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NAVIGATING THE SKIES: ADDRESSING THE REGULATORY SHORTCOMINGS OF CORSIA AND THE CARBON MARKET WHILE PROPOSING A REVISED FRAMEWORK FOR ACCOUNTABILITY AND ENFORCEMENT

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Abstract

The aviation industry is no stranger to the climate debate and has long been a recognized contributor to climate change. The prevalence of civil aviation and its demand has only risen in the past half-century, now reaching a climactic point where industry leaders, regulators, and policymakers alike must address the vexing dilemma of how to shield profit margins—and the future existence of the industry altogether—while also addressing the increasingly pressing concerns of the climate question.

Regulatory efforts have been underway on both a domestic and international scale since the turn of the century, from the inception of emissions reduction targets in the Kyoto Protocol and the Paris Agreement, to the more recent emergence of market-based instruments such as the aviation sector's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). However, the historical trajectory of aviation

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emissions and their accompanying regulatory responses have failed to yield clear mitigating results; rather, they have further exacerbated the issue. Notably, market-based instruments such as carbon and emissions trading schemes are highly novel, presenting unique legal issues that can manifest into unfair practices, counterproductive procedures, and expensive litigation. To curtail future impediments to CORSIA, international regulators, such as the International Civil Aviation Organization (ICAO) and the domestic counterparts of each member state, must demand cooperation—rather than bare-minimum compliance—from industry leaders and business interests that will fall under the purview of CORSIA in the near future.

The present article discusses the regulatory nature of CORSIA and similar carbon emissions trading schemes in their current state, including how they are intended to function and interact with the carbon market and its individual actors, and whether international and domestic aviation regulatory bodies should adopt a revised framework to achieve the ultimate goal of *reducing* aviation-related emissions. Part I discusses the inevitable rise of greenhouse gas emissions with respect to civil aviation and global reduction initiatives undertaken as a result. Part II provides a historical analysis of the legal nuances and policies surrounding carbon emissions trading schemes currently utilized by the aviation sector, such as CORSIA, along with an overview of the carbon market and the role of each market participant, as well as how the scheme is intended to function, and whether it is indeed doing so. Part III examines possible revisions to the current scheme that address any regulatory vulnerabilities while recommending the most feasible solutions and regulations to avoid misuse of the program and eliminate the prevalence of offset project failures.

I. Introduction

Shortly before the COVID-19 pandemic brought the global economy to a grinding halt, international aviation was experiencing its highest demand in history, seeing upwards of 100,000 flights departing from airports around the world daily.¹ Three years later, the financial implications of the pandemic on the aviation sector appear to have nearly subsided

1. Meyers, Joe; Hutt, Rosamond, *This Visualization Shows You 24 Hours of Global Air Traffic – In Just 4 Seconds*, World Economic Forum (July 16, 2016), <https://www.weforum.org/agenda/2016/07/this-visualization-shows-you-24-hours-of-global-air-traffic-in-just-4-seconds/>.

completely.² In addition to the industry's miraculous recovery to near pre-pandemic levels, demand for air travel is expected to double by the year 2040.³ Unsurprisingly, this rapid recovery within the sector has reignited lingering concerns regarding the environmental consequences of such an imperative industry.⁴ Regulating civil aviation presents its own slew of challenges, in part by the international nature of its commercial activities and vast array of market participants. The establishment of international regulatory agencies, such as ICAO, has signaled that a global cooperative effort to regulate the industry is attainable. ICAO has outlined its objectives "to improve the operational safety, security, efficiency and regularity of national and international civil aviation."⁵ The ICAO Council has convened on numerous occasions to discuss the advent of addressing aviation's contribution to climate change on a global scale, most notably in 2010, where the ICAO Assembly adopted two primary objectives of "improv[ing] energy efficiency by 2 percent per year until 2050, [and] . . . to achieve carbon neutral growth from 2020 onwards."⁶ ICAO has provided member states with a so-called "basket of measures" to utilize in their efforts to achieve this goal, ranging from sustainable aviation fuels to operational improvements.⁷ However, the most intriguing egg in the basket hatched at the 39th session of the ICAO Assembly in 2016, where the Council introduced a "global market-based measure scheme for international aviation," called the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).⁸

2. International Air Transport Association, "Global Outlook for Air Transport - June 2023," <https://www.iata.org/en/iata-repository/publications/economic-reports/global-outlook-for-air-transport---june-2023/>.

3. *Id.*

4. Environmental and Energy Study Institute, "Fact Sheet: The Growth in Greenhouse Gas Emissions from Commercial Aviation," <https://www.eesi.org/papers/view/fact-sheet-the-growth-in-greenhouse-gas-emissions-from-commercial-aviation#:~:text=Carbon%20Emissions%20from%20International%20Aviation,-In%20its%202019&text=ICAO%20reports%20GHG%20emissions%20from,and%20non%20DCO2%20climate%20effects>.

5. International Civil Aviation Organization, "Mission," [https://www.icao.int/secretariat/technicalcooperation/pages/whoweare.aspx#:~:text=Mission,and%20Recommended%20Practices%20\(SARPs\)](https://www.icao.int/secretariat/technicalcooperation/pages/whoweare.aspx#:~:text=Mission,and%20Recommended%20Practices%20(SARPs)).

6. International Civil Aviation Organization, "ICAO Environmental Report 2019," [https://www.icao.int/environmental-protection/Documents/ICAO-ENV-Report2019-F1-WEB%20\(1\).pdf](https://www.icao.int/environmental-protection/Documents/ICAO-ENV-Report2019-F1-WEB%20(1).pdf).

7. International Civil Aviation Organization, "ICAO Submission to SBSTA50," https://www.icao.int/environmental-protection/Documents/SBSTA50%20ICAO%20submission_Final.pdf.

8. *Id.* at 4.

A. CORSIA's Adoption in the United States and Current Monitoring, Reporting, and Verification Structure

CORSIA and its accompanying Standards and Recommended Practices (SARPs) have been adopted by participating member states in the form of Annex 16, Volume IV to the Convention on International Aviation.⁹ The United States' domestic regulatory counterpart to ICAO—the Federal Aviation Administration (FAA)—has described the program as “a global market-based measure designed to offset international aviation CO2 emissions in order to stabilize the levels of such emissions.”¹⁰ The process of offsetting is theoretically achieved by the acquisition and cancelation of emissions units from the global carbon market by airplane operators.¹¹ Under CORSIA, all ICAO member states whose airplane operators undertake international flights were required to develop a system for monitoring, reporting, and verifying (MRV) of CO2 emissions, from those international flights starting January 1, 2019.¹² The FAA has developed and since implemented its own MRV program—simply called CORSIA MRV—open to U.S. carriers on a voluntary reporting basis for the initial phase of the program.¹³ Once member states compile their data and report it to ICAO, it is then complemented with the calculation of offsetting requirements associated to the emissions from those international routes connecting participating states.¹⁴

B. Aviation Activities Excluded from CORSIA's Regulatory Umbrella

It is important to note that CORSIA only applies to international flights, excluding domestic aviation activity.¹⁵ Additional excluded activities include humanitarian, medical, and firefighting operations, operations on behalf of the military, and operations using an airplane with a maximum

9. International Civil Aviation Organization, “SARPs - Annex 16 - Volume IV,” <https://www.icao.int/environmental-protection/CORSIA/Pages/SARPs-Annex-16-Volume-IV.aspx>.

10. *Id.*

11. *Id.* at 10.

12. *Id.* at 12.

13. U.S. Federal Aviation Administration, “FAA Fact Sheet – Aviation and Climate Change,” <https://www.faa.gov/media/29121>.

14. *Id.*

15. International Civil Aviation Organization, “CORSIA FAQs - December 2022,” https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_FAQs_Dec2022.pdf.

certificated take-off mass equal to or less than 5,700 kg.¹⁶ CORSIA is set to be implemented in three stages: a pilot phase which began in 2021, spanning to the end of 2023; a first phase from 2024 to 2026; and a second phase, set to begin at the start of 2027 until 2035.¹⁷ The first two phases are voluntary, with 125 member states already participating as of 2023, while the second phase will become mandatory for all member states absent an exemption.¹⁸ Conditions that warrant exemption include states whose individual share of international aviation activities in Revenue Tonne Kilometers (RTKs) in the year 2018 fall below 0.5% of total RTKs, and states that are not part of the list of states that account for 90% of total RTKs when sorted from the highest to the lowest amount of individual RTKs.¹⁹ In September of 2022, ICAO decided that the global emissions baseline for CORSIA from 2024 until the end of the scheme in 2035 will be 85% of 2019 emissions.²⁰ The baseline establishes a standard that serves as a reference point for greenhouse gas emissions produced from civil aviation going into the future that qualifying airlines must adhere to and must subsequently offset when exceeded.

