ICAO Committee on Aviation Environmental Protection

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Introduction

The Committee on Aviation Environmental Protection (CAEP)[2] is a technical committee of the ICAO Council established in 1983. CAEP assists the Council in formulating new policies and adopting new Standards and Recommended Practices (SARPs) related to aircraft noise and emissions, and more generally to aviation environmental assessments. This article provides an overview of the CAEP processes, and describes the work done by the Committee during the CAEP/12 cycle (2019-2022).

CAEP Process

CAEP comprises of 31 ICAO State Members from all regions of the world and 21 Observers. CAEP works under the stewardship of a Chairperson and two Vice-Chairpersons, elected by CAEP from its Members. A CAEP Secretary, who is designated by the President of the ICAO Council, assists the CAEP Chairperson. Being a Committee of the Council, the CAEP holds its deliberations under a confidentiality agreement and results are only made public when approved by the ICAO Council.

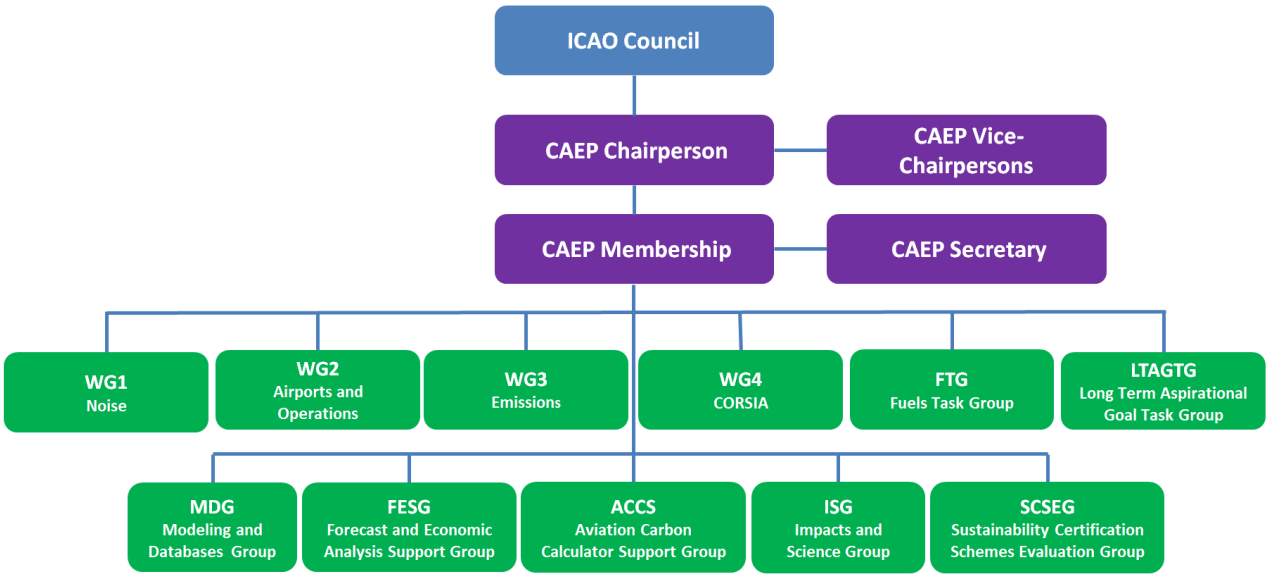


FIGURE 1: CAEP Structure during the 2019-2022 triennium

1 Urs Ziegler was Chairperson of the ICAO Council's Committee on Aviation Environmental Protection (CAEP) during its twelfth cycle (2019-2022). Ricardo Antonio Binotto Dupont and Tan Kah Han were Vice-Chairpersons.

2 https://www.icao.int/ENVIRONMENTAL-PROTECTION/Pages/CAEP.aspx

To deliver its work programme, formal meetings of CAEP are normally held once every three years and is complemented by annual Steering Group meetings. As the name implies, the intent of the Steering Group is to steer or provide guidance to the work carry out by Working Groups that are established under CAEP. The Working Groups work on various technical items related to aviation and environment. The scope of CAEP work has been expanding constantly, and eleven Working Groups have been set up to develop the CAEP/12 work programme. Figure 1 presents the current CAEP structure, with details of its Working Groups.

