Considerations on the EU non-CO2 MRV implementation

General considerations

Airbus recognises that non-CO_2 emissions are an important subject for aviation.

Therefore, **whilst reducing CO2 emissions from aviation remains a first priority for us**, we are **accelerating our already intensive work on non-CO2 emissions** - notably on increasing the understanding of non-CO2 emissions generation, their climate effects as well as on testing and evaluating potential solutions.

Airbus is actively working on a large portfolio of projects addressing non-CO_2 emissions and their climate impacts. This is done in close collaboration with research institutions, universities and other key stakeholders in- and outside the aviation sector.

Based on the current status of scientific understanding and climate modelling capabilities it is considered as essential to continue investing into **fundamental research** to improve the understanding of non-CO2 impacts, environmental trade-offs, and enhance their quantification and at the same time into large scale **industrial research programmes** to start evaluating and testing potential mitigation solutions.

With the emergence of EU regional policy measures on non-CO2 emissions (Amendment of the EU-ETS MRR adding the implementation of an EU non-CO2 Monitoring, Reporting and Verification scheme), **there is a growing need also for ICAO to take an important role in harmonising aviation's approach to reducing the climate impact of non-CO2 emissions at international level.** This is essential for ensuring a competitive level playing field in the long term (and to avoid potential further EU regulations on non-CO2 (i.e. monetization of non-CO2 emissions from 2028).

EU non-CO2 MRV specific considerations

Airbus and the EU aviation industry have extensive expertise in engine emissions, aircraft performance and aircraft operations. Airbus and the industry therefore believe that it would be an opportunity for the Commission to involve industry (in particular "implementing parties" and OEMs) in the development of the MRV scheme and to take industry's recommendations into consideration.

Airbus, together with the EU aviation industry, stand ready to actively and constructively contribute to EU MRV policy discussions and to support the Commission in making the MRV feasible and pragmatic (required data), robust (using scientifically validated information/ models) and relevant for future climate mitigation.

Our today's understanding of the currently proposed MRV scheme and reporting methodology is that it is very complex and probably very challenging to be implemented in the short remaining time before implementation (1st of Jan 2025):

- Reporting:
    - Even though default values are provided for most of the required data inputs, those values are very conservative and hence will not contribute to the improvement of associated modelled climate impact results (models itself already induce high levels of uncertainties).
    - Conservative default values indirectly enforce a high level of reporting burden on airlines to avoid the inaccurate representation of their activities.
    - Larger airlines may be able to finance such extra reporting; smaller, financially weaker airlines, will be disadvantaged by having to accept using the conservative default values.

  - Airlines are required to report data which is not under their control (e.g. climate parameters) or not measured (e.g. fuel properties).

- Modelling:
  - Today's climate models incorporate high levels of uncertainties and lack accuracy due to scientific uncertainties - in particular for flight-by-flight modelling.
  - The proposed model (NEATS) to be used for estimating the climate impact of non-CO2 emissions is not "open source" today and therefore does not allow airlines to understand the figures that they are required to report.
  - This default model will also feature a performance and emissions model. This model is built without industry inputs, which puts into question the correct representation of products. Airbus, together with the EU aviation industry, stands ready to provide our expert knowledge for the refinement of this performance and emission model.

- Time to implement:
  - The complexity of the reporting requirements and the scheme itself, may jeopardise the timely implementation of the MRV by January 2025. Therefore, a phased implementation approach is recommended, with a first phase of simplified reporting (Operators reporting only what they can usefully contribute) and the augmentation of the reporting granularity - if deemed as useful (learning-by-doing) - in a second phase.

In a constructive approach to make the non-CO2 MRV workable - in particular considering that only six months remain before implementation (1st Jan 2025) - Airbus and the EU aviation industry have worked on a proposal of a simplified reporting scheme, with a phased approach, to make the EU non-CO2 MRV simpler, more efficient and relevant for climate mitigation.
The proposed data reporting as well as general recommendations are offered for consideration in the ANNEX to this paper.

<u>Scope of the EU non-CO2 MRV :</u>

- We recognise that a broad scope of flights would bring additional information to the MRV results (especially transatlantic), but international aviation emissions are under the responsibility of ICAO, not the EU, it is therefore recommended that the applicable MRV scope should be mandatory only for intra-EU flights (as per the current EU-ETS 'stop-the-clock') and just open to voluntary reporting for aircraft operators on extra-EU flights to third countries.

