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Media Briefing

Net Zero and Non-CO2 Emissions Update

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Net Zero

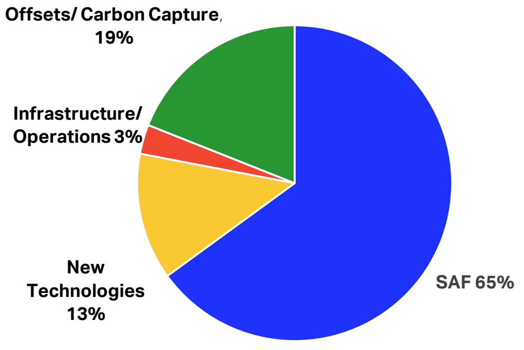
- SAF
  - Output
  - Opportunities
  - SAF Accounting
  - Progress Tracking

Non-CO_2 Emissions

- What Are Contrails?
- Why Are They an Issue?
- What Are We Doing About Them?

The Critical Importance of SAF

Different levers of Net Zero



- Multiple levers can be used in different combinations to achieve net-zero emissions
- SAF will be **responsible for the greatest amount of CO_2 reductions by 2050 (65%)**
- **1,000 x increase in production is needed by 2050 (500 Mt)**
- With strong and urgent public policy support, this is absolutely achievable.

Source: IATA Sustainability and Economics

Aviation Net Zero CO2 commitment requires different levels of technologies or approaches to realize its 2050 ambition. While advance~~s~~ in fuel and infrastructure efficiencies, technological innovations, and operational enhancements are essential, a significant transition to sustainable energy sources is crucial, with a particular emphasis on deploying and utilizing drop-in renewable liquid hydrocarbon fuels like SAF.

Government policy plays instrumental role in ensuring and enabling an environment to use all levers driving aviation towards reaching net-zero CO2 emissions by 2050. It is important that policymakers consider various factors to ensure optimal outcomes, such as supporting SAF production, ensuring technology and feedstock neutrality, while supporting scale up.

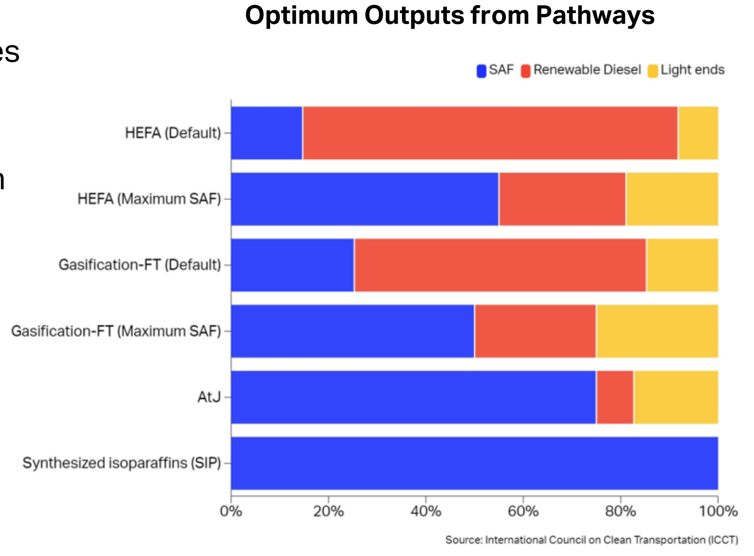
SAF Production vs Other Renewable Fuel Outputs

A typical product mix includes Renewable Diesel, SAF, and light ends like naphtha

Each production method can be optimized to produce different products

Adjusting the product mix with technology is possible but incurs costs.

Policy is crucial to ensure SAF production is not neglected.



We agree about the critical importance of SAF to decarbonize the aviation industry. It is also important to remember where SAF comes from, and that it is one of the outputs of a given renewable fuel refinery. It is a fraction.

Typically, SAF is produced alongside renewable diesel, biogas, and naphtha.

