approach. However, industry unity was placed above individual differences. The industry was keen to make progress on a single global MBM. The EU had threatened, in the absence of sufficient progress at the 38th ICAO Assembly, to "snap back" the application of EU ETS provisions on international aviation, which it had put on hold in December of 2012.

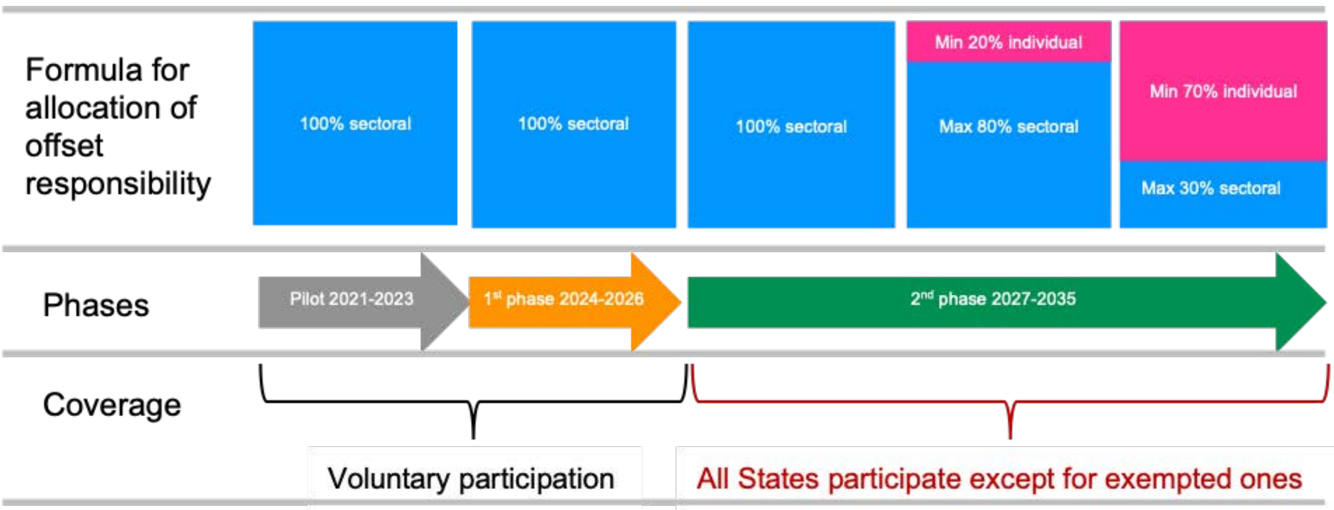
The 38th ICAO Assembly delivered sufficient progress to put EU concerns at bay. The discussions that followed, through processes launched by ICAO, were useful in highlighting the diverse set of perspectives, especially from developing and emerging economies. The complexity of the adjustments that accompanied the individual-approach proposal from industry proved too cumbersome for the ICAO process. Given these dynamics and the difficulties encountered with securing adjustments under the individual approach, developing country airlines were no longer inclined to support a carbon offset scheme entirely based on the individual approach. In June 2016, months before the 39th ICAO Assembly, IATA members called for the use of both sectoral and individual approaches for determining offset responsibility of carriers.[6]

In October 2016, the 39th ICAO Assembly adopted the CORSIA scheme with both sectoral and individual components. Furthermore, the scheme also reflects key concerns of airlines related to having a route-based approach for scheme-phasing in a way that ensures uniform treatment of all operators on the same route.

Key design features of CORSIA

In its current form, CORSIA is a carbon offsetting scheme that addresses the growth in total CO_2 emissions from international aviation above 2020 levels. There are three key features of CORSIA: a formula for allocating offset responsibility, a phased approach to implementation, and provisions related to scheme application. The scheme will be under periodic review and is also underpinned by a process for monitoring, reporting, and verification of CO_2 emissions from international aviation, covering all states.