CAEP had to adapt its working arrangements in order to continue progressing its work during the COVID-19 pandemic. For that, various CAEP meetings were held virtually: not only the CAEP/12 meeting itself, which was held from 7 to 17 February 2022, but also the CAEP Steering Group meetings in 2020 and 2021, more than 30 full Working Group meetings, and hundreds of meetings of subgroups.

Operational processes were also reviewed to ensure the effectiveness of CAEP proceedings – some working papers and associated actions were decided following a 'silent approval procedure' prior to the meetings. This applied only to items deemed not contentious, identified in coordination between the CAEP working group co-rapporteurs and the CAEP Chairperson. In the absence of objections by a common deadline, the matters addressed under the 'silent approval procedure' were considered decided. This facilitated more effective and efficient discussions during actual (virtual/online) CAEP meetings. Ultimately, the experience of online CAEP meetings has allowed meetings to progress more quickly, but not always more easily.

Contributors to CAEP

More than 600 technical experts are involved in CAEP activities. These experts have been nominated by CAEP Members and Observers to provide technical inputs in specific areas of CAEP working groups (e.g. Emissions, Noise, Fuels, CORSIA, etc.). There is close coordination within these working groups to deliver on the work programmes; for example, the Long-Term Aspirational Goal Task Group (LTAG-TG) worked closely with other working groups (e.g. Forecasting and Economic Analysis Support Group (FESG), Modelling and Databases Group (MDG)) in gathering data from internal and external sources, tapping on mutual expertise in the process. Finally, analysis by the Impacts and Science Group (ISG) has put the results of the LTAG-TG into context of the latest findings in climate science.

Hundreds of meetings have been convened across these Working Groups during the past CAEP cycle, ensuring that CAEP is able to deliver on the work programme assigned by the ICAO Council. We express gratitude for the steadfast commitment and valuable contributions from all the experts, in particular to those who have taken up responsibilities to lead Working Groups and Subgroups focused on specific tasks. This work has significantly advanced ICAO's efforts in aviation environmental protection.

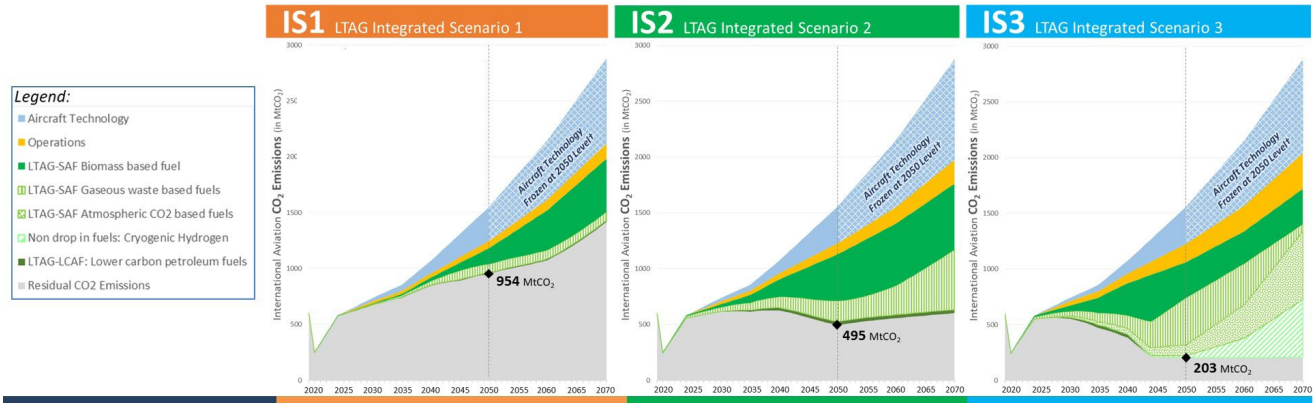
Some key achievements in the CAEP 12 cycle

While making significant progress on issues where global expectations are high, CAEP continued to work on its "fundamentals". Indeed, aircraft noise and local air quality remain key and limiting factors in airport areas. Operational improvements remain short-term levers accessible to all to reduce emissions, ensuring that in this global journey towards greening the aviation sector.

