2026

SAF MARKET OUTLOOK

By SkyNRG and ICF

Foreword

Maarten van Dijk
CEO - SkyNRG

We are proud to present the sixth edition of SkyNRG's Sustainable Aviation Fuel (SAF) Market Outlook, developed for the second consecutive year in close collaboration with ICF.

The SAF Market Outlook started in 2020 as an internal document to guide our long-term strategy. We were in the early development phase of DSL-01, our first SAF production plant based on HEFA technology, and exploring opportunities to develop additional plants using advanced biomass and e-SAF pathways. We decided to make part of our Market Outlook analysis publicly available to contribute to the general understanding and the momentum of the SAF industry.

Fast forward to today: the SAF market is maturing with EU and UK mandates now in force, providing the long-term demand certainty needed to scale supply. SkyNRG started construction on DSL-01 earlier this year, marking an important step in our transition to becoming an owner and operator of SAF production capacity.

The annual Market Outlook continues to guide our strategy and decision-making. This year, the analysis underscores the continued need to diversify feedstocks and technologies as the market scales rapidly, driven by regulation as well as macroeconomic trends reinforcing the strategic case for SAF. Robust policy frameworks and targeted support for offtakers, technology developers, and infrastructure players are essential to keep SAF growth on track.

Dan Galpin
Global Aviation Lead - ICF

It has been our pleasure to continue working with SkyNRG on this flagship SAF Market Outlook report.

The SAF market entered a new phase in 2025. With mandates now in force in the EU and UK, and more countries advancing policy frameworks, the market is moving from early voluntary uptake toward compliance-led demand. The results of this are clearly seen in the SAF Market Outlook Report in which global SAF supply is estimated to have doubled again in 2025.

In the current geopolitical context, SAF is increasingly relevant as an energy resilience lever, helping countries reduce exposure to imported fossil fuels where production can be built around domestic resources. However, scaling a new fuel market at this pace has also exposed practical challenges around pricing transparency, cost passthrough and documentation. Continued policy support will be needed to ensure the market scales sustainably, with investment flowing into the advanced pathways required beyond HEFA.

The SAF Market Outlook remains an important reference for the SAF community. It has been a privilege to collaborate with SkyNRG on this report and to continue supporting the development of a scalable, resilient and sustainable aviation fuel market.

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Reading guide

Within the Sustainable Aviation Fuel (SAF) industry, a variety of terms are used for policies and demand drivers. In this report we use the following definitions: 1. Policy-driven demand, made up of 1a: **Mandates:** policy enforced with legislation and penalties; and 1b: **Government targets:** legislative targets typically supported with incentives, e.g., Japan's 10% SAF target by 2030. 2. **Voluntary market:** made up of Aircraft operator and corporate commitments, e.g., KLM, DHL or Microsoft.

Executive Summary

Introduction

2025 marked a major step change in SAF market development, as the industry transitioned from primarily voluntary uptake toward a compliance-driven market. With EU and UK mandates now in force and more countries advancing policy frameworks, regulation is providing the long-term demand certainty needed to scale supply. Supplied SAF volumes doubled again to approximately 2 Mt (0.7 Bgal) in 2025 (from 1 Mt (0.3 Bgal) in 2024), with demand expected to reach 12.8 Mt (4.2 Bgal) by 2030 under our central scenario. The rapid scale-up of mandated markets has also started to expose practical market formation challenges around pricing transparency, infrastructure, and feedstock availability, reflecting the complexities of scaling a new global fuel market at pace.

Intensifying geopolitical instability, trade fragmentation and energy insecurity are increasingly shaping how regions approach SAF development. As a result, the market is increasingly driven by diverging regional strategies. Europe is building around demand certainty and de-risking measures, the United States around incentives and protectionism, while Asia is rapidly scaling production capacity through industrial policy. Vulnerabilities in fossil fuel supply chains are accelerating these trends and reinforce the strategic case for SAF, which, when produced from domestic resources, can strengthen resilience and reduce exposure to imported fossil fuels.

As the market is scaling rapidly, the need to diversify feedstocks and technologies is becoming harder to ignore. While on paper, projected capacity appears sufficient to meet 2030 demand, the industry still relies heavily on HEFA, with nearly 85% of announced capacity linked to feedstocks already under pressure from other sectors. Updated assumptions point to somewhat higher long-term feedstock availability compared to last year's estimate, but competing demand from road transport is a key limiting factor. Feedstock availability is also unevenly distributed, e.g., with Europe already highly dependent on imported waste lipids for biofuel production. Without diversification beyond HEFA, the sector risks trading one energy dependence for another, reinforcing the need to diversify both feedstocks and technology pathways to support long-term scalability and regional energy resilience.

Recent project milestones demonstrate that next-generation SAF pathways can operate at commercial scale, marking important progress toward diversification beyond HEFA. However, a significant gap remains between ambition and project execution, with progress on advanced pathways still too slow to support long-term growth targets. In Europe and the United States, projects continue to face delays linked to permitting and insufficient policy de-risking, while countries such as China are moving more rapidly to scale industrial capacity through coordinated industrial policy and state-backed deployment. Unless commercialization frameworks accelerate, these delays risk constraining post-2030 supply growth, meaning aviation stays stuck on fossil fuels longer.

Global SAF Market

Global SAF demand is expected to grow from around 2.1 Mt (0.7 Bgal) in 2025 to 3.0 Mt (1.0 Bgal) in 2026, reaching 12.8 Mt (4.2 Bgal) by 2030 under the *Current Trends* scenario. While this represents a downward revision from last year's outlook, primarily driven by weaker short-term demand expectations in the United States, confidence in longer-term demand materialization has improved across other regions as various SAF policies move closer to implementation. Europe continues to lead near-term compliance demand through binding mandates, while countries including Indonesia, South Korea, Singapore, Japan, Australia, and Brazil continue advancing policy frameworks, supporting broader market expansion.

Approximately 5 Mt (1.7 Bgal) of projected 2030 demand is linked to mandates already in force or confirmed, with roughly a further 3 Mt (1.0 Bgal) expected from countries likely to implement mandates over time. The remaining 5 Mt (1.7 Bgal) is expected to come from regions without binding mandates, where uptake depends on policy targets and incentives, alongside airline commitments, corporate Scope 3 demand and broader voluntary action.

Around 60 airlines have committed to using at least 10% SAF by 2030, representing approximately 13 Mt (4.3 Bgal) of potential voluntary demand. Growing corporate demand for SAF claims continues to play an important role in driving demand beyond the regulatory minimum. However, realizing this non-mandated demand remains dependent on willingness to pay supported by incentives, robust accounting frameworks, and willingness to engage in long-term offtakes. As a result, the key challenge is not the availability of SAF supply itself, but mobilizing sufficient bankable corporate offtake commitments, alongside broader voluntary demand, to support the financing of new production capacity.

Expected global SAF capacity in 2030 increased by 0.4 Mt (0.1 Bgal) to 18.5 Mt (6.1 Bgal), broadly in line with last year's Market Outlook. While announced capacity continues to grow, particularly in Asia, the near-term demand-supply outlook remains fragile. Projected SAF capacity appears sufficient to meet 2030 demand, but temporary overcapacity before 2030 may weaken SAF price signals, put pressure on producer margins, encourage flexible producers to shift output towards renewable diesel or even risk cancellations.

Beyond 2030, demand growth quickly overtakes the current capacity outlook, with SAF demand expected to nearly triple to around 47 Mt (16 Bgal) by 2035. This makes the near-term period critical for project development. While RD switching and co-processing could provide some flexibility, the HEFA tipping point is still expected around 2030, reinforcing the urgency of commercializing and scaling alternative pathways.

The pipeline of advanced SAF projects has grown, supported by stronger policy focus and emerging de-risking mechanisms, however, progress remains too slow. While the e-SAF pipeline improved with 0.8 Mt (0.3 Bgal) compared to last year's estimate, commercialization of AtJ and Bio-FT pathways saw limited progress. More broadly, regulatory and financing frameworks are still insufficient to adequately de-risk first-of-a-kind advanced fuel projects and mobilize private capital at scale. Without faster project delivery and commercialization support, the industry risks hitting a post-2030 supply wall.

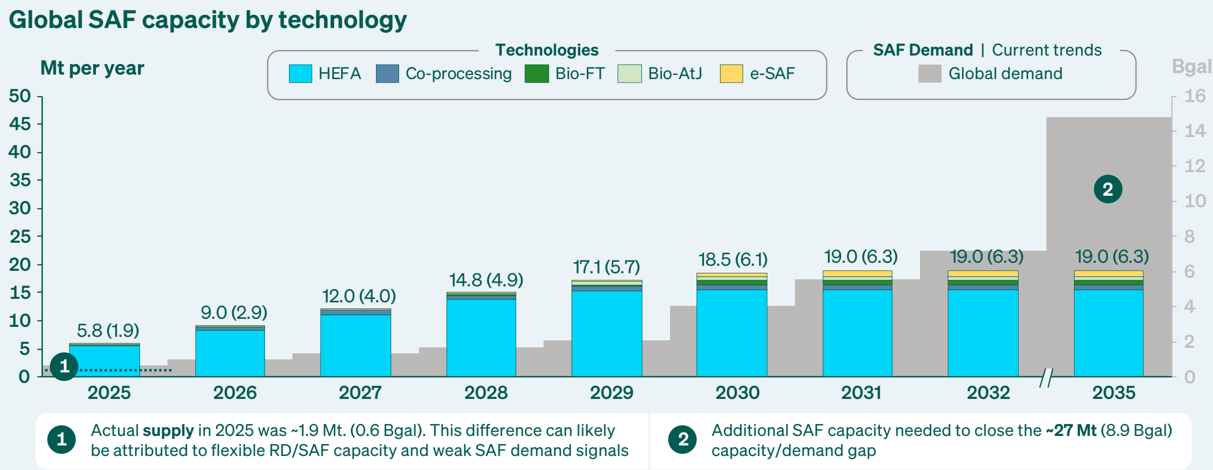


Figure 1: Global SAF capacity and demand balance is expected to yield a supply gap from 2032

Regional SAF Market Trends

Europe

→ **Europe retains its position as the main SAF demand center through binding mandates under ReFuelEU Aviation and the UK SAF mandate**, creating the clearest long-term demand visibility globally. In parallel, policymakers are increasingly complementing mandates with investment support and de-risking mechanisms aimed at accelerating commercialization of advanced pathways, including the EU Sustainable Transport Investment Plan, the UK Revenue Certainty Mechanism, and broader industrial and energy security initiatives under frameworks such as AccelerateEU.

