国 际 民 用 航 空 组 织

工 作 文 件

A42-WP/28
EX/15
04/08/25

大会 — 第 42 届会议

执行委员会

议程项目 17：环境保护 — 国际航空碳抵消和减排计划（CORSIA）

国际民航组织关于环境保护的持续政策和做法的综合声明 — 国际航空碳抵消和减排计划（CORSIA）

（由国际民航组织理事会提交）

执行摘要

随附供通过的是一项关于对大会 A41-22 号决议-国际民航组织关于环境保护的持续政策和做法的综合声明 — 国际航空碳抵消和减排计划（CORSIA）做出修订的提案，这些修订是根据大会第 41 届会议以来在实施国际航空碳抵消和减排计划方面的发展而进行的。

经大会通过后，经修改的 A41-22 号大会决议连同经修改的 A41-20 号大会决议和经修改的 A41-21 号大会决议，将取代 A41-20 号决议、A41-21 号决议和 A41-22 号决议，并将构成国际民航组织关于环境保护的持续政策和做法的综合声明。

行动：请大会：

a) 承认自大会第41届会议以来取得的重大进展，包括各国和飞机运营人根据附件16第IV卷有力实施CORSIA及其二氧化碳排放监测、报告和核查（MRV）要求；

b) 欢迎理事会及时制定和更新CORSIA实施要素，包括CORSIA合格燃料、CORSIA合格排放单位和 CORSIA中央登记处；

c) 鼓励各国和其他相关利害攸关方迅速扩大CORSIA合格燃料的生产和认证，并敦促理事会根据航空环境保护委员会的技术意见，加快原料和途径可持续性认证和批准，以尽可能扩大规模，并增加所有地区国家实现国际航空部门包容性脱碳的机会；

d) 认识到授权书对于方便飞机运营人获取和向其提供CORSIA合格排放单位至关重要，并鼓励主办产生CORSIA合格排放单位活动的政府签发此类授权书；

e) 要求理事会根据航空环境保护委员会（CAEP）的技术意见，继续定期评估和监测CORSIA合格燃料和CORSIA合格排放单位的供应和需求，以使飞机运营人能够满足其CORSIA抵消要求，同时确保CORSIA合格燃料和CORSIA合格排放单位的质量和可持续性；

f) 欢迎国际民航组织的CORSIA援助、能力建设和培训（ACT-CORSIA）方案在成员国的贡献和参与下继续取得成功，并请各国继续参与和支持ACT-CORSIA方案；

g) 鼓励更多国家尽快自愿加入CORSIA计划；

h) 审议本文件附录B中所载有关理事会2025年CORSIA定期审查工作的信息；和

i) 通过附录C中所载经修改的大会决议：国际民航组织关于环境保护的持续政策和做法的综合声明 — 国际航空碳抵消和减排计划（CORSIA）。

战略目标:	本工作文件涉及战略目标 — 航空具有环境可持续性。
财务影响:	本文件提及的各项活动将在国际民航组织 2026-2028 年业务计划指导下，根据 2026-2028 年经常预算和/或预算外捐助的可用资源情况开展。
参考文件:	Doc 10184 号文件：《大会有效决议》（截至 2022 年 10 月 7 日）

1. 引言

1.1 国际民航组织大会第 41 届会议通过了关于国际航空碳抵消和减排计划（CORSIA）的 A41-22 号决议，其中包含国际民航组织理事会在 2022 年 CORSIA 定期审查工作中建议的对 CORSIA 设计特点的调整，即：对于 CORSIA 基线，在试行阶段（2021-2023 年）使用 2019 年的排放量；试行阶段结束后（2024-2035 年），使用 2019 年排放量的 85%。在计算 CORSIA 抵消要求时，将部门和运营人个别增长因子所用百分比改为部门 100%、个别 0%（2030 年至 2032 年期间）；部门 85%、个别 15%（2033 年至 2035 年期间）。对于新加入者阈值，将基准排放量从 2020 年的改为 2019 年的。

1.2 A41-22 号决议要求理事会在气候与环境委员会、技术咨询机构（TAB）和航空环境保护委员会（CAEP）支持下，如 2016 年该计划建立以来一样，继续监督和更新 CORSIA 实施框架（参见 A41-22 号决议第 19 段）。自国际民航组织大会第 41 届会议以来，为维护 CORSIA 实施框架而开展的工作（参见第 2 段），以及 CORSIA 实施所取得的进展（参见第 3 段）和 2025 年 CORSIA 定期审查的结果（参见第 5 段和附录 B）均表明，CORSIA 实施工作走上正轨，并继续如 2016 年通过 CORSIA 时的预期那样向前推进。

2. 维护CORSIA实施框架

2.1 CORSIA实施框架由三部分组成：附件16—《环境保护》第IV卷 — 国际航空碳抵消和减排计划（CORSIA）中的标准和建议措施（SARP）；Doc9501号文件 —《环境技术手册》（ETM）第IV卷中的指南；以及五个CORSIA实施要素：自愿参加CORSIA；国际民航组织CORSIA二氧化碳估算和报告工具CERT）；CORSIA合格燃料； CORSIA合格排放单位以及CORSIA中央注册处（CCR）。

附件 16 第 IV 卷

2.2 2023年3月，理事会通过了对附件16第IV卷的第1次修订，其中反映了A41-22号决议对CORSIA设计要素的调整以及2022年2月CAEP/12会议的技术建议。附件16第IV卷第1次修订于2024年1月1日作为附件16第IV卷第二版开始适用，此亦为CORSIA第一阶段（2024-2026年）开始之际。

2.3 2025年2月举行的CAEP/13会议建议对附件16第IV卷做小的修订，以澄清与二氧化碳排放监测、报告和核查（MRV）相关的事项，这些修订目前正在理事会审议，将于2027年1月1日开始适用。

Doc 9501 号文件第 IV 卷

2.4 2023年10月，国际民航组织发布Doc 9501号文件第IV卷第三版：CORSIA实施技术指南，航空环保委对此做了更新，以支持相关利害攸关方实施附件16第IV卷第二版的标准和建议措施。

2.5 2025年2月召开的CAEP/13会议建议修订Doc 9501号文件第IV卷，以编入对CORSIA合格燃料相关事项的进一步指导；Doc 9501号文件第IV卷第4四版计划于2025年最后一个季度出版。

CORSIA 实施要素

2.6 CORSIA计划的5个实施要素反映在国际民航组织附件16第IV卷直接提引的14个国际民航组织文件中，这些文件载有CORSIA实施的关键材料，并经理事会批准在国际民航组织网站公布。自国际民航组织大会第41届会议以来，理事会依照本文件附录A中的时间表，持续审查和批准对这14个国际民航组织文件的更新。

3. CORSIA实施进展

自愿参加 CORSIA

3.1 国际民航组织大会强烈鼓励所有国家自愿参加试行阶段和第一阶段，因为国家更多的参与将有助于提高该计划的环境完整性（A41-22号决议，第9c)段）。国际民航组织文件《CORSIA适用第3章国家对的国家》每年更新，以反映从2021年起给定年度受CORSIA抵消要求约束的国家对名单。[1] 自大会以来，自愿国家的数量不断增加，达到126个国家（2024年）、129个国家（2025年）和130个国家（2026年）。

二氧化碳排放的监测、报告和核查（MRV）

3.2 CORSIA计划的有力实施取决于所有从事国际飞行的飞机运营人对每年的二氧化碳排放量进行统一监测、报告和核查（MRV）。根据附件16第IV卷的规定，很多运营人有资格通过使用国际民航组织CORSIA二氧化碳估算和报告工具，[2] 采用简易化程序监测和报告二氧化碳排放量，该工具的年度更新由航空环保委制定、理事会批准。

3.3 各国必须根据运营人报告的数据，通过CORSIA中央登记处（CCR）向国际民航组织提交年度二氧化碳排放数据，并随附有关下列项目的信息：运营人名单；经认可的核查机构；CORSIA合格燃料的减排量；以及CORSIA合格排放单位的注销量。这些信息是在国际民航组织网站发布的与CCR有关的国际民航组织文件的基础。[3] 2024年3月，国际民航组织根据附件16第IV卷第二版的最新报告要求，发布了更新版CCR。

3.4 自国际民航组织大会第41届会议以来，各国通过CCR提交了CORSIA试行阶段三年（2021年、2022年和2023年）的二氧化碳排放数据，具体如下：

---

1 CORSIA自愿国家网页: https://www.icao.int/environmental-protection/CORSIA/Pages/state-pairs.aspx
2 CORSIA二氧化碳估算和报告工具网页: https://www.icao.int/environmental-protection/CORSIA/Pages/CERT.aspx
3 CORSIA中央登记处网页: https://www.icao.int/environmental-protection/CORSIA/Pages/CCR.aspx

— 2022年，107个国家提交了2021年的二氧化碳排放数据，国际民航组织对另23个国家采用了填补数据缺口的方法；2021年二氧化碳排放总量为2.9亿吨，CCR所报数据的排放覆盖率为96.5%；

— 2023年，115个国家提交了2022年的二氧化碳排放数据，国际民航组织对另21个国家采用了填补数据缺口的方法；2022年二氧化碳排放总量为4.29亿吨，CCR所报数据的排放覆盖率为97.7%；和

— 2024年，121个国家提交了2023年的二氧化碳排放数据，国际民航组织对另15个国家采用了填补数据缺口的方法；2023年二氧化碳排放总量为5.30亿吨，CCR所报数据的排放覆盖率为99.0。

CORSIA 年度部门增长因子和抵消要求的计算

3.5 国际民航组织根据各国报告的信息，并采用数据缺口填补程序进行补充后，公布了国际民航组织文件年度版《CORSIA年度部门增长因子》(SGF)，其中包含2021年、2022年和2023年的SGF值。鉴于SGF2021、SGF2022和SGF2023的值为零，CORSIA试行阶段无累积抵消要求。

3.6 报告的年度二氧化碳排放量趋势表明，从2024年起，SGF可能出现正值，进而对飞机运营人产生抵消要求。这一可能性更加突显了持续、有力地实施CORSIA监测、报告和核查制度的重要性，因为国际民航组织对年度SGF值的计算，靠的是按照附件16第IV卷的要求坚持报告年度二氧化碳排放数据。

CORSIA 合格排放单位（CEUs）

3.7 国际民航组织文件《CORSIA合格排放单位》[4] 确定飞机运营人为满足CORSIA抵消要求而使用的排放单位的合格性，并由理事会根据技术咨询机构（TAB）的技术建议定期予以更新。TAB对申请人排放单位方案合格性的年度评估，则是以CORSIA排放单位合格性评价标准为根据进行的。

3.8 最近完成2024年技术咨询机构评估后，11个排放单位方案符合在CORSIA试行阶段提供CORSIA排放单位的资格；鉴于试行阶段未产生抵消要求，运营人无需通过CORSIA购买和注销CORSIA排放单位。

3.9 目前，有六个排放单位方案符合为CORSIA第一阶段提供排放单位的资格。技术咨询机构定期向理事会更新潜在的CEU供应信息，同时指出CEU的市场供应须先获得东道国认证（又称《联合国气候变化框架公约》巴黎协定第六条下的东道国授权），这是避免对CORSIA使用的单位进行重复申报的关键措施。

3.10 在这方面，理事会要求秘书处加强外联活动，以提高对这一问题的认识。此后，国际民航组织发布国家级信件，鼓励产生CORSIA排放单位活动的东道国政府签发授权书，这或有助于飞机运营人获取和使用CORSIA排放单位（见A42-WP/26号文件）。

[4] CORSIA排放单位网页: https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Emissions-Units.aspx

CORSIA 合格燃料（CEFs）

3.11 在实施CORSIA的背景下，飞机运营人可以通过申报CORSIA合格燃料减排量减少它在给定年度的CORSIA抵消要求。自国际民航组织大会第41届会议以来，有关CORSIA合格燃料的五个国际民航组织文件皆定期做了更新，[5]并取得以下主要进展:

— 2022年11月，理事会批准2024年1月1日或之后生产的低碳航空燃料（LCAF）可持续性评价标准，之前还批准了可持续航空燃料（SAF）的可持续性评价标准；

— 2023年6月，理事会决定，之前在CORSIA试行阶段批准进行SAF认证的两个可持续性认证计划（SCS），也获准用于2024年1月1日或之后的认证；而第三个可持续性认证计划2024年10月仍在审批中; 和

— 理事会已批准定期更新国际民航组织文件《CORSIA合格燃料的默认生命周期排放值》和《CORSIA实际生命周期排放值计算方法》，其中包含计算CORSIA合格燃料减排量的相关信息。

3.12 2024年6月，理事会批准国际民航组织可持续航空燃料、低碳航空燃料和其他更清洁航空能源全球框架和长期理想目标实施路线图。全球框架要求加快制定和批准新的可持续性认证计划，以便加速分析和批准新燃料来源和路径的生命周期排放值（见A42-WP/25号文件）。

3.13 2025年2月举行的CAEP/13会议批准了补充指南，以支持核查机构核查来自CORSIA合格燃料的减排量申报。该指南将被纳入Doc 9501号文件第IV卷第四版，并于2025年3月在国际民航组织网站公布，[6] 以支持CORSIA的核查活动。

4. CORSIA能力建设和援助

4.1 国际民航组织CORSIA援助、能力建设和培训（ACT-CORSIA）方案[7]，是作为“不让任何国家掉队”倡议的一部分于2018年7月推出的，其目的是在国际民航组织的框架下，以“协调一致的做法”，帮助所有国家实施CORSIA计划；上届大会强调了这一方案的重要性（参见A41-22号决议第21段）。

4.2 结对子伙伴关系目前有136个国家参与（16个支助国和120个申请国），此为ACT-CORSIA方案的基石。伙伴关系下提供的培训促进了CORSIA高水平的实施，从CORSIA自愿国数量稳步增长和各国通过中央登记处提供二氧化碳排放数据的高覆盖率都可以看到这一点。为确保采取所需的协调一致的做法，国际民航组织秘书处每年都组织教员培训（ToT）课程。

4.3 国际民航组织在全球航空培训（GAT）方案下，于2019年启动CORSIA核查课程，以培训核查机构；该课程于2023年9月更新，以使其内容与附件16第IV卷第二版保持一致。2025年，在GAT方案下

---

5 CORSIA合格燃料网页: https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx

6 https://www.icao.int/environmental-protection/CORSIA/Documents/Guidance%20on%20verification%20of%20CEF%20claims.pdf

7 参见CORSIA主网页: www.icao.int/corsia 详细了解ACT-CORSIA各项活动

又开发了三个CORSIA课程，其中两个是为了满足对CORSIA合格燃料和CORSIA排放单位日益增长的培训需求，另一个则是CORSIA的入门课程。这些新课程将于2025年第四季度推出。

4.4 国际民航组织秘书处继续制作和更新CORSIA推介材料，具体有：CORSIA常见问题解答（FAQ），每年更新；CORSIA新闻简讯，每月出版；以及CORSIA导引 — 计划的设计和实施指南，定期更新，此为一套预先录制的介绍稿，可在国际民航组织网站查阅。

5. 2025年CORSIA定期审查

5.1 2023年3月，理事会启动2025年CORSIA定期审查工作，要求航空环保委在2022年CORSIA审查过程的基础上开展这项任务，重点评估CORSIA抵消要求的供应、需求、价格和成本影响。

5.2 自2024年3月以来，航空环保委定期向理事会提供最新的技术分析。理事会根据需要对航空环保委今后应着重关注的技术分析领域提供补充指导。航空环保委提供给理事会的意见（经理事会审议后）在国际民航组织网站公布[8]。

5.3 2025年CORSIA定期审查工作与新冠疫情笼罩下的2022年CORSIA定期审查相比，是在CORSIA稳定实施的背景之下展开的。由于CORSIA实施取得进展，2025年CORSIA定期审查可以用对已完成的CORSIA试行阶段实施情况的评估，补充对第一阶段及其后阶段的预测分析。

5.4 理事会在2025年6月审议了航空环保委最新一轮技术意见后，同意其将向国际民航组织大会第42届会议提交的2025年CORSIA定期审查报告，详见本文件附录B。

6. 对现有综合声明的修订

6.1 根据大会第41届会议以来取得的进展，本文件附录C中提出对大会关于CORSIA的A41-22号决议的修改意见，包括：

a) 修改序言段落，以反映对构成CORSIA实施框架的各相关文件的更新，以及2022年CORSIA定期审查的结果和对《联合国气候变化框架公约》（UNFCCC）有关术语的调整；

b) 修改执行部分第11和12段，以呼应2022年CORSIA定期审查后第41届大会做出的决定；和

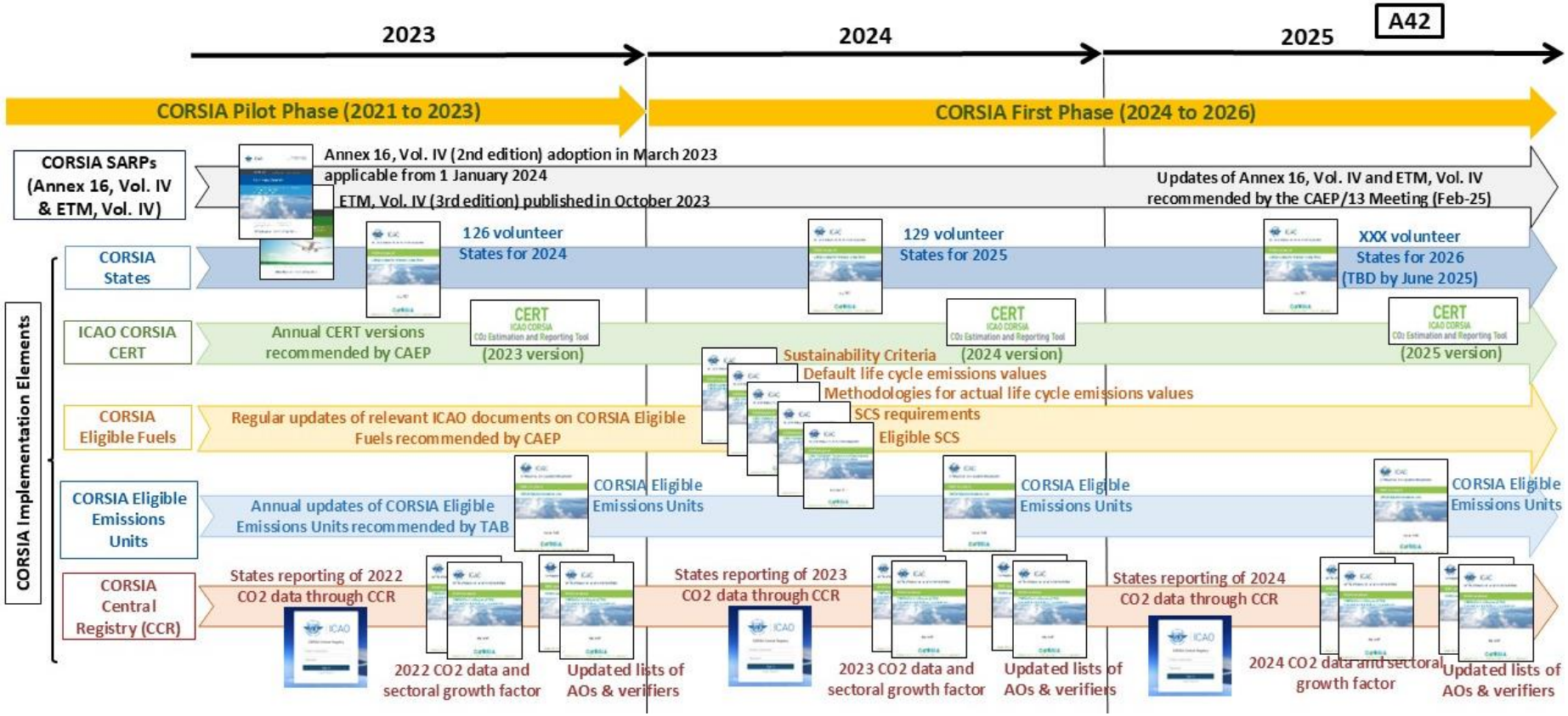
c) 修改执行部分第20段，调整有关《联合国气候变化框架公约》的术语。

— — — — — — — —

[8] 参见CORSIA主网页：(www.icao.int/CORSIA)，CORSIA定期审查部分。

APPENDIX A

OVERVIEW OF THE MAINTENANCE OF THE CORSIA IMPLEMENTATION FRAMEWORK (2023 – 2025)



— — — — — — — —

APPENDIX B

COUNCIL REPORT TO THE 42ND SESSION OF THE ICAO ASSEMBLY ON THE 2025 CORSIA PERIODIC REVIEW

ICAO | CAEP

Technical Assessments
in Support of the
2025 CORSIA Periodic Review

May 2025

Page intentionally left blank

EXECUTIVE SUMMARY

Background

The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is the first global market-based scheme that applies to a sector. It complements other aviation in-sector emissions reductions efforts such as technological innovations, operational improvements and sustainable aviation fuels to meet the ICAO aspirational goal of carbon neutral growth.

Every 3 years, in accordance with the ICAO Assembly Resolution on CORSIA, the Council conducts a Periodic Review of CORSIA. The Committee on Aviation Environmental Protection (CAEP) WG4 CORSIA Tools and Analysis Group (CTAG) conducts technical assessments in support of the CORSIA Periodic Review as requested by the Council.

At its 228th session in March 2023, the Council requested CAEP to undertake work in order to support the Council on the 2025 CORSIA periodic review building upon the 2022 CORSIA review process, with a focus on the assessment of supply, demand, price and cost impact of the CORSIA offsetting requirements; and perform technical analyses to facilitate the development of a methodology for the periodic review. Following the consideration of interim technical assessments, the Council also made specific requests to CAEP from its 231st through 234th Sessions.

This document presents a comprehensive summary of the assessments in support of the 2025 CORSIA Periodic Review by CAEP provided to the 235th Session of the Council.

The 2025 CORSIA Periodic Review comprises two key components:

- *backward-looking assessment:* The 2025 CORSIA Periodic Review provided a unique opportunity to look back in time and assess how CORSIA worked during the Pilot Phase (2021-2023) in context of forward-looking projections anticipated during the 2022 CORSIA Periodic Review, and
- *updated forward-looking assessments:* Estimates of offsetting requirements (i.e., demand), supply and price of CORSIA Eligible Emissions Units (CEEU) and emissions reductions from CORSIA Eligible Fuels (CEF) were updated using the latest traffic forecasts and other relevant assumptions on the expected implementation of CORSIA.

Review of CORSIA's Pilot Phase (2021-2023)

Leveraging data reported to ICAO through the CORSIA Monitoring, Reporting and Verification (MRV), the CAEP collected data and tracked actual/historical CO_2 emissions from international aviation from 2019 to 2023. The actual historical CO_2 emissions were placed in context of projections of CO_2 emissions that were presented to the Council as part of the 2022 CORSIA Periodic Review prior to the 41st Assembly. It was observed that actual CO_2 emissions followed a low forecast scenario in 2021, but the international aviation sector exhibited a stronger recovery in CO_2 emissions in 2022 and 2023.

Given the effects of the COVID-19 global pandemic on international aviation and despite the recovery since 2020, CO_2 emissions from international aviation subject to offsetting requirements remained below the 2019 CORSIA sector baseline in 2021, 2022 and 2023. As a result, the Sector Growth Factors (SGFs) were 0% for all three years of the CORSIA Pilot Phase meaning that there was no offsetting required during the Pilot Phase of CORSIA.

Despite the absence of offsetting requirements, markets started to develop and prepare to meet the expected future demand for emissions reductions from CEF and CEEU.

Updated forward looking CORSIA analyses

The CAEP has updated its forward-looking assessments of CO_2 emissions based on the latest (CAEP/13) ICAO/CAEP Traffic Forecasts. CO_2 emissions from international aviation are expected to return to 2019 level by 2026, 2027 and 2029 respectively under the high, mid and low CAEP/13 traffic scenarios.

Given updated CO_2 emissions projections and the 85% of 2019 CORSIA baseline starting in 2024, offsetting requirements are expected to start in 2024 under all CAEP/13 traffic scenarios.

Cumulative offsetting requirements could range from ≈950 to ≈1500 $MtCO_2$ from 2024 to 2035 and ≈105 to ≈150 $MtCO_2$ during the First Phase (2024-2026). The range of offsetting requirements from 2021 to 2035 is within the range of estimates of offsetting requirements from the 2022 CORSIA Periodic Review analyses presented to the Council in June 2022 where, under an 85% of 2019 baseline for 2024-2035, offsetting requirements were estimated to range from 600 to 2100 $MtCO_2$.

To understand and assess how future offsetting requirements (focusing on the First Phase of CORSIA from 2024 to 2026) may be addressed, the CAEP developed updated scenarios for emissions reductions from CEFs. The CAEP considered the latest short term CEF production data through 2030. In 2024, the global production of Sustainable Aviation Fuel (SAF) reached 1 million tonnes, representing ≈0.6% of international aviation jet fuel consumption and ≈0.3% of global aviation fuel consumption. For the First Phase of CORSIA (2024-2026), global SAF production may reach levels up to the "moderate" scenario. Estimates of production provide an upper bound on the potential contribution of emissions reductions from CEF.

Given the uncertainty in how aeroplane operators may choose to address offsetting requirements (i.e., mix of emissions reductions from CEF and/or cancelled CEEUs), a scenario-based assessment was conducted. Offsetting Requirements may be addressed with:

(1) CEEUs (only),
(2) emissions reductions from CEF according to the Moderate CEF short term production scenario with 50% of CEF claimed under CORSIA and the rest is addressed with CEEUs, and
(3) emissions reductions from CEF according to the Moderate CEF short term production scenario with all CEF claimed under CORSIA and the rest with CEEUs.

The scenario-based analysis suggests that emissions reduction from CEF may address up to ≈ 15 % of offsetting requirements (≈ 130 $MtCO_2$) during the First Phase of CORSIA. The remainder (i.e., final offsetting requirements) would be addressed using CEEUs.

Absolute quantities of emissions reductions from CEF and/or CEEUs used to meet offsetting requirements were then monetized to estimate the cumulative costs of compliance from 2024 to 2026 using the following assumptions and data:

a) Unit Prices of Emissions Reductions from CEF: The cost abatement (i.e., CEF Premium / tCO_2 abated) from the emissions reductions from CEF could range from ≈ \$600-800 per tCO_2. The CEF Premium is calculated as the difference between the Unit Price of SAF (≈ \$2.0 per Liter in 2024) and the unit price of Conventional Jet Fuel (≈ \$0.7 per Liter for 2024).

b) Unit Prices of Emissions Units: The CAEP has updated its estimates of the prices of emissions units for the First Phase of CORSIA. Based on limited price information and data available and for the purpose of CAEP analyses, the average price of emissions units was estimated to range from \$10 to \$40 per tCO_2 during the First Phase of CORSIA.

Combining unit price information with quantities of emissions reductions from CEF and/or CEEUs, the total cumulative costs associated with addressing offsetting requirements from 2024 to 2026 could range from ≈ \$1B to \$5B using CEEUs (only) to ≈ \$10B to \$20B using a mix of CEEUs and emissions reductions from CEF assuming that all the available CEF, according to the latest CAEP Moderate scenario, are claimed towards CORSIA.

TABLE OF CONTENTS

BACKGROUND

High Level Description of CORSIA

The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is the first global market-based scheme that applies to a sector. It complements other aviation in-sector emissions reduction efforts such as technological innovations, operational improvements and sustainable aviation fuels to meet the ICAO aspirational goal of carbon neutral growth.

The CORSIA Periodic Review

Background on the First (2022) CORSIA Periodic Review

Paragraph 17 of Assembly Resolution A40-19 includes a provision that the ICAO Council will conduct a periodic review of the CORSIA every three years from 2022. In this regard, the Council, in June 2020, highlighted the importance of undertaking the 2022 periodic review, with technical contribution of the CAEP, which will offer an opportunity to examine the impact of COVID-19 on CORSIA on various issues, including the impact on the baseline beyond the pilot phase.

In March 2021, the ICAO Council agreed on the process and methodology for the CORSIA periodic review towards 2022, and on the framework for the consideration of inputs from its subsidiary bodies such as the CAEP and the Technical Advisory Body (TAB).

Following several interim assessments, in March 2022, CAEP provided further inputs to the 225th Session of the ICAO Council regarding the 2022 CORSIA periodic review, including further assessment of COVID-19 impacts on CORSIA (C-WP/15326), including:

- Assessment of COVID-19 impacts on CORSIA and its baseline,
- Assessment of the costs of CORSIA implementation on States and aeroplane operators, and
- Review of the analysis of possible market distortions (in the context of CORSIA design elements).