SAF Production Status & Renewable Fuel Capacity

- **SAF share versus total renewable fuel output needs to increase substantially**

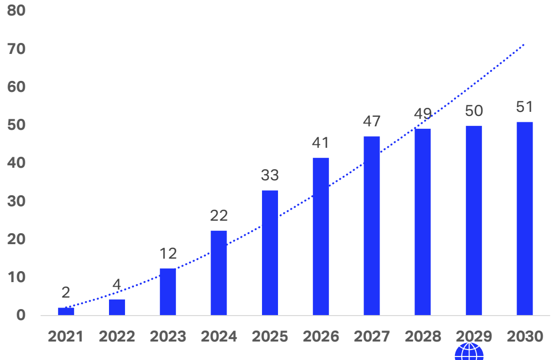
SAF as a % age Share of Fuels

Year	2019	2020	2021	2022	2023e	2024f
Estimated SAF Output (Mt)	<0.02	0.05	0.08	0.24	0.5	1.5*
Global Jet Fuel (Mt)	288	157	182	254	271*	285
SAF % of Global Jet Fuels	<0.01%	0.03%	0.04%	0.1%	0.2%	0.53%
% SAF from total RF capacity					3%	6%?

* Based on current projections and assumptions that delayed 2023 capacity will fully commercialize in 2024.

Source: IATA Sustainability and Economics

Cumulative Renewable Fuel Capacity* (Mt)



*Renewable Fuel projects typically have a 3–5 year lag effect from Project Announcement to Commercialization.

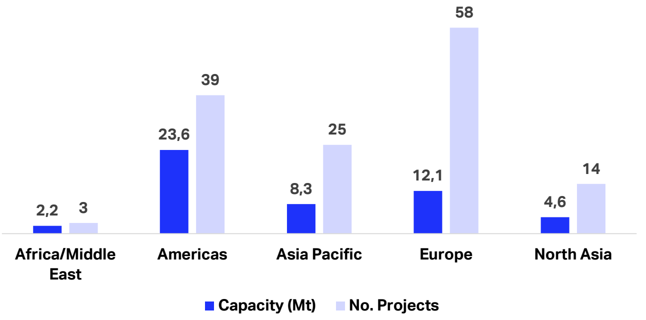
The SAF ecosystem is a complex interplay of technology, policy, and market dynamics. Despite 9 ASTM qualified production pathways; SAF share today stands at less than 1% of total aviation fuel where we see HEFA as the only dominant production route at present and continuing to mid-term.

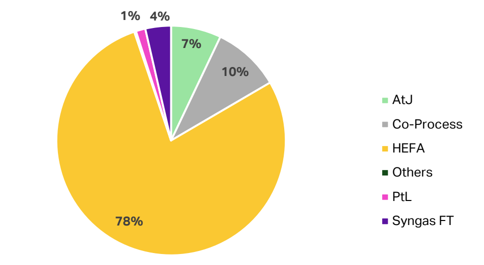
Scale of other technologies is limited due to various challenges like high capital intensity of new technology-based projects, lack production support, complexity around certification and nascent functional markets.

We do see a projected increase in renewable fuel projects announced around the world estimated at 51Mt by 2030, and we must be cognizant these are announcements and project realization require multifaceted support.

Importantly we need to see these facilities creating more SAF, right now the outputs are far below the optimum.

Projects and SAF Pathways to 2030





SAF Production Pathways - Percentage Split of Total Capacity

- **140** identified SAF projects progressing, by **100+** producers in **31** countries
- Focus of projects in certain geographies is aligned to policies to promote SAF
- HEFA will continue to dominate SAF production unless we accelerate deployment of alternate pathways

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Source: IATA Sustainability and Economics

To assess the commercial readiness of these announced SAF projects we have been tracking them regularly and we can see a clear accumulation of these operating or announced units in certain geographies which reflect that SAF focused policies have the greatest impact on SAF expansion

- From publicly-announced renewable fuel projects until 2030, around **140 identified projects progressing**.
- **100+ global identified producers in 31 countries** with cumulative renewable fuel capacity at 51 Mt
- A stark aggregation of these projects in certain geographies is reflection of conducive policies to promote SAF.
- HEFA will continue to dominate SAF production unless we accelerate deployment of alternate pathways
- EU now driving SAF diversification, exemplified through more individual plants across broader technologies.
- Going forward, the key will be scaling these several demo facilities, to commercial operations.

