POLICY BRIEF

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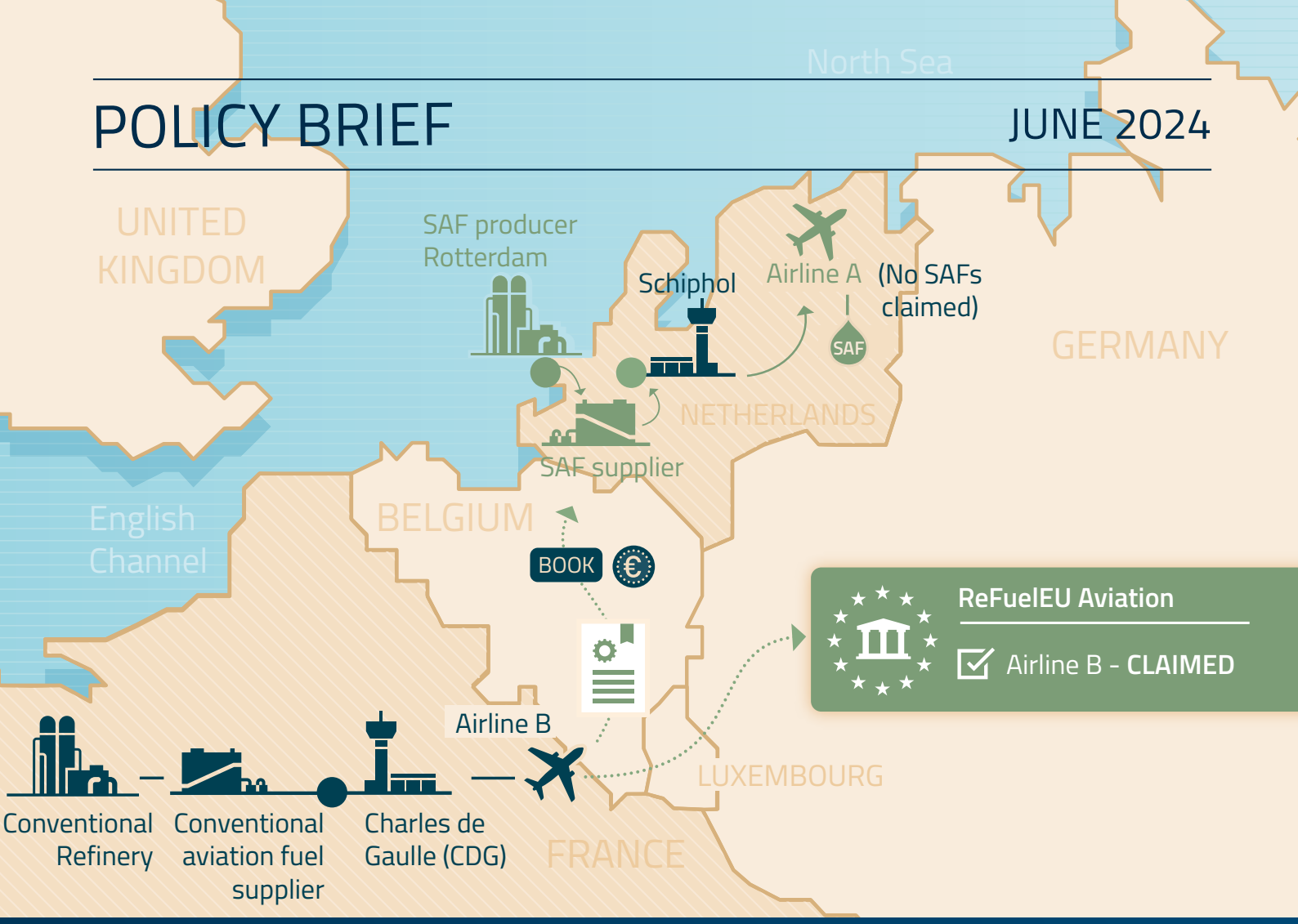

Book and Claim – A system for Sustainable Aviation Fuels (SAFs)

Recommendations by Future Cleantech Architects

Future Cleantech Architects

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Executive Summary

In 2019, 5% of the EU's emissions came from aviation, with the sector rapidly recovering from the impact of COVID-19 and demand returning to 92% of pre-pandemic levels in 2023. Due to its highly active aviation sector, the EU requires on average 10-15% of total global jet fuel demand annually. However, Sustainable Aviation Fuel (SAF) production, a 'drop-in' fuel alternative for conventional fuel expected to play a major role in decarbonizing the sector, remains minimal. SAF availability in 2023 amounted to 0.5 Mt globally, with a maximum production capacity of 0.24 Mt within the EU, which is equivalent to ~0.6% of the EU's total fuel consumption for that year.