→ **Post-2030, Europe's energy resilience will depend on its ability to diversify beyond HEFA** toward pathways better aligned with its resource availability. E-SAF and advanced biofuels could help maintain domestic refining capability, repurpose existing infrastructure, and reduce exposure to imported fossil fuels and feedstocks as conventional refining capacity continues to decline.

→ **At the same time, Europe remains structurally exposed to imported feedstocks and fuel supply chains.** While regional SAF capacity continues to expand, the market risks becoming increasingly reliant on imports of waste-based feedstocks and e-SAF for compliance in the early 2030s. Operational and planned HEFA capacity already exceeds domestic waste oil availability. This creates growing exposure to global trade flows at a time when domestic feedstock availability remains limited and geopolitical tensions are increasing.

North America

→ **In the United States, SAF market development continues to be shaped by a layered policy framework** combining federal incentives, state-level fuel standards, and support for domestic agricultural supply chains. However, recent policy developments have further strengthened the relative attractiveness of RD over SAF. While biofuels continue to benefit from strong support through mechanisms such as the RFS, recent updates to the 45Z credit and related guidance have weakened the near-term business case for SAF relative to RD and increasingly favor North American crop- and waste-based feedstocks. Increased federal biofuel blending obligations further strengthen demand for RD, but this can support SAF in the long-term.

→ **As a result, several producers appear to be shifting focus back toward RD, where margins and policy support remain comparatively stronger**, while SAF demand expectations and project momentum have softened relative to last year's outlook. Nevertheless, projected US SAF capacity still exceeds domestic demand through much of the outlook period, positioning the country as a potential exporter of SAF volumes, particularly advanced fuels and e-SAF needed to support European compliance markets. This situation, combined with ample regional fossil fuel supply, makes the US comparatively less exposed to fuel import vulnerability than Europe or Asia.

Asia

→ **Asia has rapidly emerged as the largest source of announced SAF production capacity**, overtaking the United States in this year's outlook. China in particular is accelerating deployment through strong industrial policy support, streamlined permitting, and rapid project execution across HEFA and emerging SAF pathways. At the same time, several Asian countries have continued moving further along the SAF policy development path, with growing momentum around mandates, blending targets, and national roadmaps.

→ **Countries that historically exported waste oils and biofuel feedstocks are increasingly seeking to move up the value chain toward domestic refining and SAF production**, marking a broader strategic shift across the region. Export controls on feedstocks introduced or considered in countries such as China, Indonesia, and Malaysia reinforce this trend and could materially reshape future SAF and feedstock trade flows. This may provide these Asian markets with greater runway to scale HEFA relative to regions more dependent on imports.

→ **However, Asia's current feedstock advantage is unlikely to be sufficient on its own over the longer term.** As aviation demand and domestic biofuel consumption continue to grow, long-term resilience will require diversification beyond HEFA. Advanced biofuels based on agricultural residues and e-SAF pathways are therefore likely to become increasingly important. Once again, China appears to be moving faster than other regions in commercializing new technologies and industrial capacity, potentially positioning Asia strongly for a post-HEFA market.

Rest of World

→ **SAF policy momentum is increasingly expanding beyond the major established markets, with several countries advancing new mandates, roadmaps and industrial strategies** linked to energy security and domestic value creation. Brazil continues to emerge as a key future SAF producer supported by strong legacy biofuels infrastructure and an evolving policy framework, while momentum is also growing in Australia, having just announced A$1.1 billion in supply-side support, and confirmed intent to introduce a demand-side mechanism. While in several of these regions, SAF is recognized as a tool to strengthen fuel security, create domestic industrial value, and reduce dependence on imported fuels, they also remain reliant on HEFA and first-generation feedstocks, creating potential tensions between energy security, food systems, and sustainability objectives if advanced pathways do not scale over time.

SAF Demand

How much SAF is needed to meet policies, targets and ambitions globally?

Introduction

SAF demand is increasingly shaped by energy security and industrial strategy, alongside aviation decarbonization. The disruption to oil markets through the Hormuz crisis has increased awareness of the role SAF can play in improving energy resilience, supplementing national supplies with fuel produced from domestic feedstocks and refineries. This reinforces national initiatives to capture more domestic value by moving up the value chain from feedstock production and collection to SAF refining, while creating new markets for farmers, feedstock suppliers and industrial communities. This is leading to more complex policy approaches, for example, differences in mandate design, eligible pathways, support mechanisms, and the treatment of domestic production versus imports.

For this outlook, SAF demand has been grouped into 2 categories:

1. **Policy-driven demand**, which includes direct compliance demand created by mandates, and policy-enabled demand, where mechanisms reduce the cost premium of SAF relative to fossil jet, thereby encouraging additional uptake and helping to meet national targets.
2. **Voluntary demand**, which refers to SAF purchases made without a direct legal requirement, e.g., by corporates or airlines going beyond compliance to meet decarbonization commitments.

In practice, these categories often overlap, as voluntary actors are also more likely to purchase SAF in markets where policy incentives improve its economics.

Forecasting SAF demand is complicated by the rapid evolution of the policy environment, with early net-zero commitments now being translated into mandates, incentives, and contractual commitments at different speeds across regions.

Several of the policy frameworks that support SAF demand also cover other fuels, meaning that obligations or incentives may be met through SAF, renewable diesel or other low-carbon fuels depending on eligibility rules, market prices and technology availability.

This uncertainty is compounded as many mandates and targets are set as a share of jet fuel use, which itself depends on aviation activity, fleet renewal, operational efficiency improvements and the deployment of new aircraft technologies.

To reflect these uncertainties, a scenario-based approach was used.

Methodology

The ICF SAF Demand Model is built on a detailed, bottom-up assessment of global aviation activity, fleets, and fuel use. Passenger and cargo demand are forecast at a country-level, combining short-term, capacity-driven projections with longer-term, macroeconomic demand drivers. These traffic forecasts are then translated into flight activity and jet fuel consumption, taking account of fleet composition, aircraft and operational efficiency improvements, and the pace of fleet renewal. This leads to a projected jet fuel demand in 2050 of 460 Mt (152 Bgal), a roughly 4.5% increase to last year's estimate driven by a higher baseline demand in 2025, a refinement on cargo movements and expectations of a slower fleet renewal.

Existing and emerging SAF policies and targets are assessed at country-level and applied to the projected country-level jet fuel baseline to estimate future SAF demand. To reflect uncertainty around future policy development, implementation and realization, three scenarios are developed:

Existing Policies assumes SAF demand grows only to meet requirements under policies that are already legally in force, representing a lower-bound outcome with limited voluntary uptake.

Current Trends reflects delivery of targets that have been clearly committed to and are supported by policies or initiatives under development, providing a central case if progress continues broadly in line with recent momentum.

Accelerated Action assumes the introduction of additional policies and initiatives that significantly increase SAF deployment, consistent with faster progress towards aviation's net-zero objectives.

Global SAF Demand

In 2026, SAF demand is expected to increase to around 3.0 Mt (1.0 Bgal), corresponding to approximately 0.9% of global jet fuel demand, or approximately the total jet fuel demand of Vietnam. Under the central *Current Trends* scenario, global SAF demand is projected to reach **12.8 Mt (4.2 Bgal)** by **2030**, equivalent to **3.6%** of global jet fuel demand. By **2050**, SAF demand reaches 194 Mt (64 Bgal), equivalent to **42%** of global jet fuel uplift.

Under the *Existing Policies* scenario global SAF demand is projected to reach approximately 6.4 Mt (2.1 Bgal) by 2030, equivalent to a blend rate of 1.8%. Demand increases to around 67 Mt (22 Bgal) by 2050, corresponding to a global SAF blend rate of approximately 14.5%.

In the *Accelerated Actions* scenario, where SAF policy development accelerates through the introduction of additional and more ambitious measures aligned with global net-zero objectives, SAF demand could reach 265 Mt (88 Bgal) by 2050, equivalent to a global blend rate of 58%. In this scenario, SAF demand reaches 20 Mt (6.6 Bgal) by 2030, corresponding to a global blend rate of 5.8%, consistent with the achievement of the CAAF/3 objective of a 5% reduction in emissions from international aviation.

Assuming an average lifecycle emissions reduction of 70-80% for SAF, these blending trajectories correspond to emissions reductions of the jet fuel pool in 2050 of **10-12%** in the *Existing Policies* scenario, **29-34%** under *Current Trends*, and **40-46%** in *Accelerated Actions*. This highlights the need for continued SAF policy development, a focus on SAF incentivizing higher GHG reductions and also reinforces the importance of a portfolio approach to aviation decarbonization, with SAF complemented by other levers such as new aircraft technology, operational efficiency, and market-based measures.

