BRIEF

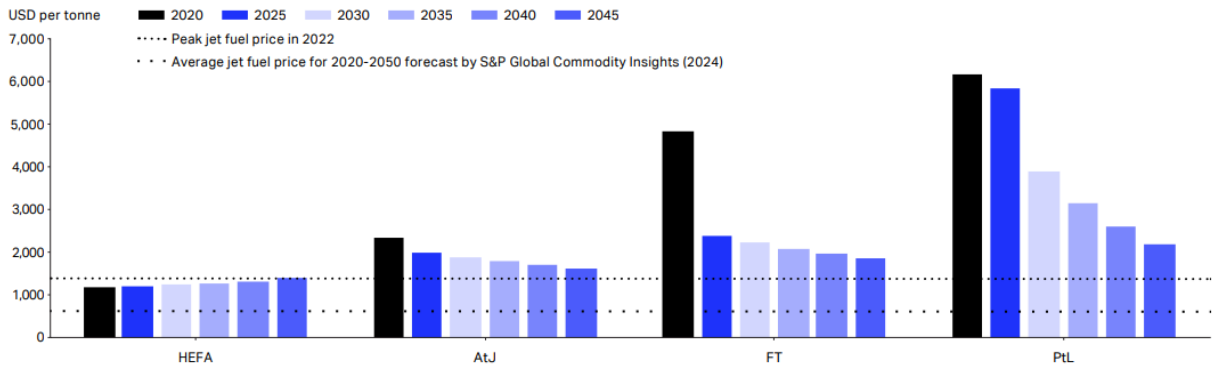
SAF procurement: Pricing options for different strategies

Introduction

While the higher price of sustainable aviation fuel (SAF) remains one of the main impediments to its broader scale-up, it is generally assumed that economies of scale will bring about competitive prices as more producers come online and more supply is available to meet growing demand. This process of reducing supply constraints in the market is complex in the case of SAF. The SAF price reflects more distinct production costs and add-on costs than conventional aviation fuel (CAF), introducing new intricacies to airlines' fuel cost forecasts.

IATA's recently updated Net Zero 2050 Finance Roadmap[1] models minimum selling prices (MSP) for SAF produced using different pathways, and provides an assessment of the possible evolution of the costs of air transport's energy transition. It is important to note that the price that airlines pay for SAF (and for fossil jet fuel), in addition to the production costs, incorporates add-on costs such as a market premium, logistics, certification, transaction-related costs, and markups throughout the supply chain. These add-ons may vary significantly: in 2024, the difference between production cost and market prices (the market premium) in Europe reached as high as around 1000 USD/tonne[2] of HEFA[3] SAF. However, SAF prices fluctuated throughout the year, and this number is but one snapshot of a market that is at its very first beginnings and hence lacks transparency in terms of deals and prices paid. Robust policy support will be critical to ensure the scale-up of SAF production and its deployment by helping to bring about reduced production costs and greater competition.

Chart 1: IATA average minimum selling price (MSP) of major SAF pathways per five-year period over 2020-2050, USD per tonne (does not consider additional market costs)



[1] https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/finance-net-zero-roadmap.pdf
[2] https://www.argusmedia.com/en/methodology/key-commodity-prices/argus-european-saf
[3] HEFA: Hydrotreated esters and fatty acids, the most widely used pathway to produce SAF currently

Adopting the right strategies for SAF procurement will require an understanding of the interplays between technologies, feedstocks, policy, and risk allocation. This Brief is a practical resource for fuel buyers and finance departments embarking on their SAF journey as it describes the initial considerations for the type of SAF purchase agreement an airline might opt for, the currently available pricing options, and how to facilitate the adoption of SAF procurement strategies.

Initial considerations

The fundamental question that every airline must answer before embarking on SAF procurement is: **why are we buying SAF?** Unlike the response for CAF ("to fly our aircraft"), there are several possible reasons for buying SAF, including regulatory compliance, corporate strategy, shareholder requirements, and customer demands.

These reasons will determine the types of SAF to be procured, including feedstock and/or pathways used, any target emissions reduction factor, the specific regulation to be complied with (if any), and whether the SAF should be supplied in neat or blended form. The purpose will also influence the decision regarding acceptable points of delivery, timelines, and length of the supply contract, as well as whether the transaction is motivated exclusively by the claiming of the environmental attributes associated with the SAF purchase, using a book & claim approach. IATA's SAF Handbook for Airlines[4] provides information that helps answering these questions.