To make flying more sustainable, the EU has started implementing several policy measures to combat the sector's emissions. Most prominent is ReFuelEU Aviation, adopted in October 2023, which focuses on SAF supply and uptake through progressively increasing targets. It mandates that by 2050, SAFs should make up at minimum 70% of the fuel supplied and uplifted at EU airports. However, with SAF production remaining low in the EU to this day, additional measures need to be employed to help achieve this regulation's targets and the long-term aspirational goals of the sector. Flexibility mechanisms such as Book and Claim can help widen the market for SAF tradability by removing geographical barriers, thereby increasing SAF accessibility and overcoming shortfalls in supply in the medium-to-long term.

The Book and Claim system, when implemented effectively and in conjunction with other policy measures, has the potential to accelerate SAF development and deployment, contributing significantly to the aviation industry's sustainability goals while addressing logistical and economic challenges. It offers a pathway towards a more sustainable aviation future by leveraging flexibility and accessibility. However, proper certification, international collaboration, independent auditing, monitoring, and reporting are necessary to ensure transparency and accountability in SAF procurement and use through this system.

This brief outlines Future Cleantech Architects' six policy recommendations to ensure the effective implementation of a Book and Claim scheme within the EU to help meet RefuelEU Aviation's targets and the Union's overall environmental goals by 2050.

Recommendations

1.

Implement a harmonized SAF sustainability standards and certification process

An EU-wide, harmonized, certification process, based on multiple sustainability criteria such as the fuel's lifecycle greenhouse gas (GHG) emissions, must be developed and standardized for SAF eligibility and usage.

2.

Implement a SAF trusted partners registry

It is crucial that each Member State works solely with certified, trusted partners, both in the EU and from third-party countries, and that the fuel is monitored, reported, and verified on a daily basis.

3.

Incorporate Book and Claim as a flexibility tool in ReFuelEU

As a first step, a Book and Claim system should be incorporated as a delegated act in the ReFuelEU Aviation regulation.

4.

Adopt policy mechanisms to support Book and Claim schemes on a Member State level

Member States should incorporate Book and Claim into their legal framework and national reporting database, with clear provisions on its use to ensure that SAFs purchased through this scheme count towards ReFuelEU Aviation's targets.

5.

Monitor and leverage current Book and Claim schemes

EU Member States should keep track of and leverage findings from current Book and Claim pilot projects to maximize this mechanism's potential.

6.

Develop and enact a harmonized EU Book and Claim framework

Member States should report on the benefits and roadblocks of pilot Book and Claim projects, with these reports feeding back to future European Commmision reports on the implementation of the ReFuelEU regulation.

Sector Overview

Aviation represented 5% of the EU's 2019 total CO_2 emissions and – despite the decrease observed during the COVID-19 crisis – is one of the few sectors whose emissions are expected to continue to rise in the Union. The EU aviation sector must step up and coordinate its efforts to mitigate its environmental impact to align with the EU's overall climate goals of reaching net-zero emissions by 2050 (see FCA's policy brief).

Tackling aviation's emissions to align with these long-term goals and address the sector's total warming impact will require a number of policy levers working together. They include promoting alternatives for short-haul flights, implementing carbon pricing mechanisms, reinvesting revenues from carbon pricing into research, development, and innovation, facilitating the uptake of innovation such as all-electric planes where feasible, promoting the uptake of Sustainable Aviation Fuels (SAFs), and tackling the sector's non-CO_2 effects.

