Tracing Developments of Flying to Failures of the Environment

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Abstract

Today, the air transport industry is one of the most important industries in the world because of its decisive role in improving the quality of life of millions of people. Since the aviation industry relies heavily on fossil fuels and other non-renewable sources of energy, the emissions emerging from aviation are considered significant contributors to climate change. The International Civil Aviation Organization (ICAO) was made a responsible entity under the Kyoto Protocol to regulate the greenhouse gases emitted by international civil aviation. ICAO undertook various efforts but failed to effectively regulate emissions. In 2016 in response to the rising pressure to curb emissions from aviation, it introduced a market-based scheme called Carbon Offsetting and Reduction Scheme for Aviation (CORSIA). To achieve carbon-neutral growth, under this offsetting scheme airplane operators are required to offset a proportion of their total carbon emissions above the 2019 industry baseline. Offsetting on which this scheme heavily relies is unlikely to stimulate emission reductions in aviation and other sectors due to the prices and excess availability of the carbon offsets. The current CORSIA implementation, however, also fails to respect or consider the countries' differences in domestic policies, capacity building and economic structure. Against this backdrop, this thesis examines the effectiveness of this scheme by dissecting its fundamentals and the reasons for implementation. The researcher also aims to highlight the capital-intensive nature of the scheme and the hindrance it poses to the growth of aviation industries in developing economies by comparing its impact on the aviation market of the United States of America and India.

Résumé

De nos jours, l'industrie du transport aérien représente l'une des industries les plus influentes au monde en raison de son rôle crucial dans l'amélioration de la qualité de vie de millions de personnes. Étant donné que l'industrie aéronautique dépend fortement des combustibles fossiles et d'autres sources d'énergie non renouvelables, les émissions provenant de cette dernière sont considérées comme des contributeurs importants au changement climatique. L'Organisation de l'aviation civile internationale (OACI) est l'entité responsable en vertu du protocole de Kyoto de la réglementation des gaz à effet de serre émis par l'aviation civile internationale. L'OACI a entrepris divers efforts mais n'a pas réussi à réglementer efficacement les émissions. En 2016, face à la pression croissante pour réduire les émissions de l'aviation, elle a introduit un système basé sur le marché appelé Carbon Offsetting and Reduction Scheme for Aviation (CORSIA). Pour atteindre l'objectif zéro carbone, ce système d'équilibrage exige que les opérateurs d'avions compensent une proportion de leurs émissions totales de CO2 au-dessus de la ligne de base de l'industrie de 2019. Cependant, l'équilibrage sur lequel ce système s'appuie fortement n'aboutiraprobablement pas à la réduction d'émissions dans l'aviation et d'autres secteurs en raison des prix et de la disponibilité excessive des compensations carbone. La mise en application actuelle de CORSIA échoue également à respecter ou à prendre en compte les différences entre les pays en matière de politiques nationales, de renforcement des capacités et de structure économique. Dans ce contexte, cette thèse examine l'efficacité de ce système en décomposant ses fondements et les raisons de sa mise en œuvre. Le chercheur vise également à souligner la nature capitalistique du système et les obstacles qu'il pose à la croissance des industries de l'aviation dans les économies en développement en comparant son impact sur le marché de l'aviation des États-Unis et de l'Inde.

LIST OF ACRONYMS AND ABBREVIATIONS

AAI- Airports Authority of India

ACI- Airports Council International

ACR- American Carbon Registry

ACT-SAF - Assistance, Capacity-Building and Training for Sustainability Aviation Fuel

AOC- Air Operator's Certificate

ARB- Air Resources Board

ATAG- Air Transport Action Group

BEE- Bureau of Energy Efficiency

CAEP- Committee on Aviation Environmental Protection

CAR- Climate Action Reserve

CAR- Civil Aviation Requirement

CBD- China Development Bank

CBDR- Common But Differentiated Responsibilities

CCR- CORSIA Central Registry

CCERs- China Certified Emission Reductions

CDM- Clean Development Mechanism

CEF- CORSIA-eligible fuels

CERs- Certified Emission Reductions

CMP- Conference of Parties serving as the Meeting of Parties to the Kyoto Protocol

CNG 2020 goal- Carbon-neutral growth goal

COP- Conference of Parties

CORSIA- Carbon Offsetting and Reduction Scheme for Aviation

CPCB- Central Pollution Control Board

DGCA- Directorate General of Civil Aviation

DOE- Designated Operational Entities

EAOCs- Early Action Offset Credits

EAS- Essential Air Service

EMS- Environment Management System

ETF- Enhanced Transparency Framework

ETS- emissions trading system

EU- European Union

EU ETS- European Union emissions trading system

FAA- Federal Aviation Authority

FCO project- Forest Carbon Project

GCC- Global Carbon Council

GHG- Greenhouse Gases

GIACC- Group on International Aviation and Climate Change

GMBM- Global Market-Based Mechanisms

HFCS- Hydrofluorocarbon

IATA- International Aviation Transport Association

ICAO- International Civil Aviation Organization

ICCT- International Council on Clean Transportation

IFSET- ICAO Fuel Savings Estimation Tool

IHLG- Industry High Level Group

IPCC- Intergovernmental Panel on Climate Change

LCAF- Lower Carbon Aviation Fuel

MoCA- Ministry of Civil Aviation

MoU- Memorandum of Understanding

MRV- Monitoring, Reporting, and Verification

MTOM- Maximum Take-Off Mass

OECD- Organization for Economic Co-operation and Development

NCLB- No Country Left Behind

NDCs- Nationally Determined Contributions

PFCS- Perfluorocarbons

REDD- Reducing Emissions from Deforestation and Forest Degradation

ROC- Registry Offset Credits

RTKMs- Revenue Tonne Kilometers

SAF- Sustainable Aviation Fuel

SARPs- Standards and Recommended Practices

SCS- Sustainability Certification Scheme

SPCB- State Pollution Control Board

TAB- Technical Advisory Board

UDAN- Ude Desh ka Aam Nagrik

UNFCCC- United Nations Framework Convention on Climate Change

U.S.- United States of America

VCS- Verified Carbon Standard

VER- Verified Emission Reduction

Chapter 1: Introduction

One of the significant sustainability issues that the present generation is currently facing is climate change mitigation by reducing emissions from aviation. The consensus among scientists has shown that the proliferation of aviation emissions has emerged as a contributor to climate change[1]. Initial estimates of ICAOs Committee on Aviation Environmental Protection (CAEP) according to which the total volume of emissions from CO2 in 2006 ranged to 600 million tonnes gives us a fair idea that although small but emissions from aviation (both domestic and international) are a significant contributor to climate change. This is because about 2% of total CO2 emissions are accounted for by aviation from the total 12% that is emitted by transportation sources. Aviation accounts for this percentage as aircraft engines release emissions both into the upper as well as lower troposphere directly and cause a different impact on the atmosphere's composition[2]. Aviation emission in the upper troposphere increase concentrations of sulfate that favor titration of ammonia thereby leading to concentrations consisting of lower ammonium nitrate. These concentrations increase the formation of nitrate particles in the lower troposphere[3]. To take up arms against these emissions, the international community has come together by promulgating treaties and conventions to find a solution[4]. However, despite their efforts, the goal is only sluggishly being achieved. To assess the role played by the international community in combating emissions from aviation, the researcher in this thesis will concentrate on two approaches, firstly treaty law approach and secondly delegating the responsibility for reducing emissions to a specific industry and solving the problem through ICAO[5]. By referring to the treaty law approach, the researcher has made an attempt to bring out the essence of already existing treaties and conventions to address carbon emissions and their effectiveness in addressing emissions from aviation in particular. The other approach has been adopted by the

[1] Murtala Ganiyu A Murgan, "Revisiting the role of United Nations Framework Convention on Climate change (UNFCCC) and the Kyoto protocol in the fight against emissions from international civil aviation" (2021) 12:No.1(2021) African Journals Online.
[2] *Climate change and flying: what share of global CO2 emissions come from aviation?*
[3] Etienne Terrenoire et al, "Impact of present and future aircraft NOx and aerosol emissions on atmospheric composition and associated direct radiative forcing of climate" (2022) Atmospheric Chemistry and Physics, online: <https://acp.copernicus.org/articles/22/11987/2022/acp-22-11987-2022.pdf>.
[4] *Ibid*.
[5] ICAO, "Vision and Mission", online: <https://www.icao.int/about-icao/Council/Pages/vision-and-mission.aspx>.

researcher to assist in understanding the impact of CORSIA and how it plans to aid in achieving the goals set out in the already existing international conventions and treaties. According to the treaty law approach, the international community promulgated United Nations Framework Convention on Climate Change (UNFCCC)[6] and Kyoto Protocol[7] while including aviation emissions under the umbrella of anthropogenic substances affecting the environment. UNFCCC was adopted in 1992 with an aim to impede interference of dangerous anthropogenic substances in the climate system by stabilizing GHG levels in the atmosphere[8]. This framework convention differentiated between developed and developing countries as developed countries according to UNFCCC were expected to take a lead to combat adverse effects of climate change and developing countries were expected to contribute to climate mitigation[9]. This was in accordance with its principle of common but differentiated responsibilities and respective capabilities[10].
The Kyoto Protocol, which was negotiated and adopted by the third Conference of Parties (COP) of UNFCCC in 1997committed industrialized countries listed as annex 1 countries to reduce by 5%[11] six gases, namely: carbon dioxide methane, nitrous oxide, Sulfur hexafluoride, hydrofluorocarbon (HFCS) and perfluorocarbons (PFCS) and ground-level zone by 2012[12]. The protocol to aid the countries in achieving their target offered them flexibility mechanisms which were also called Kyoto mechanisms. The Kyoto mechanisms offered were international emissions trading, clean development mechanism and joint implementation[13]. Amongst these three flexibility mechanisms, the clean development mechanism has been chosen as one of the offsetting programmes by ICAO for the generation of CORSIA-eligible emission units, which further makes it of paramount importance. Parties to the Kyoto Protocol decided to call on developed countries (Annex I parties) to pursue limiting or reducing GHG from aviation through ICAO (Article 2(2) of the Kyoto Protocol) to contribute towards the reduction of aviation

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[6] *UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE*, (1992).
[7] *Kyoto Protocol to the United Nations Framework Convention on Climate Change, 11 December 1997, 2303 UNTS 162 (entered into force 16 February 2005) [Kyoto Protocol]*.
[8] "Introduction to Climate Finance", online: *United Nations Climate Change* <https://unfccc.int/topics/climate-finance/the-big-picture/introduction-to-climate-finance/introduction-to-climate-finance>.
[9] *United Nations Framework Convention on Climate Change, 9 may 1992,* article 3(1).
[10] *Ibid*.
[11] *Kyoto Protocol to the United Nations Framework Convention on Climate Change,* Article 3(1).
[12] Paul Stephen Dempsey, "Trade and Transport Policy in Inclement Skies - The Conflict between Sustainable Air Transportation and Neo-Classical Economics" (2000) 65:4 Journal of Air Law and Commerce 639.
[13] *International Emissions Trading Clean Development Mechanism Joint Implementation* (the Kyoto Protocol Mechanisms).

emissions. The protocol by making ICAO the responsible entity had contributed fundamentally to the reduction of aviation emissions[14]. A quasi-legislative power was accorded to ICAO by the convention[15]. To minimize the adverse effects of international civil aviation on global climate, ICAO formulated policies, developed SARPs on aircraft emissions and conducted outreach activities through CAEP[16]. The 37th Assembly Session of 2010 witnessed the adoption of two global aspirational goals which were improving fuel efficiency by 2% through 2050 and CNG from 2020 onwards. ICAO in furtherance of this global aspirational goal and for the promotion of sustainable growth of international aviation pursued a basket of measures in the form of improving aircraft technology, SAF. Along with this, ICAO with an aim of creating a system for effective regulation of international aviation emissions introduced in 2016 a market-based scheme called Carbon Offsetting and Reduction Scheme for Aviation (CORSIA)[17].

According to this scheme, airplane carriers are required to account for emissions produced by flights between participating states by purchasing carbon offsets. Carbon offsetting can be referred to as a process under which the polluting company makes up for greenhouse gas which it has emitted by buying carbon credits[18]. Carbon credits are generated from projects that aim to reduce GHG emissions, sequester carbon (the process of capturing and storing carbon dioxide in the atmosphere) or pull GHG from the atmosphere or prevent the release of emissions. One carbon credit is generated when a project verifies that they have reduced, avoided, or destroyed one metric tonne of GHG[19].

ICAO, while implementing this scheme intended to realize its carbon-neutral growth goal (CNG 2020 goal) of stabilizing emissions from international aviation at 2020 levels[20] but the inherent flaws associated with this scheme decrease the likelihood of stimulating emission reduction.

[14] *Aviation, Offsets and the Paris Agreement*, by Niclas Svenningsen.
[15] ICAO, "Vision and Mission", online: <https://www.icao.int/about-icao/Council/Pages/vision-and-mission.aspx>.
[16] "ICAO Environment: Climate Climate", online: <https://www.icao.int/environmental-protection/pages/climate-change.aspx>.
[17] Robin Pomeroy, "Carbon offsets- how do they work, and who sets the rules?", (2 September 2022), online: *World Economic Forum* <https://www.weforum.org/agenda/2022/09/carbon-offsets-radio-davos/>.
[18] *Ibid*.
[19] *Ibid*.
[20] *Ibid*.

Some commentators have even called out the organization's objectives as "seemingly weighed against the needs of the climate system."[21]. And some have even claimed that ICAO's legal framework and institutional settings do not provide a conducive setting to address climate change or other environmental issues[22]. Thus, this thesis primarily focuses on examining the effectiveness of CORSIA and the complexities surrounding it. It highlights the significant issues that exist in the scheme and the reasons which might affect the very nature of the scheme and lead to its failure. The primary purpose of this thesis is to contribute to the ever-growing literature on emissions from the aviation industry as a whole. Currently, an attempt has been made by ICAO to address emissions from civil aviation by introducing CORSIA, but there is a blanket of complexities involved in it. With this thesis, an attempt has been made to bring out the essence of CORSIA and the shortcomings surrounding it. The researcher in this thesis further explores the different impacts CORSIA can have on the aviation industry of developing and developed states.

Against this backdrop, the researcher in this thesis argues that this scheme is not beneficial as the carbon offsets generated by ICAO-approved offsetting programmes do not meet all requirements laid down under CORSIA emission units' eligibility criteria. ICAO has approved eight programmes that are eligible to supply CORSIA-eligible emission units for the pilot phase until 2023 which are: American Carbon Registry, Architecture for REDD+ Transactions, China GHG Voluntary Emission Reduction Program, Clean Development Mechanism, Global Carbon Council, Climate Action Reserve, Gold Standard and Verified Carbon Standard. Under the pilot phase, CORSIA will apply only to States who volunteer to participate in the scheme. According to the CORSIA-emissions unit eligibility criteria laid down by ICAO, offsets generated from offsetting programmes to be called CORSIA-eligible emission units should be additional, based on a realistic and credible baseline, quantified, monitored, reported, and verified. Carbon credits should also represent permanent emissions reductions and should not cause material increases in emissions elsewhere. Furthermore, they should have a clear and transparent chain of custody, not cause any net harm, and be counted only once[23]. Additionally, emission unit eligibility criteria

[21] Andrew Macintosh, "Overcoming the barriers to international aviation greenhouse gas emissions abatement" ANU Centre for Climate Law and Policy, online: <https://law.anu.edu.au/sites/all/files/wp2_2008_-_overcoming_barriers_to_international_aviation_emissions_abatement.pdf>.

[22] Kati Kulovesi, "Addressing Sectoral Emissions Outside the United Nations Framework Convention on Climate Change: What Roles for Multilateralism, Minilateralism and Unilateralism" (2012) 21:193 198.

[23] *CORSIA Emissions Unit Eligibility Criteria: ICAO Document* (2019).

also obligate offsetting programmes to have in place measures to avoid double claiming, use and issuance. Offsetting programmes are also required to demonstrate that the country where the emission reduction activities are conducted agrees to account for the offset unit issued. Also, offset projects should not violate any state or provincial law or national and international obligation[24]. To buttress the contention that offsetting programmes fail to meet the CORSIA emission units eligibility criteria, the researcher in this thesis contends that emission reductions generated by these eight ICAO-approved offsetting programmes are not additional. A carbon credit or a carbon offset will be classified as being additional under CORSIA if it reduces GHG emissions above the emissions which would have been reduced in the business-as-usual scenario or under any law, regulation, or legally binding mandate. Clean Development Mechanism (CDM), which is one of the offsetting programmes approved by ICAO lacks the ability for determining the additionality of emission reductions from the baseline accurately[25]. Additionality is calculated against a hypothetical baseline, there is no definite benchmark in CDM project[26]. Additionally, a report by the Technical Advisory Board stated that CCERs which are generated by China GHG Voluntary Emission Reduction Program and VERs which are generated by Verified Carbon Standard, both of which are generated by CORSIA-approved offsetting programmes also fail to meet the additionality criteria. This is because they are largely based on the CDM methodologies which are likely responsible for this result in their initial stages[27]. Also, the forest offsets generated by REDD to quantify GHG reductions face the challenge of establishing an appropriate baseline as the volume of credits to be issued under this offsetting programme is high[28]. With regards to the requirement for offset credits to be quantified, monitored, reported, and verified, the forest sector is one such sector that has high levels of uncertainty for quantifying emissions[29]. This is because the estimation of GHG from

[24] *Ibid*.
[25] Chris Juhnke, "The Clean Development Mechanism - The Past and Future" (2012) 42:3 Environmental Policy and Law 151–155.
[26] Robin Pomeroy, *supra* note 15.
[27] ICF Consulting et al, *Assessment of ICAO's global market-based measure (CORSIA) pursuant to Article 28b and for studying cost pass- through pursuant to Article 3d of the EU ETS Directive* (European Commission, 2020).
[28] Rob Bailis, Derik Broekhoff, & Carrie M Lee, *Supply and sustainability of carbon offsets and alternative fuels for international aviation* (Stockholm Environment Institute).
[29] Directorate-General for Climate Action, "Commission proposes to 'stop the clock' on international aviation in the EU ETS pending 2013 ICAO General Assembly", (12 November 2012), online: *European Commission: Climate Action* <https://climate.ec.europa.eu/news-your-voice/news/commission-proposes-stop-clock-international-aviation-eu-ets-pending-2013-icao-general-assembly-2012-11-12_en>.

forests requires the analysis of satellite data to multiple field measurements spread across a broad landscape. The relative complexity associated with this process can result in substantial measurement errors[30].

This problem is not only prevalent with forest offsets but even third-party verifiers under CDM have been subject to this criticism due to their lack of capacity and competence with regard to the level of quality checks required to ensure offset quality. Competition between Designated Operational Entities (DOEs) has also raised concerns about these remaining competitive and profitable by lowering the quality of their audits. Offset credits generated from CDM projects also run the risk of leakage as internal emission reductions are offset by increased emissions external to the project[31]. Carbon leakage occurs due to project activities causing unanticipated increases or decreases in greenhouse gas benefits outside the project's accounting boundary. It can also happen by shifting the agricultural industry to unprotected lands[32].

Furthermore, forest carbon credits used for offsetting emissions from flying directly impact climate breakdown as they run the risk of being released through wildfires, droughts, floods, pest invasions, illegal logging, and geopolitical and economic dynamics[33]. Under CDM projects, there is a lack of comprehensive permitting which creates asymmetry. This is because project proponents are rewarded for reducing emissions, but penalties are not imposed for increased emissions. This grants parties incentives to focus on emission reductions in CDM projects and permit an increase in emissions elsewhere[34]. To avoid double claiming Verified Carbon Standard (VCS), Climate Action Reserve (CAR), Gold Standard, and CDM have some measures related to legal ownership of emission reductions, but the risk of double counting is not well managed under CORSIA. This is due to ineffective rules and procedures to avoid double counting[35]. Although ICAO mandates programmes to demonstrate that country where the emission reduction

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[30] Rob Bailis, Derik Broekhoff, & Carrie M. Lee, *supra* note 26.

[31] Robert Repetto, "The Clean Development Mechanism: Institutional Breakthrough or Institutional Nightmare?" 34:3/4 Policy Sciences 303–327.

[32] note 21.

[33] Ross W Gorte & Jonathan L Ramseur, "Forest carbon markets: Potential and Drawbacks" (2010) RL34560 Congressional Research Service, online: <https://nationalaglawcenter.org/wp-content/uploads/assets/crs/RL34560.pdf>.

[34] Robert Repetto, *supra* note 29.

[35] Umwelt Bundesamt & DEHSt, "Options for Improving the Emission Unit Eligibility Criteria under the Carbon Offsetting and Reduction Scheme for International Aviation", online: <https://www.dehst.de/SharedDocs/downloads/EN/project-mechanisms/discussion-papers/improving-unit-eligibility.pdf?__blob=publicationFile&v=>.

activities are conducted agrees to account for the offset unit issued but fails to lay down robust rules to be followed by the countries with regard to accounting for double claiming.
Paris Agreement, however, takes care of this as it mandates states to apply the concept of the corresponding adjustment which is in the form of bookkeeping[36]. Conference of Parties to the UNFCCC in the UNFCCC meeting held in Glasgow (COP 26) allowed to authorize of the use of carbon credits issued by the emission reduction programmes for offsetting under CORSIA and for purposes of voluntary offsetting[37]. The rules also clarify that the country hosting emission reduction activities upon such authorization must apply an adjustment to the ledger used for tracking progress for achieving its NDCs for reflecting that the aviation industry or another credit buyer has used the emission reduction[38]. The researcher in this thesis also voices the dire need of reviewing the baseline. The present baseline criteria are the average carbon dioxide emissions from international aviation in 2019. Earlier, it had to be the average of 2019 and 2020, but with covid-19 and restrictions on flying, 2019 was agreed upon as a baseline. Also, due to covid-19 and the hardships that have followed, a lot of airlines, including Miami Air International, Flybe, and Virgin Australia, have filed for bankruptcy. This means that there are now fewer air carriers than prior to covid. The aviation industry due to covid suffered a major blow estimating a loss of $370 billion[39]. A glance at the present situation of international aviation makes it clear that the aviation industry is still recovering and has not recovered completely post-covid. The recovery has although been rapid amid a surge in travel pursuant to the lifting of Covid-19 restrictions but airlines in 2022 expected their revenue to reach only 84% of 2019 levels[40]. Although air travel has been able to recover slowly from the trough flight passenger traffic has yet to bounce back fully[41]. Overall passenger numbers in 2021 could only reach 47% of 2019 levels and this was due to domestic travel and not due to an increase in the number of

[36] *Expert Report*, by Derik Broekhoff (2022).
[37] *Ibid*.
[38] *Ibid*.
[39] Julie Peasley, "When will air travel return to pre-pandemic levels?", (14 December 2022), online: <https://www.weforum.org/agenda/2022/12/when-will-air-travel-return-to-pre-pandemic-levels/>.
[40] Geoffrey Weston et al, "Air Travel Forecast: When Will Airlines Recover from Covid-19?", online: *Bain & Company* <https://www.bain.com/insights/air-travel-forecast-when-will-airlines-recover-from-covid-19-interactive/>.
[41] Julie Peasley, "When will air travel return to pre-pandemic levels?", (14 December 2022), online: <https://www.weforum.org/agenda/2022/12/when-will-air-travel-return-to-pre-pandemic-levels/>.

international travel[42]. The international traveler numbers in 2021 were only 27% of 2019 levels[43]. This makes the baseline even higher as the baseline was calculated on the basis of average carbon dioxide emissions from international aviation and recovery post-covid was speedy due to domestic and not international travel.

The baseline criterion is set so high that if the same pace continues, the airlines would not have to buy any carbon offsets for the next 5 years[44]. This creates an abundance of offsets in the market and following the concept of demand and supply, brings the price of offsets so low limiting the scope of the scheme. It is further estimated that in future the prices of offsets might increase but even if the prices go up by 20 percent even then it will be within the paying capacity of the airlines[45].

Thus, not only the failure of offsetting programmes to meet all the requirements in carbon credit criteria affects the integrity of CORSIA but it is also affected due to the critical insufficiency of CORSIA sustainability criteria for CORSIA-eligible fuel[46]. CORSIA sustainability criteria lay down the requirements for fuel to be classified as CORSIA-eligible fuel. Airlines to reduce their offsetting requirements under CORSIA can use CORSIA-eligible fuels (CEF). Two types of fuels eligible under CORSIA are sustainable aviation fuel (SAF) and lower carbon aviation fuel (LCAF). CORSIA Lower carbon aviation fuels are fuels that meet CORSIA sustainability criteria and CORSIA sustainable aviation fuel refers to renewable or waste-derived aviation fuel that meets CORSIA sustainability criteria[47]. SAF and LCAF according to CORSIA sustainability criteria for the pilot phase will be classified as CEF if 10% lower GHG emissions are produced from the fuel when compared to baseline life cycle emissions values for aviation fuel. Additionally, according to the sustainability criteria, it should be obtained from biomass that has been obtained from land (primary forest, wetlands, or peat lands) converted after January 1, 2008, and which should not result in the degradation of carbon stock[48]. To elucidate on the

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[42] Julie Peasley, "When will air travel return to pre-pandemic levels?", (14 December 2022), online: <https://www.weforum.org/agenda/2022/12/when-will-air-travel-return-to-pre-pandemic-levels/>.
[43] "Air Passenger Numbers to Recover in 2024", online: *IATA* <https://www.iata.org/en/pressroom/2022-releases/2022-03-01-01/>.
[44] Florian Wozny et al, "CORSIA—A Feasible Second Best Solution?" (2022) MDPI, online: <https://elib.dlr.de/187534/2/applsci-12-07054.pdf>.
[45] *Ibid*.
[46] *Carbon Offsetting in International Aviation in Asia and the Pacific: Challenges and Opportunities* (Asian Development Bank, 2020).
[47] *Ibid*.
[48] *Ibid*.

contention of woeful inadequacy of CORSIA sustainability criteria, the researcher contends that the current criteria for biomass for producing CEF are more concerned about the carbon stock of lands and do not deal with any measures for the purpose of enhancing biodiversity[49].

Also obtaining biomass for producing CEF from biodiversity-rich protected lands can have adverse impacts on biodiversity. The keenness expressed by countries and airlines to use SAF extracted from renewable resources such as plants or used cooking oil has resulted in the emergence of a new and insatiable market for soy, palm, and vegetable oils that will have a further impact on biodiversity.[50]

Apart from the failure of offsetting programmes to meet the carbon credit criteria and insufficiency of criteria governing CORSIA-eligible fuel, which strikes at the heart of the scheme, ICAO's mechanism to enforce CORSIA is also weak. ICAO adopted CORSIA in the form of Annex 16 — Environmental Protection to the Convention on International Civil Aviation, Volume IV — Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and has chosen a legal instrument which is a mix of resolutions and Standards and Recommended Practices (SARPs) for implementation[51]. This thesis argues that the ability of ICAO to enforce compliance with the scheme is limited because SARPs become effective within three months of submissions to the contracting states pursuant to them being adopted by ICAO council or at a time prescribed by the Council unless disapproval is registered by most of the states[52] but the legal force of SARPs is not the same as treaty provision[53]. Although the legal force of SARPs is not the same as treaty provision, but failure to comply can allow other states to prohibit the non-complying aircraft from entering its airspace. However, this is subjective in nature and wholly and solely depends on the relationship shared among countries, which tends to further weaken the implementation of CORSIA. This is because the relations shared by the

[49] Derik Broekhoff, *supra* note 34.

[50] "Fueling our crises How Europe's move to soy in biofuels contributes to our climate crisis, food insecurity and the collapse of the Amazon", (November 2022), online: *Transport & Environment* <https://www.transportenvironment.org/wp-content/uploads/2022/11/Soy_Study_TE_2022_final_embargoed_Friday_4_Nov-1.pdf>.

