POLICY

Unlocking geographical constraints on the global SAF market through a robust SAF accounting framework

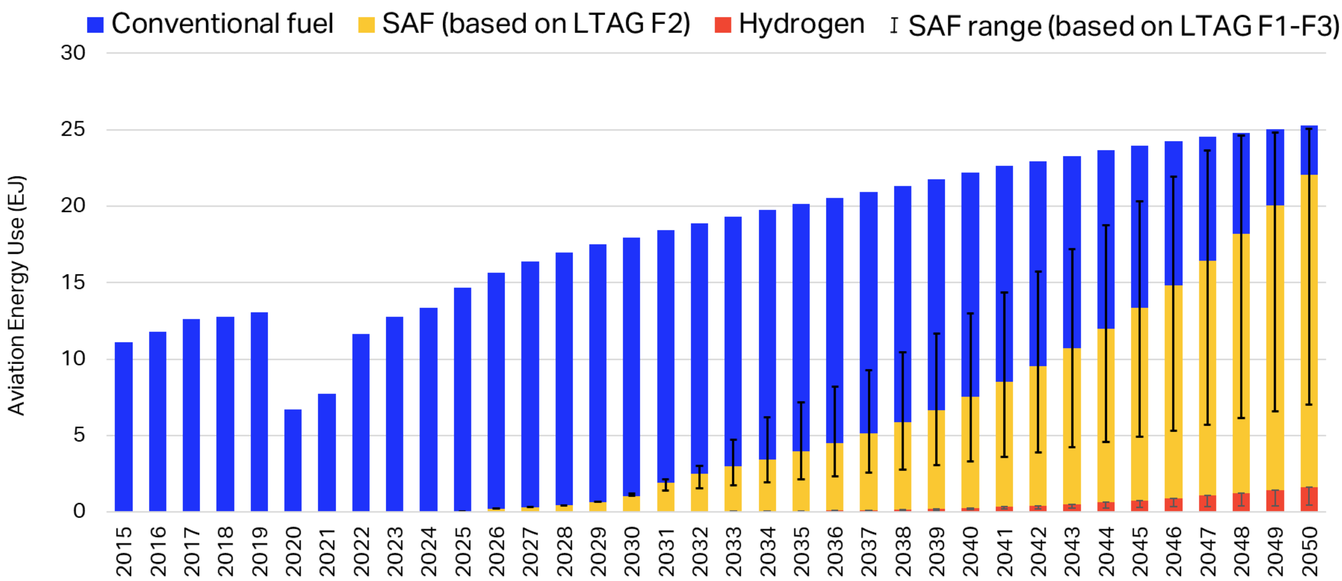
A must-have for SAF deployment and its commercial viability

A robust Sustainable Aviation Fuel (SAF) accounting framework, based on trusted chain-of-custody mechanisms, is necessary to support the global aviation industry's goal to reach net-zero carbon emissions by 2050.

The current state of SAF production

Since the Paris Agreement in 2015, the World is engaged in an energy transition which aims to replace the use of fossil fuels with alternative renewable fuels. This is a challenge of unprecedented proportions, affecting all industries and all productive processes. In the domain of civil aviation, which relies on combustion of fuel for aircraft propulsion, the vast majority of the decarbonization is expected to be realized by Sustainable Aviation Fuels (SAF) on the 2050 horizon, and until such time that alternative propulsion technologies mature and become scalable for global air transport. However, SAF is currently in very limited supply: in 2022, the production of SAF amounted to less than 0.1% of civil aviation's global jet fuel consumption.

Figure 1: Aviation's energy transition to 2050.



Source: [IATA Net Zero Roadmaps]

With fuel demand set to rise from 225 Mt in 2022[1] to 500 Mt in 2050, and the mission to replace most of that fuel demand with SAF by 2050, the need for developing SAF production is formidable. Today the dominant pathway is HEFA, which refines vegetable oils, waste oils, or fats into SAF through a process that uses hydrogen (hydrogenation). This pathway will not be able to meet demand on the 2050 horizon and it is important that research and development continues regarding all existing and future viable pathways and feedstocks for SAF production.

Given IATA's 2021 commitment to achieving net-zero CO_2 emissions by 2050, and ICAO's (the International Civil Aviation Organization) 2022 commitment to the same objective, it is necessary to unite all efforts in the mission to accelerate and maximize the production of SAF. In spite of the strong favourable price signal in the SAF market, as SAF costs 2-5 times more than jet fuel, the scaling up of production still falls short of demand. Unless supply constraints are eased, the price is likely to remain high or increase further, inherently favouring the fossil fuel market. The fact that the price signal is insufficient in today's SAF market to bring about the necessary increase in production points to deficiencies in its structure which can be attributed to the developing nature of the market.