The EU has already taken steps to introduce such policies, for example, the removal of free allowances for the aviation sector within the EU Emissions Trading Scheme (ETS) by 2026. Most importantly, the Union introduced the ReFuelEU Aviation regulation, which came into effect in October 2023. This regulation focuses on the importance of SAFs in reducing the sector's emissions by introducing progressively increasing minimum SAF targets in the final fuel mix until 2050. The aim is that, by 2050, SAFs will make up at minimum 70% of the fuel supplied and uplifted at Union airports. Of this 70%, at least 35% should be from synthetic fuels, with the rest coming from biofuels[1].

The EU benefits from a highly dynamic aviation sector, requiring 10-15% of global jet fuel demand annually. This amounted to ~46 Mt of jet fuel in 2019, before the impact of the COVID-19 pandemic. As the European aviation sector has mostly recovered, with demand in 2023 reaching 92% of pre-pandemic levels, the EU's maximum SAF production potential remains minimal at 0.24 Mt or 0.6% of the EU's 2023 total fuel consumption[2].

ReFuelEU Aviation is a notable first step to facilitating SAF production and uptake in the Union by providing a market signal that there will be long-term demand for these fuels, thereby reducing risk in potential SAF production ventures. To boost SAF development and deployment in the Union further, from the minimal 0.24 Mt feasible today, and to meet the ambitious 2050 targets set out by this regulation, additional policy levers that reinforce ReFuelEU Aviation are required. This includes, for example, reinvesting revenue from carbon-pricing mechanisms into scaling up SAF production, which will help to close the commercialization gap for these fuels. One powerful policy lever to help boost SAF uptake within the EU - and ensure ReFuelEU Aviation targets are met in the coming years - involves flexibility tools such as Book and Claim, whose merits will be evaluated in this brief.

An introduction to the Book and Claim system

Currently, SAF production remains low, with 0.5 Mt produced in 2023 globally, which amounted to <0.5% of total global jet fuel consumption for that year. Production is also limited to a handful of producer countries around the world, such as the US, UK, China, and the Netherlands. Their costs remain higher than conventional aviation fuels, up to 4x higher for biofuels and 6x higher in the case of synthetic fuels. SAFs can have lower lifecycle greenhouse gas (GHG) emissions relative to conventional fuel if they are produced from sustainable resources[3]. However, optimal SAF production sites, potential buyers, and the airports requiring these fuels may often be geographically distant from one another. Therefore, transporting SAFs from production sites to airports could add to both their emissions and costs.

One potential flexibility mechanism that can help fuel suppliers and aircraft operators reach the targets of ReFuelEU Aviation, especially in the medium-to-long term as they aim to overcome shortfalls in supply, is the use of a Book and Claim system. Book and Claim is an accounting practice that can help decouple sustainability claims from the physical flow of goods. This means that the supplier and buyer are not physically connected through the supply chain. The supplier provides the sustainable goods available for 'booking.' The buyer pays the premium for these sustainable goods, which are not physically assigned to the buyer, but their sustainability attributes are nonetheless 'claimed' by the buyer. The most recognizable example of the successful implementation of the Book and Claim scheme is for renewable electricity (see Box 1 for more details).

Book and Claim for renewable electricity

Box 1

The Book and Claim scheme is useful in the case of electricity, as there is no way to physically trace renewable electricity through the grid. With Book and Claim, providers keep track of the renewable electricity they produce, and the consumer pays the premium for this renewable electricity while continuing to receive electricity from the grid as usual, which may not 100% stem from renewable sources. By paying this premium, the consumer ensures that renewable electricity is produced and available, and in return, the consumer receives a certificate – called Guarantees of Origin in Europe – attributing this renewable electricity to them, whether the electricity that ends up being supplied to their home is renewable or not. One of the concerns that this system has raised is the risk of greenwashing by companies who take part in Book and Claim, making sustainability claims of 100% direct renewable electricity usage without sufficient clarification. Doubts have also been raised about the effects on expanding renewable electricity production capacity due to Book and Claim. For Book and Claim to be effective, it should work in a way where revenue from the scheme is used to stimulate increased renewable electricity production in the areas with the most abundant renewable energy resources. This highlights the need for clear provisions when implementing a Book and Claim scheme to maximize its efficacy. Such provisions are detailed out in the coming sections for a Book and Claim scheme developed for SAFs.