Co-processing as a Transition Opportunity

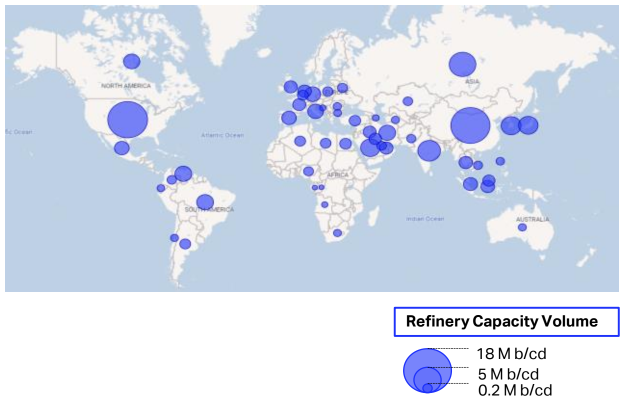
Co-processing (ASTM approved) in existing refineries can swiftly expand SAF production

Potential increase in co-processing limit from 5% to 30%

Policies must facilitate common acceptance of life cycle assessments.

Co-processing should be seen as a transition facilitator – it is not a goal itself.

Available Refining Volume



Source: IATA Sustainability and Economics

There are several potential solutions to accelerate aviation's access to critical SAF quantities at least in near- to mid-term:

Co-processing: Existing refineries can be used to co-process 5% of approved renewable feedstocks as per ASTM D1655 Annex A1 alongside the crude oil streams. This solution can swiftly expand SAF production, however policies must be put in place to facilitate a level playing field and navigate regulatory complexities around their life-cycle assessments.

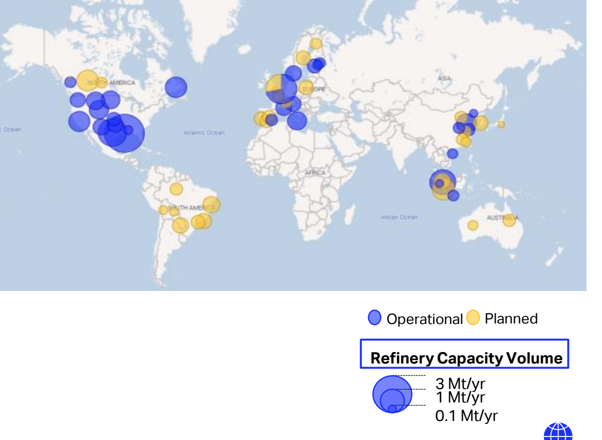
Renewable Diesel Shift to SAF

Today's stand-alone Renewable Diesel (RD) capacity (~4-5 Mt) expected to double by 2030

With road transport demand shifting to alternate energies, opportunity to progressively shift to SAF

SAF focused incentives can facilitate swift conversion of RD units to produce SAF with minor modification.

Standalone Renewable Diesel Capacity Volume



Source: IATA Sustainability and Economics

There are stand alone Renewable Diesel (RD) facilities because market incentives are more for RD. So to convert to higher fractions of SAF, they may need additional facilities including fractionators or tank storage. This could support a swing of around 15% through basic modification. More would require more cracking capability and therefore more investment.

Incentives to better balance the output of renewable fuel facilities: The current RD facilities are designed to maximize diesel production backed by lucrative incentives with the greatest demand from motor vehicles. As the transport sector transitions to the electrification, the diesel demand is expected to diminish for instance in the EU. The IRU is already predicting the decline in road diesel demand.