C. Emerging Issues Involving the Voluntary Phase of CORSIA and Its Interaction with the Pre-existing Carbon Market

Although a vast number of member states have opted for the voluntary phases of CORSIA as mentioned, the future of the program has been shrouded with skepticism regarding its long-term effectiveness in actually achieving its goals.²¹ This uncertainty is not limited to only CORSIA in particular, rather, it includes the offsetting credits circulating through the carbon market that airlines are permitted to utilize to fulfill their obligations.²² The carbon offsets are vulnerable to the following kinds of

16. International Air Transport Association, *CORSIA Handbook*, IATA (Jan. 2024), <https://www.iata.org/contentassets/fb745460050c48089597a3ef1b9fe7a8/corsia-handbook.pdf>.

17. ICAO, *supra* note 15.

18. *Id.* at 18.

19. *Id.*

20. International Air Transport Association, "*CORSIA - Carbon Offsetting and Reduction Scheme for International Aviation*," <https://www.iata.org/en/iata-repository/pressroom/fact-sheets/fact-sheet---corsia/#:~:text=In%20October%202022%2C%20at%20its,planned%2C%20which%20the%20industry%20supported>.

21. Transport & Environment, "*Assessment of CORSIA's Environmental Integrity and Credibility*," https://www.transportenvironment.org/wp-content/uploads/2021/07/2021_03_Briefing_Corsia_EU_assessment_2021.pdf.

22. *Id.*

problems that regulators need to account for through either better regulation or enforcement. First, the questionable quality of the offsets offered has raised concerns as to whether the offsetting activity actually occurs, or often double counting offsets.²³ For example, one finding in a European Commission (EC) study into CORSIA to inquire as to how it may interact with the EU-ETS (European Union Emissions Trading System) indicated that “[a] large share of existing projects are delivering emission reductions in sectors that are already covered by their respective country’s current climate targets and double counted.”²⁴ This finding highlights a dire need for reinforcing verification standards when ICAO chooses which registries to furnish to airlines as valid offsets.

Concerns surrounding the quality of offsets subsequently lead to the second issue, the oversaturation and pricing of the offsets, which is exacerbated by the apparent lack of transparency and enforceability of the scheme.²⁵ The EC study further found that there are currently more eligible carbon offset credits available under CORSIA than there is demand, some at exorbitantly low prices, and this same demand is expected to persist throughout the entire life-cycle of the program.²⁶ This can incentivize airlines to simply pay a small price for likely-phony credits rather than pursuing long-term—albeit costly—methods such as sustainable aviation fuels (SAF).²⁷

Moreover, on the issue of transparency, member states are currently not required to publish the final offsetting requirements of their airline operators, meaning “there is no way of checking whether states are actually implementing CORSIA.”²⁸ Without some form of accountability for non-compliance, airline operators are further disincentivized from participating if they do not want to, and with cheap offsets constantly circulating within the voluntary market throughout the entire life-cycle of the program without caps on purchases, those who do find it cheaper to buy offsets than improving their operations can actually make the climate problem worse, not better.

The final concern is that CORSIA simply does not cover large swaths of the aviation sector including key markets such as China, Russia, India, Brazil, and Vietnam, which have not yet signed on for the voluntary phases,

23. *Id.*

24. *Id.*

25. *Id.* at 9.

26. *Id.* at 6.

27. *Id.*

28. *Id.* at 2.

posing a lingering question as to how these states may transition to a mandatory phase, if at all.²⁹ Even member states who have opted for the voluntary phase have yet to develop domestic regulatory regimes to enforce it, including large markets such as the United States, which “don’t yet have binding regulations to implement it, which further damages the scheme’s ability to neutralize aviation’s emissions growth.”³⁰ Absent regulations and enforcement mechanisms that address these issues, airlines are simply not properly incentivized to reduce their emissions considering “it is cheaper for airlines to continue polluting and buying offsets than actually reducing emissions by using clean fuels.”³¹

The United Nations Development Program has emphasized that “[i]f held to high standards of integrity and transparency, carbon markets can help accelerate the transformation needed, by effectively putting a price on pollution and creating an economic incentive for reducing emissions.”³² Nevertheless, each issue posed will require a thorough exploration of the actual carbon market these credits are circulating through, and how each market actor, whether it be the regulators, the airlines, or the registries that issue them, interacts with it.³³ Only then can ICAO and individual domestic regulatory authorities undertake a thorough inquiry as to what changes may need to be applied to the current framework, as well as the various legal, technical, and logistical steps that must be considered.

II. Civil Aviation’s Historical Contribution to Climate Change, Recent Regulatory Responses, and the Role of the Carbon Market and its Participants

The inception of modern aviation regulation dates to the mid-twentieth century when civil aviation began to take shape and gain widespread popularity on a global scale.³⁴ With this popularity came growing concerns over safety and environmental impacts tied to the growth of the industry.

29. *Id.*

30. *Id.*

31. *Id.*

32. United Nations Development Programme, “*What Are Carbon Markets and Why Are They Important?*” <https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-why-are-they-important#:~:text=If%20held%20to%20high%20standards,ums%20needed%20to%20build%20resilience>.

33. *Id.*

34. International Civil Aviation Organization, “*History*,” [https://www.icao.int/secretariat/technicalcooperation/pages/history.aspx#:~:text=ICAO%20came%20into%20being%20on,and%20Social%20Council%20\(ECOSOC\)](https://www.icao.int/secretariat/technicalcooperation/pages/history.aspx#:~:text=ICAO%20came%20into%20being%20on,and%20Social%20Council%20(ECOSOC)).

International organizations, most prominently ICAO, began to emerge and lead the global effort to establish a comprehensive set of guidelines encompassing safety, security, and increasingly, environmental concerns.³⁵ The Convention on International Civil Aviation—also known as the Chicago Convention—was signed on December 7, 1944, by 52 member states.³⁶ Pending ratification of the Convention by 26 states, the Provisional International Civil Aviation Organization (PICAO) was established.³⁷ It functioned from June 6, 1945, until April 4, 1947, and by March 5, 1947, the 26th ratification was received.³⁸ ICAO came into being on April 4, 1947, and in October of the same year, ICAO became a specialized agency of the United Nations linked to the Economic and Social Council (ECOSOC).³⁹ One of the several functions of the Organization's work over the last six decades has been to help states improve civil aviation in their respective nations through projects implemented under ICAO's Technical Cooperation Program (TCP), and the execution of the program's initiatives are overseen by the Technical Cooperative Bureau (TCB).⁴⁰

Within the domain of reducing aviation-related emissions, ICAO moved for a more standardized approach to tackling the issue, as opposed to the previous patchwork of national or regional regulatory initiatives. ICAO “offers a harmonized way to reduce emissions from international aviation, minimizing market distortion, while respecting the special circumstances and respective capabilities of ICAO member states.”⁴¹ This is in reference to regional regulatory efforts such as the EU-ETS, which essentially “makes polluters pay for their greenhouse gas emissions, helps bring emissions down, and generates revenues to finance the EU's green transition.”⁴² The EU-ETS encompasses all EU countries plus Iceland, Liechtenstein, and Norway, and “covers emissions from around 10,000 installations in the energy sector and manufacturing industry, as well as

35. *Id.*

36. *Id.*

37. *Id.*

38. *Id.*

39. *Id.*

40. *Id.*

41. International Civil Aviation Organization, “*CORSIA - Carbon Offsetting and Reduction Scheme for International Aviation*,” <https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx>.

42. European Commission, “*What is the EU Emissions Trading System (EU ETS)?*” https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/what-eu-ets_en.

aircraft operators flying within the EU and departing to Switzerland and the United Kingdom—or around 40% of the EU’s emissions.”⁴³

A. Analyzing the Functional Similarities and Differences Between CORSIA and the Pre-existing EU-ETS

The EU-ETS scheme operates differently from the more recently concocted CORSIA. The EU-ETS is known as a “cap and trade” system, where “a cap is a limit set on the total amount of greenhouse gases that can be emitted by the installations and aircraft operators covered by the system.”⁴⁴ The cap is then reduced annually in line with the EU’s climate target, ensuring that emissions decrease over time.⁴⁵ The cap is expressed in terms of “emission allowances,” where one allowance gives the right to emit one ton of CO₂eq (carbon dioxide equivalent).⁴⁶ For each year, companies must surrender enough allowances to fully account for their emissions, otherwise heavy fines are imposed.⁴⁷ Within the cap, companies primarily buy allowances on the EU carbon market, but they also receive some allowances for free, and companies can also trade allowances with each other as needed.⁴⁸ If an installation or operator reduces their emissions, they can either keep the spare allowances to use in the future or sell them.⁴⁹ The EU-ETS is also classified as a “compliance” market because it is a regional policy that subjects participants to regulatory penalties for non-compliance.⁵⁰

Conversely, CORSIA is known as an “offsetting” scheme, where airlines are provided a baseline determination of their CO₂ emissions for a particular time period, and emissions exceeding this baseline determination at the end of the monitoring and reporting period are required to be offset by the acquisition and cancelation of emissions from the global carbon market.⁵¹ Most recently, at its 41st Assembly, ICAO set 85% of 2019 emissions as CORSIA’s baseline from 2024 until the end of the scheme in 2035, a “significantly more ambitious target than originally planned, which

43. *Id.*

44. *Id.*

45. *Id.*

46. *Id.*

47. *Id.*

48. *Id.*

49. *Id.*

50. UNDP, *supra* note 32.

51. *Id.*

the industry supported.”⁵² Where the EU-ETS is a compliance market, CORSIA currently operates under a voluntary carbon market, where airlines are given a menu of available carbon registries that are eligible to provide offsetting credits.⁵³ Simply put, emissions trading systems such as the EU-ETS have a greenhouse gas emissions cap covering sectors of the economy, while offsetting schemes (e.g. CORSIA) compensate for emissions through reductions in other sectors but *without* an associated emissions cap.⁵⁴

Both regimes omit necessary regulatory criteria for ensuring not only the accuracy of monitoring and reporting practices but also the effectiveness and quality of available eligible emissions units, further leading to skepticism of CORSIA and its predecessors. CORSIA, for example, does not cover domestic flights, which still cover a large swath of the aviation sector’s contribution to global emissions.⁵⁵ Addressing these omissions and regulatory concerns will be pivotal to the effectiveness and longevity of CORSIA and its progeny.