[1] Biofuels are produced from renewable biological sources such as forest residue and wastes in a variety of pathways defined by the chosen feedstock. Synthetic fuels are artificially produced from hydrogen and CO_2 in the presence of an energy source, most commonly electricity. For synthetic fuels to be as close to carbon neutral as possible, the hydrogen must be clean, and the CO_2 must come from sustainable sources.

[2] Based on 2023 demand data from Eurocontrol relative to 2019 and accounting for annual efficiency improvements.

[3] If they are made from clean hydrogen and sustainable carbon sources in the case of synthetic fuels, and from sustainable feedstocks in the case of biofuels.

What are the benefits of a Book and Claim system for SAFs?

1. Removes geographical barriers

- SAF production is likely to be limited to geographical regions where the availability of clean energy and sustainable carbon or biomass feedstock is high. This does not always coincide with the countries where air traffic, and therefore jet fuel consumption, is highest. This leads to a mismatch in supply and demand and limits the possibility of supplying SAFs to all airports and aircraft that need them. The Book and Claim system can help bypass these limitations, as the fuel is no longer physically restricted to the airline/flight claiming its use. This will be highly beneficial within the EU, as air traffic is not uniform across the Union. Countries such as Germany, France, Spain, and Italy have more than double the average daily air traffic of other Member States. On the other hand, one of the largest SAF producers in the EU, Neste, has its production sites in Finland and the Netherlands. Book and Claim can help facilitate these countries' access to SAFs, while minimizing transport related emissions and costs, if they are unable to locally produce the SAF in the large quantities needed[4].

2. Supports SAF uptake

- A specific fuel supplier or airline could cover the SAF premium with certified fuel suppliers. The local airport near the SAF production site receives this fuel. The carbon emissions reductions and the percentage of SAF uptake are then allocated to the fuel supplier or airline that paid the SAF premium in another region, rather than the one that physically used the SAF on its journey. In the case of the fuel supplier, this premium is then passed on to the airline. To ensure transparency and accountability, the booked SAFs should then be consumed close to the region of production within the year, with consumption certificates issued and validated by regulatory authorities. This is critical for third-country producers, as they must meet these conditions for their SAF to be eligible in the EU scheme.

3. Stimulates domestic and international SAF development

- Book and Claim could also spur optimal SAF development in regions where resources and feedstocks for their production are abundant. This scheme would provide these regions with access to a larger SAF market, leading to an increase in their production capabilities to meet the additional SAF demand.

4. Limits fuel GHG transport emissions and supports domestic SAF accessibility

- SAF uptake is meant to reduce the sector's greenhouse gas (GHG) emissions compared to the continued use of conventional jet fuel. Having SAF supply and usage be at local airports, close to where they are produced, would help lower their lifecycle GHG emissions further by limiting transport emissions. It also gives these airports earlier access to SAFs than would have been the case without a Book and Claim system in place

5. Bypasses technical limitations

- The Book and Claim system could also bypass technical limitations, such as the current maximum 50% SAF blending limits. Corporate buyers can opt to pay for the equivalent of a flight 100% fueled by SAFs, as this fuel is no longer physically bound to one flight but will be made accessible to help cover the operations of multiple flights at an airport near the SAF producer.

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[4] Future Cleantech Architects will publish a technical assessment of ReFuelEU Aviation's SAF targets in the third quarter of 2024.

Is there an opportunity for the Book and Claim system in ReFuelEU Aviation?

Currently, Article 15 of RefuelEU Aviation opens a door to and highlights the potential of flexibility measures such as Book and Claim, but the implementation of such measures is not yet mandatory under this regulation (see Box 2 for Article 15 from ReFuelEU Aviation on Flexibility Mechanisms). While Member States do not have to utilize flexibility tools as part of this SAF mandate, they could opt to do so voluntarily to ease supply pressures. The benefits of a Book and Claim scheme will become more apparent past 2030 as supply shortages increase with the exponential rise in SAF needs to meet ReFuelEU Aviation's later-stage targets. To minimize over-dependence on virtual SAF claims over domestic SAF development, a cap on the quantity of ReFuelEU eligible SAFs could be implemented, if these SAFs are claimed via the Book and Claim scheme. Book and Claim contributions can then be used as a last mechanism when all other physical supply options are exhausted.