Global policy-driven SAF demand

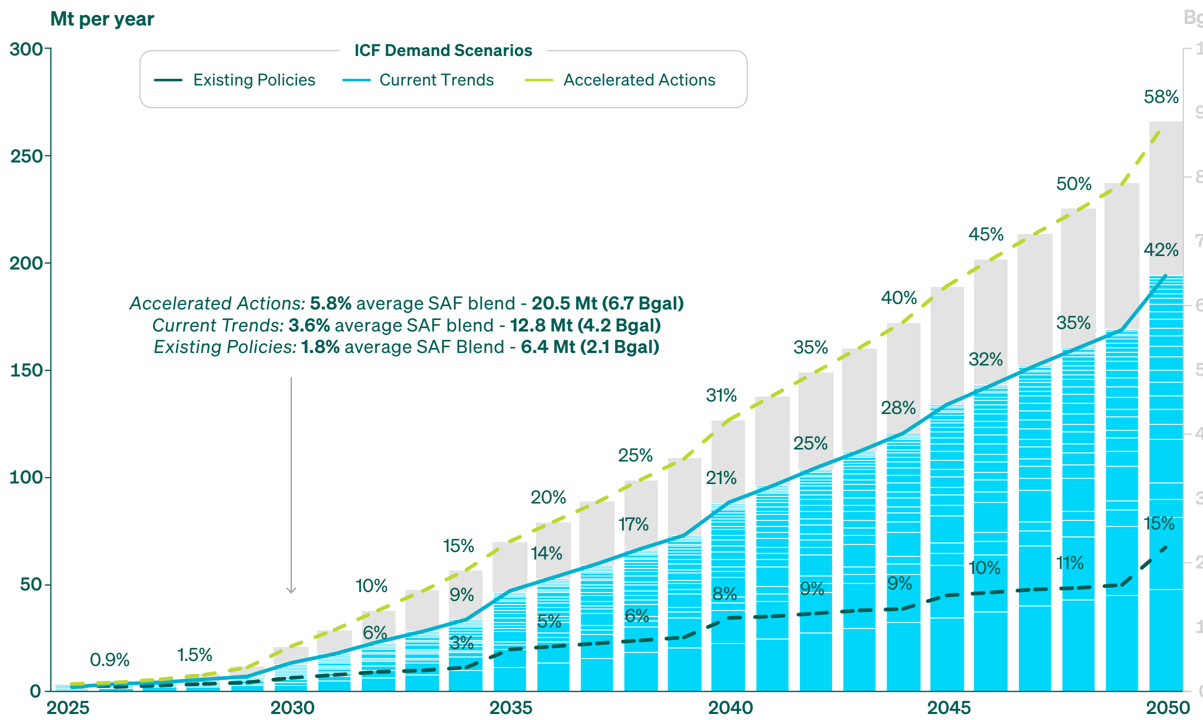


Figure 2: SAF demand is expected to reach 12.8 Mt (4.2 Bgal) by 2030 under the *Current Trends* demand scenario

These projections should also not be read as a fixed ceiling on SAF's long-term role. Modelling demand over a multi-decade period is inherently uncertain, and stronger climate impacts, energy security concerns or policy ambition could accelerate SAF deployment beyond the levels modelled. Global biofuel production was already around 114 Mt in 2024[1] and the COP30 ambition to quadruple sustainable fuels production by 2035 could expand the supply base further. As road transport electrifies, part of the existing biofuel production base, infrastructure and feedstock demand could shift towards aviation. In parallel, lower-CI and potentially net-negative SAF pathways would increase the emissions reduction achieved per tonne of fuel, reducing the physical volume needed to deliver a given decarbonization outcome.

Mandates now form the backbone of global SAF demand. By 2030, currently implemented mandates account for around 5 Mt (1.7 Bgal) of demand, with a further 3 Mt (1.0 Bgal) linked to mandates expected to be implemented before the end of the decade. These mandates remain the foundation of market formation. By creating firm demand, they have supported investment and brought additional supply into the market, creating a more competitive and liquid market.

The remaining approximately 5 Mt (1.7 Bgal) of 2030 demand is expected to come from regions without binding mandates, where uptake depends on policy targets, incentives and voluntary purchases. Around 60 airlines have committed to using at least 10% SAF by 2030, representing approximately 13 Mt (4.3 Bgal). While this overlaps with mandated demand in some markets, it also represents a material source of potential uptake beyond compliance requirements.

This demand is highly sensitive to the SAF premium and is most likely to materialize where policy incentives, low-carbon fuel credits and/or corporate Scope 3 purchases reduce the net cost to airlines. Corporate demand therefore plays an important supporting role by helping airlines recover part of the premium, but its impact depends on continued willingness to pay, robust accounting frameworks and confidence in SAF claims.

Voluntary demand also plays an important market-balancing role, as it can absorb supply in excess of mandated demand. Without sufficient voluntary uptake, oversupply can lead to weaker SAF price signals, increasing the risk of project delays or cancellations.

This is particularly important for advanced SAF pathways, which are needed for the market to grow sustainably into the 2030s. Investment decisions are taken several years ahead of first production, and some corporate-backed offtakes are already helping. If near-term demand signals weaken, projects may be deferred even where longer-term demand is expected to strengthen, creating a risk that supply is not available once constraints emerge.

Global policy-driven SAF demand

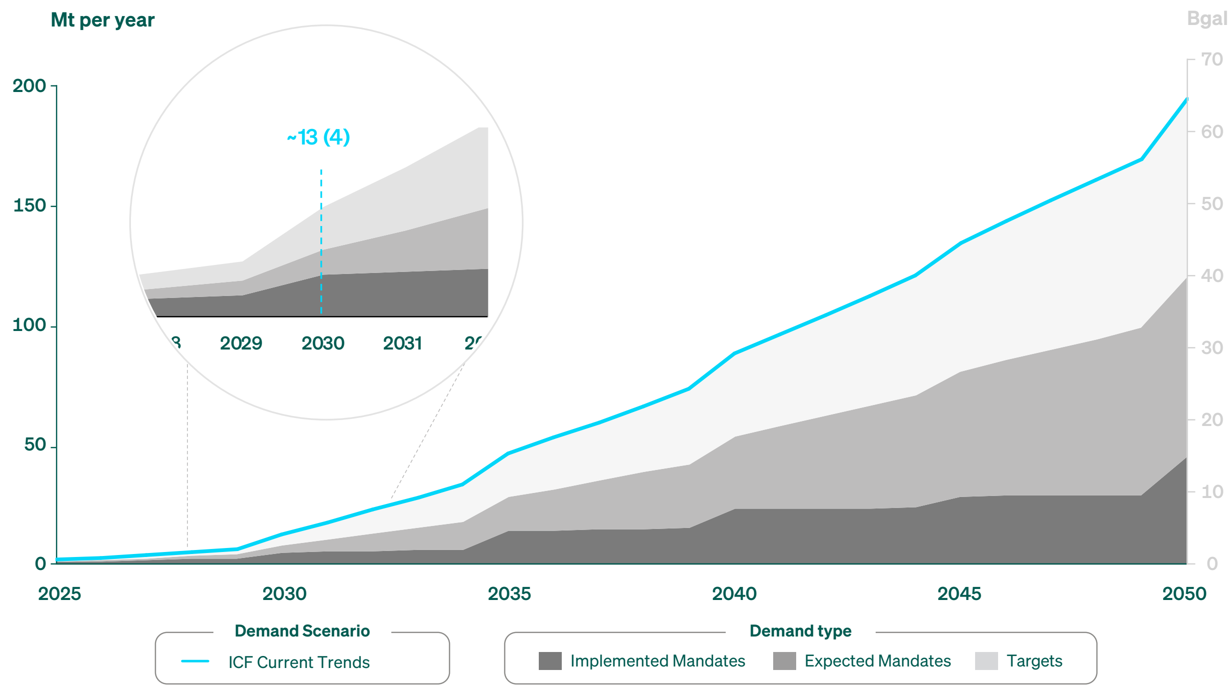


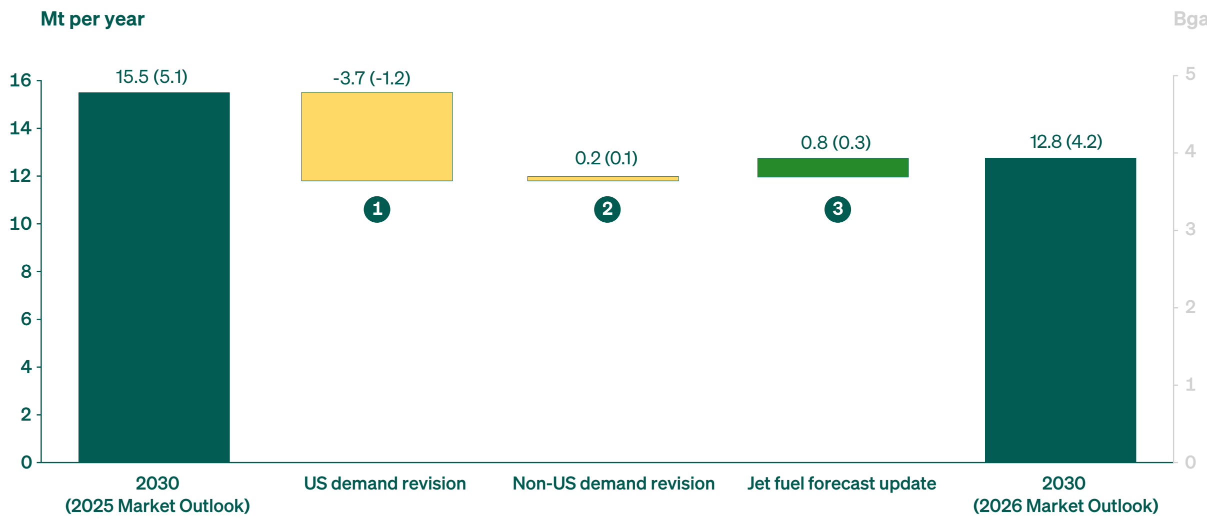
Figure 3: Only 5Mt of projected demand in 2030 comes from currently implemented mandates

Comparison to 2025 Market Outlook

Compared with the 2025 Market Outlook, the 2030 *Current Trends* demand outlook has been revised down from 15.5 Mt (5.3 Bgal) to 12.8 Mt (4.2 Bgal), equivalent to a reduction from 4.5% to 3.6% of global jet fuel demand. This revision is primarily driven by a lower near-term outlook for the United States, where recent policy changes have weakened federal SAF economics and reduced near-term demand expectations.

