

Policy paper

Non-CO₂ MRV in EU ETS, a no-regret step to mitigate aviation's full climate impact

The non-CO₂ MRV introduced by the EU ETS and currently being discussed among EU Member States represents a historic first step to tackle non-CO₂ effects, as it can boost research and start a pathway to their mitigation. The proposed MRV uses the most advanced open source models available, and can be improved with the latest research. Data required is available to aircraft operators, weather services and national authorities.

To maximise the benefits of the non-CO₂ MRV in EU ETS, T&E recommends:

- **Maintaining the full geographical scope including incoming and departing flights, as agreed by co-legislators;**
- **Ensuring a flexible framework to be updated with the latest available science;**
- **Using the retrieved data to boost scientific understanding of non-CO₂ effects and mitigation pathways.**

Background

The climate impact of non-CO₂ effects from aviation, including nitrous oxides emissions and contrail formation, [has been known since 1999](#). Current scientific consensus, gathered by EASA in its [2020 report](#), highlights that their impact is at least as bad, and up to three times worse, than that of CO₂. Thanks to a big progress in research and development, [solutions are being tested](#) in live trials, proving that non-CO₂ mitigation can be one of [the most effective ways](#) to reduce aviation's climate impact in the coming decade.

Considering their significant environmental impact, and the mitigation opportunities, the groundbreaking revision of the EU ETS in 2022 required the development of a Monitoring, Reporting and Verification (MRV) framework for non-CO₂ effects. This requirement, agreed by EU co-legislators, is consistent with the precautionary principle to combat climate change. This monitoring tool will precisely aim to address research gaps by collecting additional data on the potential climate impact of flights.

Purpose and benefits of the non-CO₂ MRV under the ETS

The aim of the non-CO₂ MRV framework required by the EU ETS is to monitor, report and verify the impact of non-CO₂ effects for all flights entering, leaving or flying within the EEA. This impact is quantified using available data and models developed by research institutions and tested throughout the aviation industry.

Recommendations for inclusion into the EU ETS would only follow at the end of 2027, after reviewing the results of the MRV framework from 2025 to 2027.

The implementation of the non-CO₂ MRV can boost the understanding of non-CO₂ effects, and inform policymakers and the aviation industry on the best set of policies and incentives for their effective mitigation. The absence or weakening of such an MRV framework would unnecessarily delay action, despite non-CO₂ being recognised as a climate issue for the past decades.

By requiring the reporting, rather than making it voluntary as [some airline groups are suggesting](#), the framework will ensure a consistent approach across the aviation industry, improving scientific knowledge and mitigation opportunities. It will also allow companies reporting their business travel emissions to better account for non-CO₂ effects. 44 big [corporate flyers](#) already apply a multiplier for their travel emissions, this additional data will help bring clarity to customers on the full impact of their travel.

Scope

According to Articles 3a and 14 and Annex 1 of the revised [EU ETS Aviation Directive](#), the MRV framework covers all flights which depart from or arrive in an airport situated in the territory of a Member State.

This full geographic scope is essential to ensure the credibility of the scheme. It allows a better understanding of the impacts of long-haul flights, which research shows to cause more warming and present more promising mitigation opportunities. As an example, estimated contrail warming per mile flown in the North Atlantic region is [the highest in the world, and 71% higher than over Europe](#), due to the high latitudes, flight density, and night time operations. Research has also found that area to be [suitable for large scale contrail mitigation trials](#). Including that region in a monitoring system is the only way forward to ensure proper scientific understanding and effective mitigation strategies.