Currently, there are only a few boutique producers at select locations and geographies. To facilitate further deployment, it is necessary to provide the frameworks and policies required for the nascent SAF market to mature and operate on market-based principles, where supply and demand is balanced by competitive and transparent pricing, thanks to reduced market fragmentation. One such essential instrument is a SAF accounting system, based on trusted chain-of-custody mechanisms.

The importance of SAF accounting

A fit-for-purpose SAF accounting framework would enable airlines to claim the environmental benefits from SAF purchases to meet or reduce their regulatory obligations and fulfil additional commitments. A robust SAF accounting system – or network of interoperable systems – offers the following benefits:

- Ensures **immutable tracking** of the environmental attributes, to **enable verification**.
- Provides **full transparency** of the claims made over any specific batch of SAF.
- **Prevents double counting** from double issuance, usage, or claiming.
- Allows **stacking of incentives** to maximize opportunities to fund SAF's higher prices.

The utilization of flexible and trusted chain-of-custody mechanisms such as mass balance or book and claim[2], unlocks additional benefits for increased efficiency in SAF production and transport:

- Enables SAF production where it is **most efficient**.
- Provides **increased demand** for production facilities geographically distant from larger airports.
- **Avoids unnecessary transport** of SAF and feedstocks, minimizing cost and the associated incremental emissions, enabling efficient deployment.
- Promotes **competition.**

SAF accounting under the CORSIA framework

The provisions in CORSIA Standard and Recommended Practices (SARPs) recognize that jet fuel and SAF are not segregated at airports but are instead typically co-mingled. CORSIA eligible fuels (CEF) can be mingled in fuel pipelines, storage terminals, and in airport storage systems, all upstream from its use in aircraft. The CEF purchased by a particular airline may not be physically used in its aircraft, and it will not be feasible to determine the specific CEF content at the point of uplift in an aircraft, given the nature of the upstream supply chain. Claims of emissions reductions from the use of CEF by airlines are hence based on mass of CEF according to purchasing and blending records[2]. Furthermore, according to ICAO Doc 9501 - Environmental Technical Manual, Volume IV, the CEF can be produced and uplifted anywhere in the world, as long as they satisfy CORSIA reporting requirements in accordance with the CORSIA SARPs[3].

[1] IATA Global Outlook for Air Transport, June 2023
[2] As defined by the ISO 22905:2020 – Chain of custody general terminology and models
[3] Note 1, Clause 2.2.4 of ICAO CORSIA SARPs, Annex 16 Vol IV, Part II, Monitoring of CORSIA eligible fuels claims
[4] Clause 3.3.5.5 ICAO Doc 9501, Environmental Technical Manual, Volume IV, Use of CORSIA eligible fuels

Promoting competition

As long as SAF supply remains restricted, only airlines operating at the few airports fortunate enough to benefit from such supply will be able to purchase SAF. This will slow the energy transition for the aviation industry while also potentially creating market distortions since market access to SAF is not granted equally to all airlines in the world.

A SAF accounting framework enables separation of the environmental attributes of the SAF purchased from the physical delivery of that SAF. This would allow any airline in the world to engage in SAF purchases, irrespective of the supply, or lack thereof, in that airline's operating location. In this manner, all airlines would have equal access to one global market for SAF, and while this is optimal for all kinds of markets, it is essential in a supply-constrained market where airlines are subjected to decarbonization obligations. All airlines must have equal opportunity to meet such obligations, and all airlines must have equal opportunity to realize the airline industry's commitment to achieving net-zero CO_2 emissions reductions by 2050.

While CORSIA SARPs already allow airlines to claim emissions reduction from the use of SAF via purchase and blending records, the lack of broad recognition from policy makers of such systems limits the airlines' ability to conduct their claims in a consistent and harmonized manner. Additional requirements from voluntary schemes may also prevent corporate customers from contributing to the unlocking of further investments and financing that is much needed to increase SAF production. Explicit recognition from policy makers of airlines' ability to stack the environmental attributes from the use of SAF would help to address this.

"Stacking" of incentives versus double counting: different scopes of emissions

Stakeholders in the aviation value chain may be subject to multiple regulations or commitments affecting the same emissions. For instance, a batch of SAF sold in the US could benefit from production incentives claimed by the producer; the airline may decide to use the environmental attributes to reduce their CORSIA obligation **(scope 1, direct)**; and a corporate customer could include the associated emissions reduction in their annual reports **(scope 3, indirect)**.

