

SAB Chairperson's Report to the Clean Aviation Governing Board on the Activities of the Scientific Advisory Body (SAB): 22 March 2023 — 4 July 2023

Author: Trevor YOUNG (Chairperson, SAB)

Date: 22 September 2023

Scope

This report on activities of the Scientific Advisory Body (SAB) of the Clean Aviation Joint Undertaking (CAJU) has been prepared by the Chairperson of the SAB. The assistance of the CAJU is acknowledged: the CAJU provides administrative and secretariat support to the SAB to facilitate the execution of assigned tasks, in accordance with Article 21 of Council Regulation (EU) 2021/2085.

Formal meeting of the SAB

SAB meeting no. 02/2023 was held on 4 July 2023 (09.00–16.00) at the CAJU premises in Brussels in hybrid format. The minutes of the meeting, approved by the SAB at their subsequent meeting on 21 September 2023, are attached (annex).

Key actions/events associated with SAB Meeting 02/2023

- Several SAB members were engaged as expert reviewers for the Clean Sky 2 SPD (Clean Sky 2 System & Platform Demonstrator) Annual Reviews in Q2/2023. Following their participation in these reviews, members prepared, for the SAB meeting of 4 July 2023, briefing summaries (PowerPoint presentations), highlighting key observations for the SAB and CAJU.
- In Q2/2023, the SAB was consulted on the CA 2022 Annual Activity Report (AAR). The consultation, which involved a detailed review of the draft 2022 AAR, took place in April 2023. SAB members who participated as experts for the Annual Reviews of the CS2 SPDs were assigned the greatest responsibility in assessing the document. The SAB report was submitted to the JU on 2 May 2023. Overall, the SAB endorsed the AAR, as it considered it to be a satisfactory record of the main events and achievements in the CA programme in 2022, consistent with the Annual Work Plan. The SAB identified points of concern and provided suggestions for improving the document. Detailed comments, generated by the SAB in their review of the AAR, were recorded in an annex (pp. 3-11) to their report.
- The planning for the first round of CA Annual Reviews, set for October 2023, was discussed at the SAB meeting (4 July 2023). A preliminary assignment of SAB members who would act as experts for the project reviews was briefly discussed.

- The SAB was represented at the Clean Aviation-Clean Hydrogen Workshop (23 April 2023) by Maria Argumosa. In her feedback to the SAB (4 July 2023), she reviewed the key objectives of the workshop, including the desire to increase synergies between the two organisations and identify key technical domains where they could collaborate.
- The high-level outcomes of the CS2 Technology Evaluator (an agenda item carried forward from the previous SAB meeting) were briefly discussed. Although most of the aircraft concepts met the objectives, difficulties in achieving low NO_x performance in cruise was identified, especially for the SMR+/++ concepts. A small SAB working group was set up and tasked to provide a written opinion on the subject (due for the next meeting of the SAB on 21 Sep 2023).
- The Impact Monitoring (IM) process established by the CAJU for the CA programme was an important topic of discussion at SAB Meeting 02/2023. The request from the CAJU was for the SAB to provide a scientific opinion on how to implement impact monitoring assessments within the CA programme, compliant with Council Regulation (EU) 2021/2085, considering the practical reporting constraints in the programme. The SAB had established (following SAB Meeting 01/2023) a working group to undertake this task. Initial feedback was provided at the meeting (4 July 2023). It was noted that the SAB report would not be an all-encompassing assessment of this exceedingly complex topic, but rather that it would present a high-level overview of the key questions and identify some pragmatic solutions on how to conduct impact monitoring assessments in CA, considering the data that will become available (from CA projects) and also the relative lack of scientific certainty associated with certain climate impact relationships. This work will continue in Q3/2023.
- Related to the above point, the CA Month 6 (M6) Impact Monitoring deliverables were expected to be submitted to the CAJU in July/August 2023. It was agreed that SAB members would review these deliverables (reports) and provide written feedback before the next SAB meeting (21 Sep 2023).

Chairperson's notes

- The chairperson welcomes Wily Sigl as the EASA representative on the SAB, following the resignation of Emmanuel Isambert. The SAB records its thanks to Mr Isambert for his excellent contributions to the work of the SAB.
- The SAB has continued to refine its procedures for undertaking formal tasks assigned to it by the CAJU. The process of introducing, defining and managing consultations has been improved by formalising a sequential numbering system to identify consultations. The SAB has completed eight consultations (status: 4 July 2023); in Q3/2023, the focus will be on consultations #9, #10 and #11 (described above).