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ANNEX

Proposal for a simplified MRV with a phased implementation

Rationale:

- The proposed MRV scheme, puts at the charge of airlines the reporting of data not under their control (e.g. weather, climate parameters) or not measured (e.g. fuel properties, as of 03/2024).
- Some of the detailed data to report may add little benefit at high cost, compared to the default (examples: FDR vs ADS-B trajectories, or FDR fuel flow vs. performance model based on reported a/c weight) - determining which data is fit for purpose is the aim of R&T projects such as CICONIA.

⇒ A phased approach is proposed: Phase 1 see operators reporting only what they can usefully contribute. The granularity of reporting can be improved in Phase 2 if proven useful for the purpose, based on the learnings of the first step and results of research projects.

Phase 1 (2025 and 2026):

- Operators report basic flight information (incl. TOW and/or load factor per flight to feed the performance model)
- Trajectories are automatically taken from ADSB/Eurocontrol data, flight performance are computed from a model
- Weather data from an external single source of truth
- Computation of emissions and CO2e is at the charge of the authority - operators can access it for consultation.
- Average European fuel properties are the default values, changed to local fuel properties from EASA database when available.

Phase 2 (to start for the reporting year 2027):

- If proven useful vs default data through further research, operators report FDR data (performance and trajectory)
- Reporting of weather flight data is optional, with an incentive to report sensed humidity data.
- Calculation and reporting of engine emissions and CO2e impact is at the charge of the operators, once the approach is validated

Proposed streamlined MRV: Phase 1 in details

	Reported data	First phase: Simplified reporting	Rationale
Input	**1. Flight information**	**OK**	-
Input	**2. 4D Flight trajectory**	**ADS-B / Eurocontrol data (default)** - automated, no airline involvement	Exists already, trajectory is quite accurate and extensive, minimise the burden of operators
Input	**3. Enhanced weather data**	**Weather model (NWP) enhanced with climate parameters, not at the charge of operators.** Single source of truth model to be used managed by an independent body	A single source of truth is required for fairness; in order to enable CO2e computation the weather model needs to be enriched with climate parameters that operators are not mastering
Input	**4. Aircraft properties**	**OK,** (incl. TOW per flight and/or load factor as %MTOW. (Or: Default TOW value to be provided by the system? But penalising)	-
Input	**5. (Optional) aircraft performance data**	**From NEATS performance model, based on reported a/c properties & flight information**	Minimise the burden of operators and data storage; Modelled performance might be enough for the purpose (compared to downloaded FdR data)
Input	**6. Flight fuel properties** (e.g. H contents, % aromatics, S contents, % of SAF)	• **Default fuel based on average fuel properties in EU.** If no data available in Europe, consider average from CRC world survey • Reported SAF usage in line with EASA reporting (Ecolabel or ReFuelEU) • Optionally: based on purchase records?** • Optionally: physical level of incorporation reported by the operator	• Currently operators have no means of knowing fuel properties (even when they know % of SAF incorporation) • Proposed default fuel properties are very penalising, even out of Jet-A1 spec • ReFuelEU fuel monitoring scheme is coming
Input	**7. Engine emissions**	• Simplified NOx computation in a first step. Just calculated levels not CO2e **Proposal**: OEMs may offer support on implementation, incl. the proposed option to pre-compute NOx and nvPM emissions. CO2e calculations to be included in 2nd phase. Benefits of SAF to be included in 2nd phase when SAF volumes increase.	• Minimise the burden of operators • NOx modelling using official ICAO method (BFFM2), could be precomputed and added as an output of the performance model • nvPM impact on contrails forcing highly uncertain especially at low nvPM levels, and lots of research ongoing and not published • OEMs have unique knowledge to bring to the discussion
Output	**CO2e computation**	**To be kept voluntary or not at the charge of the operators as a first step** (especially the use climate parameters such as radiation, efficacy, etc.)	Minimise the burden of operators; climate modelling is a complex topic so the process must be validated first

** *IATA proposes to get fuel properties from the fuel suppliers as part of the invoice, to be consistent with the existing CO_2 MRV*

