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Agenda Item 4: Work on the feasibility of a long-term global aspirational goal - Options

VIEWS OF THE UNITED STATES ON THE FEASIBILITY OF A LONG-TERM ASPIRATIONAL GOAL FOR INTERNATIONAL CIVIL AVIATION CO_2 EMISSIONS REDUCTIONS

(Presented by the United States of America)

SUMMARY

This paper presents the views of the United States on the CAEP LTAG-Task Group (LTAG-TG) analyses and recommendation. It also places the results of the LTAG-TG in context of the 2021 U.S. Climate Action Plan that describes the efforts of the United States to reduce CO_2 emissions from aviation by 2050.

Action by the CAEP is in paragraph 4.

1. INTRODUCTION

1.1 Following the 40th Session of the ICAO Assembly and the request from Council to explore the feasibility of a LTAG for international aviation, CAEP assessed the feasibility of an LTAG by defining and evaluating future scenarios for in-sector CO_2 reductions from aviation. The United States welcomes the final report contained in CAEP/12-WP/14 and recognizes the substantial time and resources contributed across participants to carry out the analyses and produce the final report. The United States acknowledges the contribution and cumulative efforts of more than 280 experts, which makes this report and its underlying analyses a consensus study from CAEP that will be critical to guiding the recommendations by the Council and decisions at the 41st Session of the ICAO Assembly.

1.2 This paper presents the views of the United States on the LTAG-TG analyses and recommendation. It also places the results of the LTAG-TG analyses in context of the 2021 U.S. Climate Action Plan that describes the efforts of the United States to reduce CO_2 emissions from aviation by 2050.

2. UNITED STATES VIEWS ON THE LTAG-TG ANALYSES

2.1 Scope and methodology

2.1.1 The Council tasked the CAEP, through the LTAG-TG, to provide technical support "in the exploration of the feasibility of a long-term global aspirational goal for international civil aviation CO_2

emissions reductions including options and roadmaps for their realization, for Council consideration." To carry out this task, the LTAG-TG developed a series of integrated scenarios and sensitivity studies to understand how international civil aviation CO_2 emissions could evolve over the next fifty years. These scenarios considered uncertainty stemming from a range of factors, including future aviation demand, aerospace technology development, and the broader evolution of the energy sector.

2.1.2 In accordance with its remit from Council, LTAG-TG focused on exploring the potential for CO2 emissions reductions from in-sector measures (i.e., aircraft technology, operational improvements, and fuels) only. It is also important to emphasize that the LTAG-TG methodologies and analyses are based on life cycle emissions. As a result, the potential for reductions from the use of new fuel types is limited by the life cycle emissions reduction they can achieve and the opportunities for further reductions from the use of offsets was not considered at all. The LTAG-TG analysis considered in-sector measures only.

2.2 Comprehensiveness and robustness of the LTAG-TG analyses

2.2.1 Through the set of integrated in-sector scenarios (IS), the LTAG-TG explored a broad range of readiness and attainability levels of technology, fuels, and operations measures. The United States fully supports the sensitivity analysis of the IS3 scenario that examined the importance of fuels to reducing CO_2 emissions. It is important to note that multiple paths may result in similar levels of CO_2 emissions such as levels resulting from the IS3 scenario (i.e., 150 to 260 $MtCO_2$ as shown in Figure 4 of the LTAG-TG report and Figure 1 below). These complementary analyses show the critical role of drop-in fuels, which have the largest impact on reducing CO2 emissions driving the overall reductions by 2050. This is also confirmed by numerous other studies such as the CAEP/10 and CAEP/11 Trends Analyses and the work conducted to support the 2021 U.S. Aviation Climate Action Plan.

2.2.2 The United States agrees with the LTAG-TG on the caveats and limitations associated with the availability of data, modelling methodologies and assumptions. The LTAG-TG analysis projects the evolution of a complex global system, namely the international aviation system, 30 to 50 years out in the future. The LTAG-TG report documents these caveats and limitations in the relevant sections. We strongly agree with the LTAG-TG that additional time and/or data (if the data even exist) would not change the overall results and takeaways captures in the LTAG-TG report.

2.2.3 The United States agrees that the LTAG-TG completed the technical work in accordance with the tasks as defined in its Terms of Reference approved by the 219th ICAO Council.