The framework defined by the Greenhouse Gas Protocol (GHGP) allows for multiple claims under different scopes, and SAF accounting frameworks must support such **stacking** of claims by different stakeholders pertaining to the same batch of SAF. The GHGP[5] considers that accounting for the same emissions under different scopes **does not constitute double counting**, and instead regards it a common and expected practice.

Enabling SAF production in developing aviation markets

The investment proposition for investors and SAF production entrepreneurs is currently at the very early stages of innovation and technological development. It is a stage where all the risks are shouldered by the investors, and the dominant future technology is still unknown. Many measures can be taken to improve the investment proposition and spread the risk-taking more broadly. Nevertheless, a fundamental element in assessing the potential success of any such investment is the estimated market size and the access to that market. Similarly, the location of raw material inputs in the production process and access to such inputs will be a determining factor in investment decisions.

Many of the current and potential future feedstocks likely to be important in SAF production will probably be predominantly located in areas which represent a limited share of global aviation traffic. It would go counter to the objective of decarbonization to have the global SAF market rely on sourcing of inputs from distant locations for production in areas with greater air transport density. Instead, it is important to give feedstock-rich areas access to the global aviation market, while freeing those locations from local demand constraints.

[5] Corporate Accounting and Reporting Standard, Chapter 4

A SAF accounting framework aligned with the CORSIA SARPs would give all SAF producers access to global airline demand for SAF, making the case for new SAF production capacity much more attractive in markets where local SAF demand would not otherwise justify the necessary investments. Ultimately, this would open the SAF market to global competition, drive innovation, reduce market fragmentation, and ensure competitive prices.

Fuel accounting based on trusted Chain-of-Custody (CoC) mechanisms

Fuel supply chains may be configured differently. Consequently, different CoC approaches exist that seek to ensure accurate accounting in each case. CoC relates to the process by which inputs and outputs, as well as associated information are transferred, monitored, and controlled at each step in the relevant supply chain. The 3 most used CoC models are:

- **Physical segregation:** materials or products originate from a single source and their specified characteristics are maintained separately from any other throughout the supply chain. This is the case when SAF is supplied to the end users via a dedicated infrastructure, as has been seen in specific SAF demonstration flights.
- **Mass balance:** this is the tracking of SAF inputs at each stage of the aviation fuel distribution network, requiring documentation checks of the amount of SAF at every junction. This is commonly used when SAF is blended late in the supply chain, notably at existing fuel facilities which are shared by multiple fuel suppliers at airports.
- **Book and claim** enables the decoupling of SAF's environmental attributes from the physical molecules upstream in the supply chain, and does not require physical uptake of any portion of the SAF by the buyer, as long as the product's use by other airlines can be proven.

KEY CONSIDERATIONS FOR POLICYMAKERS

A SAF accounting framework is a necessary but not sufficient condition for accelerating and maximizing SAF production. It will not deliver all the expected results in any immediate way, as it will remain dependent upon complementary frameworks and policies. Important considerations are included in the recommended principles for SAF accounting frameworks, as presented in IATA's Policy paper on SAF accounting.

The use of a trusted accounting framework for SAF will help unlock the geographical constraints currently faced by SAF producers. It would also have a positive impact on local feedstock production capabilities which, in turn, could bring economic benefits to States.

ICAO member States are encouraged to recognize and adopt SAF accounting methodologies for international aviation to enable:

- The claiming of emissions reductions from SAF use towards different regulatory schemes (e.g., CORSIA).
- The tracking of the sustainability attributes and life-cycle emissions linked to the feedstock across geographies, production pathways, transportation, and use of SAF.
- The different stakeholders to claim a SAF purchase against their specific emissions scopes while avoiding same-scope double claiming of any given batch of fuel.

Governance and delivery

The delivery of SAF accounting systems and their operations can be ascertained by industry and private sector organizations. There are already multiple private sector actors operating in the SAF accounting area. IATA and other organizations are currently collaborating to establish common principles for the interoperability of such platforms. IATA could develop an industry solution for SAF accounting to facilitate airlines' tracking of SAF's environmental attributes and their claiming under different frameworks. Any IATA solution would be on a not-for-profit basis, in order to prevent such a system from adding further costs to the price of SAF.

States in ICAO should assess the robustness of the outcome of private initiatives and recognize their use for regulatory compliance.