To help industry better address these challenges, it will be imperative to have policy enablers that facilitate maximizing SAF production, the long-term robust need for aviation industry.

These are low hanging fruits and an industry in need of every drop of SAF should not miss these opportunities.

Accelerating SAF Uptake

IATA's SAF Registry aims to accelerate SAF uptake by authoritatively accounting and reporting emissions reductions from SAF**:**

Key attributes include:

- **Promote a Global SAF Market**
- **Broad Application and Neutrality**
- **Regulatory Compliance**
- **Independent Governance**
- **Cost Efficiency**

Initial support already from:

- ✓ 17 airlines,
- ✓ 1 airline group
- ✓ 6 National Aviation Authorities,
- ✓ 3 OEMs
- ✓ 1 Fuel Producer

Increasing rapidly…

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IATA will establish the SAF Registry to accelerate the uptake of SAF by authoritatively accounting and reporting emissions reductions from SAF.

- **Wide Geographic Scope:** The Registry will allow airlines to purchase SAF regardless of where it is produced. Each batch's certified environmental attributes can be tracked and assigned to the purchasing airline. By ensuring that the environmental attributes of SAF are properly recorded and transferred between parties, airlines and their customers can report emissions reductions accurately, aligning with any reporting obligations and international standards.
- **Broad Application and Neutrality:** The Registry will be neutral with respect to regulations, types of SAF, and any other specificities under relevant jurisdictions and frameworks, making it capable of handling all such user requirements. As the initiator, IATA is working with certification organizations and fuel producers to standardize data for efficient processing.
- **Regulatory Compliance**: The Registry will help airlines meet regulations such as CORSIA and the EU ETS, ensuring compliance with SAF mandates and provide transparency to authorities regarding emissions reductions. The Registry will ensure that the sector's agreed SAF accounting and reporting principles are adhered to and fully in alignment with international protocols and industry best practices. It will provide safeguards against double counting and double claiming; and ensure the immutability and integrity of all interventions under the Registry.
- **Governance:** Independent governance will ensure the system's impartiality and robustness.
- **Cost Efficiency:** Participation in the registry will be on a cost-recovery basis to avoid adding unnecessary cost barriers to the SAF ramp-up.

The Registry is being developed in consultation with airlines, government authorities, international organizations, OEMs, fuel producers and suppliers, airports, and corporate travel management companies.

Tracking Net Zero Progress

- **Net Zero Tracking Methodology**
- Facilitated in the **reporting platform, TrackZero**, anticipated launch in Q4 2024

Category	Metric
Emissions (in CO_2, TTW)	Absolute: $MtCO_2$
	Intensity 1: gCO_2/RTK
	Intensity 2: gCO_2/ATK

Category	Sub-metric
SAF	Total net SAF delivered (mass)
	Total blended SAF delivered (mass)
	Average SAF blend ratio (%)
	Average LSf emissions reductions
	Percentage of Neat SAF of all fuel globally (%)
Offsets	Total number of offsets retired, broken down as: - Mandatory vs voluntary | CORSIA eligible vs other
CDR/CSS Technologies	CO_2 removed by CDR/CSS technologies
New Aircraft Technologies	Average kg CO_2/kWh
	Average share of electric propulsion in hybrid-electric aircraft
	Average kg CO_2/kg H_2
Future Developments	CO_2 avoided as a result of new technologies

IATA published the Net Zero Tracking Methodology which defines the scope, data sources, and metrics to track progress toward the industry's net zero CO2 emissions by 2050. **By 2026, we want to be reporting as comprehensively as we can and looking at different measures.**
Track overall progress and break it down per lever: 3 key metrics and 11 sub-metrics to measure emissions and mitigation measures

The Methodology is facilitated in the reporting platform, TrackZero, anticipating launch in Q4 2024

Upon submission, airlines receive the following benefits:

1) anonymous benchmarking and ranking on key performance metrics

2) airline-specific Net Zero Report to publish if desired

Ahead of launch, IATA will conduct a campaign to support participants prepare for data submission


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Aviation contrails:
Roadblocks & enablers
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What are Contrails?