[51] ICAO, "The Postal History of ICAO: Annex 16 – Environmental Protection", online: <https://applications.icao.int/postalhistory/annex_16_environmental_protection.htm>.

[52] *Convention on International Civil Aviation (Chicago Convention);*, Article 90 at 90.

[53] Paul Stephen Dempsey, "Compliance & Enforcement in International Law: Achieving Global Uniformity in Aviation Safety" (2004) 30:1 North Carolina Journal of International Law, online: <https://scholarship.law.unc.edu/ncilj/vol30/iss1/1/?utm_source=scholarship.law.unc.edu%2Fncilj%2Fvol30%2Fiss1%2F1&utm_medium=PDF&utm_campaign=PDFCoverPages>.

countries has the tendency to dominate the outcome. For example, in the recent scenario, it can be seen that Russia banned 36 countries from using its airspace[54], but it did not ban India and China from using its airspace, which can help us to conclude that the outcome completely depends on the relations shared by the countries[55]. So, if a country fails to comply with SARPs then if other member states will deny entry or not will solely depend on the state. SARPs are designated as annexes for convenience and do not form a part of the Chicago Convention[56]. Articles 12 and 37 of the Chicago Convention impose on ICAO member states an affirmative obligation to formulate their laws, rules, and regulations in conformity with the SARPs laid down by ICAO[57].

It is the responsibility of the States under Article 12 of the Convention to ensure the uniformity to the greatest possible extent of their regulations with SARPs laid down by ICAO. (Article 12, Chicago Convention)[58]. Each contracting state under Article 37 undertakes to collaborate to secure uniformity of the highest practicable degree in their domestic laws, regulations, standards, and procedures related to aircraft, personnel, airways, and auxiliary services with SARPs[59]. But if the contracting states find it impracticable to comply with SARPs or if they have or adopt regulations different therefrom, they can depart from the same under Article 38 after immediately notifying ICAO of the discrepancy introduced between its own practice and SARPs laid down under the Annex[60]. If a state does not make appropriate amendments to its own regulations or practices in case of any amendment to SARPs shall notify to ICAO council of the action that it proposes to take within sixty days. Requirements laid down under Articles 37 and 38 obligate the state to harmonize its domestic law with SARPs[61] but the absence of a definition of the word, the highest practicable degree of uniformity under Article 37 can refrain the state

[54] "Russia bans British airlines from its airspace", *BBC* (25 February 2022), online: <https://www.bbc.com/news/business-60505417>.
[55] Mira Rojanasakul & Jin Wu, "Where Russia Is Banned From Flying—And Who It's Banned in Retaliation", *Bloomberg* (1 March 2022), online: <https://www.bloomberg.com/graphics/2022-russia-ukraine-flight-bans/?leadSource=uverify%20wall>.
[56] *Ibid*.
[57] *Ibid*.
[58] Dr Paul Stephen Dempsey, *The Chicago Convention as the Constitution of an International Constitution of an International (Civil Aviation) Organization* (McGill University).
[59] *Ibid*.
[60] *Ibid*.
[61] Paul Stephen Dempsey, *supra* note 46.

from doing everything possible by it[62]. A state can also reject an Annex under Article 38 either in whole or in part if the state submits an objection in a timely fashion on the grounds of impracticability of compliance. On finding it impracticable to comply with SARPs states have a duty to immediately notify the ICAO but it is unclear as to whether the state is required to notify either immediately or upon discovering the impracticability. The provision to opt out makes SARPs only a soft law. It can hardly be deemed to be binding as it grants states the option to depart from the same and reject them on the subjective self-determination that their compliance would be impracticable[63]. It is also argued in this thesis that transparency for the implementation of CORSIA is a central requirement but[64] ICAO lacks a mechanism for freedom of information policy or for the members of the public to request documents. This is because the Chicago Convention which had established ICAO does not mention transparency or public consultation in ICAO's regulatory function[65].

The researcher in this thesis also argues that the one size fits all approach adopted by ICAO with regards to CORSIA according to which airlines are under the mandate to account for their emissions by purchasing offsets hampers the growth of aviation industry of developing countries. Although ICAO has commenced implementation of this scheme in a phased manner with a view to put the interests of developing countries first to incorporate "the principle of special circumstances and respective capabilities of States, in particular developing States while minimizing market distortion" and also weave in the principle of common but differentiated responsibilities recognised under UNFCCC but it still fails to consider the stages of development of the aviation sector of various countries. CORSIA is not too soft or too hard on airlines, the requirements of CORSIA make it difficult for the countries to comply with. This makes the scheme less efficient and effective, for a matter of fact, it is difficult for developing countries to procure sustainable aviation fuel whereas America has already started the manufacturing and production of sustainable aviation fuel and its airlines have started using it as well. Additionally, as discussed above, there are doubts with regard to the efficacy of CORSIA offsetting

[62] Md Tanveer Ahmad, *Toward Governing Emissions From Aviation That Contribute To Climate Change and Global Warming* Institute of Air and Space Law, Faculty of Law, McGill University, 2015).
[63] Paul Stephen Dempsey, *supra* note 46.
[64] Directorate-General for Climate Action, *supra* note 27.
[65] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *Assessment of ICAO's global market-based measure (CORSIA) pursuant to Article 28b and for studying cost pass- through pursuant to Article 3d of the EU ETS Directive*.

mechanism until the same is rectified, CORSIA impacts the aviation sector of developing countries adversely. For rectification, there need not be tougher requirements but the effectiveness of CORSIA needs to be increased by an efficient and systematic implementation. The scheme should be such that it does not leave behind or fails to consider the economic aspect of a country with a growing aviation industry and the financial needs of that country. To further this contention, the researcher draws a comparative analysis between the aviation industry of the U.S. and India. The researcher compares the impact of the deregulation of the U.S. aviation industry on the U.S. and India since deregulation has played a quintessential role in the development of the US aviation industry. The U.S. government promulgated the Airline Deregulation Act in 1978 which granted airlines the liberty to take decisions related to the entry and exit of flights, frequency of service, and fares to be charged to passengers for routes. The U.S. government's decision to deregulate the aviation sector resulted in the creation of a highly competitive aviation market. American airlines to adapt to this enhanced their fleets for survival and profitability[66]. Airline deregulation in the US not only saw an influx of new entrants into the market but lower fares, new services, increase in flight frequency which resulted in growth in the number of passengers[67] that ultimately made the US aviation industry more profitable and dynamic[68]. On the other hand, the Indian government decided to deregulate the aviation industry in 1994 that is after 13 years after the U.S decided to deregulate its aviation industry and that too after its national carrier (Air India which covered international routes) was hard hit by the US opening its skies. Air India was hard hit because while the US aviation industry was growing tremendously, the Indian aviation industry remained stagnant due to deregulation and the nature of the aviation regime.

The nature of the aviation regime in the U.S. and India is one of the reasons for the difference in the size of the airline industries of these countries[69]. Furthermore, CORSIA acts as a roadblock in the path of growth of India's aviation industry by the imposition of additional costs and that too at a time when the Indian aviation industry is trying to acquire a more significant share of

[66] ROBERT PETERSON, "Impacts of Airline Deregulation", online: <https://onlinepubs.trb.org/onlinepubs/trnews/trnews315airlinedereg.pdf>.

[67] Andrew R Goetz & Timothy M Vowles, "The Good, the Bad, and the Ugly: 30 Years of US Airline Deregulation" (2009) Journal of Transport Geography 251–263.

[68] ROBERT PETERSON, *supra* note 57.

[69] Arijit Mazumdar, "DEREGULATION OF THE AIRLINE INDUSTRY IN INDIA: Issues, Causes and Rationale" (2009) 70 Indian Political Science Association 451–469.

international traffic by opting for aeroplanes having a narrow body fleet. The Indian airline industry is operating on a thin margin of profits, has been subjected to stringent restrictions, and was hard hit due to covid-19. Although Indian airlines as discussed above, can opt for CORSIA-eligible fuel to reduce the offsetting obligations the high cost of CEF prevents them from availing of this option. This is because the high cost of fuel adds to their additional costs.

The researcher to buttress this argument, compares the existing obligations which already affect the finances of American and Indian airlines in the form of fleet requirement, equity requirement and regulation pertaining to the allocation of fleets of carrier service providers. It further compares the impact of covid on American and Indian airlines and the role played by the government of the two countries to minimize their woes. The researcher also compares the preparedness of American and Indian airlines about the use of CORSIA-eligible fuels. While the concept of sustainable aviation fuel for Indian airlines is at a nascent stage, the world's largest airline American Airlines at San Francisco International Airport has already received its first-ever batch of CORSIA-certified SAF by Neste MY Sustainable Aviation Fuel TM[70].

To further elucidate the contention that CORSIA hampers growth, the researcher argues that ICAO's CNG 2020 goal, assumes greater responsibility for reducing emissions from aviation on the airline industry in developing countries like India as it neglects the historical emissions of countries in international aviation. According to the presentation of arguments related to the complexities involved around CORSIA and its effect on the growth of the aviation industry of India and the U.S., the researcher concludes that CORSIA was introduced with the intent to let the world reap the benefits of global travel and tourism while regulating the emissions from international aviation. However, these targets are unlikely to be achieved. This is because participation in CORSIA is partial rather than complete and as has been discussed above, ICAOs ability to enforce compliance with the scheme is limited[71].

To aid ICAO in achieving its CNG goal, the researcher in this thesis suggests that ICAO should also address the effect of non-carbon dioxide emissions on climate change as currently it only

[70] "American Airlines Receives Aviation Industry's First-ever CORSIA-certified Sustainable Aviation Fuel From Neste", (12 July 2022), online: *American Airlines: Newsroom* <https://news.aa.com/news/news-details/2022/American-Airlines-Receives-Aviation-Industrys-First-ever-CORSIA-certified-Sustainable-Aviation-Fuel-From-Neste-CORP-OTH-07/default.aspx>.

[71] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *supra* note 56.

caters to carbon dioxide emissions[72]. This is because aviation apart from carbon dioxide, also emits other gases. While the aircraft is at high altitudes, contrails, and contrail cirrus in the form of clouds composed of ice crystals are generated, which have a strong warming effect. Additionally, when methane is broken into the atmosphere by nitrogen oxide, there is a cooling effect, but nitrogen oxide also adds to the warming effect on the climate as it contributes to the formation of ozone. An aeroplane's overall climate impact is thus not only based on its fuel consumption but also its altitude and climatic conditions. Considering that aircraft not only emit carbon dioxide but also non-carbon emissions, ICAO should therefore also address the non-carbon emissions and their effect on climate change[73].

Non-carbon emissions can also be catered to by bringing in place a monitoring and reporting system, introducing common calculation methods for non-carbon emissions and implementing policies for reducing them. Cloudiness can be controlled by using SAF which due to lower aromatics burns clearly, emits lower soot particles[74].

To ensure the integrity and effectiveness of this scheme, the researcher in this thesis suggests revising CORSIA emission units eligibility criteria and quantifying emission reduction and removal methodologies. Over-estimation of emission reductions can be avoided, and shortcomings can be redressed by ICAO by adopting new principles to quantify emission reduction that not only deals with establishing a robust baseline but further addressing carbon leakage, measuring project emissions and also choosing appropriate crediting period durations[75].

CORSIA-eligible fuels which consist of sustainable aviation fuel (SAF) and lower carbon aviation fuel play an important role in decarbonizing and higher ambitions for aviation but their usage is limited due to higher production costs compared with conventional fuel[76]. A study conducted in 2019 estimated that alternate aviation fuels were two to eight times more expensive than conventional jet fuels. To thus incentivize airlines to opt for using SAF for reducing their offsetting obligations against the backdrop of the availability of carbon credits at lower prices,

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[72] Stefan Go¨ssling et al, "Voluntary Carbon Offsetting Schemes for Aviation: Efficiency, Credibility and Sustainable Tourism" (2007) 15:3 Journal of Sustainable Tourism, online: <http://www.tec-conseil.com/files/library/documents/Gossling_et_al.pdf>.

[73] *Ibid*.

[74] Dr Lambert Schneider & Nora Wissner, "Fit for Purpose? Key issues for the first review of CORSIA" (2022) öko-Institut eV, online: <https://www.oeko.de/fileadmin/oekodoc/Key-issues-for-first-review-of-CORSIA.pdf>.

[75] *Ibid*.

[76] *Ibid*.

ICAO should also consider introducing a minimum quota for SAF consistent with the proposed target for 2035-2050[77].

1.2. Research Questions

1. What is the efficacy & impact of CORSIA on the aviation Industries?
2. What are the fundamentals & various dimensions of CORSIA?
3. How does CORSIA affect the aviation industry of developing nations like India?
4. How can the ramifications of CORSIAs impact be juxtaposed with the aviation industries of advanced nations like the US?

1.3. Scope of Thesis

The thesis is limited to ICAO's 40th Assembly session which was held from September 24 to October 4, 2019, and deals with related documents which were issued thereafter.

1.4. Thesis outline

Chapter 2 provides information regarding how and why International Civil Aviation Organisation was created. In the first part of the chapter, emphasis has been laid on existing international conventions that exist to address climate change. It further provides information on the EU ETS system, a market-based scheme exclusively designed for the European Union, that was adopted and the reason it failed. The ultimate purpose of the chapter is to give an insight into CORSIA by assessing the effectiveness of this scheme. This chapter discusses in detail the implementation elements of CORSIA, comprising offsetting requirements and eligible emission units. CORSIA-eligible fuels and MRV requirements bring to light their shortcomings to highlight why the scheme is not a good fix.

Chapter 3 draws a comparative analysis of the aviation industry of the United States of America and India to contend that CORSIA hampers the growth of India's developing and emerging aviation industry. The U.S. is one of the most developed nations with a sophisticated and is amongst the largest aviation markets in the world. On the other hand, India is one of the fastest-growing economies in the world, having an ever-evolving and huge global aviation market. To further the contention that the impact of CORSIA is unfair and inappropriate on the aviation market of India, the researcher argues that CORSIA fails to consider the difference in the stage of the aviation industry of various states and applies a one size fit all approach. Since the

[77] *Ibid*.

deregulation of the US airline industry acted as a significant driving force behind the growth of the US aviation industry, the researcher in this chapter also considers the impact of deregulation, which contributed to the development of the aviation industry of the U.S. and affected India's aviation sector. A comparison in this chapter is also drawn regarding the obligations that have already been placed on Indian and US airline operators in the form of fleet requirements, equity requirements and regulations about the allocation of fleets of carrier service providers. This has been discussed to contend that Indian airline operators are already subjected to conditions which affect their finances, and CORSIA adds to their costs at a time when India's aviation industry has the potential to grow. Since covid had added to their woes, the chapter also compares the role played by the Indian and the US government in minimizing their distress. As CORSIA imposes additional costs by allowing airlines to reduce their offsetting obligations by using CORSIA-eligible fuel, which is costlier than traditional jet fuel, the chapter also deals with the preparedness of Indian and US airlines in that regard by focusing specifically on sustainable aviation fuel.

Chapter 4, while providing a summary and conclusion of the entire thesis, also puts forth some suggestions to ensure the effective implementation of CORSIA.

1.5. Methodology

This thesis predominantly is a work of primary and secondary sources, as it places reliance on various primary sources of law such as UNFCCC, Kyoto Protocol, and Chicago Convention, amongst others & also depends upon secondary sources like newspaper articles, research articles and presentations of pioneers of the industry to efficiently and more effectively understand the concept of CORSIA, the challenges it brings to different states and the effectiveness of the scheme in reducing emissions from international aviation.

Chapter 2: Fundamentals and Shortcomings of CORSIA

2.1. Introduction: The importance of aviation and how it is affecting the environment

The development of the air transport industry, coupled with technical and service achievements such as better jet fuels, new high bypass turbofan engines, and better radars for managing air traffic, has made the aviation industry safer and more economical, which has contributed to making it one of the most critical industries in the world. The role that the aviation sector has fulfilled ever since the flight of the first jet airliner in 1949 has made it essential for the economic progress of the states. This industry also plays a decisive role in improving the quality of life of millions of people, which is also evident from the recent estimates by cross-industry Air Transport Action Group (ATAG)[78]: The aviation industry has provided 10.2 million direct jobs, which range from airlines, airport industry as well as the civil aerospace sector. The aviation industry also accounts for 55.3 million indirect (through purchasing the goods and services from companies in its supply chain), induced (by way of spending by industry employees), as well as tourism-related jobs. Additionally, the global aviation industry's total economic impact had reached USD 2.7 trillion (3.6 percent of the world's GDP in 2016) and supported 65.5 million jobs globally[79].

In the past, not much attention was given to monitoring and controlling greenhouse gas emitted by the aviation industry, as it was not outlined in the objectives of the Chicago Convention that formulated core principles for permitting international air transport and established a specialized agency called ICAO[80]. The main objectives of ICAO are laid down in the Chicago Convention[81], which was set post World War II era in which the main emphasis was on stabilizing the aviation industry. It was an initial period when these objectives were set. At that time, the only aim of the drafters of the Chicago convention was to explore the benefits that aviation could offer, and that

[78] "Aviation Benefits Beyond Borders", (October 2018), online: *Air Transport Action Group* <https://aviationbenefits.org/media/166344/abbb18_full-report_web.pdf>.
[79] *Ibid*.
[80] Alejandro Piera, "Getting Global Cooperation: ICAO and Climate Change" (2016) Occasional Paper Series X McGill, Centre for Research in Air and Space Law, online: <https://www.mcgill.ca/iasl/files/iasl/x_getting_to_global_cooperation_icao_and_climate_change_final.pdf>.
[81] Article 44(i): The aims and objectives of the Organization are to develop the principles and techniques of international air navigation and to foster the planning and development of international air transport so as to promote generally the development of all aspects of international civil aeronautics., *Convention on International Civil Aviation (Chicago Convention),*.

could be possible only by enhancing connectivity and encouraging economic prosperity[82]. The sole concern of the drafters at that time was to draft a convention that would help shape the aviation industry in a "safe, regular, efficient, and economical" manner to "meet the needs of the people of the world." It was virtually not possible for any of the drafters to envision the growth of such a tiny transport sector to the dimensions that it has stretched out today[83]. The Chicago Convention does not have the word "environment" mentioned even once throughout the text. It is not even surprising because, at the time when the Chicago Convention was drafted, the sole aim of the drafters was to lay emphasis on the "growth" and "development" of the aviation industry, which is quite evident from the wording of the Chicago Convention[84]. The growth of the aviation sector and the importance that it has occupied today explains well why the growth and development of the air transport industry were heavily favored[85]. As noted by China, "the development of international air transport is [ICAO's] priority[86]."

But the rate at which the aviation industry has grown has also led to a drastic increase in the emissions from aviation. The fact that emissions from the aviation industry have outpaced technological innovations that may help to curb or reduce emissions has raised concerns. To reduce their carbon footprints, some airlines have proposed replacing jet fuel with sustainable aviation fuel (SAF) extracted from renewable resources such as plants or used cooking oil[87]. These are known as sustainable alternative fuels (SAF) and can also be produced sustainably compared to conventional aviation kerosene. Sustainable aviation fuel is any fuel that has the potential to generate lower carbon emissions than conventional kerosene on a life cycle basis as it is made by blending conventional fossil-based fuel with renewable hydrocarbon up to a maximum 50 percent mixture[88]. Since SAF can be incorporated automatically into the existing

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[82] "Global Deal or No Deal ? Your free guide to ICAO's 38th Triennial Assembly", online: <https://www.transportenvironment.org/wp-content/uploads/2021/07/2013%2009%20Your%20Guide%20to%20ICAO_final.pdf>.

[83] Alejandro Piera, *supra* note 71.

[84] *Ibid*.

[85] *Ibid*.

[86] ICAO: Environment, *37th Session of the ICAO Assembly Working Papers by Item*.

[87] ICAO, "Launch of ICAO Assistance, Capacity-building and Training for Sustainable Aviation Fuels", online: *ICAO Assistance, Capacity-building and Training for Sustainable Aviation Fuels (ACT-SAF) programme* <https://www.icao.int/Newsroom/Pages/Launch-of-ICAO-Assistance-Capacitybuilding-and-Training-for-Sustainable-Aviation-Fuels.aspx>.

[88] Air Transport Action Group, "Beginner's Guide to Sustainable Aviation Fuel", (November 2017), online: <https://aviationbenefits.org/media/166152/beginners-guide-to-saf_web.pdf>.

airport fuelling system without changing the aircraft or engine fuel system, it is considered a drop in fuel. They can be used without modifying the aircraft technically and are certified as Jet-A1 fuel. The introduction of carbon into the atmosphere is limited by SAF made from plant feedstock, as plants absorb carbon dioxide through photosynthesis during growth. A loop is created when SAF is produced from plants that absorb carbon dioxide as carbon is released back into the atmosphere when it is burned[89]. Since SAF does not use fossil carbon used in petroleum-based jet fuel but uses carbon, which is already present in the atmosphere, it is de-fossilized. The carbon contained in the waste is also recycled when SAF is produced by using organic solid waste as feedstock. It also reduces emissions of methane which is a potent greenhouse gas susceptible to leaks from landfills[90]. SAF derived from fats, oils and greases which is also referred to as FOGs, reduces 50% to 80% GHG emissions over their lifecycle[91]. A whooping 85% to 95% of GHG emissions are reduced by SAF which is derived using biomass and municipal solid waste over their lifecycle. Biomass includes forest and crop residue, sludge, animal waste, and algae[92]. SAF reduces 40 percent emissions by blending with 50 percent of conventional fuel[93]. Along with generating fewer conventional pollutants, sulfur oxides and particulates emitted by SAF are also less.

The usage of SAF also diminishes contrail formation as fewer particulates are exhausted by aircraft. ICAO to ensure the sustainability of SAF as compared to petroleum fuel, lays down SAF standards[94]. Along with achieving GHG emission reductions on a life cycle basis SAF according to standards set by ICAO, is required to avoid competition with food and water and contribute towards development which is economic and social[95]. Despite evaluating ways to increase flights' environmental sustainability, the industry today is still highly dependent on fossil fuels and thus faces growing rates of carbon dioxide emissions[96]. According to IATA, the

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[89] *Ibid*.

[90] Jeff Overton, "An Introduction to Sustainable Aviation Fuels: Part 1 of a series, 'Sustainable Aviation Fuels: A Critical Emissions Mitigation Strategy Gaining Momentum'", online: <https://www.eesi.org/articles/view/an-introduction-to-sustainable-aviation-fuels>.

[91] Jacopo Prisco, "Green jet fuel is here -- so why are airlines not using it?", *CNN* (26 April 2022), online: <https://edition.cnn.com/travel/article/saf-jet-fuel-green/index.html>.

[92] Jeff Overton, *supra* note 81.

[93] *Ibid*.

[94] *Ibid*.

[95] *Ibid*.

[96] Jocelyn Timperley, "Future Planet : The fastest way aviation could cut its carbon emissions", *BBC* (25 May 2021), online: <https://www.bbc.com/future/article/20210525-how-aviation-is-reducing-its-climate-emissions>.

airlines operate on a very thin profit margin and their ability to absorb the high cost of SAF is limited. The price of SAF is far more than standard jet fuel and the price of fuel with regards to profit is the single most considerable expense[97]. Another reason for this is the impossibility of an aircraft carrier launching a 300-ton plane full of people into the sky at 500 miles an hour and not adding greenhouse gas emissions to the atmosphere. But it could be possible with airplanes that are powered by hydrogen; that is a tale for the future to tell[98].

Atmospheric concentrations due to fossil fuel emissions and net land use change emissions have increased by 40 percent since pre-industrial times. Fossil fuels have been the driving factor for various industries and are the source of power for these industries. The concentration of carbon dioxide in the atmosphere is rising due to burning fossil fuels for energy. Plants pull out carbon dioxide by photosynthesis from the atmosphere, which is released by burning coal and oil. Plants have been pulling carbon dioxide from the atmosphere for millions of years. Humans have returned that carbon to the atmosphere in a few hundred years. Since the industrial revolution, the number of industries has grown significantly, which has also increased the demand for fossil fuels, resulting in the burning of more fossil fuels for energy. According to the Global Carbon Update 2021[99], annual emissions from burning such fuel have significantly increased, from an average of 3 billion tons of carbon in 1960 to 9.5 billion tons in 2010[100].

Emissions from aircraft do not consist of carbon dioxide alone; approximately 70% of the exhaust is carbon dioxide. The remaining 30% of the exhaust is water vapors. Since these vapors have a short lifespan in the atmosphere as part of the water cycle, they tend to have a minimal direct warming impact. However, they contribute to the creation of contrails. The water vapour

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[97] Sumit Singh & Gaurav Joshi, "How SAF Can Become Cost Competitive Against Conventional Fuel", (21 October 2022), online: <https://simpleflying.com/saf-cost-competitive-jet-fuel/>.

[98] Mark Piesing, "Future: The epic attempts to power planes with hydrogen", *BBC* (21 March 2022), online: <https://www.bbc.com/future/article/20220316-the-epic-attempts-to-power-planes-with-hydrogen>.

[99] Pierre Friedlingstein1,2, Matthew W Jones3, Michael O'Sullivan1, Robbie M Andrew4, Dorothee C E Bakker5, Judith Hauck6, Corinne Le Quéré3, Glen P Peters4, Wouter Peters7,8, Julia Pongratz9,10, Stephen Sitch11, Josep G Canadell12, Philippe Ciais13, Rob B Jackson14, Simone R Alin15, Peter Anthoni16, Nicholas R Bates17, Meike Becker18,19, Nicolas Bellouin20, Laurent Bopp2, Thi Tuyet Trang Chau13, Frédéric Chevallier13, Louise P Chini21, Margot Cronin22, Kim I Currie23, Bertrand Decharme24, Laique M Djeutchouang25,26, Xinyu Dou27, Wiley Evans28, Richard A Feely15, Liang Feng29, Thomas Gasser30, Dennis Gilfillan31, Thanos Gkritzalis32, Giacomo Grassi33, Luke Gregor34, Nicolas Gruber34, Özgür Gürses6, Ian Harris35, & Derik Broekhoff, "Global Carbon Budget 2021" Earth System Science Data: Open Access 1917–2005.

[100] REBECCA LINDSEY & ED DLUGOKENCKY, "Climate Change: Atmospheric Carbon Dioxide", (23 June 2022), online: *Climate.gov* <https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide>.

from the exhaust freezes instantly as the ambient temperature is very low, forming the nucleus of ice crystals. With ambient temperatures reaching optimal humid and cold temperatures, the crystals further expand and take up water vapour from the atmosphere, which leads to the formation of contrail-induced cirrus clouds. The clouds formed along with contrails trap infrared rays, which tend to produce a warming effect three times that of carbon dioxide. Although the life span of these clouds is relatively short, usually a few hours, with thousands of flights in the sky at a time, this leads to a severe warming effect[101]. That is by far the highest carbon dioxide emission in numbers emitted by aircraft since the beginning of powered flights. The chemical interactions that happen at high altitudes thus make aviation emissions worse for climate change. The Intergovernmental Panel on Climate Change (IPCC) suggests that in terms of radiative forcing, aviation's total climate impact is between two and four times that of carbon emissions from other sources[102]. Radiative forcing happens when there is a difference between the amount of energy entering the earth and the amount of energy that is leaving the earth. As in today's scenario, more energy is entering the earth than leaving, which causes the atmosphere to heat up[103]. According to the draft of the Working Group Contribution to the Sixth Assessment Report by the IPCC in 2021[104], aviation contributes to 2.4 percent of global carbon dioxide emissions on an annual basis, composed of gases and particles from aircraft, ground support services, auxiliary power units that provide electricity and air conditioning to aircraft etc.[105]. This contribution is relatively small. Still, this industry has been a significant contributor towards greenhouse gas emissions over the last two decades as emissions from this sector have been increasing at rates

[101] Jeff Overton, "Issue Brief | The Growth in Greenhouse Gas Emissions from Commercial Aviation (2019, revised 2022)", (9 June 2022), online: *Environmental and Energy Study Institute* <https://www.eesi.org/papers/view/fact-sheet-the-growth-in-greenhouse-gas-emissions-from-commercial-aviation>.
[102] "CORSIA: A FALSE SOLUTION TO THE VERY REAL THREAT OF EMISSIONS FROM AVIATION", (2 October 2019), online: *CORSIA: Offsetting emissions from aviation is a "dangerous, deeply flawed distraction"* <https://redd-monitor.org/2019/10/02/corsia-offsetting-emissions-from-aviation-is-a-dangerous-deeply-flawed-distraction/>.
[103] David Chandler, "MIT: Climate Portal", (25 September 2020), online: *Radiative Forcing* <https://climate.mit.edu/explainers/radiative-forcing>.
[104] Martin CAMES et al, *Emission Reduction Targets for International Aviation and Shipping* (DIRECTORATE GENERAL FOR INTERNAL POLICIES POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY, 2015).
[105] *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, by Masson-Delmotte, V, P Zhai, H-O Pörtner, D Roberts, J Skea, PR Shukla, A Pirani, W Moufouma-Okia, C Péan, R Pidcock, S Connors, JBR Matthews, Y Chen, X Zhou, Ml Gomis, E Lonnoy, T Maycock, & M Tignor, and T Waterfield (eds) (Intergovernmental Panel on Climate Change, 2018).

around 2.5 percent per year[106], increasing between 2010 and 2018 to roughly 4 percent per year[107].

