Overview of the Thirteenth Cycle of the Committee on Aviation Environmental Protection (CAEP/13)

ICAO's technical progress towards achieving net zero carbon emissions by 2050 and environmental protection

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Introduction

The Committee on Aviation Environmental Protection (CAEP), stands as a technical body of the ICAO Council. It provides the technical information for ICAO to address climate impact and other environmental challenges within the global civil aviation industry and adopts the necessary Standards, guidance and other decisions related to climate change and environmental protection. As concerns related to aircraft noise, local air quality, and the climate impact of greenhouse gas emissions intensify, the work of CAEP becomes ever more significant and fundamental for a sustainable future for international aviation.

CAEP's work includes studies on noise reduction, local air quality (LAQ), and measures to lower CO_2 emissions, such as advancements in aircraft technology, operational improvements, sustainable aviation fuels, and market-based measures like the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), helping to inform policy decisions targeted at tackling climate change. The Council reviews CAEP's recommendations, informing and supporting the decisions of the Assembly.

This article offers an overview of the work accomplished by the Committee during the CAEP/13 cycle (2022-2025), which is currently under evaluation by the ICAO Council for final approval.

A Brief History

ICAO has been working on environmental issues since 1960, with a more concentrated focus on aircraft noise and engine emissions. On December 5th, 1983, CAEP was established by the ICAO Council as a successor to the Committee on Aircraft Noise (CAN) and the Committee on Aircraft Engine Emissions (CAEE). Its creation marked an important step towards consolidating ICAO's environmental oversight into a single technically focused body responsible for advising the Council on environmental matters related to international civil aviation.

1 Michael Lunter was Chairperson of the ICAO Council's Committee on Aviation Environmental Protection (CAEP) during its thirteenth cycle (2023-2025). Francis Mwangi from Kenya and Maryam Al Balooshi from the United Arab Emirates were Vice-Chairpersons.

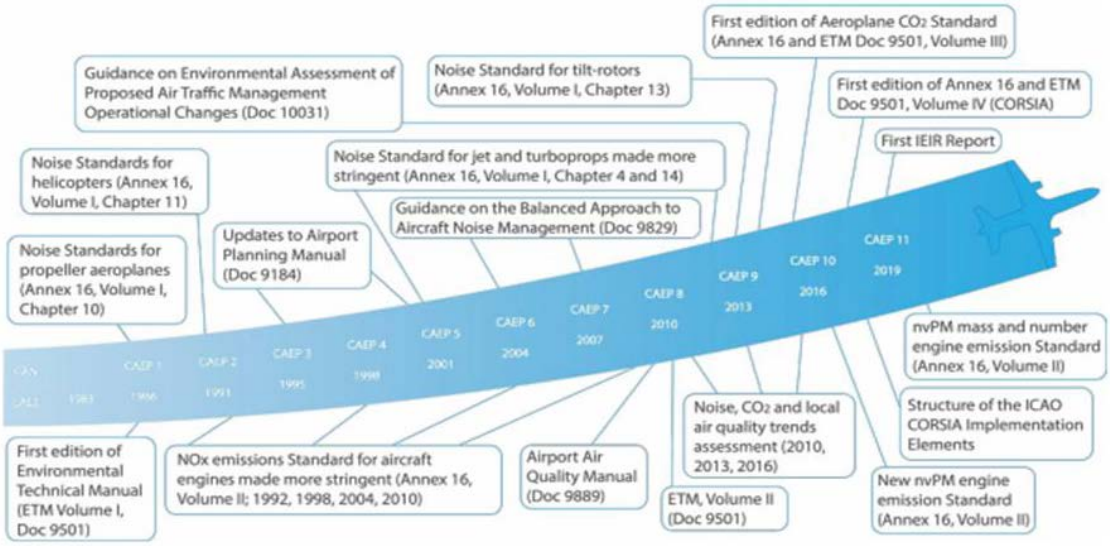

FIGURE 1: Deliverables of CAEP since CAEP/1.