B. CORSIA Standards and Recommended Practices for Uniform Implementation and Harmonization

Determining emissions metrics and baseline figures for independent airline operators and individual member states while also enforcing offset requirements can be a vexing task for regulators. Particularly, ICAO has sought to remedy this issue through the adoption of various Standards and Recommended Practices (SARPs), such as those developed at the 39th ICAO Session in 2016 and supplemented in Volume IV to Annex 16 of the Convention.⁵⁶ SARPs are important to lay out uniform standards and recommendations on how the global market-based approach of CORSIA can be feasibly undertaken by member states, as well as addressing the unique advantages and challenges each Member State may face.⁵⁷ These standards and practices will be discussed further in the following section, including the various technical boards that ICAO has tasked with preparing said protocols.

52. IATA, *supra* note 2.

53. UNDP, *supra* note 32.

54. *Id.*

55. *Id.*

56. Annex 16 Volume 4, *supra* note 9.

57. *Id.* at 6.

C. Technical Specifications of CORSIA and Additional Guidance Provided to Member States to Develop MRV Programs

The Committee on Aviation Environmental Protection (CAEP) is an important actor to make note of, as ICAO has tasked CAEP as of November 2013 with developing the technical aspects of the scheme.⁵⁸ SARPs are supplemented periodically with the Environmental Technical Manual provided by CAEP, most recently with Volume IV being added at the 2019 session.⁵⁹ The Environmental Technical Manual is intended to make the most recent information available to administrating authorities, airline operators, verification bodies, and other interested parties in a timely manner, aiming at “achieving the highest degree of harmonization possible.”⁶⁰

The preparation and implementation of a corresponding Monitoring, Reporting, and Verification system by member states among qualifying airline operators is necessary to achieve accurate compliance, accompanied by an Emissions Unit Criteria (EUC), which provides operators a schedule of appropriate emissions units that may be purchased to satisfy offsetting requirements under the scheme.⁶¹ ICAO provides guidance on eligible emissions credits frequently with a list of eligible vendors where operators are permitted to acquire necessary credits from the carbon market to cancel out or “offset” their excessive emissions for a specified monitoring and reporting timeframe.⁶² The effectiveness and overall track record of voluntary offsetting credits and EUC compliance will be examined in a subsequent section, as careful consideration of these factors will be essential to any future iteration of CORSIA’s regulatory structure and framework for enforcement.

D. Vulnerabilities, Criticisms, and Lack of Deterrence Furnished by the Carbon Market and Offsetting Schemes, Hindering the Effectiveness of CORSIA

The concern fueling the skeptical practicality of a global market-based offsetting scheme that lacks stringent regulation is attributed not only to the complex nature of the aviation industry and its global reach, but also to the

58. *Id.* at 29.

59. *Id.*

60. International Civil Aviation Organization, *Environmental Technical Manual*, Volume IV, <https://www.icao.int/environmental-protection/CORSIA/Pages/ETM-VIV.aspx>.

61. *Id.*

62. *Id.*

fungible nature of offsetting credits in their current state and the treatment of such credits as renewable. When considering the advent of a new regulatory regime that enables programs such as CORSIA to function as they are intended, it is important to examine the relative position of carbon credits and offsets as they exist in the carbon market and their relationship with such schemes.

E. Analyzing the Function and Role of the Voluntary Carbon Market and its Relationship with CORSIA

Conceptually, the carbon market is simply a marketplace, or “trading system,” in which carbon offsetting credits are bought and sold.⁶³ Credits can be purchased from private entities, often known as carbon registries, by companies and individuals that want to compensate for their greenhouse gas emissions by canceling out or “reducing” carbon emissions long-term in the form of an offset.⁶⁴ One tradable carbon credit “is equal to one ton of carbon dioxide or the equivalent amount of a different greenhouse gas reduced, sequestered or avoided . . . [o]nce a credit has been used, . . . it becomes an offset and is no longer tradable.”⁶⁵ There are two types of carbon markets that operate globally: compliance and voluntary.⁶⁶ A compliance market operates as a result of some domestic or international regulation that requires its adherence, while a voluntary market refers to the issuance or buying and selling of credits voluntarily.⁶⁷

Currently, the supply of voluntary carbon credits comes primarily from private entities that “develop carbon projects, or governments that develop programs certified by carbon standards that generate emission reductions and/or removals.”⁶⁸ An example of this practice would be when an airline produces a surplus of one ton of carbon dioxide above its permitted baseline in a given year, and it then attempts to offset the excess by purchasing a credit from a private registry. This essentially invests the money used in the acquisition of the credit to fund a project classified as being outside of normal business activities, for example, a reforestation project in a developing country that compensates for the surplus emissions.

63. United Nations Development Programme, “*What Are Carbon Markets and Why Are They Important?*” <https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-why-are-they-important>.

64. *Id.*

65. *Id.*

66. *Id.*

67. *Id.*

68. *Id.*

1. Actual Carbon Market Response to Voluntary Offsetting and Industry Outlook on Plummeting Demand for Offsets

In practice, the implementation of these schemes and their integration into the carbon market have been less than perfect. Beginning in 2023, data began to indicate that the demand for carbon offsets globally was dropping for the first time in seven years.⁶⁹ The primary factor driving the decline has been attributed to “growing criticism of carbon offsets by investors and the media, tempering enthusiasm from buyers.”⁷⁰ Subsequently, this growing criticism led several companies to ease off on purchasing offsets or even phasing them out entirely to wait for more reliable studies.⁷¹ Ecosystem Marketplace, a Washington-based non-profit tasked with increasing information availability and transparency when examining ecosystem services and payment schemes, has also attributed the drop in demand to the quality of the schemes.⁷²

The hesitation accompanying the drop in demand is attributed to behavioral reactions to criticisms of the schemes.⁷³ Companies simply do not want their carbon-neutral pledges and marketing to come under scrutiny for utilizing cheap offsets, and this hinders participation in voluntary markets.⁷⁴ Nevertheless, this does not necessarily mean that the efforts for these schemes are in vain, rather, that reform is indeed necessary to gauge a sufficient margin for error when these projects are created and sold.⁷⁵ Mitigating the sale of low-quality offsets that promise unattainable outcomes through more stringent regulations may remedy this issue. While this solution is more expensive, it offers a higher probability of actually being functional.⁷⁶

69. Bloomberg Professional, “*Long-Term Carbon Offsets Outlook 2023*,” <https://www.bloomberg.com/professional/blog/long-term-carbon-offsets-outlook-2023/>.

70. Reuters, “*Carbon Credit Market Confidence ebbs as Big Names Retreat*,” <https://www.reuters.com/sustainability/carbon-credit-market-confidence-ebbs-big-names-retreat-2023-09-01/>.

71. *Id.*

72. *Id.*

73. Bloomberg Professional, *supra* note 69.

74. *Id.*

75. *Id.*

76. *Id.*

2. U.S. Securities and Exchange Commission Comments on Carbon Offsets Regarding Increased Disclosure by Market Participants that Utilize Them

In March of 2021, the United States Securities and Exchange Commission (SEC) issued a statement “proposing for public comment amendments to its rules under the Securities Act of 1933 (‘Securities Act’) and Securities Exchange Act of 1934 (‘Exchange Act’) that would require registrants to provide certain climate-related information in their registration statements and annual reports.”⁷⁷ Among the concerns of investors mentioned regarding climate pledges by companies, the statement emphasized that “without more specific, standardized, and reliable disclosures, it will be difficult to assess and measure the progress companies make toward achieving what they have pledged.”⁷⁸ Particularly, in regard to carbon credits and offsets, the SEC proposed that “[i]f, as part of its net emissions reduction strategy, a registrant uses carbon offsets or renewable energy credits or certificates (‘RECs’), the proposed rules would require it to disclose the role that carbon offsets or RECs play in the registrant’s climate-related business strategy.”⁷⁹

Although this instruction appears broad in the abstract, it alludes to an existing concern among pundits of carbon offsets and their intersecting role across environmental regulation and the carbon market as a commercial instrument: how do market participants verify the offset did what it was supposed to do? Moreover, under the proposed rules, “carbon offsets represent an emissions reduction or removal of greenhouse gases in a manner calculated and traced for the purpose of offsetting an entity’s greenhouse gas (GHG) emissions . . . [w]e are proposing to define a REC.”⁸⁰

Defining what a “credit” is and its treatment within its respective market will ultimately set the stage for a proper functioning regulatory framework that offsetting and trading schemes such as CORSIA can utilize moving forward. To date, the Commodity Futures Trading Commission (CFTC)

77. Federal Register, *The Enhancement and Standardization of Climate-Related Disclosures for Investors*, <https://www.federalregister.gov/documents/2022/04/11/2022-06342/the-enhancement-and-standardization-of-climate-related-disclosures-for-investors>.