In June 2022, the 226th Session of the ICAO Council requested CAEP to undertake further analysis on the impacts of COVID-19 on CORSIA and its baseline, building upon the analyses delivered by CAEP during the 225th Council Session in March 2022. The objective of the requested analysis was to estimate the CORSIA offsetting requirements and the regional breakdown, using the average of 2019 and 2020 emissions as the agreed baseline in Assembly Resolution A40-19, as well as the following scenarios for the CORSIA baseline after the pilot phase (2024 to 2035): (1) 2019 emissions only; (2) a percentage of 2019 emissions, which reflects an equivalent level to the average of 2019 and 2020 emissions; and (3) the mid-point between the baseline scenarios (1) and (2) above;

The ICAO Council, following consideration of the additional CAEP analysis and other design elements of CORSIA, agreed on a series of proposals for consideration by the 41st Session of the ICAO Assembly, namely:

- Use of 2019 emissions as the CORSIA baseline for the pilot phase (2021 – 2023);
- Use of 85% of 2019 emissions as the CORSIA baseline after the pilot phase (2024 – 2035); and
- Changes to the percentage use of the sectoral and individual operator's growth factors for the calculation of offsetting requirements under CORSIA, as follows:
    - 2030 - 2032: 100% sectoral and 0 % individual; and
    - 2033 - 2035: 85 % sectoral and 15% individual

The 41st Session of the ICAO Assembly considered the Council proposals and adopted the Resolution A41-22 on CORSIA including the design adjustments above, as reflected in Assembly Working Paper A41-WP/659.

The 2025 CORSIA periodic review

In March 2023, the ICAO Council requested CAEP to undertake work to support the Council on the 2025 CORSIA periodic review, building upon the 2022 CORSIA review process, with a focus on the assessment of supply, demand, price and cost impact of the CORSIA offsetting requirements. The Council also requested CAEP to perform technical analyses to facilitate the development of a methodology for the periodic review.

In March 2024, CAEP presented to the 231st Session of the ICAO Council a status update on CORSIA analyses with a proposed preliminary schedule of further updates to the CORSIA analyses (C-WP/15562). The updated CORSIA analyses included, inter alia, the development of proxy CAEP/13 CO_2 emissions trends; estimations of offsetting requirements through 2035; assessment of regional impacts; estimations of final offsetting requirements after emissions reductions from CEFs; impacts on aeroplane operators; and estimates of costs associated with CORSIA.

The Council reviewed CAEP's inputs and noted that, in order to support the Council in undertaking the 2025 CORSIA periodic review, CAEP would provide the Council with further updated CORSIA analyses, as well as the schedule of subsequent updates, during the 232nd Session, including updated information on the price of CEEUs and CEFs.

In June 2024, CAEP presented to the 232nd Session of the ICAO Council further updates to the CORSIA analyses and to the schedule of subsequent updates (C-WP/15587). The Council reviewed CAEP's inputs and requested CAEP to provide subsequent updates of the CORSIA analyses to support the Council in undertaking the 2025 CORSIA periodic review, as per the schedule presented by CAEP. The Council also emphasized the need for further information to be provided on the supply, regional distribution and price of CEEUs and CEFs, as a key input to the 2025 CORSIA periodic review and to any recommendations that would form part of the report by the Council to the 42nd Session of the Assembly.

In October 2024, CAEP provided the 233rd Session of the ICAO Council with a status report on its technical work to support the Council in undertaking the 2025 CORSIA periodic review (C-WP/15630), noting that updates to the CORSIA analyses had been limited in scope since the previous update. The Council reviewed CAEP's inputs and requested CAEP to provide further updates on the CORSIA analyses to support the Council in undertaking the 2025 CORSIA periodic review during the 234th Session, as per the schedule presented by CAEP, with a particular emphasis on matters related to the overall supply, demand and price of CEFs and CEEUs, as well as the related impacts on the implementation of the scheme.

In March 2025, CAEP presented to the 234th Session of the ICAO Council a comprehensive update to the CORSIA analyses (C-WP/15676). The updated CORSIA analyses follows the structure of the analyses presented at the previous 232nd Session, with a focus on those elements previously identified by the Council as a priority for further CAEP inputs, namely on matters related to the supply, regional distribution and price of CEEUs and CEFs. The Council reviewed CAEP's inputs and recognized the significant amount of analytical work undertaken by CAEP representing important technical contributions in support of the Council's work on the 2025 CORSIA periodic review. The Council also noted that CAEP would provide further updates to the CORSIA analyses during the 235th Session of the Council in June 2025, including on the supply of CEFs and CEEUs and their prices, and subsequent costs of the scheme, bearing in mind that the Council would need to finalize the 2025 CORSIA periodic review during the 235th Session and provide its related recommendations to the 42nd Session of the ICAO Assembly.

ASSESSMENT APPROACH IN SUPPORT OF THE 2025 CORSIA PERIODIC REVIEW

High level approach

The 2025 CORSIA Periodic Review comprises (1) ***a backward-looking assessment*** of how CORSIA worked during the Pilot Phase in context of projections anticipated during the 2022 Review, and (2) ***updated forward-looking assessments*** based on the latest historical data and traffic forecasts.

As shown in Figure 1 and as presented in Working Papers submitted up to the 226th Session of the Council (June 2022), the assessments in support of the 2022 CORSIA periodic review were mostly focusing on forward-looking assessments in the context of the ongoing impacts and recovery from the COVID-19 global pandemic on the international aviation sector and its emissions. These assessments included scenario-based estimations of future offsetting requirements under different CORSIA baseline options. The 2022 CORSIA periodic review based on analyses through the first part of 2022, submitted to Council at the 225th and 226th Sessions (March and June 2022, respectively) towards the 41st Session of the ICAO Assembly in Oct. 2022, was also conducted in the middle of the pilot phase of CORSIA. As such there was very limited (relevant) historical data on the functioning of CORSIA given that the pilot phase started on 1 January 2021.

Given the additional time and experience gained since the 2022 CORSIA periodic review, the 2025 CORSIA periodic review provides an opportunity for conducting a more in-depth review of the functioning of CORSIA since the last review, including the pilot phase. As such, the high-level approach for the 2025 CORSIA periodic review comprises two key components:

- a backward-looking review of how CORSIA worked during the pilot phase in context of projections anticipated during the 2022 review, and
- an update of the forward-looking assessments based on the latest historical data and most recent ICAO traffic forecast.

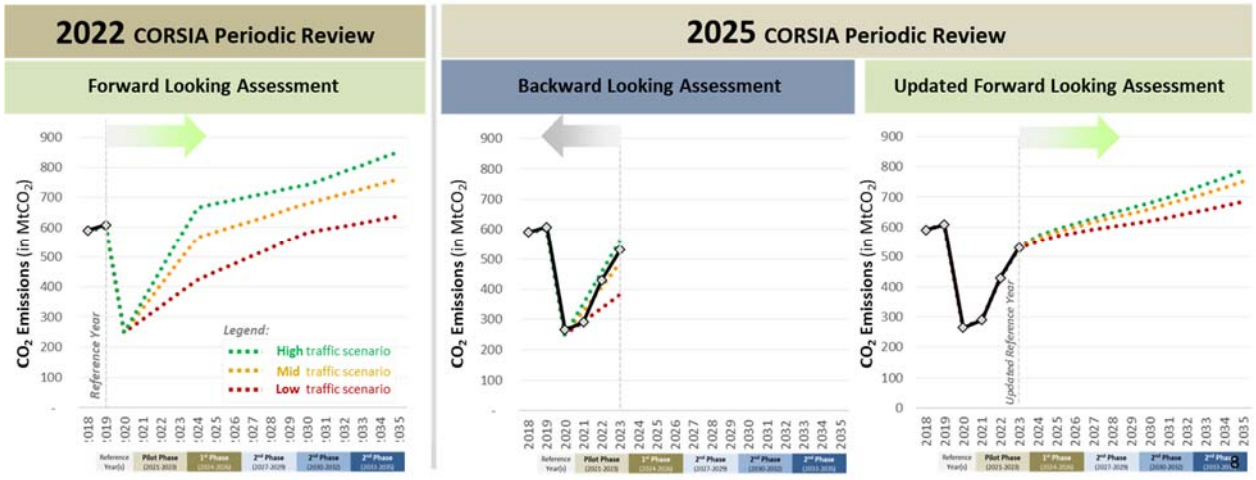


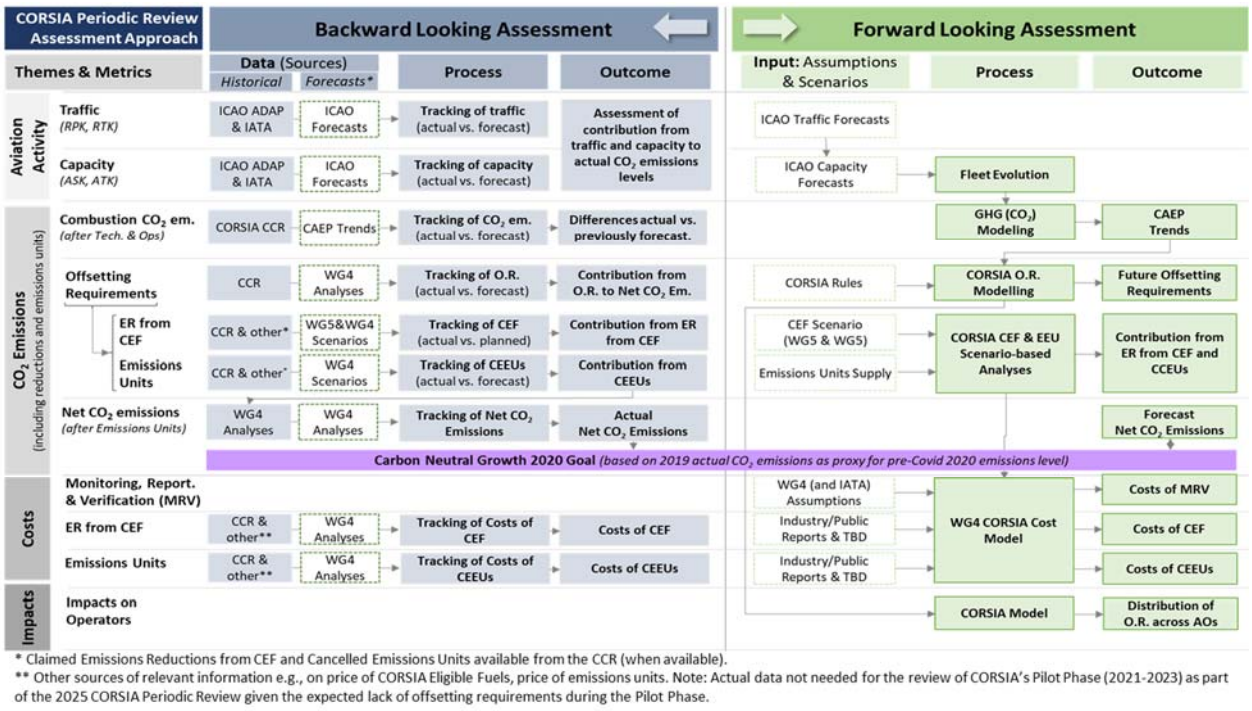
Figure 1 | CORSIA Periodic Reviews: High Level Approach

CORSIA Periodic Review Assessment Approach: Summary of Scope, Data, Processes and Outcomes

Figure 2 shows the details on the two key components of the 2025 CORSIA periodic review: backward-looking review and updated forward-looking assessments. This includes the descriptions of key metrics that are tracked and modelled, data sources, analysis processes and outcomes.

The forward-looking assessment depicts the approach underlying assessments by the CAEP/WG4 and presented to CAEP and Council to date. This includes the estimations of offsetting requirements and how they may be met in the future, at what costs to States and operators as well as considerations on the impacts on operators and international aviation. This process typically starts with the integration of ICAO traffic forecasts (either used directly by WG4 towards the proxy/interim CAEP trends or as input to official CAEP trends generally available at the end of a CAEP cycle). This step results in a set of scenarios for CO_2 emissions from international aviation. Detailed modelling by WG4 and the application of the CORSIA rules (or alternative policy assumptions) allows for the assessment of annual offsetting requirements through 2035. For forward-looking assessments, scenarios of how offsetting requirements may be addressed using emissions reductions from CEF and/or CEEUs are then developed. These estimates are then translated into costs to aeroplane operators under several unit price assumptions and scenarios. The costs of the implementation of MRV requirements are also estimated. Given estimates of future offsetting requirements, net CO_2 emissions through 2035 are assessed and placed in context of the Carbon Neutral Growth 2020 Goal (based on 2019 actual CO_2 emissions as proxy for pre-COVID 2020 emissions level). The forward-looking assessment also analyzes the impact of CORSIA offsetting requirements on aeroplane operators.

The left-hand side of Figure 2 shows details on the approach supporting the backward-looking assessment. A posteriori and by collecting historical data available through the year of the assessment (e.g., 2024), actual CO_2 emissions are tracked to understand how CORSIA has been functioning.



* Claimed Emissions Reductions from CEF and Cancelled Emissions Units available from the CCR (when available).
** Other sources of relevant information e.g., on price of CORSIA Eligible Fuels, price of emissions units. Note: Actual data not needed for the review of CORSIA's Pilot Phase (2021-2023) as part of the 2025 CORSIA Periodic Review given the expected lack of offsetting requirements during the Pilot Phase.

Figure 2 | CORSIA Periodic Review: Assessment Approach

Historical CO_2 emissions are put in context of previous forward-looking assessments (e.g., pre-Assembly 41) to understand differences between actual emissions and previously anticipated. The review of historical versus previously forecast aviation activity (e.g., traffic, capacity) can help explain differences. Based on historical data

reported through the CORSIA Central Registry (CCR), quantities of emissions reductions from CEF and cancelled emissions units can be tracked to understand how offsetting requirements were met. Such assessment also allows for the tracking of net CO_2 emissions (i.e., emissions reductions from CEF and cancelled emissions units subtracted from combustion emissions) and compared against actual 2019 CO_2 emissions level used as proxy for pre-COVID 2020 emissions level and the Carbon Neutral Growth 2020 Goal. If offsetting requirements result in the claiming of emissions reductions from CEF and cancelled emissions units, the actual costs from those may be estimated and tracked.

Models and Analyses in Support of the CORSIA periodic review

Historically, the CAEP working groups provided technical support towards the development and then implementation of CORSIA. These analyses included assessments of the costs and CO_2 emissions reductions expected to result from CORSIA. To conduct integrated costs and benefits (i.e., emissions reductions), additional modelling steps are required.

COMPASS

The technical assessments and analyses in support of the CORSIA periodic review presented to the Council to date and contained in this document are based on the **CO**RSIA **M**odel for **P**arametric **A**nalyses and **S**tochastics **S**imulations (COMPASS). COMPASS was developed by experts nominated by the United States building on their expertise and experience since 2014 from modeling and assessing options towards the development of CORSIA. As shown on Figure 3, COMPASS integrates a wide array of inputs and assumptions. This tool enables a reconciliation of the various CO_2 emissions forecasts at a level (i.e., Aeroplane Operator-State Pair) required for CORSIA Analyses. The resulting State Pair level emissions forecast is combined with the underlying set of assumptions on the phased implementation of CORSIA (i.e., list of participating States from the pilot phase and first phase and the ICAO 2018 RTK Statistics that define the participation in CORSIA during its second phase). These modelling steps result in the estimation of CO_2 emission reductions from CORSIA (i.e., quantities of offsetting requirements that feed into the CORSIA Cost & Emissions Integration Model along with the output of the COMPASS MRV Cost model). The output to the CORSIA Cost & Emissions Integration Model forms the basis for analyses of offsetting requirements, costs, among other metrics.

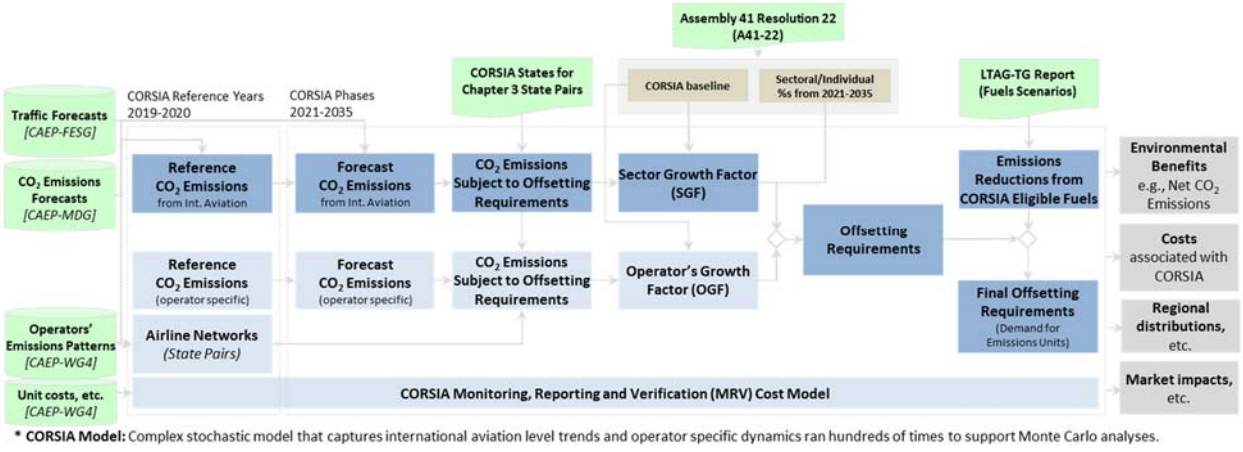


Figure 3 | COMPASS: High Level Architecture

The COMPASS framework integrates CORSIA program parameters, a global capacity growth forecast, historical growth/decline profiles for individual operators, and historical new entrant and subsidiary operator models. The COMPASS framework can be used to evaluate the temporal and integrated impact of parameter and design choices under the CORSIA framework such as baseline definition, operator vs. sectoral growth factor calculation approaches,

and potential offsetting requirements for different categories of operators (e.g., new-entrant and subsidiary operators). The output from COMPASS enables CORSIA impact analyses at several levels of (dis-)aggregation:

- Operator: CO_2 from international operations and offsetting requirements by an individual operator,
- State: results for operators attributed to a given ICAO member state,
- Region: results for operators attributed to States within a particular ICAO region,
- State-pair: CO_2 from international operations between two ICAO member states,
- FESG route group: CO_2 from international operations between state pairs binned into route groups as defined by the CAEP Forecast and Economic Analysis Support Group (FESG),
- Operator classification: CO_2 from international operations attributed to cargo vs. passenger operators, operators that are in the CORSIA scope of applicability during the baseline year(s) and remain in scope through 2035, operators that are in the CORSIA scope of applicability during the baseline year(s) and exit scope prior to 2035, new operators that enter the CORSIA scope of applicability after the baseline year(s) (i.e., new entrant operators), and new operators that enter the CORSIA scope of applicability after the baseline year(s) that are subsidiaries or immediate successors to existing entities (i.e., subsidiary operators), and
- System: Aggregate results for international aviation under the various scopes of applicability of CORSIA (e.g., international aviation, international aviation subject to offsetting requirements).

To support these multiple levels of (dis-)aggregation, COMPASS tracks CO_2 emission growth/decline at the operator and state pair levels. Model data (i.e., total emissions, emissions subject to offsetting, and offsetting requirements) may be analyzed at the desired level of aggregation through post-processing of model outputs.

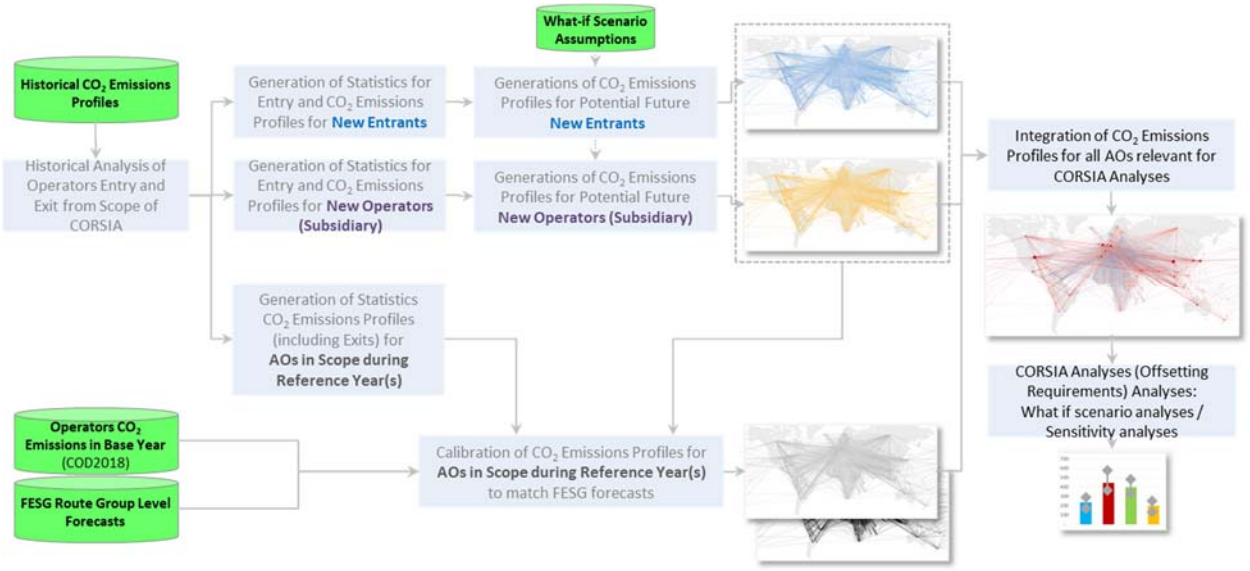


Figure 4 | COMPASS: Approach for integrating aeroplane operators' entries and exits from CORSIA scope

CORSIA's timeline of applicability ranges from 2021-2035, divided into five compliance periods of three years each (2021-2023 i.e., pilot phase, 2024-2026, 2027-2029, 2030-2032, and 2033-2025). ICAO states may elect to participate in CORSIA for the entire period 2021-2035 or to begin participation partway through this period.

COMPASS supports impact assessment for varying state participation, whether an ICAO state elects to begin participating during any year between 2021 and 2035 or not to participate in CORSIA.

Detailed predictions and forecasts for unknown/future operators cannot be developed with a high level of accuracy and confidence due to the fundamental uncertainty associated with such forecasts and level of disaggregation through 2035 (e.g., at the aeroplane operator level). There is uncertainty inherent in both the number of new entrant operators and the ICAO State of attribution expected for those operators. Therefore, a parametric modelling

approach was used to generate scenarios of potential future new entrants' emergence and evolution (calibrated through assumptions and available data) in addition to expected growth/decline in international emissions for operators in scope during the baseline year(s). This parametric modelling approach was combined with fast-time simulation capabilities to enable iterative analyses as new assumptions/data become available, or to enable Monte Carlo analyses. This modelling approach enables analyses to characterize the sensitivity of offsetting requirements across categories of aeroplane operators and the relative magnitude of offsetting requirements across numerous baseline options and/or input assumptions and data. Results may be assessed at the aggregate/stochastic level or for any individual (deterministic) scenario underlying these stochastic results.

AERO-MS CORSIA Module

In 2024, the CAEP WG4 considered the **A**ERO-MS **C**ORSIA **M**odule (ACM) developed by experts from the European Union Aviation Safety Agency (es). Below are the main characteristics of the ACM:

- The ACM includes international aviation CO_2 emissions data by State Pairs from the CCR. Currently the CCR contains data for the CORSIA baseline year (2019) and the CORSIA pilot phase years 2021-2023.
- The ACM includes international aviation CO_2 emissions data by State Pairs from the AERO-MS for the remainder of the CORSIA years up to 2035. The data result from the implementation of the CAEP/13 baseline scenarios in the AERO-MS.
- The ACM allows users to specify: i) CORSIA baseline by compliance cycle; ii) sectoral/individual % by compliance cycle; iii) ICAO Member States to join CORSIA by year;
- The ACM takes into account unit costs of CEEUs and CEFs in order to compute the costs for meeting offset requirements.
- The ACM takes into account alternative CEF scenarios in order to compute the contribution of CEFs to meeting offset requirements.
- The ACM uses AERO-MS data on the distribution of CO_2 emissions across operators from 14 world regions considered in the AERO-MS. In the ACM a distribution profile is assigned to each of the State Pairs. The distribution data are used in the ACM to assess the outputs by AERO-MS region, whereby the outputs for each region relate to all aeroplane operators which are based in the region. The results for the 14 AERO-MS regions are aggregated in the ACM at 6 ICAO regions level.

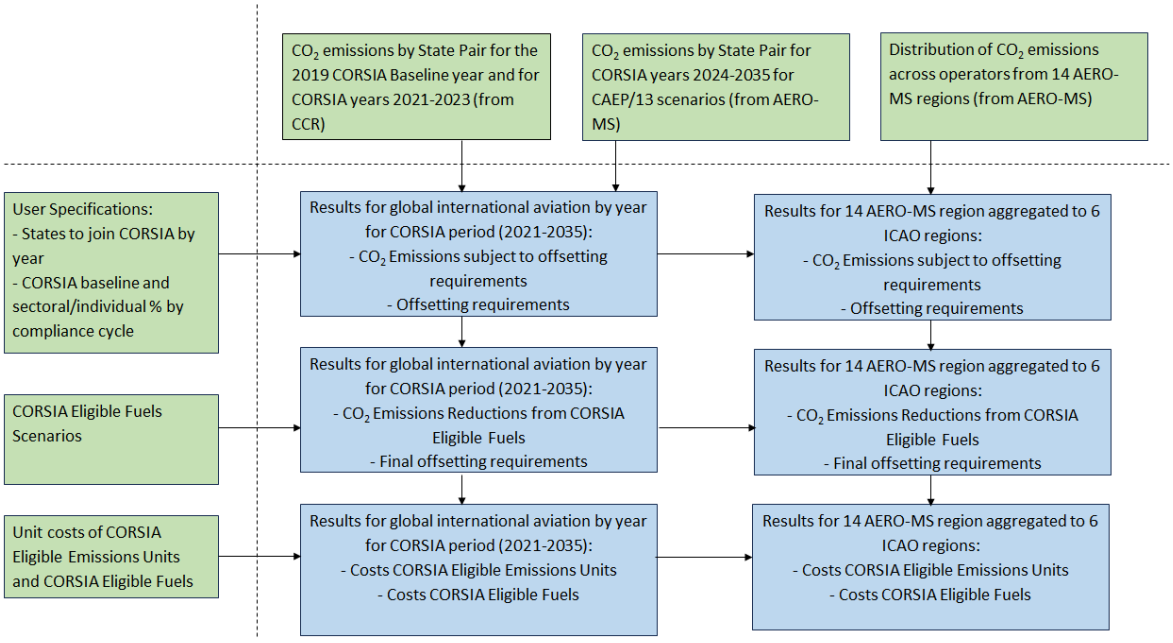


Figure 5 | **AERO-MS CORSIA Module: Schematic overview**

Figure 5 provides a schematic overview of the ACM including all the inputs to the ACM and the outputs generated in the various computational steps. The outputs are generated per year (2021-2035) and per ICAO region.

Results from both models are based on the latest set of assumptions as described in Appendix B.

The CAEP WG4 CTAG CORSIA Analyses Group has started to conduct a comparison of COMPASS and the ACM. The first comparison conducted as part of the CAEP/13 cycle shows consistency between the results of the two models. The CAEP/14 Work Programme calls for WG4 to continue its comparisons of the models, further document the modelling assumptions and methodologies and to continue the thorough validation of the models.

REVIEW OF CORSIA'S PILOT PHASE (2021-2023)

Actual CO_2 emissions from international aviation in context of previously anticipated projections during the 2022 CORSIA Periodic Review

Actual CO_2 emissions from 2019 to 2023 were collected from the CORSIA Central Registry. Figure 6 shows actual historical CO_2 emissions from international aviation through 2023, in context of previously anticipated CO_2 emissions as of the last (2022) CORSIA periodic review. It was observed that, following the impact of the COVID-19 Global Pandemic on international aviation, actual CO_2 emissions reach levels in 2021 close to the CAEP/12 Low forecast. The international aviation sector exhibited a stronger recovery in 2022 and 2023 were CO_2 emissions reached levels between the Mid and High CAEP/12 trends.

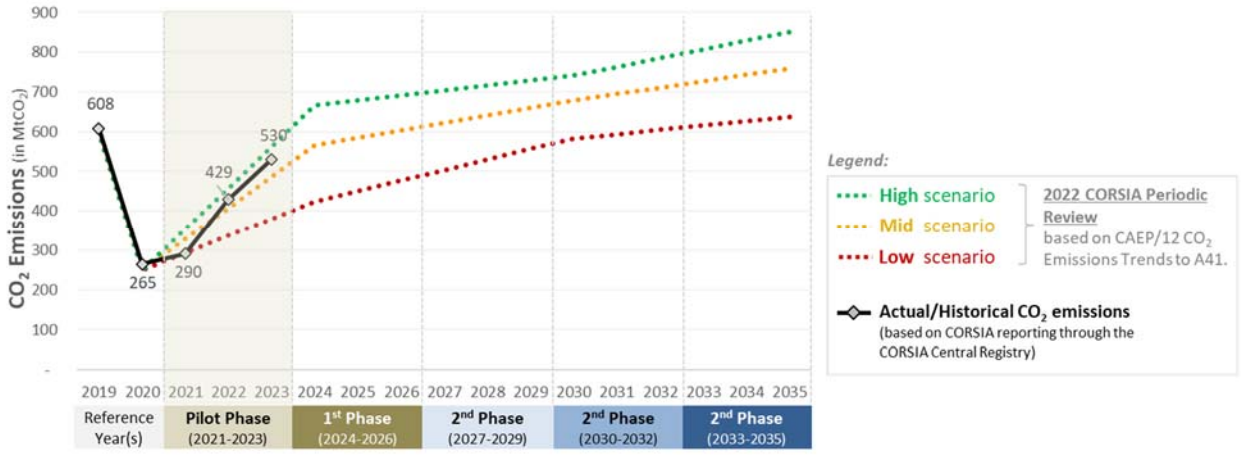


Figure 6 | CO_2 Emissions: Actual/historical versus previously anticipated during the last CORSIA periodic review (in 2022)

Offsetting Requirements during the Pilot Phase of CORSIA

In accordance with the Annex 16 Volume IV on CORSIA, while MRV requirements were applicable from January 1, 2019, the calculation of offsetting requirements was applicable from January 1, 2021 (i.e., start of the pilot phase).