2.3 Views on options

2.3.1 We welcome the context provided by the LTAG-TG to help understand the results of the analyses. This helps to translate the breadth and depth of technical results by CAEP into potential actionable items for consideration by the Council.

2.3.2 The United States considers that a goal based on an annual level of emissions in a reference year provides a clear and simple way to communicate such a goal. As cumulative emissions are the key factor in determining the overall impact of aviation on the climate, we would also welcome discussions on a goal based on cumulative emissions.

2.3.3 Figure 1 (below) shows an adapted version of Figure 4 of the LTAG-TG report. It also shows the 2019 CO_2 emissions levels (proxy for 2020 Carbon Neutral Growth (CNG) goal) for context as well as the average 2019 and 2020 CO_2 emissions used as reference under CORSIA (from 2024 to 2035). Figure 1 shows that in-sector technology, operations, and fuels measures considered under scenario IS1 would be insufficient to reduce CO2 emissions meaningfully as the full range of emission is well above the

2019 emissions level. IS2 would result in CO_2 emissions levels close to and within the 2019 and average 2019-2020 range. The LTAG-TG analyses and report indicate that to meet future potential growth of aviation traffic and reduce CO_2 emissions below a CNG goal, the international aviation sector needs to consider continued aircraft technology and operational improvements, but more importantly, the development and dramatic expansion of sustainable aviation fuels (SAF) with low life cycle emissions in line with Integrated Scenario 3. IS3 shows that despite replacing 100% of conventional jet fuel with SAF and unless SAF exhibit 100% reduction in life cycle emissions, it will be difficult for residual CO_2 emissions from international aviation to drop below 150-250 MtCO2 considering in-sector measures only. These residual emissions are due to the life cycle emissions reduction from fuels in IS3 being roughly 80% (to be precise, the life cycle emissions reduction in 2050 is 81% for the mid-traffic forecast).

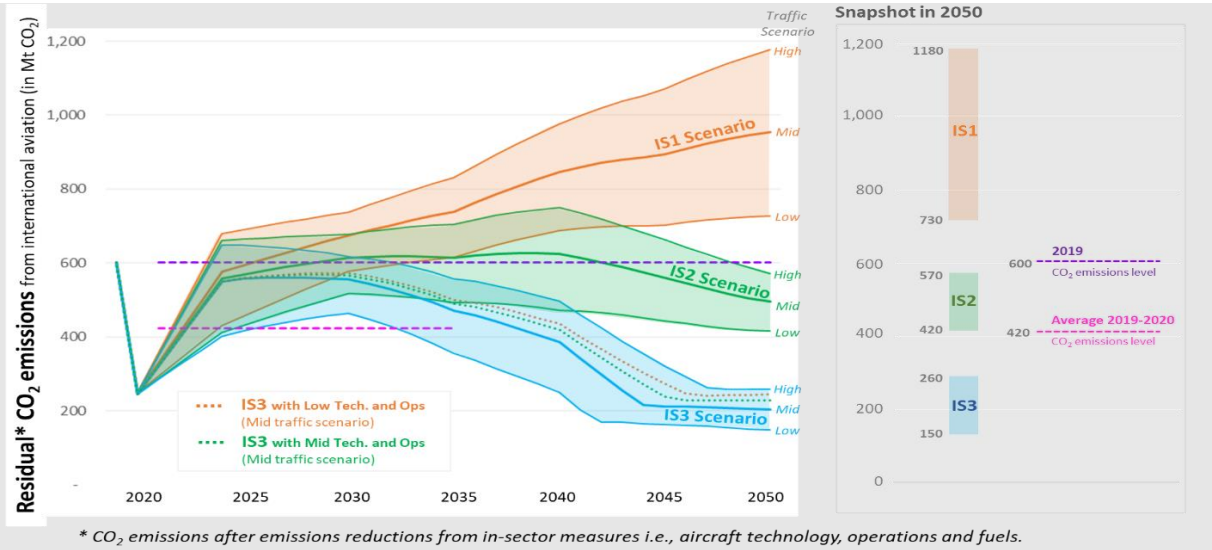

Figure 1: Temporal distribution and snapshot in 2050 of residual in-sector CO_2 emissions from international aviation

2.3.4 The LTAG-TG analyses show that to further reduce CO_2 emissions below 150-250 MtCO_2 in 2050 market-based measures would be required. This would also provide greater flexibility to the international aviation sector to meet its goal in case CO_2 emissions after technology, operations, and fuels improvements remain above the goal.