Since it was established, CAEP has been a cornerstone in the development of international Standards and Recommended Practices (SARPs) addressing aircraft noise, local air quality emissions, and global climate impacts. The first SARPs were formalized in 1971 in Annex 16 to the Convention on International Civil Aviation and have evolved to include:

- Volume I: Aircraft Noise
- Volume II: Aircraft Engine Emissions
- Volume III: Aeroplane CO_2 Emissions
- Volume IV: Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

As of 2025, CAEP has completed 13 cycles, during which it has guided the aviation sector through technical advancements and policy developments. These include the creation of the Airport Air Quality Manual in 2010, the adoption of the first global CO_2 emissions standard for aeroplanes and new standards for non-volatile particulate matter (nvPM) in 2016, and comprehensive analyses supporting the rollout of CORSIA, ICAO's carbon offsetting scheme in 2017.

CAEP Process & Contributors

The success of the Committee lies in its expert-oriented and collaborative approach to developing aviation environmental standards. CAEP brings together 33 ICAO Member States covering all geographic regions. There are also 22 Observers (10 states and 12 organisations) who participate in CAEP's activities but are not be part of the final decision-making process of the members. Overall, more than 1200 globally recognized experts contribute to CAEP's activities. Nominated by CAEP's Members and Observers, they offer technical guidance in specialized areas of CAEP working groups, assisting in the delivery of CAEP work programme. CAEP's experts represent a variety of stakeholders, including government agencies, industry organizations, other UN agencies, civil society, NGOs, and research groups. This diversity of contributors ensures that CAEP's work is inclusive of a wide range of perspectives to inform the decisions of ICAO Member States

- CAEP is led by a Chairperson and two Vice-Chairpersons. Each are elected by the Committee from its Members at the beginning of every new cycle. Meanwhile, the CAEP Secretary is appointed by the President of the ICAO Council and supports the Chairperson in conducting the work undertaken by the Committee. As a Committee of the Council, CAEP operates under a confidentiality agreement, with its discussions remaining private until the ICAO Council approves the results and decides on publication.

CAEP holds formal meetings once every three years to deliver its work programme and decide on the future work programme for the upcoming cycle. Additionally, annual Steering Group meetings are held every year to

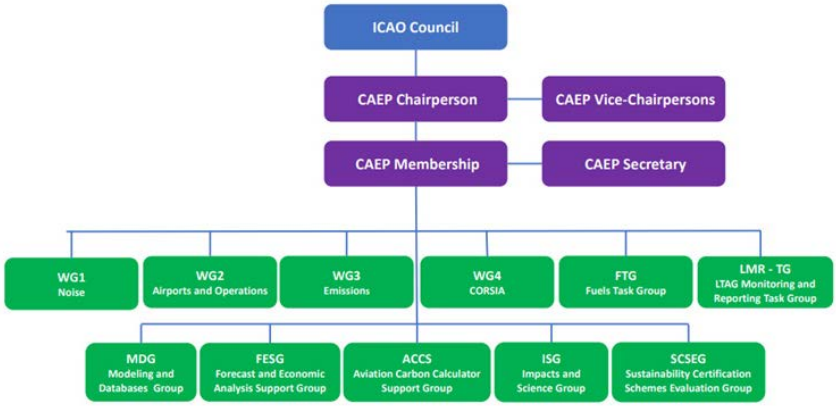

FIGURE 2: CAEP Structure during CAEP/13 cycle.

steer and guide the work undertaken by the Working Groups. The Working Groups, established under CAEP, work on various technical items concerning the nexus of aviation and environment. The scope of CAEP's work is continuously expanding and 11 Working Groups have been established to develop the CAEP/13 work program. Figure 2 highlights the CAEP/13 structure, with details of its Working Groups.

Key achievements of CAEP/13 cycle

The Thirteenth meeting of CAEP, hosted at the ICAO headquarters in Montréal, took place from 17 to 28 February 2025. The meeting gathered over 286 participants to conclude the CAEP/13 cycle, culminating three years of activity by the CAEP Working Groups. A total of 31 recommendations were agreed by the Committee which established a methodology on monitoring and reporting CO_2 emissions reductions against the ICAO long term global aspirational goal, proposed more stringent aircraft noise and CO_2 emissions standards, and made progress on non-CO_2 emissions, climate adaptation, airports, operations, fuels and CORSIA. Together these advancements respond to the requests of the 41st Session of the ICAO Assembly and the Council and will lay the technical foundation needed to continue to transform the sector's environmental commitments into concrete actions.