As shown in Figure 7, given the effects of the COVID-19 Global Pandemic on international aviation and despite the recovery since 2020, CO_2 emissions from international aviation subject to offsetting requirements remained below the 2019 CORSIA sector baseline in 2021, 2022 and 2023. As a result, the SGFs were 0% for all three years of the CORSIA Pilot Phase.

Offsetting was therefore not required during the Pilot Phase and there was no demand (triggered by CORSIA) for emissions reductions from CEFs and/or CEEUs.

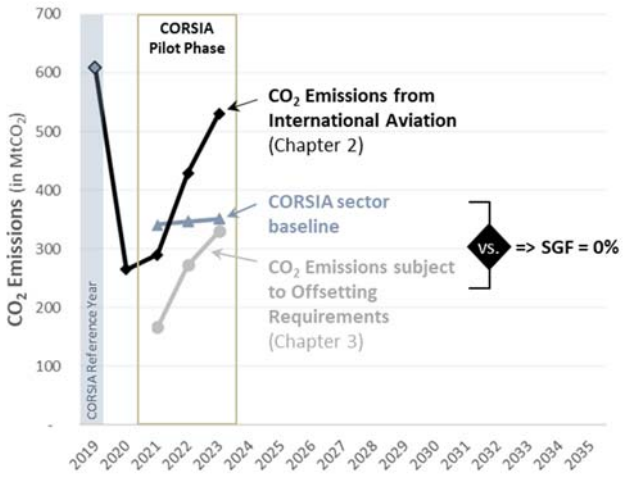


Figure 7 | **Offsetting requirements during the pilot phase**

Assessment of the Supply of Emissions Reductions from CEF and/or CORSIA Eligible Emissions Units during the Pilot Phase

The absence of demand for emissions reductions from CEF and/or emissions units for CORSIA compliance purposes does not mean that there was no supply, and that the markets did not prepare to meet potential and future demand.

To structure this assessment, the CTAG CORSIA Analyses Group developed a comprehensive framework to assess the potential role of the emissions reductions from CEFs and CEEUs towards meeting offsetting requirements. This part of the CORSIA Analyses is critical to the analyses and observations given the key role of emissions reductions from CEF on demand for CEEUs to meet offsetting requirements in a compliance cycle. Figure 8 shows the key steps from the overall supply of emissions reductions from alternative fuels and emissions units to the subsets that are or could be claimed under CORSIA to address offsetting requirements. As noted on Figure 8, it is conceptual and is not meant to represent actual values or estimations.

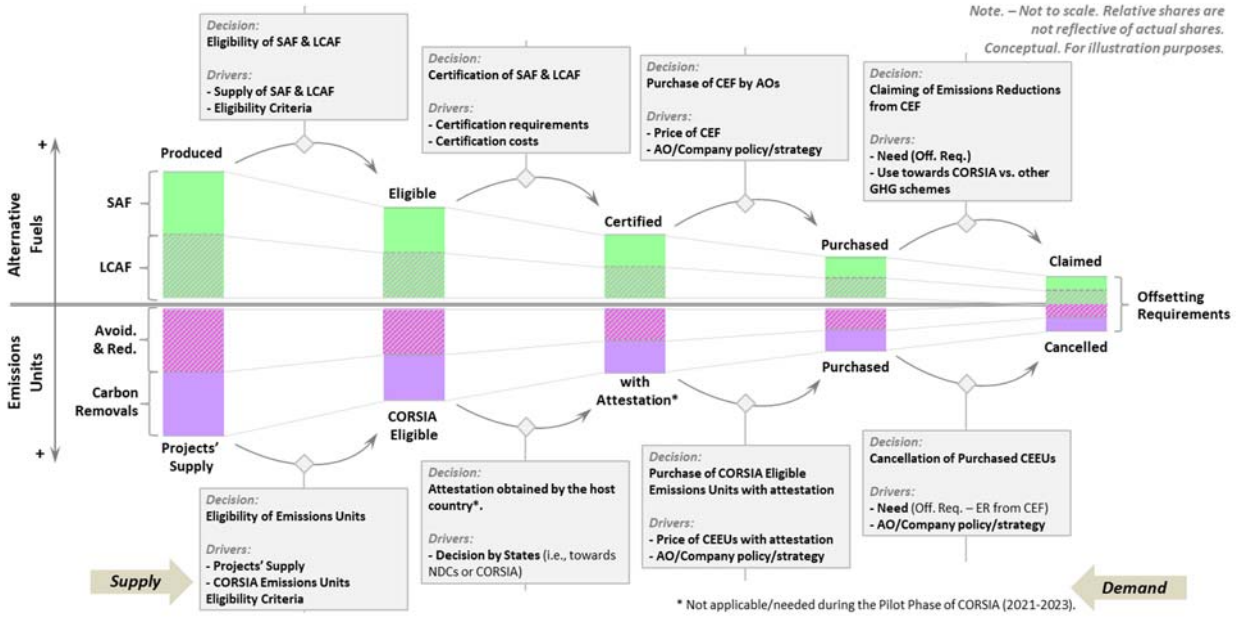


Figure 8 | **Framework towards the assessment of the role of emissions reductions from CEF and CEEUs**

The upper part of Figure 8 shows the steps for alternative fuels, including SAFs and Lower Carbon Aviation Fuels (LCAF). Starting with the left-hand side, the production of SAF and LCAF bounds the total emissions reductions from SAF that may be claimed by aeroplane operators under CORSIA. A fraction of the total SAF and LCAF produced may meet the "CORSIA Sustainability Criteria for CORSIA Eligible Fuels". A subset of eligible SAF and LCAF may be certified by a Sustainability Certification Scheme (SCS). A subset may be purchased and used by aeroplane operators. Finally, a fraction may be claimed under CORSIA. Figure 8 also shows the key drivers influencing the relative shares for each step of this process.

Similarly, as depicted on the lower part of Figure 8, there is also a "funnel" for emissions units (i.e., from overall emissions units to cancelled CEEUs). Starting with the left-hand side, the total supply of emissions units based on avoidance, reductions and carbon removals bounds the amount that may be cancelled under CORSIA. A subset may meet the "CORSIA Emissions Unit Eligibility Criteria" i.e., CEEUs as decided by the ICAO Council and valid for a CORSIA compliance cycle. A subset of CEEUs may obtain an attestation by the host country. A subset of CEEUs with attestation may be purchased by aeroplane operators and claimed under CORSIA in a given year or compliance cycle to meet final offsetting requirements (i.e., offsetting requirements reduced by the emissions reductions from the use of CEF).

Such a framework can help improve the understanding (a) a posteriori of the supply of emissions reductions from CEF as well as emissions units and the effects of steps in the process that result in how demand (i.e., offsetting requirements) was met; (b) a priori how future supply may meet future demand (see next section for details).

The CAEP (WG4 CTAG) applied the framework described above for its review of the pilot phase of CORSIA. Based on initial and available information and data, Figure 9 summarizes the role of emissions reductions from CEF and CEEUs during the pilot phase of CORSIA.

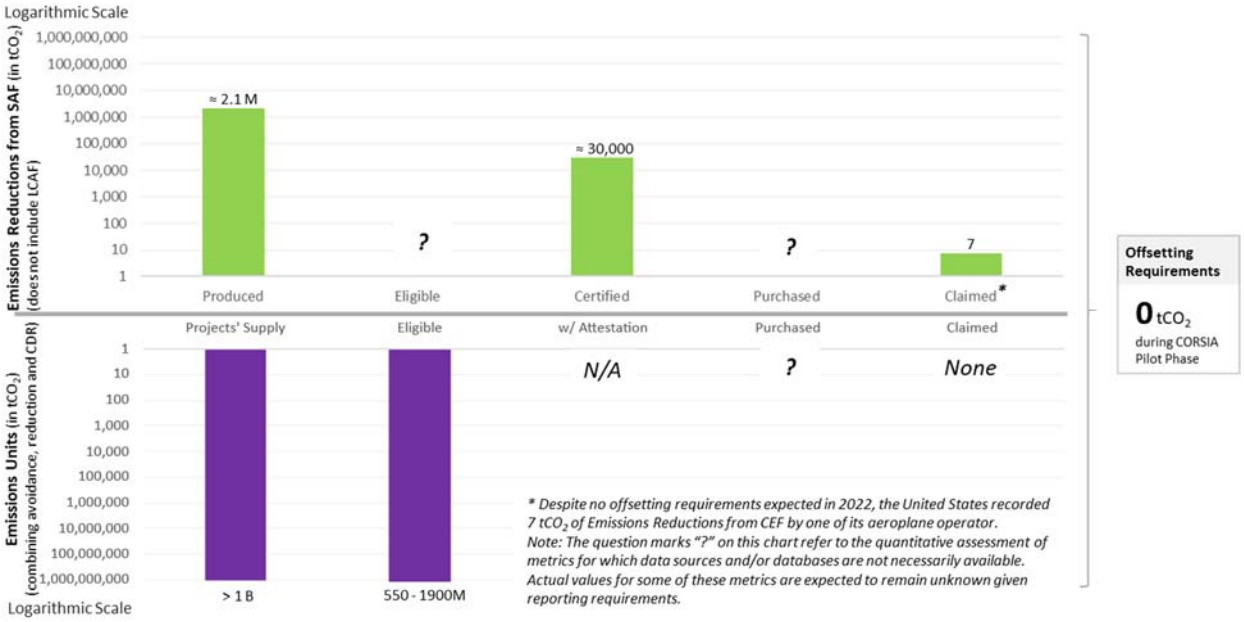


Figure 9 | **Assessment of the role of Emissions Reductions from CEF and CEEUs**

SAF & LCAF: Production

The production of SAF is tracked at the global aviation level. In other words, it is not segregated for domestic vs. international aviation. In 2023, volumes of produced SAF reached over 600 million liters (0.5 Mt), double the 300 million liters (0.25 Mt) produced in 2022 , which tripled compared to the production of 100 million liters in 2021. For the purpose of estimating first order magnitude of emissions reductions associated with the SAF produced in 2021 through 2023, an average Emissions Reductions Factor (ERF) of 80% was used based on CORSIA Default Values for

Tallow and Used Cooking Oil based SAF as 85% of SAF supply over the next five years should be produced from this type of process and feedstock. This assumption is corroborated by the SCS reports described below.

As of April 2025, the CAEP (WG4 CTAG) was not aware of estimates of the production of Low Carbon Aviation Fuels (LCAF) between 2021 and 2023.

SAF & LCAF: Eligible

The CTAG CORSIA Analyses Group noted the absence of comprehensive sources of information or centralized repository where information on SAF produced from 2021 to 2023 that meets the sustainability criteria under CORSIA is available. It should be noted that information is available on the portion of SAF produced that was certified against the CORSIA sustainability criteria (see next section for details).

SAF & LCAF: Certified

The WG4 CORSIA Analyses tracked the portion of SAF produced from 2021 to 2023 that was certified against the CORSIA sustainability and eligibility requirements. Information from the reporting by SCS was leveraged for purposes of historical data collection. The SCSs are responsible every year for reporting the quantities of CEFs that were certified and the associated Greenhouse Gas (GHG) emissions. Reports from the SCSs are available on the ICAO CORSIA SCS webpage . For example, over 1500 and 33 tonnes of SAF that were certified against CORSIA requirements were reported to be produced in 2022 by Roundtable on Sustainable Biomaterials (RSB) and International Sustainability & Carbon Certification (ISCC) respectively. The SCS reports indicate that in 2023 a total of 9740 tonnes of neat SAF was produced and certified towards CORSIA. This corresponds to emissions reductions from CEF of approximately 26000 tCO_2. In total, the emissions reductions from CEF during the Pilot Phase of CORSIA reached approximately 30000 tCO_2. No LCAF production was reported to be certified by the SCSs during the pilot phase of CORSIA (2021-2023).

SAF & LCAF: Purchased

SAF memoranda of understanding (MOU) and purchase contracts are distinct from actual SAF usage by airline operators. To track progress on the use of SAF in a manner that is consistent with the accounting of emissions reductions from SAF, data on SAF volume and CO_{2e} emissions reductions was collected from airlines' Environmental, Social, and Governance (ESG) reports from 2019 to 2023. This data is used for other CORSIA analyses purposes but not reported on Figure 9 as the quantities of SAF reported by operators do not specify the share of CEFs with Certification.

SAF & LCAF: Claimed under CORSIA

Despite the absence of offsetting required in the pilot phase, some emissions reductions from CEFs were reported towards CORSIA. In 2022, the United States has recorded emissions reductions from CEF totaling 7 tCO_2 by one of its aeroplane operators.

In the future, information reported to the CCR would be leveraged to track emissions reductions from CEF claimed under CORSIA.

Emissions Units: Eligible

Historically, information on quantities of CEEUs was provided by the Technical Advisory Body (TAB) to the Council. According to the latest reporting from the TAB to Council (ref. C-WP/15631), the resulting potential total supply of CEEUs for the pilot phase is up to around 550 million – 1.9 billion.

Emissions Units: Host Country Attestation

N/A.

Emissions Units: Purchased

Information and data on emissions units purchased by aeroplane operators may not be easily available as this information is not necessarily reported in a comprehensive manner.

Emissions Units: Claimed under CORSIA

Information reported to the CCR could be leveraged to tracking of CEEUs cancelled under CORSIA. In 2021 through 2023, no CEEUs were cancelled under CORSIA.

Regional Breakdown of the Emissions Reductions from CEF and CEEUs

During its 232nd session, the Council "*emphasized the need for further information to be provided on the supply, regional distribution and price of CORSIA Eligible Emissions Units and CORSIA Eligible Fuels, as a key input to the 2025 CORSIA periodic review and to any recommendations that would form part of the report by the Council to the 42nd Session of the Assembly*."

The CAEP (WG4 CTAG) conducted a comprehensive assessment of the regional distribution of key metrics underlying the emissions reductions from CEF as well as emissions units. This assessment is based on the definitions of the ICAO Regions as depicted in Figure 10.

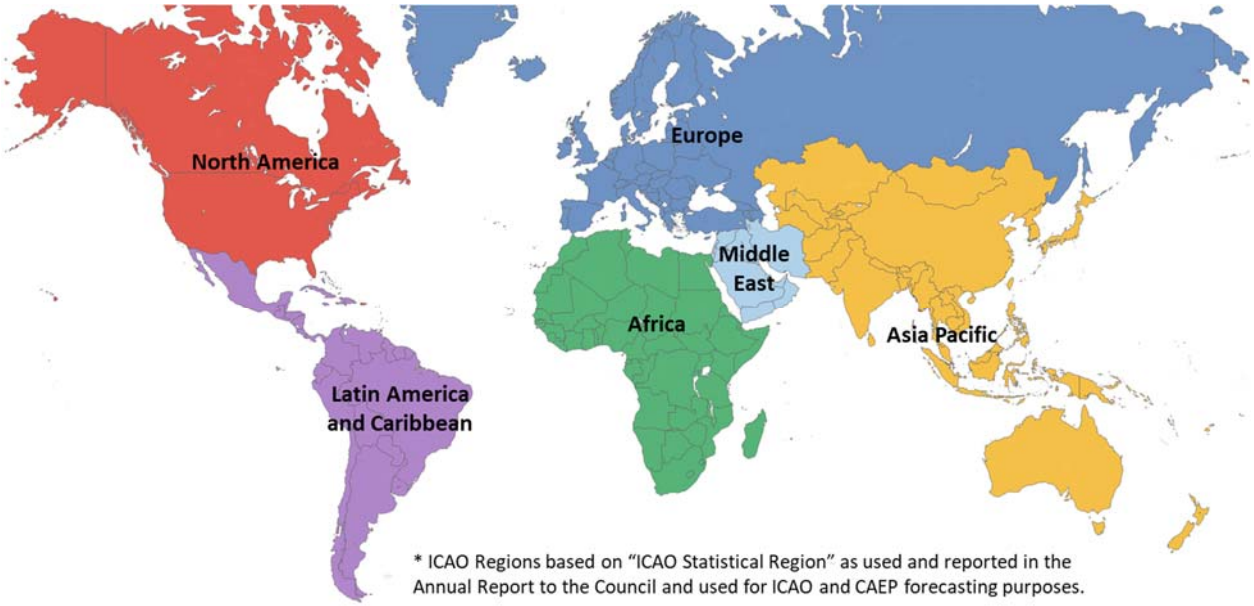


Figure 10 | **ICAO Regions Definitions**

The CORSIA Analyses task group collected and processed data to break down the estimates of SAF production, certified SAF, and Emissions Reductions from SAF claimed under CORSIA. Similarly, the CEEUs were broken down by ICAO Regions. Figure 11 depicts the regional distributions of emissions reductions from CEF and emissions units.

The regional breakdown of SAF production from 2021 to 2023 is based on the production capacity as reported in the ICAO tracker of SAF Facilities based only on a) in service – producing SAF and b) in service – producing other renewable fuels. The regional distribution of certified SAF is based on the "*Production location of the neat CORSIA Eligible fuel*" i.e., Field 8.e in the SCS Reports from 2022 and 2023. The regional distribution of Emissions Reductions from CEF claimed under CORSIA is based on the contextual information of the provider of this ad hoc information i.e., United States. The regional distribution of CEEUs is based on information from the TAB report to the 230th session of the Council.

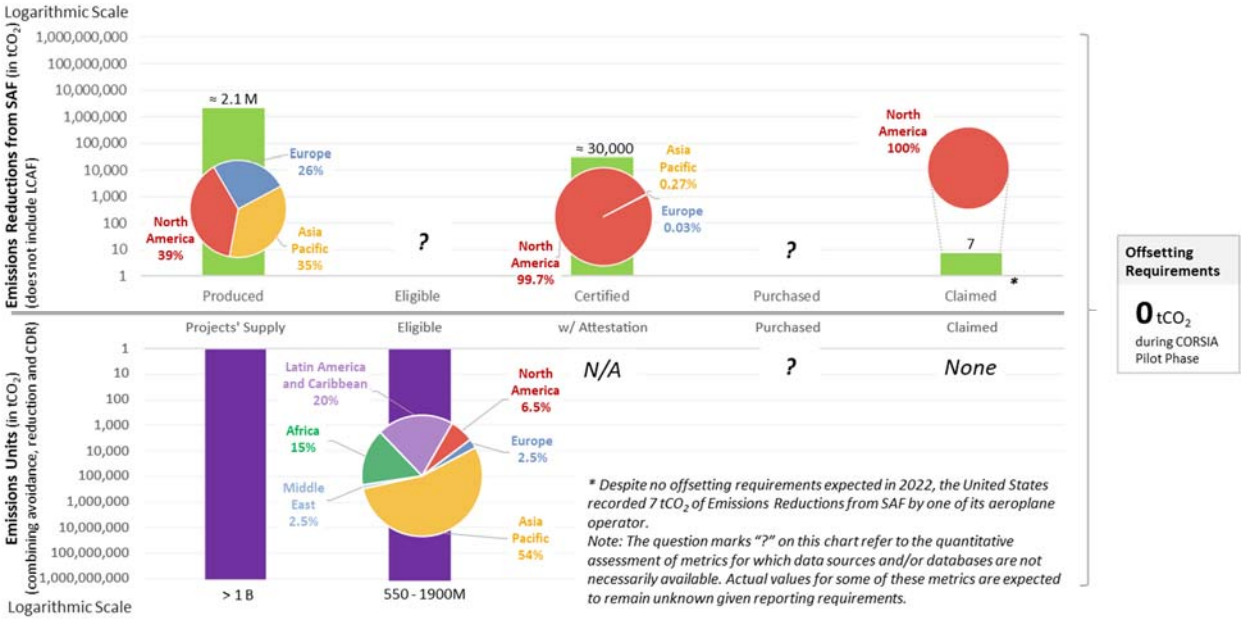


Figure 11 | **Regional Breakdown of the Emissions Reductions from CEF and CEEUs**

Net CO_2 Emissions in Context of the ICAO Carbon Neutral Growth goal from 2020 (CNG2020)

In 2013, ICAO agreed to a Carbon Neutral Growth goal aimed at achieving carbon neutral growth in international aviation from 2020 onwards (CNG2020). This goal is achieved through a "basket of measures," including technological advancements, operational improvements, SAF, and market-based measure i.e., CORSIA.

The CAEP tracked net CO_2 emissions from international aviation (i.e., after emissions reduction from CEF and cancelled CEEUs). Given reported data through the CCR, net CO_2 emissions remained below their 2019 level. The COVID-19 global pandemic was the primary driver of the decline in international aviation activity and resulting CO_2 emissions. As a result, the international aviation sector met its mid-term goal of "keeping net carbon emissions from 2020 at the same level" (assuming 2019 level as a proxy for pre-COVID 2020 expected emissions).

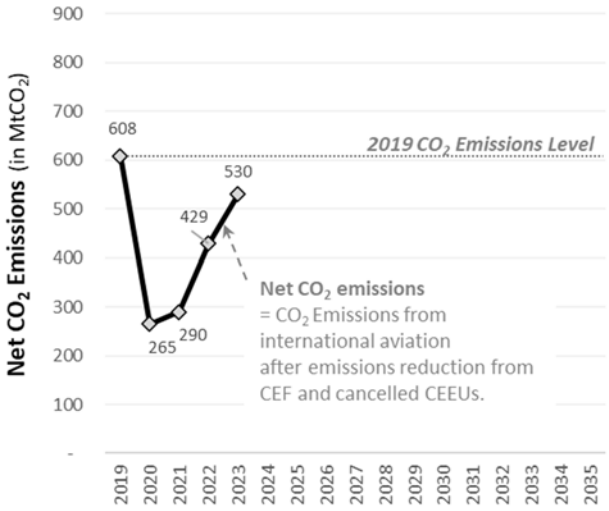


Figure 12 | **Evolution of Net CO_2 Emissions in context of Carbon Neutral Growth goal from 2020 (CNG2020)**

UPDATED FORWARD LOOKING CORSIA ANALYSES

Using the approach described in the previous chapter, the CAEP (WG4 CTAG) updated its forward-looking assessment in support of the 2025 CORSIA periodic review through 2035 with a focus on the first phase of CORSIA from January 1, 2024, to December 31, 2026.

Potential Evolution of CO_2 emissions from International Aviation from 2024 to 2035

Historically, the CTAG CORSIA Analyses Group has used the CAEP GHG (CO_2) emissions trends as input to its analyses i.e., updated forward looking assessments. Figure 13 shows the CAEP/13 trends of CO_2 emissions from international aviation from 2019 to 2035 adjusted for CORSIA analyses purposes. These trends reflect historical CO_2 emissions from international aviation that are becoming available from the continued MRV under CORSIA. The CCR and resulting documents report these statistics. The CAEP WG4 CTAG adjusted the CAEP/13 CO_2 emissions trends to match the CCR reported data in 2023.

According to the adjusted CAEP/13 CO_2 emissions trends, CO_2 emissions are expected to return to 2019 level by 2026, 2027 and 2029 under the High, Mid and Low CAEP/13 scenarios, respectively.

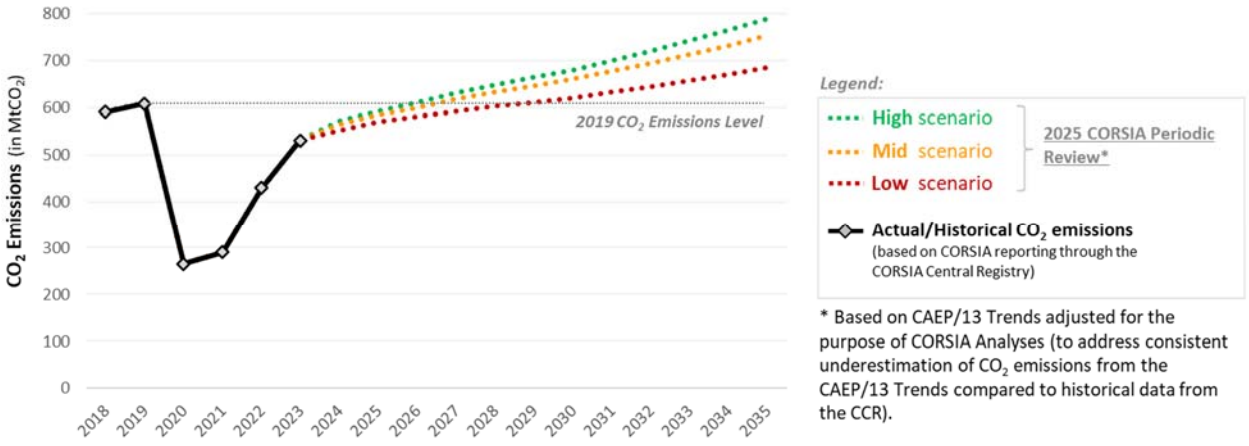


Figure 13 | **Updated CO_2 Emissions Projections from CAEP WG4 CTAG**

It should be noted that the CAEP/13 Trends are based on the CAEP/13 ICAO/CAEP Traffic Demand Forecasts. These forecasts were developed in 2022-2023 with a base year of 2018 and recommended by CAEP at its 2023 Steering Group meeting (Oct. 2023). As a result, they reflect expectations and long-term trends as of 2023. These forecasts, however, do not take into consideration the current uncertainty and potential effects of changes in trade conditions and the global, regional, and/or national economic dynamics that may affect international aviation traffic demand.

Potential Offsetting Requirements from 2024 to 2035

Total offsetting requirements across the international aviation sector are influenced by the impact of COVID-19 and the rate of recovery across years. Offsetting requirements are expected to start in 2024 under all CAEP/13 scenarios.

Figure 14 shows the offsetting requirements through 2035 under the proxy CAEP/13 trends (i.e., low, mid, and high scenarios). The estimations of offsetting requirements reflect the outcome of the Assembly Resolution A41-22 i.e., 85% of 2019 baseline from 2024 and adjustments to sectoral/individual shares (i.e., 100% sectoral share from 2030-2032 and 85% sectoral share from 2033-2035).

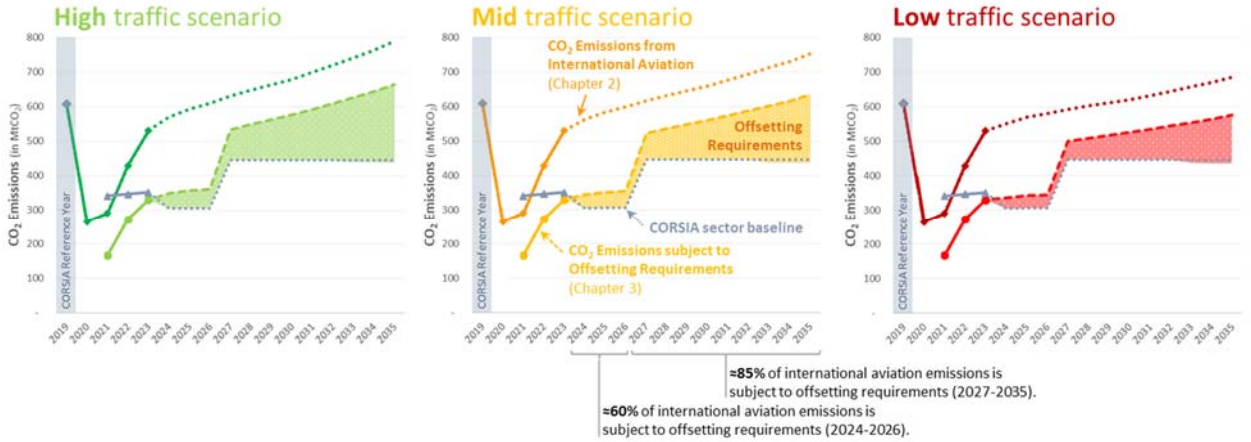


Figure 14 | **Estimation of Offsetting Requirements from 2024 to 2035**

Figure 15 shows the temporal distribution of offsetting requirements from 2024 to 2035 under the proxy CAEP/13 trends. It takes into account the decisions made at the 41st Session of the ICAO Assembly (as reflected in Assembly Resolution A41-22). Offsetting is expected to start in 2024 under all three traffic forecasts/scenarios.