78. *Id.*

79. U.S. Securities and Exchange Commission (SEC), *Statement on Proposed Rule on Climate Risk Disclosure*, https://www.sec.gov/news/statement/crenshaw-climate-statement-032122#_ftn27.

80. U.S. Securities and Exchange Commission (SEC), *Proposed Rule: Climate Risk Disclosure*, <https://www.sec.gov/files/rules/proposed/2022/33-11042.pdf>.

and the SEC have defined carbon credits as “environmental commodities,” meaning they are neither derivatives, nor securities.⁸¹ As a result, neither the CFTC nor the SEC have issued rules around the trading of carbon credits within the voluntary markets.⁸² Omissions of this nature can inevitably lead to MRV discrepancies and corporate misuse when market participants and international regulators attempt to prop up a market-based approach using the carbon market as its backbone.

In the context of how CORSIA’s regulatory framework currently functions, the acquisition and cancellation of carbon credits with the goal of *reducing* greenhouse gas emissions within the sector suggests that those credits are finite—requiring them to eventually be exhausted—similar to commodities. However, the emission of greenhouse gases currently is an infinite process not limited to aviation. So long as there are energy systems existing that emit greenhouse gasses into the environment, it is increasingly difficult to argue that carbon offsets in the form of credits in their current state are quantified in a manner that logically *reduces* emissions while actively continuing to produce them. A model of this nature is unsustainable absent a limit on how many credits a participant can buy and sell, inevitably transforming what was conceived as a limit on emissions into a license to pollute even further.

3. Effectiveness of Current Eligible Emissions Units, Industry Criticism, and Lack of Transparency in MRV

A debilitating concern that has plagued the voluntary carbon market and its relationship with offsetting schemes such as CORSIA is the actual effectiveness of offsetting projects, especially those whose offsetting activities fall outside the scope of the purchaser's normal business activities. One such credit broker is the Verra Registry, which is also listed as one of the verified CORSIA-eligible emissions units that can be used toward an airline’s offsetting targets.⁸³ However, they have come under fire recently “amid concerns that Verra, a Washington-based nonprofit, approved tens of millions of worthless offsets that are used by major companies for climate

81. Gibson, Dunn & Crutcher LLP, “*Webcast Recording: Carbon Markets and the Voluntary Market*,” (June 8, 2023), <https://www.gibsondunn.com/wp-content/uploads/2023/06/WebcastRecording-Carbon-Markets-and-the-Voluntary-Market-08-JUN-2023.pdf>.

82. *Id.*

83. International Civil Aviation Organization (ICAO), “*CORSIA Eligible Emissions Units*” (March 2023), https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/CORSIA%20Eligible%20Emissions%20Units_March2023.pdf.

and biodiversity commitments.”⁸⁴ This subsequently led to their CEO exiting after fifteen years as head of the top carbon credit issuer in the nation.⁸⁵ Several other carbon registries have followed suit for the same reason, prompting a major decline in the actual demand for carbon credits, as well as environmental groups “call[ing] on the U.S. Securities and Exchange Commission to make offset purchases part of a wider climate rule that would force companies to disclose greenhouse-gas emissions.”⁸⁶

Another pivotal issue behind the doubt looming over carbon offsets is that the offsetting activity necessary to make the credit valid needs to be outside the usual course of business of the company redeeming them. For example, a commercial airline carrier funding a reforestation project in a developing nation would, in theory, offset their excessive emissions above their respective baseline determination. This casts doubt among investors and consumers, inevitably leading to skepticism regarding the effectiveness of CORSIA entirely, and for this reason, reforestation offsets especially have come under scrutiny.⁸⁷ For example, the “calculations concerning the amount of carbon saved through tree-planting programs are based on the assumption that the trees will last at least one hundred years, but there is no guarantee that the trees planted through reforestation programs will not succumb to disease or forest fire before that one-hundred-year mark.”⁸⁸

Furthermore, “some scientists suggest that a rise in temperature of two to three degrees Celsius could cause the trees to die early, break down into methane, and actually worsen the climate change situation.”⁸⁹ The prospect of a carbon-neutral initiative that has the potential to harm the environment is highly alarming. Moreover, the lack of regulation in the offset market “allows disreputable organizations to sell the same carbon credit many times over,” and the practice of “double counting” of credits is another reason for the SEC’s push for increased disclosure of climate initiatives.⁹⁰ This can be a concern for investors and consumers who often bear the cost

84. Patrick Greenfield, *The Guardian*, “*CEO of world's biggest carbon credit provider says he is resigning*” (May 23, 2023), <https://www.theguardian.com/environment/2023/may/23/ceo-of-worlds-biggest-carbon-credit-provider-says-he-is-resigning>.

85. *Id.*

86. Bloomberg Law, “*Green Groups Want Offsets Included as Part of SEC's Climate Rule*,” <https://news.bloomberglaw.com/esg/green-groups-want-offsets-included-as-part-of-secs-climate-rule>.

87. Catherine Verdier, *Carbon Offsets: “Are Such Credits Effectively Helping Mitigate Climate Change?”*, 7 *Sustainable Dev. L. & Pol'y* 63 (2007).

88. *Id.* ¶ 5.

89. *Id.*

90. *Id.* ¶ 6.

of such programs.⁹¹ Due to these factors, consumers ultimately have no way of ensuring that their money is actually reaching the intended programs.⁹²

Airlines themselves have addressed their skepticism to the actual effectiveness of offsetting, as opposed to incentivizing the use of sustainable aviation fuels, carbon sequestration, or other methods that may be more effective but simply cost more for airlines to adopt given the availability of cheap offsets.⁹³ United Airlines CEO Scott Kirby has been vocal on the debate, outright calling offsets a form of “greenwashing” and estimating that “planting trees on every acre of available land would address less than five months of emissions.”⁹⁴ Furthermore, aviation experts have indicated that from a mere business perspective, “[f]or an airline, it makes absolutely no sense to buy expensive SAF when it can actually buy cheap offsets instead.”⁹⁵ This indicates that without decreasing oversaturated demand for cheap offsets, airlines have no reason to deviate from participating in the voluntary carbon market, as it technically fulfills their obligations while exacerbating the climate issue.

F. The Role of the Regulators, Airlines, and Private Carbon Registries in Facilitating the Acquisition and Cancellation of Credits While Balancing These Roles to Incentivize Compliance Rather Than Complaints

The development and implementation of CORSIA has been spearheaded primarily by the United Nations, the parent body of ICAO, which inherently manifests an embedded difficulty of developing domestic regulations by each member state that perfectly align with the program's envisioned objectives—reducing greenhouse gas emissions caused by aviation—and not merely trading them.⁹⁶ In 2017, in preparation for the first voluntary phase, ICAO issued a document labeled the “Regulatory and Organizational Framework to Address Aviation Emissions,” aimed at

91. *Id.*

92. *Id.*

93. Allison Lampert, Rajesh K. Singh, Reuters, “Rising Airline Emissions Could Trigger Global Caps Early 2024 - Trade Group” (March 20, 2023), [https://www.reuters.com/business/environment/rising-airline-emissions-could-trigger-global-caps-early-2024-trade-group-2023-03-20/#:~:text=O\)%%2C%20opens%20new%20tab%20CEO,electric%20aircraft%20and%20carbon%20sequestration.](https://www.reuters.com/business/environment/rising-airline-emissions-could-trigger-global-caps-early-2024-trade-group-2023-03-20/#:~:text=O)%%2C%20opens%20new%20tab%20CEO,electric%20aircraft%20and%20carbon%20sequestration.)

94. *Id.*

95. *Id.* See Jo Dardenne, aviation director for Brussels-based Transport & Environment.