However, this has been slightly offset by increased momentum outside the US. Global policy development has continued to progress, particularly in Asia, where several countries have moved from roadmaps and targets towards more defined policy frameworks. In some cases, the modelled SAF blend assumptions are similar to last year, but confidence that these volumes can materialise has improved as policies have moved closer to implementation, including in India, South Korea and Indonesia.

Current Trends 2030 SAF demand: 2025 to 2026 Market Outlook



1. Assuming jet-fuel demand remains constant relative to last year, lower SAF uptake assumptions in the US would reduce SAF demand by 3.7 Mt (1.2 Bgal).
2. Changes in SAF uptake assumptions and methodological refinements lead to an additional net increase of 0.2Mt (0.1 Bgal), assuming constant jet-fuel demand.
3. A higher jet fuel demand forecast partially offsets reductions in SAF uptake, limiting the net decrease. e.g., in the US, the net decrease in 2030 is reduced to -2.9Mt (1.0 Bgal).

Figure 4: Change in projected 2030 SAF demand since last year's outlook is driven mostly by a revision in the US demand outlook

Europe

2025 marked the first year of mandates in Europe, with ReFuelEU Aviation and the UK SAF mandate moving the market from voluntary uptake to compliance-led demand. Early evidence suggests that first-year obligations were met comfortably in both markets, demonstrating the rapid emergence of a functioning SAF compliance market. However, this scale-up also exposed practical issues around SAF pricing transparency, fuel supplier cost pass-through and the timing of supporting documentation.

In both markets, policies are being developed to support the targets. EU ETS SAF allowances help reduce the effective cost of SAF uptake for airlines, while additional tools are being developed to support advanced SAF, recognizing that mandates alone may be insufficient for higher-cost, less mature pathways to reach financial close. Under the Sustainable Transport Investment Plan, the Early Movers Coalition and proposed double-sided auction mechanism are intended to support e-SAF project development, while in the UK the Revenue Certainty Mechanism is expected to reduce revenue uncertainty for eligible advanced SAF projects.

European Union: EU SAF demand rises in line with the ReFuelEU trajectory, reaching 3.0 Mt (1.0 Bgal) in 2030 when the minimum SAF share increases to 6%, before increasing to 10.3 Mt (3.4 Bgal) in 2035, 18.0 Mt (5.9 Bgal) in 2040, 23 Mt (7.6 Bgal) in 2045 and 38 Mt (12.5 Bgal) in 2050[2]. ReFuelEU also includes a dedicated sub-mandate for e-SAF. The requirement begins in 2030, with a minimum synthetic aviation fuel share of 0.7% in 2030 (0.4 Mt or 0.1 Bgal) and an average requirement of 1.2% across 2030 and 2031 (0.6 Mt or 0.2 Bgal per year). This increases to an average of 2% between 2032 to 2034 (1 Mt or 0.3 Bgal), before increasing to 5% in 2035 (2.6 Mt or 0.9 Bgal), 10% in 2040 (5.3 Mt or 1.8 Bgal), 15% in 2045 (8.2 Mt or 2.7 Bgal) and 35% in 2050 (19 Mt or 6.3 Bgal).

The European compliance market is also expanding beyond the EU. Switzerland joined the ReFuelEU framework in 2026, adding 40 kt (13 Mgal) of SAF demand, while Norway is expected to implement the regulation in 2027, adding 30 kt (10 Mgal).

United Kingdom: Like ReFuelEU, the UK SAF mandate sets an obligation as a share of jet fuel supplied, however, compliance is certificate-based and linked to SAF carbon intensity[3]. Lower-CI SAF generates more certificates per unit of fuel, meaning the physical volume needed for compliance can be lower than the headline obligation. Early evidence suggests that the 2025 obligation was met comfortably, with SAF accounting for 2.5% by volume (0.3 Mt or 1 Bgal) of jet fuel uplift. Unlike ReFuelEU, the UK SAF mandate increases each year, meaning that in 2026 a 3.6% obligation translates into around 0.4 Mt (0.1 Bgal) SAF demand[a]. However, with a combination of certificate carry-over from 2025 and lower CI, this demand may be lower.

The mandate also creates a distinct demand signal for non-HEFA SAF. The e-SAF sub-mandate starts in 2028 at 0.2% of jet fuel demand, equivalent to 24 kt (8 Mgal) of SAF[b]. Alongside the e-SAF sub-mandate, the HEFA cap limits the extent to which the mandate can be met through HEFA. The cap starts in 2027, when total SAF demand reaches 0.6 Mt (0.2 Bgal), of which a maximum of 570kt (188 Mgal) can be HEFA.

By 2030, total SAF demand reaches 1.2 Mt (0.4 Bgal), equivalent to 10% of jet fuel demand, with HEFA capped at 0.9 Mt (0.3 Bgal), or 71% of total SAF demand. This leaves 0.4 Mt (0.1 Bgal) to be met through non-HEFA SAF, of which at least 60 kt (20 Mgal) must be e-SAF (0.5% of total jet fuel).

By 2040, total UK SAF demand increases to 2.9 Mt (1.0 Bgal), equivalent to 22% of jet fuel demand. The HEFA cap remains flat at 7.8% of jet fuel demand, allowing a maximum of 1.0 Mt (0.3 Bgal) of HEFA SAF and leaving 1.9 Mt (0.6 Bgal) to be met through non-HEFA SAF, including 0.5 Mt (0.2 Bgal) of e-SAF (3.5% of total jet) and 1.4 Mt (0.5 Bgal) of other non-HEFA SAF.

North America

United States: The United States remains a policy-enabled SAF market, where demand depends on narrowing the cost premium between SAF and fossil jet through federal tax credits, state-level incentives, LCFS-type mechanisms, RFS value, voluntary willingness to pay and corporate Scope 3 demand. As in last year's outlook, SAF demand was assessed through a state-level analysis of jet fuel use and policy support.

Under the *Current Trends scenario*, US SAF demand is now expected to reach 2.7 Mt (0.9 Bgal) by 2030, equivalent to a 3.5% SAF blend. This represents a reduction of around 2.9 Mt (1.0 Bgal) compared with the 2025 Market Outlook, which assumed partial achievement of the SAF Grand Challenge[4]. This revision reflects two opposing effects relative to last year's outlook: less ambitious SAF uptake assumptions and higher projected jet fuel demand. Holding jet fuel demand constant, the change in SAF uptake assumptions would reduce demand by around 3.7 Mt (1.2 Bgal). This is partially offset by higher jet fuel demand, which increases absolute SAF volumes and limits the net reduction to 2.9 Mt (1.0 Bgal). This reflects weaker federal SAF economics under the current administration. Changes introduced under the "One Big Beautiful Bill Act" extended the 45Z credit through 2029, removed the previous $0.75/gallon SAF bonus, capped the incentive at $1.00/gallon in line with other eligible clean fuels, restricted eligibility to North American feedstocks, and removed induced land use change from the CI calculation[5]. The combined impact is a lower federal incentive stack for SAF and a weaker relative business case compared with other biofuels, particularly Renewable Diesel.

[a] The amount of SAF required to meet the 3.6% obligation depends on the CI of the SAF. If the average CI of SAF is 18 gCO2e/MJ, i.e., 80% emissions reduction relative to fossil baseline, then 0.4 Mt is required.
[b] For the following calculations, SAF with an average emissions saving of 70% is used, meaning one unit of SAF generates one certificate. It is important to note however, that the average CI is likely to be less than this, meaning less SAF on a volumetric basis is needed.

These changes reduce the affordability of imported waste oils and will likely shift more production towards domestic feedstocks. If production shifts towards higher-CI crop-based feedstocks, SAF will generate less value under CI-based incentive schemes, increasing the net premium that airlines or corporate buyers need to cover. At the same time, RD benefits from stronger obligated demand under road-fuel policies, is typically cheaper to produce, and competes for the same HEFA feedstocks. This is likely to pull feedstock towards RD and encourage flexible HVO producers to maximize RD output unless SAF premiums are sufficient.

Weaker federal SAF support is being partly offset by continued policy development at the state level. A growing number of states are introducing SAF-specific incentives, procurement mechanisms and low-carbon fuel policies, helping to broaden the geographic basis for SAF demand. The increase in RFS obligations is also a positive signal for US biofuels more broadly, which may benefit SAF supply in the medium term through technology developments and the gradual transition of volumes into aviation if on-road markets become saturated. While this is likely to be a gradual process nationally, small volumes may be increasingly squeezed into aviation in specific markets, for example in California, where almost 70% of diesel consumed is RD.

In the longer term, the US SAF outlook remains broadly aligned with last year's view. Under *Current Trends*, SAF demand reaches 47 Mt (16 Bgal) by 2050, equivalent to a 50% blend, compared with 55% (41 Mt or 14 Bgal) in the 2025 Market Outlook. This suggests that the main revision is concentrated in the near term, rather than a fundamental change in the medium to long-term role of SAF in US aviation decarbonization.

Canada: Canada's clearest near-term SAF demand signal is in British Columbia, where the Low Carbon Fuel Standard includes minimum SAF uplift requirements of 1% in 2028, 2% in 2029 and 3% in 2030, equivalent to around 55 kt (18 Mgal) in 2030[6]. The BC LCFS also requires jet fuel uplifted in the province to reduce its average carbon intensity, starting at 2% in 2026 and rising to 10% in 2030. However, given the availability and cost of alternative compliance options, this CI requirement is not expected to be met primarily through SAF use. At the national level, Canada's Aviation Climate Action Plan sets an aspirational target of 10% SAF use by 2030, although this has not yet been translated into a binding federal SAF mandate[7].