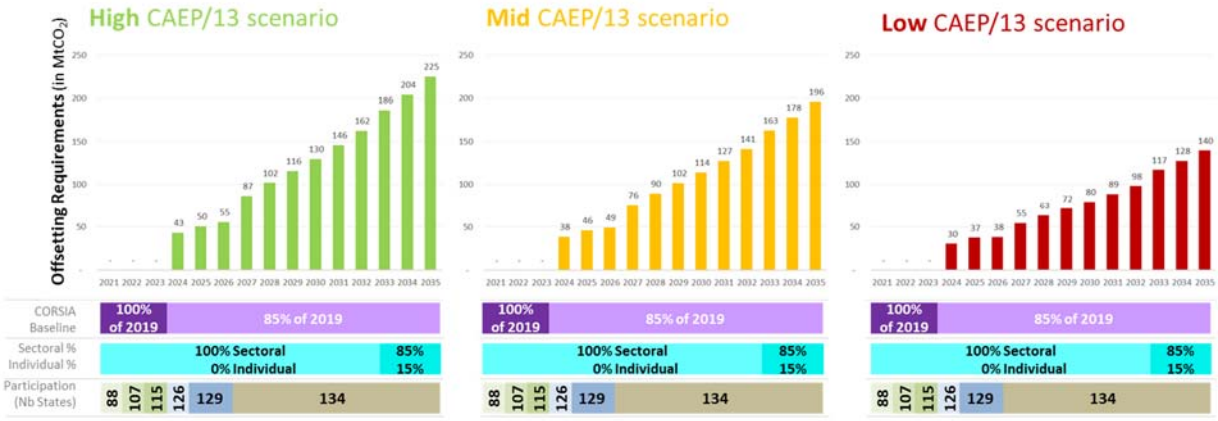


Figure 15 | **Offsetting Requirements from 2024 to 2035**

Figure 16 shows the cumulative offsetting requirements from 2021 to 2035. Given the ICAO CAEP/13 traffic forecasts and decisions at Assembly 41, cumulative offsetting requirements (O.R.) from 2024 to 2035 could range from 950 to 1500 $MtCO_2$.

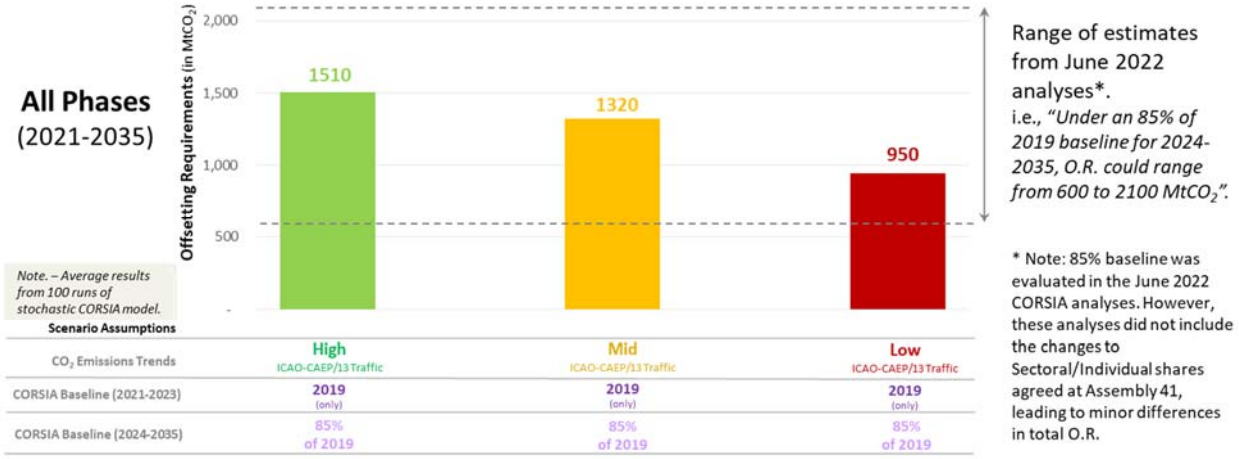


Figure 16 | **Cumulative Offsetting Requirements from 2021 to 2035**

During its 232nd session the Council "*emphasized the need for further information to be provided on the supply, regional distribution and price of CORSIA Eligible Emissions Units and CORSIA Eligible Fuels, as a key input to the 2025 CORSIA periodic review and to any recommendations that would form part of the report by the Council to the 42nd Session of the Assembly.*"

The WG4 CORSIA Analyses task group has started to conduct a comprehensive assessment of the regional distribution of key metrics underlying the emissions reductions from CEF as well as emissions units. This assessment is based on the definitions of the ICAO Regions as depicted in Figure 17.

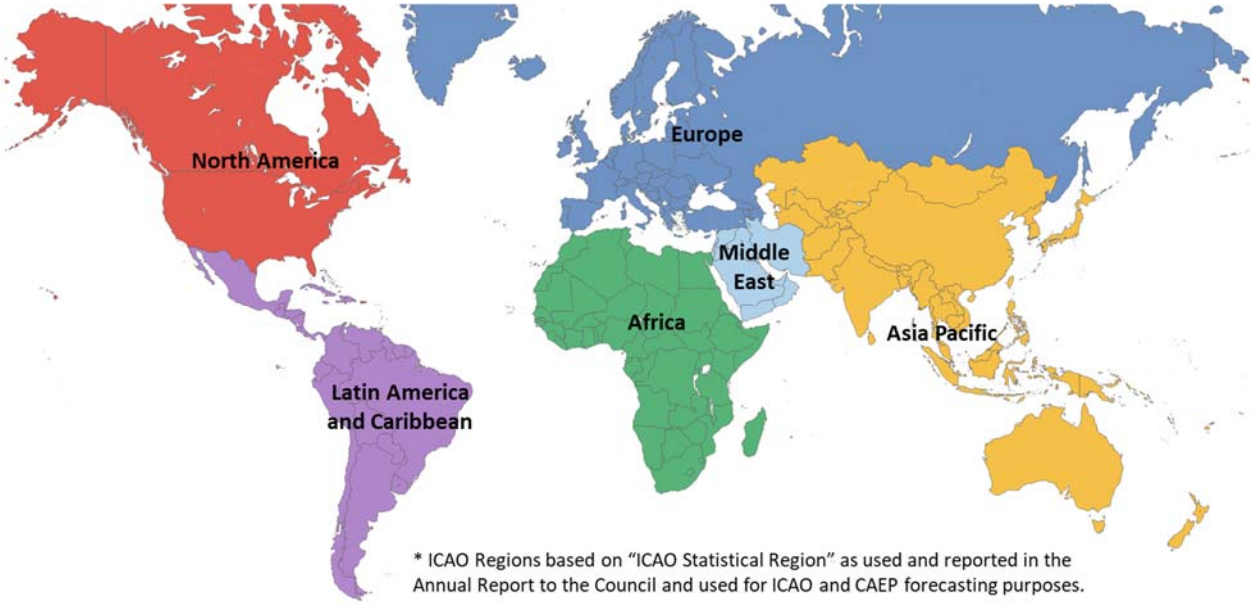


Figure 17 | **ICAO Regions Definitions**

Figure 18 shows the regional distribution of estimated offsetting requirements from 2024 to 2035 based on the CAEP/13 CO_2 emissions trends and assumptions on the expected implementation of CORSIA through 2035.

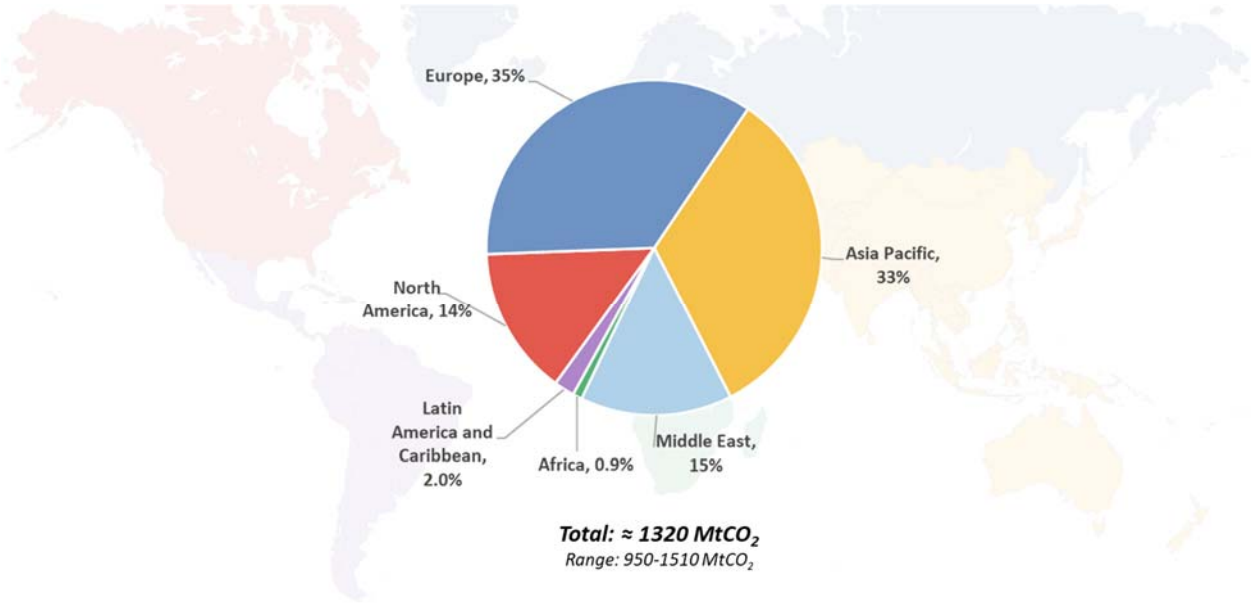


Figure 18 | **Regional breakdown of demand i.e., regional distribution of offsetting requirements (2021-2035)**

Figure 19 shows the regional breakdown of offsetting requirements by ICAO Regions. Offsetting requirements were then placed in context of CO_2 emissions from international aviation (as displayed in Figure 19 that depicts percent CO_2 emissions to offset divided by CO_2 emissions from international aviation; aka Chapter 2 CO_2 emissions).

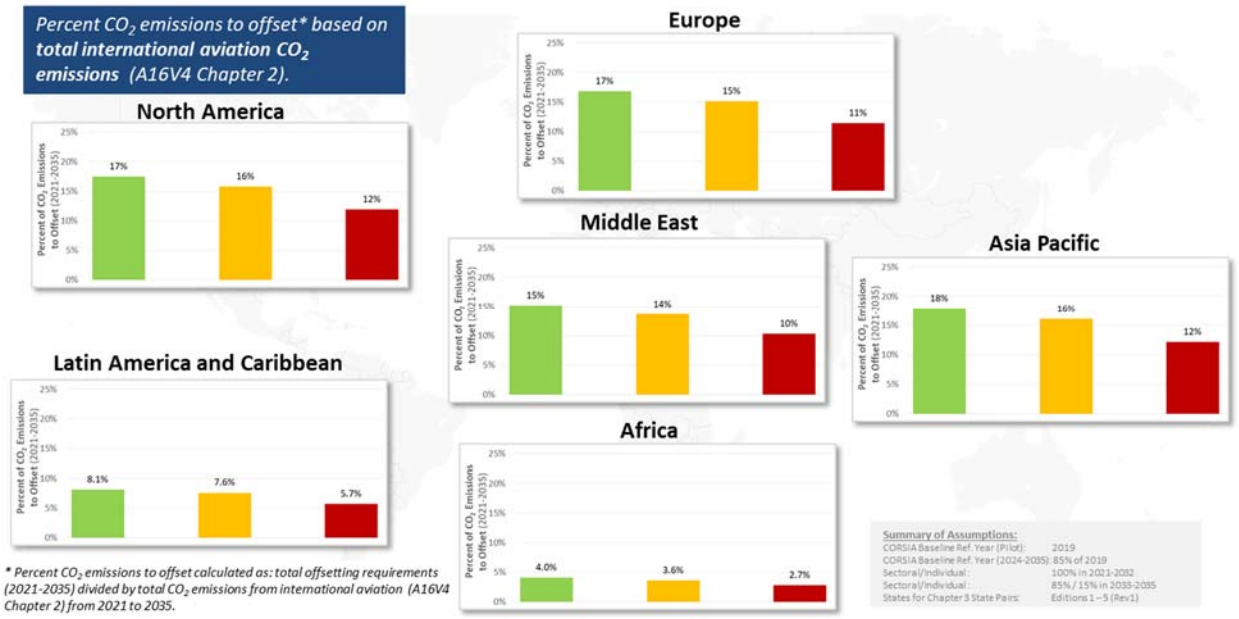


Figure 19 | **Regional Distributions of Offsetting Requirements Relative to CO_2 emissions**

Figure 20 shows the same estimates of offsetting requirements in context of CO_2 emissions from international aviation subject to offsetting requirements (i.e., Chapter 3 CO_2 emissions).

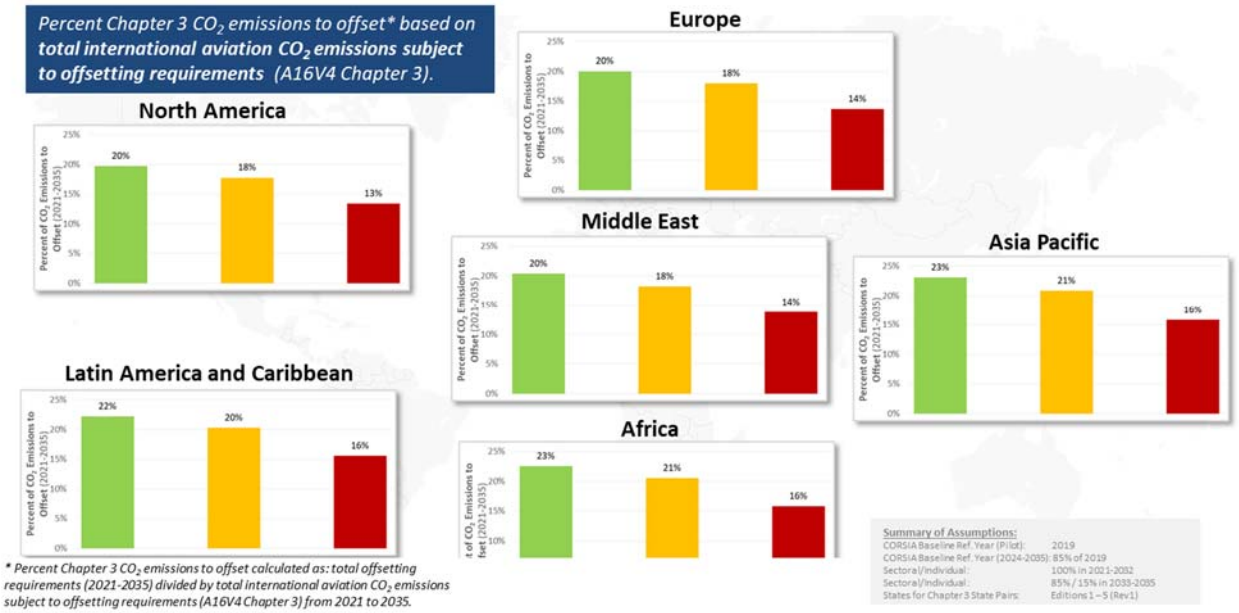


Figure 20 | Regional Distributions of Offsetting Requirements Relative to CO_2 emissions subject to Offsetting Requirements.

All regions show the effect of the COVID-19 global pandemic in a similar manner. The percent of CO_2 emissions offset, which is driven by the participation of States in CORSIA, the CORSIA baseline and the overall growth between 2021 and 2035 on the 40 FESG route groups, is also similar across all regions, except certain regions where there is a relatively higher number of States that are exempted and not voluntarily participating which results in lower percent of CO_2 emissions offset through 2035.

Assessment of offsetting requirements (demand) given the supply of emissions reductions from CEF and CEEUs

The CTAG CORSIA Analyses Group applied the framework described in Figure 21 for its forward-looking assessment of CORSIA offsetting requirements and how they may be met with a focus on the first phase of CORSIA. Based on interim and available information and data, Figure 22 summarizes the role of emissions reductions from CEFs and CEEUs during the first phase of CORSIA.

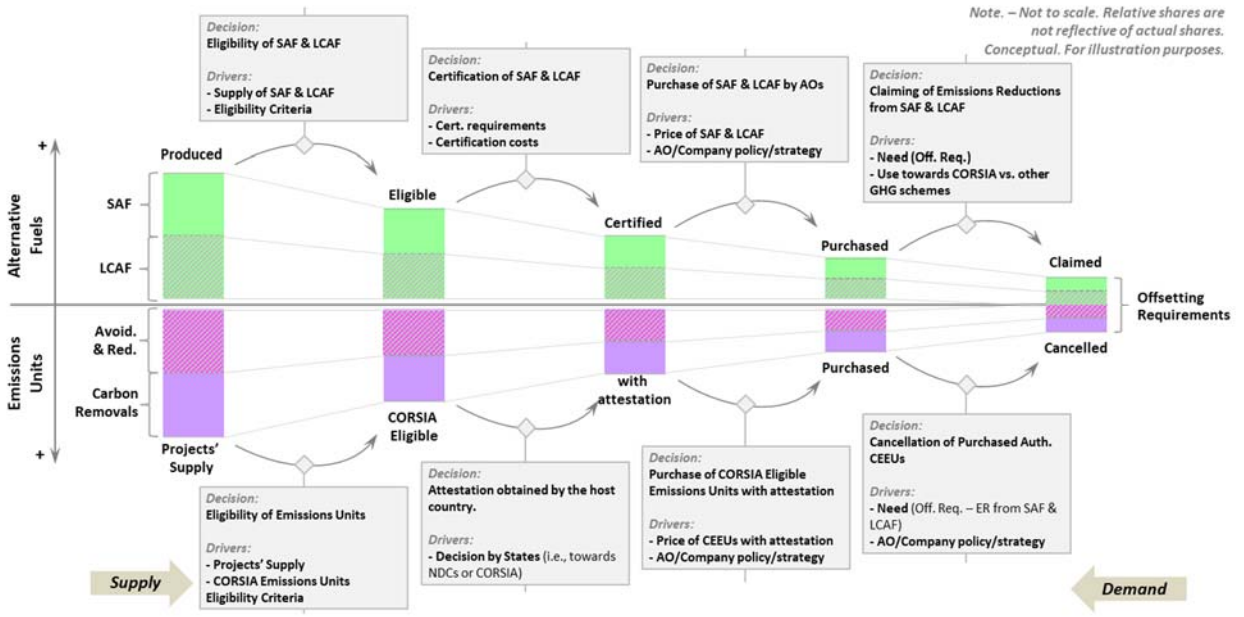


Figure 21 | **Framework towards the assessment of the role of Emissions Reductions from CEF and CEEUs**

The CORSIA Analyses task group has started to collect and process data to attempt to break down the estimates of SAF production, certified SAF, and Emissions Reductions from SAF claimed under CORSIA. Similarly, the CEEUs were broken down by ICAO Regions. Figure 22 depicts the regional distributions of emissions reductions from SAF and emissions units.

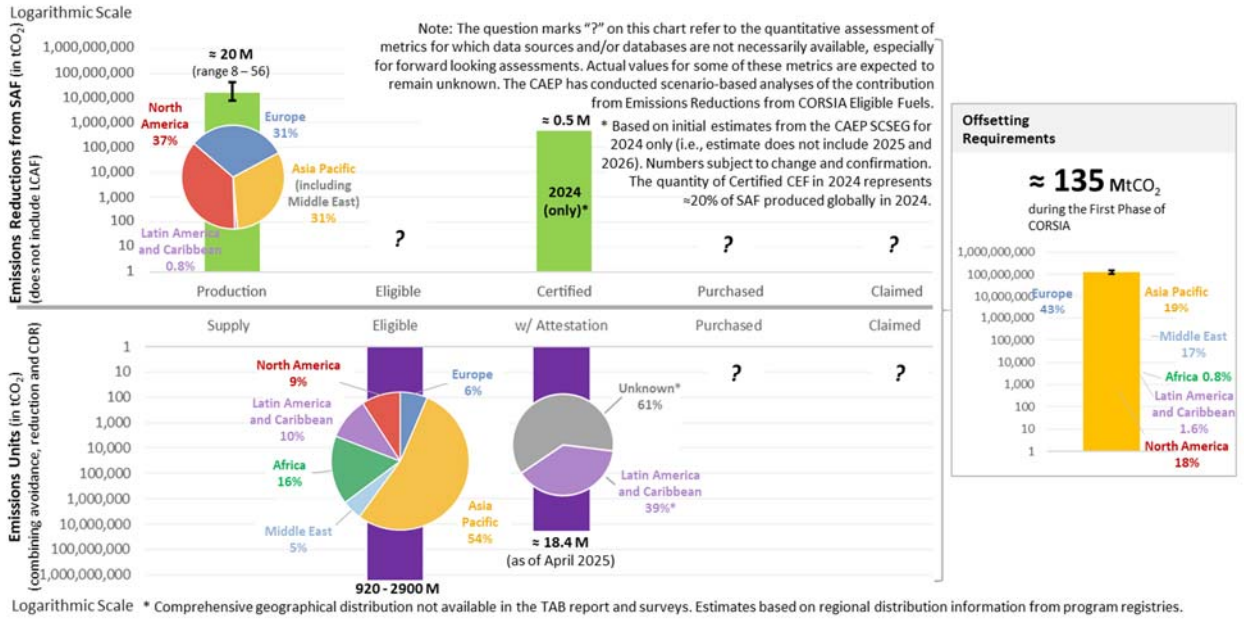


Figure 22 | **Assessment of the role of Emissions Reductions from SAF and CEEUs (Focus on 2024-2026)**

SAF & LCAF: Production

When estimating the emissions reductions from SAF (i.e., production of SAF regardless of its eligibility towards CORSIA) and as presented in Figure 24, data is based on a combination of International Air Transport Association (IATA) and CAEP WG5 CEF short-term production projection. The CAEP WG5 maintains two databases to meet the varied needs of ICAO:

- *Production Analysis Database* – This database includes announcements and production facilities that fulfill a set of scope and data requirements.
- *Announcements Database* – This database includes announcements including characteristics of the expect SAF production that help assign a maturity level used in assessing the likelihood of future production under various scenarios.

The projection analysis considers a set of four production scenarios: Low, Moderate, High, and High+. The different scenarios are representative of more pessimistic or optimistic expectations on the development of the SAF market in the short term. The CAEP WG5 SAF short-term production projections uses 2024 as the baseline year based on SAF production estimate by IATA of 1 million tonnes of SAF.

As shown in Figure 24, across the four scenarios (Low, Moderate, High, and High+), SAF volumes in the year 2030 range from 2.3 Mt in the Low scenario, to 32.1 Mt in the High+ scenario.

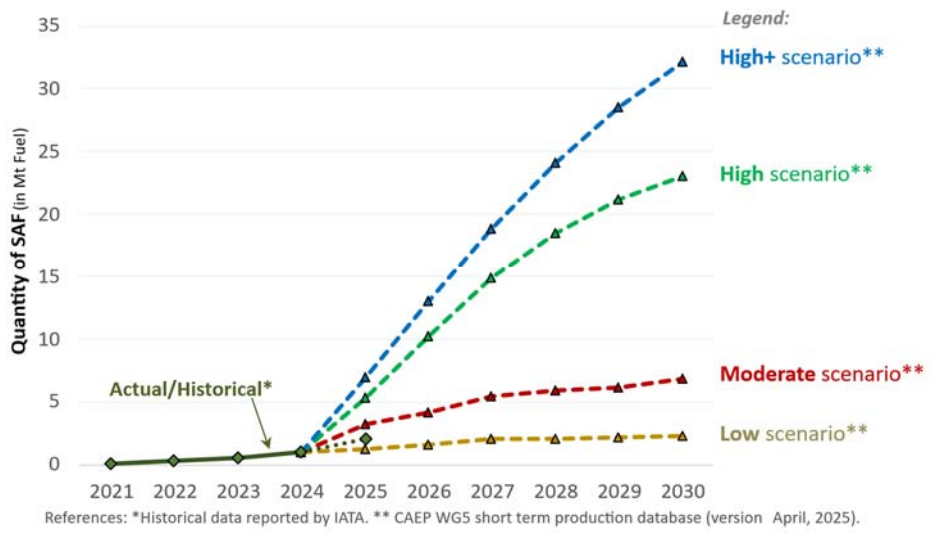


Figure 23 | Scenario-based projections of the production of SAF in million tonnes of fuel

For the purpose of estimating the first order magnitude of emissions reductions associated from SAF produced in 2024 through 2026, an average emissions reduction factor (ERF) of ≈75% was assumed with a range from ≈65% based on the CAEP Long Term Aspirational Goal (LTAG) F1 scenario and ≈85% based on CORSIA Default Values for Tallow and Used Cooking Oil based SAF as 85% of SAF supply over the next five years should be produced from this type of process and feedstock. Figure 24 shows potential emissions reductions associated with the SAF production scenarios and assumptions on emissions reductions factor. Under the moderate scenario, emissions reductions from SAF may reach up to ≈20 Mt CO_2.

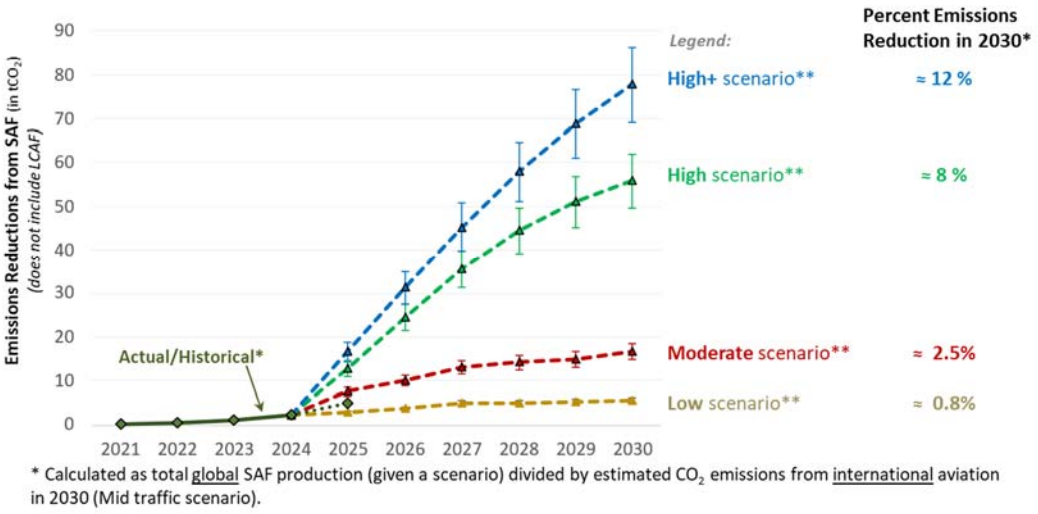


Figure 24 | Scenario-based projections of potential emissions reductions from SAF

While the LTAG-TG assumed a potential role of LCAF starting in 2026, there are currently no details about announcements of the availability of LCAF for CORSIA purposes. Such information is being tracked and will be considered as it becomes available.

CEF & LCAF: Certified

The SCS reports on Certified CEFs only provided actual/historical data. Initial estimates by the CAEP Sustainability Certification Scheme Evaluation Group (SCSEG) for certified CEF in 2024 were considered. There are no forward-looking projections on how much CEF may be certified in the future.

CEF & LCAF: Purchased

SAF memoranda of understanding (MOU) and purchase contracts are distinct from actual SAF usage by airline operators. Data on SAF volume and CO_{2e} emissions reductions was collected from airline ESG reports from 2019 to 2024 and announcements from 2024 onward. This data is used for other CORSIA analyses purposes but not reported on Figure 22 as the quantities of SAF reported and announced by operators do not specify the share of CEFs with Certification.

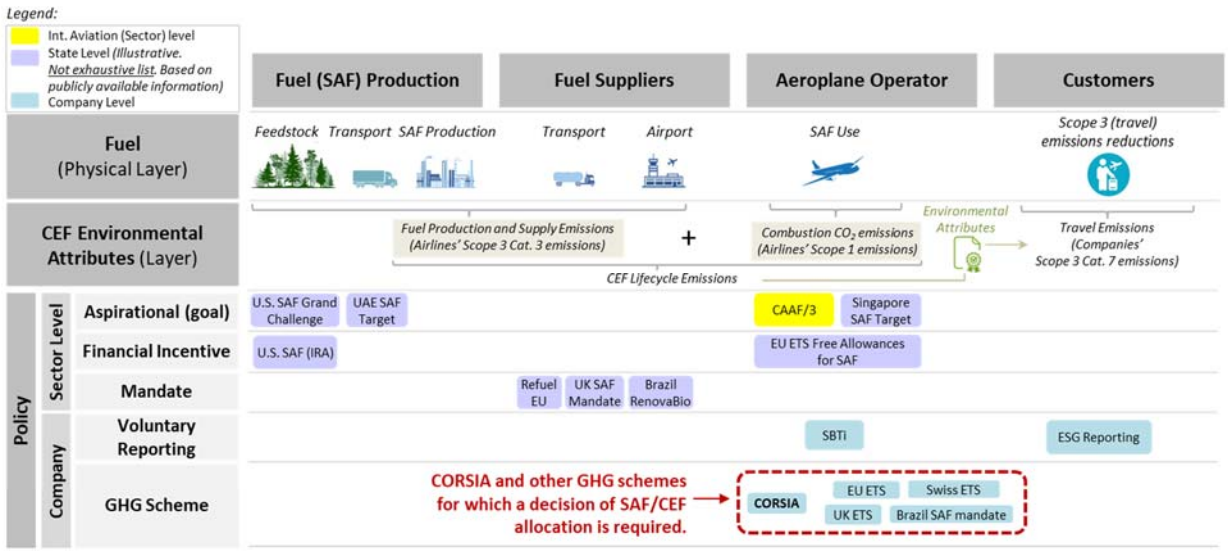
CEF & LCAF: Claimed under CORSIA

For the purpose of forward-looking assessments and given the uncertainty in the fraction of SAF that may be certified towards CORSIA, purchased and ultimately claimed by operators, the CAEP WG4 (CTAG) developed scenarios that provide an upper bound of the contribution from emissions reductions from CEF based on the scenarios of productions of SAF and a lower bound where no CEF is claimed towards CORSIA.