Environmental Trends

One key deliverable of the Committee during the CAEP/13 cycle was assessing environmental trends in aircraft noise and emissions. CAEP updated global environmental trends on aircraft noise, Greenhouse Gases (GHG), and Local Air Quality (LAQ) emissions, as requested by the 41st Session of the ICAO Assembly.

LTAG Monitoring and Reporting (LMR) Methodology

CAEP also advanced in work related to the Long-Term Aspirational Goal (LTAG) Monitoring and Reporting (LMR). In response to Assembly Resolution A41-21, paragraph 9, as well as the Global Framework for Sustainable Aviation Fuels (SAF), Lower Carbon Aviation Fuels (LCAF) and other aviation cleaner energies adopted by the Third Conference on Aviation and Alternative Fuels (CAAF/3), CAEP developed and agreed to start the implementation of a robust and comprehensive LMR methodology to track progress towards the LTAG. This methodology combines a backward-looking assessment to track actual performance of international aviation, with a forward-looking assessment towards 2050. These assessments will consider the contributions from various drivers and measures, such as traffic, technological innovations, Sustainable Aviation Fuels (SAF), and their effect on CO_2 emissions reductions, as well as cost and impacts on the sector's development. CAEP also developed a tiered approach to the LMR methodology to enable a phased implementation of the LMR methodology during future CAEP cycles.

Moreover, CAEP agreed on future CAEP work on residual CO_2 emissions mitigation measures for aviation to be carried out during the CAEP/14 cycle.

Aviation Fuels

Regarding aviation fuels, CAEP continued its technical work related to Sustainable Aviation Fuels (SAF), Lower Carbon Aviation Fuels (LCAF) and other aviation cleaner energies to accelerate the certification of new fuel pathways, a critical technical work for achieving the sector's vision of 5% CO_2 emissions reduction through cleaner energies by 2030, agreed at the Third Conference on Aviation and Alternative Fuels (CAAF/3) in 2023. CAEP agreed to recommend amendments to three ICAO documents referenced in Annex 16, Volume IV tied to CORSIA Eligible Fuels (CEF), regarding criteria for the evaluation from sustainability certification schemes (SCS), new provisions for electricity sourcing used in CEF production, updates to Life Cycle Assessment values and methodologies, refining methodologies for co-processing in refinery units certified for LCAF production.

CORSIA

To strengthen the implementation of CORSIA, CAEP agreed to recommend amendments to Annex 16, Volume IV, as well as to the associated Environmental Technical Manual. These proposed changes include technical recommendations on how fuel monitoring methods are used by aeroplane operators, along with improved guidance related to reporting and verification procedures. CAEP is actively supporting the preparation for the 2025 periodic review of CORSIA, providing a range of technical inputs on CORSIA analyses to inform the Council and the Assembly.

Noise CO_2 Dual Stringency Standards

Substantial progress was also made on Noise and CO_2 Dual Stringency Standards, representing the first time both standards have been made more stringent simultaneously for aviation. CAEP conducted a detailed combined assessment of more stringent standards for aircraft noise and CO_2 emissions, using 32 modeling scenarios to evaluate their technical feasibility, economic reasonableness and environmental benefits. After reviewing the stringency options, CAEP recommended a new Chapter 16 noise Standard for new subsonic aircraft, making the standard more stringent by 6dB for large aircraft and 2dB for small ones, to take effect on 1 January 2029. It also proposed making the CO_2 standard 10% more stringent for large aircraft and 3% for small ones. The applicability date for new aeroplane types is 31 December 2031, and on 1 January 2035 for in-production models. These dual standards intend to shape the next generation of aircraft designs by moving manufacturers toward solutions reducing environmental impacts.