2.2. Controlling emissions from aviation by treaty law United Nations Framework

2.2.1. Convention on Climate Change (UNFCCC), 1992

The United Nations Framework Convention on Climate Change (UNFCCC)[108] is a Rio Convention[109], which was the first significant step by the international community towards adopting a mechanism to control the adverse effects of climate change, of which aviation emissions were also a part. It classified parties under it into Annex I and Annex II[110]. Annex I consist of developed industrialized countries which are required to provide financial and technical support to developing countries that form a part of Annex II. The ultimate objective is to stabilize the level of greenhouse gas concentration in the atmosphere to prevent dangerous anthropogenic interference with the climate system. The position of the adequacy of UNFCCC to also control aviation emissions is confirmed by the fact that Article 4(1)[111] of the Convention mandates member states to promote as well as cooperate at the international level for the development of practices and processes aiming to control, reduce or prevent anthropogenic emissions in all relevant sectors including Energy, Transport, Industry, Agriculture, Forestry and Waste Management. The article does not deal with the reduction of aviation emissions specifically. Still, when it provides for combatting emissions from the transport sector, it also includes emissions within its ambit from the aviation industry[112].

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[106] ICAO, *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) — Frequently Asked Questions (FAQs)* — (International Civil Aviation Organization, 2018).
[107] note 69.
[108] *United Nations Framework Convention on Climate Change, 9 May 1992*, 1771 UNTS 107 1994.
[109] "Parties to the United Nations Framework Convention on Climate Change", online: *United Nations Climate Change* <https://unfccc.int/process/parties-non-party-stakeholders/parties-convention-and-observer-states>.
[110] KF Kuh, "The Law of Climate Change Mitigation: An Overview" (2018) Encyclopedia of the Anthropocene, online: <https://reader.elsevier.com/reader/sd/pii/B9780128096659100278?token=C85194E79F9A3E7DD5263ABC463782C93B11365103ED935C3A0D3DFC8511DAFA18821380CCAFD997F5BAF61EB8102088&originRegion=us-east-1&originCreation=20221025215714>.
[111] *United Nations Framework Convention on Climate Change, Article 4(1).*
[112] Murtala Ganiyu A. Murgan, *supra* note 1.

2.2.2 Kyoto Protocol, 1997

The Kyoto Protocol, which was negotiated and adopted by the third Conference of Parties (COP) of UNFCCC in 1997[113] committed industrialized countries listed as annex 1 countries to reduce by 5%[114] six gases, namely: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbon (HFCS) and perfluorocarbons (PFCS) and ground-level zone by 2012[115]. Kyoto Protocol validly established two periods, 2008 to 2012 (1st commitment period) and 2013 to 2020 (2nd commitment period), to reduce these six gases. A total of 37 industrialized countries, economies in transition and the European Community in the first commitment period decided to reduce GHG emissions against the 1990 level to an average of five percent. On December 8, 2012, parties in the Doha Amendment to the Kyoto Protocol, which was adopted for the second commitment period, committed to reducing GHG emissions by at least 18 percent below 1990 levels[116]. The protocol offered flexibility mechanisms called Kyoto mechanisms for the countries to achieve their targets. The Kyoto mechanisms were international emissions trading, clean development mechanism (CDM) and joint implementation[117]. According to the international emissions trading mechanism, countries with a commitment to emission reduction or emission limitation could use CDM to implement an emission reduction project in developing countries[118]. The projects implemented under CDM could earn saleable certified emission reduction credits, each equivalent to 1 ton of carbon dioxide, which these countries could count for meeting targets under Kyoto Protocol[119]. Under the joint implementation mechanism, countries having an emission reduction or emission limitation commitment were allowed to earn emission reduction units from an emission reduction project or removal project in another party, each equivalent to 1 ton of carbon dioxide, which could be counted towards meeting the Kyoto target[120]. Along with the

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[113] *Kyoto Protocol to the United Nations Framework Convention on Climate Change, 11 December 1997, 2303 UNTS 162 (entered into force 16 February 2005) [Kyoto Protocol]*, *supra* note 5.
[114] *Kyoto Protocol to the United Nations Framework Convention on Climate Change, supra* note 9.
[115] Paul Stephen Dempsey, *supra* note 10.
[116] Karsten Würth, "What is the Kyoto Protocol?", online: *United Nations Climate Chage* <https://unfccc.int/kyoto_protocol>.
[117] *note 11.*
[118] "The Clean Development Mechanism", online: *United Nations Climate Change* <https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism>.
[119] *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, Article 12.
[120] *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, Article 6.

implementation of Kyoto mechanisms, this protocol assumes relevance in the context of the reduction of aviation emissions as parties to the Kyoto Protocol decided to call on developed countries (Annex I parties) to pursue limiting or reducing GHG from aviation through ICAO[121].

2.3. Creation of ICAO and The Convention on International Civil Aviation

The Convention on International Civil Aviation, also called the Chicago Convention, formulated core principles for permitting international air transport and established a specialized agency called ICAO[122] to oversee them. When this Convention was drafted and negotiated, emissions from international aviation were not an area of concern. Due to this, the drafters of the convention did not incorporate any explicit provision on climate change or any related environmental issues. It, however, tacitly conferred on ICAO responsibility to address the problems related to reducing the environmental impacts of aviation. One of the aims and objectives of ICAO under the Chicago Convention is to promote the development of all aspects of international civil aeronautics by developing principles and techniques of international air navigation. Since reducing the environmental impacts of aviation for climate protection is an element of international civil aeronautics, ICAO, thus, under the Chicago Convention, has a duty to regulate emissions from international aviation[123].

Furthermore, to enable ICAO to meet current global needs and address new issues, the convention mandated ICAO Council to adopt international standards and recommended practices (SARPs)[124] by laying down guidelines, the convention also demanded ICAO to adopt standards and recommended practices and designated them as annexes to the Chicago Convention[125]. Following this authority, ICAO undertook environmental issues related to the aviation industry and created Annex No 16 to the Chicago Convention in 1980.

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[121] *KYOTO PROTOCOL TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, Dec. 10, 1997 37 I.L.M. 22 (1998).*, Article 2(2)Treaty.
[122] *Convention on International Civil Aviation(Chicago Convention)*, Article 43.
[123] *Convention on International Civil Aviation (Chicago Convention), supra* note 72.
[124] *Convention on International Civil Aviation (Chicago Convention),* Article 54(1).
[125] Paul Stephen Dempsey, *supra* note 46.

2.3.1. Resolution A-33-7, Appendix I: Market-based measures regarding aircraft engine emissions

Resolution A33-7 was adopted by ICAO pursuant to deciding that the emission trading system (ETS) is one of the most appropriate mechanisms for addressing GHG emissions from international aviation. According to the resolution's Appendix I which deals with market-based measures regarding aircraft engine emissions, ICAO Assembly, while endorsing the development of an open ETS, urged Council to develop guidelines for ETS on a priority basis[126].

2.3.2. Programme of Action on International Aviation and Climate Change (PAIACC)

The ICAO Assembly in September 2007 called for forming a Group on International Aviation and Climate Change (GIACC). It was formed in January 2008 and developed the Programme of Action on International Aviation and Climate Change, which has the following elements: an annual improvement target of 2 percent in fuel efficiency globally by 2050; a decision to develop global carbon standards for aircraft and framework for market-based measures for international aviation; measures for assisting developing states, facilitation of access to financial resources, technology transfer and capacity building and continued work on alternative fuels for aviation; collecting of data on international aviation emissions by ICAO; and developing and submitting to ICAO voluntary action plans on emissions of States[127]. Along with adopting the Programme of Action on International Aviation and Climate Change, the Group on International Aviation and Climate Change also suggested holding a High-Level Meeting on International Civil Aviation and Climate Change. Welcoming the suggestion, the High-Level Meeting on International Civil Aviation and Climate Change was held in October 2009, wherein ICAO's leading role in matters of international aviation was reaffirmed[128].

2.3.3. State Action Plan on Carbon Emissions Reduction

Delegates of the 37th Session of the ICAO Assembly adopted in 2010 "State Action Plan on Carbon Emissions Reduction," under which states were encouraged to submit to ICAO an action plan outlining their policies, actions, and annual reporting on international aviation carbon dioxide emissions. Adopted by way of Assembly Resolution A37-19, member states, through this initiative, get an opportunity for showcasing specific policies and measures aiming to

[126] *Assembly Resolutions in Force* (2001).
[127] Md Tanveer Ahmad, *Toward Governing Emissions From Aviation That Contribute To Climate Change and Global Warming* Institute of Air and Space Law, Faculty of Law, McGill University, 2015).
[128] *ICAO Environmental Report 2010: Aviation and Climate Change* (2010).

mitigate carbon emissions from international aviation activities implemented by them[129]. To further support the process of development state action plan, ICAO in 2011 deployed a Fuel Savings Estimation Tool (IFSET) to calculate potential fuel savings and carbon emissions reductions. It was implemented with the overall goal of capturing the difference in flight trajectory performance in terms of fuel consumption before and after the implementation of operational improvements at local, regional, or global levels. To achieve this goal, ICAO in 2013 also established working groups for developing Global Market-Based Mechanisms (GMBMs). One of the main drivers for ICAO to establish working groups for the development of GMBMs was the decision of the European Union in 2008 to include aviation in its Emission Trading System[130].

While ICAO with the initiatives that have been discussed above was attempting to fulfil the responsibility that was accorded to it by the Kyoto Protocol for reducing GHG from aviation, the European Union's 2008 decision of including emissions from international aviation in its cap and trade system alarmed other countries. The backlash that the EU faced for this "unilateral move" pressured ICAO to adopt a basket of measures for addressing GHG emissions in the form of CORSIA[131].

2.4. European Union Emission Trading System

The European Union introduced the EU Emission Trading System[132] which was a regional market-based measure regulating carbon emissions from the civil aviation industry. The EU's rationale was to tackle transboundary air pollution by encompassing all the States with airlines that flew in the European air zone. Also referred to as a cap-and-trade system, the EU ETS aims to cap the total volume of GHG emissions from installations and aircraft operators that are responsible for 50% of EU Greenhouse Gas Emissions. This major tool of the EU allows trading emissions allowances so that the total emissions of the installation and aircraft operators

[129] ICAO Secretariat, "ICAO Tools to Support the State Action Plan Process", online: <https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2019/ENVReport2019_pg320-323.pdf>.
[130] ICAO Secretariat, "Overview-Market-Based Measures", online: *Market Based Measures* <https://www.icao.int/Meetings/GLADs-2015/Documents/ENV_Report_MBMs_2013.pdf>.
[131] Michelle Melton, "Beyond Paris: Other International Efforts to Address Climate Change", (1 March 2019), online: <https://www.lawfareblog.com/beyond-paris-other-international-efforts-address-climate-change>.
[132] *DIRECTIVE 2004/101/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms* (2004).

stay within the cap. By covering more than 11000 power stations and industrial plants in 31 countries and flights between airports of participating countries, the EU ETS has emerged as the largest regime to combat climate change in a cost-effective and economically efficient manner[133].

2.4.1. Phases of EU ETS

First introduced in 2005, the EU ETS has undergone several changes, and its implementation has been divided into four phases. Its first phase was the pilot phase which ran from 2005 to 2007. Under this phase, price formation in the carbon market was tested and the necessary infrastructure for monitoring, reporting and verification of emissions was established[134]. The cap was based on estimates as there was no reliable emission data available. The focus of this phase was to ensure the effective functioning of EU ETS ahead of 2008 and that it allows EU member states to meet their commitments under the Kyoto Protocol[135]. In this phase, businesses were permitted to use the units generated under the Clean Development Mechanism (CDM) for compliance with EU ETS. As per CDM, countries or companies could acquire Certified Emission Reductions (Emission certificates issued by bodies under UNFCCC or Kyoto Protocol on successful completion of CDM) which could be used for meeting their commitments by way of investing in projects commenced in developing and newly industrializing countries. From 2008 to 2012, the second phase of EU ETS ran under which the businesses could also use the emission reduction units generated under Joint Implementation for fulfilling their obligations under EU ETS[136]. Joint implementation permitted industrialized countries to meet part of their required cuts in greenhouse gas emissions to pay for the projects aimed at reducing emissions in other industrialized countries. Since EU ETS became the largest source of demand for clean development mechanisms and joint implementation emission reduction units, it expanded the scope of phase 2 by including aviation from 2012[137]. Under the third phase, which ran from

[133] "European Commission: Climate Action", online: <https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en>.
[134] "The EU Emissions Trading System: an Introduction", online: *Climate Policy Info Hub : Scientific Knowledge for Decision-Makers*.
[135] Md Tanveer Ahmad, *supra* note 53.
[136] "Development of EU ETS (2005-2020)", online: *European Commission: Climate Action* <https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/development-eu-ets-2005-2020_en>.
[137] *EU ETS Handbook*.

2013 to 2020, significant efforts were made to harmonize the scheme across the EU by following a review of EU ETS agreed upon in 2008. Under this phase, the operators could not receive any free allowances for electricity generation and had to buy most of the allowances through auctioning[138].

2.4.2. Opposition by Other Countries to EU's Directive Mandating Carriers to Report Carbon Emissions on Routes

Under this emission trading system, carriers that called airports in the EU from the beginning of 2012 had to report their carbon emissions on routes which were within any EU member state and to and from the EU[139]. Opposing EU directives, countries like India and China said that the imposition of obligations was against the principles of sovereignty, it regulated behaviour outside of EU Airspace and failed to differentiate between developing and developed countries. Pushback against EU ETS was kickstarted by China and Russia in their joint statement made in 2011 in which they had sought mutual agreement between all the states while claiming that the EU's move would not only cause an "extremely negative impact on international aviation industry" but also violate other state's sovereignty[140]. Challenging the validity of the EU's Directive on Emission Trading System, the Air Transport Association of America and certain US airlines approached the European Court of Justice. The Directive was challenged on the ground that it was against the rules and principles of international law and not in line with the Chicago Convention, Kyoto Protocol and Open Skies Agreement. However, the Court in its preliminary ruling delivered on December 21, 2011, upheld the validity of the Directive by observing that it did not infringe on the sovereignty of foreign nations[141].

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[138] ICAO Secretariat, *supra* note 121.

[139] "EU Emissions trading System(EU ETS)", online: *International Carbon Action Partnership* <https://icapcarbonaction.com/en/ets/eu-emissions-trading-system-eu-ets>.

[140] *Joint Statement between the Civil Aviation Administration of the People's Republic of China and the Ministry of Trans- port of the Russian Federation on European Union's inclusion of aviation into European Union Emission Trading Scheme* (2011).

[141] *Judgment of the Court (Grand Chamber) of 21 December 2011. Air Transport Association of America and Others v Secretary of State for Energy and Climate Change. Reference for a preliminary ruling: High Court of Justice (England & Wales), Queen's Bench Division (Administrative Court) - United Kingdom. Reference for a preliminary ruling - Directive 2003/87/EC - Scheme for greenhouse gas emission allowance trading - Directive 2008/101/EC - Inclusion of aviation activities in that scheme - Validity - Chicago Convention - Kyoto Protocol - EU-United States Air Transport Agreement - Principles of customary international law - Legal effects thereof - Whether they may be relied upon - Extraterritoriality of European Union law - Meaning of 'charges', 'fees' and 'taxes'.* (2011).

As a result of the ruling by the European Court of Justice, all the major economies such as Brazil, India, China, Japan, Mexico, Russia, and South Africa, the so-called "coalition of the unwilling" in February 2012, came together in Moscow and produced a statement urging the EU to pursue through ICAO measures for aviation emissions[142]. A series of possible countermeasures such as the resolution of disputes through an international dispute settlement mechanism, prohibition of airlines to participate in the EU ETS, the imposition of an obligation on EU carriers to provide for flight details and countervailing levies or charges on EU operators were put forth. Even the US Congress notably passed the Thune Bill that would prohibit compliance of directive by American companies[143]. Section 2(a) of the European Emissions Trading Scheme Prohibition Act, 2011 granted the US Administration political choice of determining whether enforcing the Directive would be in the "public interest" or not[144]. Even India and China restricted their airlines to not to comply with EU ETS without the government's pre-approval[145], which meant that the air carriers flying to Europe would have to consult and get sanctioned before handing over any carbon emission data to the European Authorities, as mandated by the EU ETS norms[146]. If it would have been allowed, then the European Union could have collected approximately 46 million euros alone from India, even when the global presence of the Indian aviation industry was negligible at that time. To further the backlash, China put on hold the order of 55 planes from Airbus[147] and Russia denied new flight permits to Finnair and also threatened similar consequences with other EU airlines[148].

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[142] "The Conflict over Aviation Emissions: A Case of Retreating EU Leadership?", (27 February 2014), online: *FINNISH INSTITUTE OF INTERNATIONAL AFFAIRS* <https://www.fiia.fi/en/publication/the-conflict-over-aviation-emissions>.

[143] "Thune Bill to Block European Airline Tax on U.S. Carriers and Passengers Signed Into Law", (27 November 2012), online: *John Thune* <https://www.thune.senate.gov/public/index.cfm/2012/11/thune-bill-to-block-european-airline-tax-on-u-s-carriers-and-passengers-signed-into-law>.

[144] *European Union Emissions Trading Scheme Prohibition Act of 2011*, Article 2(a).

[145] Manisha Singhal & Anindya Upadhyay, "India to oppose EU's emission trading system for airlines", *The Economic Times* (1 August 2011), online: <https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/india-to-oppose-eus-emission-trading-system-for-airlines/articleshow/9437394.cms?from=mdr>.

[146] Priya Esselborn, "Joint Fight", (13 January 2012), online: <https://www.dw.com/en/india-and-china-join-hands-to-fight-new-eu-emissions-law/a-6698059>.

[147] Toby Vogel, "Chinese threaten to cancel Airbus orders in ETS row", (11 March 2012), online: *POLITICO* <https://www.politico.eu/article/chinese-threaten-to-cancel-airbus-orders-in-ets-row/>.

[148] "Russia Escalates European Union Emissions Trading Row", (18 June 2012), online: *AIN* <http://www.ainonline.com/aviation-news/ain-air-transport-perspective/2012-06-18/russia-escalates-european-union-emissions-trading-row>.

2.4.3. EU's Decision Called "Stop the Clock" and 2013 ICAO Assembly

To address the continuous political pressure on the EU by the opposing countries, the Climate Commissioner Connie Hedegaard of EU on November 12, 2012, took a decision called "stop the clock" that limited the Directive's scope to intra-EU flights for one-year[149]. The rationale behind the decision was to provide a signal which was positive for the ICAO talk on the Global Market Based Mechanism which was scheduled in the autumn of 2013. The ICAO Assembly in its 38th session held from 24 September to 4 October 2013 marked a start to the negotiations as the EU Commission said that the Directive would be revised to only cover the European airspace on the meeting yielding prospects of Global Market Based Mechanism which had to be agreed in 2016 and come into force by 2020. This requirement was met by the ICAO on paper by the adoption of a resolution A38-18[150] where States decided to develop a framework for the market-based mechanisms for international civil aviation. Even the Commission in response took a decision for limiting the scope of the directive by restricting its applicability to cover only the proportion flown by international flights to and from the EU[151]. EU ETS related to aviation will be subject to new regulations in light of international developments with regard to CORSIA. The next review related to EU ETS for aviation should be focused on the implementation of global measures[152]. In case there are no new amendments, the full scope of EU ETS should be applicable from 2024 onwards[153].

Learning its lessons from the backlash faced by EU ETS, ICAO introduced CORSIA to tackle carbon emissions from aviation. It was a market based measure similar to EU ETS. The backlash primarily came from countries such as the US, Russia, India, and China for threatening their sovereignty, ICAO mandated for phased implementation of CORSIA. Since the scope of CORSIA was much larger than that of EU ETS in terms of routes and states, ICAO

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[149] Directorate-General for Climate Action, *supra* note 27.
[150] *Consolidated statement of continuing ICAO policies and practices related to environmental protection*, ICAO Doc 9790, I-36.
[151] ICAO Secretariat, *supra* note 121.
[152] "Reducing emissions from aviation", online: *European Commission: Climate Action* <https://climate.ec.europa.eu/eu-action/transport-emissions/reducing-emissions-aviation_en>.
[153] "Inclusion of aviation in EU ETS", online: *RedShaw advisors* <https://redshawadvisors.com/corsia-and-the-inclusion-of-aviation-in-the-eu-ets/) (https://www.europarl.europa.eu/thinktank/en/document/EPRS_ATA(2022)729452) (https://www.euronews.com/my-europe/2021/07/16/why-is-the-eu-s-new-emissions-trading-system-so-controversial) (https://climate.ec.europa.eu/eu-action/transport-emissions/reducing-emissions-aviation_en>.

decided for implementing the scheme in phases to put the interests of developing countries first and for incorporating "the special circumstances and respective capabilities of States, in particular developing States, while minimizing market distortion"[154]. Furthermore, stricter implementation of EU ETS on the bases of higher cap levels required participants to buy more carbon credits. Keeping in mind that the aviation industry operates on a thin margin of profit, ICAO decided to implement baseline criteria to determine the offsetting requirements of airplane operators[155]. To ensure maximum participation by member states and for giving them a sense of increased participation in the process of development of the scheme, ICAO also incorporated the concept of the No Country Left Behind and Buddy Partnership Program.

2.5. ICAO's Efforts to Adopt Resolution for Global Market-Based Mechanism

At COP, which was held in Paris, ICAO's President, Dr Olumuyiwa Bernard Aliu stressed that international aviation was not covered under the final Paris agreement[156]. In the 10th meeting that was held in Montreal in 2016, the ICAO Committee on Aviation Environmental Protection recorded significant progress in a number of critical areas as it recommended 2 standards in one meeting. This paved the way for cleaner aircraft that had less impact on the environment, which meant that the standard if accepted, would lead to less polluting aircraft. This would further allow ICAO to set up environmental standards for global aviation[157]. ICAO in March 2017 adopted a new aircraft carbon emissions standard which could reduce the impact of aviation greenhouse gas emissions on global climate[158]. To address the total carbon dioxide emissions from international civil aviation, the Council during the 39th Assembly adopted resolution A39-3[159] which was a Consolidated statement on the Global Market-based Measure Scheme. This resolution had to be implemented in the form of a Carbon Offsetting and Reduction Scheme for

[154] Jorge Liboreiro, "Why is the EU's new Emissions Trading System so controversial?", *euronews* (26 August 2021), online: <https://www.euronews.com/my-europe/2021/07/16/why-is-the-eu-s-new-emissions-trading-system-so-controversial>.
[155] Louis Redshaw, "CORSIA AND THE INCLUSION OF AVIATION IN THE EU ETS", (17 January 2017), online: *RedShaw advisors* <https://redshawadvisors.com/corsia-and-the-inclusion-of-aviation-in-the-eu-ets/>.
[156] ICAO, *supra* note 44.
[157] "THE POSTAL HISTORY OF ICAO", online: <https://applications.icao.int/postalhistory/annex_16_environmental_protection.htm>.
[158] "ICAO: Environment", online: *Climate Change Technology Standards* <https://www.icao.int/environmental-protection/Pages/ClimateChange_TechnologyStandards.aspx>.
[159] *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Global Market-based Measure (MBM) scheme*.

International Aviation for keeping the net emissions stable with the growth of the sector. After the Assembly adopted the resolution on the Global Market-based Measure Scheme, the Council after all the deliberations on June 27, 2018, adopted CORSIA in the form of Annex 16 — Environmental Protection to the Convention on International Civil Aviation, Volume IV — Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)[160].

2.6. Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

CORSIA is a market-based scheme to address carbon dioxide emissions from international aviation under which airplane carriers are required to account for emissions produced by flights between participating states by purchasing carbon offsets. The applicability of CORSIA is limited only to international flights and is not applicable on domestic flights. International flights are defined as flights which take off in one state and land in another. Whereas, domestic flights refer to the flights whose aerodrome is located in the same state[161]. However, an airplane operator that is registered in a state not currently participating under CORSIA will be under the mandate to comply with offsetting requirements if it has a flight between two participating States[162]. This scheme was adopted to enable ICAO to realize its carbon-neutral growth goal (CNG 2020 goal).

2.6.1. Offsetting obligation under CORSIA

Carbon offsetting can be referred to as a process under which the polluting company makes up by purchasing carbon credits for the greenhouse gases emitted by it[163]. Projects that aim to reduce GHG emissions, sequester carbon (the process of capturing and storing carbon dioxide in the atmosphere) or pull GHG from the atmosphere or prevent the release of emissions generate carbon credits[164]. One carbon credit is generated when a project verifies that they have reduced, avoided, or destroyed one metric tonne of GHG. The net carbon footprint of companies can be zero when they emit one tonne of GHG. However, the company has to purchase one tonne of emission reduction for every tonne they emit[165]. Carbon markets facilitate buying and selling of

[160] Directorate-General for Climate Action, *supra* note 27.
[161] "Carbon Offsetting and Reduction Scheme for International Aviation(CORSIA)", online: *ICAO Environment* <https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx>.
[162] ICAO, *supra* note 97.
[163] Robin Pomeroy, *supra* note 15.
[164] *Ibid*.
[165] *Ibid*.

eligible emission units and their price is influenced by the law of supply (availability of emission units) and demand (level of offsetting requirements)[166]. Pursuant to calculating their offsetting requirements, airplane operators at the end of every three years compliance period (Compliance period 1: years 2021 – 2023; Compliance period 2: years 2024 – 2026; Compliance period 3: years 2027 – 2029; Compliance period 4: years 2030 – 2032 and Compliance period 5: years 2033 – 2035) are required to compensate for their carbon emissions. Airplane operators under CORSIA meet their offsetting requirements when they offset part of their carbon emissions by way of reducing emissions elsewhere (outside international aviation)[167]. They are required to cancel CORSIA-eligible emission units equivalent to their total final offsetting requirements for a given compliance period. One emission unit (also referred to as carbon credits) that is equivalent to one tonne of reduced carbon emission generated from a specific project or programme that aims towards reducing emissions[168]. Airplane operators after buying emission units from the carbon market have to permanently remove and cancel the unit. Cancelling refers to permanent removal and using emission units only once so they cannot be used again. An aeroplane operator meets their offsetting requirements under CORSIA only when they use CORSIA-eligible emission units[169].

ICAO after considering the recommendations made by Technical Advisory Board (TAB) has approved eight programmes that are eligible to supply CORSIA-eligible emission units for the pilot phase until 2023 which are: American Carbon Registry, Architecture for REDD+ Transactions, China GHG Voluntary Emission Reduction Program, Clean Development Mechanism, Global Carbon Council, Climate Action Reserve, Gold Standard and Verified Carbon Standard. Additionally, only the carbon offsets generated by these eight offsetting programmes are eligible to have their first crediting period starting on or after January 1, 2016, and in respect of emission reductions occurring through 2020[170].