While CORSIA is the only global market-based measure applying to CO_2 emissions from international aviation, emissions reductions from CEFs may be claimed towards other GHG schemes. The CAEP identified and reviewed other relevant GHG schemes. The CAEP also started to assess the use of SAF/CEF by aeroplane operators and quantify the likelihood of claiming SAF/CEF towards CORSIA in comparison to other schemes.

Figure 25 depicts the SAF supply chain, considering both the physical layer and the environmental attributes layer. On the physical layer, the first step is the production of the SAF which includes the acquisition of feedstock, its transportation and the actual production of the SAF. Once the SAF is produced it is generally transported to a jet fuel blending point that may be at an airport but could also be at a remote location in the jet fuel transportation network. The blended SAF is then used by the global aviation system (not necessarily the operator who purchased

the SAF and would claim its environmental attributes). The CEF Environmental Attributes depict the emissions and emissions reductions associated with the production and use of the CEF. The emissions associated with the fuel production and supply emissions are upstream emissions of the combustion CO_2 emissions by the operator. They are generally referred to as airlines' scope 3 category 3 (upstream) emissions and airlines' scope 1 emissions respectively. Downstream of the aeroplane operator, the customer (i.e., flying public or corporations) may purchase the environmental attributes of the CEF to reduce its "Travel Emissions" (i.e., companies' scope 3 category 7 emissions). The use of environmental attributes of CEF to address companies' scope 3 category 7 emissions (e.g., for ESG reporting purposes) is not considered double claiming given the different emissions accounting frameworks.



* *Not an exhaustive list given the ongoing development of national schemes (to address domestic aviation). Subject to updates and future work by CAEP.*

Figure 25 | Identification and Review of Other Relevant GHG Schemes

Figure 25 also depicts policies related to SAF incentivization, development support, and accounting of its emissions reductions. At the sector level, various aspirational goals on the production of SAF (e.g., US SAF Grand challenge, UAE SAF Target) were reviewed as well as the operator level CAAF/3 aspirational goal for international aviation. Financial incentive mechanisms may also affect the production of SAF (e.g., US SAF IRA fuel production incentives) along with mandate on the supply of SAF (e.g., Refuel EU). Finally, companies may also have voluntary goals and reporting associated with the use of SAF or CEF (e.g., Science Based Target initiative at the company level and ESG reporting for companies which includes travel emissions). None of these policies and mechanisms are considered "other GHG schemes" from a CEF claiming perspective. In other words, these SAF production and supply incentivization mechanisms can co-exist with CORSIA without risks of double claiming.

From the universe of policies, the following were considered to require a decision with regards to SAF/CEF allocation: EU-ETS, UK-ETS, Swiss ETS, and the Brazil SAF mandate. Each GHG scheme possibly triggering a decision by operators have specific applicability rules and SAF eligibility criteria, including provisions for domestic emissions (not included in the scope of applicability of CORSIA that applies to international aviation only). The main characteristics of each Scheme are shown in Figure 26. It should be noted that the set of other schemes presented in Figure 26 does not represent an exhaustive list given the ongoing development of national schemes (to address domestic aviation). CAEP intends to continue to monitor the development of other relevant schemes and update its analyses accordingly.

Scheme*	Scope	Types of Fuel Eligible	Description
CORSIA	**Global**	**CORSIA Eligible Fuels**	**Operators may claim emissions reductions from CORSIA Eligible Fuel**
EU ETS	Regional	Food/Feed crop-based fuel not allowed	Operators may claim emissions reductions from eligible SAF
UK ETS	National	Food/Feed crop-based fuel not allowed	Operators may claim emissions reductions from eligible SAF
Swiss ETS	National	Food/Feed crop-based fuel not allowed	Operators may claim emissions reductions from eligible SAF.
Brazil SAF Mandate	National	Aligned with CORSIA	Operators should reduce net emissions using SAF

* Not an exhaustive list given the ongoing development of national schemes (to address domestic aviation). Subject to updates and future work by CAEP.

Figure 26 | **"Other GHG Schemes" Possibly Triggering a Decision by Operators to Claim SAF/CEF**

Demand from CORSIA and other schemes is likely to exceed the supply of SAF/CEF, making it a supply constrained market. The use or allocation of limited emissions reductions from SAF/CEF (towards the least overall cost outcome) will likely be driven by the costs of alternatives e.g., emissions units under CORSIA and carbon permits (allowances) under other GHG schemes. Figure 27 shows a simplified decision tree representing the drivers and the process by which an aeroplane operator may decide to allocate (i.e., claim) CEF towards CORSIA vs. other GHG schemes or not claimed towards any schemes.

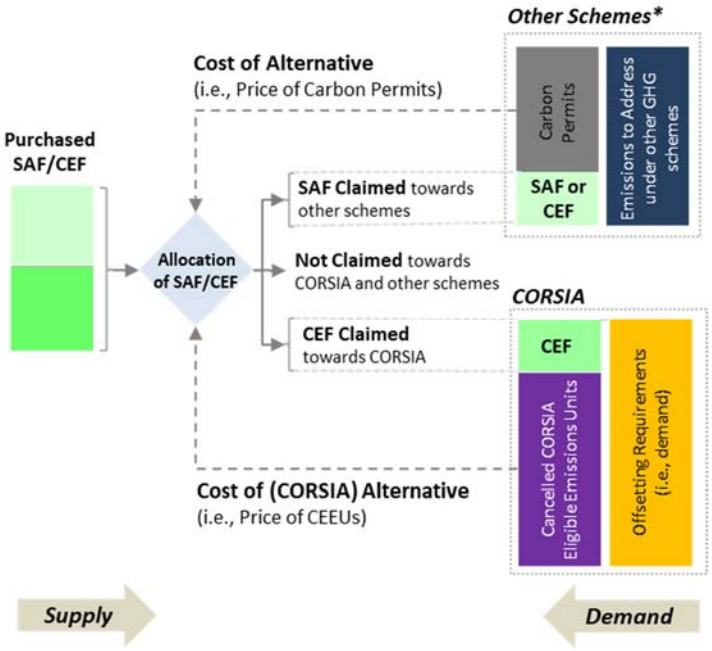


Figure 27 | **Assessment of the Potential Allocation of SAF/CEF to CORSIA vs. other GHG Schemes**[1]

[1] "CORSIA is the only global market-based measure applying to CO_2 emissions from international aviation" (ICAO Resolution A41-22 par. 18). Note: Through C-DEC 232/6 action e), the Council requested CAEP to consider "other […] GHG schemes", which requires considering specific country and/or regional schemes for purpose of technical analyses.

If an aeroplane operator has purchased SAF, some of which may be certified CEF, depending on the GHG schemes that are applicable it could need to decide where to allocate the emissions reductions from the SAF/CEF. As shown on Figure 27, CEF could be claimed under CORSIA to meet offsetting requirements in a given compliance cycle. The remainder of the offsetting requirements (i.e., final offsetting requirements) would need to be addressed with CEEUs. Alternatively, the operator may choose to allocate the SAF toward the other GHG schemes to reduce its needs for carbon permits to meet its obligations. All else being equal, the price of the alternatives (i.e., CEEUs or Carbon Permits) may drive and be a factor driving the allocation decision. If the prices of carbon permits are greater than CEEUs, a least cost of compliance approach would indicate that the SAF would be allocated towards the other GHG scheme. It is important to highlight that other factors, such as the cost of certification of CEF, may also play a role in how SAF/CEF may be claimed. Specific provisions of other schemes (affecting the allocation of SAF/CEF) are yet to be accounted for in this initial assessment.

The CAEP has started to implement the assessment approach presented in Figure 27 via independent and complementary analyses.

Assessment based on Operator Reported SAF Use and Uptake Announcements

The use/claiming of emissions reductions from SAF/CEF towards CORSIA or other GHG schemes is inherently an operators' driven decision (considering applicable schemes and alternatives). As such, aeroplane operator data of SAF actual usage and planned/announced usage was collected. Two tiers of data were considered in this analysis. Tier 1 included actual SAF usage as reported by operators, for example through their ESG reports. Tier 2 was based on operators' announcements of SAF uptake. As the announcements include volume of SAF and years of start and end of procurements. The WG5 Moderate scenario uptake rates were used as a proxy to allocate SAF across years. Figure 28 shows an overview of the analysis approach. The operator level data was then aggregated by State of attribution. Given the applicability of GHG schemes, the SAF actual and planned/announced usage was calculated for "CORSIA only" States vs. States with CORSIA and other GHG schemes.

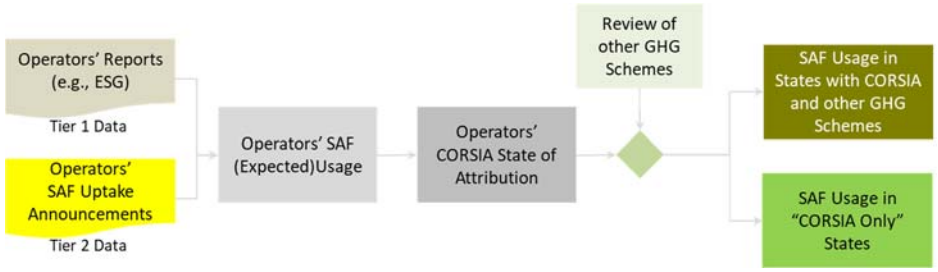


Figure 28 | Approach for collecting data on SAF actual and planned usage and categorization by applicability of CORSIA and other schemes if applicable

Figure 29 shows the State level aggregation of operators' actual and planned SAF usage from 2021 to 2026 with general applicability of schemes.

State of Attribution	2021	2022	2023	2024*	2025*	2026*	Applicablity of other GHG Schemes
Australia	-	2,535	6,807	7,993	10,265	13,503	CORSIA Only
China	3	450	1,085	11,144	14,660	19,195	CORSIA Only
Finland	-	-	2,266	4,855	5,132	6,751	CORSIA & Other GHG Scheme(s)
France	-	44,400	88,799	115,799	239,261	314,738	CORSIA & Other GHG Scheme(s)
Germany	-	13,000	88,903	95,000	384,564	473,047	CORSIA & Other GHG Scheme(s)
Hungary	-	-	-	-	34	-	CORSIA & Other GHG Scheme(s)
Ireland	-	-	-	1,000	-	-	CORSIA & Other GHG Scheme(s)
Japan	4	125	351	-	-	-	CORSIA Only
New Zealand	-	-	-	-	-	24,000	CORSIA Only
Norway	-	1,777	1,759	-	-	-	CORSIA & Other GHG Scheme(s)
Qatar	-	-	3,120	-	-	-	CORSIA Only
Singapore	-	1,000	-	1,000	1,000	-	CORSIA Only
Sweden	-	3,083	6,049	11,000	15,140	15,140	CORSIA & Other GHG Scheme(s)
United Arab Emirates	-	153	179	9,084	-	-	CORSIA Only
United Kingdom	-	1,952	55,671	172,106	68,717	80,842	CORSIA & Other GHG Scheme(s)
United States	13,488	24,218	48,489	145,327	650,625	1,044,265	CORSIA Only
Total SAF (in tonnes of Fuel)	13,495	92,692	303,478	574,309	1,389,398	1,991,481	

* Planned/Announced.

Figure 29 | State level aggregation of operators' actual and planned SAF usage from 2021 to 2026 with general applicability of schemes

As shown on Figure 30, based on partial data reported by operators for 2024 and estimates based on announcements through 2026, approximately 49% of the global SAF usage from 2024-2026 may be by operators attributed to States where only CORSIA is applicable. It should be noted that this analysis does not include the allocation of crop-based SAF (not eligible under the EU ETS, UK ETS and Swiss ETS) that may be used towards CORSIA (if any). It also does not include specific obligations from individual operators regarding other GHG schemes (beyond CORSIA). Finally, it assumes that all the CEF possibly claimed towards CORSIA would be certified.

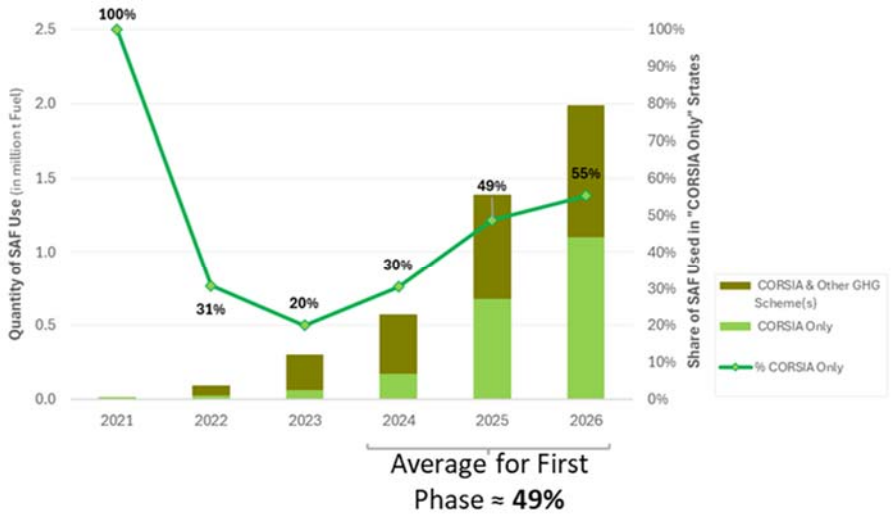


Figure 30 | Summary of results on operators' actual and planned SAF usage from 2021 to 2026 given the applicability of schemes

Multi-Factor Assessment of the Potential Allocation of SAF

To assess the potential SAF/CEF allocation on CORSIA and Other Schemes across all CORSIA phases, an analysis of **SAF distribution** and **allocation decision**, given the characteristics of the various GHG schemes, was conducted. Figure 31 shows the approach considered for the SAF allocation decision.

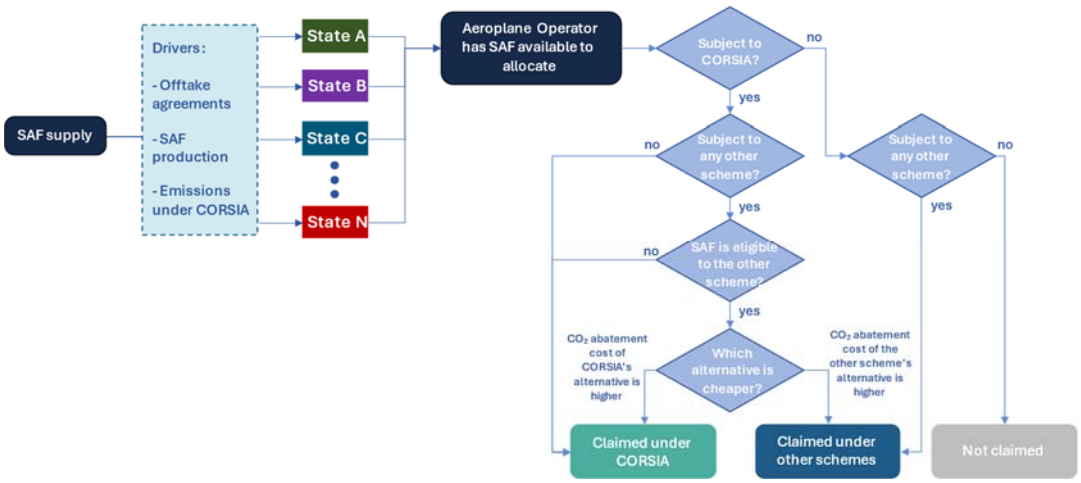


Figure 31 | **Assessment of the SAF Allocation decision**

The first part of the analysis consists of distributing SAF to operators and States. The total SAF supply considers the average Moderate scenario of total emissions reductions from SAF shown in Figure 24. This part of the analysis takes into consideration three factors as contributors to SAF distribution: (1) the commitment of operators to buy SAF through off-take agreements, (2) the geographic location of the SAF production facilities in place and announced to start operations in the coming years, and (3) the level of operators' emissions covered by CORSIA Chapter 2 emissions.

- *Off-take Agreements*: This factor reflects the share of SAF allocated to operators that have entered into off-take agreements with SAF producers, demonstrating their commitment and interest in purchasing SAF.
- *Location of SAF Facilities*: This factor captures the impact of SAF distribution logistics and acknowledges that States expected to host SAF production facilities are introducing policies to support both SAF production and use.
- *CO_2 Emissions*: This factor accounts for the greater capacity of larger aeroplane operators to invest in SAF, as well as their increased need for emissions offsetting due to higher overall emissions.

Once SAF is distributed to the States, each State's SAF share is allocated based on the specific rules of any applicable GHG Schemes, i.e., according to the information summarized Figure 26. The CO_2 abatement cost for the SAF claim alternative under each Scheme was determined using historical pricing data. If an alternative is not available or not yet defined for a particular Scheme, it is assumed to be more expensive than CORSIA Emissions Units. It was also not considered possible pricing differences concerning the certification process under each scheme.

In the first phase of CORSIA (2024–2026), off-take agreements should play a more prominent role in the distribution of SAF among operators than other factors. Given the limited SAF supply, only a subset of operators will have access to it. Additionally, many state-level policies are set to come into effect during or after this initial phase. Therefore, for the first phase, only the off-take agreements factor was considered. For the second phase, the average of the three factors was used.

The share of crop-based SAF available is determinant to the results, since this kind of feedstock is restricted in some of the Other GHG Schemes. The LTAG Report on Fuels[2] estimates a roughly 40% share of crop-based fuel in 2035. However, from the SCS reports available so far, limited SAF has been certified using this kind of feedstock. It is expected that this share will increase as new SAF facilities start to operate, and more feedstock is needed. The analysis considered a 0% share of crop-based SAF for the first phase of CORSIA and both 0% and 40% scenarios for the other compliance cycles.

[2] ICAO, "ICAO Report on the feasibility of a long-term aspirational goal (LTAG) for international civil aviation CO_2 emission reductions - SAF production projections and associated GHG emissions reductions", Available at: https://www.icao.int/environmental-protection/LTAG/Documents/ICAO_LTAG_Report_AppendixM5_AttachmentB.pdf

Figure 32 shows the assessment results based on the assumptions outlined above. During CORSIA's First Phase, a total of 48% of the available SAF would be allocated under the scheme. Within this phase, the proportion of SAF claimed under CORSIA is projected to be lower in 2024 compared to 2025 and 2026, due to a larger share being directed to States operating Other GHG Schemes. For the second phase, when CORSIA becomes mandatory, the share of SAF claimed under CORSIA may increase to a range between 58 and 70%, depending on the proportion of crop-based SAF available in the market.

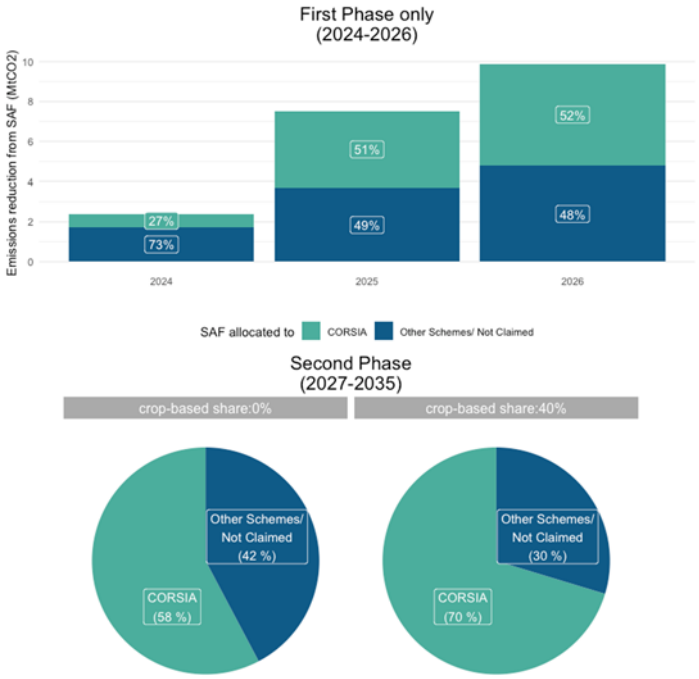


Figure 32 | **Assessment of the Potential Allocation of SAF/CEF to CORSIA vs. other GHG Schemes**

As presented in the two subsections above, the CAEP conducted two complementary assessments of the historical, current and expected use of SAF/CEF including:

- Operator based analyses using operator reported SAF usage (Tier 1 data), announcements of SAF uptake (Tier 2 data).
- Multi-factor assessment including: SAF announcements, SAF production across States and emissions distribution.

Figure 33 shows the summary of results of the assessments of the potential allocation of SAF/CEF to CORSIA vs. other schemes. First order assessments indicate that ≈ 48-50% of CEF SAF, produced globally, may be claimed towards CORSIA (the remainder towards other schemes or not claimed). This percentage may increase with increasing fractions of crop-based CEF, however the share of crop-based CEF is likely to remain limited during the first phase of CORSIA.

For the purpose scenario-based analyses, a 50% fraction was assumed. It should be noted that this analysis does not include a constraint on the share of CEF certified in 2024 (pending confirmation by SCSEG). Such constraints will be added in future CAEP assessments. In addition, additional tracking and work is needed and expected to further refine future assessments.

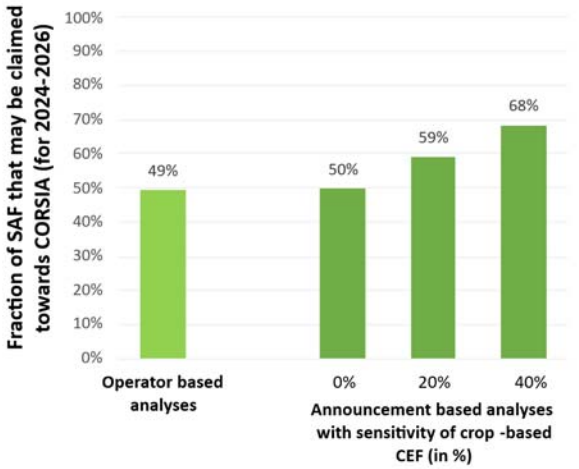


Figure 33 | Summary of Results of Assessment of the Potential Allocation of SAF/CEF to CORSIA vs. other Schemes

Given the uncertainty in how aeroplane operators may choose to address offsetting requirements (i.e., mix of ER from CEF and/or Emissions Units), a scenario-based assessment was conducted. Figure 34 shows the scenarios capturing the range of options for claiming emissions reductions from CEF and/or CEEUs to address offsetting requirements during the First Phase of CORSIA (2024-2026). As depicted on Figure 15, under a mid-traffic scenario, offsetting requirements during the First Phase may reach approximately 135 $MtCO_2$. As shown on the far-left bar of Figure 15, these offsetting requirements may be addressed with emissions reductions from CEF according to (Moderate CEF scenario) assuming that all the CEF produced would be claimed under CORSIA. The remainder of the offsetting requirements (i.e., final offsetting requirements) would be addressed using CEEUs. As shown on the second bar and considering the results of the assessments summarized above (i.e., Figure 33) a fraction (e.g., 50%) of the emissions reductions from CEF according to (Moderate CEF scenario) could be claimed towards CORSIA with the other half being claimed towards other GHG schemes or not claimed at all. As with the previous scenario, the remainder of the offsetting requirements (i.e., final offsetting requirements) would be addressed using CEEUs. Finally, as a bounding scenario, if none of the CEF is claimed towards CORSIA, the entirety of the offsetting requirements could be addressed using CEEUs only.

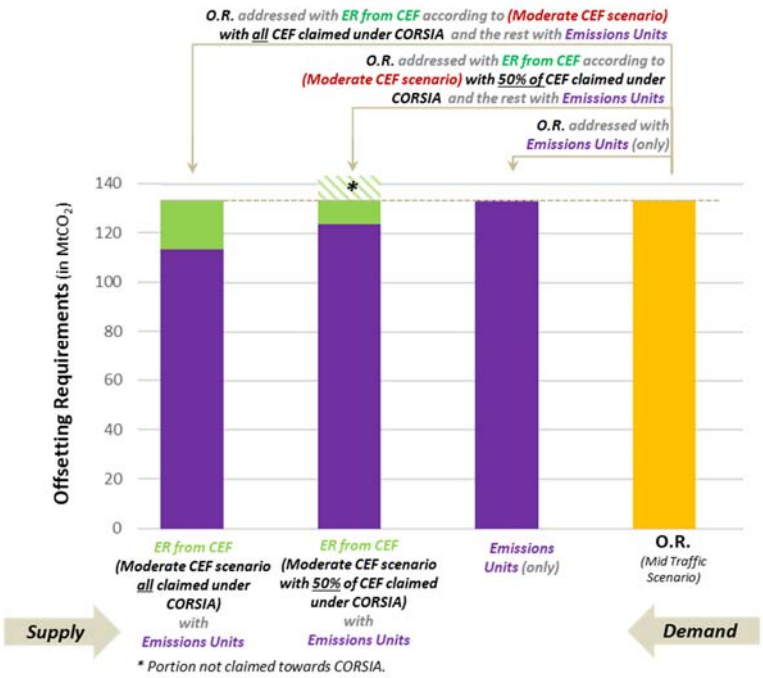


Figure 34 | Scenarios capturing the range of options for claiming emissions reductions from CEF and/or CEEUs to address offsetting requirements during the First Phase of CORSIA (2024-2026)

Cumulative Final Offsetting Requirements (i.e., demand for emissions units) during the First Phase (2024-2026) would vary depending on traffic and emissions reductions from CEF scenarios. Figure 35 shows the summary results of the splits between cumulative emissions reductions from CEF and cumulative final offsetting requirements during the First Phase (2024-2026) across traffic scenarios and CEF scenarios.

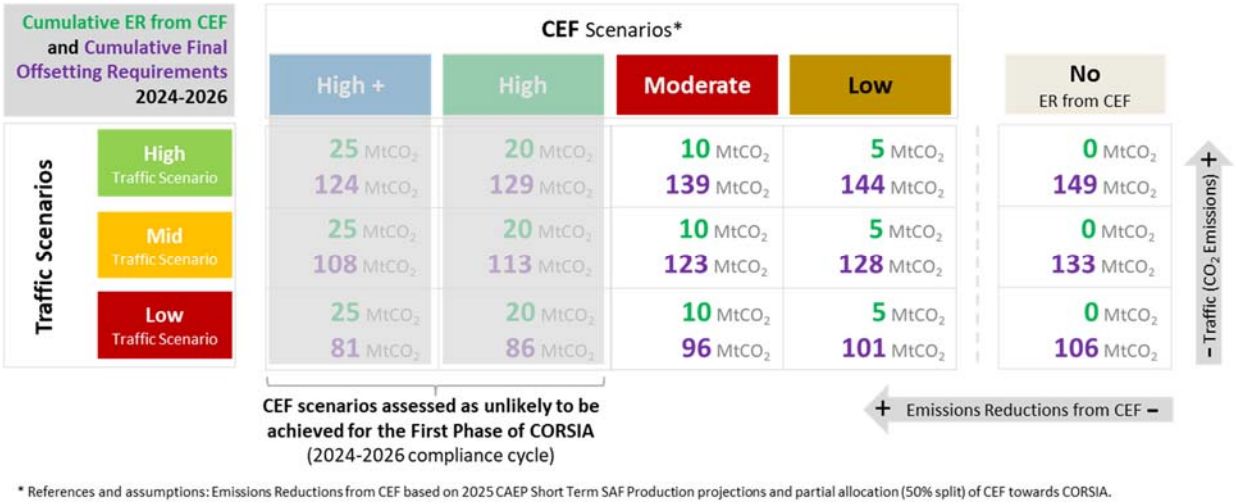


Figure 35 | Summary of potential claiming of emissions reductions from CEF and/or CEEUs across traffic forecasts and CEF scenarios (illustration for 50% allocation towards CORSIA vs. other schemes)

As noted in the subsection on "SAF/CEF: Production" the CAEP WG5 High and High+ CEF Scenarios were assessed as unlikely to be achieved for the First Phase of CORSIA (2024-2026 compliance cycle). Depending on the traffic forecasts and the amount of SAF produced in the coming years, emissions reductions from CEF may range from 0 to 20 $MtCO_2$ (10 $MtCO_2$ if only half is claimed towards CORSIA). A total of 86 to 149 million CEEUs may be required to address final offsetting requirements during the first phase of CORSIA.