Considerations on the EU non-CO2 MRV implementation

Proposed streamlined MRV: Phase 2 in details

	Reported data	Second phase reporting	Rationale
Input	**1. Flight information**	**OK**	-
Input	**2. 4D Flight trajectory**	**FDR trajectory data** **(only if proven useful** vs. ADS-B/Eurocontrol data)	FdR trajectory data in principle more accurate and granular than ADS-B, but huge reporting/storage burden. Fitness for purpose can be demonstrated in the first step
Input	**3. Enhanced weather data**	**Optional reporting of FDR measured weather data,** with incentive for humidity measurement and reporting	• Air data to be used to improved weather model • Development then installation on aircraft of humidity sensors require incentives
Input	**4. Aircraft properties**	**OK**	-
Input	**5. (Optional) aircraft performance data**	**Optional: FDR fuel flow data** (only if proven useful vs. performance model)	FdR trajectory data more accurate than modelling, but huge reporting/storage burden. Fitness for purpose vs model has to be demonstrated.
Input	**6. Flight fuel properties** (e.g. H contents, % aromatics, S contents, % of SAF)	**Fuel properties per operator/route from EASA database as default, based on RefuelEU reporting when deployed** with option to be complemented by airline data from purchase records.	• Based ReFuelEU fuel monitoring scheme when deployed • Operators have the option to report more granular data if they have the means to do so
Input	**7. Engine emissions**	**Emissions & CO2e computation at the charge of operators once the approach is validated** • NOx emissions computed from FdR data • nvPM levels: calculated with improved method to be defined with OEMs • nvPM impact on contrails to be based on latest science **Proposal: OEMs may offer support on implementation**	nvPM emission computation and impact on contrails implemented in a second step, based on published results (es. VOLCAN flight test campaign)
Output	**CO2e computation**		Computation is put at the charge of operators once the model and tool are validated

get fuel properties from the fuel suppliers as part of the invoice, to be consistent with the existing CO_2 MRV

General recommendations - 1/2

- Provide scientifically validated information for policymakers.
- Minimise administrative burden while ensuring robust data governance.
- Recognise limited and varied capabilities for data collection based on aircraft types.
- Address confidentiality and open access concerns critical to the success of the MRV framework.
- Emphasise the importance of three-dimensional aircraft trajectory data, recommending the use of ADS-B track data.
- Highlight challenges and potential solutions for collecting ambient humidity and temperature data.
- Acknowledge the complexity of quantifying non-CO2 emissions' climate impact.
- Recommend collaboration with atmospheric scientists and explore alternative approaches.
- Support ongoing academic and industry research to enhance understanding of non-CO2 aviation effects.
- Encourage collaboration with projects like SESAR 3, such as CICONIA and CONCERTO, for valuable insights.
- Support the development of reliable humidity sensors and high-altitude weather forecast models.

Considerations on the EU non-CO2 MRV implementation

General recommendations 2/2

- We indeed want (and need) the representativity and accuracy of non CO2 models (especially regarding NOx impacts) to be increased, and as such, it would be interesting to suggest projects aimed to:
  - Perform a structured intercomparison program of air traffic climate impact simulation in the different complex climate models available in EU (similar in principle to the different Models Intercomparison Programs performed to improve climate simulation through IPCC reports phases);
  - Calibrate simple models on multiple complex climate models results to eliminate the potential biases of a single complex climate model.
  - Perform a structured intercomparison program to compare the available simple climate models to calculate the CO2eq emissions of non CO2 effects.
- To organize, steer and monitor all resulting projects, an independent scientific council should be created and could detect / launch improvement initiatives of the different models.

Practical recommendations

- Phase 1 to start for the reporting years as of 2025. Phase 2 to start for the reporting year 2027.
- No penalties for any missing data not within aircraft operators' control, esp. during Phase 1
- Data storage: Storage of reported data to be done in Europe, ensured by a neutral 3rd party (EASA or EUROCONTROL?), with secure data exchange and storage similar to FdR data exchange with ECTL
- Transparency: Model and its implementation as a tool shall be transparent, open access and include peer-reviewed methods
- Dynamic model: Progressively integrate latest learnings and knowledge on aviation climate science, including retrospective calculation of previous CO2e figures
- The MRV scheme shall be accompanied by a full impact assessment, including the CO2 impact of operating the scheme
- ICAO: Tangible results at ICAO Non-CO2 Symposium 16-18 September in Montreal
- Detach non-CO2 MRV review to ETS scope review (2026 vs 2028)
- Weather-based models are critical to enable airlines to perform operational mitigations. While relevant for contrails, the maturity of such weather-based model for other non-CO2 effects (eg. aCCF for NOx) is too low and the outcome of operational mitigations is at best uncertain. We hence recommend the reporting of NOx emission without converting it in RF or eqCO2, while supporting research to improve these models and study the impact of model-induced mitigations.