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[166] *Ibid*.
[167] ICAO, *supra* note 97.
[168] *Ibid*.
[169] By ICAO Secretariat, *An Overview of CORSIA Eligible Fuels (CEF)*.
[170] "CORSIA Eligible Emissions Units", (March 2022), online: *ICAO Document* <https://www.icao.int/environmental-protection/CORSIA/Documents/TAB/ICAO%20Document%2008_CORSIA%20Eligible%20Emisions%20Units_March%202022.pdf>.

The American Carbon Registry (ACR) issues offsets for both voluntary as well as compliance carbon markets, for California's cap-and-trade program specifically. While national, regional, or international carbon reduction regimes create and regulate compliance carbon markets, voluntary markets function outside the purview of this mechanism. Individuals from voluntary carbon markets can voluntarily purchase carbon offsets without any intended use for compliance purposes[171]. Launched in 2013, California's cap and trade program is its strategy for reducing greenhouse gas emissions. Under this program cap and trade regulation to create a powerful economic investment in cleaner technologies establishes a declining limit on major GHG sources throughout California. Cap and trade programmes are applicable to emissions covering approximately 80 percent of the State's GHG emissions. California Air Resources Board (CARB) which implements and enforces this, creates allowances equivalent to the total amount of permissible emissions (cap). The value of each allowance is one metric ton of carbon equivalent emissions[172]. Under the cap-and-trade programme, California Registry Offset Credits (ROCs) and California Early Action Offset Credits (EAOCs) are eligible for meeting obligations of emission reductions. California Air Resources Board (ARB) under the cap-and-trade regulation approves Early Action Offset Programs which can issue Early action offset credits. Early action projects are listed by the American Carbon Registry and ACR issues early action offset credits as per voluntary quantification methodology approved by ARB[173]. ROCs are issued by American Carbon Registry from California compliance offset program[174]. Carbon credits generated by American Carbon Registry are called Emission Reduction Tonnes (ERT). China's Greenhouse Voluntary Emission Reduction Program also issues offsets for both voluntary and compliance markets, with the Clean Development Mechanism significantly overlapping. All the CORSIA-eligible credits that have been issued tend to originate from projects based in the People's Republic of China. Carbon credits generated by China Greenhouse Voluntary Emission Reduction Program are called China Certified Emissions Reductions (CCERs). Clean Development Mechanism (CDM) which has been approved by CORSIA as one of its offsetting programmes is the only "flexibility mechanism" that as discussed above was created to enable developing countries to contribute towards combating

[171] "Mandatory & Voluntary Offset Markets", online: *Carbon Offset Guide* <https://carboncreditcapital.com/faq/>.
[172] "Cap-and-Trade Program", online: *California Air Resources Board* <https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/about>.
[173] *Ibid*.
[174] "AMERICAN CARBON REGISTRY ISSUES FIRST CALIFORNIA REGISTRY OFFSET CREDITS", online: *Winrock International* <https://winrock.org/american-carbon-registry-issues-first-california-registry-offset-credits/>.

climate change while also giving industrialized countries some flexibility in meeting their emission targets[175]. CDM was not established with an aim to reduce global GHG emissions but reduce implementation costs of emission levels by shifting these costs from high-income countries to low-income countries[176].

Lower marginal abatement cost in developing countries attracts developed countries to invest in CDM projects for reducing their compliance cost[177]. Marginal abatement cost levied to mitigate adverse impacts on the environment refers to the cost of reducing environmental negatives such as pollution or negative by-products created during production[178]. In this process, host countries derive the advantages of financial assistance, technology transfer, and non-GHG emission reductions[179]. Defined under Article 12 of the Kyoto Protocol, CDM allows Annex B party with emission reduction commitment under the protocol to implement emission reduction projects in developing states and thereby earn saleable certified emission reduction (CER) credits[180]. Pursuant to the completion of the second commitment period of the Kyoto Protocol in 2020, CDM Executive Board in its 108th meeting took a decision for continuing CDM projects and Programme of Activities until UNFCCC COP 26 taking a properly legitimised decision. This decision of the CDM Executive Board in 2020 meant that thousands of CDM projects could operate in developing and emerging countries and keep on generating CERs to achieve GHG reductions[181]. In its 109th meeting, CDM Executive Board decided to register CDM activities provisionally subject to the participants acknowledging and accepting the risk that it would not be possible for the board to issue CERs for the achieved emission reductions[182]. In UNFCCC COP 26, CMP (Conference of Parties serving as the Meeting of Parties to the Kyoto Protocol) decided to formally retrain CDM

[175] Institute for Global Environmental Strategies (IGES) et al, *CDM supply potential for emission reductions up to the end of 2020*.
[176] Jon Strand & Knut Einar Rosendahl, "Global emissions effects of CDM projects with relative baselines" 34:4 Resource and Energy Economics 533–548.
[177] Florian Wozny et al, *supra* note 37.
[178] SINAI, "Carbon Finance Marginal Cost of Abatement: Understanding the Basics", (13 October 2021), online: <https://www.sinaitechnologies.com/post/marginal-cost-of-abatement-understanding-the-basics>.
[179] Florian Wozny et al, *supra* note 37.
[180] Paul Stephen Dempsey, *supra* note 10.
[181] "CDM Executive Board decides to temporarily extend CDM operations beyond 2020", (13 January 2021), online: <https://www.upm-cdm.eu/cdm-executive-board-decides-to-temporarily-extend-cdm-operations-beyond-2020/>.
[182] Asian Development Bank, "From Kyoto to Paris— Transitioning The Clean Development mechanism", (October 2021), online: <https://www.adb.org/sites/default/files/publication/745291/kyoto-paris-clean-development-mechanism.pdf>.

Executive Board from registering any new registration requests, renewing crediting periods or issuing CERs for emission reductions occurring after December 31, 2020[183]. CMP also decided on the registration of new CDM requests to be made under the Paris Agreement Article 6.4 mechanism[184]. The mechanism under Article 6.4 provides for the trading of credits from GHG emissions generated through specific projects between countries under the COPs supervision[185]. For example, Country A can invest in country B for setting up a wind farm and when emissions are reduced from setting up such a farm, country B will be benefited from clean energy and country A will receive credits for reductions[186]. In accordance with the decision taken by COP 26, ICAO had decided to restrict the eligibility of CERs to be classified as CORSIA-eligible emission units. To be classified as CORSIA-eligible emission units CERs should have their first crediting period starting on or after January 1, 2016, and should be generated in respect of emission reductions occurring through 2020[187]. Climate Action Reserve is a voluntary offsetting program that was launched in 2008 with projects that are implemented within North America. It also establishes and sets standards for establishing and verifying the greenhouse reduction program[188]. By focusing on projects hosted by developing countries, Gold Standard issues offset for voluntary markets. Under this emission reduction programme, quality control labels (focusing on environmental integrity and contributing to sustainable development) are also issued for offsets generated from CDM and other offsetting mechanisms. Carbon credits generated by Gold Standard are referred to as verified emissions reductions (VERs). By developing projects in developed and developing countries, Verified Carbon Standard (VCS) issues offsets for the voluntary markets. Architecture for REDD+ Transactions (ART) aims towards incentivizing governments for reducing emissions from deforestation and forest degradation (REDD), restoring forests, and protecting intact forests[189].

[183] "Process under UNFCCC (COP, CMP, CMA, SB)", online: *Ministry of Foreign Affairs of Japan* <https://www.mofa.go.jp/ic/ch/page22e_000921.html>.
[184] *Ibid*.
[185] "What You Need to Know About Article 6 of the Paris Agreement", (17 May 2022), online: <https://www.worldbank.org/en/news/feature/2022/05/17/what-you-need-to-know-about-article-6-of-the-paris-agreement>.
[186] Kelley Kizzier, Kelly Levin, & Mandy Rambharos, "What You Need to Know About Article 6 of the Paris Agreement", (2 December 2019), online: <https://www.wri.org/insights/what-you-need-know-about-article-6-paris-agreement>.
[187] SINAI, *supra* note 170.
[188] "Climate Action Reserve", online: *Carbon Offset Guide* <https://www.offsetguide.org/understanding-carbon-offsets/carbon-offset-programs/voluntary-offset-programs/climate-action-reserve/>.
[189] "Attracting New Investment to Protect and Restore Forests", online: <https://www.artredd.org>.

Mechanisms under REDD aim to slow the process of deforestation across an entire jurisdiction which involves millions of hectares[190]. Architecture for REDD+ Transactions (ART) aims towards incentivizing governments for reducing emissions from deforestation and forest degradation (REDD), restoring forests, and protecting intact forests. Mechanisms under REDD aim to slow the process of deforestation across an entire jurisdiction which involves millions of hectares[191]. Another offsetting programme that has been approved by ICAO is the Global Carbon Council (GCC)[192] which aims to assist organisations for reducing their carbon footprints, helping the diversification of the sectoral economy by adopting low carbon pathways and catalyzing climate actions on the ground. GCC, a voluntary carbon offsetting program achieves its aim by supporting organizations for implementing GHG reduction projects and measures; establishing a market system for GHG reduction project owners who sell carbon offsets and supporters providing finance to project owners and also a simple certification process for operationalizing carbon offsetting programs[193].

2.6.2. CORSIA eligible emission units eligibility criteria

According to CORSIA eligible emission unit eligibility criteria, ICAO at the programme level makes it mandatory for offsetting programmes generating CORSIA eligible emission units[194] to publicly disclose the activities followed under the programme, methodologies related to quantification which presently exist and the process that is in place for developing methodologies and protocols further[195]. While explaining the way in which the offsetting programme can contribute towards the sustainable development of a country, offsetting programmes according to CORSIA eligible emission unit eligibility criteria should also have provisions on the methodology adopted by the projects to address the issue of double counting and the safeguards that exist for environmental and social risk[196]. Furthermore, an offsetting programme according to CORSIA eligible emission unit eligibility criteria should disclose the details related to the authority responsible for its administration and the manner in which

[190] Rob Bailis, Derik Broekhoff, & Carrie M. Lee, *supra* note 26.
[191] *Ibid*.
[192] "Global Carbon Council", online: <https://www.globalcarboncouncil.com/about-gcc/global-carbon-council/>.
[193] "Welcome to Global Carbon Council", online: *Global Carbon Council* <https://www.globalcarboncouncil.com/about-gcc/global-carbon-council/>.
[194] *note 21.*
[195] *Ibid*.
[196] *Ibid*.

decisions are taken, offset credits are issued and cancelled. Also, the programme according to the CORSIA eligible emission unit eligibility criteria should stipulate procedures for tracking, individually identifying the emission units and validating and verifying emission units[197]. According to the CORSIA eligible emission units, criteria formulated by ICAO carbon credits delivered by offset credit programs that represent reductions, avoidance and sequestration of emissions should be additional. A carbon credit or a carbon offset will be classified as being additional under CORSIA if it reduces GHG emissions above the emissions which would have been reduced in the business-as-usual scenario or under any law, regulation, or legally binding mandate. Demand for offsets plays a decisive role in determining the additionality of a carbon credit. For example, if a power plant does a major retrofit by selling offsets, then GHG reductions from such a project would be additional as these would not have occurred in the usual business course[198]. On the other hand, carbon credits generated from a project that is viable in its own right, for example by selling electricity or government funding will not be called as additional as it would have happened irrespective of investment made through carbon markets[199]. The concept of additionality[200] is the first and foremost condition for any offset credit generated under an offsetting programme. Furthermore, offset credits have to be issued against a realistic and credible baseline which can be set by estimating the GHG emissions that would have occurred in the usual business course and in the absence of emission reduction activity or offset projects[201]. However not all the emission reductions generated through programmes are able to pass the muster of additionality and neither all offset credits are issued against a realistic baseline. This is because although a predicted baseline is required to assess additionality and a counterfactual baseline is required to calculate emission reductions which would have occurred in absence of project[202] but CDM projects lack a definite benchmark to assess additionality.

[197] SINAI, *supra* note 170.
[198] Rob Bailis, Derik Broekhoff, & Carrie M. Lee, *supra* note 26.
[199] "What does 'additionality' mean and why is it important?", (17 November 2020), online: <https://goldstandardhelp.freshdesk.com/support/solutions/articles/44001989691-what-does-additionality-mean-and-why-is-it-important->.
[200] Jiwan Acharya, "Additionality for Micro-scale Clean Development Mechanism Project Activities", online: <https://www.adb.org/sites/default/files/publication/29064/cdm-brief-03-additionality.pdf>.
[201] note 21.
[202] CDM Policy Dialogue, "CDM POLICY DIALOGUE RESEARCH PROGRAMME RESEARCH AREA: GOVERNANCE", online: <http://www.cdmpolicydialogue.org/research/1030_governance.pdf>.

Emissions occurring in the project's absence are based on economic, policy, and technological trends that have the tendency to change over time[203]. Furthermore, the existence of incentive incompatibility in CDM results in parties to the CERs (buyer and seller of carbon credits generated from the CDM project) inflating the approved baseline that is referred to while calculating emissions from the project. Incentive incompatibility occurs when the buyer of carbon credit (certified emission reduction) does not have any private interest in actual emission reductions as long as they received title to the same in the form of certified credits for sale or use[204].

Similarly, as long as the seller receives payment, he has no interest in whether projects are reducing emissions or not and there is the likelihood of saving money by skimping implementation[205]. The irregularities pertaining to interests that investors and host country have for high yield of CERs along with additionality also threatens to endanger CDMs environmental integrity. Environmental integrity in the particular case of CDM refers to the ability to certify emission reductions from the approved CDM projects that would not have occurred in the absence of project[206]. An attempt is made by the investors to obtain maximum CERs at the lowest cost for compliance or trading while host countries are the beneficiaries of the transfer of technologies and know-how due to them being favorable investment locations. CDM projects are thus marked with uncertainty due to the difficulty faced in calculating hypothetical emission scenarios. A study carried out by the European Commission claims that under the Clean Development Mechanism, a large majority of projects and issued certified emission reductions (CERs) are not providing real, measurable and additional emission reductions. The study further stated that almost 73% of the CERs generated from 2013-2020 have a low likelihood of the emission reductions being additional and not estimated[207]. A study conducted by the European Union's Emissions Trading System on Clean Development Mechanism found that up to 85% of the offsets generated by the Clean Development Mechanism were not additional[208]. Furthermore,

[203] Robert Repetto, *supra* note 29.
[204] *Ibid*.
[205] *Ibid*.
[206] Christina Voigt, "Is the Clean Development Mechanism Sustainable - Some Critical Aspects" (2008) 8:2.
[207] note 125.
[208] Baine P Kerr, "Regulating the Environmental Integrity of Carbon Offsets for Aviation: The International Civil Aviation Organization's Additionality Rule as International Law" (2020) 4:CCLR 255.

a report by the Technical Advisory Board[209] stated that CCERs which are generated by China GHG Voluntary Emission Reduction Program and VERs which are generated by Verified Carbon Standard, both of which are generated by CORSIA-approved offsetting programmes also fail to meet the additionality criteria. This is because they are largely based on the CDM methodologies which are likely responsible for this result in their initial stages[210].

On the other hand, forest carbon offsets certified for California's carbon market met the additionality criteria as the offsets resulted in "additional emissions reductions" beyond the reductions that would have occurred in absence of a programme[211].

Another important aspect related to additionality is that offsetting programmes should demonstrate that they have in place procedures to assess additionality. Some of the offsetting programmes such as CDM also fail to qualify through this requirement[212]. Although, there is a CDM executive board which lays down rules for the determination of additionality and consists of a framework which has four steps: identifying alternatives to project activity; conducting an investment analysis for demonstrating that the proposed activity is not the most financially or economically active; analyzing the barrier and thereafter conducting a common practice analysis but the implementation of this is however highly subjective[213]. Apart from CDM, other offsetting programmes such as ACR, Verified Carbon Standard, Climate Action Reserve (CAR), and Gold Standard have in place procedures for the determination of additionality but CORSIA eligibility emission units criteria fail to specify the procedures that provide reasonable assurance and do not mention what is deemed reasonable[214].

To determine the additionality of carbon offsets generated by the American Carbon Registry, it uses a hybrid approach of three tests which are Regulatory Surplus, Common Practices and Implementation Barriers[215]. According to the regulatory surplus test, the registry refers to

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[209] *TECHNICAL ADVISORY BODY (TAB) RECOMMENDATIONS ON CORSIA ELIGIBLE EMISSIONS UNITS,* by Technical Advisory Board(TAB).

[210] ICF Consulting et al, *supra* note 25.

[211] Christa M Anderson, Christopher B Field, & Katharine J Mach, "Forest offsets partner climate-change mitigation with conservation" (2017) 15:7 Frontiers in Ecology and the Environment, online: <https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/fee.1515>.

[212] SINAI, *supra* note 170.

[213] Harry Fearnehough et al, "Offset credit supply potential for CORSIA" (2020) Climate Change 37/2020 German Environment Agency, online: <https://newclimate.org/sites/default/files/2019/11/Offset-credit-supply-potential-for-CORSIA.pdf>.

[214] Umwelt Bundesamt & DEHSt, *supra* note 33.

[215] American Carbon Registry, *American Carbon RegistryTM A Hybrid Approach to Additionality*.

existing laws, statutes, regulations, and other regulatory frameworks which affect GHG emissions directly or indirectly and are associated with projects requiring technical, performance or managerial actions[216]. Common practice test while relying on predominant technologies implemented or industry practices referred to by a geographic region or a particular industry sector, makes it imperative for proposed offset projects to reduce GHG emissions below these technologies within a comparable environment[217]. Verified Carbon Standard to assess the additionality of projects uses standardized eligibility criteria that are formulated on the basis of penetration rates of activities, conditions pertaining to financial viability and absence of an alternative stream of revenue apart from offset credits[218]. Climate Action Reserve (CAR) determines the additionality of GHG emission reductions, prevention, or sequestration from CAR projects by employing standardized additionality tests which have two components namely: legal requirements and performance standards. Performance standards are based on the type of project[219]. Gold Standard to demonstrate the additionality of the projects registered under it incorporate the methodologies adopted by CDM to assess additionality. It however lays emphasis on the project proponent to demonstrate that it is unable to generate profit in the absence of carbon offset revenues. Apart from the financial additionality, it is imperative for the project proponents to also demonstrate that they need financial aid for sustaining project[220]. Not only do the offsetting programmes fault in getting through the condition of additionality but some offsetting programmes are also inadequate to cross the criteria pertaining to baseline. The forest offsets generated by REDD to quantify GHG reductions face the challenge of establishing an appropriate baseline as the volume of credits that are to be issued under this offsetting programme is high[221]. Issuance of carbon credits from REDD+ is based on performance which is assessed by comparing a realized forest cover against a baseline scenario that is created by the forest cover which would have been realized in the absence of the REDD+ project[222]. Due to assuming a continuation of historical deforestation trends, the baseline scenarios become

[216] *Ibid*.
[217] *Ibid*.
[218] Umwelt Bundesamt & DEHSt, *supra* note 33.
[219] *Ibid*.
[220] *Ibid*.
[221] Rob Bailis, Derik Broekhoff, & Carrie M. Lee, *supra* note 26.
[222] Thales APWest et al, "Overstated carbon emission reductions from voluntary REDD+ projects in the Brazilian Amazon" 117:39 PNAS, online: <https://www.pnas.org/doi/10.1073/pnas.2004334117>.

unrealistic counterfactuals. This is also affected due to the changes related to regional, economic, and political contexts[223]. Profiteers also tend to inflate deforestation baselines intentionally to commercialize superfluous credits and seek financial benefits[224].

Another stipulation is that carbon credits generated by offsetting programmes should also be quantified in a transparent and conservative manner and monitored, reported, and verified. An identification number should also be assigned to offset credits so that they have a strong and transparent chain of custody within the offset programme[225]. Offset credits which are generated by carbon offset programmes should not only be on the basis of accurate measurements and quantification methods but monitoring, measurement and reporting of activities related to emission reductions and actual emission reductions from the projects should be conducted on regular basis throughout the duration of crediting period[226]. An independent and accredited third party should verify the emission reductions. The requirement laid down in CORSIA emission unit eligibility criteria tells us that it is imperative to use accurate and precise measurements for quantification, but the forest sector is amongst the sectors having high levels of uncertainty for quantifying emissions[227]. This is because the estimation of GHG from forests requires analysis of satellite data to multiple field measurements which are spread across a broad landscape. The relative complexity which is associated around this process can result in substantial measurement errors[228]. Thus, all greenhouse gas programs do not possess equally strong validation and verification requirements[229]. Even third-party verifiers under CDM have been subject to this criticism due to their lack of capacity and competence regarding the level of quality checks required to ensure offset quality. Competition between Designated Operational Entities (DOEs) has also raised concerns about these remaining competitive and profitable by lowering the quality of their audits. This is because DOEs are hired by the project participants who then pay them for their services[230].

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[223] *Ibid*.
[224] *Ibid*.
[225] note 21.
[226] *Ibid*.
[227] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *supra* note 56.
[228] Rob Bailis, Derik Broekhoff, & Carrie M. Lee, *supra* note 26.
[229] Thiago Chagas et al, "Should forest carbon credits be included in offsetting schemes such as CORSIA?" (2019), online:
<https://www.researchgate.net/publication/336497956_Should_forest_carbon_credits_be_included_in_offsetting_schemes_such_as_CORSIA>.
[230] Robert Repetto, *supra* note 29.

Carbon credits according to CORSIA emission unit eligibility criteria must represent emission reductions, avoidance and sequestration that are permanent. If a carbon credit carries such risk, then the offsetting programme should additionally have a procedure in place for monitoring, mitigating as well as compensating for incidents related to non-permeance[231].

But there is a risk of non-permanence that can materialize during reversal events when carbon is stored in enhanced carbon sinks in the form of trees of geological formations. Furthermore, according to CORSIA emission units eligibility criteria, a project that reduces emissions and generates carbon credits should not cause a material increase in emissions elsewhere and should have a well-established process in order to assess and mitigate emissions leakage[232].

Carbon leakage as per IPCC occurs as a result of project activities causing unanticipated increases or decreases in greenhouse gas benefits outside the project's accounting boundary. It can also occur by shifting the agricultural industry to unprotected lands. In case it carries along with it the risk of emission reductions or removals being reversed then, such carbon credit will not qualify as CORSIA-eligible emission unit[233]. It is imperative for forestry and land use projects also referred to as Reducing Emissions from Deforestation and forest Degradation (REDD) to fulfil CORSIAs criteria of permanence. This is because carbon emissions emitted from the fuels used in aircraft stay in the atmosphere for a thousand years and efforts to offset emissions by way of preserving or planning forests should ensure its correspondence to a similar time frame[234].

Climate effects by storing carbon can only be developed if the storage is guaranteed for at least 100 years and thus it is important to ensure permanency. Natural disturbances or carbon stored underground in geological carbon capture and storage activities can however result in the re-emission of carbon stored in planted forests[235]. Forest carbon credits for offsetting emissions from flying run the risk of being released through wildfires, droughts, floods, pest invasions, illegal logging, and geopolitical and economic dynamics that directly impact climate breakdown[236]. Recent fires in the Amazon not only give us a red signal for relying on the tropical forest to offset emissions but also alerts us of the need to protect the remaining forests

[231] note 21.
[232] *Ibid*.
[233] *Ibid*.
[234] Thiago Chagas et al, *supra* note 221.
[235] *Ibid*.
[236] Ross W. Gorte & Jonathan L. Ramseur, *supra* note 31.

of the world[237]. Identification and quantification of carbon leakage from forest carbon project (FCO project) can be challenging since shifting of an activity and market behavior can also cause leakage[238].

An FCO project that causes a shift of original activity to somewhere outside the project area is referred to as activity shift. An FCO project which results in change in supply of induced carbon emission is referred to as market behavior. For example, conversion of cropland to forest land for an afforestation project can result in the decline of total crop production which also gives other landowners the incentive to cause deforestation beyond the project area to increase crop production[239]. Offset credits generated from CDM projects also run the risk of leakage as internal emission reductions are offset by increased emissions external to the project. Leakage can be due to market forces or conscious manipulation[240]. Lack of comprehensive permitting creates asymmetry as it rewards project proponents for reducing emissions but does not impose penalties for increased emissions and grants parties incentives to focus on emission reductions in CDM projects and permit an increase in emission elsewhere[241].

The offsetting programmes according to CORSIA emission units eligibility criteria should have in place measures to avoid double issuance, double claiming, and double use[242]. Issuance of more than one unit for the same emission or emissions reductions is termed double issuance. Double use means using the same issued unit twice[243]. Double claiming can occur if GHG reduction is not only used as an offset but also counted by the host country of emission reduction activity towards meeting its nationally determined contributions (NDCs) under the Paris Agreement[244]. To prevent double claiming ICAO according to the emissions unit eligibility criteria along with making it mandatory for eligible programs to have measures in place to avoid double claiming, use and issuance also obligates programs to demonstrate that the country where the emission reduction activities are conducted agrees to account for the offset unit issued[245].

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[237] Thiago Chagas et al, *supra* note 221.
[238] Chunyu Pan & Anil Shrestha, "Key challenges and approaches to addressing barriers in forest carbon offset projects" (2022) 33:4 Journal of Forestry Research 1–14.
[239] *Ibid*.
[240] Robert Repetto, *supra* note 29.
[241] *Ibid*.
[242] Thiago Chagas et al, *supra* note 221.
[243] note 21.
[244] Rob Bailis, Derik Broekhoff, & Carrie M. Lee, *supra* note 26.
[245] note 21.

VCS to avoid double claiming mandates project owners to legally attest their exclusive ownership of emission reductions. To guard against instances of overlapping claims potential project owners under CAR are required to certify effectively that they have reconciled potential conflict. They also must sign a legal attestation wherein they assert exclusive ownership of emission reductions that are credited[246]. Gold Standard to prevent double claiming mandates demonstration of full and uncontested legal ownership of products and carbon credits generated under this offsetting programme by project owners. To effectively authorize the CDM project owner's claim to emission reductions generated by the projects a letter of approval is to be issued by the host country where emission reduction projects are located. Although, the offsetting programmes approved by ICAO have some measures dealing with double claiming but effective rules and procedures to avoid the same are absent[247]. The risk of double counting is thus not well managed under CORSIA as ICAO makes it mandatory for programs to demonstrate that the country where the emission reduction activities are conducted agrees to account for the offset unit issued but fails to lay down robust rules to be followed by the countries. Paris Agreement however takes care of this as it mandates states to apply the concept of the corresponding adjustment which is in the form of bookkeeping[248]. To avoid double claiming, the Conference of Parties to the UNFCCC in the UNFCCC meeting held in Glasgow (COP 26) agreed to allow and authorize the use of carbon credits issued by the emission reduction programmes for offsetting under CORSIA and for purposes of voluntary offsetting. The rules also clarify that the country hosting emission reduction activities upon such authorization is required to apply an adjustment to the ledger used for tracking progress for achieving its NDCs for reflecting that the emission reduction has been used by the aviation industry or another credit buyer[249].

Also, offset projects should not violate any state or provincial law or national and international obligation[250]. Assisting developing countries in achieving sustainable development was one of the reasons for the implementation of CDM but it has failed to achieve this primary objective. The CDM process is being dominated by large developing countries such as India and China

[246] Umwelt Bundesamt & DEHSt, *supra* note 33.
[247] *Ibid*.
[248] Derik Broekhoff, *supra* note 34.
[249] *Ibid*.
[250] *note 21.*

which can also be witnessed from the percentage of projects that have been in pipeline since 2006[251].