The European Commission (EC) has been tasked with assessing developments in SAF production and supply within the EU aviation fuel market and must present a report to the European Parliament and the Council by the 1st of July 2024. If deemed appropriate, improvements could be made to the existing flexibility mechanism on SAF accounting outlined in Article 15, and additional measures could be introduced to help boost SAF supply and uptake further.

One measure under consideration is establishing or recognizing a SAF 'tradability' system, allowing for claiming fuel usage in the EU without a physical connection to a supply site, i.e., a Book and Claim system to help meet the targets of ReFuelEU Aviation. This would enable aircraft operators or aviation fuel suppliers to purchase SAF through contractual agreements with SAF suppliers and claim its use at EU airports without being physically bound to its availability and usage on site.

To explain how a future Book and Claim system could work, we outline a hypothetical case (based on Article 15) in Fig.1 and Box 3. This case was developed in accordance with the responsibilities, reporting, and oversight set out in ReFuelEU Aviation (Art. 6, 8, and 10) as follows: it is the responsibility of the fuel supplier to supply the Union airport managing body (those responsible for the centralized fuel distribution infrastructure) with the minimum SAF shares required and report on the total amount of fuel and SAF supplied over each reporting period. It is the airport managing body's responsibility to facilitate SAF access to aircraft operators (airlines). It is the aircraft operator's responsibility to report on the amount of fuel uplifted from Union airports, the SAF amount purchased from each fuel supplier, and who these fuel suppliers are. Failure to supply, facilitate, and uplift the requisite SAF amount will result in fines levied onto the fuel supplier, airport managing body, or aircraft by the Member State responsible as outlined in Articles 11 and 12.

To effectively implement Book and Claim within the EU, and building off the lessons learned from Book and Claim for renewable electricity, strict guiderails must be adhered to by all parties taking part in this scheme to minimize the potential for fraud as follows:

- On the physical SAF supply side: eligible fuel suppliers must work solely with trusted fuel producers belonging to a registry and report transparently on their purchased SAFs. Information reported should include the fuel producers they purchased the SAFs from as well as the purchased SAFs' quantity and quality. Fuel suppliers must also keep meticulous records of the SAFs 'booked' with them to facilitate audits. They must also report on the final destination of the physical SAFs, and the airlines who uplifted them, to avoid greenwashing and ensure the SAFs are actually consumed within a given period. Records from fuel producers must also be kept and made available for auditing to minimize fraud and double counting.

- On the Book and Claim demand side: aviation fuel suppliers or airlines looking to 'claim' SAF usage must only 'book' with trusted SAF suppliers as outlined above. In line with Article 22 of the 2023 Renewable Energy Directive and its Union database requirements, as well as Article 10 of ReFuelEU on reporting obligations, they must report meticulously on the quantity and the characteristics of the SAF supplied, its sustainability characteristics, including their life-cycle greenhouse gas emissions, starting from their point of production to the moment they are placed on the market in the Union, and the origin of the feedstock used in the production of SAFs. Elements of Book and Claim must be incorporated into existing reporting requirements, for example, reporting on the quantity and origin of 'booked' SAFs. The SAF would only be eligible for 'claiming' and counted towards the ReFuelEU targets if it adheres to the sustainability guidelines of this regulation and if it was 'booked' with trusted partners and can be tracked all the way back to the SAF producer who made it to avoid double counting.

- Aviation fuel suppliers who are 'booking' SAFs must maintain records of the final buyer of the 'claimed' SAFs to further safeguard against double counting.

- Both supply and demand side reports must be submitted periodically to independent auditors for checks and balances to avoid double counting, ensure the 'booked' SAFs are consumed on the supply side to avoid greenwashing, and make sure the 'claimed' SAFs on the demand side adhere to the minimum standard of sustainability required. On the supply side, producers and suppliers from third countries must be willing to make their records public and auditable if they want to take part in the EU's Book and Claim scheme.

