



COMMITTEE ON AVIATION ENVIRONMENTAL PROTECTION (CAEP)

STEERING GROUP MEETING

Brussels, Belgium, 8 to 12 July 2024

Agenda Item 3: Integrated Dual Stringency Analysis

VIEWS OF THE UNITED STATES ON THE INTEGRATED CO₂/NOISE STRINGENCY WORK

(Presented by the United States of America)

SUMMARY

This paper presents the views of the United States on the Integrated CO₂ Emissions and Noise Stringency Analysis. Specifically, the paper supports the Main Analysis results and recommends the improved new type modelling approach (M.07) be part of the decision-making process at CAEP/13. This paper also discusses the new type (NT) CO₂ and noise standards, and the CO₂ in-production (InP) standards. Also, the United States supports work to develop SARPs and continue exploring the use of publicly accessible data.

Action by the CAEP-SG is in paragraph 7.

1. INTRODUCTION

1.1 This paper presents the views of the United States on the Integrated CO₂ Emissions and Noise Stringency Analysis.

1.2 The world faces a profound climate crisis. To effectively address this crisis, the United States supports increased climate action across the transportation sector, including aviation. ICAO has established a collective long-term global aspirational goal for international aviation of net-zero carbon emissions by 2050. Now we must continue to work on concrete actions to progress that goal to a reality. The standards we are considering through the integrated analysis in this cycle are structured to affect aeroplanes entering the market after 2034.¹ In ICAO's basket of measures, these CAEP/13 CO₂ standards

¹ The standards that a new type design must meet are those in effect when the manufacturer applies for type certification. The applicable design standards at the time of application remain frozen over the typical five-year time frame provided by certification authorities for completing the type certification process.

may be the best opportunity to set aeroplane CO₂ standards that can have a meaningful impact on aviation emissions in 2050. Therefore, it is imperative that these standards result in meaningful CO₂ reductions.²

1.3 Further, international aviation is faced with continued pressure to reduce aviation's impact on community noise around airports. The body of research and analysis emphasizing higher levels of annoyance to a given dose of aeroplane noise is ever-growing, as is the body of research investigating health impacts of aviation noise exposure.

1.4 Aeroplane technologies that have reliably improved efficiency and reduced noise simultaneously may not continue to provide such aligned benefits in the near future. Completing an integrated dual stringency analysis over a wide range of analytical space will enable CAEP to make data driven stringency decisions for both noise and emissions, while considering the interdependences and trade-offs of various potential stringency options.

1.5 United States appreciates the progress achieved to-date by WG1/WG3/MDG/FESG on the dual stringency analysis efforts as reported to this meeting.³ We support a thorough discussion of the interim results and providing feedback to the WG1/WG3/MDG/FESG teams to complete their analyses with the objective of developing more stringent CO₂ and noise Standards and Recommended Practices (SARPs) at CAEP/13.

2. SUPPORT FOR MAIN ANALYSIS

2.1 We commend the excellent work by MDG and FESG to complete the noise, emissions, and cost modelling for the Main Analysis (MA) and believe that WG1, WG3, MDG, and FESG have set up a wide analysis space for stringency considerations. The United States has reviewed this information and believe it can be the basis to guide data-driven decisions on new CO₂ and noise standards at the upcoming CAEP/13 meeting.

2.2 Support Use of CAEP/13 New Type Modelling Approach M.07: Task M.07 was adopted due to issues recognised regarding modelling of NT standards in past CAEP cycles. The CAEP Traditional fleet evolution approach (A1) assumes that in-production aeroplanes would respond on the applicability date of the NT standards or go out of production.

2.2.1 At the second Steering Group meeting, CAEP agreed that Approach M.07 (M.07) would be included in the MA runs and report, and a decision would be taken later in the cycle for inclusion in the decision making.⁴ We commend the excellent work by MDG to include the new type modelling approach—M.07—in the MA runs to support review and discussion at SG20243. To enable data-driven decisions, the United States supports the analytical work completed to date on M.07 for the stringency scenarios, as described in CAEPSG/20243-WP/06 and CAEPSG/20243-IP/04.

2.2.2 The WG1 and WG3's review of the state of technology as part of the integrated dual stringency development indicates that technology responses are introduced gradually into new products after an applicability date. M.07 simulates this using a more realistic fleet modelling relative to A1, resulting in a different relative cost effectiveness of the standard. M.07 allows the analysis of the full analytical space

² For example, aeroplanes responding to a future tier of CO₂ standards, will not start entering the market until after 2040 or 2043. These aeroplanes will not have sufficient time to propagate through the market and meaningfully affect 2050 emissions.

³ See CAEP-SG/20243-WP/06 and CAEP-SG/20243-IP/04.

⁴ CAEP-SG/20232-SD/3, sec. 1.27.

while avoiding or minimizing the influence of fleet evolution changes. Running both A1 and M.07 permits comparison of these two NT modelling approaches.