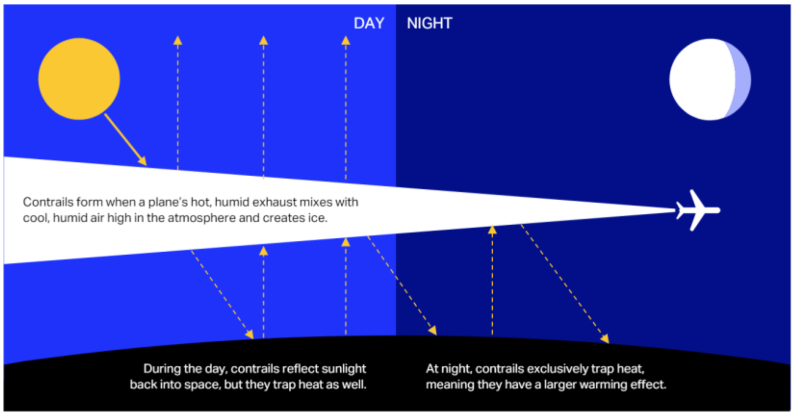


Image credit: American Airlines

Not all contrails are equal, some are warming, some cooling, some both warming and cooling

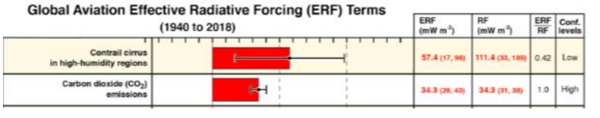
- Contrails are white line-shaped clouds produced when aircraft cruise under specific atmospheric conditions
- Some contrails disappear quickly after forming, these have no climate impact
- some contrails persist, and could merge with other contrails and clouds ,creating high altitude cirrus clouds
-These clouds could have a warming, cooling or dual impact on the climate, as they reflect solar radiation, and trap infrared radiation from the ground
-Some contrails could be even warming during some part of their lives and cooling during another. It is very case-by-case. (unlike CO2, which is always warming)

What is the Problem?

Scientific consensus:

At an aggregated level, on average, **contrails have a warming impact** on the climate

Very low confidence on how warming they are: even harder at an **individual flight level**



Contrails Map, ReViate, Breakthrough Energy, map.contrails.org

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Lee et al. "The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018", 2021

However there is scientific consensus, that if we look back at previous years, and average all the results, the contrails will have had and will continue to have an aggregated, averaged warming effect.

Just what this effect is, is quantified with low confidence. The uncertainty at an individual flight level is even higher. With extremely poor quantification

Why Critical Data Needed?