ReFuelEU Aviation Article 15 on Flexibility mechanisms

Box 2

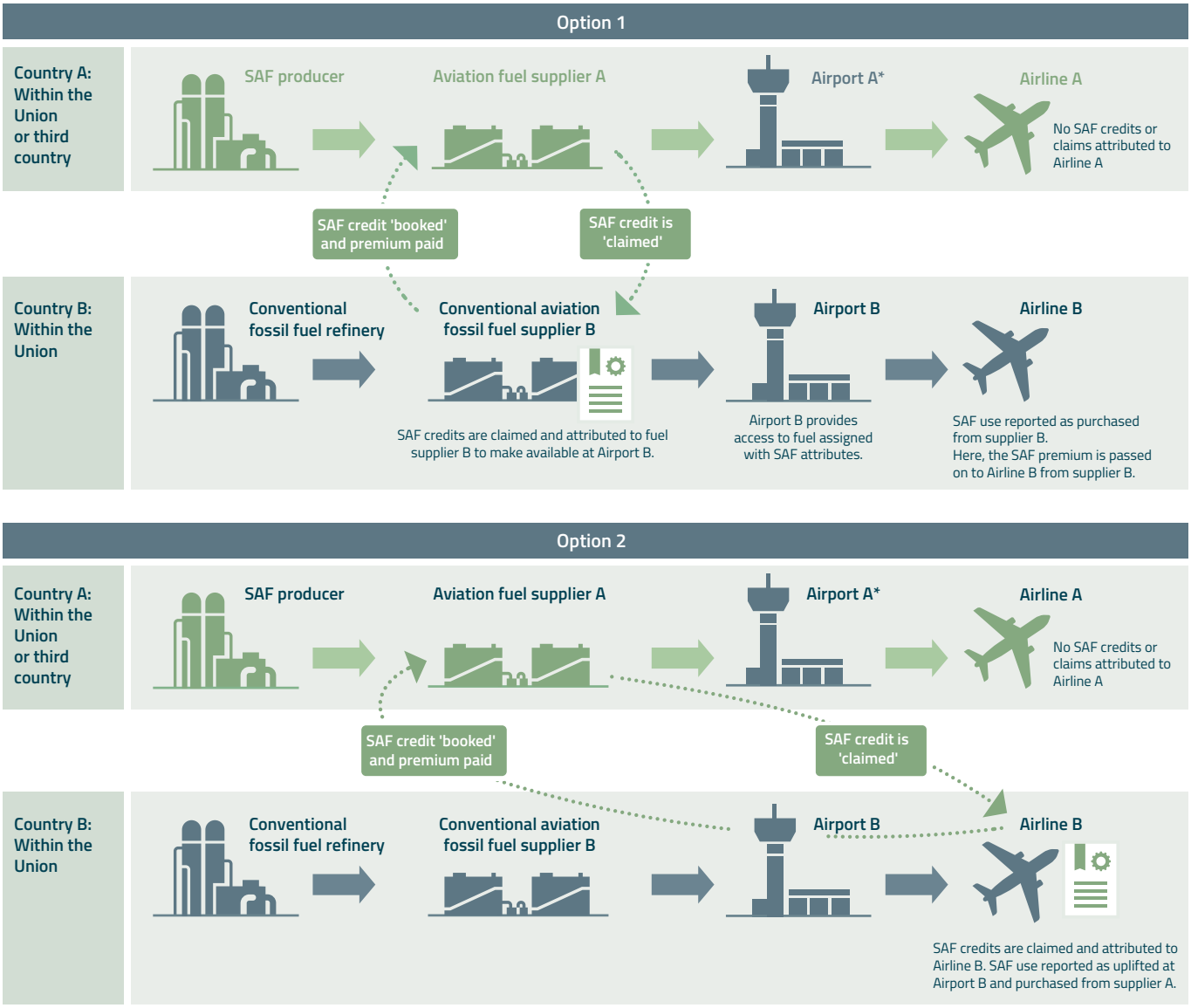
"1. By way of derogation from Article 4(1), from 1 January 2025 until 31 December 2034, for each reporting period, an aviation fuel supplier may supply the minimum shares of SAF defined in Annex I as a weighted average over all the aviation fuel it supplied across Union airports for that reporting period.