Chart 5: CORSIA has three key design elements



Source: Veritas Global

Each airline will need to offset a proportion of their total CO_2 emissions covered by CORSIA on the basis of an industry growth factor above the 2020 baseline. In later years of the scheme (2030-2035), the offset responsibility for carriers is determined through a combination of the industry CO_2 growth factor and the individual carrier CO_2 growth rate above the 2020 baseline. The baseline for 2020 emissions is determined by the average CO_2 emissions in 2019 and 2020.

There are three phases in CORSIA. The pilot phase (2021-2023) and first phase (2024-2026) are voluntary. As of 16 July 2019, 81 states representing 76.6% of international aviation activity have expressed their intention to voluntarily participate in CORSIA from its outset.[7] The second phase (2027-2035) is mandatory for all states, except for Least Developed Countries, Small Island Developing States, Landlocked Developing Countries and states that represent a very small share of international aviation.[8] By the second phase, CORSIA is envisioned to cover states that represent at least 90% of total international aviation activity.[9] To limit the administrative burden of the scheme, there are some finite technical exemptions for aircraft operators.

Next steps

For CORSIA to function effectively, there is an urgent need to secure a credible source of carbon offsets. ICAO is currently working towards an agreement on emission unit criteria. Offsets used by aviation need to be consistent with the broader climate-policy framework under the UNFCCC Paris Agreement and ensure no unintended double-counting of emission reduction efforts.

In the medium term, it may be necessary to introduce adjustments to CORSIA. In particular, as the scheme shifts from having the offset responsibility determined entirely by the sectoral growth factor to being more weighted towards the individual carrier growth component. A greater weighting on the individual approach implies a differential treatment between baseline and growth emissions at the carrier level. This would disadvantage carriers that grow more after 2020. Therefore, similar concerns may arise as were raised during the work of the IATA Climate Change Task Force. If left unaddressed, this can have broader implications for competitive dynamics in airline markets, especially if the cost of carbon offsets rises.

More broadly, the aviation industry needs to devote more attention to commercializing SAF. In the long term, by 2050, the aviation industry is targeting a net reduction of CO_2 emissions of 50% from 2005 levels. In the absence of commercial deployment of SAF, this target will likely impose a significant offset cost burden to industry. Furthermore, a strategy that is over-reliant on offsets, while economically sound, may prove politically untenable in the future.

Although challenges remain, CORSIA represents an extraordinary achievement. A key focus of industry and policy makers needs to be on ensuring that CORSIA is fully implemented with the broadest possible participation. This will enable international aviation to address its CO_2 emissions while continuing to deliver a critical service for the modern economy.

Notes

1. IATA June 2019, Airline Industry Economic Performance.

2. ICAO 2016, Environment Report. https://www.icao.int/environmental-protection/Pages/env2016.aspx

3. Assigned Amount Units are tradeable carbon credits under the Kyoto Protocol assigned to states; one unit represents an allowance to emit greenhouse gases equivalent to one metric ton of CO_2.

4. This accounting method is consistent with the approach under development at ICAO.

5. Resolution on the Implementation of the Aviation "CNG2020" Strategy.https://www.iata.org/pressroom/pr/Documents/agm69-resolution-cng2020.pdf

6. 72nd IATA Annual General Meeting: Resolution on the Development of a Global Market-Based Measure for International Aviation.https://www.iata.org/pressroom/pr/Documents/iata-agm-2016-resolution-mbm.pdf

7. ICAO document "CORSIA States for Chapter 3 State Pairs."https://www.icao.int/environmental-protection/CORSIA/Pages/state-pairs.aspx

8. Second phase applies to all states that have an individual share of international aviation activities in Revenue Tonne Kilometers (RTKs) in year 2018 above 0.5 per cent of total RTKs or whose cumulative share in the list of States from the highest to the lowest amount of RTKs reaches 90 per cent of total RTKs.

9. If states covering 90% of RTKs are to be included, the relative share of CO_2 emissions covered by the scheme would be considerably below 90%. This is because exemptions would extend to all flights performed to and from exempt states and not only to the airlines registered there.

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While Senior Economist at the IATA Chief Economist Office, George Anjaparidze led the design of CORSIA and was the lead economist on air cargo and aviation infrastructure. He is currently CEO of Veritas Global, a Swiss economics and strategy think tank and advisory: www.veritasglobal.ch

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