2.3.5 Market-based measures may be necessary to achieve a net-zero goal and while LTAG-TG did not consider potential out of sector measures as part of its remit, we do not recommend additional quantitative analyses regarding the potential supply of emissions units in 2050.

2.3.6 In addition, the United States notes that the LTAG-TG scenario and analyses only considered carbon capture, utilization, and sequestration as a means to reduce emissions from conventional jet fuel (i.e., Lower Carbon Aviation Fuels) and the production of SAF from waste and atmospheric CO2 via a power-to-liquids process. The analysis did not consider the combination of CO_2 capture with biomass-based SAF production, which could further reduce life cycle emissions. Further, the analysis did not consider the potential use of direct air capture and biomass-based CO_2 capture that could be coupled with sequestration solutions. With the use of these technologies, it would be possible to reduce emissions beyond what is shown in the LTAG analysis and potentially achieve net-zero emissions for international aviation.

2.4 Distribution of the LTAG-TG report

2.4.1 The United States supports the recommendation to the Council that the report, or a version of it, be made public free of charge to ensure that all States and stakeholders can consider its findings. We

strongly encourage the CAEP Chair, the LTAG-TG Chair and Co-chairs, and the Secretariat to coordinate and consider developing an integrated and formatted version of the CAEP report that would be accessible to both a non-technical and technical audience.

3. LTAG-TG RESULTS IN CONTEXT OF THE 2021 U.S. CLIMATE ACTION PLAN

3.1 In November 2021, the United States published an updated Aviation Climate Action Plan (see CAEP/12-IP/16 for details), which describes a whole-of-government approach to put the aviation sector on a path toward achieving net-zero emissions by 2050. The Plan builds on individual and sector-wide commitments announced by the U.S. aviation industry and highlights specific actions and policy measures to foster innovation and drive change across the entire U.S. aviation sector.

3.2 It should be clear that the United States is not sharing this information for consideration by CAEP or expecting that any information would be reflected in the LTAG-TG report. We consider the LTAG-TG report as final given the remit from Council. We share this information to place the results of the LTAG-TG in context and to support our views expressed in section 2 of this paper.

3.3 The revised Action Plan builds on the vision that emissions will be decreased through the development of new, more energy efficient aircraft and engine technologies by the original equipment manufacturers. This is in line with the aircraft technologies scenarios captured in the LTAG-TG scenarios. It also targets improvements in aircraft operations throughout the National Airspace System and by airlines flying more optimal trajectories for reduced fuel use and contrail impacts. This is also in line with the LTAG-TG scenarios, but with less of a reduction impact. In line with the fuel scenarios underlying LTAG-TG IS3, the Plan recognizes that SAF will be critical to the long-term decarbonization of aviation. Through a range of policy instruments, including the SAF Grand Challenge, our government will work with industry to rapidly scale up SAF production with the goal of meeting U.S. fuel uplift needs by 2050.

3.4 The plan also recognizes that getting the entire U.S. aviation sector on a trajectory toward net-zero emissions by 2050 requires a suite of policies to incentivize innovation, deployment, and implementation, as well as competition to lower the costs of the needed changes. In principle, it is possible to develop and deploy SAFs with zero life cycle emissions. However, it is not assured these fuels can be produced in sufficient quantity to power all U.S. aviation by 2050. That is why, with a view to closing the emissions gap and enabling us to meet our 2050 goal, the United States is examining a broad range of options, including reductions from outside the aviation sector, such as processes that capture and sequester atmospheric CO_2.

4. ACTION BY THE CAEP

4.1 The CAEP is invited to:

a) agree that no additional work is required from the LTAG-TG in the CAEP/13 cycle;

b) note that the United States is focused on reaching net-zero GHG emissions from the U.S. aviation sector (i.e., U.S. domestic aviation for all operators and international aviation from U.S. operators and airports located in the United States) by 2050; and

c) note the views of the United States that market-based measures, i.e., high-integrity offsets including carbon capture, might be needed to achieve net-zero emissions.

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