Signed by,



Trevor Young
(Chairperson, SAB)

Annex

Minutes of Meeting no. SAB 02/2023



Scientific Advisory Body
of the Clean Aviation Joint Undertaking
Meeting
N° SAB 02/2023

4 July 2023
9.00 – 16.00
Av. de la Toison d'Or, 56 - B-1060 Brussels

Minutes of the Meeting

<i>Final Agenda</i>		
1.	<i>Welcome</i>	<i>9.00 – 09.10</i>
2.	<i>Adoption of the Agenda and Approval of previous MoM</i>	<i>9.10 – 09.15</i>
3.	<i>SAB consultation on AAR.</i>	<i>9.15 – 9.25</i>
4.	<i>Feedback from Clean Aviation-Clean Hydrogen Joint Workshop</i>	<i>9.25 – 9.40</i>
5.	<i>Estimated Timeline for 2023.</i>	<i>9.40 – 9.55</i>
6.	<i>CS2 Annual Review Meetings – Reviewers' Feedback</i>	<i>9.55 – 12.00</i>
7.	<i>CS2 Technology Evaluator – H2020/HE Evaluation</i>	<i>13.00 – 13.30</i>
8.	<i>Clean Aviation Impact Monitoring</i>	<i>13.30 – 15.45</i>
9.	<i>Next Meeting Dates</i>	<i>15.45 – 15.50</i>
10.	<i>AOB</i>	<i>15.50 – 16.00</i>

Attendees of Meeting N° SAB 02/2023 held 21 March 2023:

Surname	Name	Attending
SAB members		
Alonso	Gustavo	Yes
Argumosa	Maria Del Pilar	Yes
Burt	Graeme	No
Consigny	Hervé	Yes
De Gennaro	Michele	Yes
Dunford	David	Yes
Fernberg	Patrik	Yes
Henke	Rolf	Via Teams
Hornung	Mirko	No
Sigl	Willy	Yes
Joselzon	Alain	Yes
Malina	Robert	No
Pasteuning	Wim	Yes
Sanna-Randaccio	Francesca	Yes
Young	Trevor	Yes
Clean Aviation Joint Undertaking (CAJU)		
Krein	Axel	Yes
Van Manen	Ron	Yes
Dubois	Sébastien	Yes
Brouckaert	Jean-François	Yes
Harty	Niall	Yes
Selmin	Vittorio	Yes

Meeting chair: Trevor Young

1. Welcome

Trevor Young and Jean-François Brouckaert of the CAJU welcomed SAB members to second meeting of the Clean Aviation SAB in 2023.

2. Adoption of the Agenda and Approval of the MoM for 21 March 2023.

The Chair of the SAB asked members whether they had any comments or items to add to the agenda. There were no comments from members and the agenda was thus deemed adopted.

The Chair then inquired as to whether there were any comments regarding the minutes of the meeting held on 21 March 2023. There were no comments and thus the minutes were deemed adopted. It was noted that they would be published on the website once signed by the Chair.

3. SAB consultation on the Annual Activity Report.

The SAB was consulted on the Clean Aviation Annual Activity Report (AAR). The consultation lasted from 13 April to 26 April and the report was finalised by the Chair and Vice-Chair and sent to the JU on 2 May 2023. Overall, the SAB endorsed the AAR, as it considered it to be a satisfactory record of the main events and achievements in the Clean Aviation programme in 2022, consistent with the Annual Work Plan. The SAB's detailed comments were provided in an annex to their document.

Members stressed the tight deadline for reading and providing comments on the AAR and noted that in future they would prefer to be given more time as they all had busy schedules.

4. Feedback from Clean Aviation-Clean Hydrogen Joint Workshop

Maria Argumosa presented the SAB with a summary of what occurred during the Clean Aviation-Clean Hydrogen Workshop. She attended the workshop on behalf of the SAB on 23 April 2023. She went over the key objectives of the workshop including the desire to increase synergies between the two organisations and identify key technical domains where they could collaborate.

Regarding the workshop's outcomes, she noted that the SRIAs were not aligned, and R&D programs had different operational modes. She also noted the need to analyse what is achievable and sustainable and not only focus on technology developments. There was also a need of increase collaboration among CH CA & CINEA to define roadmaps and work programmes.

In terms of technology outcomes specifically, she highlighted the need for FC technology mass reduction. She also underscored that FC cooling requirements make this technology a challenge for aviation. In conclusion, she pointed out that energy storage density should be included in the KPI targets to be comparable with the battery's storage technologies.

The slides for this presentation were shared with SAB members following the meeting.

5. Estimated Timeline for 2023

The JU provided the SAB with a run through of the timeline for the rest of 2023. It highlighted the two upcoming Governing Board meetings which the SAB Chair would be attending. There would also be two further SAB meetings in 2023, one on 21 September and the other on 7 November.

