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WORKING PAPER

HIGH-LEVEL MEETING ON THE FEASIBILITY OF A LONG-TERM ASPIRATIONAL GOAL FOR INTERNATIONAL AVIATION CO_2 EMISSIONS REDUCTIONS (HLM-LTAG)

Montréal, 19 to 22 July 2022

Agenda Item 1: CO_2 emissions reduction scenarios and options for a long-term global aspirational goal for international aviation

ICSA'S VIEWS ON A LONG-TERM ASPIRATIONAL GOAL FOR INTERNATIONAL AVIATION CO_2 EMISSIONS REDUCTIONS

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

SUMMARY

ICSA commends the Long-Term Aspirational Goal Task Group (LTAG-TG) and its nominated technical experts on completing an assessment of the feasibility of a long-term aspirational goal for international aviation CO_2 emissions reductions. This paper summarizes ICSA views on the options for a LTAG, including support for a net-zero goal in the form of a cumulative CO_2 emissions target and a peak emissions year.

Action by the Meeting is in paragraph 4.

1. INTRODUCTION

1.1 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).

1.2 For the analysis, LTAG-TG requested the Integrated Science Group (ISG) to quantify how much carbon dioxide (CO_2) 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) CO_2 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 CO_2.

2. ICSA'S LTAG VISION

2.1 At the 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 (CO_2) and non-CO_2 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 cumulative CO_2 emissions from global aviation to near-zero levels. The report has been submitted as IP/6 to this meeting.

2.3 The ICCT report compares cumulative CO_2 emissions between 2020 and 2050 from three scenarios to 1.5ºC, 1.75ºC, and 2ºC global carbon budgets. It was assumed that aviation maintains its current share of global CO_2 emissions, 2.9%, generated from fuel use (2.4%) and upstream fuel production (0.5%).[1]

2.4 Overall, the report finds that CO_2 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 CO_2 in 2025 and cutting it more than 90% below 2019 levels in 2050. In all scenarios modeled, aviation emits its proportional share of a global 1.5°C carbon budget by 2030. Non-CO_2 effects were not modelled in the report.

2.5 The ICCT report holds several implications for LTAG deliberations. First, CO_2 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 CO_2 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 CO_2 from the atmosphere will be needed to meet the highest ambitions of the Paris Agreement.

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 CO_2. 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

[1] https://theicct.org/publications/co2-emissions-commercial-aviation-2020

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 CO_2 emissions in 2050 from IS1 would exceed the annual CO_2 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.[2] Annual emissions under IS2 in 2050 would be 18% lower than in 2019, while under IS3 aircraft would emit 67% less CO_2 in 2050 compared to 2019.

3.3 A cumulative CO_2 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 CO_2 from TTW energy use in 2019 prior to the COVID-19 downturn.[3] 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.[4]

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 CO_2 targets, with some additional complexity.

3.6 None of the Integrated Scenarios reduce aviation CO_2 to zero by 2050. While research suggests that widespread use of electrofuels (e-fuels) can reduce aviation CO_2 to levels below envisioned by the IS3, some level of residual CO_2 is expected.[5] 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 (CO_2 and non-CO_2) 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. For example, sustainable aviation fuels, which are meant to play a key role towards achieving the LTAG, will require effective, ambitious national policies to succeed. This is the case because, independent of whether an air carrier is burning conventional fuel or sustainable aviation fuel, CO_2 emissions out of the back of the aircraft engine are basically the same, meaning, the emissions reductions

[2] https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%202020%20Emissions_Nov2021_web.pdf
[3] https://theicct.org/publications/co2-emissions-commercial-aviation-2020
[4] This analysis assumes a 14.5 Gt proportional carbon budget for international aviation through 2050 on a well-to-wake (WTW) basis under a 1.75ºC temperature pathway. See https://theicct.org/publication/global-aviation-vision-2050-align-aviation-Paris-jun22
[5] For further insights on the potential role of electrofuels, see IP/6 and Piris-Cabezas Pedro, *The High Integrity Sustainable Aviation Fuel Handbook*, Environmental Defense Fund, Appendices B and E. (forthcoming).

are achieved upstream under national accounting frameworks. Accordingly, an LTAG should encourage states to put their aviation sectors in Nationally Determined Contributions (NDCs).

3.8 While the carbon budgets produced by ISG account for non-CO_2 climate forces, the LTAG-TG analysis only covers CO_2 emissions. The non-CO_2 climate impact of aviation may be double that of CO_2 alone.[6] Non-CO_2 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 CO_2 only, scope should be reviewed at the next Assembly with respect to the latest scientific understanding of non-CO_2 impacts. This will be essential to guide choices regarding future technology, fuels, and operations based on finding optimal climate solutions.

4. ACTION BY THE HLM-LTAG

4.1 The HLM-LTAG 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 CO_2 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 CO_2 emissions reductions be in the form of a cumulative emissions target plus a designated year to peak emissions as an interim milestone;

e) direct Council to propose revisions to the LTAG at 42nd Assembly to account for the latest scientific understanding of non-CO_2 impacts;

f) encourage States to include their share of aviation emissions in Nationally Determined Contributions (NDCs); and

g) 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] See 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