CAEP continued to contribute to the development of concrete tools to facilitate the implementation of solid action by aviation stakeholders worldwide. For example, on airports and operations, CAEP developed a wide range of materials[3], such as the ICAO's Eco-Airport Toolkit e-collection[4], providing practical and ready-to-use information on a wide range of topics related to airport infrastructure (water management, climate resilience, airport design). CAEP agreed that other technical materials may also be developed into new guidance material to States and aviation stakeholders in the future.

3 "Operational opportunities to reduce aircraft noise", "Environmental metrics to relevance to the global aviation system", "Climate change risk assessment, adaptation and resilience", "Sustainable considerations for airport surface access, as part of the Eco-Airport Toolkit e-collection", "Investigation on possible indicators for encroachment"

4 https://www.icao.int/environmental-protection/Pages/Ecoairports.aspx



Metrics	IS1	IS2	IS3
CO_2 Emissions in 2050 after Reductions	**≈950 $MtCO_2$** in 2050 *(**160%** of 2019 CO_2 emissions)*	**≈500 $MtCO_2$** in 2050 *(**80%** of 2019 CO_2 emissions)*	**≈200 $MtCO_2$** in 2050 *(**35%** of 2019 CO_2 emissions)*
Reduction in 2050 from the Baseline	**39% total** through: Technologies - 20%, Operations - 4%, Fuels - 15%	**68% total** through: Technologies - 21%, Operations - 6%, Fuels - 41%)	**87% total** through: Technologies - 21%, Operations - 11%, Fuels - 55%
Cumulative residual Emissions from 2020 to 2070	23 $GtCO_2$ (2020 to 2050) 23 $GtCO_2$ (2051 to 2070)	17 $GtCO_2$ (2020 to 2050) 11 $GtCO_2$ (2051 to 2070)	12 $GtCO_2$ (2020 to 2050) 4 $GtCO_2$ (2051 to 2070)

FIGURE 2: LTAG feasibility study results: reductions in CO_2 emissions from international aviation with the in-sector measures through 2050 and beyond for various scenarios (IS1-IS3).

As a result the CAEP/12 meeting agreed on making a total of 31 recommendations to ICAO Council, encompassing various standards, recommended practices, guidance materials and technical reports related to aviation environmental protection. Below please find a brief summary of the main outcomes of the CAEP/12 work.

Report on the feasibility of a long-term aspirational goal (LTAG)

CAEP unanimously adopted the technical report on the feasibility of an LTAG for international aviation CO_2 emissions, which describes the potential for substantial CO_2 reductions through the use of aviation in-sector measures. Three integrated scenarios were developed to cover a range of readiness, attainability, and aspiration. Figure 2 shows the scenario's outcomes, and the potential contributions from aircraft technology, operations, and fuels. For more details on this work, refer to the dedicated articles in Chapter 4 and in the LTAG Supplement of the Report.

Aircraft Emissions

CAEP agreed to recommend amendments to Annex 16 — Environmental Protection, Volume II — Aircraft Engine Emissions, Annex 16, Volume III — Aeroplane CO_2 Emissions and their associated Environmental Technical Manuals. CAEP also agreed to proposed amendments to the ICAO Doc 9889 - , including amendments related to the updated of information on aircraft nvPM emissions. More information is available in Chapter 3 and 5 of the Report.

Aircraft noise

CAEP delivered proposed amendments to Annex 16, Volume I, including new guidance material for measurement of helicopter hover noise. CAEP also recommended the publication of a report on Noise Technology Research for Fixed Wing Aircraft and agreed on future work on noise certification approaches for Emerging Technology Aircraft (ETA). More information is available in Chapter 2 of the Report.