Once the purpose of the SAF purchase and other operational considerations have been defined, the SAF procurement process can begin. Then, two remaining areas must be addressed to narrow down the scope of negotiation: defining a **SAF procurement strategy**, and selecting the **pricing methodology** that best matches the strategy.

SAF procurement strategies & available pricing options

If the purpose for buying SAF is to start exploring what the market looks like via a test flight or program, a near-term supply contract should be sought, with very specific delivery dates and a relatively low volume. A near-term supply contract could also be for regular SAF uplift during a defined contract tenure, much like a typical CAF supply contract. Offtake agreements specify conditions for SAF to be delivered in a future period. Finally, airlines – usually via a venture company – may also seek to invest in an equity stake in a SAF supplier. Each of these possibilities has differing **degrees of risk** as well as **pricing options**, to which we turn below.

Table 1: Overview of contract timelines and pricing options

Timeline	Examples	Pricing options
Near-term	One-off or annual contract	CAF or SAF index
Long-term	Offtake agreements	Cost-of-production or Cost-plus
Strategic commitment	Equity stake	Unspecified

[4] https://www.iata.org/contentassets/d13875e9ed784f75bac90f000760e998/saf-handbook.pdf

Near-term supply

We refer to near-term supply when the SAF is supplied in the near future, either as a one-off batch delivery, which could be classified as a spot buy, or over a short tenure (e.g., for one year). The procurement process in this case is likely to involve a tender to comply with the necessary internal governance requirements.

In this case, the pricing structure of the SAF negotiated and agreed upon between the airline and the supplier would tend to mirror the pricing methodology used for CAF (see box below). It could be a **CAF price index with a SAF premium** applied, or a **SAF price index**. The CAF price index and SAF price index are provided by a price reporting agency (PRA) such as Argus Media ("Argus") or S&P Global Commodity Insights ("Platts") for specific trading markets, e.g., the US West Coast, Northwest Europe, Singapore, and others.

How does jet fuel pricing work?: An example

Airports where the jet fuel supply market is competitive usually have transparent pricing. One such example is the airport of Panama City, in Panama (PTY). As most airports in Latin America, the reference trading hub to determine the price of the product is the US Gulf Coast (USGC).

Once the fuel has been purchased by the supplier at the reference trading hub, it must be shipped to the destination (in the case of PTY, from Houston to the ports of Colon or Howard in Panama). The supplier will use intermediate storage at the port, land transport (bridger trucks for PTY), and on-airport storage, before being able to uplift to aircraft by an into-plane service agent. All the costs and markups that are added to the fuel cost along the journey to the wing, are ultimately paid by airlines.

Consequently, the price airlines pay for fuel supply is generally determined using the following structure:

PRA assessment (average of prior period) + logistics costs + additional fees + supplier's margin

Where the period is defined by the specific logistics needed to supply fuel at the destination: it could be that the fuel would typically take two weeks to arrive from origin to destination, for example, and prices would be updated fortnightly in that case.

SAF premium added on to a CAF price index: The agreed SAF price is based on a published CAF price index, to which is added an agreed premium, providing consistency with conventional aviation fuel pricing. The advantage of using a CAF index as the base price is that it allows airlines to extend their ongoing fuel price hedging practices also to SAF. On the downside, the SAF premium is often higher than under pricing options available for long-term offtake agreements. In the following examples, prices for shipments from Singapore are used, with an option to apply a SAF premium to the CAF price index either as a percentage or as a fixed number. The extra add-ons typically refer to costs of logistics and applicable fees. In the cases below, "Argus FOB[5] Singapore" would reflect prices assessed for jet fuel to be exported at the port of Singapore for use, for instance, in Hong Kong:

- Argus FOB Singapore (average of prior period) + **x% of Argus FOB Singapore (average of prior period)** + add-ons; or

[5] **Free on board: Exclusive of any freight and insurance costs, which are to be borne by the buyer. FOB is typically applicable to net export ("long") markets.**

- Argus FOB Singapore (average of prior period) + **fixed US cents per gallon** + add-ons

SAF price index: Given the complex nature of SAF pricing, Argus and Platts publish comprehensive methodologies and pricing assessments for HEFA-based SAF, which are trading assessments based on actual transactions at specific trading markets. Using this pricing option, a contract for SAF supply at Frankfurt airport could be based on observed traded prices at the Amsterdam-Rotterdam-Antwerp (ARA) trade hub ("Platts CIF[6] ARA"):

- Platts CIF ARA (average of prior period) + add-ons

Price reporting agencies base their assessments on data collected from a wide range of market participants, including producers, consumers and intermediaries, also considering information obtained from electronic trading platforms. The data includes transactions, bids, offers, volumes, parties involved, specifications, and other information contributing materially to price determination – which must meet the requirements established in the methodologies[7][8] set by each PRA. Historically, fuel suppliers and airlines have relied on these assessment as basis for most of their fuel supply contracts.