96. International Civil Aviation Organization (ICAO), “ICAO Council,” <https://www.icao.int/about-icao/Council/Pages/council.aspx#:~:text=The%20Assembly%20countries%20also%20elect,Assembly%20is%20not%20in%20session.>

“provid[ing] the opportunity for states to showcase policies and actions, including tailor-made measures that are selected on the basis of their respective national capacities and circumstances.”⁹⁷

This is an important consideration to make, considering the economic and logistic capabilities of each member state will differ from nation to nation, and supplementing deficiencies is an important role that ICAO can play as the central facilitator of the program. However, initiating the development of custom-tailored MRV regimes ultimately comes down to the domestic aviation regulatory bodies of that state, and floating concerns that the current guidance provided a “lack of legal guidance to enforce the CORSIA SARPs [and] . . . possess a risk on regulators that may hold an aircraft owner responsible for CORSIA non-compliance.”⁹⁸ Additionally, a recent report by the Executive Committee highlighted that with the current SARPs, “it still remains unclear, what action a Contracting State will initiate against a defaulter [airplane] operator, if they fail to cancel appropriate units as per the offset requirements.”⁹⁹

Moreover, in foreshadowing future legal conflicts, the committee emphasized that “legal and financial consequences may also arise if an operator fails to cancel a sufficient quantity of eligible emissions offset units to cover its existing obligations following an insolvency declaration.”¹⁰⁰ This alludes to another omission in the current patchwork regime, where the SARPs do not address the advent of how an airline might fulfill its obligations in the event of insolvency.¹⁰¹ This is especially precarious in larger aviation markets, such as the United States, where it is not an uncommon occurrence to see an airline declare bankruptcy, whether that be to liquidate or restructure; how these obligations may interact with the automatic stay has also not been addressed and could lead to costly litigation if not addressed before the mandatory phase.

The role of domestic regulators, such as the FAA, will be limited not only to modifications making their current MRV systems more stringent and transparent, but also to address the nuances of integrating the program in compliance with their domestic laws and procedures. This will be necessary to ensure each State Action Plan accounts for the “differences,

97. International Civil Aviation Organization (ICAO), “*Working Paper A40-WP/228 - Agenda Item 42: Environmental Protection*,” https://www.icao.int/Meetings/A40/Documents/WP/wp_228_en.pdf.

98. *Id.* at 3.

99. *Id.*

100. *Id.*

101. *Id.*

among . . . developing countries in particular, in domestic policies, capacity building, eco structure . . . [and] that only an inclusive and fair [market-based measure] policy for international aviation can galvanize global efforts and encourage broader participation.”¹⁰²

While the role of the international and domestic regulators becomes clearer, the role of the airline companies grays, and even more so, the role of the private carbon registries—if their contribution is even necessary. It has become evident that private carbon registries are unreliable and susceptible to misuse due to their lack of regulation. Airlines have the most to lose once the shift from voluntary to mandatory compliance implementation of CORSIA arrives, where in terms of economic impacts, “the carbon offsetting costs of the global aviation industry will be between 5.3 and 23.9 billion US dollars in 2035, accounting for 0.5%–1.4% of the total revenue of international aviation.”¹⁰³ In essence, the financial burden as a result of implementing CORSIA would cause great economic pressure on the development of the aviation industry, even in developed nations.¹⁰⁴ This adds another concern in drafting a revised regime, shifting the focus from logistical barriers, to simply addressing how to incentivize airlines to proactively participate in more strenuous MRV. Initial reluctance and uncertainty may be present among airline operators due to questions surrounding the financial consequences of reducing operations to achieve baseline targets, as opposed to continuing to utilize cheap offsetting credits. Moreover, ICAO has stated that a primary hurdle encountered thus far from the perspective of the airline operators is “lack of adequate archiving and management of data, application of quality control procedures and use of methodologies to assess uncertainties of such data.”¹⁰⁵ This highlights the embedded difficulty of trying to achieve a collective international market-based scheme that also furnishes a uniform recording system of managing data that airline operators can use to report offsetting activities, further facilitating domestic regulators’ ability to distinguish between quality

102. *Id.*

103. Maertens S., Grimme W., Scheelhaase J., Jung M. *Sustainability*. “Options to Continue the EU-ETS for Aviation in a CORSIA-world.” 2019.11.15. <https://www.mdpi.com/2071-1050/11/20/5703>.

104. Janina Scheelhaase, Sven Maertens, Wolfgang Grimme, Martin Jung, “EU ETS versus CORSIA – A critical assessment of two approaches to limit air transport’s CO2 emissions by market-based measures,” *Journal of Air Transport Management*, Volume 67, 2018, Pages 55-62, ISSN 0969-6997, <https://doi.org/10.1016/j.jairtraman.2017.11.007>.

105. Working Paper A40-WP/228 - Agenda Item 42: Environmental Protection, *supra* note 97.

offsetting projects from phony or duplicate ones. Additionally, “the challenges of huge data management, reporting requirements under CORSIA should also provide enough flexibility towards CORSIA implementation.”¹⁰⁶ The concern of providing flexibility to airlines is important to make note of as once again, the necessity for regulators to compromise with the airlines under their watch and not shift the costs of implementation to operators on top of limiting flights and the removal of valid cheap credits from the carbon market.

As for the role of carbon registries, the current model of operation is to “creat[e] a credible, fungible offset commodity . . . [and] record the ownership of credits.”¹⁰⁷ Ownership is then allocated when a “serial number is assigned to each verified offset credit [and] . . . [w]hen a credit is sold, the serial number for the reduction is transferred from the account of the seller to an account for the buyer.”¹⁰⁸ If the buyer then “uses” the credit by claiming it as an offset against their own emissions, the registry retires the serial number so that the credit cannot be resold.¹⁰⁹ Registries and their proponents have claimed that in this manner, they reduce the risk of double counting. However, this has shown to be not entirely true, given the recent failures mentioned prior. Additionally, the issue of credits being retired far before offsetting projects are completed further exacerbates the problem of low-quality credits.¹¹⁰ Accordingly, private registries will likely need to be consolidated into less of a self-service platform in which ICAO individually vets and approves offsetting projects, and more of a central hub where offsets are both acquired, recorded, and reach maturation under the supervision of one of the Technical Advisory Boards that develop the SARPs.

III. The Proposed Revisions to the Current Regulatory Framework of CORSIA and Facilitating Domestic Integration

Thus far, the present article has examined the regulatory issues and various nuances of CORSIA as it exists currently and has anticipated several of the potential legal and financial implications of failing to address these issues before the mandatory phase is slated to begin in 2027. Moving

106. *Id.*

107. Carbon Offset Guide, “Registries & Enforcement,” <https://www.offsetguide.org/understanding-carbon-offsets/carbon-offset-programs/registries-enforcement/>.

108. *Id.*

109. *Id.*

110. *Id.*

forward, the article discusses possible revisions to the current scheme and recommends feasible solutions and regulations to avoid misuse of the scheme once the defects of the previous model are removed and offsetting requirements become more strenuous to achieve.

A. Modified Monitoring, Reporting, and Verification of Carbon Emissions, While Providing a Centralized Recording Method to Give Participants Notice of Potential Double-Counting

Transforming the current setup of mandatory CORSIA implementation and emissions regulation, generally, has posed at each stage a reoccurring issue of balancing the entitlements and obligations of each market participant, while also safeguarding transparency and free competition between the airlines. For this reason, in the proposed revised framework, the role of the registries would likely need to be collapsed from private self-service entities that furnish potentially phony and unreliable offset credits, into a centralized recording system with search functions that allow participating airlines to have notice over conflicting credits to alleviate—and likely eliminate—the issue of double-counting credits.

1. Centralized Recording of All Offsetting Interests Occurring Within the CORSIA Network

Ideally, a centralized recording system would be overseen by ICAO via one of the Technical Advisory Boards, such as CAEP, to further hinder double-counting while also increasing transparency, another concern that has plagued the current framework. This would require the removal of credits from circulation, which would be done by creating more strenuous qualification standards set by ICAO via supplemented and up-to-date SARPs that direct airlines as to which valid credits are still available towards that operator's offsetting requirements, and which have already been retired.

This approach would further require the issuance of credits to be on a staggered allowance basis, wherein each airline (under the purview of their domestic regulatory agency) would have its baseline for the upcoming recording period calculated and distributed with an accompanying cap that limits how many credits that airline can acquire and use to cancel emissions they produced that exceeded their baseline, and when they would potentially need to taper down operations to remain in compliance. In doing so, “[e]nforcement systems assure that contracts clearly identify ownership of an offset credit and define who bears the risk in case of project failure,” and this idea of project failure is precisely why the registries can no longer

serve as both the manufacturer and certifying body of these offsetting projects, given that the harmful results have come to fruition before the mandatory phase of CORSIA has even begun.¹¹¹ This is due to the fact that, under the assumption that CORSIA were to function as intended and achieve its primary directives under a voluntary model, registration and enforcement must include “[a] registry with publicly available information to uniquely identify offset projects . . . [and] [s]erial numbers for each offset credit generated by each project.”¹¹² Furthermore, this registry needs to integrate a system to “transparently track ownership of offsets which makes it possible to trace each credit back to the project from which it originated . . . to easily check on the status of an offset credit (i.e., whether a credit has been retired).” Moreover, to ensure the legal obligations of all parties are guaranteed, a uniform standard of “contractual or legal standards that clearly identify the original ‘owner’ of offset credits . . . standards that spell out who bears the risk in case of project failure or partial project failure (e.g., who is responsible for replacing the credits that should have been produced by the failed project).”¹¹³

2. Eliminating Private Carbon Registries from the Equation

Nevertheless, as was observed previously, ICAO has not issued guidance on what legal remedies CORSIA furnishes—if any—in the event of project failure, airline insolvency, or other failures to fulfill the obligations attached to the assumption of an offsetting project.¹¹⁴ Absent the ability for the issuance, verification, and completion of such offsets to be conducted under the watch of a central authority, lack of accuracy and misuse will continue to run rampant and diminish the objectives of CORSIA—reducing carbon emissions from civil aviation. Accordingly, CAEP, under the directive of ICAO’s Technical Advisory Board, would benefit from developing a streamlined system that eliminates the private registries as the middlemen in issuing and recording offset credits, and bringing all checkpoints in the process under the watch and facilitation of ICAO.