Asia

Policy momentum has strengthened since last year, with several countries moving from SAF roadmaps and targets towards policy development. Several Asian countries are also increasingly seeking to move up the economic value chain, using SAF policy to retain more value domestically through fuel production rather than exporting waste oils to producers in Europe, North America and Singapore.

Singapore: SAF target of 1% from 2026, rising to 3-5% by 2030 (150 kt- 200 kt or 50-66 Mgal)[8]. Singapore delayed the introduction of its SAF levy citing rising jet fuel costs, with the levy now applying to tickets and services sold from October 2026 for flights departing from January 2027[9].

South Korea: Mandatory SAF blending for international flights confirmed, starting at 1% in 2027 (55 kt or 18 Mgal), rising to 3-5% by 2030 (0.2-0.3 Mt or 66-99 Mgal) and 7-10% by 2035 (0.4-0.6 Mt or 132-198 Mgal)[10].

China: Annual SAF use target of 50 kt (17 Mgal), with a SAF blending mandate expected to be introduced under the 15th five-year plan (2026–2030)[11]. This is likely to require a 3–5% blend (1.4-2.4 Mt, 0.5-0.8 Bgal). China is becoming increasingly important as a SAF producer and already is a key source of waste oils, meaning a SAF mandate would have a considerable impact on the future feedstock and SAF availability for export markets.

India: Proposed mandate of 1% in 2027 (49 kt or 16 Mgal), 2% in 2028 (0.1 Mt or 33 Mgal) and 5% by 2030 (0.3 Mt or 0.1 Bgal), focused on international flights. Given the size and growth of India's aviation market, even low blending rates could create material demand by 2030[12].

Indonesia: Indonesia introduced its first SAF targets by ministerial decree, requiring a 1% blend for flights departing Soekarno-Hatta and I Gusti Ngurah Rai airports from 2027, before rising to 5% for 2029 and 2030 (88 kt or 29 Mgal)[13]. Longer-term targets remain more ambitious, with earlier policy material indicating a trajectory towards 12.5% in 2040 (0.5 Mt or 0.2 Bgal), 20% in 2045 (1.0 Mt or 0.3 Bgal) and 30% in 2050 (1.5 Mt or 0.5 Bgal)[14].

Japan: Target of 10% SAF use by 2030 (1.0 Mt or 0.3 Bgal). The policy signal remains significant, but near-term demand realization will depend on the pace of domestic production, imports, and supporting measures[15].

Malaysia: Proposed target of 1% in 2027 (32 kt or 11 Mgal), rising to 47% by 2050[16]. Malaysia is also positioned as a feedstock and production hub, given its role in regional waste oil and palm-related supply chains.

Thailand: Proposed mandate of 1% in 2026 (50 kt or 17 Mgal), rising to 5-8% by 2033-2037[17].

Rest of World

Australia: Low-carbon liquid fuel policy development is ongoing, with supply-side consultation conducted in 2025 and demand-side consultation under development. Initial support has been allocated through ARENA and is complemented by the Investor Front Door program, the Fuel Security and Resilience Package, and the A$1.1 billion Cleaner Fuels Program for low-carbon liquid fuels, including SAF[18].

Brazil: Under the "Fuel of the Future" legislation (Bill 528/20), air operators must reduce emissions starting with a 1% reduction in 2027, increasing to 10% by 2037 (460-520 kt or 150-170 Mgal), assuming average SAF lifecycle GHG reductions of 70–80%[19].

Türkiye: A SAF mandate is in development, aligned with a 5% emissions reduction by 2030, equating to 470-530 kt (155-175 Mgal) assuming average SAF lifecycle GHG reductions of 70–80%[20].

United Arab Emirates: Under the General Policy for SAF (December 2023), the UAE has set a voluntary target to supply 1% locally produced SAF by 2031 (100 kt or 33 Mgal) to national airlines at UAE airports[21].

Chile: Plans to achieve a 50% SAF blend in its domestic and international flights by 2050, equating to approximately 1 Mt (0.3 Bgal) of SAF. Chile's SAF Roadmap 2050 states an aim to build an operational large-scale domestic SAF facility by 2030 to ensure that a significant proportion of the country's SAF needs can be supplied domestically[22].

SAF Capacity Outlook

What are the main SAF capacity development trends, and are we on track to meet demand?

Introduction

This chapter provides an overview of the evolving global SAF market, examining how capacity, technology pathways and regional policy dynamics are shaping future supply. Despite geopolitical and economic turbulence, the global SAF capacity outlook remained relatively resilient over the past year, supported by continued policy momentum and new de-risking measures across several regions. At the same time, delays and bankability challenges persist, particularly for advanced pathways, even as commercial lenders are showing growing interest in sufficiently de-risked SAF projects. The section also highlights the intensifying pressure on HEFA feedstocks and the urgent need to accelerate advanced pathways ahead of the expected post-2030 supply gap in the **'HEFA tipping point'** section.

Methodology

This analysis focuses on projected SAF capacity by incorporating the nameplate capacity of each facility in the year it is expected to come online. For the purposes of consistency and comparability, we do not adjust for potential ramp-up periods or for facilities operating below full capacity. As such, the figures presented reflect theoretical maximum output, rather than actual production volumes. This is also why historical numbers are higher compared to actual SAF production in that year—it reflects the SAF capacity that was installed at the end of that year.

Identified renewable fuel announcements with SAF ambitions

- Cut-off date: May 1
- Total nr. of projects considered: 456
- Nr. of facilities considered in final output: 119

Excluded announcements with low probability of reaching production

- Feasibility stage
- No public updates in 2+ years
- Characterized with high degree of compound risk and uncertainties

Adjusted SAF output when:

- Market intelligence differs from public information
- Only renewable capacity is known: apply average SAF yields based on licensed technology

Global capacity outlook

Global SAF production capacity is now expected to reach 18.5 Mt (6.1 Bgal) by 2030, up slightly from 18.1 Mt (6.0 Bgal) in last year's outlook. Beyond 2030, a few additional facilities are expected to come online, further increasing expected capacity to 19.0 Mt (6.3 Bgal) by 2035. While the overall long-term trajectory remains positive, the market outlook has become increasingly split between near-term oversupply risks and longer-term structural shortages.

Global SAF capacity with RD switching potential

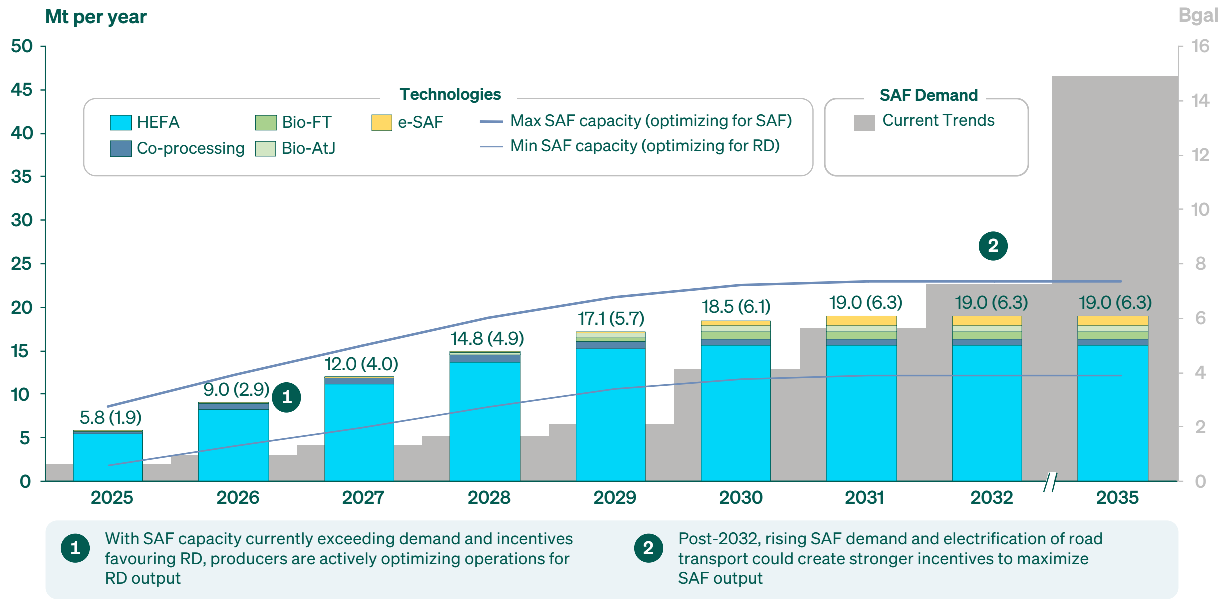


Figure 5: Global SAF capacity is expected to reach 18.5 Mt (6.1 Bgal) by 2030. RD switching can flex some capacity up or down

Compared to last year, the capacity outlook has remained broadly stable. However, because of lower short term demand expectations the market is now expected to enter a period of temporary overcapacity through the early 2030s. While sufficient capacity exists on paper to meet expected demand, this imbalance could place pressure on producer margins, result in lower utilization rates and delay FIDs. An acceleration of demand-side policies and strengthened voluntary demand could help to correct this imbalance, allowing realization of the current project pipeline.

Early signs of this dynamic are already visible in project execution timelines. Approximately a third of tracked SAF projects have been delayed by at least one year compared to last year's outlook. Delays were observed across all major pathways, though disproportionately impacting advanced routes (non-HEFA). This is concerning, as without scale-up of advanced pathways, the industry risks stagnating capacity increases post 2030, while continued momentum is critical to meet 2035 demand. While some progress has been made across e-SAF, limited progress was seen across advanced bio pathways, indicating a need to prioritize and accelerate policy support for these pathways. On a positive note, no major public project cancellations were announced over the past year. Instead, many developers appear to be adopting a wait-and-see approach as they monitor implementation of announced initiatives, further policy developments, financing conditions and demand growth.