The IATA Net Zero 2050 Policy Roadmap[9] highlights the need for cost and trading value transparency as a critical driver in the transition to SAF. Such transparency would enable more informed decision-making, encourage fair pricing, and foster collaboration to reduce carbon footprints. It would also build trust, ensuring that the move toward renewable energy is economically feasible, benefiting both the environment and the industry's long-term viability. However, given that much of the SAF purchased in the future could be on the basis of long-term offtake agreements and/or equity stake investments, a significant portion of the market is likely not covered in PRA price assessments.

Long-term offtake

Long-term offtake agreements are typically negotiated between the airline and a SAF producer looking to invest in a new or additional SAF production facility, referring to supply further in the future (e.g., in 3 to 5 years) and for a longer tenure (e.g., 5 to 10 years).

While the same pricing structure for near-term supply could be used for future supply agreements, **cost-of-production** and **cost-plus pricing** could also be agreed-upon structures. The longer-terms involved also encourage producers to accept narrower margins. In these two models, however, more risk is passed to the buyer who would absorb variations in feedstock price or other operational costs incurred by the SAF producer. Clauses that allow the seller to renegotiate pricing mid-contract or even yearly in a long-term offtake could also be introduced. If uncapped, this potential for price adjustment can add complexity to an airline's fuel budget, potentially leading to unforeseen costs and another layer of risk to SAF supply.

Cost-of-production: The cost of production is a type of pricing assessment also published by PRAs. It is based on the estimated ex-refinery cost, calculated from assessed price of feedstock and related costs, which may include the producer's return on investment (ROI) in the calculation. The cost-of-production aligns with IATA's MSP, explained in the introduction and illustrated in Chart 1.

Cost of production pricing is estimated based on the production yield of the renewable fuel at a biorefinery. European and North Asian prices take used cooking oil (UCO) as the feedstock; the USA-published prices use

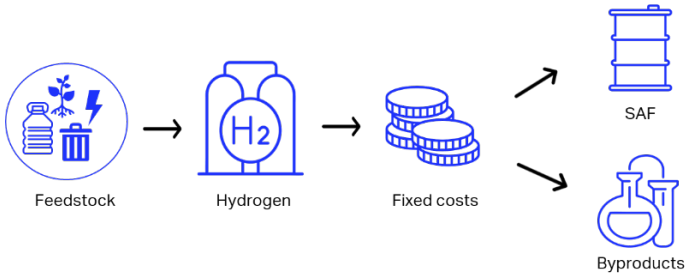
[6] Cost, insurance and freight: Inclusive of transport costs which are borne by the seller. CIF is typically applicable to net import ("short") markets.
[7] https://www.spglobal.com/commodityinsights/plattscontent/_assets/_files/en/our-methodology/methodology-specifications/platts-assessments-methodology-guide.pdf
[8] https://www.argusmedia.com/en/methodology/methodologies
[9] https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/policy-net-zero-roadmap.pdf

tallow or animal fat as the feedstock; and Southeast Asia uses hydrotreated vegetable oil (HVO) and palm fatty acid distillates (PFAD) as basis. The market price of hydrogen, an input to the SAF production process, is also included in the cost of production.

At present, due to HEFA SAF dominating the market, PRAs' assumptions are based on the HEFA production pathway's fixed costs and consider relevant feedstock price assessments produced daily. If this pricing option is used, logistics costs and a SAF premium will typically be added to make up the total SAF price.

The following is a high-level outline of the values and items that make up the cost-of-production model.