Emissions Units: Eligible

The data provided by TAB's most recent supply analysis (September 2023) finds that the two Council-approved programmes to supply units for CORSIA's first phase (2024 – 2026), ACR and ART, have the potential to issue up to around 270 – 320 million CEEUs for mitigation years 2021-2026.

For the first phase (2024-2026 compliance period), based on data collected in TAB's survey of June 2023 indicate that, the *"eight conditionally approved programmes would have the potential to issue 1 to 2 billion emissions units for mitigation years 2021-2026".*

Emissions Units: Host Country Attestation

On February 28, 2024, the Government of Guyana's announced the authorization of carbon units for use in the CORSIA for the 2024-2026 compliance period. Under the ICAO Council approved Architecture for REDD+ Transactions (ART) programme, 4.64 million CORSIA-eligible units have been issued and authorized by Guyana, now accessible to aircraft operators for meeting offsetting obligations. This decision applies the provisions of Article 6 of the Paris Agreement within the framework of the United Nations Framework Convention on Climate Change (UNFCCC). Guyana's host-country authorization ensures the environmental integrity of these carbon units, emphasizing the prevention of double-claiming between CORSIA and other national environmental purposes.

As of April 2025, the known supply of CORSIA EEUs with attestation reached approximately 18.4 million units.

The CTAG CORSIA Analyses Group intends to continue to track the availability of information and data on CEEUs with host country attestation.

As shown in Figure 36, after taking into account the potentiation contribution from emissions reductions from CEF, there is a gap in the supply of CORSIA EEUs with attestation of ≈95-115 million units (range across traffic forecasts and CEF scenarios: 70-130 $MtCO_2$). It is expected that the supply of CORSIA EEUs with attestation will increase in the coming year(s). It is critical to ensure that aeroplane operators can address their offsetting requirements under CORSIA during the first phase, where emissions units have to be cancelled no later than February 2028.

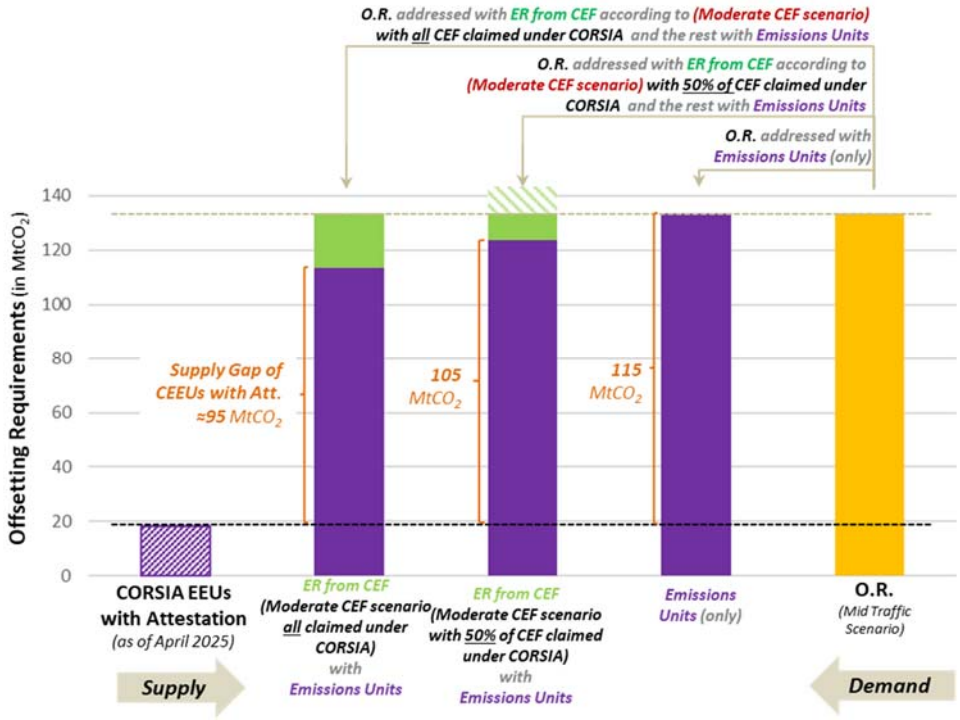


Figure 36 | **Gap in CEEUs with attestation for compliance during the First Phase of CORSIA**

Emissions Units: Purchased

Information and data on emissions units purchased by aeroplane operators may not be easily available as this information is not necessarily reported in a comprehensive manner.

Emissions Units: Cancelled towards CORSIA

For the purpose of analyses, Figure 37 shows the scenarios capturing the range of options for claiming emissions reductions from CEF and/or CEEUs to address offsetting requirements during the First Phase of CORSIA (2024-2026). These scenarios are then used to estimate the potential costs of compliance during the first phase of CORSIA.

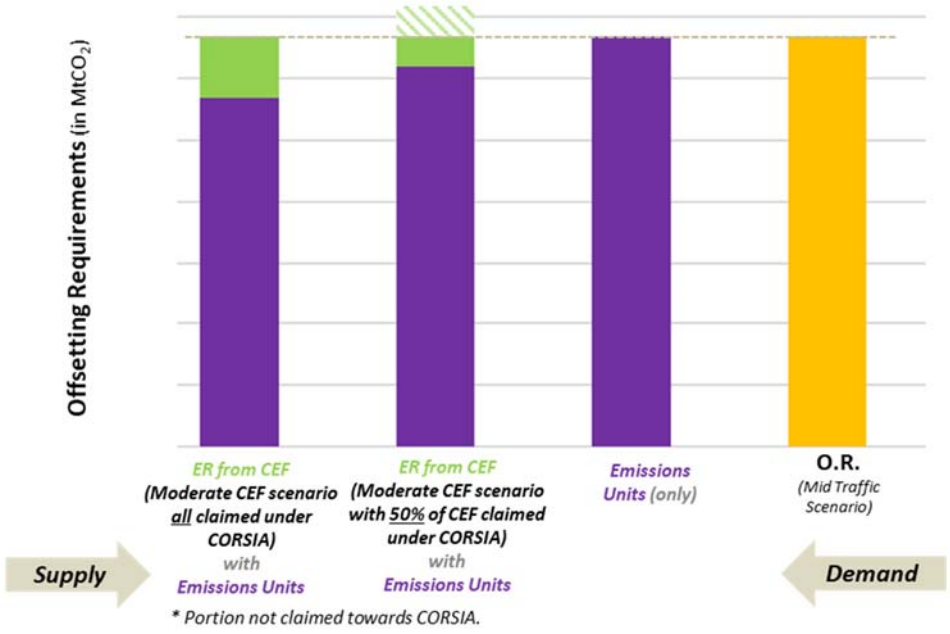


Figure 37 | Scenarios capturing the range of options for claiming emissions reductions from CEF and/or CEEUs to address offsetting requirements during the First Phase of CORSIA (2024-2026)

Potential costs of compliance (focus on the First Phase of CORSIA 2024-2026)

Cost of compliance with CORSIA Standards and Recommended Practices (SARPs), captured in Annex 16 Volume IV, include costs from CEEUs and emissions reductions from CEF as well as administrative costs associated with the CORSIA MRV processes as well as registry related costs. Figure 38 shows the scope of key functions and processes associated with CORSIA and identification of costs, emissions reductions and co-benefits.

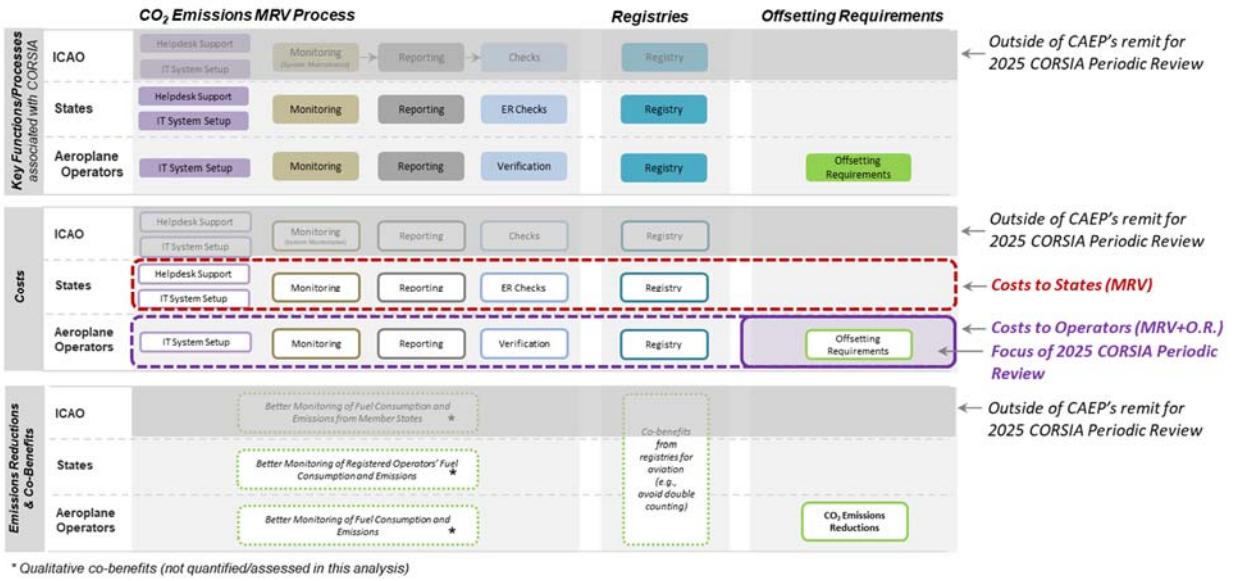


Figure 38 | Scope of key functions and processes associated with CORSIA and identification of costs, emissions reductions and co-benefits

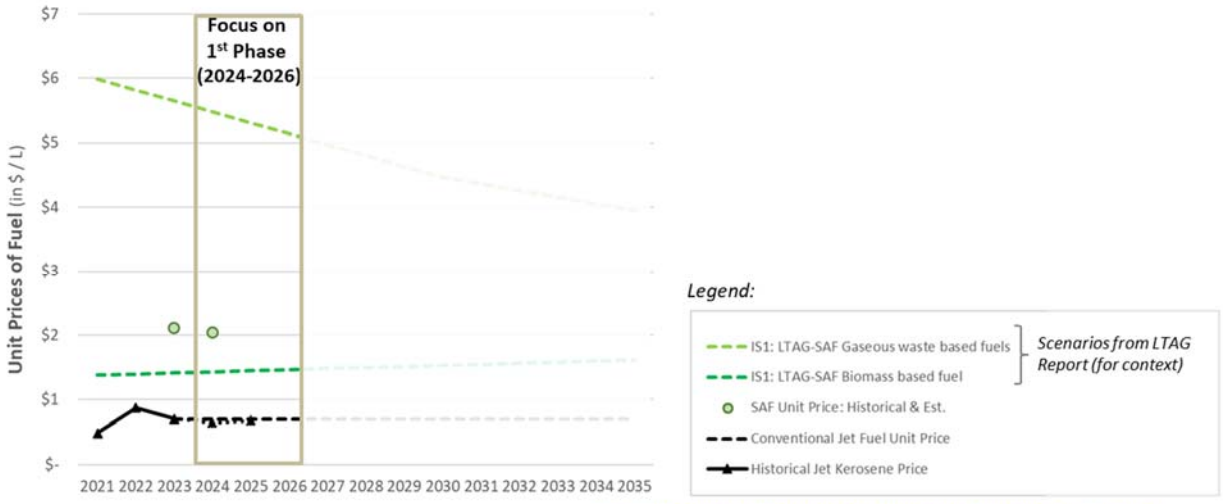
As noted as part of the technical assessments in support of the 2022 CORSIA periodic review, the costs to operators are largely driven by offsetting requirements, and to a lesser extent MRV. The costs to the States are solely from MRV. It was found that total MRV and Registry costs for all Aeroplane Operators and States could be approximately $430 million from 2018 – 2035 (ranging from $170 to 700 million). Aeroplane operators bear most of the total MRV costs (63% to 78%). Mid- and large-size aeroplane operators account for approximately 70% of total MRV and Registry costs for operators, with verification and monitoring the dominant costs. Verification is the dominant cost for aeroplane operators eligible to use simplified procedures.

Given the relative limited share of administrative costs to total costs and that the scope of applicability of CORSIA has not fundamentally changed since the 2022 CORSIA periodic review, the updated cost assessments have focused on the costs associated with from CEEUs and emissions reductions from CEF for the 2025 CORSIA periodic review.

Summary of Jet Fuel Unit Prices

Figure 39 shows the prices of SAF in context of prices of conventional jet fuel. From 2021 to 2023, the price of conventional jet fuel ranged from $0.49 to $0.87 per liter. As of December 2024, IATA estimated that conventional jet fuel prices averaged $0.64 per liter for 2024 and could be approximately $0.67 in 2025. It should be noted that as of April 2025, the price of conventional jet fuel has declined to approximately $0.53 per liter.

The unit price of SAF was approximately $2.1 per liter in 2023 and ranged from $1.8 to $2.3 in 2024 representing ≈ 3 times the price of conventional jet fuel.



* IATA, Industry Statistics, Industry Statistics, Fact Sheet, December 2024, www.iata.org/en/iata-repository/pressroom/fact-sheets/industry-statistics,
** Sources: IATA, Quantum Commodity Intelligence, Argus, EASA.

Figure 39 | Summary of estimates of price of SAF in context of the price of conventional jet fuel

Summary of Estimates of Price of Emissions Units

The CAEP WG4 Supply, Demand and Price task group considered the latest available information and data on prices of emissions units.

New data and external analysis on the price of CORSIA eligible emission units (CEEUs) has emerged since the scenario-based price analysis was updated in May of 2024. This includes two CORSIA Phase 1 EEU procurement events held by IATA, market reports from Quantum Intelligence and MSCI, and transactions in the voluntary carbon market. Taken together, CTAG-SDP has updated its pricing analysis to reflect the most up-to-date information in this nascent market.

CTAG-SDP estimated a price band of $10 to $40 per tCO_{2e} for Phase 1 (2024-2026) CEEUs. The lower end is informed by the voluntary carbon market while the upper bound is the rounded average of external market forecasts. Actual transactions have not exceeded $23 per tCO2e, and based on typical carbon market pricing behaviours, prices are expected to come down as volume comes online. However, groups like MSCI project potentially higher prices based on supply constraint risks. As such, the $10-$40 price range includes both actual and projected pricing data and reflects large uncertainties in the market. As more market information becomes available, such as supply volumes and CEEU transactions, pricing analysis will become more precise. Because data is still very limited, this analysis should not be considered final or determinative for future CEEU price trends.

The first large-scale purchase of Phase 1 CEEUs occurred in November 2024, supported by IATA in partnership with the Government of Guyana, Mercuria, and Xpansiv. CEEUs were sold at a fixed price of $21.70 per tCO_{2e}. A second procurement event was held in March 2025, where CEEUs sold for $22.25 per tCO_{2e}. In both events, The Government of Guyana made 1 million units available for sale. IATA intends to host quarterly procurement events for airlines through 2025.

Quantum Intelligence expects lower prices and larger volumes in the near term. In December 2024, Quantum Intelligence forecasted Phase 1 CEEUs will cost between $15 and $25 per tCO_{2e}, recognizing that work remains to narrow the figure and that the price band could move in the future. This mirrors trends observed in the futures market, where the Abaxx CP1 futures curve is in steep backwardation— usually a sign of tight supply, high demand, or both, with 2025 delivery starting at above $24/ tCO_{2e}, while December 2027 falls to $14.95/ tCO_{2e}.

MSCI forecasts a wider price range. In November 2024, MSCI reported Phase 1 CEEUs will fall anywhere between $18 and $51 per tCO_{2e}. The range is largely influenced by modelled uncertainty around supply volumes, which depends on countries' ability to authorize emission units for use towards CORSIA. If countries can provide attestation

and the supply of CEEUs become available to meet demand, prices will be lower. If supply continues to be constrained, prices will be higher. Other market uncertainties, such as fluctuations in demand, will also impact the price of Phase 1 CEEUs.

The voluntary carbon market (VCM) may function as an implicit price floor, in that the transaction cost of selling to a voluntary private buyer is lower than selling to an airline for use towards CORSIA or to a sovereign state for use towards its Nationally Determined Contribution (NDC). If a voluntary buyer and an airline are offering the same terms (price, volume, and structure), but the airline requires attestation of the outcomes, the seller is likely to prefer the voluntary buyer. Thus, an airline would need to exceed the highest price a voluntary buyer is willing to pay. Moreover, voluntary buyer coalitions such as the LEAF Coalition (Lowering Emissions by Accelerating Forest Finance) have committed to a price floor of $10 per tCO_{2e}. With that benchmark, it is unlikely emission units with attestation would sell at a lower cost.

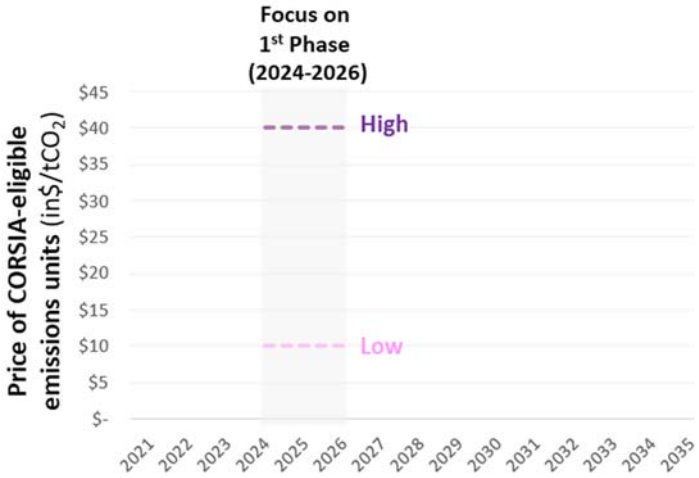


Figure 40 | **Summary of estimates of price of CEEUs for the first phase of CORSIA**

Several caveats apply to the range of prices of emissions units used for the purpose of the 2025 CORSIA periodic review. Although new data is beginning to emerge, accurate market information is still very limited. Previously, CTAG-SDP looked to the voluntary carbon market to forecast CEEU price scenarios. While the VCM remains an important indicator and helps to inform the price floor of CEEUs, voluntarily traded units do not reflect the price premium of attestation required for use towards CORSIA. At the same time, transaction data on CORSIA-eligible units with attestation remains extremely low. Operators have until January 31, 2028, to fulfil their CORSIA Phase 1 offsetting obligations for the period 2024-2026.

The CEEUs purchased by airlines in late 2024 and early 2025 were Jurisdictional REDD+ ART TREES credits as part of a fixed-price auction. The transaction price of around $22 reflects both the novelty of the transaction and today's supply constraint, where the first auctions took place in a situation of monopoly by the seller and the sales were of a novel project type. In addition to being the first (and only) sales of CORSIA Phase 1 emission units, they were the first sales of jurisdictional ART TREES emission units with attestation. Other factors that put upward pressure on the transaction price of these units include the transaction structure, the low volume of units traded, the low number of seller(s), and the type of seller.

Generally, the price of new project types trends downward over time as they become mainstream and other project types enter the market to compete. There often is a misconception that the cost of carbon credit markets goes up over time because the quality goes up. The only context within which the price of carbon credits reliably increases over time is if they are linked to an emissions trading scheme where supply is being intentionally ratcheted down on a regular basis, which is not the case with CORSIA.

While analysts expect prices for authorized units to come down as the rate and type of transactions increase and the private sector enters the market, some developments could moderate this downward trend over time. These include the introduction of national regulatory carbon prices (emissions allowances, levies) where regulators allow

emitters to surrender CORSIA carbon credits in lieu of paying the tax or surrendering permits. In such instances, emissions unit prices could be influenced by the cost of compliance alternatives, i.e., may fall just below a regulatory carbon price, which is typically higher than unregulated or over-the-counter emissions unit prices. Currently, only a few such systems are operational or planned, such as Singapore's national carbon tax—and their price impact is foreseen to be limited, both geographically and in terms of total demand volume.

Unknown supply volume is a major source of market uncertainty. Operators must purchase emission units that meet ICAO criteria, including corresponding adjustments that prevent double counting of emissions reductions towards a country's NDC. This requires countries to provide a Letter of Attestation (LoA) that authorizes the use of emission units towards CORSIA compliance. Host countries—where emission units are generated—are often developing countries that lack the infrastructure to issue LoAs. If this continues to be the case, the supply of CEEUs with attestation will remain constrained through the end of Phase 1. Capacity-building initiatives exist to address this, including Global Green Growth Institute, Article 6 Implementation Partnership, UN-REDD Programme, and more. Support for host countries to authorize the use of EEUs towards CORSIA will ease supply constraints and help to mitigate the cost associated therein.

There is also uncertainty around the demand for CEEUs. As captured in the technical assessments of offsetting requirements (i.e., demand for emissions reductions from CEF and/or CEEUs) conducted by the CAEP WG4 CTAG CORSIA Analyses group, a range from Low, Mid to High traffic forecasts was considered. These traffic forecasts were based on the CAEP/13 ICAO/CAEP traffic forecasts finalized in 2022/2023. They do not necessary reflect the potential impacts of recent/ongoing developments in global trades and the economy. Also, additional sources of demand for carbon offsets are expected in the years to come, including from Parties to the Paris Agreement that may use carbon markets to help achieve their NDCs, as well as from private companies.

Summary of Unit Prices

As shown on Figure 41, the cost abatement from the emissions reductions from CEF, defined as the CEF Premium divided by CO_2 emissions abated is assumed to range from ≈ $ 600 to $ 800 per tCO_2 during the first phase of CORSIA. The average unit prices of emissions units may range from ≈ $10 to $40 per tCO_2 during the first phase of CORSIA (2024-2026).

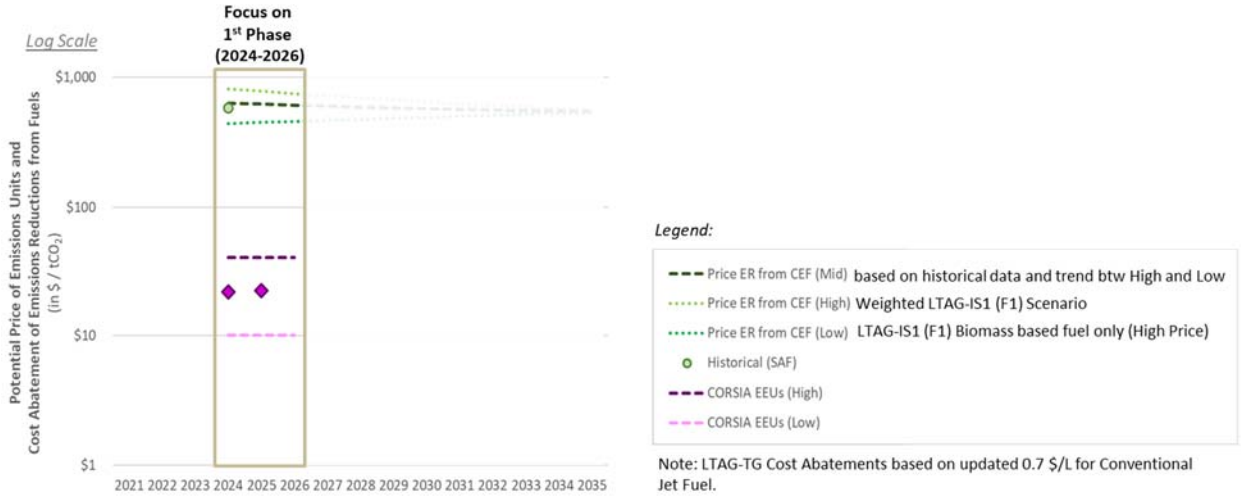


Figure 41 | **Summary of Unit Prices of CEFs and Emissions Units**

Costs of Addressing Offsetting Requirements during the First Phase of CORSIA

Figure 27 shows the scenarios for addressing offsetting requirements during the first phase of CORSIA with cost implications. Costs associated with addressing offsetting requirements from 2024 to 2026 could range from:

- ≈ $1 to 5 billion using Emissions Units only,
- ≈ $6 to 13 billion using a mix of Emissions Units and ER from CEF assuming that 50% of the CEF according to the latest CAEP Moderate scenario are claimed towards CORSIA, or
- ≈ $10 to 20 billion using a mix of Emissions Units and ER from CEF assuming that all the CEF according to the latest CAEP Moderate scenario are claimed towards CORSIA. These costs are lower than those anticipated in 2016 before CORSIA was agreed.

In 2016, the CAEP estimated the costs from a global market-based mechanism (MBM) to range from $2.2 to $6.2 billion (in 2025 alone). References: CAEP analysis presented at EAG/15 (January 2016); and IATA, *"Comments on the Cost Impact of a Global Carbon Offsetting Mechanism"*[3].

It should be noted that (1) the total cost abatement from CEF may not be fully attributable to CORSIA as airlines/operators have purchased and used SAF towards other decarbonization efforts (in the absence of CORSIA compliance requirements); (2) where States will implement SAF blending mandates (e.g., ReFuelEU Aviation regulation for EU Member States) the related abatement costs are more logically attributed to the blending mandate regulation instead of CORSIA; and (3) the actual cost of emissions reductions from CEF is expected to be lower than estimated in this analysis due to States' support (e.g., tax credits, subsidies) that reduce the effective (net) abatement cost.

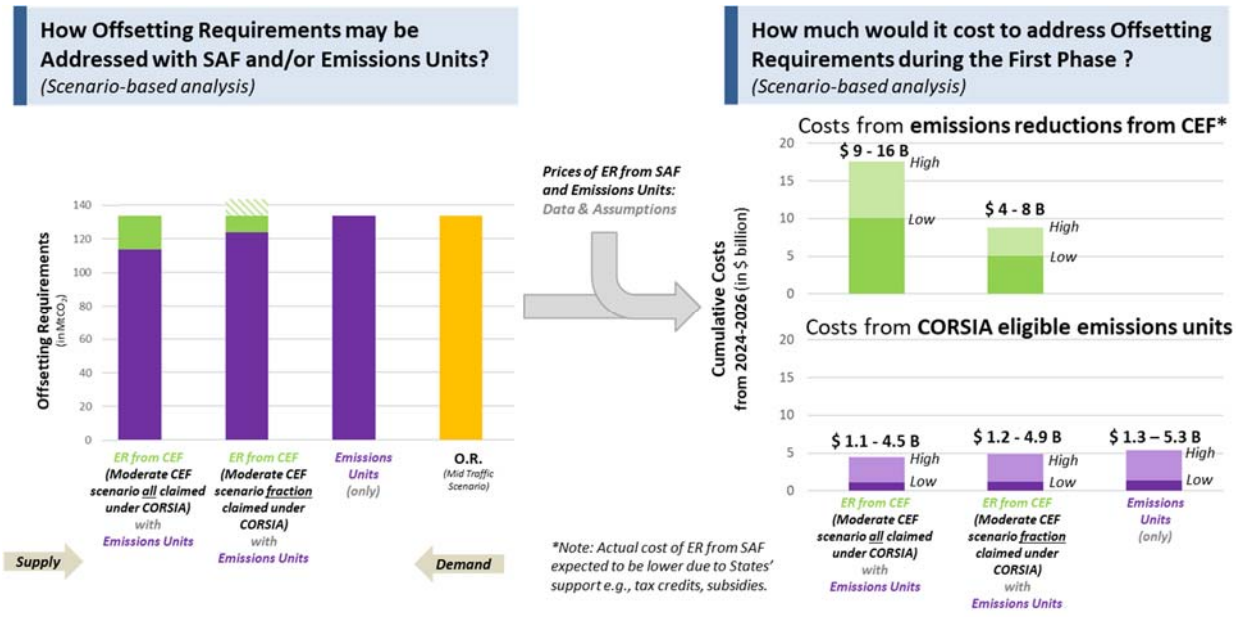


Figure 42 | Addressing Offsetting Requirements during the First Phase of CORSIA with Cost Implications

Figure 43 presents the total costs associated with addressing offsetting requirements in context of the estimated revenue and profits of the international aviation industry. IATA estimated global aviation industry revenues of $ 965 billion with projected revenues for 2025 at $1007 billion[4]. Extrapolating for 2026 and assuming a 60% ratio for international aviation, cumulative revenues from international aviation were estimated to be approx. $ 1800 billion.

The total costs associated with addressing offsetting requirements could represent ≈ 0.07% to 1.1% of international aviation revenue from 2024 to 2026 or ≈ 2% to 32% of net profits from 2024 to 2026.