Next to stronger SAF demand growth, two additional factors could significantly impact the demand/supply balance in the near term:

1. **Renewable diesel switching:** A substantial share of announced HEFA capacity remains flexible between SAF and renewable diesel production. Current market conditions continue to favor RD output in several regions, particularly in the United States, where policy incentives and demand growth remain comparatively stronger for road fuels. As a result, a significant portion of flexible capacity may continue to be directed toward RD instead of SAF. Over time, however, this dynamic is expected to reverse. As road transport electrification accelerates and SAF demand strengthens, an increasing share of flexible HVO/HEFA capacity is expected to shift back toward SAF.

2. **Co-processing:** Co-processing is continuing to be an important brownfield strategy for scaling SAF production, especially for incumbents. We estimate that co-processing has the potential to add approximately 4 Mt (1.3 Bgal) of additional SAF production capacity globally by 2035. These volumes could come on top of already announced capacity, however co-processing relies on the same feedstock constraints as standalone HEFA capacity which will naturally cap its growth potential.

Under favourable market conditions, RD switching and co-processing together could increase total effective SAF production capacity to approximately 27 Mt (8.9 Bgal) by 2035. However, this would still leave a substantial gap of around 20 Mt (6.6 Bgal) compared to projected SAF demand under the *Current Trends* scenario, highlighting the continued need for new dedicated SAF production capacity.

Global SAF capacity with RD switching and co-processing potential

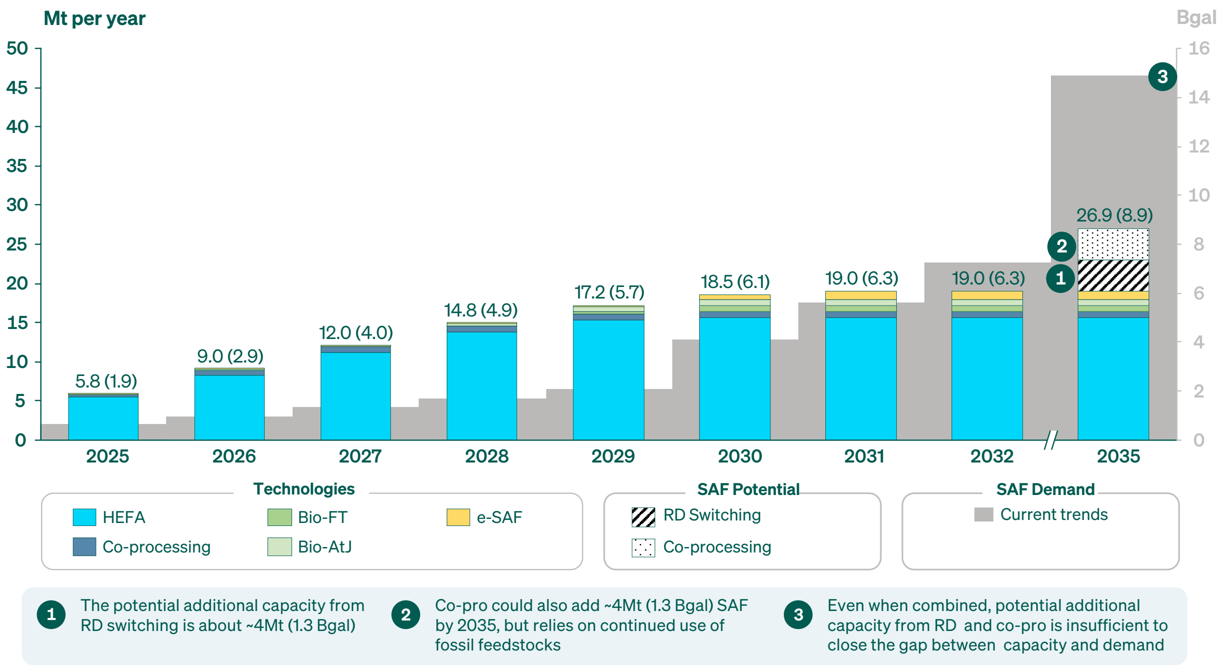


Figure 6: Global SAF capacity could reach around 27 Mt (8.9 Bgal) by 2035, including RD and co-processing potential

While oil majors and minors continue to dominate currently operational capacity and that under construction, particularly across HEFA and co-processing pathways, the strategy of incumbents increasingly appears to be shifting toward partnerships with independent developers rather than direct project ownership. Recent examples include Shell's long-term offtake agreement with Egypt Green Sky Capital[23], Total's cooperation with Sinopec[24], and BP's investment in Zhejiang Jiaao Enprotech[25]. This reflects a broader trend of incumbents seeking exposure to SAF supply while limiting direct technology and execution risk.

As a result, the majority of pre-FID SAF capacity is now being driven by independent developers, which account for approximately 70% of announced projects. More notably, independent developers represent nearly all advanced SAF capacity currently in the pipeline, including e-SAF, Alcohol-to-Jet and Bio-FT pathways. While this underlines the sector's innovation momentum, it also creates a structural financing challenge, as many independent developers lack the balance sheet strength and operational track record needed to absorb first-of-a-kind technology risks.

Nevertheless, important financing milestones were achieved over the past year. In February, SkyNRG reached FID on DSL-01 using non-recourse project financing, demonstrating growing institutional appetite to finance de-risked SAF infrastructure. Market signals also suggest increasing lender interest in financing more advanced SAF pathways, including e-SAF projects.

However, scaling advanced SAF pathways will require existing de-risking frameworks to evolve further, addressing the bankability challenges that continue to prevent projects from reaching FID and unlocking investment in commercial-scale facilities. This is particularly critical because much of the advanced SAF pipeline is driven by independent developers with limited balance sheet capacity relative to incumbent fuel producers.

Advanced SAF projects continue to face a combination of technology, feedstock, policy and market risks, increasing required equity returns and pushing projects outside the risk appetite of many debt lenders. A key challenge remains the absence of bankable long-term demand at prices sufficient to support debt repayment and acceptable project returns. While long-term offtake agreements can help provide revenue visibility, these remain difficult to secure in an early market characterized by high SAF premiums and evolving policy frameworks. Revenue certainty mechanisms are therefore likely to play a critical role in reducing revenue risk, enabling bankable offtake structures, and supporting the transition from announced projects to commercial-scale investment. Public financial institutions, on the other hand, can play an instrumental role in reducing cost of capital and project delivery risks via guarantees, insurances and innovative debt products.

Technology trends

Hydrotreated Esters and Fatty Acids (HEFA)

HEFA continues to dominate the global SAF pipeline, accounting for approximately 85% of expected 2030 capacity. Most newly added capacity over the past year came from HEFA projects and co-processing deployments, particularly in Asia and the Rest of World regions.

At the same time, co-processing is becoming an increasingly common deployment strategy among refiners and oil majors due to its ability to leverage existing refinery infrastructure with relatively limited capital investment and short deployment timelines. As a result, co-processing's share of the 2030 capacity outlook has doubled since 2024, rising from approximately 2% to 4%. This share may in fact be larger, as public information on co-processing tends to be limited.

However, the pathway also faces important structural limitations. Current co-processing pathways remain constrained by low renewable blend ratios, continued dependency on lipid feedstocks and majority of fossil input streams, limiting both scalability and long-term resilience benefits. In addition, the ability to deploy co-processing without significant refinery modifications depends heavily on the configuration of the existing refining asset base.

Alcohol-to-Jet (AtJ)

The AtJ outlook weakened significantly over the past year, with expected 2030 capacity from this pathway revised downward by approximately 1.3 Mt (0.4 Bgal). While LanzaJet's Freedom Pines facility successfully entered operations, signaling the commercial viability of the pathway, broader project progressions remained limited.

The downward adjustment was driven primarily by changing expectations surrounding a relatively small number of large US-based facilities, highlighting the pathway's concentration risk. Weaker SAF-specific incentives under the revised 45Z credit, continued uncertainty around long-term US SAF policy support and increasing competition for ethanol from road fuels appear to have negatively impacted project momentum.

Bio-Fischer-Tropsch (Bio-FT)

The Bio-FT outlook strengthened somewhat over the past year, increasing by 0.2 Mt (0.1 Bgal) to around 0.8 Mt (0.3 Bgal) by 2030. Much of this growth came from hybrid projects combining biomass gasification with e-SAF production concepts, with most new additions located in Europe and the United States.

While commercialization progress remains slow, Bio-FT is receiving renewed interest due to its ability to utilize a broader range of lignocellulosic and residual biomass feedstocks compared to HEFA pathways. Also, the proven ability of FT to convert gas into liquids, serves as an interesting platform in combination with Renewable Natural Gas as a feedstock. At feasibility stage, project activity is also becoming more geographically diverse, with projects emerging in South America, Asia-Pacific and Africa.