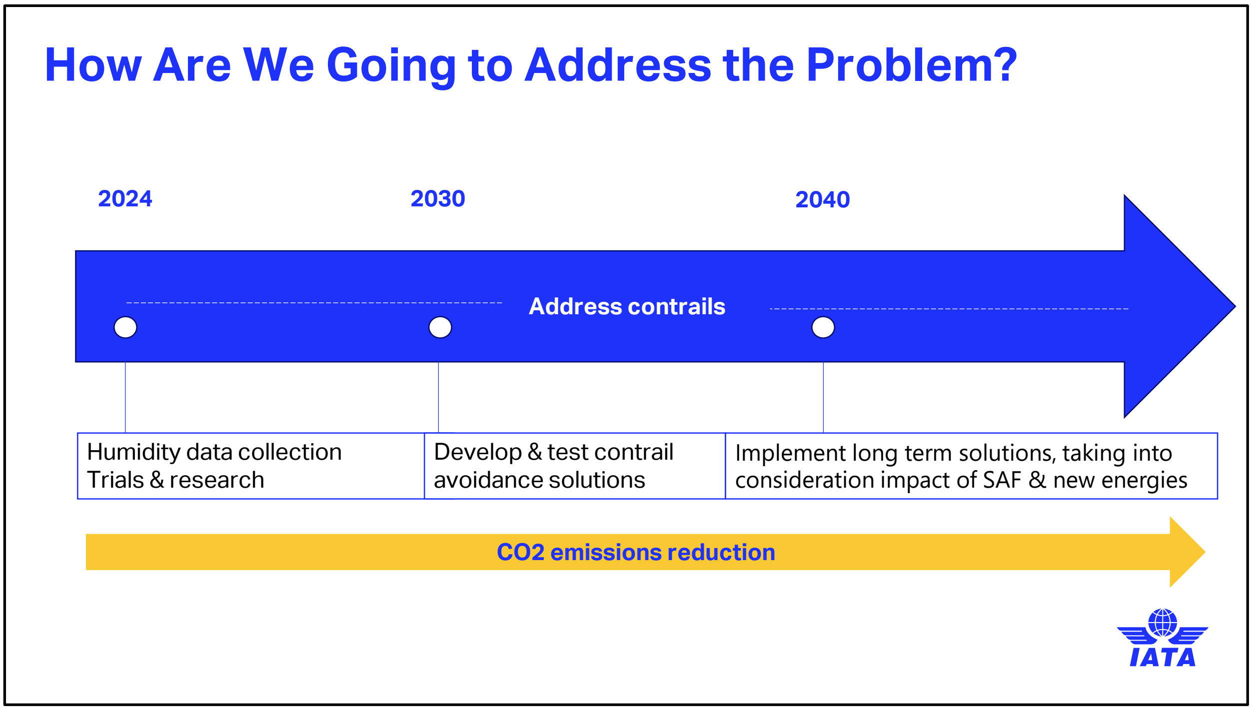
- We need to focus on improved **humidity data**
- The goal is to improve **climate models**
- This will lead to maturing **technologies & operations** to avoid contrails

The industry is actively working on further understanding and mitigating high-probability, high-warming contrails.

One of the keys to unlock further action is humidity. Humidity in the upper atmosphere is very poorly quantified, and its quantification is key to both predict where contrails will form, and also what their climate impact could be.

Most scientific literature agrees that contrail predicting models are most sensitive to humidity, and the lack of data lowers the confidence on how accurate these models can be today.

IATA is focusing now on how to get more humidity data, because this is what the scientific community needs.



The industry is addressing contrails today. Airlines are involved in trials to further understand how easy/hard it is to avoid

Airlines are also running validation trials to see if the predictions were accurate

We need more humidity data now to improve the models

This data should be fed to the meteorological organizations so that the models can be more reliable. We believe that post 2030 we will more reliably be able to predict individual contrails and their warming impact

In the future, contrail management could also be further understood and integrated to future fuels like SAF and new energies

Industry Concerns

The Inclusion of non-CO_2 for aviation in the MRV requirements under EU ETS raises concerns:

1. A non-CO_2 MRV framework will not reflect the actual non-CO2 effects of aviation
2. Including non-CO_2 effects in EU ETS MRV requirements precedes today's science
3. The non-CO_2 MRV framework is unlikely to deliver a positive climate impact

- The industry does not oppose the MRV but has expressed concerns and made recommendations.
- First the MRV is not an MRV like CO2. for CO2 you report fuel burn and this allows you to estimate CO2 emissions with high confidence. The authorities then verify the fuel burn monitored. For non-CO2, this is a data collecting exercise where airlines will be asked to report a lot of data, this data will be put into a black box coupled with weather models and a non-CO2 effect will be estimated. This estimation will be wrong. How can we then use that to reduce emissions? Baselines for non-CO2 already exist. And it is not clear how this MRV will help to get a more accurate baseline, where most of the uncertainty is in fact in the humidity

- Secondly, all scientific papers support more humidity data, our position is backed up by science. Scientific papers also note to the sensitivity of the particulate matter emissions of engines. But no papers suggest that airline reporting all the data required will actually result in more accurate non-CO2 baselines or mitigation.