As of 2009, Africa, which needs development assistance the most has only had 4% of CDM projects. Over 75% CERs have been earned by India and China since the start of the CDM programme which thus brings us to the conclusion that CDM fails to achieve its primary goal of aiding developing countries in sustainable development[252]. CDM projects also do not result in sustainable development as the projects contribute to reducing emissions and eliminating the reductions does not contribute towards the building of clean energy infrastructure[253]. CORSIA relies heavily on carbon offsets, but carbon credits generated by offsetting programmes approved under CORSIA thus do not meet all requirements laid down in the carbon credit criteria as has been discussed in detail above and fail to contribute effectively towards reducing emissions[254].

Also, the supply of carbon credits has outstripped demand in recent years due to a failure to incentivize emission reductions[255]. The four programmes that already existed (Clean Development Mechanism, Climate Action Reserve, Gold Standard and Verified Carbon Standard) that have also been approved by CORSIA as offsetting programmes capable of generating Eligible Emission Units can approximately supply 18 billion offset credits for emission reductions achieved from 2013 to 2035[256]. The clean development mechanism which is one of the largest sources of carbon offsets since its inception accounts for 118 million certified emissions reductions (CER) followed by Verified Carbon Standard (VCS) (76 million), Climate Action Reserve (CAR) (30 million) and Gold Standard (16 million)[257]. Currently, the estimated amount of CER's value today is less than €1 per tonne of carbon dioxide which is sufficient to fulfil the projected demand of CORSIA of 2.7 billion tonnes of carbon offsets through 2035[258]. Even if we consider the vintage restrictions as per which only those carbon offsets generated by these eight offsetting programmes are eligible that have their

[251] "UN: environment programme", online: *CDM projects by host region* <https://www.cdmpipeline.org/cdm-projects-region.htm>.
[252] *Ibid*.
[253] Chris Juhnke, *supra* note 23.
[254] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *supra* note 56.
[255] Harry Fearnehough et al, *supra* note 205.
[256] *Ibid*.
[257] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *supra* note 56.
[258] Harry Fearnehough et al, *supra* note 205.

first crediting period starting on or after January 1, 2016, and in respect of emission reductions occurring through 2020, the existing stock of CER's for the CDM projects eligible to be used in CORSIA's pilot phase that started their first crediting period after January 1, 2016, is approximately 3 million. CDM by 2021 has registered around 7848 projects and 355 Programs of Activities and issued over 2 billion CERs. Projects that started their first crediting period from January 1, 2016, have potentially supplied approximately 140-179 CERs[259]. As of September 30th, 2022, there are almost 408 million CERs in the CDM pending account[260]. The total stock of VCS credits from all projects and vintages is 219 million as per the information published on its website in April 2020[261]. The stock of approximately 140 Climate Reserve Tonnes is lying in the Climate Action Reserve Registry. There are approximately 5.6 million total volumes of unused credits in the gold standard registry, of which 65 million are eligible to be used in CORSIA's pilot phase[262]. Furthermore, the change in the baseline to 2019 adds to the increased supply due to zero demand for carbon credits over this period. The baseline criteria was accepted as the average carbon emissions from international flights in 2019. Keeping in mind the present situation and the standing of the aviation industry post covid period when the industry is still in the recovery phase and has not recovered fully. The baseline criteria are set so high that if the same pace continues then the airlines would not have to buy any offsets for the next 5 years. This creates an abundance of offsets in the market and following the concept of demand and supply, the price of offsets is so low, making it a complete failure. Today, offsetting a ton of carbon under CORSIA costs less than one U.S. dollar[263]. Even the price for the offsets which are certified through a more rigorous Gold Standard carbon offset program is however a magnitude higher than CER but is still over $4.6 per tonne of carbon[264]. This lower cost encourages the aviation sector to use credits instead of CORSIA-eligible fuels which can be more cost prohibitive. Due to structural oversupply, any demand from CORSIA for carbon credits will also not trigger new investment in emission reductions.

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[259] Institute for Global Environmental Strategies (IGES) et al, *supra* note 167.
[260] "CDM Registry", online: <https://cdm.unfccc.int/Registry/index.html>.
[261] "The Verified Carbon Standard Program Has Been Accepted to Supply Carbon Credits under CORSIA", (15 March 2020), online: *VERRA* <https://verra.org/the-verified-carbon-standard-program-has-been-accepted-to-supply-carbon-credits-under-corsia/>.
[262] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *supra* note 56.
[263] Florian Wozny et al, *supra* note 37.
[264] "Unlocking Potential State of the Voluntary Carbon Markets 2017", (2017), online: *Ecosystem Marketplace: A Forest Trends Initiative* <https://www.forest-trends.org/wp-content/uploads/2017/07/doc_5591.pdf>.

2.6.3. CORSIA-eligible fuels: A way out for airlines to reduce offsetting requirements

CORSIA-eligible fuels can be used by airlines to reduce their offsetting requirements. Carbon emissions can be reduced by using CORSIA-eligible fuel on a life cycle basis (that is, from production to combustion) as its reduction depends on a variety of factors such as how feedstock is used, produced and the fuel conversion process is used. For fuel to become CORSIA eligible, it has to go through a process of feedstock to conversion and then through a sustainability certification process. Two types of fuels eligible under CORSIA are sustainable aviation fuel (SAF) and lower carbon aviation fuel (LCAF). CORSIA Lower carbon aviation fuels are fuels that meet CORSIA sustainability criteria and CORSIA sustainable aviation fuel refers to renewable or waste-derived aviation fuel that meets CORSIA sustainability criteria[265]. As per CORSIA sustainability criteria, SAF and LCAF produced by a certified fuel producer will be classified as CORSIA-eligible fuel (CEF) for the pilot phase if net greenhouse gas emissions from CORSIA-eligible fuel are 10% lower in comparison to the baseline life cycle emissions values for aviation fuel. Also obtaining biomass from that land should not degrade carbon stock[266]. Additionally, fuel produced by certified fuel producers during CORSIAs first phase will be categorized as CORSIA sustainable aviation fuel if net greenhouse gas emissions from SAF is 10% lower in comparison to the baseline life cycle emissions values for aviation fuel and if it is not made from biomass that has been obtained from land (primary forest, wetlands, or peat lands) converted after January 1, 2008. Further, obtaining biomass from that land should not result in the degradation of carbon stock[267]. Additionally, CORSIA SAF will have to maintain or enhance water quality and availability, limit air pollution emissions, promote responsible management of waste and chemical use maintain or enhance soil health by implementing agricultural and forestry best management practices for feedstock production or residue collection for enhancing or maintaining soil health. Fuel will be called as CORSIA SAF only when it maintains biodiversity, conservation value and ecosystem services and should not be from biomass which is obtained by the areas that have been protected by the State due to their biodiversity, conservation value, or ecosystem services unless there's evidence that

[265] *note 39.*
[266] SINAI, *supra* note 170.
[267] *Ibid*.

production of SAF does not interfere with protection purposes[268]. While producing CORSIA SAF existing land rights and land use rights including formal and informal rights of indigenous people, humans and labour should be respected[269]. For a lower carbon aviation fuel to be called as CORSIA LCAF in its first phase, ICAO is still silent on the requirements which LCAF will have to fulfil[270]. To become more "eco-friendly", the aviation industry is although scrambling for alternative fuel sources such as sustainable aviation fuel (SAF) and lower carbon aviation fuel (LCAF)[271] but CORSIA sustainability criteria is woefully inadequate and ineffective. This is because for producing CEF, the current criteria for biomass is more concerned about the carbon stock of lands and do not deal with any measures for the purpose of enhancing biodiversity[272] which can be buttressed from the fact that fuel will be categorized as CEF during the pilot phase if it is not made from biomass that has been obtained from land (primary forest, wetlands, or peat lands) converted after January 1, 2008[273]. Further, obtaining biomass from that land should not degrade carbon stock[274]. However, obtaining biomass for producing CORSIA-eligible fuel from biodiversity-rich protected lands can have adverse impacts on biodiversity.

The keenness expressed by countries and airlines to use SAF extracted from renewable resources such as plants or used cooking oil has resulted in the emergence of a new and insatiable market for soy, palm, and vegetable oils[275] that will have a further impact on biodiversity. Indonesia, one of the biggest producers of palm oil, had introduced a mandatory biodiesel programme known as B30 with 30% palm oil content. Its state energy company PT Pertamina had also releveled its plan to produce SAF through palm oil. Additionally, the Indonesian government had also expressed its keenness in expanding the use of vegetable oil for producing SAF. In 2021, the country even attempted to conduct a first test flight that was running partially on palm oil-based jet fuel[276]. Malaysia, in 2019 had announced plans for

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[268] *ICAO Document: CORSIA Sustainability Criteria for CORSIA Eligible Fuels* (International Civil Aviation Organization, 2021).
[269] SINAI, *supra* note 170.
[270] *Ibid*.
[271] note 185.
[272] note 184.
[273] note 260.
[274] *CORSIA Sustainability Criteria for CORSIA Eligible Fuels* (INTERNATIONAL CIVIL AVIATION ORGANIZATION, 2021).
[275] note 43.
[276] "Can Palm Oil be the Jet Fuel of the Future?", (31 January 2021), online: *center for Sustainable Palm Oil Studies* <https://thecspo.org/can-palm-oil-be-the-jet-fuel-of-the-future/>.

developing SAF based on palm oil over a period of five years[277]. With the aid of the Agricultural Research Service in Peoria, Illinois, scientists devised a way to utilize fatty acids from soyabean oil and turn them into a better jet fuel. To curb emissions from aviation, British Airways decided to fuel planes with SAF derived from vegetable oil, fats and greases from the beginning of 2022. Reflecting its move towards achieving the goal of net zero carbon emissions, it had also signed a multi-year contract with Phillips Limited, an energy manufacturing company thereby making Phillips the first company in the UK to produce SAF at a commercial scale[278]. In 2020, a core part of the plan for Delta Airlines was to increase the share of biofuels powering its aircraft in an attempt to go fully carbon neutral. A similar commitment was also made by British Airways wherein the airline said that it would invest more in biofuels[279]. Further momentum was added to the decision of commercial flights to use SAF when one of the engines of the Airbus jumbo jet A380 completed its first test flight powered entirely by SAF. SAF which Airbus used was a mix of used cooking oil coupled with other waste fats that were purified for extracting sulfur and other contaminants[280]. This has resulted in the emergence of a new and insatiable market for soy, palm and vegetable oils[281]. To meet a quarter of the feedstock demand for palm and soy oil, it is anticipated that 3.2 million hectares of forest land will have to be replenished and resultantly land use change could also drive 5 gigatons of carbon emissions[282]. A report released by Rainforest Foundation Norway underscores that to meet the demand for increased production of palm oil by 61 million tonnes and soy oil by 41 million tonnes, almost 7 million hectares of tropical forests will face

[277] Jan Suszkiw, "Making Air Travel More Sustainable with Soy-Fuel Innovations", (22 November 2021), online: <https://www.ars.usda.gov/news-events/news/research-news/2021/making-air-travel-more-sustainable-with-soy-fuel-innovations/>.
[278] Shirin Ali, "Airline signs historic deal to use recycled cooking oil to fuel its planes", (4 December 2021), online: *Changing America* <https://thehill.com/changing-america/sustainability/environment/584276-airline-signs-historic-deal-to-use-recycled/>.
[279] Sally Ho, "Could Biofuels Worsen Deforestation? A New Report Reveals Potential Harm Of 'Eco-Friendly' Alternative", (12 March 2020), online: *green queen* <https://www.greenqueen.com.hk/airlines-shifting-to-biofuels-may-lead-to-7-million-hectares-deforestation/>.
[280] Andrea Willige, "An Airbus powered by cooking oil: Is sustainable aviation fuel the future of aviation?", (19 April 2022), online: *Race to Resilience* <https://climatechampions.unfccc.int/an-airbus-powered-by-cooking-oil-is-sustainable-aviation-fuel-the-future-of-aviation/>.
[281] note 43.
[282] Dr Chris Malins, "Driving deforestation The impact of expanding palm oil demand through biofuel policy", (January 2018), online: <https://d5i6is0eze552.cloudfront.net/documents/Publikasjoner/Andre-rapporter/Cerulogy_Driving-deforestation_Jan2018.pdf?mtime=20180122234132>.

deliberate land clearing[283]. Meeting increased demands of palm and soy oil will further contribute toward deforestation as tracts of forest lands will have to be eliminated for agricultural expansion[284]. Expansion of plantations of palm oil also results in the loss of tropical forests including swamp forests on peatlands which are rich in biodiversity. Thus, instead of being effective for climate mitigation, the expansion can resultantly be counterproductive. CEF can however be brought only from the fuel producers that are certified by an approved Sustainability Certification Scheme (SCS). SCS are organizations that along with certifying feedstock producers, processing facilities and traders (economic operators) against sustainability criteria also ensure that actual life cycle emissions values are calculated by economic operators using an agreed methodology and by applying default values provided by ICAO. ICAO council also validates a list of approved SCSs and whether other SCSs comply with the eligibility requirements while certifying a fuel as CEF[285]. The functioning of the CEF system under CORSIA will be at risk on CEF being assessed by the sustainability certification scheme (SCS) in different ways. CEF system is not completely centralized and it is the SCS that grants CEF a certification. Differences in the interpretation of sustainability criteria by SCSs can result in some airplane operators reducing their offsetting requirements by using a particular CEF that other SCSs do not approve. This will also result in tilting the level playing field and instead be consequential for the environment if operators choose lenient SCSs[286].

2.6.4. Phases of Implementation

As of date, CORSIA is not applicable to all countries. It is only applicable to countries that have volunteered to participate in scheme[287]. ICAO has mandated a phased implementation of the scheme. The phases are designed in the following manner. Pilot Phase(2021-2023) – Only applicable to States who volunteer to participate in the scheme; First Phase (2024-2026) – Applicable to states that participate voluntarily in the pilot phase and to other states that voluntarily participate in this phase; Second Phase (2027-2035) - Mandatory phase for all ICAO

[283] Sally Ho, *supra* note 271.
[284] "Do Biofuels Destroy Forests? Link between Deforestation and Biofuel Use", online: *Climate Policy Info Hub : Scientific Knowledge for Decision-Makers* <https://climatepolicyinfohub.eu/do-biofuels-destroy-forests-link-between-deforestation-and-biofuel-use.html>.
[285] By ICAO Secretariat, *supra* note 161.
[286] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *supra* note 56.
[287] "Who Participates in CORSIA?", online: *ICAO Environment* <https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx>.

member states with exceptions for some states that are: least developed countries, small island developing states, landlocked developing states and states that represent a small share of international aviation[288].

The pilot phase is only applicable to the States who volunteer to participate in the scheme. While a 100% sectoral rate is applicable, participating states in the pilot phase have the option to calculate their offsetting requirements based on aircraft operator's emissions covered by CORSIA in a given year (2021, 2022, 2023) or in 2020[289]. In this phase, ICAO had decided to calculate the baseline initially by the average of total carbon emissions for the years 2019 and 2020 on the routes that were covered by CORSIA offsetting in a given year from 2021 onwards. But considering covid[290], ICAO received a request to not calculate the baseline by average the 2019 and 2020 emissions. Even India in its working paper titled Implementation Challenges & Need for Review of The Baseline Emission Criteria during the 40th Session of Assembly had opposed the baseline threshold of 2019-2020[291]. It had argued that this would cause unfairness to the airlines of the developing states as the entire expanse of their operations from 2020 to 2026 would become liable in order to offset requirements under CORSIA. Considering the objections, ICAO decided to use the value of 2019 emissions to also be used for calculating 2020 emissions to calculate the baseline for this phase[292]. This decision related to baseline was included in ICAO Assembly Resolution A40-19 which is defining document of ICAO. CORSIA's first phase is applicable to states that participate voluntarily in the pilot phase and to other states that voluntarily participate in this phase. Offsetting requirements can be calculated only from aircraft operator's emissions covered by CORSIA in a given year (2024, 2025, 2026) and 100% sectoral rates apply. The modalities pertaining to adjustment in the CORSIA baseline were thus included in ICAO Assembly Resolution A40-19, ICAO's defining document. The second phase which is applicable from 2027-2035 is mandatory for all ICAO member states except least developed countries, small island developing states, landlocked developing countries and states that represent a small share of international aviation[293]. It also exempts states having an individual

[288] "California Offset Program", online: *American Carbon Registry* <https://americancarbonregistry.org/california-offsets/california-offset-program>.
[289] *Ibid*.
[290] note 166.
[291] Presented by India, *supra* note 281.
[292] *Ibid*.
[293] ICAO, *supra* note 97.

share of international aviation activities below 05.% of total Revenue Tonne Kilometer in 2018 and also states not forming part of the list (when sorted from highest to lowest amount of individual Revenue Tonne Kilometers) accounting for 90 percent of total Revenue Tonne Kilometer. CORSIA in this phase aims to cover all states representing at least 90% of total activity pertaining to international aviation[294].

2.6.5. Exemptions from Applicability of CORSIA

To avoid an administrative burden from the application of CORSIA due to low levels of international aviation activities, flights which are involved in humanitarian, medical and firefighting operations or aircraft operators that have a low level of annual emissions from their international aviation operations which are less than 10 000 metric tonnes of carbon emissions per year and the aircraft that have less than 5700 kg of Maximum Take Off Mass (MTOM) are exempted from CORSIA[295]. Under this scheme, new entrants do not have to apply CORSIA offsetting requirements for the first 3 years or until their annual emissions exceed 0.1% of the total 2020 emissions from the international aviation sector[296]. "New Entrant" refers to the operators who commence an aviation activity falling within the scope of the CORSIA on or after its entry into force for being considered as a new entrant, the operations must not even partially be a continuation of the operations of another operator. For example: if an airline creates a new Air Operator's Certificate (AOC) for its regional flight and thus splits its network between the parent company and the new AOC, the new AOC will not be considered a new entrant. Also, if an airline operating domestic flights only takes over the international flights of another airline with which it has merged, this would not be a situation for a new entrant. Although new entrants are exempted from the applicability of CORSIA offsetting requirements, they still have to report the carbon emissions as they fall under the applicability of CORSIA MRV requirements[297].

2.6.6. Scheme Administration: CORSIA MRV requirements

ICAO adopted CORSIA in the form of Annex 16 — Environmental Protection to the Convention on International Civil Aviation, Volume IV — Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and has chosen a legal instrument which is a mix of resolutions

[294] *Aviation Benefits Report*, by Published through the cooperation and agreement of the global aviation Industry High-level Group (2019).
[295] note 253.
[296] note 166.
[297] note 253.

and Standards and Recommended Practices (SARPs) for enforcing compliance. A standard refers to any specification which should necessarily be uniformly applied and conformed to by the contracting states for the safety or regularity of international air navigation[298].

On the other hand, recommended practices refer to any specification whose uniform application is recognized as desirable by the contracting states for the safety, regularity, or efficiency of international air navigation. Specifications for standard and recommended practices can be for physical characteristics, configuration, material, performance, personnel, or procedure[299]. SARPs become effective within three months of submissions to the contracting states after they are adopted by a vote by two-thirds of the ICAO Council at a meeting or at a time prescribed by the Council unless disapproval is registered by a majority of the states. The council is also required to immediately notify about the implementation of any annex or amendment to all the contracting states[300]. SARPs contain detailed rules pertaining to the administration of CORSIA by states, Monitoring, Reporting, and Verification (MRV) of emissions and also for cancelling emission units. Aircraft operators having annual carbon emissions of more than 10,000 tonnes are required to monitor, report and verify carbon emissions as well as cancellation of emission units. MRV requirement is independent of offsetting requirement and is done on an annual basis. For complying with monitoring requirements, airlines started to monitor carbon emissions on January 1, 2019. The reports during reporting are verified internally by aircraft operators. The same is also verified with third-party verifiers and also relevant state aviation authorities. The emission information is submitted by aircraft operators and verifying entities to states where the aircraft is registered. The state after receipt of the information submits the reports to ICAO for enabling it to determine sector growth factors above the baseline[301]. In addition to this, aircraft operators also submit emission unit cancellation information to the designated states after getting it verified by a third party and verifying the entity. The reports are then submitted to ICAO for aggregation[302].

ICAO under Article 37 is also mandated to adopt and amend international standards and recommended practices and procedures from time to time that deal with aspects such as

[298] Dr. Paul Stephen Dempsey, *supra* note 49.
[299] Paul Stephen Dempsey, *supra* note 46.
[300] *Convention on International Civil Aviation (Chicago Convention);*, Article 90.
[301] *An Airline Handbook on CORSIA* (IATA, 2019).
[302] *Ibid*.

communication systems and air navigation aids, characteristics of air and landing areas, airworthiness, registration, identification of aircraft and all other aspects concerned with safety, navigation and regularity of air navigation[303].

Furthermore, the intention of states to participate in CORSIA can depend on the basis of states implementing SARPs into their national law[304]. As of January 1, 2022, 107 states had announced their intention to participate in CORSIA and 8 more states including Cambodia, Cuba, Federated States of Micronesia, Iraq, Maldives, Saint Vincent and the Grenadines, Timor-Leste, and Zimbabwe also notified their decision to participate voluntarily in CORSIA from January 1, 2023, bringing the total number to 115[305]. But out of the 107 states who have announced their intention to participate in CORSIA, the scheme is being implemented by way of Monitoring, Reporting, and Verification (MRV) rules in only a handful of states such as the EU, Canada, U.S., and the UK. While states such as China and Russia which are considered as largest emitters of carbon do not have in place MRV rules for reporting carbon emissions and neither do they are a part of the scheme.

According to, a 2020 report by the International Council on Clean Transportation (ICCT) airports in the U.S., China and European Union were major drivers of commercial flight carbon with the US producing 175 million metric tons of carbon emissions and China producing more than 90 million metric tonnes[306].

China generates about 30% of global emissions[307] and has aviation industry greater than that of India which can be witnessed from the fleet size. While the total number of aircraft in India is between 800-900[308], China has a fleet size of 4500 aircraft[309]. Additionally, in 2020 Chinese air

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[303] *Convention on International Civil Aviation,* Article 37.

[304] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *supra* note 56.

[305] "Who Participates in CORSIA?", online: *ICAO Environment* <https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx>.

[306] Alex Leeds Mathews, "Airports in U.S., Europe and China Produce the Most Flight Carbon Emissions", (2 November 2021), online: <https://www.usnews.com/news/best-countries/articles/2021-11-02/charting-the-airports-that-produce-the-most-carbon-emissions>.

[307] "Which countries are the world's biggest carbon polluters?", online: *Climate Trade* <https://climatetrade.com/which-countries-are-the-worlds-biggest-carbon-polluters/>.

[308] IANS, "Indian aviation under-penetrated compared to China, near peers like Indonesia: Report", *Economics Times* (25 August 2022), online: <https://infra.economictimes.indiatimes.com/news/aviation/indian-aviation-under-penetrated-compared-to-china-near-peers-like-indonesia-report/93771853>.

[309] Mark Martin, "Despite mega Air India deal, Indian aviation is lagging behind China by a lot", *Business Today* (16 February 2023), online: <https://www.businesstoday.in/latest/corporate/story/despite-air-india-deal-indian-aviation-is-lagging-behind-china-by-a-lot-mark-martin-370535-2023-02-16>.

carriers were boarded by over 417.2 million passengers whereas over 68.96 million passengers boarded Indian carriers[310]. Whereas airlines in India only account for less than one per cent of total CO2 emissions. When global airlines in 2011 accounted for 676,000,000 tonnes of CO2, India's share in emissions was less than one per cent which was equal to 1.84 billion tonnes[311].

The civil aviation industry in China was responsible for about 0.13 gigatons of carbon emissions in 2020. These emissions between 2020 and 2050 would increase by 1.6 to 3.9 gigatons[312]. China's booming civil aviation industry which is currently in rapid development will in the near future face considerable pressure for carbon offsetting and responsibilities for reducing aviation. The aviation sector of the Russian Federation portrayed over 12% growth in 2016 supporting over 1.1 million jobs and comprising 1.6% of the Russian GDP alongside generating 1,711 million tons of carbon[313]. In the EU, MRV rules for CORSIA are being implemented through a package of regulations. The EU as a first step had amended its 2003 directive to incorporate article 28c and delegated the Commission with the power to adopt provisions for the purpose of MRV of emissions[314]. The Federal Aviation Administration of the United States issued a notice on March 6, 2019, on the CORSIA Monitoring, Reporting and Verification Program for implementing MRV rules by a voluntary program[315]. In Canada, the CORSIA system as well as MRV requirements have been implemented as a part of the Canadian Aviation Regulations[316]. In the UK, MRV requirements of CORSIA were implemented through the Air Navigation (CORSIA) Order 2021[317]. For the implementation of offsetting requirements of CORSIA in UK

[310] "Number of passengers on airlines worldwide in 2020, by registration country(in millions)", online: *Statista* <https://www.statista.com/statistics/537002/airline-passengers-worldwide-by-country/>.
[311] Uthra Radhakrishnan, "CO2 emissions from Indian aviation sector less than the global average", *Down to Earth*, online: <https://www.downtoearth.org.in/news/co2-emissions-from-indian-aviation-sector-less-than-the-global-average-39313>.
[312] Farooq Sher & David raore, *Unprecedented Impacts of Aviation Emissions on Global Environmental and Climate Change Scenario* (SpringerLink, 2021).
[313] *Tracking report-September 2022*, by Jacob Teter & Hyeji Kim (2022).
[314] *Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 2003/87/EC as regards aviation's contribution to the Union's economy-wide emission reduction target and appropriately implementing a global market-based measure* (European Commission, 2021).
[315] US DEPARTMENT OF TRANSPORTATION : FEDERAL AVIATION ADMINISTRATION, *NOTICE OF CORSIA MONITORING, REPORTING, AND VERIFICATION PROGRAM* (2019).
[316] *Canadian Aviation Regulations*, 1996, Part X.
[317] *Initial offsetting approach for CORSIA: statement of intent* (GOV.UK, 2022).

law, the UK government in 2022 further introduced The Air Navigation (CORSIA) Amendment Order, 2022[318].

Nigeria in March 2022 had adopted a Civil Aviation Order to adopt the amendment to SARPs wherein airlines conducting international flights were required to submit a copy to the Nigerian Civil Aviation Authority copy of their carbon emissions report and associated verification report by 30th April in the calendar year[319].

Apart from the issues in the implementation of CORSIA by way of SARPs, the implementation methodology is also problematic since the organization faces issues regarding the failure of member states to fill in data. For filling in data, states have to transmit an annual emission report to the CORSIA Central Registry in which they have to add details. The same can be related to total annual carbon emissions per state pair that is aggregated to airplane operators and per each operator per state, emissions units cancellation and CORSIA eligible fuels use. Provision of these statistics is a legal requirement under Article 67 of the Chicago Convention but submission of data in this regard has not been universal. As of November 30, 2021, only 116 states reported the 2019 carbon emissions to report whereas only 120 states reported the 2020 carbon emissions report to CCR[320]. Failure of participating states to fill these data gaps forces ICAO to use a number of additional information sources for planning purposes[321].

Furthermore, for the implementation of CORSIA, transparency remains a central requirement[322] and ICAO unlike UNFCCC and Paris Agreement lacks a mechanism for freedom of information policy for the members of the public to request documents. This is because the Chicago Convention which had established ICAO does not mention transparency or public consultation in ICAO's regulatory function. Transparency and public participation are the central pillars of good governance. Transparency as explained by Chayes in the international treaty law increases accountability and legitimacy and also provides adequacy, accuracy, availability, and accessibility[323]. Public participation which forms a part of the framework of international

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[318] *Ibid*.

[319] Nigerian Civil Aviation Authority, *Civil Aviation Order*.

[320] *CORSIA Central Registry (CCR): Information and Data for Transparency* (ICAO Document, 2021).

[321] Chris Lyle, "Beyond the icao's corsia: Towards a More Climatically Effective Strategy for Mitigation of Civil-Aviation Emissions" (2018) BRILL : Climate, online: <https://brill.com/view/journals/clla/8/1-2/article-p104_104.xml>.

[322] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *supra* note 56.