[3] ICAO, Assembly 39th session, A39-WP/153, *"Comments on the Cost Impact of a Global Carbon Offsetting Mechanism",* available at: https://www.icao.int/Meetings/a39/Documents/WP/wp_153_rev1_en.pdf

[4] References: IATA, Industry Statistics, December 2024, Fact Sheet, https://www.iata.org/en/iata-repository/pressroom/fact-sheets/industry-statistics/ and Global Outlook for Air Transport https://www.iata.org/en/iata-repository/publications/economic-reports/global-outlook-for-air-transport-december-2024/.

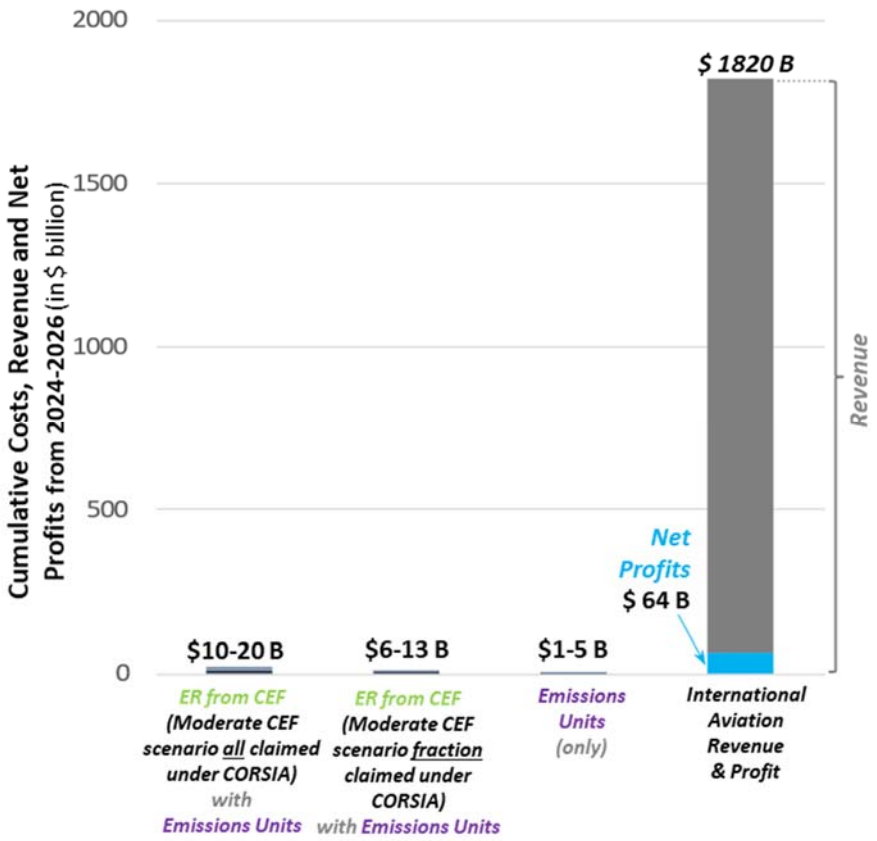


Figure 43 | **Costs of Addressing Offsetting Requirements during the First Phase in Context of Industry's Revenue**

Potential Offsetting Requirements at Operator Level

Offsetting requirements (and differences across operators) evolve over time and are driven by (1) phased implementation of CORSIA (i.e., States' participation), (2) Sector Growth Factor (e.g., CORSIA baseline) and (3) transition to individual approach from 2033.

To evaluate the impact of CORSIA on aeroplane operators, a scenario-based analysis was undertaken on different types of operators including (1) those that are in scope during the reference year(s) 2019-2020; (2) new entrants and (3) new operators (subsidiaries) who were operators not in scope during the reference years and do not meet the definition of new entrants. Operators that are in scope during the reference years and subsequently remained in scope throughout the 2021 to 2035 period contribute to 89% of total emissions, while operators that dropped out of scope contributed to 2.5% of total emissions. Likewise, new entrants and new operators (subsidiaries) contributed 5.2% and 1.3% respectively, while those that dropped out of scope represented 1.4% and 0.4% respectively.

The offsetting requirements of aeroplane operators with various characteristics were modelled in the context of their individual total CO_2 emissions, their individual growth rate and the % CO_2 emissions to offset as a proportion of their total CO_2 emissions from international aviation (aka Chapter 2) during 2021 to 2035.

Total offsetting requirements and differences across aeroplane operators evolve over time and are driven by (1) the phased implementation of CORSIA (i.e., changes in States participation throughout), (2) the SGF (e.g., emissions forecasts, CORSIA baseline from 2024) and (3) the transition to the individual approach from 2033.

Figure 44 shows the effects of decisions contained in Assembly Resolution A41-22 on the evolution of the offsetting requirements at the operator level for each CORSIA compliance phase assuming a mid-COVID scenario. Each chart depicts the percentage of CO_2 emissions to offset as a proportion of their total CO_2 emissions from international

aviation (aka Chapter 2) vs. average individual year-over-year growth rate from 2021 to 2035. Each bubble represents an individual operator, and the size of the bubble is proportional to the operator's CO_2 emissions from international aviation (aka Chapter 2) from 2021 to 2035.

During the pilot phase (2021-2023), all operators offset 0% as the SGF is expected to be 0. This phase could represent 14% of CO_2 emissions and 0% of offsetting requirements from 2021-2035.

During the first phase (2024 to 2026), where the SGF becomes positive, operators offset 0 to 10% of their CO_2 emissions. The range reflects the 100% sectoral approach and State participation, with higher percentage offset by operators with more flights on participating routes. New entrants benefit from a three-year grace period. This phase could represent 19% of CO_2 emissions and 8% of offsetting requirements from 2021-2035.

During the second phase (2027-2029), overall offsetting increases due to higher SGF and more participating states. Operators with no flights between participating States still offset zero. This compliance cycle could represent 21% of CO_2 emissions and 23% of offsetting requirements from 2021-2035.

During the second compliance cycle of the second phase (2030-2032), overall offsetting increases due to higher SGF. This compliance cycle could represent 22% of CO_2 emissions and 30% of offsetting requirements from 2021-2035. During the last compliance cycle of the second phase (2033-2035), the influence of individual approach on operators starts to be seen with a pivot point at an individual growth rate of 2%. Operators with high growth rates start to have a higher relative increase in offsetting requirements. This compliance cycle could represent 24% of CO_2 emissions and 39% of offsetting requirements from 2021-2035.

Figure 45 shows the effects of decisions contained in Assembly Resolution A41-22 on the evolution of the offsetting requirements at the operator level for each CORSIA compliance phase assuming a mid-COVID scenario. Unlike Figure 44 that normalized offsetting requirements as a proportion of total CO2 emissions from international aviation (aka Chapter 2 CO_2 emissions) this Figure 45 presents offsetting requirements as a proportion of CO_2 emissions from international aviation subject to offsetting requirements (aka Chapter 3 CO_2 emissions). Chapter 3 emissions represent the subset of total CO_2 emissions from international aviation on State pairs between States that participate in CORSIA in the given year. As shown in Figure 45, the vertical spread of percent of CO_2 emissions to offset is reduced (compared to Figure 44) as normalizing with Chapter 3 emissions removes the effects of participation in CORSIA.

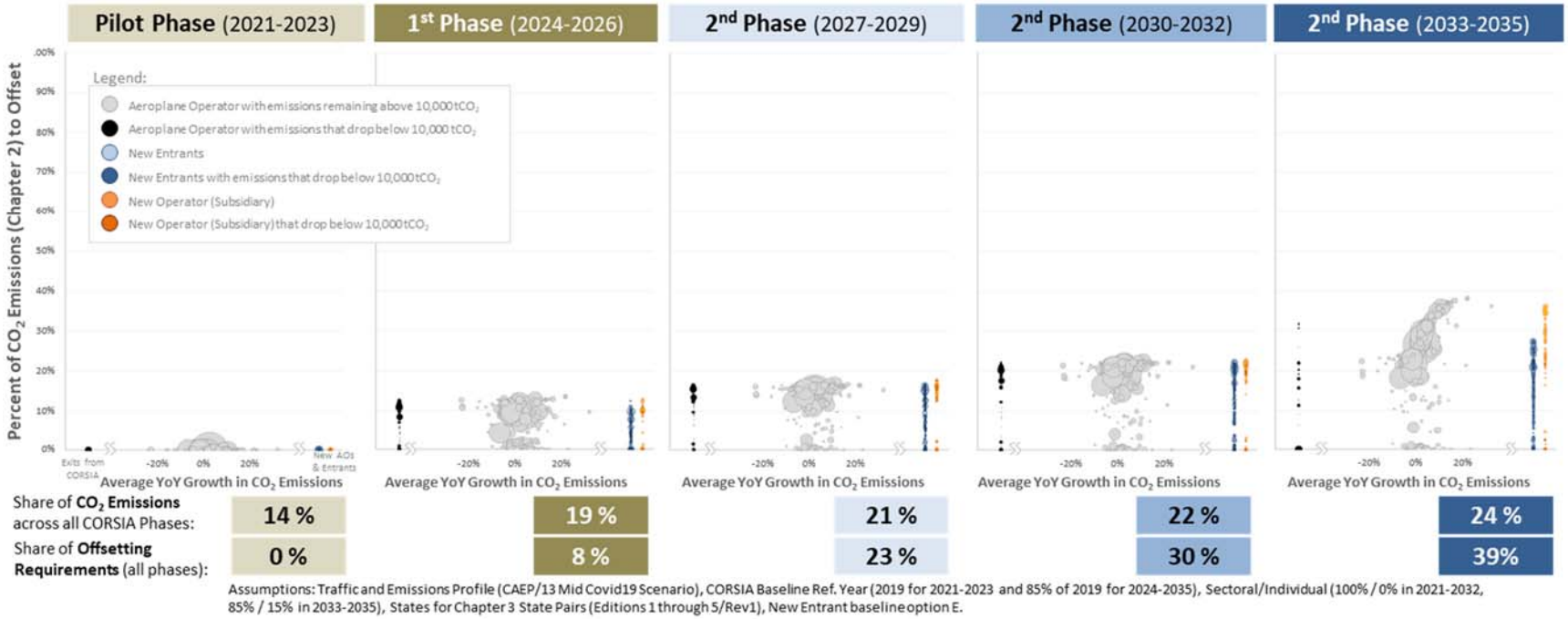


Figure 44 | **Assessment of CORSIA's impact on Aeroplane Operators: Offsetting requirements in context of CO_2 emissions from international aviation**

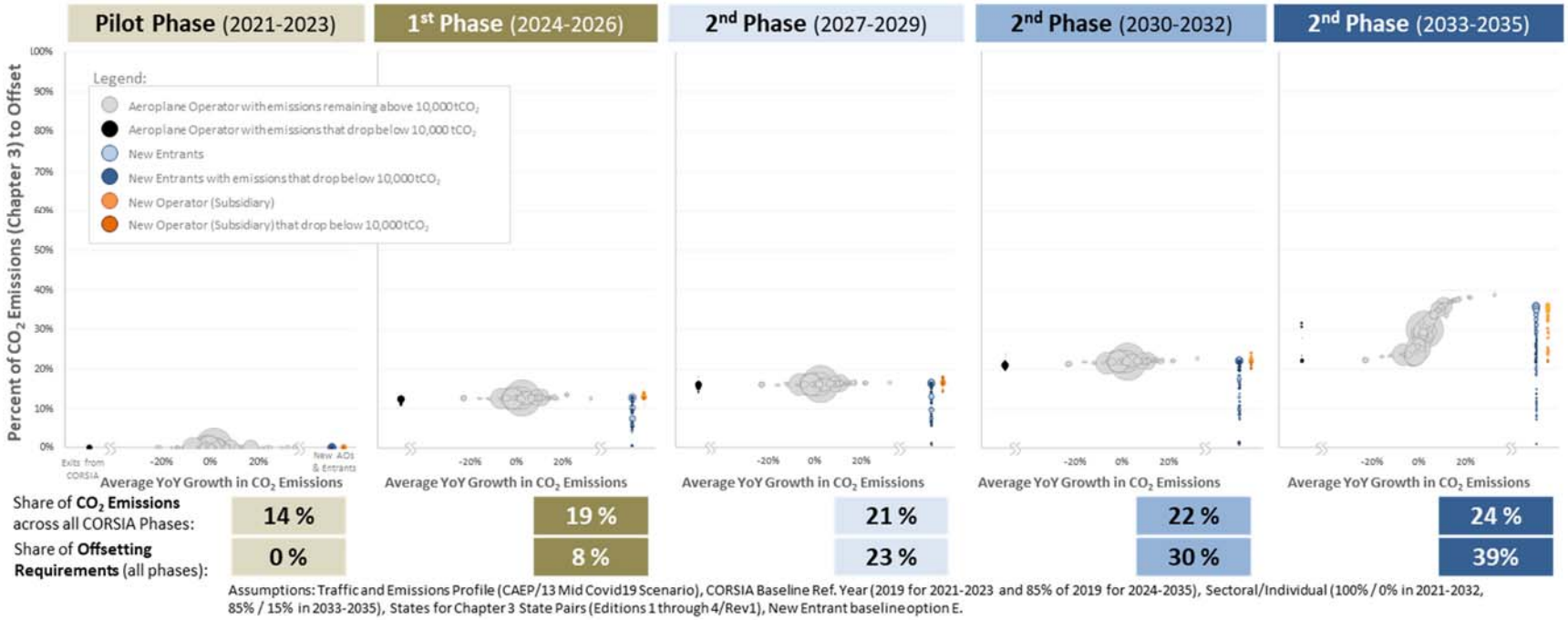


Figure 45 | Assessment of CORSIA's impact on Aeroplane Operators: Offsetting requirements in context of CO_2 emissions from international aviation subject to offsetting requirements

Potential Evolution of CO_2 Emissions from International Aviation in Context of Carbon Neutral Growth goal from 2020 (CNG2020)

As shown in Figure 46, net CO_2 emissions may be ≈550 to 560 $MtCO_2$ in 2035 (≈ -7.4% to -10.2% below the 2019 level). Given scenarios of expected CORSIA implementation, international aviation sector would meet its mid-term goal of "keeping net carbon emissions from 2020 at the same level" (assuming 2019 CO_2 emissions level as a proxy for 2020 emissions expected prior to the COVID-19 global pandemic impact on international aviation).

It should be noted that net CO_2 emissions are not expected to stabilize at 85% of 2019 emissions level due to partial participation in CORSIA (i.e., announcements of intention to voluntarily participate in CORSIA as reported in the ICAO document titled: "States for Chapter 3 State Pairs").

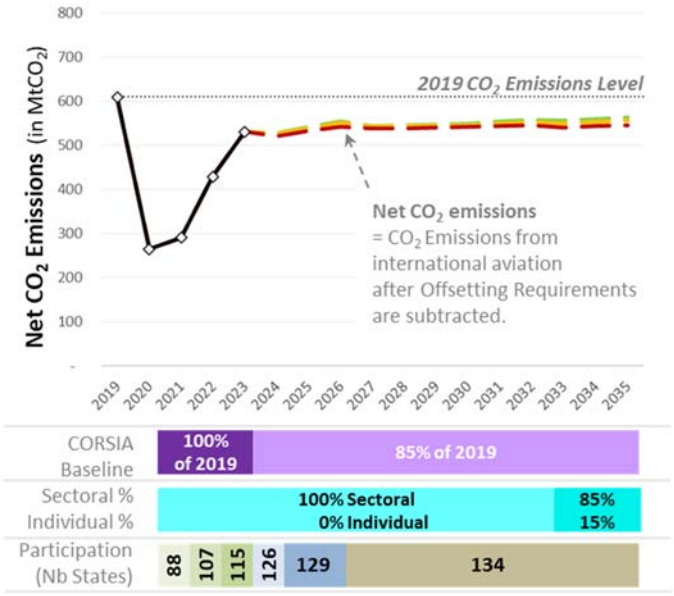


Figure 46 | **Projections of Net CO_2 Emissions through 2035**

OBSERVATIONS & CONCLUSIONS

Review of CORSIA's Pilot Phase

The CAEP continued its analyses in support of the 2025 CORSIA Periodic Review. Based on interim review and assessment of CORSIA's Pilot Phase (2021-2023), the CAEP:

- observed that due to the decline in CO_2 emissions during the COVID-19 global pandemic coupled with a CORSIA baseline based on 2019 emissions, there was no offsetting required during the Pilot Phase.
- noted that despite the lack of offsetting requirements, markets started to develop and prepare to meet potential and future demand for emissions reductions from CEF and CORSIA emissions units.
- identified the need to develop possible approaches to access data on price information for CORSIA eligible units and CORSIA Eligible Fuels.

Updated Forward Looking CORSIA Analyses

Based on its updated forward-looking assessments through 2035 with focus on the First Phase (2024-2026), the CAEP noted that:

- Given amended CO_2 emissions forecasts and 85% of 2019 CORSIA baseline, offsetting requirements are expected to start in 2024 under all traffic scenarios.
- Cumulative offsetting requirements could range from 950 to 1500 $MtCO_2$ from 2024 to 2035 and 105 to 150 $MtCO_2$ during the First Phase (2024-2026).
- Emissions reduction from CEF may address up to ≈15 % of offsetting requirements during the First Phase of CORSIA.
- Costs associated with addressing offsetting requirements from 2024-2026 could range from:

  ≈ $1 to 5 billion using Emissions Units only,

  ≈ $6 to 13 billion using a mix of Emissions Units and ER from CEF assuming that 50% of the CEF according to the latest CAEP Moderate scenario are claimed towards CORSIA, or

  ≈ $10 to 20 billion using a mix of Emissions Units and ER from CEF assuming that all the CEF according to the latest CAEP Moderate scenario are claimed towards CORSIA.

- Net CO_2 emissions may be 550 to 560 $MtCO_2$ in 2035 (-7.4% to -10.2% below the 2019 level) which would result in the international aviation sector meeting its mid-term goal of "keeping net carbon emissions from 2020 at the same level" (assuming 2019 level as a proxy for pre-COVID 2020 expected emissions).

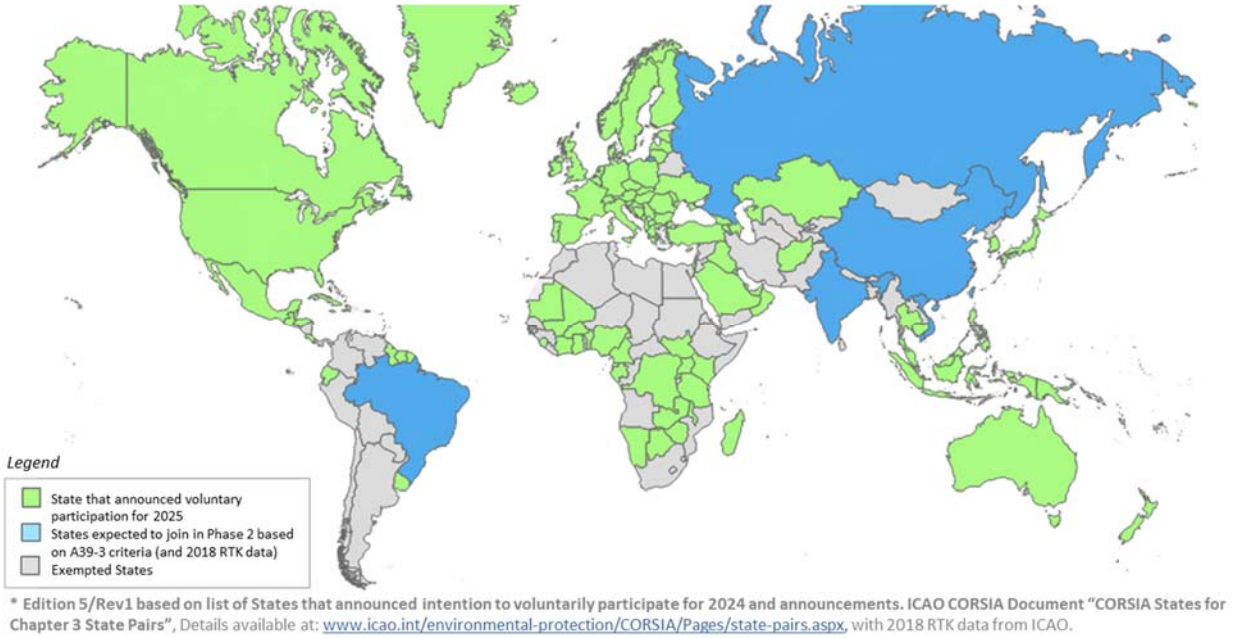
GLOSSARY OF TERMS

ACM	AERO-MS CORSIA Module
CAEP	Committee on Aviation Environmental Protection
CAGR	Compound annual growth rate
CCR	CORSIA Central Registry
C-DEC	Council (Summary of) Decisions
CEEU	CORSIA Eligible Emissions Unit
CEF	CORSIA Eligible Fuels
CNG	Carbon Neutral Growth
CO_2	Carbon dioxide
COMPASS	CORSIA Model for Parametric Analyses and Stochastics Assessments
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
COD	Common Operations Database
CTAG	CORSIA Tools and Analysis Group
C-WP	Council Working Paper
EASA	European Union Aviation Safety Agency
ESG	Environmental, Social, and Governance
FESG	Forecast and Economic Analysis Support Group
GHG	Greenhouse Gas
IATA	International Air Transport Association
ISCC	International Sustainability & Carbon Certification
LCAF	Lower Carbon Aviation Fuel
LTAG	Long Term Aspirational Goal
MDG	Modelling and Database Group
MRV	Monitoring, Reporting and Verification
OR	Offsetting Requirement
RPK	Revenue Passenger Kilometre
RSB	Roundtable on Sustainable Biomaterials
RTK	Revenue Tonne Kilometre
SAF	Sustainable Aviation Fuel
SARP	Standards and Recommended Practice
SCS	Sustainability Certification Scheme
SCSEG	Sustainability Certification Scheme Evaluation Group
SG	Steering Group
SGF	Sector Growth Factor
V&V	Verification and Validation

APPENDIX A: ADDITIONAL INFORMATION ON CORSIA MODELLING

Assumptions on participation in CORSIA

As illustrated on Figure 47, this document includes the list of 129 States that participate in CORSIA from 1 January 2025. The CORSIA Analyses also reflect the States expected to join CORSIA during the second phase based on Annex 16, Volume IV provisions and the published 2018 RTK statistics.



* Edition 5/Rev1 based on list of States that announced intention to voluntarily participate for 2024 and announcements. ICAO CORSIA Document "CORSIA States for Chapter 3 State Pairs", Details available at: www.icao.int/environmental-protection/CORSIA/Pages/state-pairs.aspx, with 2018 RTK data from ICAO.

Figure 47 | **CORSIA States for Chapter 3 State Pairs (Edition 5, rev1)**

APPENDIX B: SUPPORTING INFORMATION AND DATA

Summary of Results from COMPASS

Traffic Scenario	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
High	0.0%	0.0%	0.0%	12.3%	14.2%	15.3%	16.3%	18.6%	20.6%	22.5%	24.6%	26.7%	29.8%	31.7%	33.9%
Mid	0.0%	0.0%	0.0%	11.1%	13.0%	13.9%	14.6%	16.7%	18.6%	20.3%	22.2%	24.1%	27.1%	28.9%	30.9%
Low	0.0%	0.0%	0.0%	9.1%	10.9%	11.1%	10.9%	12.4%	13.8%	15.1%	16.6%	18.1%	21.1%	22.6%	24.3%

Figure 48 | **Summary of Sector Growth Factors (SGF)**

Note: When the Sector Growth Factor (SGF) was negative for a given year, it is set at zero percent per Annex 16 Volume IV standards.

	Unit	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total (2021-2035)
High CAEP/13 scenario																			
CO_2 emissions international aviation (chapter 2)	Mt	608.1	265.2	290.4	429.0	530.4	571.2	592.6	610.6	630.3	647.7	663.7	679.6	699.4	720.0	741.6	763.5	788.9	9,358.8
CO_2 emissions subject to offsetting requirement (chapter 3)	Mt			167.1	272.4	330.2	348.6	356.6	361.5	532.8	548.1	561.9	575.9	591.8	608.5	625.7	643.5	664.5	7,189.2
Share of CO_2 emissions subject to offsetting requirements	%			57.6%	63.5%	62.3%	61.0%	60.2%	59.2%	84.5%	84.6%	84.7%	84.7%	84.6%	84.5%	84.4%	84.3%	84.2%	76.8%
Offsetting requirements	Mt			0.0	0.0	0.0	42.9	50.5	55.4	86.7	102.0	115.8	129.8	145.7	162.4	186.2	204.2	225.2	1,507.1
Offsetting requirements / chapter 2 emissions	%			0.0%	0.0%	0.0%	7.5%	8.5%	9.1%	13.8%	15.8%	17.5%	19.1%	20.8%	22.6%	25.1%	26.7%	28.5%	16.1%
Offsetting requirements / chapter 3 emissions	%			0.0%	0.0%	0.0%	12.3%	14.2%	15.3%	16.3%	18.6%	20.6%	22.5%	24.6%	26.7%	29.8%	31.7%	33.9%	21.0%
Mid CAEP/13 scenario																			
CO_2 emissions international aviation (chapter 2)	Mt	608.1	265.2	290.4	429.0	530.4	563.6	584.5	600.1	617.2	632.4	646.3	660.2	676.9	694.3	712.5	731.1	752.6	9,121.3
CO_2 emissions subject to offsetting requirement (chapter 3)	Mt			167.1	272.4	330.2	344.0	351.9	355.5	522.2	535.6	547.8	560.0	573.5	587.5	601.8	616.5	633.8	6,999.8
Share of CO_2 emissions subject to offsetting requirements	%			57.6%	63.5%	62.3%	61.0%	60.2%	59.2%	84.6%	84.7%	84.8%	84.8%	84.7%	84.6%	84.5%	84.3%	84.2%	76.7%
Offsetting requirements	Mt			0.0	0.0	0.0	38.3	45.8	49.4	76.1	89.5	101.7	113.9	127.5	141.4	163.1	178.1	195.6	1,320.4
Offsetting requirements / chapter 2 emissions	%			0.0%	0.0%	0.0%	6.8%	7.8%	8.2%	12.3%	14.2%	15.7%	17.3%	18.8%	20.4%	22.9%	24.4%	26.0%	14.5%
Offsetting requirements / chapter 3 emissions	%			0.0%	0.0%	0.0%	11.1%	13.0%	13.9%	14.6%	16.7%	18.6%	20.3%	22.2%	24.1%	27.1%	28.9%	30.9%	18.9%
Low CAEP/13 scenario																			
CO_2 emissions international aviation (chapter 2)	Mt	608.1	265.2	290.4	429.0	530.4	550.4	570.4	580.8	592.2	602.2	611.4	620.7	632.4	644.7	657.4	670.5	685.5	8,668.5
CO_2 emissions subject to offsetting requirement (chapter 3)	Mt			167.1	272.4	330.2	336.1	343.6	344.3	500.6	509.5	517.6	525.7	534.8	544.4	554.4	564.5	576.3	6,621.4
Share of CO_2 emissions subject to offsetting requirements	%			57.6%	63.5%	62.3%	61.1%	60.2%	59.3%	84.5%	84.6%	84.7%	84.7%	84.6%	84.4%	84.3%	84.2%	84.1%	76.4%
Offsetting requirements	Mt			0.0	0.0	0.0	30.4	37.5	38.2	54.5	63.4	71.5	79.6	88.7	98.3	117.2	127.5	139.8	946.7
Offsetting requirements / chapter 2 emissions	%			0.0%	0.0%	0.0%	5.5%	6.6%	6.6%	9.2%	10.5%	11.7%	12.8%	14.0%	15.3%	17.8%	19.0%	20.4%	10.9%
Offsetting requirements / chapter 3 emissions	%			0.0%	0.0%	0.0%	9.1%	10.9%	11.1%	10.9%	12.4%	13.8%	15.1%	16.6%	18.1%	21.1%	22.6%	24.3%	14.3%

Figure 49 | **Summary of results for key CORSIA metrics** (average across 100 model runs of stochastic model)