Global AtJ & Bio-FT capacity

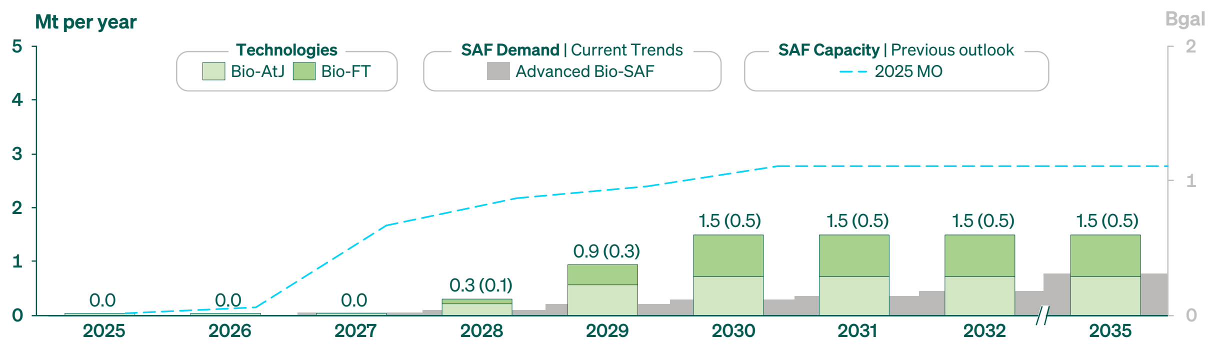


Figure 7: AtJ and BioFT capacity could reach 1.5 Mt (0.5 Bgal) by 2030, a 1.2 Mt (0.4 Bgal) decrease since last year's outlook

e-SAF

The global e-SAF outlook strengthened over the past year, improving by approximately 0.8 Mt (0.3 Bgal) compared to last year's outlook. Growth was driven by rapid project developments in China and more robust policy support in Europe, including the announcement of double-sided auctions under the Sustainable Transport Investment Plan. Several projects progressed into more advanced development stages, including pre-FEED and FEED. Based on our latest assessment, approximately 0.6 Mt (0.2 Bgal) of European e-SAF capacity is now considered sufficiently advanced to potentially reach FID by the end of 2027, though a substantial share remains dependent on the Methanol-to-Jet (MtJ) pathway achieving ASTM certification. Due to lead times and contingencies, only around 0.2 Mt (0.1 Bgal) is currently expected to become operational by 2030. Without acceleration of advanced or earlier stage projects, Europe will largely depend on imported e-SAF volumes during initial years of the e-SAF mandate.

While no major European e-SAF projects reached FID over the past year, Infinium reached FID on its Project Roadrunner facility in the United States, supported in part through project financing from HSBC, representing an important milestone for the bankability of the pathway. Moreover, China is also emerging as a strong region for e-SAF development, supported by streamlined permitting, industrial coordination and shorter delivery timelines. An initial 100 kt (33 Mgal) e-SAF project is under construction in China and an additional 0.5 Mt (0.2 Bgal) is emerging in the feasibility stage, reinforcing its growing role in future global e-SAF supply.

Global e-SAF capacity

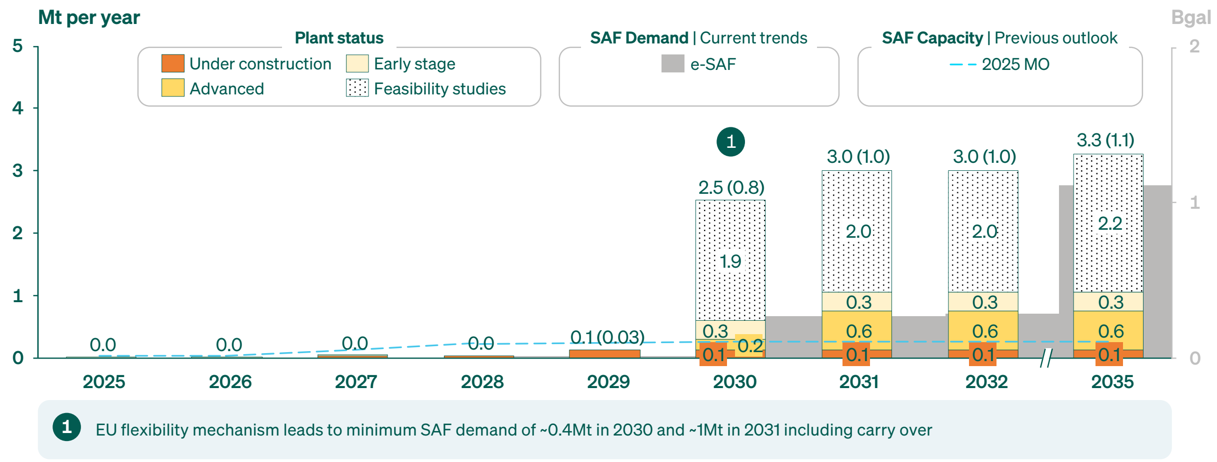


Figure 8: e-SAF capacity could reach 0.6 Mt (0.2 Bgal) by 2030, increasing to 1.0 Mt (0.3 Bgal) by 2031. This excludes feasibility stage projects, which could add an additional 2.0 Mt by 2031

Regional trends and trade flows

Regional SAF markets are increasingly shaped by diverging policy frameworks, creating distinct demand centers, production hubs, and trade flows. Europe has emerged as the clearest source of demand growth through binding mandates, while the US is shifting toward a more domestic feedstock model and Asia continues to expand capacity rapidly, led by strong industrial policy support in China. As a result, trade flows for both SAF and feedstocks are increasingly driven by policy and strategic positioning as much as by production economics, with Europe risking to become more reliant on imports of compliant SAF and feedstocks, while several Asian countries are moving to retain resources for domestic production and energy security.

Europe

In Europe, project momentum has picked up: this year, announced capacity in 2030 increased to 4.7 Mt (1.6 Bgal) in 2026 (from 3.8 Mt (1.3 Bgal) previously), indicating continued pipeline expansion in the EU and UK. In terms of project realization, the SAF pipeline has made tangible progress, with 3.0 Mt (1.0 Bgal) now operational or under construction, around 45% up from 1.7 Mt (0.6 Bgal). While this indicates a steadily progressing pipeline, mainly the advanced SAF segments still remain challenged. Both the EU and UK are responding by taking a more active de-risking approach, introducing measures to help commercialize and accelerate progress in these segments. However, this also means that e-SAF projects are still awaiting implementation of measures under STIP and the extension of SAF allowances, while advanced biofuels in the UK are awaiting implementation of the revenue certainty mechanism to progress project milestones.

The EU and UK remain the primary global regulatory demand centres for SAF, with mandates increasingly reshaping global trade flows for both feedstocks and finished fuels. While overall regional SAF capacity appears broadly sufficient on paper through 2030, shortages in advanced bio-SAF and e-SAF are expected to increase reliance on imports during the early 2030s.

This import dynamic is already visible in trade flows today. Europe relies heavily on imported waste oils, with the majority coming from Asia[26], which would likely need to increase further if Europe realizes planned additions in HEFA SAF capacity. Imports of refined SAF from Asia are also increasing. Trade data showed approximately 95 kt (31 Mgal) of SAF exported from China to Europe in January 2026 alone[27].

North America

The United States remains one of the largest SAF markets globally, with recent RIN generation data suggesting that 0.9 Mt (0.3 Bgal) of SAF was supplied in 2025, making the US the second largest SAF markets after the EU. However, recent policy developments are increasingly reshaping trade flows toward a more domestically focused model. Updated 45Z rules restrict eligibility to feedstocks sourced from the US, Canada, and Mexico, while additional tariffs were introduced on imported feedstocks and biofuels, including UCO out of Asia. Together, these measures increasingly favour domestic feedstock supply chains and reduce reliance on imported waste oils.

While weaker federal SAF economics have reduced near-term demand expectations, projected US SAF capacity continues to exceed domestic demand through much of the outlook period. This positions the US as a potential exporter of SAF volumes, particularly advanced SAF and e-SAF needed to meet European sub-mandates.

These policy shifts are already influencing global trade flows. Chinese UCO and Brazilian tallow, volumes that previously flowed into the US market are increasingly being redirected toward Europe, reinforcing Europe's growing role as the primary import destination for globally traded SAF feedstocks.

Asia

Asia is increasingly emerging as a global SAF production hub. With projected SAF capacity exceeding regional demand through much of the outlook period, the region is expected to remain a major exporter of both SAF and feedstocks in the near term, particularly towards Europe where mandates are creating firm demand for compliant volumes.

At the same time, several Asian countries are taking steps to retain feedstocks for domestic refining and energy security objectives. China has removed export tax incentives and introduced export controls on UCO, Malaysia is considering restrictions on exports of UCO and POME[28] and Indonesia already maintains export bans on POME and UCO[29]. These measures suggest a gradual shift away from exporting raw feedstocks toward higher-value domestic refining and SAF production.

This trend could materially reshape future trade flows. While Europe currently depends heavily on Asian feedstocks and increasingly imports refined SAF from the region, stronger domestic demand growth and industrial policy support in Asia may reduce export availability over time. China in particular is emerging as an increasingly important force in global SAF markets, as a producer but potentially also as a future source of demand.

Rest of World

Outside the major established SAF markets, policy momentum continues to expand, with several countries advancing mandates, roadmaps and industrial strategies linked to energy security and domestic value creation. While SAF development in these regions remains concentrated around HEFA pathways and a relatively limited number of projects, several markets are increasingly positioning themselves as future export-oriented suppliers. Brazil accounts for the majority of the announced capacity in the Rest of World outlook, supported by strong biofuel infrastructure, agricultural feedstock availability and growing policy momentum.

Brazil's "Fuel of the Future" framework is expected to support both domestic SAF production and future exports into mandate-driven markets such as Europe. Meanwhile, parts of Latin America are seeking to capture greater value domestically through local refining rather than feedstock exports alone. Momentum is also mounting in Australia, where SAF is increasingly linked to sovereign fuel capability and low-carbon industrial policy, including the recent announcement of a A$1.1 billion low-carbon fuels program and plans to complement this with a demand-side mechanism.