Supersonic Aeroplanes

CAEP continued its work on Supersonic Transport Aircraft (SST) and approved the results of an Exploratory Study to better understand the environmental impacts resulting from the introduction of supersonic aircraft. CAEP agreed to develop Landing and Take-off Noise SARPs for Supersonic aeroplanes during the next cycle, as well as to update all elements of Annex 16, Volume II and ETM, Volume II, including the regulatory limits for modern supersonic engines (without afterburning technology) based on emissions data availability. More information is available in Chapter 2 of the Report.

Airports and operations

CAEP developed a wide range of materials related to airports and operations including 1) Operational Opportunities to Reduce Aircraft Noise; 2) Environmental Metrics of Relevance to the Global Aviation System; 3) Climate Change Risk Assessment, Adaptation and Resilience; 4) Sustainable Considerations for Airport Surface Access, as part of the Eco-Airport Toolkit e-collection[5]; and 5) Investigation on Possible Indicators for Encroachment. These are recommended to be published on the ICAO website, while the manual on Operational Opportunities to Reduce Aircraft Noise is recommended to be issued as an ICAO Document. More information is available in Chapter 6 of the Report.

CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)

CAEP also agreed on amendments to the CORSIA SARPs, and its associated Environmental Technical Manual, in ensuring the smooth implementation of CORSIA. CAEP's regular updates to Council on CORSIA developments, such as COVID-19's impact on emissions, will also facilitate upcoming deliberations on CORSIA's periodic review. On sustainable and lower carbon aviation fuels, amendments to the ICAO documents[6] which form part of the CORSIA Implementation Elements related to 'CORSIA Eligible Fuels', were also agreed by CAEP. The meeting also discussed the definition of a baseline for new entrants and agreed that there is a need to conduct further work on this item during the next CAEP/13 cycle. More information is available in Chapter 8 of the Report.

Sustainable and lower carbon aviation fuels

CAEP agreed to recommend amendments to four ICAO documents[7] that are referenced in Annex 16, Volume IV and are part of the CORSIA Implementation Elements related to "CORSIA eligible fuels", including sustainability criteria and methodologies to calculate the life cycle emissions of CORSIA lower carbon aviation fuels (LCAF). In addition, CAEP also agreed on guidance material on potential policies and coordinated approaches for the deployment of Sustainable Aviation Fuels that could be used as a resource by Member States. More information is available in Chapter 7 of the Report.

Impacts and Science

CAEP developed and recommended the publication of three assessment reports on 1) the impacts of aviation NOx emissions on air quality, human health and climate; 2) fuel composition effects on nvPM emissions; and 3) potential environmental impacts from supersonic aircraft. CAEP also agreed on a White Paper on non-acoustic factors related to community annoyance. More information is available in Chapter 2 and 3 of the Report.

Conclusion

These developments are indicative of the valuable contributions from all CAEP Members, Observers and nominated technical experts in advancing ICAO's efforts in aviation environmental protection. Moving into the new CAEP/13 cycle, CAEP will continue to monitor and review environmental issues associated with aviation, in order to continue to provide robust and technically sound recommendations to the ICAO Council.

5 https://www.icao.int/environmental-protection/Pages/Ecoairports.aspx

6 ICAO document "Default life cycle emission values for CORSIA eligible fuels", ICAO document "CORSIA methodologies for calculating actual life cycle emissions values", ICAO document "CORSIA sustainability criteria for CORSIA eligible fuels", ICAO document on "CORSIA eligibility framework and requirements for sustainability certification schemes (SCS)"

7 ICAO document "Default life cycle emission values for CORSIA eligible fuels", ICAO document "CORSIA methodologies for calculating actual life cycle emissions values", ICAO document "CORSIA sustainability criteria for CORSIA eligible fuels", ICAO document on "CORSIA eligibility framework and requirements for sustainability certification schemes (SCS)"