



WORKING PAPER

ASSEMBLY — 41ST SESSION

EXECUTIVE COMMITTEE

Agenda Item 17: Environmental Protection – International Aviation and Climate Change

ICSA'S VIEWS ON A LONG-TERM ASPIRATIONAL GOAL FOR INTERNATIONAL AVIATION CO₂ EMISSIONS REDUCTIONS

(Presented by the International Coalition for Sustainable Aviation (ICSA))

EXECUTIVE SUMMARY

This paper sets out ICSA's recommendations for a net-zero Long-Term Aspirational Goal (LTAG) for international aviation based upon a cumulative CO₂ budget with an interim milestone. It also recommends that the LTAG be updated to include non-CO₂ climate impacts at the 42nd Assembly.

Action: The Assembly is invited to:

- a) note ICSA's support for a net-zero emissions goal for international aviation;
- b) note the research presented in Paragraph 3 concluding that new technologies like electrofuels could cut aviation CO₂ to near zero levels in 2050, consistent with a 1.75°C temperature target under which aviation does not increase its share of emissions;
- c) note that out-of-sector measures will be needed to achieve net-zero emissions in 2050;
- d) agree that the LTAG for international aviation CO₂ emissions reductions be in the form of a cumulative emissions target plus a designated year to peak emissions as an interim milestone;
- e) agree the LTAG be updated at the 42nd Assembly to account for the latest scientific understanding of non-CO₂ impacts; and
- f) agree that the LTAG should not prevent States from taking national or regional action to deliver further ambition, especially in the near-term.

<i>Strategic Objectives:</i>	This working paper relates to the Environmental Protection Strategic Objective.
<i>Financial implications:</i>	Does not require additional funds.
<i>References:</i>	ICAO Assembly Resolution A40-18 Doc 10178, <i>Report of the High-level Meeting on the feasibility of a Long-Term Aspirational Goal for international aviation CO₂ emissions reductions (HLM-LTAG)</i> ICAO Report on the Feasibility of LTAG (HLM-LTAG-IP/02)

¹ English, Arabic, Chinese, French, Russian and Spanish versions provided by ICSA.

1. INTRODUCTION

1.1 ICSA welcomes the progress made at the HLM-LTAG, in particular the conclusions that ICAO and its member states are encouraged to work together to strive to achieve a collective LTAG of net-zero carbon emissions by 2050, in support of the Paris Agreement's temperature goal, with the maximum possible level of progress on the implementation of aviation in sector CO₂ emissions reduction measures, and supported by the timely update and development of relevant ICAO SARPs and guidance, as appropriate. This provides a solid foundation.

1.2 The CAEP LTAG Task Group (LTAG-TG) completed its technical analysis and submitted a final report to CAEP/12, which has been published on the ICAO website. ICSA commends the task group and its nominated technical experts, including those from ICSA, for their hard work. The analysis was comprehensive and fulfils the tasks provided in the LTAG-TG Terms of Reference (ToRs).

1.3 For the analysis, LTAG-TG requested the Integrated Science Group (ISG) to quantify how much carbon dioxide (CO₂) could be emitted globally, by all sectors, between now and 2050, consistent with limiting climate change to 1.5°C or 2°C. The remaining carbon budget from 2020 to 2050 from all anthropogenic sources is 400 gigatonnes (Gt) CO₂ at a 67% probability of limiting temperature increase to 1.5°C. The comparable budget for 2°C at a 67% probability is 1,150 Gt CO₂.

2. ICSA'S LTAG VISION

2.1 At 40th Assembly in September 2019, ICSA presented an introductory vision for a "Zero Climate Impact" pathway for international aviation (A40-WP/561). Work to establish a long-term goal covering both carbon dioxide (CO₂) and non-CO₂ climate impacts was recommended.

2.2 In June 2022, ICSA member the International Council on Clean Transportation (ICCT) released a detailed assessment of technologies that could reduce CO₂ emissions from global aviation to near-zero levels in 2050. The report has been submitted as A41-WP/362 to this meeting.

2.3 The ICCT report compares cumulative CO₂ emissions between 2020 and 2050 from three scenarios to 1.5°C, 1.75°C, and 2°C global carbon budgets. It was assumed that aviation maintains its current share of global CO₂ emissions, 2.9%, generated from fuel use (2.4%) and upstream fuel production (0.5%).²

2.4 Overall, the report finds that CO₂ emissions from aircraft need to peak by 2030 at the latest, and as soon as 2025, to align aviation with the Paris Agreement. The Action scenario peaks emissions in 2030 but still uses up aviation's entire 2°C carbon budget by 2050. The Breakthrough scenario achieves a 1.75°C future after peaking CO₂ in 2025 and cutting it more than 90% below 2019 levels in 2050. In all scenarios modelled, aviation emits its proportional share of a global 1.5°C carbon budget by 2030. Non-CO₂ effects were not modelled in the report.

2.5 The ICCT report holds several implications for LTAG deliberations. First, CO₂ emissions from aircraft will need to peak this decade, and as early as 2025, in order to cut aviation emissions to near-zero levels by mid-century. Second, a long-term climate goal set as cumulative CO₂ emissions, rather than a single 2050 target, is more likely to achieve the ambitions of the Paris Agreement. Finally, out of sector approaches like direct removal of CO₂ from the atmosphere will be needed to meet the highest ambitions of the Paris Agreement.

² <https://theicct.org/publications/co2-emissions-commercial-aviation-2020>

3. FORMAT OF ICAO GOAL

3.1 As described in Paragraph 5 of the LTAG-TG final report, two metrics for a long-term goal are (1) annual level of emissions; and (2) cumulative total emissions. Table 1 summarizes the results of the three Integrated Scenarios in million tonnes (Mt, annual) and billion tonnes (Gt, cumulative) of CO₂. LTAG estimates uses a modified tank-to-wake (TTW) basis which integrates the upstream emissions from SAF production but not from fossil jet fuel production.