- We are concerned that the industry could drive the focus away from CO2 (where we have high confidence) and into non-CO2 (where we have low confidence), and also focus efforts only on MRV when they could be doing other things. This is dangerous and could have severe climate consequences

Recommendations

- Voluntary participation in the MRV for airlines.
- Collect more humidity data to develop contrail avoidance models.
- Establish clear methods for scientifically validating any MRV output
- Use average values, not worst-case scenarios, to fill data gaps for volunteering airlines.
- Encourage industry and scientific community to conduct research and engage in activities to further understand and mitigate non-CO2 effects.

The MRV framework, as it currently stands, should address the following concerns:

• **Participation in the framework should be voluntary**, and a first pilot phase should be established to test the process, accuracy, and effectiveness of the system, as well as allow operators to explore other measures.

• There should be **clear pathways for scientific validation of reported non-CO2 effects** and a roadmap for reducing the differences between the modeled estimations and reality.

• The **application scope of non-CO2 MRV provisions should be strictly intra-EU** to mirror that for CO2. Any intention to expand beyond the current EU ETS application scope for aviation would imply a legal risk of extraterritorial impact and would work counter to any MRV implementation. Furthermore, the probability of contrail formation is highly dependent on the region: mid-latitudes have a higher probability of contrail formation than the tropics or the equator, so contrails affect different regions differently.

• Data gaps for volunteering airlines should be filled with **average values** and not worst-case scenario data, which induce unwarranted bias in the data, particularly on fuel properties.

• The timeframes and metrics chosen for combining CO2 and non-CO2 into single reports should be aligned with the latest scientific understanding and should avoid over-representing **short-lived non-CO2 effects against the long-lasting effects of CO2**.

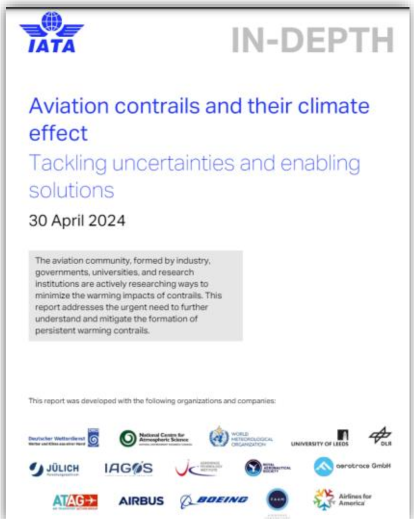
• **Safeguards** should be included against unnecessary collection of **sensitive data and their misuse.**

• Airlines should be **encouraged to conduct their own research and participate in new and existing activities** to understand non-CO2 effects better and to explore potential mitigation opportunities.

IATA Technical Publication on Contrails

- Science first
- Current understanding
- Knowledge gap
- Industry efforts

IATA international group of experts on non-CO_2


IN-DEPTH

Aviation contrails and their climate effect

Tackling uncertainties and enabling solutions

30 April 2024

The aviation community, formed by industry, governments, universities, and research institutions are actively researching ways to minimize the warming impacts of contrails. This report addresses the urgent need to further understand and mitigate the formation of persistent warming contrails.

This report was developed with the following organizations and companies:

IATA published a technical paper, with academic and meteorologist partners, as well as industry, to ask for more humidity data, using existing channels and collaborative routes, and developing new sensors. We believe this is something that can really help. Airline people are not climate scientists, nor meteorologists, nor do we manufacture equipment, but we do fly airplanes, and these airplanes can be used as airborne laboratories to help advance the science.

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