Supersonic Aeroplanes

CAEP recommended a new Chapter 15 Landing and Take-Off (LTO) noise certification standard for supersonic aeroplane types, to be included in Annex 16, Volume I and applicable as of January 1, 2029. The committee also agreed to continue its work developing an en route noise certification Standard for supersonic aeroplanes and an LTO emissions certification Standard for supersonic aeroplane engines.

Airports and Operations

During the CAEP 13 Cycle, the Committee developed several reports regarding airports and operations, including Community engagement practices, an updated Climate Adaptation Synthesis Report, good practices of noise monitoring systems, a Report on Operational Opportunities to Reduce Climate Effects of Contrails and Non-CO_2 Emissions, as well as a new publication on *Cleaner Energy at Airports* added to the Eco-Airport Toolkit e-collection, all of which will be published to the ICAO website.

CAEP also considered the ICAO Global Air Navigation Plan (GANP), focused on operational improvements.

CAEP also proposed technical amendments to Annex 16, Volume II and ETM Volume II regarding Local Air Quality emissions and amendments to the ICAO Airport Air Quality Manual.

Impacts and Science

CAEP Impacts and Science Group (ISG) produced three reports related to aviation climate impact and non-CO_2 aviation emissions science to be published, on *Air Quality and Climate Impacts Interdependencies and Trade-Offs*, *Supersonic Climate, Air Quality and Noise Impacts* as well as a report of the CAEP ISG workshop on contrail impacts.

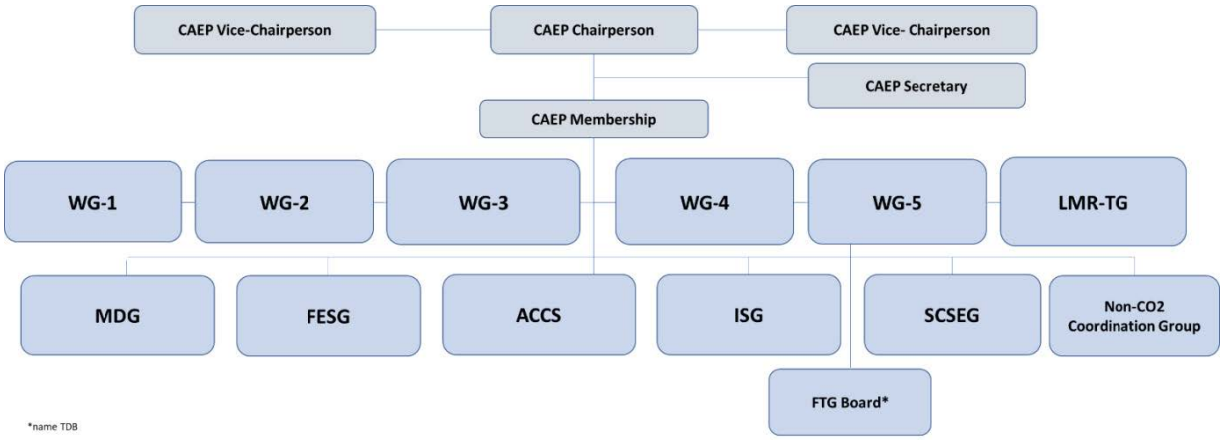

FIGURE 3: the new structure for CAEP/14 cycle.

Future Work for the CAEP/14 Cycle

Additionally, CAEP decided on its future work programme for the CAEP/14 Cycle (2025-2028), during the meeting. CAEP will continue its work on environmental trends, noise, airports and operations, emissions, CORSIA, fuels, LTAG Monitoring and Reporting, Impacts and Science.

CAEP plans to provide technical contributions in support of the ICAO Roadmap for the implementation of the CAAF/3 outcomes and the LTAG, for example with the implementation of LMR methodology, the development of a study on fuel accounting systems for international aviation, and the assessment of Life Cycle Assessment values for new fuel sources and pathways.

Conclusion

CAEP's achievements during the last triennium reflect the invaluable dedication of its Members, Observers, and technical experts in supporting ICAO's environmental goals. As CAEP enters its new cycle, it will remain committed to monitoring emerging issues and developments in environmental aviation, ensuring that relevant, and well-researched recommendations continue to guide the ICAO Council and the Assembly toward a more sustainable future for international aviation.