111. Carbon Offset Guide, *supra* note 127.

112. *Id.*

113. *Id.*

114. Working Paper A40-WP/228 - Agenda Item 42: Environmental Protection, *supra* note 97.

3. Shifting Completely from Voluntary Offsetting to a Compliance Offsetting Scheme

After highlighting the faults of the voluntary carbon market and how it has failed to integrate with CORSIA and provide airlines with high-quality offsets, shifting to a mandatory regime becomes increasingly attractive. In doing so, it will be important to distinguish the differences between the two. Carbon markets can exist under both mandatory (compliance) schemes and voluntary programs, where “compliance markets are created and regulated by mandatory national, regional, or international carbon reduction regimes,” and voluntary markets “function outside of compliance markets and enable companies and individuals to purchase carbon offsets on a voluntary basis with no intended use for compliance purposes.”¹¹⁵ However, fulfilling a compliance purpose is indeed what CORSIA aims to do. With this in mind, the conclusion forms that the mere flexibility and lax framework of voluntary markets simply lack the strict elements necessary to achieve CORSIA’s difficult goals.

Operating under a mandatory compliance style program, for regulated emissions sources (in the present matter, civil aviation), “offsets can serve as an alternative compliance mechanism to direct emissions reductions or allowances that emission sources can use to meet their emissions cap.”¹¹⁶ However, direct emissions reductions (i.e. reducing flights, improving ground operations, etc.) must not be brushed aside so hastily as obsolete, but rather incentivized in a future compliance model and will be discussed further in a subsequent section. Therefore, it is recommended to completely shift to a compliance model for the mandatory phase of CORSIA. If airlines are allowed to keep using the voluntary market to meet their obligations with inexpensive offsets from voluntary registries without restrictions on validity or quantity, CORSIA will perpetuate the problem of airline emissions under a veil of ambiguity.

B. Enhancing CORSIA: Strategic Revisions for Environmental Effectiveness and Program Integrity

This section aims to redefine CORSIA's trajectory through a nuanced approach, employing specific revisions to enhance fairness, accuracy, and confidence in the program's environmental goals. It primarily focuses on

115. Carbon Offset Guide, “Mandatory vs. Voluntary Offset Markets,” <https://www.offsetguide.org/understanding-carbon-offsets/carbon-offset-programs/mandatory-voluntary-offset-markets/>.

116. *Id.*

amplifying and building upon CORSIA's effective components while addressing and refining its shortcomings. These revisions should include carefully crafted limits on credit acquisition and cancellation, along with an examination of industry-wide factors at a macro level. This involves analyzing long-term air service incentives in relation to CORSIA, while also respecting pre-established limits and enhancing the current system without disrupting economic incentives for airlines. By introducing these revisions, the objective is to foster an environment that not only ensures a level playing field for all participants but also instills a greater sense of transparency and trust in the efficacy of CORSIA over time. Finally, this section endeavors to illuminate the intricacies of these proposed adjustments, emphasizing their collective role in fortifying CORSIA as a robust and reliable framework for tackling the aviation industry's environmental footprint, rather than making its stain on the Earth larger.

1. Placing Hard Caps on Credit Acquisition and Cancellation

A primary aspect of CORSIA that would benefit from revision would be to place a cap on the quantity of credits an individual airline operator can retire at a time in order to meet their baseline. The reason for this is because at the simplest level, “a carbon credit or offset represents a reduction in or removal of greenhouse gas emissions that compensates for CO₂ emitted somewhere else.”¹¹⁷ The emphasis on *reduction* or *removal* here is of utmost importance, considering the present article has identified that in its current form, CORSIA simply furnishes the mechanism of acquiring and utilizing offsets to meet emissions “goals” without placing a limit on how many times this method can be used. This is problematic because long-term projections “estimate that demand for air passenger journeys in 2050 could exceed 10 billion . . . [and] expected 2021-2050 carbon emissions on a ‘business as usual’ trajectory is approximately 21.2 gigatons of CO₂.”¹¹⁸ Higher demand will subsequently lead to higher emissions, with more airlines flocking to buy up cheap offsets from private registries, allowing them to continue emitting CO₂ from increased operations under the guise that they are being offset by the acquisition and cancellation of said credits.

117. CarbonCredits.com, “Carbon Credits vs Carbon Offsets: What's the Difference?” <https://carboncredits.com/carbon-credits-vs-carbon-offsets-whats-the-difference/#:~:text=In%20a%20sense%2C%20offset%2Dproducing,CO2%20the%20company%20can%20emit.>

118. International Air Transport Association (IATA), “Fly Net Zero,” <https://www.iata.org/en/programs/environment/flynetzero/#:~:text=The%20Net%20Zero%20Carbon%20Emission,2050%20could%20exceed%2010%20billion.>

In order to reduce the wide margin for error that has risen as a result of the oversaturation of cheap credits available to feed current demand trends, a robust quantification of appropriate emissions reductions and removals is likely necessary. Ideally, in a centralized recording and verification environment overseen by ICAO, this requires “establishing robust baselines, addressing any carbon leakage (including global leakage), robust measurement of project emissions, and choosing appropriate crediting period durations.”¹¹⁹ This is necessary considering that determining baselines has been found to “involve considerable uncertainty and are not always determined in a conservative manner.”¹²⁰ While some of the emissions reduction criteria developed by ICAO are calculated reasonably, other methodologies of quantification have resulted in considerable overestimation (such as the reforestation projects mentioned prior, and the inability to adequately assess their feasibility long-term).¹²¹ Efforts have been underway to recalibrate the standard for baseline emissions to accommodate initiatives such as CORSIA, one instance being at COP26 in Glasgow, where “countries adopted new principles for the quantification of emission reductions and removals . . . requir[ing] that baselines are set *below* business-as-usual and are consistent with NDCs, long-term low greenhouse gas emission development strategies, and the Paris Agreement goals.”¹²² Notably, reducing the baseline from business-as-usual activities is important here, as maintaining the status quo with rising demand in aviation will only create more emissions heading into 2050, leaving a half-measure as the only solution to combat rising emissions from civil aviation.

2. Addressing Issues of Additionality and Reducing Prevalence of Double Counting Offset Projects

When an airline retires an emissions credit resulting from the assumption of an approved offsetting project to fulfill its obligations under CORSIA, clearly determining which activities involved are considered *additional* to

119. Schneider, Lambert; Wissner, Nora, Öko-Institut e.V., “*Key Issues for the First Review of CORSIA*,” <https://www.oeko.de/fileadmin/oekodoc/Key-issues-for-first-review-of-CORSIA.pdf>.

120. *Id.*

121. *Id.*

122. *Id.* citing Michaelowa, A.; Hermwille, L.; Espelage, A.; Michaelowa, K. (2021): Ambition coefficients, aligning baseline for international carbon markets with net zero pathways (Carbon Mechanisms Review, Vol.9). Wuppertal-Institut für Klima, Umwelt, Energie (ed.), 2021. Online available at https://www.perspectives.cc/public/fileadmin/user_upload/ambition_coefficients-cmr10-21.pdf. (emphasis added)

their business-as-usual activities and which are not, will be a necessary distinction to make to eliminate double counting throughout the lifespan of CORSIA. Emission reductions or removals are considered additional if “the project would not have been implemented in the absence of the added incentive created by the carbon credits.”¹²³ At face value, this test appears simple enough to comply with, however, “the definition of additionality and the respective tests to prove additionality vary among programs,” meaning ICAO’s specific approach for certifying valid emissions unit criteria requires specific review to analyze whether its vetting process and overall standards only allow high-quality units to be redeemed for meeting baseline requirements.¹²⁴ This tracks to previous issues presented by lack of additionality, considering “[u]sing carbon credits from already implemented projects does not necessarily trigger any further emission reductions,” hindering any actual removal or reduction of carbon emissions.¹²⁵

As was observed through the rocky history of the major carbon registries and their lax practices on the issuance of phony credits, lack of additionality assurance has likely led to double counting of credits in numerous instances in industries outside of aviation.¹²⁶ Similarly, the current approach and criteria under ICAO’s guidance are not certain to ensure additionality across all projects that circulate through CORSIA.¹²⁷ Two primary reasons for this include that currently, “the EUC are very basic minimum requirements for additionality, [and] . . . the EUC do not seem to be applied consistently by ICAO.”¹²⁸ Some potential improvements to the additionality requirements have been put forward, for example, the “exclusion of certain project types which are at risk of not being additional . . . the specification

123. *Id.* citing Gillenwater, M. (2012): What is Additionality?. GHG Management Institute. Washington D.C., 2012. Online available at <https://ghginstitute.org/research/>.