2. By 1 July 2024, the Commission shall identify and assess the developments on SAF production and supply on the Union aviation fuel market as well as assess possible improvements or additional measures to the existing SAF flexibility mechanism referred to in paragraph 1, such as setting up or recognizing a system of tradability of SAF to enable fuel supply in the Union without it being physically connected to a supply site, with a view to further facilitate the supply and uptake of SAF for aviation during the flexibility period.

Such a possible system, incorporating elements of a book and claim scheme, could enable aircraft operators or fuel suppliers, or both, to purchase SAF through contractual arrangements with aviation fuel suppliers and to claim the use of SAF at Union airports.

The Commission shall present a report to the European Parliament and to the Council setting out the main findings of the evaluation carried out pursuant to this paragraph and accompanied, where appropriate, by a legislative proposal."

Is there an opportunity for the Book and Claim system in ReFuelEU Aviation?



*Airport A will be supplied with fuel from both conventional aviation fuel producers (not depicted here) and SAF producers, and final fuel supplied to airline A would be a mix of SAF and conventional fuel.

A hypothetical case for Book and Claim in the EU based on Option 2 in Fig. 1

Box 3

If Book and Claim were to be utilized as a flexibility mechanism within the Union, how would such a scheme work in reality? Take one of the global leading SAF producers, Neste, whose SAF is already available at EU airports such as Frankfurt (Germany) and Schiphol (the Netherlands). Neste production sites, however, are concentrated in Finland, Rotterdam, and Singapore. Through the establishment of a Book and Claim system, airlines connected to some of the EU's busiest hubs, such as Paris' Charles de Gaulle (CDG), but without access to nearby SAFs, could enter into a contractual agreement with the fuel supplier based in Rotterdam which has access to Neste SAFs, a trustworthy SAF producer, pay the premium for their SAF, and 'book' it. On the supply side, this transaction is then recorded by the fuel supplier in Rotterdam and attributed to the buyer, for example, by an airline in Paris CDG, in line with Option 2 in Fig. 1, who 'claims' it. The SAF attributes are then associated with this airline that 'booked' it, paid for it, and can 'claim' it. As part of their reporting obligations, the airline in Paris will report on the SAF purchased, and from whom, which will help keep track of the SAF flow and minimize double counting. In line with ReFuelEU Aviation, this SAF is then reported by the airline as uplifted at CDG airport. However, the SAF is physically supplied to the closest airport to the refinery where it is produced. For example, if it is produced in the Rotterdam refinery, then the SAF can be supplied to Schiphol which minimizes transport costs and emissions compared to having this SAF transported to CDG. Records from fuel producers and suppliers supplying the physical SAFs are made public and provided to an EU independent monitoring authority for auditing and are checked against SAF purchases reported by the airlines to minimize double counting on either side.

Recommendations to develop an effective Book and Claim system

Book and Claim is a useful measure for SAFs, as they are not always likely to be produced where they are consumed. Book and Claim, when implemented with a rigorous verification process and combined with other policy levers, can catalyze SAF development within the EU and third countries where there is abundant access to clean electricity and sustainable carbon sources, or sustainable feedstocks, for their production. The Book and Claim system adds flexibility to SAF development and deployment that otherwise may be limited by geographic and/or resource constraints. This system could support the creation of a market for SAF producers and stakeholders willing to pay a premium for these fuels in return for certificates attributing their benefits to said stakeholders. Additionally, as supply remains constrained within the EU in, this system could help alleviate the pressure of meeting ReFuelEU Aviation's later-stage targets by being able to claim the use of SAF without having it physically onboard a flight, or even within Union territory.