[323] Nafiseh Jafarzadeh, *Charting Environmental Law Futures in the Anthropocene: Global Assessment and Review: The Importance of a Transparency Turn in International Environmental Law*.

environmental law is a democratic process which facilitates non-state actors in decision-making at the national, regional, and international levels. It not only fosters bottom-up decision-making, democratic process, accountability, and transparency but also grants non-state actors tools for influencing environmental decision-making[324]. Public consultation is one of the best tools to also enhance voluntary compliance as announcing changes in a timely manner gives time to adjust to those changes and the sense of legitimacy motivates affected parties to comply[325]. Regulatory negotiation can also be a procedure for public participation that involves the formulation of rules by cooperation between the authorities and the persons who are directly affected[326].

Under UNFCCC, the press has extensive access to proceedings and the official submissions of parties and observers, official documents and decisions are immediately posted online[327]. Accredited observers can access the UNFCCC meetings of the treaty bodies including the bodies of limited compositions and also make interventions at meetings subject to the chairperson's approval[328]. Under the Paris Agreement, to represent an important component of the ambition cycle in the global climate regime, an Enhanced Transparency Framework (ETF) is designed for building trust that all the countries are contributing their share to meet their national climate targets and actions defined in their NCD's[329]. States under the Agreement get detailed guidance on the reporting/review/consideration process with regard to the information that is to be submitted and the ETF makes it possible to track the progress made by each country by making the reports submitted by the states public[330]. The information gathered under the ETF thus provides a clear understanding and helps in supporting climate change actions which consequently contributes to the global stocktake process that will take stock of the implementation of the Agreement periodically[331]. But ICAO offers limited opportunity for public

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[324] Jona Razzaque, "Public Participation in Environmental Decision Making", (1 March 2006).
[325] Delia Rodrigo & Pedro Andres, "Background Document on Public Consultation", online: *OECD* <https://www.oecd.org/mena/governance/36785341.pdf>.
[326] Svitlana Kravchenko, Tareq MR Chowdhury, & Md Jahid Hossain Bhuiyan, *Principles of international environmental law from: Routledge Handbook of International Environmental Law Routledge* (2012).
[327] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *supra* note 56.
[328] Aoife O'Leary, "TRANSPARENCY AND ICAO'S AVIATION OFFSETTING SCHEME: TWO SEPARATE CONCEPTS?" (2017) Columbia Law School, online: <http://columbiaclimatelaw.com/files/2017/11/Oleary-2017-11-Transparency-and-ICAOs.pdf>.
[329] "Reporting and Review under the Paris Agreement", online: *United Nations Climate Change* <https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-paris-agreement>.
[330] *Ibid*.
[331] *Ibid*.

participation since the press cannot access meetings conducted by the ICAO council and the documents of CAEP meetings are not available in the public domain. The meetings can be attended by ICAO's 193 member states[332]. Furthermore, the organizations (United Nations Programmes, Commissions and Agencies, other Intergovernmental Organizations and non-governmental organizations) may be invited to attend suitable ICAO meetings but they are not considered as observers[333]. Also, to shield the discussions in technical subcommittees and subgroups from public scrutiny participants are required to sign non-disclosure agreements. CAEP members are required to sign up for a set of rules including a statement of unlimited personal and professional liability for disclosing inadvertently or accidentally its documents. Non-members are barred from signing up or accessing the documents and the membership is severely restricted[334]. ICAO can however decide on publication on an ad hoc basis but lacks a mechanism for receiving request from the public for accessing unpublished documents. Under CORSIA, states have to comply with reporting requirements by transmitting aggregate report, but transparency of such reporting is affected by confidentiality of information that is reported[335].

To verify their annual emissions report, airline operators must engage a verification body[336]. A verification body is a legal entity which acts as an accredited independent third party and is entrusted with the task of verifying Emissions Reports and Emissions Unit Cancellation Reports[337]. This verification body finds its place in the list of ICAO documents titled "'CORSIA Central Registry (CCR): Information and Data for transparency"[338]. The document contains the list of verification bodies accredited in states for their airplane operators[339]. Pursuant to the receipt of emission reports from airplane operators and verification bodies, the state can only share specific data and information contained in the airplane's Emissions Reports to third parties subject to an agreement with another state. States, in the absence of an agreement with another

[332] ICAO: Uniting Aviation, "Council States 2019-2022", online: <https://www.icao.int/about-icao/Council/Pages/council-states-2019-2022.aspx>.
[333] "About the Assembly", online: *ICAO: Uniting Aviation* <https://www.icao.int/Meetings/AMC/Assembly37/Pages/default.aspx>.
[334] Aoife O'Leary, *supra* note 330.
[335] *Ibid*.
[336] *Convention on International Civil Aviation*, 2018, Annex 16.
[337] *Ibid*.
[338] *Ibid*.
[339] note 322.

state, cannot disclose the information to third parties. This is subject to an agreement with another state. States in the absence of an agreement with another state cannot disclose the information to third parties and are also required to inform the airplane operators of the requests for data sharing[340]. Although a verification body has been set up to verify the accuracy and compliance of CORSIA by airlines, they have to respect the confidential nature of data[341]. The confidentiality clause bars other airlines, the general public from being aware of the information[342]. SARPs only recommends but does not make it mandatory for the countries under the scheme to publish the final offsetting requirements of its airline operators attributed to it and the quantity of emissions units canceled over the compliance period by each airline operator. This disables the important stakeholders from being aware of the implementation of the scheme by states and raises questions related to competition and fairness. The states are free to include in their national legislation the list of airplane operators who do not comply but neither the Assembly nor SARPs provides any requirement to do so.

2.7. CORSIA Initiatives

2.7.1. No Country Left Behind

To ensure efficiency, effectiveness, and uniform implementation of SARPs, ICAO also launched an initiative of No Country Left Behind (NCLB) which focused primarily on expanding ICAO's support for the uniform implementation of SARPs to ensure that all states have access to socio-economic benefits of an aviation system that is safe and reliable globally. The socio-economic benefits can be broadly categorized as all the benefits of aviation, such as increased tourism, improved search and rescue capabilities and capacities, and other benefits arising from expanded and efficient global connectivity[343]. As a part of a global alliance, the success of the NCLB is heavily dependent on the support and collaboration of partners and donors, as to which states are required to be firmly committed. To ensure success, aviation and non-aviation sectors are needed to invest to achieve NCLBs spirit. The effective implementation of global aviation standards is achieved by the encouragement of optimal utilization of resources through well-established

[340] *International Standards and Recommended Practices*, *supra* note 338.
[341] EUROPEAN COMMISSION: & Directorate-General for Climate Action, *supra* note 56.
[342] *Ibid*.
[343] ICAO, "Annual Report of the ICAO Council: 2015 All Strategic Objectives: No Country Left Behind", online: *No Country Left Behind* <https://www.icao.int/annual-report-2015/Pages/all-strategic-objectives-nclb-initiatives.aspx>.

developed frameworks both at National and International levels. To help achieve this, ICAO shoulders a unique responsibility and uses its role to advocate for aviation by fostering and advising governments on the benefits of aviation in the achievement of their national goals and aspirations; by cooperation with development banks in the facilitation of resources, and by strengthening support from international organizations on matters of mutual interest. To keep up with the liberalization process in the NCLB initiative, in the arena of air transport in particular, efforts have been made by ICAO to provide more targeted assistance keeping in mind the needs of states, in particular developing countries[344]

But there exists a rigid dichotomy if NCLB is effective or does only provide states with an additional burden[345]. This is because the primary component of NCLB is to provide technical assistance to states to advance their civil aviation, through efficient and effective implementation of ICAO's SARPs and policies on various aspects, for example, environmental protection, security and facilitation, economic development of air transport[346]. There is no annex pertaining to the economic aspect of air transport, which is a major concern as it ignores ICAOs critical Strategic Objective which is to help the economic development of the civil aviation sector of member states[347]. Additionally, NCLB also minimizes ICAOs, another initiative called as Industry High-Level Group (IHLG) which was established in September 2013. The IHLG considers matters of global significance to international civil aviation that can be effectively addressed together by industry and states rather than individually[348]. This policy is not good and fully effective since its focus is only on the part of the objectives set forth by ICAO and aids in achieving them in part and does not provide for a well-rounded initiative[349].

2.7.2. ACT-CORSIA Climate Change Mitigation: CORSIA, ICAO, Chapter VI

For the wider implementation of CORSIA and to bring together states and the aviation industry, ICAO launched a program called Act-CORSIA (Assistance, Capacity-building and Training for CORSIA) in Montreal during the ICAO Seminar on CORSIA in July 2018. Since CORSIA-related SARPS had to be implemented from 1st January 2019 and several states needed targeted

[344] *Ibid*.
[345] Ruwantissa ABEYRATNE, "No Country Left Behind and ICAO's Leadership Role in Air Transport" (2022) 47:3 Air & Space Law 315–330.
[346] *Ibid*.
[347] *Ibid*.
[348] *Ibid*.
[349] *Ibid*.

assistance for CORSIA monitoring, rereporting and verification (MRV), Act-CORSIA comprised of many elements which help in the better understanding and plethora of information on CORSIA including CORSIA Buddy Partnerships, Frequently Asked Questions, Brochures and Leaflets, Videos, the CORSIA Seminars and Workshops, Online Tutorials, and other Background Information. ICAO had also introduced a CORSIA Central Registry in the form of an information management system for provision of input and storage of CORSIA-relevant information reported by States[350].

2.7.3. Act-CORSIA Buddy Partnership

The council has emphasized a coordinated effort approach for CORSIA-related outreach and capacity-building activities to achieve global capacity-building initiatives. The council has also focused on the fact that any bilateral or multilateral partnerships should be coordinated through it so that such cooperation and efforts for global aviation are efficiently monitored[351]. For this, the council has encouraged buddy partnership which in turn would allow states to help each other in efficient implementation and comprehensive coverage of CORSIA, in particular to the development and approval of airplane operators' Emissions Monitoring Plans and the establishment of national and regional regulatory frameworks for CORSIA implementation. The Buddy Partnerships tend to form a vital part of the council's plan to help states prepare for implementation of CORSIA[352]. The first phase of the Buddy Partnership involved the donor states providing technical experts who worked together with receipts states. CORSIA Focal points to provide onsite training and to closely monitor the progress made by the recipient state on the preparation and implementation of CORSIA's MRV system, with a primary focus on the development and approval of Emissions Monitoring Plans, as well as on the establishment on the national/or regional regulatory frameworks[353]. It is a three-step approach. In the first step of the Partnership, the experts from both the donor State and the CROSIA Focal Point from the receipt state make the requisite preparation for training, which includes travel arrangements; in the

[350] ICAO Secretariat, "Climate Change Mitigation: CORSIA", online: *ICAO: Chapter six* <https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO%20Environmental%20Report%202019_Chapter%206.pdf>.
[351] "CORSIA Buddy Partnerships", online: *ICAO Environment* <https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Buddy-Partnerships.aspx>.
[352] ICAO Secretariat, "ACT-CORSIA: A Coordinated Approach for Assistance and Capacity-building on CORSIA", online: *ICAO: Chapter six: Climate Change Mitigation: CORSIA* <https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2019/ENVReport2019_pg211-215.pdf>.
[353] *Ibid*.

second step, the expert from the donor state travels to the recipient state to deliver on-site training, in the third step, the expert from the donor state provides follow-up remotely to the recipient State CORSIA Focal Point. To maintain consistency of assistance provided and relevant materials used in the first phase of the Buddy Partnership, the experts are trained by the ICAO Secretariat to the CORSIA. In the first phase, training is primarily focused on implementing the CORSIA MRV system of the recipient state, primarily on the development and approval of Emissions Monitoring Plans and establishing a national regulatory framework. The donor state expert is bound to use the training material, including model regulations for CORSIA implementation, which is developed by the ICAO Secretariat, in order to maintain consistency of assistance that is provided. To ensure this, ICAO also organized "Training of the Trainers" event in August 2018, in which the experts from the Donor States were trained to deliver on-site training to the recipient states. This ensures that every recipient state receives the same level of assistance, under the coordinated approach in ICAO's No Country Left Behind Initiative. The Global Aviation Training (GAT) Office, in accordance with the NCLB, has devised an action plan on the recommendations of the council which supports Member States in aviation training and human resource development using an analytical approach. This fosters the spirit of NCLB in its soul and meaning[354]. Buddy Partnership is an initiative under the CORSIA Outreach and Capacity building program which was introduced to widen the reach of CORSIA and to make it more effective and efficient. The partnerships are a crucial part of ICAO's plan to further strengthen and provide technical assistance to States and to prepare them for a smoother CORSIA implementation. It provides States with only technical assistance and does not provide them with any financial assistance to states. This initiative is well conceived as many states have agreed to participate in this initiative from the donor state to the receiving state. It further prepares the State for the implementation of CORSIA and thus pushes for a uniform implementation of the scheme as the technical experts are trained by ICAO[355].

2.7.4. Assistance, Capacity-Building and Training for Sustainability Aviation Fuel (ACT-SAF)

In June 2022, ICAO also launched Assistance, Capacity-Building and Training for Sustainability Aviation Fuel (ACT-SAF) to provide states with an opportunity to unlock their full potential in

[354] *Ibid*.
[355] note 353.

the development and deployment of SAF[356]. ACT-SAF is in furtherance of the 2050 ICAO Vision for SAF, No country left behind initiative, and the main three pillars of sustainable development recognized by the United Nations (economic, social and environmental sustainability)[357]. In the long run, the ACT-SAF Program with its tailored assistance approach will help states in the development and deployment of SAF. It will also foster partnerships among States and stakeholders which would help in promoting SAF[358].

Thus, ICAO for wider implementation of CORSIA and with an attempt to provide more targeted assistance, especially keeping in mind the needs of developing countries, had introduced the concept of Act-CORSIA (Assistance, Capacity-building, and Training for CORSIA). Still, it failed to guarantee the achievement of the objectives to ensure a level playing field for all countries[359]. This is because SARPs are adopted by a vote of two-thirds of the ICAO council members of thirty-six members at a meeting. They come into effect within three months of the ICAO council submitting the annex to the contracting states or at the end of the time prescribed by the Council unless disapproval is registered by a majority of the states[360]. Out of the 193 member states[361], SARPs are promulgated by 36 members, less than 18% of the members[362]. Other states are however given the right to participate in the deliberations[363] and relatively few actually do. However, in case of discrepancies between member states on major issues, ICAO does not provide them with sufficient opportunities to resolve their controversies through consultations and thereby fails to reflect on the principle of member states-driven decision-making and full consultation approach. There is also an absence of institutional arrangements for

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[356] ICAO, *supra* note 78.

[357] "ICAO Buddy Partnerships on Environment", online: *ICAO Environment* <https://www.icao.int/environmental-protection/pages/BuddyPartnerships.aspx>.

[358] Jane Hupe, *The ICAO Basket of Measures on CO2 Emissions Mitigation – Focus on CORSIA*.

[359] *Convention on International Civil Aviation (Chicago Convention);* Article 90.

[360] Pierre Friedlingstein1,2, Matthew W Jones3, Michael O'Sullivan1, Robbie M Andrew4, Dorothee C E Bakker5, Judith Hauck6, Corinne Le Quéré3, Glen P Peters4, Wouter Peters7,8, Julia Pongratz9,10, Stephen Sitch11, Josep G Canadell12, Philippe Ciais13, Rob B Jackson14, Simone R Alin15, Peter Anthoni16, Nicholas R Bates17, Meike Becker18,19, Nicolas Bellouin20, Laurent Bopp2, Thi Tuyet Trang Chau13, Frédéric Chevallier13, Louise P Chini21, Margot Cronin22, Kim I Currie23, Bertrand Decharme24, Laique M Djeutchouang25,26, Xinyu Dou27, Wiley Evans28, Richard A Feely15, Liang Feng29, Thomas Gasser30, Dennis Gilfillan31, Thanos Gkritzalis32, Giacomo Grassi33, Luke Gregor34, Nicolas Gruber34, Özgür Gürses6, Ian Harris35, & Derik Broekhoff, "Global Carbon Budget 2021" Earth System Science Data: Open Access 1917–2005.

[361] ICAO: Uniting Aviation, "Council States 2019-2022", online: <https://www.icao.int/about-icao/Council/Pages/council-states-2019-2022.aspx>.

[362] *Convention on International Civil Aviation (Chicago Convention);*, Article 90.

[363] Dr Paul Stephen Dempsey, *The Chicago Convention as the Constitution of an International Constitution of an International (Civil Aviation) Organization* (McGill University).

member states to conduct consultation and negotiation on significant issues prior to Council decision[364]. The insufficiency of discussions on issues related to the sovereignty and governance of various countries undermines the leadership sought by ICAO. It hampers the willingness of the parties to work together to address issues of international civil aviation emissions[365]. Although the issue of international aviation and climate change is a matter of the development rights of the countries, the CORSIA implementation pathway needs to consider differences among the countries in their domestic policies, capacity building, and economic structures. This is because CORSIA was developed by experts from developed countries and addressed the issues of macroeconomy administration rather than air navigation or international air transport. Although various countries had divergent views, ICAO still insisted on granting itself the power for certification of carbon credits and sustainable aviation fuel which does not fall into the domain of air navigation and international air transport[366].

[364] Presented by China and the Russian Federation, *PERSPECTIVES ON THE FAIR AND EQUITABLE CORSIA IMPLEMENTATION PATHWAY* (2019).
[365] *Ibid*
[366] *Ibid*

Chapter 3: Impact of CORSIA on the aviation industry: A comparison between India and the United States of America

3.1. Introduction

The main thrust of this chapter is to evaluate the effect of CORSIA on the United States of America which currently has one of the most developed aviation markets in the world and India which is the fastest-growing and is expected to take over as the largest aviation market in the world[367]. The researcher makes an attempt to do this by drawing a comparative analysis between the aviation markets of the two countries. To substantiate the same, the researcher in this chapter firstly argues that the implementation of CORSIA acts as a roadblock in the growth of the aviation industry of India at a time when airlines in India are trying to acquire a greater share in international traffic[368]. ICAO has decided to implement CORSIA in a phased manner to reconcile with the UNFCCCs principle of common but differentiated responsibilities (CBDR) but the scheme becomes compulsory for member states from 2027[369]. Irrespective of this phased implementation, the researcher contends that CORSIA fails to consider the differences in the stage of development of the aviation industry of India and the U.S. The major reason behind such difference can be traced back to the deregulation of airlines which was introduced through the U.S. Airline Deregulation Act of 1978 in the United States of America which contributed to the growth of the U.S. aviation industry[370] and impacted India's airline sector. At a time when the Indian government regulated the economic decisions of airlines in 1978, the U.S. government promulgated the U.S. Airline Deregulation Act which granted airlines the liberty to take decisions[371] related to the entry and exit of flights, frequency of service, and fares to be charged from passengers for routes. A highly competitive market to adapt to the route-based system made the airlines in America enhance their fleets for survival and profitability. Airline deregulation in the U.S. not only saw an influx of new entrants into the market but lower fares, new services, and

[367] IBEF, "Indian Aviation Industry: India's aviation sector has become the third largest domestic aviation market in the world", (December 2022), online: <https://www.ibef.org/industry/indian-aviation>.
[368] Gaurav Joshi, "IATA Expects 430 Million Additional Air Journeys In India By 2040", (16 November 2022), online: <https://simpleflying.com/430-million-additional-air-journeys-in-india-by-2040/>.
[369] note 280.
[370] Robert Peterson, *supra* note 57.
[371] "Overview of Airline Deregulation Act", online: *Virginia Department of Health: Protecting you and your environment* <https://www.vdh.virginia.gov/content/uploads/sites/23/2017/04/AirlineDeregulationAct.7.pdf>.

an increase in flight frequency that resulted in the growth of the number of passengers[372] which ultimately made the U.S. aviation industry more profitable and dynamic[373]. On the other hand, the Indian government decided to deregulate the aviation industry in 1994 which is 13 years after the U.S. decided to deregulate its aviation industry and that too after its national carrier (Air India which covered international routes) was hard hit by the U.S. opening its skies by giving its airlines more freedom and liberty. Air India was hard hit because while the U.S. aviation industry was growing tremendously, the Indian aviation industry remained stagnant due to the nature of the aviation regime[374]. The culmination of established monopolies as a result of deregulation made the Indian aviation sector a breeding ground of growth and development for all existing players and new entrants as the sector became more liberal and investment friendly[375]. Consequently, there was also a rise in international traffic handled by Indian carriers as traffic increased from 31.7% in 1990-91 had increased to 34.6% in 2009-10[376]. Although during the last 20 years, scheduled carriers made some gains in the total passenger traffic from/to India but post-2020 airlines in India have more potential to grow. Against this backdrop, the researcher in this chapter argues that the implementation of CORSIA is unfair to India's developing aviation industry, especially at a time when Indian airlines which currently have a small share in the international aviation market[377] are attempting to increase the same by investing in airplanes having a wide body. CORSIA also fails to consider airlines' coping capability as it mandates airline operators registered in ICAO member states to account for their GHG emissions by purchasing carbon offsets and thus applies a "one size fits all approach" which can be burdensome for the growing aviation industry of India. Although as discussed in the previous chapter, CORSIAs offsetting scheme fails to incentivize emission and does not meet all requirements laid down in the carbon credit criteria (as has been discussed in detail in the previous chapter) it fails to contribute effectively towards reducing emissions until the offsetting

[372] Andrew R. Goetz & Timothy M. Vowles, *supra* note 58.
[373] Robert Peterson, *supra* note 57.
[374] Arijit Mazumdar, *supra* note 60.
[375] *Ibid*.
[376] Roshli Aniyeri & Dr cRatnam Nadar, "Analogy Dissection in Variability of Aircraft- Passenger Movement in IndianAirports" (2015) 6:2 International Journal of Scientific & Engineering Research, online: <https://www.ijser.org/paper/Analogy-Dissection-in-Variability-of-Aircraft-Passenger-Movement.html>.
[377] Nirbhay Kumar, "Indian carriers lose market share to foreign airlines", *The Economic Times*, online: <https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/indian-carriers-lose-market-share-to-foreign-airlines/articleshow/2790675.cms?from=mdr>.

scheme is into existence[378], CORSIA will have adverse implications on India's growing airline sector. Although the airlines can reduce their offsetting obligations by opting for CORSIA-eligible fuel but its price is far more as compared to standard jet fuel[379]. From a broader perspective, not all states are able to comply with CORSIA-eligible fuel due to the lack of its availability and cost. Thus, CORSIA by way of this "one size fits all approach" fails to consider the maturity of the respective aviation industry of various states and subjects airline operators to significant financial implications and exponentially increased additional costs which have the tendency of putting them at a competitive disadvantages vis a vis American airline[380].
The Indian airline industry is already operating on a thin margin of profits[381] has also been subjected to stringent restrictions and was particularly hard hit due to the covid-19 crisis. Keeping in mind, the present shape of the Indian airline industry which has been constantly reporting losses post-covid, subjecting them to additional costs by way of this scheme adds to their expenditure as even reducing their offsetting obligations comes at a cost. CORSIA thus poses a huge challenge to India's growing aviation industry which has limited resources and options for national action thus causing economic pressure in the development of the Indian aviation industry[382]. The researcher thus compares the obligations that have already been placed on the airline operators which have the potential to affect the finances of American and Indian airline operators respectively in the form of fleet requirement, equity requirement and regulation pertaining to the allocation of fleets of carrier service providers. The researcher further buttresses the contention that there exist financial woes for the airline operators of developing states, in particular, that of India by comparing the impact of covid on American and Indian airlines and the role played by the governments of the two countries to minimize their financial distress. Furthermore, a comparison is also drawn between the preparedness of American and Indian airlines with regard to the use of CORSIA-eligible fuels by specifically drawing attention to the use of sustainable aviation fuel by them. The researcher further argues that CORSIA also

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[378] Directorate-General for Climate Action, *supra* note 27.
[379] *Department-Related Parliamentary Standing Committee on Transport, Tourism and Culture: Demands for Grants(2021-22) of Ministry of Civil Aviation.*, by Parliament of India: Rajya Sabha.
[380] *Ibid*.
[381] Heather Timmons, "For India's Airlines, Passengers Are Plentiful but Profits Are Scarce", *The New York Times*, online: <https://www.nytimes.com/2007/05/08/business/worldbusiness/08air.html>.
[382] Weijun Liao, Ying Fan, & Chunan Wang, "How does COVID-19 affect the implementation of CORSIA?" (2022) 99:102180 Journal of Air Transport Management, online: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9759428/>.

neglects the historical share of emissions in international aviation and CORSIAs CNG goal assumes greater responsibility for reducing emissions from aviation in the country having the fastest growing and emerging aviation market as compared to countries whose share of historical and current global emissions of greenhouse gases has been relatively small. The effects of climate change and global warming can be seen all over the world, be it in a developing state or a developed state. But the response system for every state is very different. Thus, the researcher brings to light the past emissions from international aviation by the U.S. and India. It is pertinent to mention that the contribution to such adverse effects of climate change and global warming from developed states used to form a chunk of these contributions[383] and the contribution from the developing states was negligible. Although India will participate in CORSIA from its mandatory phase, the chapter also discusses emission control mechanisms undertaken by India to highlight what it is doing to reduce emissions and work towards compliance with CORSIA.

3.2. CORSIA hampers the growth of Indian airlines

As discussed in the previous chapter, ICAO to weave in the principle of common but differentiated responsibility recognized under UNFCCC decided to implement CORSIA from 2020 in a phased manner but irrespective of the phased implementation CORSIA hampers the growth of the aviation industry of India[384]. The implementation of CORSIA acts as a roadblock in the growth of the aviation industry of India. This is because CORSIA fails to consider the difference in the stage of development of the airline industry of development of airline industry of India and the U.S[385]. The aviation industry of India and that of the U.S. are very different. The major reason behind such a difference in the stage of development can be traced back to the deregulation of airlines[386] which was introduced through the U.S. Airline Deregulation Act of 1978 in the U.S. which contributed to the growth of the aviation industry of the U.S.

[383] Hannah Ritchie, "Who has contributed most to global CO2 emissions?", (1 October 2019), online: <https://ourworldindata.org/contributed-most-global-co2>.
[384] Presented by India, *CORSIA – Implementation Challenges*.
[385] *Ibid*.
[386] Fred l Smith,jr & Braden Cox, "economic history, economic regulation, government policy: airline deregulation", online: <https://www.econlib.org/library/enc/airlinederegulation.html>.

3.2.1. Effect of Deregulation of the U.S. Aviation industry on American and Indian airlines

Private American airlines had got the liberty to take decisions regarding entry, exit, frequency of service, and fares[387] related to the operations of their respective airline carriers which was possible due to the promulgation of the U.S. Airline Deregulation Act, of 1978. This further resulted in the government ceasing to regulate the economic aspects of the airline industry[388]. Removal of unnecessary government regulations coupled with lower average airfares resulted in a drastic transformation of the U.S. airline industry as it not only increased productivity due to the generation of a greater number of flights but also provided stability to the airline industry which facilitated the country's economic growth[389]. American airlines in order to make a mark in the highly competitive market and to adapt to the route systems also enhanced their fleets for survival and profitability[390]. To sustain itself in the emerging competition, American airlines decided to improve its performance by increasing its standards of efficiency. According to Baily, the Airline Deregulation Act was one of the greatest microeconomic policy accomplishments of the U.S. that aided in the U.S. market aviation reaching its saturation level[391]. While airlines in India were hard hit by the domination of American airlines which could be witnessed by the declining share of Air India in international traffic.

