



COMMITTEE ON AVIATION ENVIRONMENTAL PROTECTION (CAEP)

STEERING GROUP MEETING

Takamatsu, Japan, 16 to 20 October 2023

Agenda Item 7: 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 United States supports the main analysis, including the proposed new-type (NT) stringency options for CO₂ and noise, and in-production (InP) stringency options for CO₂, as well as the proposed modelling scenarios for use in the analysis. This paper also discusses the work conducted by the United States to develop an Alternative Growth and Replacement Database (GRdb) and proposes next steps for it.

Action by the CAEP-SG is in paragraph 4.

1. INTRODUCTION

1.1 This paper presents the views of the United States on key elements of the Integrated CO₂ Emissions and Noise Stringency Analysis. The views presented in this paper support the overall goal of ensuring that the work proceeds according to the Integrated Stringency Coordination Group (ISCG) endorsed schedule, which is critical in enabling a successful task outcome.

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 (LTAG) of net-zero carbon emissions by 2050. Now we must continue to work on concrete actions to progress that goal to a reality. The integrated standards we are considering in this cycle are structured to affect aeroplanes entering

the market after 2034.¹ In CAEP's basket of measures, these CAEP/13 CO₂ standards will be the last set of aeroplane CO₂ standards that can have a meaningful impact on aviation emissions in 2050.² Therefore, it is imperative that these standards result in meaningful CO₂ reductions.

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 aircraft noise is ever-growing, and as is the body of research investigating health impacts of aviation noise exposure.

1.4 Compounding these challenges is the fact that the technologies that have reliably improved efficiency and reduced noise may not continue to provide such aligned benefits in the near future. This is the reason completing an integrated dual stringency analysis is critical, as it will allow CAEP to make stringency decisions for both noise and emissions while considering the interdependences and trade-offs of various potential stringency options. Therefore, the United States fully supports the dual stringency activity at CAEP/13 with the objective of developing more stringent CO₂ and noise Standards and Recommended Practices (SARP).

1.5 WG1, WG3, and MDG-FESG, in coordination with the ISCG and Data Processing and Analysis Ad Hoc Group (DPAahg), have summarized the work to-date on the dual stringency in their status report to the Steering Group (CAEPSG.20232.WP019.7.en). We welcome the progress made thus far, and based on our review of this status report, the Main Analysis should commence according to the proposed plan and schedule.

2. SUPPORT FOR MAIN ANALYSIS INPUT PACKAGE

2.1 The United States supports the broad analytical space described in CAEP-SG/20232-WP/19 (and in more detail in CAEP-SG/20232-IP/05), including the recommended set of 30 scenarios for modelling and incorporating alleviation for small aeroplanes. We support the proposed NT stringency options for CO₂ and noise, and InP stringency options for CO₂, as well as the proposed modelling scenarios for use in the Main Analysis.

2.2 Support for Improved New-Type Modelling Approach

2.2.1 Task M.07 of the CAEP/13 MDG work programme calls for the MDG to "conduct a review of lessons learned from CAEP/12 analyses since the development of the most recent MDG/FESG lessons learned document." This remit was adopted due to issues recognised regarding modelling of NT standards in past CAEP cycles, including the assumption that in-production aeroplanes would respond on the applicability date of the NT standards or go out of production. We commend the excellent work by MDG to progress this task and put forward a robust methodology that can be used in the Main Analysis. To enable data-driven decisions, the United States supports the WG recommendation to use the new type modelling approach ("Approach M.07") in the scenarios to be evaluated, as described in CAEP-SG/20232-WP/19 (and in more detail in CAEP-SG/20232-IP/05).

2.3 Support In-Production Scenarios for CO₂

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.

² For examples, 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.

2.3.1 CAEP/12 directed WG3 to “consider, as a priority, the applicability to new types of aeroplanes.” The recommended scenarios achieve this, by including a limited set of scenarios for in-production aeroplanes. By including these InP scenarios, we ensure data-driven decisions can be made regarding the effectiveness of the proposed InP CO₂ standard stringency options. We strongly support including these InP scenarios in the Main Analysis. WG1, WG3, and MDG-FESG have collectively agreed this set of NT (for noise and CO₂) and InP (for CO₂) scenarios achieves the goal of allowing the analysis of the full analytical space at a reasonable workload.