Table 1. Residual emissions from international aviation under the LTAG-TG Integrated Scenarios

Integrated Scenario	Annual CO ₂ Emissions, 2050	Cumulative CO ₂ Emissions, 2021-2050
IS1	950 Mt	23 Gt
IS2	500 Mt	17 Gt
IS3	200 Mt	12 Gt

3.2 The LTAG-TG ToRs requested that work be placed in the context of achieving the current ICAO aspirational goals, including carbon neutral growth from 2020. The annual CO₂ emissions in 2050 from IS1 would exceed the annual CO₂ emissions from international aviation in 2019 (used here as a default value for 2020 given the impact of the COVID-19 pandemic on global revenue tonne kilometres in 2020) of 606.5 Mt.³ Annual emissions under IS2 in 2050 would be 18% lower than in 2019, while under IS3 aircraft would emit 67% less CO₂ in 2050 compared to 2019.

3.3 A cumulative CO₂ emissions goal allows for easier comparison to future revised global carbon budgets that may be published. According to Appendix R3 of the LTAG-TG final report, IS3 would account for a 3% share of a 1.5°C climate budget at 67% probability, increasing to a nearly 6% share for IS1. In contrast, aviation contributed 2.4% of CO₂ from TTW energy use in 2019 prior to the COVID-19 downturn.⁴ If civil aviation were to continue to account for 2.4% of the global carbon budget through 2050, then IS3 would be consistent with a 1.75°C temperature trajectory.⁵

3.4 The LTAG-TG final report points out that an LTAG could be complemented by intermediate goals or waypoints in preceding milestone years. This could be applied if either the annual level of emissions or cumulative total emissions metrics are chosen for the goal. Currently, CORSIA is meant to help facilitate carbon-neutral growth through 2035 by offsetting international aviation emissions above 2019 levels. Under IS3, international aviation emissions peak prior to 2030 and never return to 2019 levels.

3.5 ICSA recommends a cumulative emissions target plus a designated year to peak emissions as an interim milestone. This approach would ensure that the aviation sector makes early and proactive investments in new technology to achieve net-zero emissions and does not consume its share of the global carbon budget too quickly. For example, 2030 could be designated as a target year for peak emissions along with a cumulative 12 Gt total budget, consistent with IS3. Alternatively, a multi-year emissions trajectory could be established with discrete annual CO₂ targets, with some additional complexity.

3.6 None of the Integrated Scenarios reduce aviation CO₂ to zero by 2050. While research suggests that widespread use of electrofuels (e-fuels) can reduce aviation CO₂ to levels below envisioned

³ https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%202020%20Emissions_Nov2021_web.pdf

⁴ <https://theicct.org/publications/co2-emissions-commercial-aviation-2020>

⁵ <https://theicct.org/publication/global-aviation-vision-2050-align-aviation-Paris-jun22>

by the IS3, some level of residual CO₂ is expected.⁶ Therefore, additional out-of-sector measures will be needed to achieve net-zero emissions by 2050, as pledged by industry associations and many States. Out-of-sector measures may be particularly important to achieve zero climate impacts after accounting for the full (CO₂ and non-CO₂) climate impacts of aviation (see below).

3.7 While the LTAG can help guide and inform national and regional aviation measures, it cannot substitute for legally binding measures to reduce emissions. An LTAG should not prevent further ambition by states, including effective regional or national actions as required, to deliver timely reductions in aviation emissions.

3.8 While the carbon budgets produced by ISG account for non-CO₂ climate forces, the LTAG-TG analysis only covers CO₂ emissions. The non-CO₂ climate impact of aviation may be double that of CO₂ alone.⁷ Non-CO₂ emissions from aviation will also need to be drastically reduced if the sector hopes to help states remain in the boundaries of carbon budgets that limit global temperature rise to between 1.5°C and 2°C. ICSA believes that, while an initial LTAG can be set for CO₂ only, the scope should be updated at the next Assembly with respect to the latest scientific understanding of non-CO₂ impacts. This will be essential to guide choices regarding future technology, fuels, and operations based on finding optimal climate solutions.

4. ACTION BY THE ASSEMBLY

4.1 The ICAO Assembly is invited to:

- a) note ICSA's support for a net-zero emissions goal for international aviation;
- b) note the research presented in Paragraph 3 concluding that new technologies like electrofuels could cut aviation CO₂ to near zero levels in 2050, consistent with a 1.75°C temperature target under which aviation doesn't increase its share of emissions;
- c) note that out-of-sector measures will be needed to achieve net-zero emissions in 2050;
- d) agree that the LTAG for international aviation CO₂ emissions reductions be in the form of a cumulative emissions target plus a designated year to peak emissions as an interim milestone;
- e) agree the LTAG be updated at 42nd Assembly to account for the latest scientific understanding of non-CO₂ impacts; and
- f) agree that the LTAG should not prevent states from taking national or regional action to deliver further ambition, especially in the near-term.

— END —

⁶ WP/362; Piris-Cabezas Pedro, *The High Integrity Sustainable Aviation Fuel Handbook*, Environmental Defense Fund, Appendices B and E. <https://www.edf.org/media/new-handbook-provides-expert-guidance-using-high-integrity-sustainable-aviation-fuels-saf>

⁷ Lee, et.al (2021) "The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018", *Atmospheric Environment*, vol. 244, <https://doi.org/10.1016/j.atmosenv.2020.117834>