124. *Id.* citing Broekhoff, D.; Schneider, L.; Tewari, R.; Fearnough, H.; Warnecke, C. (2020): Options for Improving the Emission Unit Eligibility Criteria under the Carbon Offsetting and Reduction Scheme for International Aviation, 36/2020. Umweltbundesamt. Berlin, 2020, last accessed on 10 Jun 2021.

125. *Id.* citing Warnecke, C.; Schneider, L.; Day, T.; La Hoz Theuer, S.; Fearnough, H. (2019): Robust eligibility criteria essential for new global scheme to offset aviation emissions. In: NATURE CLIMATE CHANGE 9 (3), pp. 218–221. DOI: 10.1038/s41558-019-0415-y

126. Patrick Greenfield, *supra* note 84.

127. Broekhoff, D.; Schneider, L.; Tewari, R.; Fearnough, H.; Warnecke, C. (2020): Options for Improving the Emission Unit Eligibility Criteria under the Carbon Offsetting and Reduction Scheme for International Aviation, 36/2020. Umweltbundesamt. Berlin, 2020, last accessed on 10 Jun 2021.

128. *Id.*

that additionality procedures provide ‘high assurance’ that the emission reductions would not have occurred without the carbon credit programs.”¹²⁹ Moreover, to ensure these processes and their evaluation are further kept centralized under ICAO’s purview and to increase confidence and transparency between participants, a revised framework can benefit from “improved requirements for governance arrangements for carbon crediting programs, such as approved procedures for evaluating key aspects for additionality, including legal requirements and the financial feasibility of the relevant activities, and involvement of independent experts to review such assessments.”¹³⁰ Additionally, regarding consistency and emissions unit criteria, impact assessments performed by the EU on CORSIA have found that “several of the programs do not fulfill the EUC related to additionality, but have nevertheless been approved.”¹³¹ Once again, this illustrates the affinity for error present within the current structure of the program and the weakness of its emissions unit criteria, hence why it needs to be addressed early.

C. Recommendations for Improving Transparency and Public Disclosure Between Regulated Airlines

The current edition of CORSIA’s emissions unit criteria does indeed include public disclosures as a prerequisite to validity, and several of the approved offsetting programs do indicate said disclosures regarding rules and information on their websites, however, the ease of finding said documents and their accessibility by interested parties differs widely.¹³² Moreover, the value of these disclosures on transparency appears minimal, considering the “public disclosure practices of all standards appear to be limited to substantive and procedural requirements.”¹³³ These disclosures also fail to provide “consolidated reports on how many projects were

129. *Id.*

130. *Id.*

131. *Id.* Schneider, citing ICF Consulting; Air Transportation Analytics; New Climate Institute; Cambridge Econometrics; HFW; Sven Starckx (2020): 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. European Commission (ed.). Brussels, 2020, last accessed on 18 Mar 2021.

132. German Emissions Trading Authority (DEHSt), “Improving Unit Eligibility under the Clean Development Mechanism (CDM) and Joint Implementation (JI),” https://www.dehst.de/SharedDocs/downloads/EN/project-mechanisms/discussion-papers/improving-unit-eligibility.pdf?__blob=publicationFile&v=2.

133. *Id.*

deregistered due to non-compliance with safeguards.”¹³⁴ For these reasons, CORSIA’s effectiveness and the validity of its offsetting credits would benefit immensely by ensuring this sort of meta-data and related information is available on-demand when an interested party seeks it. Adding this consideration will not only improve transparency but also a quality control mechanism for vetting offsets, given that “[such] evaluations can provide further evidence on the extent to which program’s requirements safeguard against harmful impacts.”¹³⁵

1. Integrating a Standard Remaining Carbon Budget to Align CORSIA’s Goals with the Paris Agreement

While the Paris Agreement and CORSIA were concocted at different points in time and accompanied by varying metrics for determining their success, their general objectives remain parallel to one another. One way to better align these goals, as one report analyzing key issues for the first review of CORSIA found, would be “deriving a CO₂ emissions target based on the concept of remaining carbon budgets (RCBs).”¹³⁶ The remaining carbon budget is a metric “used to explain the net amount of CO₂ that humans can continue to emit without exceeding a certain global warming limit . . . and is often used to assess and evaluate actions in line with the Paris Agreement.”¹³⁷

Accordingly, if ICAO were to align CORSIA’s long-term goals with that of the Paris Agreement, it would require efforts to limit the global temperature increase to remain within a margin of no more than 2°C or 1.5°C.¹³⁸ Notably, RCBs are a “simplified concept of a very complex system . . . [t]here are different definitions and estimates using different assumptions.”¹³⁹ This underscores the importance of aligning goals across different schemes and initiating a trend toward standardizing climate measures. This approach aims to address the current lack of harmonization and alleviate associated challenges. Accordingly, this begs the question as to what kind of budget we have available to work with. An independent

134. *Id.* at 28.

135. *Id.*

136. Schneider, *supra* note 119.

137. Rose Winter, Climate Action, “Analysis Looks at the Remaining Carbon Budget and the Need for Immediate Action,” [https://www.climateaction.org/news/analysis-looks-at-the-remaining-carbon-budget-and-the-need-for-immediate-action#:~:text=The%20remaining%20carbon%20budget%20\(RCB,line%20with%20the%20](https://www.climateaction.org/news/analysis-looks-at-the-remaining-carbon-budget-and-the-need-for-immediate-action#:~:text=The%20remaining%20carbon%20budget%20(RCB,line%20with%20the%20)

138. *Id.*

139. Broekhoff, *supra* note 127.

2021 study estimated that “the RCB for remaining at or below 2°C and 1.5°C global temperature increase to be about 1,110 GtCO₂ (gigaton of carbon dioxide) and 230 GtCO₂ respectively for the period 2020 to 2100.”¹⁴⁰ However, a more recent report conducted by the Intergovernmental Panel on Climate Change (IPCC) released in October of 2023 found that the “remaining global carbon budget to achieve these goals was actually much less than that.”¹⁴¹ As a result, the IPCC study found that in total, there are “approximately 250 billion metric tons of carbon allowance left to maintain a 50% probability of limiting the global temperature increase to 1.5 degrees Celsius”¹⁴² As mentioned, this accounts for the global carbon budget across all regions and sectors, while CORSIA pertains to civil aviation alone, however, making this consideration and accounting for these challenges in CORSIA’s next review will be beneficial to more accurately tailoring its expectations and maintaining feasibility while also not obstructing ongoing global efforts. Additionally, aligning global efforts into a collective push to fall within the range of the same climate objectives can reduce the resources and labor needed to administer and implement such processes, further enhancing the financial feasibility of such schemes.

2. Re-examining Carbon Credit Non-permeance and the Potential Consequences of Neglecting the Issue Until Later Stages of the Program

It is imperative to keep in mind that aviation emissions, as a result of the combustion of fossil fuels, will remain in the atmosphere for thousands of years.¹⁴³ The practice of civil aviation as we know it did not begin yesterday, that is to say, the present issue is a problem that requires attention today and not later, from a variety of technical, legal, logistical, and financial avenues. With that being said, there is one aspect that threatens the integrity of CORSIA to a point where the program will no longer have the option of recourse or repair if left to run rampant as it is presently. This is the issue of non-permeance, which has been alluded to in previous sections as it tends to manifest itself into several other considerations of the program. Carbon credit project non-permeance occurs

140. *Id.*

141. Winter, *supra* note 137.

142. *Id.* ¶ 1.