2.3.2 ICAO, some Member States including the United States, and industry are rallying to achieve net-zero emissions by 2050. The United States believes that including InP applicability for CO₂ in the development of new standards is a straightforward and tangible way to help achieve the 2050 objective. Adopting InP standards for CO₂ and engine emissions is consistent with prior CAEP standard setting to incrementally improve over time while complementing NT standards by incrementally incentivizing current in-production aeroplane models to improve their fuel efficiency. We recognize that emissions of in-production aeroplanes can be affected sooner than new type aeroplanes.³ Furthermore, without in-production standards, manufacturers of in-production aeroplanes that do not meet the new type standards could continue producing and selling their aeroplanes indefinitely. Market forces might drive manufacturers of these in-production aeroplanes to make some improvements to meet the new type standards, but it is not a certainty. We support running the analysis with the down-selected set of NT and InP CO₂ scenarios as agreed upon by the working groups as described in CAEP-SG/20232-WP/19.

3. NON-OEM TECHNOLOGY RESPONSE AND ALTERNATIVE GRDB

3.1 In general OEM’s technology responses for reducing CO₂ emissions and noise are based on on-going technology development for their products and may be based on their internal research, development, and product design activities. However, the specific technical details about ‘what’ and ‘how’ the technology responses will be applied by an OEM are not shared with CAEP due to proprietary considerations. When the manufacturer data sharing challenges arose earlier in this cycle, the United States started similar work on developing technology responses for the GRdb based on publicly accessible data, to be available if CAEP needed it. Much of the work conducted by CAEP is done using publicly accessible data (e.g., certification data and limited published cost data), except for technology responses to standards. The United States ended up developing an “alternative GRdb” to address this gap in information. It was provided to WG1 and WG3 for review in several phases over the summer and is presented to this meeting in CAEP-SG/20232-IP/18. Since the data sharing concerns appear to have been resolved, the aeroplane manufacturer data should be used for the Main Analysis. However, this also provides us an opportunity to evaluate if or how independently-developed technology responses could be incorporated into the CAEP process in future cycles. Such a process will result in higher levels of transparency by allowing both the basis of the technology responses to be examined within CAEP as well as a potential public release of the entire dataset.

3.2 The goal of the ‘alternative GRdb’ was to develop and provide technology responses based on publicly accessible information. Aeroplane noise and CO₂ Metric Value (MV) data was based on certification data where available or publicly accessible estimates where necessary. Unique CO₂ and noise technology responses were then developed for each aeroplane and each stringency option combination in the CO₂/Noise stringency option matrix. Because these technology responses are assembled based on independent information, they can be evaluated and understood by the technical working groups more easily

³ New type designs are infrequent, and it is not unusual for new type designs to take 8–10 years to develop, from preliminary design to entry into service.

than the technology responses, depicted by per cent improvements, provided by industry (See example technology response in section 5 of IP/18).

3.3 While initially developed as a stopgap/backup option for the dual stringency main analysis, there are unique challenges to the version of the ‘alternative GRdb’ developed this cycle that would have needed to be overcome for it to be used this cycle (e.g., limited CO₂ MV certification data availability and lack of time and resources for WG1 and WG3 to review technology responses). However, this analysis could be used as the basis for continuing to investigate the use of public data and how its use may affect future standard setting processes, thereby increasing transparency. Such an investigation would provide an opportunity for more technical feedback and may inform future standard setting activities at CAEP. The United States will offer additional resources to MDG/FESG to conduct any modelling runs, in parallel to the Main Analysis, using the alternative GRdb and facilitate discussions regarding review of the proposed technology responses and methodology within WG1 and WG3 with the goal to provide a report to CAEP/13 with recommendations and evaluating the pros and cons (see Section 7 in IP/18 for further scoping of potential work).

4. ACTION BY THE CAEP-SG

4.1 The CAEP-SG is invited to:

- a) adopt the WG-approved main analysis input package, as described in CAEP-SG/20232-WP/19;
- b) note U.S. views on InP scenarios and M.07 approach;
- c) agree to have Working Group 1, Working Group 3, and MDG/FESG assist in evaluating the use of publicly available data, primarily supported by U.S. resources, and provide a report to CAEP/13 as described in 3.3 above.

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