Air India was hard hit due to deregulation because while American airlines had the leverage to decide on various factors associated with flying whereas scheduled air services in India were still under the regulation of the Indian government. The Government of India in 1953 decided to nationalize the aviation industry by implementing the Air Corporations Act of India by establishing two airlines Indian Airlines for domestic travel and Air India for international travel[392] with a view that these airlines monopolize the market and restream private commercial airlines(both domestic and foreign) from offering scheduled services[393]. India being a young country that just got independence had to put the national interest first but failed. After gaining independence the Indian government aimed at nationalizing every sector that it could since the

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[387] Andrew R. Goetz & Timothy M. Vowles, *supra* note 58.
[388] Fred L. Smith,Jr. & Braden Cox, *supra* note 388.
[389] Donald J Lloyd-Jones, "Deregulation and Its Potentional Effect on Airline Operations" (1975) 41:4 https://core.ac.uk/download/pdf/147638478.pdf.
[390] Robert Peterson, *supra* note 57.
[391] Dongho Kim, "The Effects of Airline Deregulation: A Comparative Analysis" (2016) East Asian Journal of Business Management, online: <http://koreascience.or.kr/article/JAKO201616759692479.pdf>.
[392] *Ibid*.
[393] *Ibid*.

lack of finances and the inexperience to manage a country that was facing political instability put the government under tremendous pressure. The government while nationalizing had expected air transport which is a public utility service to serve national interest but instead of showing signs of high growth, and high public savings, both these corporations (Air India and Indian Airlines) began to incur losses[394].

Lack of an adequate fleet, ageing aircraft of Indian Airlines and Air India and the government's reluctance to invest in fleet replenishment had resulted in the airlines experiencing a decline in their share in domestic and international traffic[395]. The reluctance of Indian government to replenish their fleet was because India's rate of growth in the developing world was one of the lowest due to the rise in public deficit and balance of payment crisis[396]. The situation was so grave that India was forced to borrow not only for meeting its revenue expenditure but also for financing the public sector which also included the aviation sector. This made the public sector which ideally played the role of boosting the economy a reason for the net drain of finances[397].

The "established monopoly" due to the Indian government's failure to devise an appropriate response to the US deregulation due to lack of finances could not be of any use to Air India to keep up with the cutthroat competition from foreign airlines. This was because while the Indian government still had the power to regulate the expenditure including expansion of the fleet and managing India's civil aviation sector, American airlines had the liberty to take major decisions for lowering their fares, generating a greater number of flights, and improving their performance to increase their share in international traffic and also expanding their fleet[398].

Consequently, Air India failed to cope with rising traffic to and from India at a time when foreign airlines had expanded their fleet. Rising traffic meant the expansion of the fleet but Air India in 1980 had 17 aircraft and this remained almost the same till 1991[399].The reason for Air India's failure to increase its fleet could also be attributed to the government's policy of restricting the same as it involved a high amount of expenditure which had a direct impact on

[394] "The Indian Economy Since Independence", online: <https://home.fau.edu/sghosh/web/images/india%20talk.pdf>.
[395] Arijit Mazumdar, *supra* note 60.
[396] *note 396.*
[397] *Ibid*.
[398] Dongho Kim, *supra* note 393.
[399] Arijit Mazumdar, *supra* note 60.

India's balance of payment situation[400]. This left the Indian aviation sector in a fragile and underdeveloped state which could also be seen from the 51st report of the Committee of Public Undertakings (1988-1989) according to which the share of India's carriers in India's international traffic fell from 51.09% in 1971 to 29.94% in 1990[401]. Foreign carriers commanded a 70% share of international air traffic in 1990 in comparison to the same carriers sharing international traffic equally with India in 1971 was also proof of the weakening of Air India[402]. To say the least, with the inexperience and the growing competition from rich counterparts like the U.S., the Indian government was not able to put up against the policies and the experiences of the US government which curtailed the growth of the aviation sector.

This decline in India's share in international traffic coupled with consequential benefits in the form of increased profits of foreign airlines, efficient airline operations and lower fares resulted in the Indian government thinking that moving away from strict regulatory regimes would result in the accrual of similar benefits for the Indian aviation sector[403]. At a time when U.S. airlines had started to flourish, the Indian government after 13 years decided to deregulate the aviation industry in 1994[404]. Deregulation of the Indian aviation industry was initiated by the reforms which were introduced in 1991 and were implemented by the promulgation of the Air Corporations (Transfer of Undertakings and Repeal) Act, 1994[405].

Deregulation de-reserved the aviation industry from the purview of the public sector, permitted private investment and participation[406]. Not only were barriers to the participation of private domestic commercial airlines eased due to deregulation but it also resulted in a boost to the country's economy due to promotion of foreign trade as well as foreign direct investment[407]. In the year 1994, airline deregulation saw the emergence of a new business model in the Indian aviation industry[408].The government not only opened skies for private domestic commercial

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[400] *Ibid*.
[401] *Ibid*.
[402] Ministry of Civil Aviation, *Air India - Fare Aspect: Committee on Public Undertakings* (1990).
[403] Baldev Raj Nayar, *The State and International Aviation in India: Performance and Policy on the Eve of Aviation Globalization* (Manohar Publishers & Distributors, 1994).
[404] *Ibid*.
[405] *The Air Corporations(Transfer of Undertakings and Repeal)Act, 1994*.
[406] Arijit Mazumdar, *supra* note 60.
[407] *Ibid*.
[408] Anubhav Singh, "A study of Current Scenario of Aviation Sector in India" (2016) 2:4 International Journal of Innovative Knowledge Concepts, online:

airlines to fly[409] within the country but also allowed them to also operate to other countries which consequently caused a shift in the way people traveled[410].

Culmination of established monopolies made the sector a breeding ground of growth and development for all existing players and new entrants as the sector became more liberal and investment friendly[411]. The liberty granted to airlines to take decisions regarding lowering the fares meant that the airline service which was earlier seen as a mode of transport exclusively for the elite could now tap the middle class and the common man[412]. Indian aviation industry saw the expansion of private airlines and attracted many players from abroad in the country. Consequently, the number of international passengers increased from 10.89 million in 1996-1997 to 19.87 million in 2006-2007[413]. Furthermore, the number of international passengers which were 20.96 million in 2007-2008 increased to 32.98 in 2016-2017[414].

There was an increase in international traffic handled by Indian carriers from 31.7% in 1990-91 to 34.6% in 2009-10, these 20 years has been a proof that scheduled carriers have made some gains in the total passenger traffic from/to India[415]. However, the 16-year gap in the deregulation of the Indian and the U.S. aviation industry is a major reason for the difference in the stage of development of the aviation sector of these two countries. This is majorly because when the Indian government decided to deregulate its aviation industry, the U.S. aviation industry was ahead already and was growing[416]. The U.S. aviation industry experienced growth because passenger traffic after deregulation increased by 55% within a gap of 10 years (1978 to 1988). The sector not only witnessed an increase in passenger traffic, but the customers yielded gains from a 17% fall in the costs of travel on major routes. Passengers yielded a gain of $6 billion

<https://www.researchgate.net/publication/302261935_A_study_of_Current_Scenario_of_Aviation_Sector_in_India/link/5759464e08aec91374a3485b/download>.

[409] Shivang Gupta, "Factors Affecting the Performance of Aviation Sector in India" 3:6 International Journal of Law Management & Humanities 395.

[410] Arijit Mazumdar, *supra* note 60.

[411] Aishani Singh & Shounak Sengupta, "Indian Aviation Sector: The Parallel Rise & Fall" (2019) 10:11 International Journal of Scientific & Engineering Research 153–160.

[412] *Ibid*.

[413] Arijit Mazumdar, *supra* note 60.

[414] *Ibid*.

[415] *Report of Working Group on Civil Aviation Sector*, by National Transport Development Policy Committee (Ministry of Civil Aviation, Government of India, 2012).

[416] Robert Peterson, *supra* note 57.

whereas stakeholders of carriers received profit gains of about $2.5 billion[417]. Additionally, the number of air traffic passengers traveling to or from the U.S. increased from 100 million to approximately 224 million between 2006 and 2018[418] U.S. air traffic passenger miles increased to 762 billion passengers from 2007 to 2019. Airlines in the U.S. according to the U.S. Bureau of Transportation Statistics carried 82.5% more passengers in 2021 (674 million) as compared to 2020 (369 million). To cater to the demand of an increasing number of passengers, U.S.-based American Airlines ordered from Boeing 30 new 737 Max 8 jets[419]. According to IATA, U.S. airlines received 231 narrow-body aircraft and 41 wide-body aircraft. North American Airlines was expecting to take delivery of 361 narrow-body and 52 wide-body aircraft[420]. An increase in air traffic passenger, as well as an increase in capacity, has played a quintessential role in the emergence of U.S. airline groups as world leaders and the U.S. aviation industry as the largest and most developed but post-2020 airlines in India as compared to the United States have much more potential to grow[421].

3.2.2. Growth of the Indian Aviation Industry post-2020

The fact that Indian airlines have much more potential to grow post-2020 can further be buttressed from the statement which was made by Union Minister of Civil Aviation and Steel, Mr Jyotiraditya Scindia that India in the next 7-10 years was expected to reach 400 million passengers from existing 200 million[422]. He had also said that the country was expected to increase its fleet size from 700 to 1200 and that India would experience spectacular growth due to 1200 planes and 40 crore passengers by 2027 and 220 airports by 2030. Additionally by 2037, the number of passengers are projected to reach 520 million and to satisfy this demand, the government has pledged to build 100 additional airports under the Ude Desh ka Aam Nagrik

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[417] Xiaowen Fu, Tae Hoon Oum, & Anming Zhang, "Air Transport Liberalization and Its Impacts on Airline Competition and Air Passenger Traffic" (2010) 49:4 Transportation Journal 24–41.
[418] "Top global airlines in 2021, by fleet size", online: *Statista* <https://www.statista.com/statistics/1013159/airlines-worldwide-fleet-size/>.
[419] "North America Aviation Market - Growth, Trends, COVID-19 Impact, and Forecasts (2022 - 2027)", online: <https://www.mordorintelligence.com/industry-reports/north-america-aviation-market>.
[420] *Ibid*.
[421] *Agenda Item 17: Environmental Protection – Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) Perspectives on the Fair and Equitable CORSIA Implementation Pathway: Presented by China and Russian Federation* at 17.
[422] ANI, "India's civil aviation sector likely to log 400 mn passengers in next 7-10 years: Scindia", *Economics Times*, online: <https://infra.economictimes.indiatimes.com/news/aviation/indias-civil-aviation-sector-likely-to-log-400-mn-passengers-in-next-7-10-years-scindia/95274988>.

(UDAN) scheme[423]. In an attempt to increase its international presence, Indian carrier AirIndia to augment its fleet by 25% has signed leases and letters of intent for 25 Airbus narrowbody aircraft, 21 new Airbus A320 Neos, four A321 Neos and five Boeing B777-200 widebody aircraft[424]. Air India's fleet will be augmented as wide-body aircraft that are expected to join the fleet between December and March next year will be deployed on routes from India to the United States. This will result in Air India providing for the first time Premium Economy for long-haul flights[425]. Consequently, Mumbai will also see flight additions to San Francisco and New York's international airports (Newark Liberty and John F Kennedy). There will also be three times a week service to San Francisco from Bangalore. For short-haul international destinations and domestic sectors, Air India intended to introduce in the first quarter of 2023, four A321 neo's in the first quarter of 2023 followed by 21 A320S neo's in the second half of 2023. These newly leased aircraft will be introduced to routes from India to destinations in South East Asia such as Singapore, Bangkok, Kuala Lumpur, Colombo, Dhaka, and Dubai. They will also aid AirIndia in increasing its capacity to carry passengers between metro cities on every flight. Additionally, with an intent to boost the Tata Group's own company's transformation journey, Air India in November 2022 leased from China Development Bank Aviation (CBD) fleet of six Airbus a320neo aircraft[426]. The aircraft will be delivered in the second half of 2023. With this move, AirIndia aims to increase the carrier's fleet and boost its domestic and international operations. Not only AirIndia but IndiGo had applied to DGCA to permit the airlines to wet lease wide-body Boeing planes from Turkish Airlines[427]. Although DGCA acceded to IndiGo's request but only permitted the airline to wet lease (A wet lease refers to a leasing arrangement whereby a person agrees to provide an entire aircraft coupled with at least

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[423] *Ibid*.

[424] Air India, "Air India leases 30 new aircraft to boost domestic and international operations over the next 15 months", online: <https://www.airindia.in/writereaddata/Portal/News/738_1_Air_India_leases_30_new_aircraft_to_boost_domestic_and_international_ope.._.pdf>.

[425] Anu Sharma, "Air India to lease six more wide-body aircraft to ramp up international capacity", online: <https://www.livemint.com/companies/news/air-india-to-lease-six-more-wide-body-aircraft-to-ramp-up-international-capacity-11670243151304.html>.

[426] Express News Service, "Amid rising demand, Air India leases six aircraft from CDB Aviation", online: <https://www.newindianexpress.com/business/2022/nov/10/amid-rising-demandair-india-leases-sixaircraft-from-cdb-aviation-2516803.html>.

[427] "DGCA allows IndiGo to wet lease wide-body planes for only upto 6 months", *Business Standard* (27 October 2022), online: <https://www.business-standard.com/article/companies/dgca-allows-indigo-to-wet-lease-wide-body-planes-for-only-up-to-6-months-122102700500_1.html>.

one crew member) the wide-body planes for six months[428].

Thus, the attempts undertaken by Air India and IndiGo to increase their fleet size lay emphasis on the fact that airlines are trying to acquire a greater share of international traffic, and establish their presence in the international market and different continents to boost the economy and strengthen the aviation sector. However, at a time when Indian airlines have finally begun to expand their international operations, CORSIA applies a "one size fit all approach" and fails to take into account the coping capabilities of the aviation sector of India. This one size fit all approach can be burdensome for smaller airlines which currently have a smaller share in international traffic as it fails to consider the maturity of the respective aviation industry of various states and subjects airline operators to significant financial implications and exponentially increased additional costs[429] which have the tendency of putting them at a competitive disadvantages vis a vis American airline.

3.3. CORSIA is unfair to the Aviation Industry of States having a smaller share in International Traffic

An additional cost is imposed as CORSIA provides airlines with an option to reduce their offsetting obligations by opting for CORSIA-eligible fuel, the price of which is far more as compared to standard jet fuel. Airlines in India have already been subject to regulations in the form of fleet requirements, equity requirements and regulations pertaining to fleet allocation that have raised unnecessary barriers to the entry of Indian carriers, limiting their presence in the market and subjecting them to financial implications[430].

The airlines were subjected to financial implications because the 1991 balance of payment crisis coupled with the desire to promote the economic development of the country had forced the government to backtrack from its nationalist policy and resort to deregulation of the aviation industry[431]. The government had undertaken this decision to also encourage private investment and participation and thus subjected the new entrants to financial implications to ensure entry of

[428] *Ibid*.
[429] Parliament of India: Rajya Sabha, *supra* note 381.
[430] PR Sanjai, "India to talk to 40 countries on bilateral air service pacts.", (7 October 2011), online: <http://www.livemint.com/2011/10/07000747/India-to-talk-to-40-countries.html>.
[431] Arijit Mazumdar, *supra* note 60.

only those private airlines who had the capital and capability to aid the government in achieving the desired purpose of deregulation[432].

3.3.1. Existing obligations affecting the finances of the Indian aviation industry

To enter into the Indian aviation market, a scheduled service operator applying for the provision of services using aircraft having a takeoff mass of 40,000 kg or more is required to either purchase or lease a minimum of five aircraft and should have a start-up equity of Rs 50 crore. The growth of the airline's fleet of up to five planes adds to this equity requirement by Rs 20 crore approximately. The start-up fleet minimum either purchased or leased remains at five aircraft even for the aircraft having a take-off mass of less than 40,000 kg. The minimum equity requirement starts at Rs 20 crore in this case and with every additional aircraft it grows by Rs 10 crore[433]. Although non-scheduled operators according to Civil Aviation Requirements laid down by the Office of the Director General of Civil Aviation are required to only possess a single aircraft but their equity has to be on the basis of a number of aircraft owned or leased by the operator[434]. However, airlines in the U.S. even while entering the aviation market are only required to possess just one aircraft and the authorities instead of considering their fleet requirements consider the potential airline's financial viability. The U.S. Federal Aviation Authority requires applicants for Air Carrier Certificate to disclose financial information pertaining to assets and liabilities, ongoing litigation, information on insurance policy and six-month operation plan[435]. Dispensation of such freedom at the stage of entry has played an imperative role in shaping the aviation industry but also making it profitable and the world's largest. Coupled with the fleet and equity requirements, the finances of Indian airlines are also affected due to the regulation pertaining to the allocation of fleets of carrier service providers to various parts of the country by the Government of India order[436]. According to the order, civil aviation routes are divided into three categories[437]. Category I includes routes which are popular

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[432] *Ibid*.
[433] *Civil Aviation Requirements*, 3, Series C, Part II- sections 3.2.1 and 3.2.3 at 3.
[434] *Civil Aviation Requirements*, *supra* note 435.
[435] *Federal Aviation Administration, DOT Subpart C—Certification, Operations Specifications, and Certain Other Requirements for Operations Conducted Under Part 121 or Part 135 of This Chapter* (Authenticated U.S. Government Information).
[436] *GOVERNMENT OF INDIA MINISTRY OF CIVIL AVIATION Rajya Sabha UNSTARRED QUESTION NO. : 3221 TO BE ANSWERED ON THE 24th March 2021 GREEN AVIATION POLICY* (Ministry of Civil Aviation).
[437] Nancy Shah, "Competition Issues in the Civil Aviation Sector", (http://www.cci.gov.in/images/media/ResearchReports/F1_NancyShah_20080411102237.pdf), online: *Competition Commission of India*.

and extensively serviced whereas category II and III include routes which are remote, small and unpopular. Although the government by this regulation intends to serve social needs by ensuring that airline services reach all Indian domestic destinations, it forces Indian carriers to allocate their resources to routes experiencing light passenger traffic thereby leading to losses due to their failure to recover the cost of operation. Considering that India is still in its development stage, this regulation is important to ensure the provision of benefits alike to all parts of the country but before entering the aviation market, it compels new entrants to make appropriate financial provisions for bearing this loss[438] and this regulation thus limits the entry of those aircraft who do not have the capability to absorb the same[439]. U.S. airlines on the other hand get subsidies from the U.S. government for flying to such routes which are unpopular and not profitable by the Essential Air Service (EAS) Programme. This program is being funded by the government by appropriating the budget to Federal Aviation Authority (FAA)[440].

3.4. Impact of covid on American and Indian airlines

It is pertinent to mention that most Indian Airlines operate with leased aircraft[441]. At a time when Indian airlines were expecting growth in traffic and aiming to lease wide-body aircraft for increasing their international presence, the advent of covid forced airlines to pay rent irrespective of no operations[442]. This dried up the airline's cash reserves. Although IndiGo with an aim of replacing its fleet and for growth had also planned to place an order of 300 aircraft before covid but the same had to be deferred due to it[443]. If IndiGo would have placed the order, the airline apart from paying rent for the leased aircraft would have also had to face identical issues with loan repayments which would have further made it difficult for the airline to sustain itself during covid. This was because the Indian Government was not in a position to provide any

[438] *Ibid*.
[439] *Ibid*.
[440] "Essential Air Service: Changes in Subsidy Levels, Air Carrier Costs, and Passenger Traffic", online: *United States General Accounting Office (GAO)* <http://ostpxweb.dot.gov/aviation/x-50%20role_files/GAO%20EAS.pdf>.
[441] Tom Boon, "Where Are The World's Aircraft Registered?", (13 October 2020), online: *Simple Flying* <https://simpleflying.com/where-are-the-worlds-aircraft-registered/>.
[442] Cyril Amarchand Mangaldas, "Covid-19: Flight Plan for Indian Aviation Industry", online: <https://www.lexology.com/library/detail.aspx?g=a8dc7603-f5cb-4be7-956f-c64b792c516a>.
[443] "After Air India, IndiGo & other airlines to order 1,200 planes: CAPA", *Times of India*, online: <https://timesofindia.indiatimes.com/business/india-business/after-air-india-indigo-other-airlines-to-order-1200-planes-capa/articleshow/97992052.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst>.

financial help to the aviation sector as it is still a developing state and has to address issues such as poverty. It was also not as economically viable for the Indian Government as compared to the U.S. Government to provide financial assistance to the aviation sector.

Despite, the hardships faced by the aviation sector worldwide, ICAO still decided to continue with the implementation of CORSIA which only worsened the plight of the airline carriers who were still trying to recover from the losses suffered. Irrespective of the huge impact of CORSIA on airlines in terms of finances, ICAO did not budge from its decision to implement CORSIA which added to the woes of Indian airlines as they did not get any time to recover from their losses or get back on track. CORSIA thus added an additional layer of financial implication, especially on the airlines of developing countries who were fighting multiple battles for their sustenance and survival.

Indian airlines such as IndiGo and SpiceJet were hard hit due to covid and incurred losses in 2019-2020[444]. While IndiGo which has the highest market share in India, posted losses of ₹2,884 crores and ₹1,194 crores, SpiceJet posted losses of ₹600 crores and ₹112 crores in Q1 and Q2, respectively[445]. Indian airline operators according to the Ministry of Civil Aviation had reported for the financial year 2020-21 losses of Rs 19,564 crore while airports reported losses of Rs 5,116 crore[446]. While the cash reserves of airlines were drying up, they were forced to pay a lot of charges ranging from parking charges to lease charges based on sale and also leaseback transactions (Leaseback transactions refer to a transaction wherein a person firstly purchases an asset at a cheaper rate and then sells it at a higher price[447]. After selling the person uses the asset without owning it by leasing the asset back to themselves for a long time[448])[449]. Airlines that had entered into leaseback transactions were forced to pay rent for the airplanes irrespective of the same not flying. While airlines were under financial stress due to drying cash reserves, the Directorate General of Civil Aviation (DGCA) issued a circular announcing fare caps on tickets

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[444] *note 442.*

[445] "COVID effect: delhi airport to shut operations at T2 terminal from Monday midnight", *The Economic Times* (17 May 2021), online: <https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/covid-effect-delhi-airport-to-shut-operations-at-t2-terminal-from-monday-midnight/articleshow/82700600.cms>.

[446] Office of The Secretary of Transportation, *Budget Estimates: Fiscal Year 2022* (U.S. Department of Transportation).

[447] *Ibid*.

[448] *Ibid*.

[449] Madhava Sai Amulothu, "Impact of COVID-19 on the Aviation industry in India" (2020) 2:1 LexForti Legal Journal 53.

(minimum and maximum price) between two places which added to their woes as it restrained them from charging exorbitant fares from the consumers to recover their losses. Another circular by the Ministry of Civil Aviation further escalated their problems as it laid down rules for refund to passengers as per which the airlines had to issue the refund tickets booked during the lockdown period within three months without charging any cancellation charges[450]. At a time when Indian airlines were in the midst of a financial breakdown, American airlines were granted specific and temporary regulatory reliefs in the form of regulatory waivers, approving operational adjustments from the U.S. Federal Aviation Administration (FAA) in March 2020. Although on the expiry of the reliefs, stakeholders did not petition further for continuation, FAA further identified additional ways for mitigating potential safety impacts. It granted regulatory relief and issued guidance by using its standard processes in most cases. By following its standard procedure, the FAA publicized airlines' petitions for regulatory exemptions and accepted public comments on them. It also phased out medical certification grace periods for the crew members who had already been granted extensions. Furthermore, in March 2020, aviation businesses and airports under covid relief laws were provided assistance for more than $100 billion. To ensure continuity in payment of wages, salaries and benefits to passenger airlines, cargo airlines, and certain aviation contractors financial assistance for up to $63 billion was provided[451]. For providing liquidity to passenger airlines, cargo airlines, repair stations as well as ticket agents up to $29 billion was provided for loans and loan guarantees[452]. FAA to support U.S. airports and tenants who were severely disrupted by the pandemic provided grants to the tune of $20 billion[453]. Additionally, $3 billion were offered towards the Aviation Manufacturing Jobs Protection program to ensure the continuity of wages and salaries to employees[454]. Aviation excise taxes on air transport of people, cargo and aviation fuel were also suspended throughout the calendar year 2020[455].

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[450] *Ibid*.
[451] "American Rescue Plan: President Biden's Plan to Provide Direct Relief To Americans, Contain COVID-19,And Rescue The Economy", online: <https://www.whitehouse.gov/american-rescue-plan/>.
[452] *CARES Act- Liquidity for Eligible Businesses, States, and Municipalities*, 4003.
[453] note 452.
[454] *Ibid*.
[455] United States Department of Transportation, "Airport & Airway Trust Fund (AATF)", online: *Federal Aviation Administration* <https://www.faa.gov/about/budget/aatf>.

The airline industry is already subjected to many restrictions and is operating on a thin margin of profits. Indian airlines during covid-19 did not receive support from the government in the manner which was provided by the FAA to American airlines for their sustenance. Additionally, they were also subjected to various fleet and equity requirements and had to bear the loss of flying to unpopular destinations or to destinations that have fewer passenger loads. Coupled with this CORSIA imposed on them additional costs in the form of CORSIA-eligible fuel which can be used by airlines to reduce their offsetting requirements but their ability to absorb the high cost of SAF is limited since the price of fuels with regard to profit is the single most considerable expense[456]. Also, as discussed in the previous chapter the price of sustainable aviation fuel (SAF) which is one of the eligible fuels under CORSIA is relatively high in comparison with traditional jet fuel. International Air Transport Association (IATA) had previously noted that the price of the SAF which is far more compared to standard jet fuel is the main reason why airlines in India have been slow in adopting this[457]. The cost of aviation fuel plays a dominant role in deciding the price of airplane ticket[458].

3.5. Preparedness of Indian airlines for using SAF

For Indian airlines, the concept of sustainable aviation fuel is at a nascent stage but a handful of flights such as IndiGo and SpiceJet have attempted for blending traditional jet fuel with SAF for lower carbon emissions[459]. By blending 75% aviation turbine fuel and 25% bio jet fuel made from the Jatropha plant, SpiceJet in 2018 had operated its first flight. In February 2022, IndiGo took delivery of an aircraft which ran on SAF from Airbus. In December 2021 an agreement was signed by the airline with the Dehradun-based Council of Scientific and Industrial research-Indian Institute of Petroleum for the manufacturing and global deployment of SAF[460]. With an intention to work together in areas related to sustainable aviation Tata group airlines, Air India,

[456] "Proposal for Sustainable fuel", online: *Department of Biotechnology Ministry of Science & Technology, Government of India* <https://dbtindia.gov.in/sites/default/filesCall%20for%20Proposal%20on%20sustainable%20aviation%20fuel.pdf>.
[457] Sumit Singh & Gaurav Joshi, *supra* note 88.
[458] Fox News, "9 surprising factors that influence the price of your airline ticket", (22 March 2018), online: <https://www.foxnews.com/travel/9-surprising-factors-that-influence-the-price-of-your-airline-ticket>.
[459] Anu Sharma, "Pratt & Whitney sees market for hybrid electric regional jets in India", (21 September 2022), online: <https://www.livemint.com/companies/news/pratt-whitney-sees-market-for-hybrid-electric-regional-jets-in-india/amp-11663765539389.html>.
[460] Anu Sharma, "India has the potential to become SAF market, says Airbus", (19 September 2022), online: <https://www.livemint.com/companies/news/india-has-the-potential-to-become-saf-market-says-airbus/amp-11663592055968.html>.

Air Asia, and Vistara in September 2022 signed a Memorandum of Understanding (MoU) with the Council of Scientific and Industrial Research to collaborate and work together for research, development, and deployment of SAF[461].

Thus, at a time when the concept of SAF for airlines in India is at the nascent stage and Indian airlines are voluntarily attempting to lower their carbon emissions, CORSIA will add to their existing financial obligations since they will have to keep aside a chunk from their revenue to use SAF and reduce their offsetting obligations.