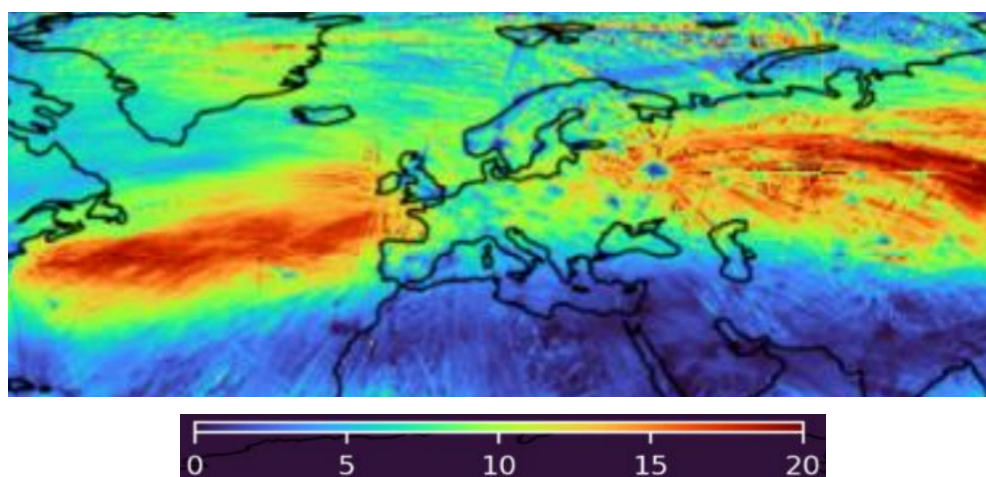


Figure 1. Percentage of flight distance forming persistent contrails over the EU and surrounding areas¹

¹ Retrieved from Teoh et al. (2023). Global aviation contrail climate effects from 2019 to 2021 - <https://doi.org/10.5194/egusphere-2023-1859>

Furthermore, there are no requirements to report non-CO₂ effects beyond the EU ETS. That means that a reduction in the scope would significantly limit the amount of data and the opportunities to mitigate non-CO₂ effects beyond intra-EEA flights.

Finally, this scope is consistent with the general scope of the EU ETS Directive for other transport modes and their non-CO₂ emissions. Shipping companies are required as of 2024 to monitor maritime non-CO₂ emissions (nitrous oxide (N₂O) and methane (CH₄)) for voyages to, from, and within the EU. Aviation cannot seek another exemption while other sectors are required to do more.

As non-CO₂ emissions account for two thirds of aviation's climate impact and adversely affect human health, the aviation industry must no longer avoid its responsibility but instead take decisive action to confront its complete environmental impact. The MRV scheme is a necessary first step aimed at better understanding these effects with a view to explore mitigation pathways. Any divergence from the original full scope would only lead to a large part of aviation emissions remaining hidden from regulators and consumers alike.

Simplicity

The European Commission, under guidance from the research community and aircraft operators, has proposed a framework which recommends standardised methods of calculating the warming impact.

The data inputs identified are available to aircraft operators (flight information, trajectories, aircraft properties) and [weather services](#) (meteorological data), or can be easily obtained from standard models ([ICAO EDB](#), [BADA](#)), reporting requirements (fuel properties monitoring under ReFuelEU) or independent sources (ADSB position data). The framework intends to minimise the administrative burden on airlines and authorities by automating reporting processes as much as possible. It also proposes a simplified option for smaller airlines who may not have the resources to devote to the data collection.

The proposed framework complements the existing MRV for CO₂, which has minimum burden and cost implications for aircraft operators. For an airline with a fleet of 100 aircraft, compliance with the ETS CO₂ MRV is [estimated between 10k€ and 100k€](#), less than 0.005% of the typical revenues [in the range of several billion euros](#) for an airline of that size. We can expect the non-CO₂ MRV to be in the same or a slightly higher range. This would result in a framework that starts a pathway to non-CO₂ reduction with minimal impact on an industry that has historically benefited from tax exemptions and which is currently [racking record profits](#).

Accuracy

The framework uses the latest available models for calculation of non-CO₂ effects. These models are open access, backed by scientific research and routinely [used by the industry](#). The framework is also flexible to maturing research in the area, so any relevant improvements on models, data availability or new approaches, such as the use of satellite observations, can be quickly incorporated.

Furthermore, the data retrieved and the output results from the framework can also be used to improve the models and further increase accuracy, as stated by the European Commission during consultation processes.

Conclusions

In light of the estimated climate impact of aviation's non-CO₂ effects, the non-CO₂ MRV proposed by the European Commission is a reasonable, no-regret measure that will boost our understanding of non-CO₂ effects and incentivise mitigation, without any economic detrimental consequences or significant efforts on aircraft operators. T&E recommends the following measures:

Key recommendations

- 1** Implement a non-CO₂ MRV framework with full geographical scope under the EU ETS, as agreed by co-legislators.

- 2** Ensure a flexible framework that can be improved with the integration of the latest available science.

- 3** Use the retrieved data to boost scientific understanding of non-CO₂ effects and mitigation pathways.

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