Chart 2: Cost of production items

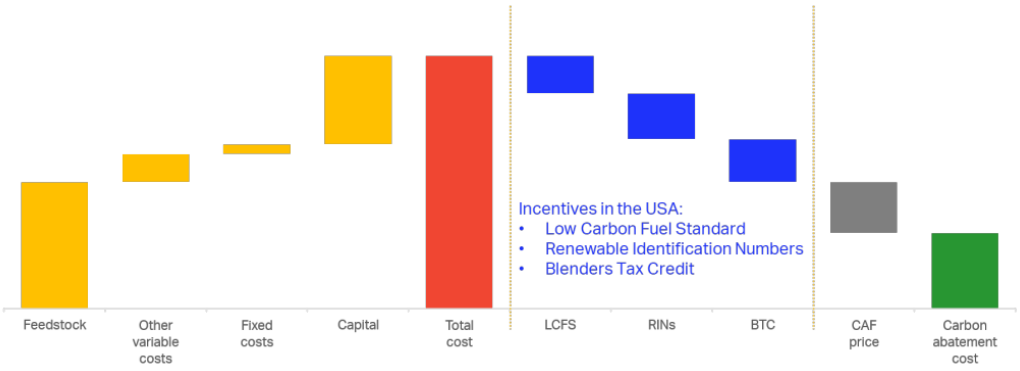


Feedstock cost, hydrogen cost, and other fixed costs are added, while revenues from byproducts are deducted. Feedstock costs are the largest cost component for a HEFA producer. Variable processing costs include items such as hydrogen, electricity, steam, and chemicals. Hydrogen is the largest cost component within the variable processing costs.

It is also worth noting that, for a producer to execute blended SAF sales, blending capability and infrastructure are required, which come with their own additional costs.

Cost-plus: The cost-plus model forecasts the total costs (feedstock, hydrogen, variable cost, fixed costs, CAPEX, and OPEX) that a supplier anticipates in order to produce the SAF required for a customer. Depending on the location and the applicability of incentives, the cost-plus model will deduct any rebates (tax credits and incentives), and the remaining value will be the "green premium" (SAF premium). For HEFA-based SAF, the example below provides an indicative illustration of a cost-plus pricing model with incentives.

Chart 3: Cost-plus pricing model for HEFA (with US incentives[10])



[10] The Blenders Tax Credit (BTC) will be replaced by a Clean Fuel Production Credit (CFPC) starting 2025

This model is becoming more popular with suppliers due to the risk profile favoring the seller. In this case, the cost fluctuation of items such as feedstock and hydrogen will be passed from seller to buyer. In some instances, this could represent a significant shift in pricing if feedstock market price conditions change.

However, from an airline's perspective, one advantage of this model is the ability to diversify the risk between CAF and SAF, providing potential reassurance about the benefits of these pricing scenarios. It is important to note that managing feedstock market fluctuations will remain challenging until the market reaches some degree of maturity.

It is also important to note that the values presented to the buyer by the seller may not be transparent. Any contract should include strong transparency provisions regarding fluctuating costs to ensure cost management and promote a win-win partnership. Diversifying feedstock usage in these contracts could be another way to mitigate the fluctuation risk.

The latest version of IATA's Aviation Fuel Supply Model Agreement (AFSMA)[11] provides more details regarding SAF clauses that should be added to agreements to protect buyers. This valuable resource for airlines offers a comprehensive guide for navigating the complexities of SAF contracts.

Equity stake investment

An equity stake is a strategic investment airlines can introduce into their business model and SAF strategy. It entails an airline purchasing a ownership interest in a SAF refinery. Such ownership can ensure access to future supply and offer preferential pricing. As such, the buyer gains enhanced control over the supply chain.

It goes without saying that investing in fuel production represents a new, equity, risk to the airline, the sum of which can be lost if the project were to fail. As such, it is an option reserved for the few airlines that have balance sheets and resources commensurate with endeavors of this sort.

Some airlines have chosen to take an equity stake with suppliers to ensure SAF supply and safeguard access to feedstock in the short to medium term. Given the nature of these agreements, the parties could use very different pricing methodologies than those discussed earlier in this document, including CAF parity, for example.

Conclusion

Adopting SAF is crucial for the aviation industry's transition to a low-carbon future, but its implementation remains challenged by complex pricing mechanisms, high production costs, and other logistical considerations. While economies of scale may eventually reduce the cost of producing SAF, the intricate cost structures, including feedstock variability, production expenses, technology restrictions, and additional market premiums, create uncertainties in airline fuel budgets.

To navigate this new landscape effectively, airlines must adopt tailored **procurement strategies based on their objectives**, considering the **risk profile** that different pricing models will expose the buyer to**. Pricing methodologies**, including cost-of-production and cost-plus models, provide insight into the current market pricing. However, true cost transparency is still lacking and the complete risk profile faced by airlines remains opaque. To overcome this, robust policy support, collaborative efforts between all parties in the value chain, and transparent agreements are essential to scaling SAF production.

[11] **https://www.iata.org/contentassets/ebdba50e57194019930d72722413edd4/afsma-ed-5.1-july-2023f.pdf**

Although the SAF market is still in a nascent stage, it is quickly evolving, and more pricing options may become available in the future. IATA will update this document as substantial developments may occur.