But on the other hand, the U.S. aviation industry is already mature and has the financial capacity to adopt SAF without having to worry about sustenance. This can be buttressed from the fact that American airlines in the U.S. have pledged to work with the Biden administration in September 2021 for making available to aircraft operators 3 billion gallons of SAF. Airlines such as Delta Air and Southwest Airlines have also expressed their intentions to replace 10% jet fuel with SAF by 2030[462]. U.S. Congress in 2021 also introduced the Sustainable Skies Act to boost incentives for the use of SAF. The legislation intends to accelerate commercial scale production of SAF by establishing a tax credit of $1.50 - $2.00 per gallon for SAF. The credit will be provided to the blenders that supply SAF with demonstrated 50% or greater lifecycle GHG savings[463]. The legislation also includes a complementary proposal to grant 1 billion U.S.D over five years for the expansion of the number of SAF-producing facilities in the U.S. National Business Aviation Association in April 2022 along with 80 stakeholders in the aviation industry urged Congress to pass the Sustainable Skies Act[464]. For using green hydrogen-produced fuel, the largest U.S. aviation deal was signed by Delta Airlines in 2021 with Louisiana-based DG Fuels which uses waste carbon as a feedstock. Measuring the scope of the challenge ahead, Delta Airlines had also said that the existing supply of global SAF could operate a fleet of Delta's size

[461] "Tata group airlines Air India, Vistara, AirAsia ink MoU for sustainable aviation", *Hindustan Times* (22 September 2022), online: <https://www.hindustantimes.com/india-news/tata-group-airlines-air-india-vistara-airasia-ink-mou-for-sustainable-aviation-101663838205131.html.>.

[462] David Shepardson, "U.S. outlines roadmap to boost sustainable aviation fuel", *Reuters*, online: <https://www.reuters.com/business/energy/us-outlines-roadmap-boost-sustainable-aviation-fuel-use-2022-09-23/>.

[463] "Fact Sheet: EU and US policy approaches to advance SAF production", online: *IATA* <https://www.iata.org/contentassets/d13875e9ed784f75bac90f000760e998/fact-sheet---us-and-eu-saf-policies.pdf>.

[464] Jessica Reed, "Stakeholders Urge Congress to Pass Sustainable Skies Act", online: *Avionics International* <https://www.aviationtoday.com/2022/05/03/sustainable-skies-act/>.

for one-day[465]. United Airlines in 2015 had brought from Fulcrum BioEnergy a $30 million stake which allowed the airlines to purchase 90 million gallons of SAF per year for a period of ten years pursuant to the production picking up. In 2021, United committed to purchasing 1.5 billion gallons of SAF from Alder Fuels which plans to produce SAF having characteristics at par with today's jet fuel[466]. As a part of American airline's net zero directives, American Airlines in 2021 finalized a deal with biofuel company Gevo for purchasing over five years 500 million gallons of SAF[467]. In July 2022, the world's largest airline American Airlines at San Francisco International Airport also received its first-ever batch of CORSIA-certified SAF by Neste MY Sustainable Aviation Fuel™. To accelerate the growth of the use of SAF, Neste worked closely with stakeholders[468]. United Airlines also became the first airline in aviation history to fly an aircraft full of passengers using 100% sustainable fuels which shows the readiness of the U.S. to start using sustainable fuel[469]. On the other hand, the International Air Transport Association(IATA) is still calling for governments to provide large scale incentives in order to increase the production of sustainable aviation fuel. The present cost of sustainable aviation fuel is anywhere between two to four times that of conventional aviation fuel which makes it unaffordable for many budget airlines[470].

3.6. CORSIA carbon-neutral growth goal assumes greater responsibility on states with developing Aviation Industry

Since the Indian aviation sector has emerged as one of the fastest growing industries, with a forecast growth of 7 to 8% per annum[471], its share of international aviation emissions in comparison with the 2020 baseline will also be 70% in the future[472] which means that offsetting

[465] Trevor Laurence Jockims, "The airline race for a breakthrough fuel to cut one billion tons of carbon is just starting", *CNBC* (24 September 2022), online: <https://www.cnbc.com/2022/09/24/how-airlines-plan-to-end-one-billion-tons-of-carbon-emissions.html>.
[466] LINNEA AHLGREN, "Explained: The Different Types Of Sustainable Aviation Fuel", (18 November 2021), online: <https://simpleflying.com/sustainable-aviation-fuel-types/>.
[467] Trevor Laurence Jockims, *supra* note 466.
[468] note 61.
[469] CISION PR Newswire, "United to Become First in Aviation History to Fly Aircraft Full of Passengers Using 100% Sustainable Fuel", (1 December 2021), online: <https://www.prnewswire.com/news-releases/united-to-become-first-in-aviation-history-to-fly-aircraft-full-of-passengers-using-100-sustainable-fuel-301435009.html>.
[470] IATA, "Incentives Needed to Increase SAF Production", (21 June 2022), online: <https://www.iata.org/en/pressroom/2022-releases/2022-06-21-02/>.
[471] Presented by India, *supra* note 386.
[472] Office of The Secretary of Transportation, *supra* note 447.

requirements of Indian airlines will be more. This can be proved from the data of emissions emitted by Indian airlines in 2019 as domestic flights by Indian carriers emitted 11,843 thousand tons of carbon emissions while 7,057 thousand tons of emissions were emitted by international flights[473]. Keeping in mind the fleet expansion plans of airplane carriers, the carbon emissions from international flights are expected to grow exponentially[474]. Even former Civil Aviation Minister VK Singh in August 2021 said that there was an increase in carbon emissions by Indian airlines from 2012 to 2019 by 63.5 percent. Against this backdrop the researcher argues that the vast majority of Organization for Economic Co-operation and Development (OECD) countries already have mature international aviation industries and financial, technological and personnel resources to deal with aviation emissions that would experience only limited incremental emission growth in the future[475].

In contrast, non-OECD countries have huge demand and potential for the development of international aviation and the would witness rapid growth in emissions from international aviation in the next 20 years[476]. According to predictions by IATA, India by 2026 will find its place in the top five air transportation markets since the level of international operations by airlines in India is on a high growth path and the world's fastest-growing airports are situated in these emerging markets[477]. Additionally, the data presented by IEA and Airbus says that the aggregate of carbon emissions from international aviation from 1971 to 2016 by OECD countries was 68% of global emissions and 32% for non-OECD countries[478]. OECD countries will emit 30% of international aviation emissions in comparison with the 2020 baseline whereas non-OECD countries will contribute towards the remaining 70%[479]. Thus, in a scenario where air transport markets in developed countries such as the U.S. which is relatively mature with a forecast of growth around 4% per annum and developing countries such as India have forecast growth of 7-8% per annum, ICAO's CNG 2020 goal which it attempts to achieve through

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[473] PTI, "Airlines in India emitted 84,322 kilotonnes of CO2 between 2016-2020: Govt", *Energyworld: The Economic Times*, online: <https://energy.economictimes.indiatimes.com/news/oil-and-gas/airlines-in-india-emitted-84322-kilotonnes-of-co2-between-2016-2020-govt/90501168>.

[474] PTI, "Airlines in India emitted 84,322 kilotonnes of CO2 between 2016-2020: Govt", *Energyworld: The Economic Times*, online: <https://energy.economictimes.indiatimes.com/news/oil-and-gas/airlines-in-india-emitted-84322-kilotonnes-of-co2-between-2016-2020-govt/90501168>.

[475] Presented by India, *supra* note 281.

[476] *Ibid*.

[477] *Ibid*.

[478] *Ibid*.

[479] *Ibid*.

CORSIA is not fair to aviation markets in developing countries. It is unfair as CORSIA assumes greater responsibility for reducing emissions from aviation on the airline industry in developing country and emerging economy country like India as it neglects the historical emissions of countries in international aviation[480].

3.7. Emission Control Mechanisms by India

Although the international aviation industry is a key area for global emission reduction in future. A developing state has the potential to pollute more than its developed counterpart as forecast related to carbon emissions from international aviation shows that there is still a large room for countries having emerging aviation industry to contribute towards emissions significantly[481]. It is estimated that emissions from aviation in India will increase by 70% in future and neither India nor its aviation industry is shrugging away the responsibility it owes towards the environment. To keep a check on the emissions from international aviation, India has adopted more ways of reducing their emissions from international aviation[482]. Although India will participate in CORSIA from its mandatory phase, India is trying to mitigate and reduce the global emissions emerging from its fastest growing aviation industry by way of emission control mechanisms[483]. DGCA had set up a unit in 2009 to address environmental issues from Indian aviation and further provide solutions and guidance for fuel efficiency, reducing carbon and abating noise. By its circular issued in 2011, Airlines were mandated by DGCA to submit data relating to fuel consumption on a monthly basis to serve as the basis for setting up carbon emission inventory[484]. For making the Indian aviation industry sustainable, the Ministry of Civil Aviation (MoCA) in coordination with DGCA, the Ministry of Environment, Forest and Climate Change and industry stakeholders for developing had developed an action plan under the National Civil Aviation Policy of 2016. The Civil Aviation Ministry in 2016 policy also aimed for strengthening policy guidelines dealing with conserving energy, adopting sustainable practices, and limiting carbon emissions by coordinating with ICAO. Furthermore, the policy impressed upon MoCA to

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[480] *Ibid*.
[481] Weijun Liao, Ying Fan, & Chunan Wang, *supra* note 384.
[482] *Ibid*.
[483] Teri: The Energy and Resources Institute, "Decarbonization of Transport Sector in India: Present Status and Future Pathways", online: <https://www.teriin.org/sites/default/files/files/Decarbonization_of_Transport%20Sector_in_India.pdf>.
[484] Arushi & Stefan Drews, "Aviation and Environment", online: *Centre for Science and Environment* <https://cdn.cseindia.org/userfiles/aviation_paper.pdf>.

encourage rolling out Airport Collaborative Decision Making for reducing on-ground and aerial congestion and consult the Ministry of Defense for optimizing the Flexible Use of Airspace. Airports under the policy were mandated to comply with the latest emission norms for all equipment operating within its environment by April 1, 2017. Vehicles needed for ground handling were asked to use alternative fuels for providing significant Local Air Quality emission benefits in comparison with petrol and diesel equipment[485].

To keep emissions from domestic aviation in check, India published a white paper on National Green Aviation Policy, introduced a national cap and trade system in India and also passed Energy Conservation (Amendment) Bill, 2022. Having the aim to promote green and sustainable growth of air travel to various parts of the country, the National Green Aviation policy proposed to introduce a regulatory framework for remedying environmental issues created by the civil aviation industry. Another aim of it was to formulate policies dealing with various environmental aspects such as managing the environment, airport master planning, and green infrastructure programs. Responsibility was placed on the Directorate General of Civil Aviation (DGCA) to study, assess and evaluate the contribution of emissions to local air quality, oversee compliance with green aviation policy as per its regulatory framework and make bio-jet fuels more economical by coordinating with other government bodies. For speeding up the creation of development activities in aviation that give due regard to environmental concerns, it also established a timeline for consultation with central and state governments, the environment ministry, Central Pollution Control Board (CPCB) and State Pollution Control Board (SPCB), and DGCA[486]. India during the Conference of Parties summit in 2021 committed to reducing by 2030 one billion tonnes of projected carbon emissions and reducing its carbon intensity by 45% by 2030 over 2005 levels[487].

The Bureau of Energy Efficiency (BEE) presented a draft blueprint in October 2021 for the introduction of a national cap and trade system in India. India intends to introduce this in three phases. In the first phase, the aim is to increase demand for carbon credits from voluntary buyers, existing designated consumers, power distribution companies and airlines. BEE in the second phase aims to then increase its supply by developing, registering, and validating projects aiming

[485] *National Civil Aviation Policy 2016* (Ministry of Civil Aviation).
[486] note 438 at 13030.
[487] "India's Stand at COP-26", (3 February 2022), online: *Press Information Bureau, Ministry of Environment, Forest, and Climate Change* <https://pib.gov.in/PressReleasePage.aspx?PRID=1795071>.

to reduce emissions. The system will then be made mandatory in the third phase in which specific sectors and companies will only be designated to generate only a certain volume of emissions. In furtherance of the national cap and trade system in India, the Lok Sabha of the Indian Parliament in August 2022, passed the Energy Conservation (Amendment) Bill, 2022 which empowered the central government to have a domestic carbon credit trade in the country. Under the bill which greenlighted the creation of a carbon credit trading scheme, carbon credit certificates will be issued to entities registered under the carbon credit scheme by the central government or any authorized agency. Not only the entities but any other person can voluntarily purchase a carbon credit certificate.

Along the legislature, airports in India have been active towards mitigating the impacts of direct airport operations on the environment. Indira Gandhi International Airport for reducing emissions adopted several initiatives such as renewable energy, green airport infrastructure, electric vehicles, and waste and water treatment plants[488]. A semi-robotic vehicle called TaxiBot was also introduced for taxing planes to runways which aid the airport in saving 214000 litres of fuel annually. Cochin International Airport with a view to becoming self a sufficient installed solar plant to generate electricity for daily operations and became the first solar airport in the world[489]. Delhi, Mumbai, and Bangalore International Airports undertook initiatives for developing green buildings/ terminals. Even 44.87 MW capacity solar power plants were commissioned by the Airports Authority of India (AAI) at 51 airports. Solar power plants having a capacity of 15.76 MW were also installed by AAI at 06 airports. Airports Council International (ACI) recognized Delhi, Mumbai, Bangalore, and Hyderabad International airport as carbon-neutral airports and for assessing the use of clean renewable resources for reducing carbon emissions, AAI at four airports (Kolkata, Bhubaneswar, Varanasi & Trivandrum) implemented Airport Carbon Accreditation Programme[490]. The Airport Carbon Accreditation programme was launched by Airport Council International in 2009 to introduce a common framework for airports for managing and reducing carbon emissions[491]. Along with airports even, airlines such as Air India contributed towards a reduction in carbon emissions by implementing an Environment

[488] Saloni Chokhani, "How airports in India contribute to aviation's sustainability goals", online: *ICF* <https://www.icf.com/insights/transportation/airports-contribute-india-sustainability-goals#>.
[489] Arushi & Stefan Drews, *supra* note 484.
[490] *Ibid*.
[491] Saloni Chokhani, *supra* note 489.

Management System (EMS) through which the airline could maintain data as well as information related to fuel consumption, carbon emissions and energy demand. By developing this system Air India had bagged the National Environment Health and Safety Award in 2015. With this system, the airline could also develop a future action plan for reducing carbon emissions and complying with regulatory obligations[492]. To go green, reduce the consumption of fuel and aid the aviation industry towards net carbon zero, even Civil Aviation Minister Jyotiraditya Scindia called on airlines to adopt sustainable fuel[493]. To explore opportunities for developing and use of sustainable aviation fuel, airline companies such as SpiceJet and GMR group in 2021 partnered with Boeing and French companies. GMR and French companies such as Safran, Axens and Airbus had teamed up for examining the development of a demonstrator of sustainable aviation fuel based on agricultural products. SpiceJet to decarbonize its fleet had partnered with Boeing for leveraging supplies of sustainable aviation fuel from CSIR -Indian Institute of Petroleum and its production partner and licensees[494].

3.8. Conclusion

CORSIA serves as a hindrance to the growth of the aviation industry in developing country like India which has the fastest-growing aviation market as it places an additional responsibility on Indian airlines to account for their emissions and imposes additional costs at a time when the airlines are attempting to increase their share of international traffic[495]. ICAO has commenced implementation of CORSIA in a phased manner as per which ICAO member states will have to mandatorily participate in the scheme from 2027 but CORSIA applies a one size fit all approach. It fails to consider the difference amongst countries on the basis of their stage of development, historical share in emissions from international aviation as well as coping state. The Indian aviation industry was hard hit due to the deregulation in the U.S.A in 1978 and subsequent deregulation in the airline industry in Australia, Canada, Japan, the UK, and several other western European

[492] PTI, "Air India bags National Environmnet Health and Safety Award", online: <https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/air-india-bags-national-environment-health-and-safety-award/articleshow/50143941.cms?from=mdr>.
[493] Meghan Sapp, "India calling for more use of SAF", (29 March 2022), online: <https://www.biofuelsdigest.com/bdigest/2022/03/29/india-calling-for-more-use-of-saf/>.
[494] Aneesh Phadnis, "SpiceJet, GMR group announce sustainable aviation fuel initiatives", *Business Standard* (26 March 2022), online: <https://www.business-standard.com/article/companies/spicejet-gmr-group-announce-sustainable-aviation-fuel-initiatives-122032501153_1.html>.
[495] Presented by India, *supra* note 386.

countries[496]. When airlines in the U.S.A started flourishing, India was experiencing a decline in aviation traffic[497] since the Indian government post-independence in 1947 attempted to nationalize every sector but the lack of finances and political instability resulted in the government facing tremendous pressure. India while nationalizing even the aviation industry had expected the industry to show signs of high growth coupled with high profits but instead the aviation transport sector witnessed a drastic downfall[498]. Air India was hard hit due to deregulation because American airlines had the leverage to decide on various factors associated with flying whereas scheduled air services in India were still under the regulation of government[499]. It is the priority of any state government to look at the well-rounded development and growth of all sects of society and not favour capitalism.

Additionally, the regulation pertaining to the allocation of fleets of carrier service providers to various parts of the country makes it imperative for them to also appropriate financial provisions for bearing this loss[500]. The unprecedented advent of covid added to their woes which can be witnessed from the loss that was reported by Indian airline operators for the financial year 2020-21 was Rs 19,564 crore while airports reported losses of Rs 5,116 crore[501]. For close to two years, major airlines faced losses such as IndiGo and SpiceJet incurred losses in 2019-2020. While IndiGo which has the highest market share in India, posted losses of ₹2,884 crore and ₹1,194 crore, SpiceJet posted losses of ₹600 crore and ₹112 crore in Q1 and Q2, respectively. CORSIA also assumes greater responsibility for reducing emissions from aviation on the airline industry in developing country and emerging economy country like India due to the ICAOs 2020 carbon-neutral growth goal, whose share of historical and current global emissions of greenhouse gases has been relatively small due to a smaller share of international traffic[502]. It also violates legitimate development rights since post-2020 airlines in India have much more potential to grow with the forecast of growth of 7 to 8% per annum[503] which can be

[496] Arijit Mazumdar, *supra* note 60.
[497] *Ibid*.
[498] Arijit Mazumdar, *supra* note 60.
[499] *Research Study of the Civil Aviation Sector in India*, by Nathan Economic Consulting India Pvt Ltd, India (The Ministry of Corporate Affairs, Govt. of India, India, 2012).
[500] Nancy Shah, *supra* note 439.
[501] Office of The Secretary of Transportation, *supra* note 447.
[502] Presented by India, *supra* note 386.
[503] *Ibid*.

witnessed from orders of wide-body aircraft that are being placed by some Indian airlines such as Air India and IndiGo. Their share of international aviation emissions in comparison with the 2020 baseline will also be 70% in the future. Thus, at a time when the Indian aviation industry is attempting to participate in international aviation competition and is eyeing on key potential to grow and make a mark in the international market, a scheme like CORSIA can hamper the growth of these carriers. The airline industry is already subjected to many restrictions and is operating on a thin margin of profits putting an additional burden that can further slow down its growth.

Conclusions and Suggestions

This thesis has canvassed to examine the efficacy of CORSIA which ICAO implemented to achieve its carbon-neutral growth goal of stabilizing emissions from international aviation at 2020 level[504]. Based on the flaws and missed opportunities, the researcher in this thesis concludes that this scheme is not a good fix for achieving CNG 2020 goal and is critically insufficient. This is because CORSIA faces challenges that affect its key foundation which potentially hampers its effectiveness.

Firstly, because its sustained existence would depend on the goodwill of states as CORSIA derives its authority from SARPs which do not actually form a part of the Chicago Convention and are designated as annexes for the purpose of convenience. It thus lacks enforcement mechanism[505] since states according to Articles 12 and 37 of the Chicago Convention are under an affirmative obligation to formulate their laws, rules, and regulations in conformity with the SARPs but under article 38 of the Chicago Convention have the option to reject an annex either in whole or in part at any point in time[506]. The provision to opt out makes SARPs only a soft law. It can hardly be deemed to be binding as it grants states the option to depart from the same and reject them on the subjective self-determination that their compliance would be impracticable[507]. Not only is CORSIA short of enforcement mechanism but it also lacks ambition since it has no future beyond 2035. Although ICAO Council has planned for conducting a special review in 2032 for deciding the future until its feet are dragged ahead of 2035, this scheme will only be successful in covering 6 per cent of forecasted carbon emissions from international aviation[508].

Apart from having no future, ICAO has also failed to establish a long-term goal for the mitigation of emissions from international aviation irrespective of being made a responsible entity under Kyoto Protocol to regulate the greenhouse gases emitted by international civil aviation 23 years ago[509]. Importantly, this scheme also does not address non-carbon emissions from aviation[510].

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[504] Georgia Hawley, *supra* note 14.
[505] *Ibid*.
[506] Paul Stephen Dempsey, *supra* note 46.
[507] *Ibid*.
[508] Jocelyn Timperley, *supra* note 87.
[509] Chris Lyle, "COMMENTARY: The global governance of aviation's emissions – time to revisit the ICAO/UNFCCC relationship", (24 March 2021), online: <https://www.greenairnews.com/?p=785>.
[510] Jörgen Larsson et al, "International and national climate policies for aviation: a review" 19:6 Climate Policy 787–799.

Coupled with these flaws, the efficacy of the offsetting scheme on which CORSIA relies is also in doubt. ICAO for CORSIA has approved eight offsetting programmes that are eligible to supply CORSIA-eligible emission units for the pilot phase until 2023 which are: American Carbon Registry, Architecture for REDD+ Transactions, China GHG Voluntary Emission Reduction Program, Clean Development Mechanism, Global Carbon Council, Climate Action Reserve, Gold Standard and Verified Carbon Standard but they fail to contribute towards reducing emissions from aviation. This is because carbon credits generated by ICAO-approved offsetting programmes do not meet all requirements laid down in the carbon credit criteria as discussed above. Failure of these programmes affects the integrity of the offsetting scheme. Carbon offsets under CDM projects, CCERs which are generated by China GHG Voluntary Emission Reduction Program and VERs which are generated by Verified Carbon Standard fail to meet the additionality criteria. CDM lacks the ability for accurate determination of the additionality of emission reductions from the baseline[511]. Lack of accuracy is because additionality is calculated against a hypothetical baseline and CDM projects have no definite benchmark. Even CCERs and VERs lack additionality as they are largely based on the CDM methodologies which are likely responsible for this result in their initial stages[512].

Additionally, even forest offsets generated by REDD+ while quantification of GHG reductions face the challenge of establishing an appropriate baseline. This is due to the high volume of credits already issued under this offsetting programme[513]. With regards to the requirement for offset credits to be quantified, monitored, reported, and verified, the forest sector is one such sector that has high levels of uncertainty for quantifying emissions[514]. This problem is not only prevalent with forest offsets but even third-party verifiers under CDM have been subject to this criticism due to their lack of capacity and competence about the level of quality checks required to ensure offset quality. Competition between Designated Operational Entities (DOEs) has also raised concerns regarding these remaining competitive and profitable by lowering the quality of their audits.

[511] Chris Juhnke, *supra* note 23.
[512] ICF Consulting et al, *supra* note 25.
[513] Rob Bailis, Derik Broekhoff, & Carrie M. Lee, *supra* note 26.
[514] Jocelyn Timperley, *supra* note 87.

Offsetting projects such as the UN's REDD+ program and Kyoto Protocol's CDM have often been referred to as overpromising and undelivering since they have performed poorly leading to reductions which are "insufficient."[515]

According to a study by the European Commission, 85% of offsets projects implemented under the CDM failed to reduce emissions[516]. Furthermore, there is a risk associated with the use of offsets as they have the potential of leading to a belief that there is no need for behavioural change which can result in causing irreversibility in consumption and patterns of production. Emission reductions are produced by offsetting programmes and thus lack credibility as the same are not permanent, real, and verifiable[517].

Additionally, the CORSIA sustainability criteria dealing with CORSIA-eligible fuel is also woefully inadequate and ineffective. This is because, for producing CEF, the current criteria for biomass is more concerned about the carbon stock of lands and does not deal with any measures for the purpose of enhancing biodiversity. In addition to the critical insufficiency, the keenness expressed by countries and airlines to use SAF extracted from renewable resources such as plants or used cooking oil has resulted in the emergence of a new and insatiable market for soy, palm and vegetable oils that will have a further impact on biodiversity. Expansion of plantations of palm oil also results in the loss of tropical forests including swamp forests on peatlands which are rich in biodiversity. Thus, instead of being effective for climate mitigation, the expansion can resultantly be counterproductive.

The scheme adopts an approach of phased implementation which also hampers the growth of emerging aviation industries of states. A comparative analysis between the aviation markets of India and the U.S. suggests that CORSIA acts as a roadblock to the growth of the Indian airline industry.

It can be concluded that the implementation of CORSIA at a time when the Indian aviation sector is aiming to acquire a greater share of international traffic adds an additional responsibility and costs, to the already existing high expenditures and post covid trauma. In addition, the ICAOs CNG goal which it intends to achieve through CORSIA assumes greater responsibility for reducing emissions from aviation in the country having an emerging aviation

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[515] Umair Irfan, "Can you really negate your carbon emissions? Carbon offsets, explained.", *Vox* (27 February 2020), online: <https://www.vox.com/2020/2/27/20994118/carbon-offset-climate-change-net-zero-neutral-emissions>.

[516] *Ibid*.

[517] Georgia Hawley, *supra* note 14.

market. Airlines can reduce their offsetting requirements by opting for CORSIA-eligible fuel, which is priced exorbitantly high compared to standard jet fuel. A study conducted in 2019 estimated that alternative aviation fuels were two to eight times more expensive than conventional jet fuels[518]. The burden of using these fuels and offsetting will ultimately shift to the end consumer. In a developing state where the aviation industry as well as the entire economy is still in a transition phase, even a slight difference in the price of an airline ticket can make a huge impact on the demand for it, which can further have the potential to hamper the growth of the aviation industry.

Based on the shortcomings that this scheme currently has, ICAO, for effectively regulating emissions from international aviation should also address through CORSIA non-carbon emissions by putting in place another monitoring and reporting system and implementation of policies. To significantly increase environmental benefits, policies can be implemented for avoiding non-carbon emissions in climate-sensitive areas by establishing climate-restricted areas (spatial and temporal fly zone) and imposing charges on airplanes flying through these areas. Additionally, aircraft and route-specific nitrogen levies can be foisted to address nitrogen oxide emissions. The quantification methodologies pertaining to emission reduction and removal also require revision to ensure integrity of carbon offsetting scheme. Over-estimation of emission reductions can be avoided, shortcomings can be redressed by the adoption of new principles to quantify emission reduction. These principles should not only deal with establishing a robust baseline but further addressing carbon leakage, measuring project emissions, and choosing appropriate crediting period durations[519].

To incentivize airlines for using SAF, against the availability of carbon credits at lower prices and of CORSIA-eligible fuel at higher prices, ICAO should also consider introducing a minimum quota for SAF consistent with the proposed target for 2035-2050[520]. Considering the essentiality of SAF for decarbonizing the aviation sector, ICAO should also consider supporting its use by policies other than those that are being pursued under CORSIA currently[521]. ICAO for the facilitation and implementation of CORSIA can also establish a full consultation-based CORSIA implementation pathway to accord balanced consideration to the concerns and

[518] IATA, *supra* note 471.
[519] Dr. Lambert Schneider & Nora Wissner, *supra* note 65.
[520] *Ibid*.
[521] *Ibid*.

positions of parties. This would grant every country an opportunity for contributing to the best of its ability which would lead to promoting worldwide sustainable development of international aviation[522].

In sum, to meet the complex challenges associated with international aviation emissions, the need of the hour is the implementation of multi-faceted solutions which involve the contribution of various actors including ICAO, states, the aviation industry and society[523].

Additionally, at this point in time, developing countries are facing difficulties even in procuring SAF and keeping up with the additional cost which does not even require any fleet changes. In this scenario, it is difficult to imagine the acceptance of an electric battery-powered aircraft by states since this requires a complete change of fleet.

[522] Presented by China and the Russian Federation, *supra* note 368.
[523] Georgia Hawley, *supra* note 14.

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