As EU SAF demand outpaces production capacity, especially past 2030, fuel suppliers will have to look to imports to close the deficit. Book and Claim can help make ReFuelEU's targets more achievable by creating a marketplace for SAF tradability unbound by physical supply constraints. However, to maximize the impact of such a flexibility tool, strict guiderails must be adopted to regulate its implementation and maximize its efficacy. Future Cleantech Architects recommends the following:

1.Implement a harmonized SAF sustainability standards and certification process

- Currently, SAF production happens in a variety of ways: whether producing biofuels or synthetic fuels. Synthetic fuels require clean electricity and sustainable carbon sources, such as from Direct Air Capture (DAC). Biofuels can be 1st, 2nd, or 3rd generation, based on the feedstocks used to produce them, and thus vary in their GHG savings potential. To maximize the emissions reductions from SAFs:
  - When utilizing Book and Claim, all Member States must agree and adhere to a unified minimum standard of sustainability based on the fuel's lifecycle GHG emissions, as well as additional criteria such as indirect impact on land use change and feedstock origins in the case of biofuels, as outlined in ReFuelEU Aviation and the Renewable Energy Directive. This ensures that the SAF 'claims' match the requirements of ReFuelEU Aviation, for example on permitted feedstocks for biofuels, and can be counted towards this regulation's targets.
  - An EU-wide, harmonized certification process, based on the above-mentioned sustainability criteria must be developed and standardized for SAF eligibility and usage. Eligible SAFs provided by trusted fuel producers and sold by trusted fuel suppliers can then be accounted for and allocated to the organizations that paid the premium on them. These eligible SAFs, purchased under a Book and Claim scheme, are then counted towards ReFuelEU Aviation's targets. This approach should also extend to third country providers seeking to participate in the Book and Claim system.

2. Implement a SAF trusted partners registry

- It is crucial that each Member State works solely with certified, trusted partners, both in the EU and from third-party countries. To this end, a registry of trusted fuel producers must be set up and made accessible across the Union. The fuel produced must be monitored, reported, and verified daily, both for sustainability criteria and quantity produced, to avoid double counting.

3. Incorporate Book and Claim as a flexibility tool in ReFuelEU

- As an initial step, based on the results of the undergoing EC assessment due in July 2024 and the two options detailed out in Fig. 1, a Book and Claim system should be incorporated as a delegated act in the ReFuelEU Aviation regulation. This will ensure that Book and Claim becomes an EU-wide recognized mechanism targeted at helping to reduce the aviation sector's emissions by increasing SAF accessibility within the Union. To minimize dependence on such a scheme, the EU framework could include a cap on eligible SAF quantities that count towards the targets, if purchased through Book and Claim.

4. Adopt policy mechanisms to support Book and Claim schemes on a Member State level

- Member States should incorporate Book and Claim into their legal framework and their national reporting database (which contributes to the Union database), as detailed above in the guiderails for the effective implementation of a SAF Book and Claim scheme, with clear provisions on its use. This will help ensure that SAF purchases made through a Book and Claim scheme with trusted partners will count towards the SAF targets outlined in ReFuelEU Aviation. Additionally, this will help promote Book and Claim's effective utilization as a tool to help reduce aviation emissions by increasing each country's access to credible SAF credits, especially for countries within the EU with high air traffic and low SAF production capabilities.

5. Monitor and leverage current Book and Claim schemes

- EU Member States should keep track of and leverage findings from current Book and Claim pilot projects such as the RSB Book and Claim System or Neste Impact, amongst others, to ensure that they are maximizing this mechanism's potential. For example, the RSB system includes extensive SAF traceability rules and independent auditing measures to ensure maximum emissions savings and avoid double counting.

6. Develop and enact a harmonized EU Book and Claim framework

- Member States should report on these pilot projects, identifying benefits and roadblocks or limitations, such as the ease of access to a harmonized certification scheme for the sustainability of the fuels. These reports from Member States should feedback to future EC reports on the implementation of the ReFuelEU regulation, which will be produced every four years, starting from January 2027, and are responsible for assessing additional measures to improve SAF supply and production in the EU. Their findings should help in progressively harmonizing the Book and Claim framework across the Union.

Additional resources:

FCA's The Basics & The Gaps factsheet and video as well as articles on aviation are available here: The Basics & The Gaps Aviation

About Future Cleantech Architects:
We are a climate innovation think tank. We exist to close the remaining innovation gaps to reach net-zero emissions by 2050. To reach this objective, we accelerate innovation in critical industries where sustainable solutions are still in very early stages.

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