The JU also informed the SAB of the upcoming M6 deliverable for impact monitoring. The SAB and Programme Office had a deadline of the end of August to submit their reviews and feedback would be sent to the consortium by the end of September. The SAB would also be consulted on the Work Programme for 2024, which was set to take place in October.



The JU then went through the timeline for the upcoming ARM schedule in September and October. The dates for each ARM and the corresponding SAB member who would attend each ARM was shared with the SAB members after the meeting.

6. CS2 Annual Review Meetings – Reviewers’ Feedback

Due to time constraints this agenda point was not discussed. The SAB members who had participated in the CS2 Annual Reviews had prepared PowerPoint presentations, which were made available to all members. Questions arising from these presentations would be addressed at a later SAB meeting.

7. CS2 Technology Evaluator – H2020/HE Evaluation

Due to time constraints this agenda point was not also discussed. It was postponed to a later SAB meeting.

8. Clean Aviation Impact Monitoring

Given the importance of this agenda point it was agreed to move directly to this point and come back to the previous two agenda points at a later date. This discussion focussed on three separate consultations assigned to the SAB, consultations 9, 10, 11.

A. Consultation 9

The JU opened a discussion with the SAB on impact monitoring in CA. The discussion began with a summary of the work done so far by the working group in June 2023. The working group consisted of Gustavo ALONSO, David DUNFORD, Rolf HENKE, Mirko HORNUNG, Emmanuel ISAMBERT, Alain JOSELZON, Robert MALINA, Francesca SANNA-RANDACCIO, Willy SIGL, Trevor YOUNG.

With regard to its conclusions, the draft report outlined that some effects, especially non-CO2 effects like contrail cirrus, have significant uncertainties but should not be ignored. The report suggested focusing primarily on CO2 emissions while cautiously considering non-CO2 effects in GHG aggregation processes. It encouraged the use of various metrics and methodologies to provide comprehensive inputs.

The draft report supported the CAJU adopted approach to data collection using a template and recommended sharing it with stakeholders for input. It suggested two levels of impact monitoring in the Clean Aviation programme: one to assess GHG reduction targets at the aircraft level, mainly focusing on CO2 and NOx emissions, and another to evaluate progress toward climate-neutral aviation by 2050, considering various emissions data, including non-CO2 effects.

Additionally, the draft report emphasised assessing the maturity of technological innovations to support the launch of new products and services by 2035, aiming to replace 75% of the operating fleet by 2050. Finally, it was stressed that the recommendations regarding impact

monitoring should be periodically reviewed and updated, considering evolving knowledge, research outcomes, and regulatory inputs. The relevance of other ongoing projects and initiatives related to aviation emissions was also noted.

B. Consultation 10

The challenges of balancing NO_x and CO₂ emissions within the framework of CS2 were thoroughly addressed in the dedicated SAB report as part of consultation 10. David DUNFORD gave an overview of the draft report on NO_x in the context of CS2. Concerning Clean Aviation, it was observed that there hasn't been any specific research dedicated to NO_x emissions. Furthermore, relevant engine combustion technologies were found to have a low Technology Readiness Level (TRL), underscoring the need for additional research efforts.

Turning to Clean Sky 2; a mission objective was introduced but was not met, in contrast to the achievement of the low altitude objective, which is regulated by an ICAO standard for LTO cycle NO_x emissions. NO_x emissions at the mission level are contingent upon various factors, including engine cycle, combustion technology (which needs to be tailored to the core engine size), operational conditions, and the trade-off with CO₂ emissions. The overarching aim is to achieve global environmental optimisation (initially focusing on ambitious CO₂ emissions reduction). This endeavour entails collaboration between engine and aircraft manufacturers and necessitates further research, as elaborated by SAFRAN AE during the ARM 2023 event.

C. Consultation 11

Following the discussions on these two draft reports, the third part of this agenda item on impact monitoring focussed on the approach adopted by the CAJU in CA. Jean-François Brouckaert opened the discussion on this point with the SAB. The expectations of the SAB were outlined; members were asked to review the month 6 (M6) Impact Monitoring deliverables and prepare a written assessment for each project. The Chair suggested that a template for assessing these deliverables be prepared, based on what is done in CS2.

9. Next meetings

The JU confirmed the dates for the future meeting dates as agreed at the prior SAB meeting in March:

- 21 September 2023 to assess Call 2 and SRIA outcomes.
- 7 November 2023 to discuss feedback on CA reviews and WP24.

10. AOB

No other specific points were addressed under AOB.

There being no further business to attend to, the Chair brought the meeting to a close at 16:05.

Minutes approved by:



SAB Chairperson

Date: 21 September 2023