Summary of Results from AERO-MS ACM

	Unit	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total (2021-2035)
High CAEP/13 scenario																			
CO_2 emissions international aviation (chapter 2)	Mt	608.1	265.2	290.4	429.0	530.4	570.4	592.0	609.8	628.1	647.0	662.7	678.9	699.2	720.2	742.0	764.6	788.0	9,352.7
CO_2 emissions subject to offsetting requirement (chapter 3)	Mt			167.1	272.4	330.2	348.4	354.5	359.1	537.2	553.1	565.9	579.1	595.8	613.1	630.9	649.3	668.4	7,224.6
Share of CO_2 emissions subject to offsetting requirements	%			57.6%	63.5%	62.3%	61.1%	59.9%	58.9%	85.5%	85.5%	85.4%	85.3%	85.2%	85.1%	85.0%	84.9%	84.8%	77.2%
Offsetting requirements	Mt			0.0	0.0	0.0	42.9	48.6	53.3	91.2	107.1	120.0	133.2	149.9	167.1	185.2	203.6	222.6	1,524.6
Offsetting requirements / chapter 2 emissions	%			0.0%	0.0%	0.0%	7.5%	8.2%	8.7%	14.5%	16.6%	18.1%	19.6%	21.4%	23.2%	25.0%	26.6%	28.3%	16.3%
Offsetting requirements / chapter 3 emissions	%			0.0%	0.0%	0.0%	12.3%	13.7%	14.8%	17.0%	19.4%	21.2%	23.0%	25.2%	27.3%	29.4%	31.4%	33.3%	21.1%
Mid CAEP/13 scenario																			
CO_2 emissions international aviation (chapter 2)	Mt	608.1	265.2	290.4	429.0	530.4	563.5	583.8	599.2	615.0	631.3	645.0	659.1	676.4	694.2	712.6	731.7	751.3	9,112.9
CO_2 emissions subject to offsetting requirement (chapter 3)	Mt			167.1	272.4	330.2	345.3	350.2	353.6	526.4	540.2	551.4	562.8	577.0	591.6	606.6	622.1	638.1	7,034.9
Share of CO_2 emissions subject to offsetting requirements	%			57.6%	63.5%	62.3%	61.3%	60.0%	59.0%	85.6%	85.6%	85.5%	85.4%	85.3%	85.2%	85.1%	85.0%	84.9%	77.2%
Offsetting requirements	Mt			0.0	0.0	0.0	39.8	44.3	47.7	80.4	94.2	105.4	116.9	131.0	145.6	161.0	176.5	192.4	1,335.2
Offsetting requirements / chapter 2 emissions	%			0.0%	0.0%	0.0%	7.1%	7.6%	8.0%	13.1%	14.9%	16.3%	17.7%	19.4%	21.0%	22.6%	24.1%	25.6%	14.7%
Offsetting requirements / chapter 3 emissions	%			0.0%	0.0%	0.0%	11.5%	12.6%	13.5%	15.3%	17.4%	19.1%	20.8%	22.7%	24.6%	26.5%	28.4%	30.2%	19.0%
Low CAEP/13 scenario																			
CO_2 emissions international aviation (chapter 2)	Mt	608.1	265.2	290.4	429.0	530.4	550.1	570.3	580.4	590.6	601.0	610.2	619.6	631.6	644.0	656.7	669.8	683.2	8,657.2
CO_2 emissions subject to offsetting requirement (chapter 3)	Mt			167.1	272.4	330.2	340.5	343.6	344.9	505.8	514.6	521.9	529.4	539.2	549.2	559.4	569.9	580.7	6,668.8
Share of CO_2 emissions subject to offsetting requirements	%			57.6%	63.5%	62.3%	61.9%	60.2%	59.4%	85.6%	85.6%	85.5%	85.5%	85.4%	85.3%	85.2%	85.1%	85.0%	77.0%
Offsetting requirements	Mt			0.0	0.0	0.0	35.0	37.7	39.0	59.8	68.6	76.0	83.5	93.2	103.2	113.9	124.4	135.1	969.5
Offsetting requirements / chapter 2 emissions	%			0.0%	0.0%	0.0%	6.4%	6.6%	6.7%	10.1%	11.4%	12.5%	13.5%	14.8%	16.0%	17.3%	18.6%	19.8%	11.2%
Offsetting requirements / chapter 3 emissions	%			0.0%	0.0%	0.0%	10.3%	11.0%	11.3%	11.8%	13.3%	14.6%	15.8%	17.3%	18.8%	20.4%	21.8%	23.3%	14.5%

Figure 50 | **Summary of results for key CORSIA metrics**

Summary of Results across CORSIA Models

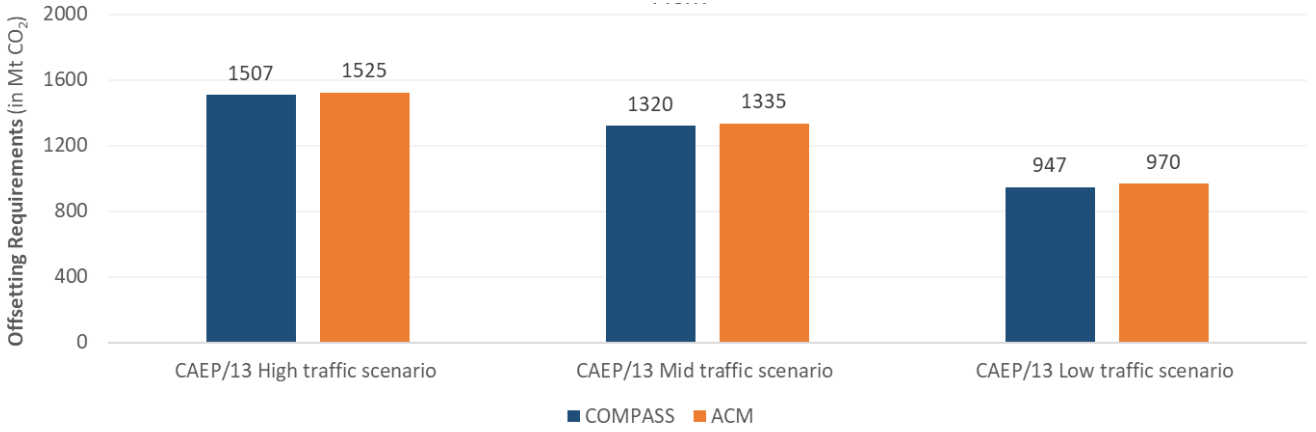


Figure 51 | Offsetting requirements for all phases (2021-2035) for CAEP/13 scenarios

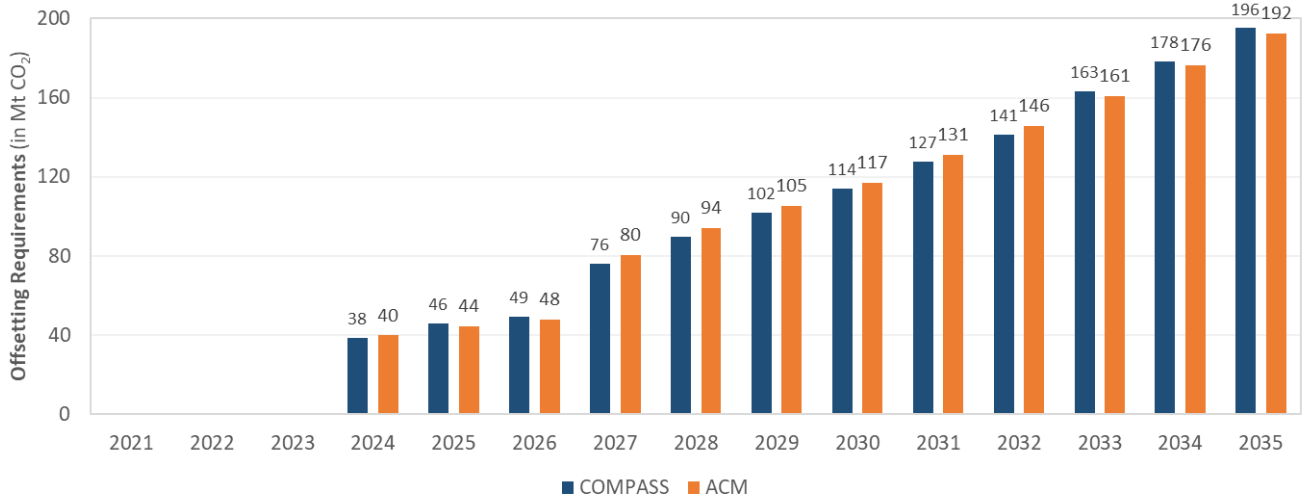


Figure 52 | Offsetting requirements by year for CAEP/13 Mid traffic scenario

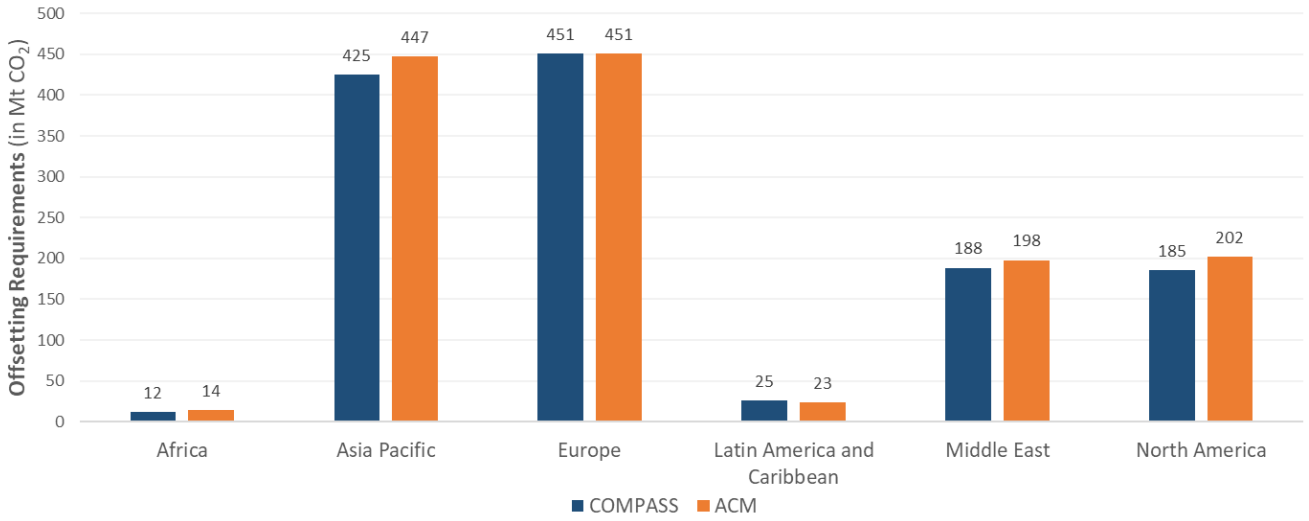


Figure 53 | Offsetting requirements all phases (2021-2035) by ICAO region for CAEP/13 Mid traffic scenario

附录 C

A ~~41-22~~ 42-xx 号决议：国际民航组织关于环境保护的持续政策和做法的综合声明 — 国际航空碳抵消和减排计划（CORSIA）

鉴于大会 A38-18 号决议决定制定用于国际航空的全球基于市场的措施（GMBM）计划，供大会第 39 届会议做出决定；

忆及大会第 A38-18 号决议要求理事会在成员国支持下，查明包括成员国在内的存在的主要问题和困难，就全球基于市场的措施计划提出建议，以适当处理这些问题和各项关键设计要素，包括虑及各种特殊情况和各自能力的方法，以及从 2020 年开始作为一揽子措施的一部分实施这项计划的机制，该一揽子措施还包括实现国际民航组织的全球理想目标的各种技术、运行改进和可持续的代用燃料；

鉴于大会 A39-3 号决议决定作为一揽子措施的一部分，以国际航空碳抵消和减排计划（CORSIA）的形式实施一项全球基于市场的措施计划，以实现国际民航组织的全球理想目标，这一揽子措施还包括航空器技术、运行改进以及可持续的航空燃料；

认识到国际民航组织是处理国际航空排放的适当论坛，并且理事会、其气候与环境委员会（CEC）、其技术咨询机构（TAB）及其航空环境保护委员会（CAEP）为支助实施国际航空碳抵消和减排计划所开展的大量工作；

欢迎附件 16 —《环境保护》第 IV 卷 —《国际航空碳抵消和减排计划》第~~一~~二版获得通过，该文件中的规定包括针对国际航空碳抵消和减排计划的监测、报告和核查（MRV）程序；

还欢迎《环境技术手册（ETM）》（Doc 9501 号文件）第 IV 卷 —《证明遵守国际航空碳抵消和减排计划的程序》第~~二~~三版的发布；

欢迎在编制和更新国际民航组织国际航空碳抵消和减排计划实施要素方面所取得的进展，这些要素在附件 16 第 IV 卷中直接提及的 14 份国际民航组织文件中进行了反映，包含理事会核可的对实施国际航空碳抵消和减排计划至关重要的一些材料；

还欢迎理事会设立了技术咨询机构（TAB），其任务是就 CORSIA 合格排放单位向理事会提出建议；

认识到国际民航组织及其成员国采取一种协调一致的做法与航空业界合作开展能力建设活动的重要性，以支持国际航空碳抵消和减排计划的实施，特别是通过国际民航组织国际航空碳抵消和减排计划援助、能力建设和培训（ACT-CORSIA）方案来开展这些活动，该方案包括组织研讨会、制定宣传材料以及在各国之间建立国际航空碳抵消和减排计划伙伴关系，这有助于各国顺利实施监测、报告和核查方面的各项要求，以及向国际航空碳抵消和减排计划中央登记处报告年度二氧化碳的排放情况；

欢迎不断有成员国宣布欲在自 2021 年开始的试办阶段自愿参与国际航空碳抵消和减排计划，自愿参与的数量在 2021 年为 88 个国家，2022 年为 107 个国家，~~而~~ 2023 年为 115 个国家，2024 年为 126 个国家，2025 年为 129 个国家，而 2026 年为 130 个国家；

认识到强有力的能力建设活动能促进成员国决定自愿参与国际航空碳抵消和减排计划；

~~忆及鉴于 COVID-19 大流行病以及为避免给飞机运营人带来不适当的经济负担，理事会（2020 年 6 月）决 定在试行阶段使用 2019 年排放量而不使用 2020 年排放量来实施 CORSIA 相关设计要素（即：CORSIA 基线、 计算飞机运营人抵消要求的基准年和新加入者的阈值）；~~

~~认识到~~忆及在航空环境保护委员会的技术~~援助~~支持下，理事会完成了对国际航空碳抵消和减排计划的 2022 年定期审查，包括分析 COVID-19 大流行病及其二氧化碳恢复情景对 CORSIA 抵消要求的需求、供应和成本的影响，和相应通过的大会 A41-22 号决议与对 CORSIA 相关设计要素的调整，例如 CORSIA 基线及在试行阶段及之后对飞机运营人抵消要求的计算 ~~COSIA 基线的影响分析~~；

注意到航空业反对分散的国家和地区基于市场的措施，支持制定国际航空碳抵消和减排计划作为单一的全球碳抵消计划，认为这是符合成本效益的措施，可补充包括技术、运行和基础设施措施在内的更为广泛的一整套措施；

认识到基于市场的措施不应重复，并且对国际航空二氧化碳排放量应只计入一次；

强调大会第 39 届会议关于实施国际航空碳抵消和减排计划的决定，反映了成员国大力支持对国际航空业采取一个全球性解决方案，反对可能是分散的国家和地区基于市场的措施；

重申关切利用国际民用航空作为调动其他部门气候融资的收入的一个潜在来源，和基于市场的措施应确保，与其他部门相比，国际航空部门受到公平的对待；

忆及《联合国气变公约》（UNFCCC）和《巴黎协定》，并确认其在顾及国情差异的情况下反映共同但有区别的责任和各自能力的原则；

还确认《芝加哥公约》中规定的不歧视及发展国际航空的平等和公平之机会的原则；

认识到关于国际航空碳抵消和减排计划的相关工作及其实施将有助于实现《联合国气变公约》下通过的《巴黎协定》所规定的各项目标；

鉴于《联合国气变公约》及其《京都议定书》和《巴黎协定》规定了各种机制，例如，《京都议定书》下的清洁发展机制（CDM）和《巴黎协定》下的~~一个新的市场机制~~巴黎协定信用额度交易机制（PACM），有助于减少温室气体排放以支持可持续发展，这将特别惠及发展中国家；

~~欢迎 UNFCCC 与国际民航组织在开发用于航空的清洁发展机制方法方面开展的合作；~~

认识到本决议不构成根据《联合国气变公约》、《巴黎协定》或其他国际文书谈判的先例，不对谈判结果进行预判，不代表《联合国气变公约》、《巴黎协定》或其他国际文书缔约国的立场；

大会:

1. 决定本决议以及 A42-xx ~~A41-20~~ 号决议：国际民航组织关于环境保护的持续政策和做法的综合声明 — 一般规定、噪声和当地空气质量和 A42-xx ~~A41-21~~ 号决议：国际民航组织关于环境保护的持续政策和做法的综合声明 — 气候变化取代 A41-20 ~~A40-17~~ 号决议、A41-21 ~~A40-18~~ 号决议和 A41-22 ~~A40-19~~ 号决议，并构成国际民航组织关于环境保护的持续政策和做法的综合声明；

2. 确认在可供用于解决国际航空产生的二氧化碳排放的一揽子措施的所有要素，包括航空器技术、运行改进、可持续的航空燃料和国际航空碳抵消和减排计划方面取得的进展，并申明最好使用在航空业内提供环境效益的航空器技术、运行改进和可持续的航空燃料；

3. 还确认尽管取得这一进展，但航空器技术、运行改进和可持续的航空燃料产生的环境效益可能无法提供足够的二氧化碳减排来应对国际航空运输量的增长，以便及时实现全球理想目标，即自 2020 年起，将国际航空产生的全球净二氧化碳排放量保持在相同水平；

4. 强调国际航空碳抵消和减排计划具有补充实现全球理想目标的一揽子广泛措施的作用，不会给国际航空带来不适当的经济负担；

5. 忆及其在第 39 届会议上决定实施一项全球基于市场的措施计划，以国际航空碳抵消和减排计划（CORSIA）形式来解决国际民用航空（即在一国离港并在另一国到港的民航航班）产生的高于国际航空碳抵消和减排计划基线水平的二氧化碳排放总量的任何年度增长量，同时考虑到特殊情况和各自的能力。

6. 要求理事会继续确保做出一切努力，在使成员国采取的航空器技术、运行改进和可持续的航空燃料方面取得进一步进展，并反映在它们解决国际航空产生的二氧化碳排放的行动计划中，并监测和报告实施各项行动计划的进展情况，以及应制定一项方法，确保飞机运营人在某一特定年内计划下的抵消要求能够通过使用 CORSIA 合格燃料（即 CORSIA 可持续航空燃料和 CORSIA 低碳航空燃料）予以削减，以便使一揽子措施中的所有要素都有所反映；

7. 要求理事会继续监测一揽子措施中的各项要素的实施情况，并审议必要的政策和行动，确保以均衡的方式使所有要素都取得进展，并增加持续实施非基于市场的措施所减少的排放量的百分比；

8. 确认各国，特别是发展中国家，在气候变化影响面前的脆弱性、经济发展水平、以及对国际航空排放的贡献等方面的特殊情况和各自能力，同时尽量减少市场扭曲；

9. 忆及其在第 39 届会议上决定对国际航空碳抵消和减排计划采取分阶段实施的做法，以照顾到各国特别是发展中国家的特殊情况和各自能力，同时尽量减少市场扭曲，具体如下：

a) 试办阶段在 2021 年至 2023 年实施，适用于自愿参加这个计划的国家。参加这个阶段的国家可从下文第 11 e) i) 段决定其飞机运营人的抵消要求的基础；

b) 第一阶段在 2024 年至 2026 年实施，适用于自愿参加试办阶段的国家以及任何其他自愿参加这个阶段的国家，并可依照下文第 11 a) 段计算抵消要求；

c) 强烈鼓励所有国家自愿参加试办阶段和第一阶段，注意到已经自愿参加的发达国家正在发挥带头作用，另外几个国家也已经自愿参加了；

d) 秘书处将在国际民航组织网站公布自愿参加试办阶段和第一阶段的国家的最新信息；

e) 第二阶段在 2027 年至 2035 年实施，适用于 2018 年在以收费吨公里数表示的国际航空活动中其单个份额占到总收费吨公里数的 0.5%以上的国家，或者在从最高到最低收费吨公里数排列的国家名单中，其累计份额达到总收费吨公里数 90%的国家，但最不发达国家（LDCs）、小岛屿发展中国家（SIDS）和内陆发展中国家（LLDCs）不包括在内，除非它们自愿参加这个阶段；

f) 强烈鼓励受到豁免或尚未参加的国家，特别是那些作为地区经济一体化组织成员的国家，尽早自愿参加这个计划。决定自愿参加这个计划或决定停止自愿参加这个计划的国家仅可从任何特定年份的 1 月 1 日开始，并且它们必须在前一年的 6 月 30 日以前将这项决定通知国际民航组织；和

g) 从 2022 年开始，理事会将每三年审查一次国际航空碳抵消和减排计划（CORSIA），包括审查它对国际航空增长的影响，将其作为理事会审议是否必须对下一阶段或遵守周期酌情作出调整的基础，并向大会建议这种调整，供其作出决定；

10. 忆及其在第 39 届会议上决定国际航空碳抵消和减排计划应适用于两国之间相同航线上的所有飞机运营人，以期尽量减少市场扭曲，具体情况如下：

a) 根据上文第 9 段纳入国际航空碳抵消和减排计划的两国之间航线上的所有国际航班均属国际航空碳抵消和减排计划的抵消要求的范围；

b) 根据上文第 9 段纳入国际航空碳抵消和减排计划的一个国家与另一个未被纳入该计划的国家之间航线上的所有国际航班均被免除国际航空碳抵消和减排计划的抵消要求，但保留简化的报告要求；和

c) 根据上文第 9 段未被纳入国际航空碳抵消和减排计划的两国之间航线上的所有国际航班均免除国际航空碳抵消和减排计划的抵消要求，但保留简化的报告要求；

11. 忆及其在第 39 届会议上决定并在第 41 届会议上进一步决定从 2021 年起每年计算一给定年度须由飞机运营人抵消的二氧化碳排放量，计算方法如下：

a) 飞机运营人的抵消要求=[% 部门部分×（给定年度国际航空碳抵消和减排计划所涵盖的飞机运营人的排放量×给定年度的部门增长因子）]+[%个别部分×（给定年度国际航空碳抵消和减排计划所涵盖的飞机运营人的排放量×给定年度飞机运营人的增长因子）]；

b) 其中，2021 年至 2023 年期间的部门增长因子 =（CORSIA 在给定年度覆盖的总排放量 — 2019 年 CORSIA 覆盖的总排放量）/CORSIA 在给定年度覆盖的总排放量，和 2024 年至 2035 年期间的部门增长因子 = （CORSIA 在给定年度覆盖的总排放量 — 2019 年 CORSIA 覆盖的总排放量的 85%）/CORSIA 在给定年度覆盖的总排放量；

c) 其中，2033 年至 2035 年飞机运营人的增长因子 =（给定年度飞机运营人在 CORSIA 计划下覆盖的排放量 — 2019 年飞机运营人在 CORSIA 计划下覆盖的排放量的 85%）/给定年度飞机运营人在 CORSIA 计划下覆盖的排放量；

d) 其中，部门百分比 =（100% — 个别百分比）；和

e) 其中，部门百分比和个别百分比按以下方式应用：

i) 2021 年至 2023 年，部门为 100%，个别为 0%，但每个参与国都可以在试行阶段选择是否将此应用于：

a) 上文所述给定年度 CORSIA 所涵盖的飞机运营人的排放量，或

b) 2019 年 CORSIA 所涵盖的飞机运营人的排放量；

ii) 2024 年至 2026 年，部门为 100%，个别为 0%；

iii) 2027 年至 2029 年，部门为 100%，个别为 0%；

iv) 2030 年至 2032 年，部门为 100%，个别为 0%；

v) 2033 年至 2035 年，部门为 85%，个别为 15%；

f) 给定年度飞机运营人的排放量和 CORSIA 覆盖的总排放量不包括该计划当年豁免的排放量；

g) 上述第 11 b) 和 11 c) 段中的排放范围将在每年年初重新计算，以考虑到由于自愿加入或新阶段或合规周期开始而增加的所有国家的往返航线；

12. 忆及其在第 39 届会议上决定并在第 41 届会议上进一步决定对新加入者[1]免于适用国际航空碳抵消和减排计划，豁免期三年，或直至其年排放量超过 2020 年总排放量的 0.1%，以较早发生者为准。从次年起，新加入者将被纳入该计划，并享受与其他飞机运营人同等待遇；

[1] 新加入者被定义为在附件 16 第 IV 卷生效之时或之后开始从事属于该卷范围内的航空活动，并且其活动不是另一飞机运营人先前进行的航空活动的全部或部分延续的任何飞机运营人。

13. 忆及其在第 39 届会议上决定，尽管有上述规定，国际航空碳抵消和减排计划不适用于以下低水平的国际航空活动，以避免行政负担：飞机运营人的国际航空业务每年产生的二氧化碳排放量不到 10 000 公吨；飞机最大起飞质量（MTOM）小于 5 700 千克；进行人道主义、医疗、消防作业；

14. 忆及其在第 39 届会议上决定作为分阶段实施和豁免的结果，未被该计划所涵盖的排放量，不被指定为被纳入该计划的任何飞机运营人的抵消要求；

15. 忆及其在第 39 届会议上决定设立为期三年的遵守周期，从 2021 年至 2023 年第一个周期开始，使飞机运营人能根据该计划协调其抵消要求，同时它们每年向飞机运营人所在国指定的登记处主管部门报告所需的数据；

16. 忆及其在第 39 届会议上决定需要在国际航空碳抵消和减排计划中提供保障措施，以确保国际航空部门的可持续发展和防止给国际航空带来不适当的经济负担，并要求理事会决定启动此种行动的基础和标准，并确定可能的手段解决这些问题；

17. 忆及其在第 39 届会议上决定为上文第 9 g）段提到的目的以及为推动国际航空部门的可持续发展和该计划的有效性，理事会在航空环境保护委员会的技术协助下从 2022 年起每三年对国际航空碳抵消和排放计划（CORSIA）进行一次定期审查，供大会审议。除其他外，定期审查应包括：

a) 评估：实现国际民航组织全球期望目标的进展；该计划对各国和飞机运营人的市场和成本影响和对国际航空的影响；该计划的设计要素的运作情况；

b) 考虑该计划的改进将能支持《巴黎协定》的宗旨，特别是长期温度目标；和更新该计划的设计要素，以便改善实施、提高成效和尽量减少市场扭曲，同时亦顾及改变该计划的设计要素如对监测、报告和核查要求带来的后果；和

c) 在 2032 年底对该计划的终止、其 2035 年之后的延长或任何其他改进进行一次特别审查，包括考虑航空器技术、运行改善和可持续航空燃料对于实现国际民航组织的环境目标所作的贡献；

18. 决定国际航空碳抵消和减排计划是唯一适用于国际航空二氧化碳排放的全球基于市场的措施，以避免拼凑重复的国家或地区基于市场措施，从而确保国际航空二氧化碳排放量应只计入一次；

19. 要求采取以下行动，实施国际航空碳抵消和减排计划：

a) 理事会在航空环境保护委员会的技术贡献下，酌情更新附件 16 第 IV 卷和环境技术手册第 IV 卷；

b) 理事会在航空环境保护委员会的技术贡献下，酌情继续编制和更新附件 16 第 IV 卷中提及的国际民航组织国际航空碳抵消和减排计划文件，其中涉及：国际民航组织国际航空碳抵消和减排计划二氧化碳核算和报告工具、国际航空碳抵消和减排计划合格燃料、国际航空碳抵消和减排计划排放单位标准（EUC）、和国际航空碳抵消和减排计划中央登记处等；

c) 理事会虑及技术咨询机构的建议，编制和更新附件 16 第 IV 卷中提及、关于国际航空碳抵消和减排计划使用的合格排放单位的国际民航组织国际航空碳抵消和减排计划文件；

d) 理事会保持和更新由国际民航组织主持的国际航空碳抵消和减排计划中央登记处，以便成员国向国际民航组织报告相关信息；

e) 理事会将继续监督国际航空碳抵消和减排计划的实施，并在气候与环境委员会及航空环境保护委员会的支持下酌情提供支持；和

f) 成员国采取必要行动，按照附件 16 第 IV 卷规定的时间表，确保为遵守和执行国际航空碳抵消和减排计划制定国家政策和监管框架；

20. *忆及*其在第 39 届会议上决定《联合国气变公约》及其《京都议定书》建立的机制，以及巴黎协定信用额度交易机制（PACM）下产生的排放单位，符合在国际航空碳抵消和减排计划（CORSIA）中使用的资格，只要它们与理事会就避免重复计算和使用时间和期限的决定以及技术咨询机构和航空环境保护委员会对此提出的技术意见取得一致；

21. *决定*国际民航组织和成员国采取一切必要行动，为按照附件 16 第 IV 卷规定的时间表实施国际航空碳抵消和减排计划提供能力建设和协助，并建立伙伴关系，包括：通过国际民航组织国际航空碳抵消和减排计划援助、能力建设和培训（ACT-CORSIA）方案来开展这些活动，该方案包括组织研讨会、制定宣传材料以及在各国之间建立国际航空碳抵消和减排计划伙伴关系，同时强调在国际民航组织的框架下采取协调一致的做法进行能力建设和援助活动的重要性；

22. *忆及*其在第 39 届会议上决定国际航空碳抵消和减排计划将采用符合上文第 19 段排放单位标准（EUC）的排放单位；

23. *要求*理事会促进采用能够惠及发展中国家的方案所产生的排放单位，并鼓励各国拟定本国的航空相关项目；和

24. *要求*理事会探索进一步拟定航空相关方法，用于各种抵消方案，包括《巴黎协定》下的机制或其他方案，并鼓励各国使用这些方法来采取行动减少航空二氧化碳的排放，这可能会进一步促使国际航空碳抵消和减排计划使用实施这些方案所产生的信用额，而不重复计算减排量。

— 完 —