2.2.3 We are concerned with how the results from the traditional Approach A1 for new type modelling could be misinterpreted because of the large change in benefits seen between CSO-C and CSO-D. This large change in emissions going from CSO-C to CSO-D is not the result of the introduction of a step change in technology between stringencies. Rather, it is due to a modelling assumption where larger aeroplanes cover the operations of a non-complying smaller aeroplanes resulting in fewer operations and reduced fuel burn. Such fleet changes are considered unlikely to occur in the marketplace.

2.2.4 The United States recommends that M.07 be continued to be included in the MA and be part of the CAEP/13 decision making.

3. CO₂ STANDARDS

3.1 New Type Standards: A CAEP/13 NT standard for CO₂ poses unique challenges compared to CAEP/10. In CAEP/10, a brand-new standard was developed, including a metric system and certification procedures, without the availability of certification data. In CAEP/13, new challenges arose such as detailed quantitative assessments of CO₂ and noise interdependency trades as well as data restrictions in early phases. A NT CO₂ standard in CAEP/13 can provide an opportunity to establish a minimum performance level for future type certifications. The main analysis is beginning to provide good insight into the cost effectiveness of potential new dual standards, and what may be possible for setting minimum performance levels for future designs.

3.2 In-Production Standards: The United States believes InP applicability is critical to the credibility and transparency of the CO₂ standards. The MA includes a range of InP CO₂ scenarios. At one end of the range, there are stringency options reflecting technology following standards that are capturing improvements already seen in the fleet and, thus, these options result in minimal CO₂ emission reductions and costs. On the other end of the range, there are stringency options that may require integration of additional technology on existing InP aeroplanes, which would result in both increased costs and benefits. The modelling results will provide a strong basis to allow Member States to make data-driven decisions on InP standards at CAEP/13.

3.2.1 We recognize InP standards have real-world and near-term consequences, and Member States and manufacturers may have aeroplane specific concerns that may not be reflected in the modelling, and such issues need to be evaluated and considered. A concern was raised that some InP aeroplanes are not certified yet for the CAEP/10 InP standards, and therefore much of the MA CO₂ metric values are best estimates. Therefore, aeroplanes close to a stringency option would need careful evaluation. Another concern was raised about the potential impacts on new aeroplanes about to enter the market, in particular ensuring that improvements over time are considered to avoid prematurely cutting off the production of new market entrants. This concern appears to be specific to some business jets, and it is part of the reason alleviations have been incorporated into the stringency options for these aeroplanes. Each aeroplane should be carefully considered when assessing InP standards, while also reviewing the information from the MA on InP standards. We welcome other Members' views on InP standards and what specific concerns they may have.

4. NOISE STANDARDS

4.1 The United States views setting a NT noise standard in conjunction with a NT CO₂ standard during CAEP/13 as a challenging opportunity to develop two technology-based environmental standards at

the airplane level at the same time. Stringency analysis during CAEP/13 has made advances relative to the previous CAEP/9 noise standard setting in terms of improved models for cost effectiveness, clearer definition of technical feasibility, manufacturer specific technology responses and quantitative interdependency assessment of noise, CO₂, costs, etc. Comparing M.07 and A1 results will provide influence of fleet modelling assumptions on population impacted by noise, which hitherto has not been possible. We are continuing to analyse the MA results.

4.2 The United States recognizes challenges associated with dual stringency setting and fully supports limiting the scope of CAEP/13 to only NT standard for noise.

4.3 MA noise stringency options refer to cumulative noise margin reductions. The United States supports reviewing tightening of margins at individual point margins without requiring any technology response to make sure the MA proceeds without additional burden. Currently, Chapter 14 requires 1 dB margin at each point to the limit lines. Our analysis indicates there is potentially room to tighten the individual point margin without triggering a technology response. We have shared this analysis at the WG1-7 meeting, and we plan to provide a recommendation at CAEP/13.

4.4 As there is a significant pressure to reduce impact of aviation on the climate change by reducing CO₂ emissions, some OEMs are exploring low carbon technologies, which are not sufficiently mature for standard setting and have higher uncertainties on their noise levels. The United States urges CAEP to recognize the need to be mindful of such technologies as we develop NT noise standards.

5. **SARP DEVELOPMENT**

5.1 WG1 and WG3 have initiated discussions on updates to the Annex 16, Volumes 1 and 3, respectively. The United States recommends continued efforts to provide draft updates in advance of CAEP/13 meeting. This work is necessary to implement potential decisions at CAEP/13 into the SARPs.

6. **PUBLICLY ACCESSIBLE DATA**

6.1 The United States supports the work within WG1 and WG3 on the potential use of publicly accessible data for future analyses and the report to CAEP/13.

7. **ACTION BY THE CAEP-SG**

7.1 The CAEP-SG is invited to:

- a) support the results of the Main Analysis to guide data-driven decisions for the upcoming CAEP/13 meeting;
- b) agree that Approach M.07 should remain in the Main Analysis and decision-making process at CAEP/13;
- c) note U.S. views on In-Production CO₂ standards;
- d) note U.S. support for SARP development within WG1 and WG3; and
- e) note U.S. support for the work within WG1 and WG3 on the use of publicly accessible data.