143. *Id.* Schneider, citing Archer, D.; Eby, M.; Brovkin, V.; Ridgwell, A.; Cao, L.; Mikolajewicz, U.; Caldeira, K.; Matsumoto, K.; Munhoven, G.; Montenegro, A.; Tokos, K. (2009): Atmospheric Lifetime of Fossil Fuel Carbon Dioxide. In: *Annu. Rev. Earth Planet. Sci.* 37 (1), pp. 117–134. DOI: 10.1146/annurev.earth.031208.100206.

when “there is a risk that the emission reduction or removal is reversed . . . [non-permeance] occurs through natural or human-caused disturbance, like a forest fire, leading to no net reduction or even net emissions.”¹⁴⁴ Moreover, “some types of carbon credits, especially in the land-use and forestry sector, there is a risk that the emission reduction or removal is reversed.”¹⁴⁵ Additionally, the worse the effects of climate change become over time, the higher the likelihood of these reversals occurring.¹⁴⁶ Nevertheless, from viewing the availability of current offsets furnished by ICAO that satisfy CORSIA’s offsetting requirements, “[a] corresponding robust guarantee for long-term biological carbon is beyond the capability of most carbon offsetting programmes,” and this leads back to the prevalence of non-permeance discoveries occurring today, all pointing to the root cause that “ICAO’s current approach towards addressing non-permanence does not sufficiently recognize these risks, has severe shortcomings and the EUC therefore need to be strengthened considerably.”¹⁴⁷

This particular issue requires a holistic approach to address the source of these miscalculations, primarily stemming from ICAO’s lax emissions unit criteria for valid offsets. First, the EUC on non-permanence “does not specify the time period for which programmes have to ensure the permanence of the emission reduction and avoid reversal.”¹⁴⁸ This consideration is not only necessary for ensuring accurate net reductions over time, but also extends the gap of unavailable legal recourse in the event of party non-performance from a contractual point of view, whether that be on the side of the airline, the credit issuer, or the regulators. Notably, upon recommendation from the Technical Advisory Board in 2020, the ICAO Council has approved programs that provide for monitoring and compensation for reversals, but only until the end of the CORSIA implementation period, which is about 20 years.¹⁴⁹ As mentioned

144. Schneider, *supra* note 119.

145. *Id.* Schneider, citing Broekhoff, D.; Schneider, L.; Tewari, R.; Fearnough, H.; Warnecke, C. (2020): Options for Improving the Emission Unit Eligibility Criteria under the Carbon Offsetting and Reduction Scheme for International Aviation, 36/2020. Umweltbundesamt. Berlin, 2020, last accessed on 10 Jun 2021.

146. Archer et al., *supra* note 143.

147. *Id.*

148. *Id.* Schneider, citing ICAO - International Civil Aviation Organization (2019c): CORSIA Emissions Unit Eligibility Criteria, 2019. Online available at https://www.icao.int/environmentalprotection/CORSIA/Documents/ICAO_Document_09.pdf, last accessed on 21 Jul 2021.

149. *Id.* Schneider, citing ICAO - International Civil Aviation Organization (ed.) (2020a): Recommendations on CORSIA eligible emission units - TAB recommendations

previously, the effects of carbon emissions from aviation have a lasting presence in the atmosphere for much longer than 20 years. In other words, this is simply not long enough of a provision to remedy any subsequent reversals alone, and “this approach could seriously undermine CORSIA’s environmental impact as well as its economic effectiveness.”¹⁵⁰ Therefore, industry pundits have recommended that “monitoring and compensation for reversals is conducted for 100 years . . . EUC should require that project owners have legal obligations to compensate for intentional or avoidable reversals; that all carbon credits are replaced in instances where monitoring ceases and that pooled buffer reserves be sufficiently capitalized and diversified.”¹⁵¹ Finally, projects with high risks or an otherwise higher affinity to fail “should be excluded from eligibility.”¹⁵²

D. Discussing Possible Long-Term Industry Shifts, Considerations, and Alternatives While Recalibrating CORSIA’s Trajectory to More Feasibly Align With Its Goals

In redefining the trajectory of CORSIA, this section focuses on a nuanced approach utilizing various individual revisions aimed at enhancing the fairness, accuracy, and confidence in the program's ability to achieve its environmental goals, while basing its analysis primarily around revisions that amplify and build upon the working parts of CORSIA, while filtering and modifying the lackluster elements. As mentioned, some of these revisions will need to include strategically designed and explicitly stated limits on credit acquisition and cancellation, while also exploring industry considerations on a macro level. This includes examining air service incentives, the inevitable non-permeance of credits and their long-term interaction with CORSIA, and accommodating pre-established limits and building upon the existing system, all while avoiding disruptions to the economic incentives of engaging with the airline industry. By introducing these revisions, the objective is to foster an environment that not only ensures a level playing field for all participants, but also instills a greater sense of transparency and trust in the efficacy of CORSIA over time. Finally, the section endeavors to illuminate the intricacies of these proposed adjustments, emphasizing their collective role in fortifying CORSIA as a

from its first assessment, excerpt from the TAB report of January 2020. Technical Advisory Body, 2020. Online available at https://www.icao.int/environmentalprotection/CORSIA/Documents/TAB/Excerpt_TAB_Report_Jan_2020_final.pdf, last accessed on 22 Jul 2021.

150. *Id.*

151. Schneider, *supra* note 119.

152. *Id.*

robust and reliable framework for tackling the aviation industry's environmental footprint, rather than making its stain on the Earth larger.

1. Long-term Industry Outlook and Regional Economic Implications

The idea of reducing flights while trying to maintain an industry whose growth is dependent on increasing flights is a daunting thought, but not impossible. One such way is for regional airports to begin reducing air service incentives provided to airlines to encourage them to enter a region or otherwise begin offering service from a geographical area they did not advertise prior, subsequently increasing their service offerings and available flights.¹⁵³ Air service incentives are essentially financial inducements that are offered to airlines to encourage new services to particular airports and to “mitigate some of the financial risk that an airline takes when it starts service in a market that it did not previously serve.”¹⁵⁴ There are generally two types of air service incentives that operate, which differ regarding whether they originate from the airport itself or from community organizations interested in stimulating its region's air service capabilities and scope.¹⁵⁵ Local organizations that may be interested in initiating such initiatives can include “state and local governments, private businesses or economic development organizations, and convention or visitor bureaus.”¹⁵⁶ Anticipating the effects of these incentive programs is important because how these local markets react can be an indicator of the longevity of the program and how feasible its goals become as it advances.

2. Recalibrating CORSIA's Short-term Trajectory to Align With its Long-term Goals

There have however been certain pullbacks on the expansion of air service incentives. For instance, “the types, duration, and other characteristics of incentives offered by airports (i.e. coming from airport funds) are limited by FAA policy and relevant statutes.”¹⁵⁷ Examples of incentives offered by airports to facilitate the entry and expansion of certain airline services can include “reductions or waivers of fees, such as various airport rents, landing fees, and other certain airport facility fees, as well as

153. National Academies Press, *Building and Maintaining Air Service Through Incentive Programs* (2020) National Academies of Sciences, Engineering, and Medicine., 4-39 (1st ed. 2020).

154. *Id.*

155. *Id.*

156. *Id.*

157. *Id.*

marketing support or assistance.”¹⁵⁸ The general principle underlying the FAA’s restrictions on incentives offered by airports ensures they do not offer subsidies, or otherwise direct cash payments, and that these incentives are “limited in duration (to a maximum of 1 or 2 years), depending on whether the incentives are offered to new entrants or to both new entrants and incumbent airlines.”¹⁵⁹ Conversely, the community incentives are not subject to FAA restrictions like airport incentives, as long as they are “not airport directed, determined, or funded.”¹⁶⁰ Community incentives have become quite common in the United States, and have become “more significant as potential differentiators among airports and their air service incentive programs.”¹⁶¹ This is an area where the FAA may examine relevant overlap with CORSIA’s collective goals of reduction, combined with the effects of domestic incentives on actually increasing demand and accessibility while hindering the program’s effectiveness yet again. A practical alternative to the current structure of how these airline incentives operate would be for more oversight by the FAA regarding the effects of community incentives on increasing the prevalence of air travel in a given region and assessing whether this increase in flights could feasibly continue while also expecting the participating airlines to achieve their offsetting obligations under CORSIA. By maintaining the current structure of the source of sponsorship to assist airlines in their operations but instead, tailoring the areas of application of the incentive to be more aligned with CORSIA’s goals, a more feasible blanket approach to assisting airlines in maintaining their revenue without increasing service offerings can be developed.

IV. Conclusion

In conclusion, the present article has weaved through the various environmental challenges posed by civil aviation emissions and explored some of the regulatory mechanisms and international measures designed and adopted to address this issue. The paper further underscored the aviation industry’s historical role as a significant contributor to global climate change, and the continuously increasing emittance of greenhouse gasses, further illustrating the imperative for robust regulatory frameworks that do not make the error of exacerbating the issue. Having examined past

158. *Id.*

159. *Id.*

160. *Id.*

161. *Id.*

and ongoing attempts at a solution, it becomes evident that while regulatory efforts have indeed evolved, vexing challenges persist. Moreover, the complexity of international cooperation, varying emission standards, and the delicate balance between economic growth and environmental responsibility pose ongoing hurdles. Carbon offsetting and reduction schemes, like CORSIA, represent a promising step forward, yet they still require careful calibration to ensure true effectiveness without compromising economic viability, fair competition, and free trade between participants.

As the aviation industry continues to address these issues of sustainability and environmental awareness, it must navigate these intricate regulatory landscapes, identify their faults, and foster collaboration and innovation, rather than hindering the development of creative—albeit restrictive—solutions to the climate crisis. The paper's analysis serves as a foundation for understanding the intricate interplay between historical context, regulatory frameworks that emerged as a result, and ultimately the civil aviation industry's environmental responsibilities. Looking ahead, the efficacy of carbon offsetting and trading schemes will primarily hinge on the industry's commitment to *tangible* emission reductions. The future demands a proactive stance, with continuous adaptation of regulatory strategies, technological advancements, and industry-wide cooperation.