Global SAF capacity by Region

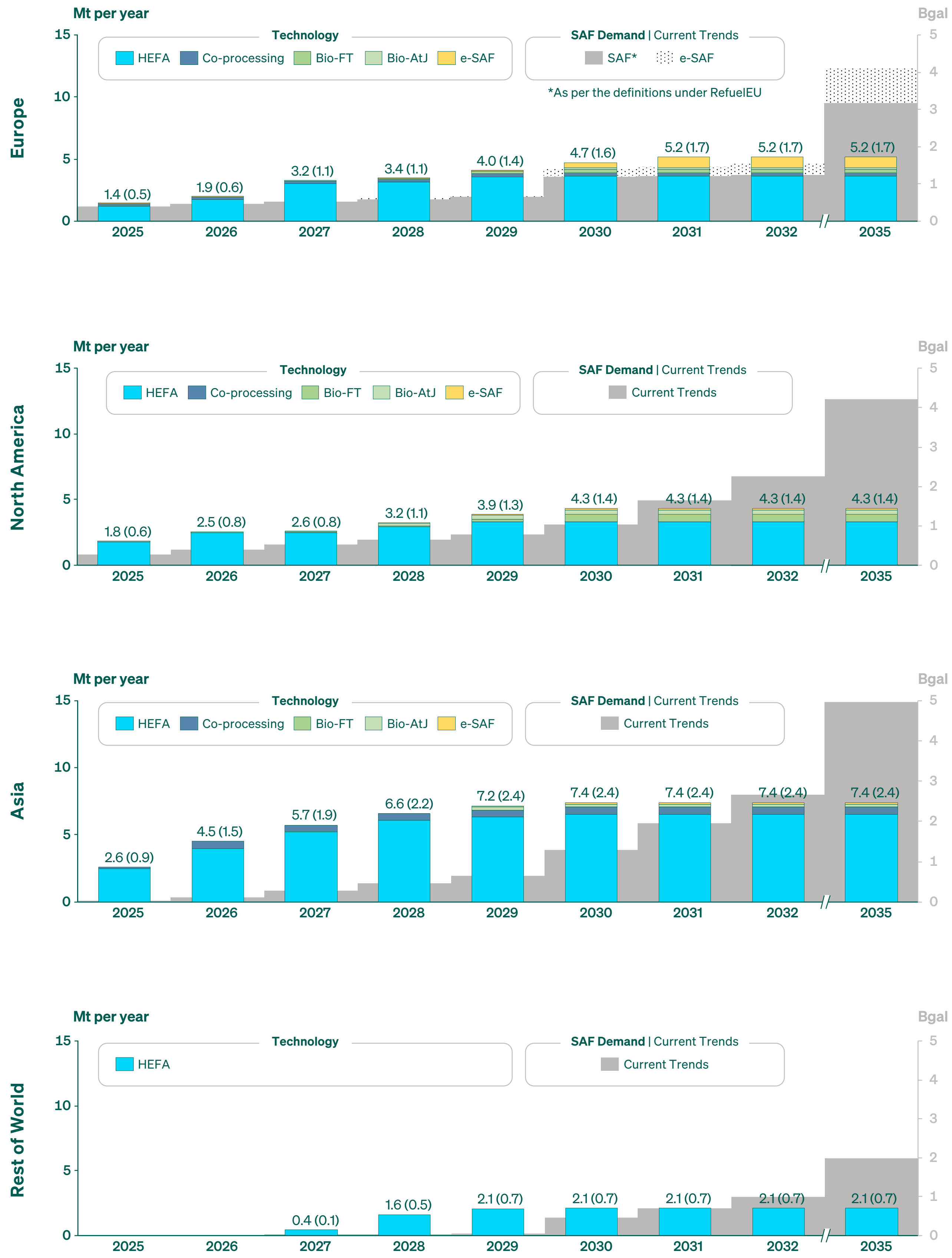


Figure 9: Regional SAF demand and capacity show undersupply in most regions by 2035

The Global HEFA Tipping Point

In last year's outlook, we explored what is needed to accelerate SAF deployment globally to get on track for net zero aviation by 2050. Our analysis highlighted that the current SAF outlook remains heavily dependent on HEFA, despite increasing evidence that globally available HEFA feedstocks are likely to become significantly constrained by 2030. We therefore identified the need to accelerate advanced SAF pathways and outlined several key enablers required for the industry to scale in line with projected demand (see Box 1).

1. **Stable long-term demand and/or supply incentives**
2. **Financial de-risking and public co-funding support for advanced SAF pathways**
3. **Long-term corporate demand commitments**
4. **Supply chain and feedstock commercialization**
5. **Sustainability certification and governance**
6. **Infrastructure and industry coordination**

Box 1: Key enablers identified in 2025 SAF Market Outlook

This year, we updated the HEFA tipping point analysis because of observed developments on the demand and supply side:

- **Demand:** Lower expectations under the *Current Trends* scenario reduced projected 2030 SAF demand by a net 2.7 Mt (0.9 Bgal) compared to last year's Market Outlook. This revision was almost entirely driven by lower demand in the feedstock-agnostic SAF category, which declined by 2.8 Mt (0.9 Bgal). In contrast, demand for waste oil-based SAF increased slightly by around 100 kt (33 Mgal), due to a higher projected EU jet fuel demand in 2030 compared to last year's outlook.
- **Supply:** SAF feedstock potential is primarily driven by availability and the aviation claim. We examined five key trends that impact these parameters, and ultimately influence the SAF potential (See Table 1)

Table 1: Key trends impacting feedstock availability and the share that can be claimed for use in the production of SAF.

Trend	Impact on HEFA SAF potential	
	2030	2050
1. Demand for low-carbon fuels in shipping In the near term, maritime decarbonization is expected to have only a limited impact on HEFA feedstock availability for SAF. While the shipping sector is beginning to transition toward low-carbon fuels, uptake of biofuels remains relatively limited and the sector is not structurally dependent on HEFA feedstocks due to the availability of multiple alternative fuel pathways[30]. In particular, LNG and increasingly bio-LNG currently offer a more cost-competitive, scalable, and infrastructure-ready compliance pathway than FAME or HVO-based marine fuels[31]. As a result, near- to medium-term competition between shipping and aviation for lipid-based feedstocks is expected to remain limited, leaving HEFA SAF potential largely unaffected this decade. Over the longer term, however, shipping could emerge as a more material competitor for HEFA feedstocks if the scale-up of alternative maritime fuels such as ammonia and methanol progresses more slowly than expected. Under such scenarios, increasing demand for bio-based marine fuels could tighten feedstock availability and place upward pressure on HEFA feedstock prices, thereby reducing the long-term HEFA SAF potential available for aviation.		
2. Demand for renewable diesel and biodiesel in road Demand for renewable fuels in the road sector continues to be a major determinant of HEFA feedstock availability for SAF. In recent years, higher blending mandates in emerging economies and increasing renewable fuel requirements in the United States have strengthened policy-driven demand for biofuels, particularly renewable diesel[32,33,34]. In the short to medium term, this creates significant additional competition for HEFA feedstocks. Road transport policies continue to absorb a large share of available waste oils and lipid-based feedstocks, limiting the volumes available for SAF production and constraining near-term HEFA SAF potential. Over the longer term, however, this dynamic is expected to gradually reverse. As electrification reduces liquid fuel demand in the road sector, biofuel demand is expected to ease, particularly in light-duty transport. This could free up additional HEFA feedstocks for SAF production post-2040, increasing the long-term HEFA SAF potential available to aviation.		

Trend	Impact on HEFA SAF potential	
	2030	2050
3. Electrification of heavy-duty transport The accelerating electrification of heavy-duty transport is beginning to influence long-term biofuel demand expectations. In Europe, electric truck adoption increased by around 40% year-on-year[35], while in China the rapid scale-up of electric freight transport is already contributing to lower projected global diesel demand growth[36]. In the near term, however, the impact on HEFA SAF potential remains limited. Despite rapid growth, electric trucks still represent a relatively small share of the global heavy-duty fleet, meaning current impacts on diesel consumption, biofuel demand, and HEFA feedstock availability remain modest. Over the longer term, electrification of heavy-duty transport is expected to materially reduce diesel demand and associated biofuel requirements in the road sector. As this transition accelerates post-2030, additional HEFA feedstocks could become available for SAF production, increasing the long-term HEFA SAF potential available for aviation.	=	↑
4. Supply of oils from intermediate/cover crops Investment in cover and intermediate crop pathways is increasing, particularly among incumbent fuel producers seeking to expand future lipid-based feedstock supply. Companies such as Neste, BP, and Repsol are increasingly exploring these feedstocks as part of broader strategies to diversify and scale renewable fuel production[37,38,39]. In the near term, however, these developments are expected to have limited impact on HEFA SAF potential. Cover crop pathways remain at an early stage of development, with supply chains, yields and collection systems not yet sufficiently mature to support material fuel production volumes before 2030. At the time of writing, Europe is still waiting for the release of guidance for the certification of intermediate crops. Over the longer term, these pathways could modestly expand the available HEFA feedstock pool. As agricultural practices, logistics systems, and commercial deployment mature, cover and intermediate crops may provide an additional source of lipid-based feedstocks, helping to alleviate some feedstock pressure within the HEFA pathway.	=	↑

Trend	Impact on HEFA SAF potential	
	2030	2050
5. Increasing momentum on first-generation oil crops Interest in first-generation oil crops is increasing in several regions, driven by energy security concerns, existing agricultural supply chains, and the absence of other low-cost feedstocks. In Southeast Asia, Indonesia and Malaysia continue to expand palm-based biodiesel programs[40,41] while countries such as Australia are showing signs of moving beyond a purely waste-based feedstock approach in support of domestic fuel security and SAF production[42,43]. In the short to medium term, this trend increases the potential availability of lipid-based feedstocks for HEFA SAF production, supporting higher overall HEFA SAF potential than previously assumed. Given the maturity, scalability, and relatively low cost of first-generation oil crops, these feedstocks can provide a comparatively rapid pathway to expand renewable fuel supply. Over the longer term, however, increased reliance on first-generation crops raises broader sustainability and socio-economic considerations. While these feedstocks may reduce dependence on imported fossil fuels, rapid deployment can create pressures on land use, food systems and biodiversity. As a result, the long-term role of first-generation oil crops in SAF production is likely to remain constrained by sustainability frameworks and evolving policy preferences.	↑	↑

Taken together, these trends increase the long-term availability of HEFA feedstocks relative to last year's outlook. By 2050, **total feedstock potential is now estimated at around 80 Mt**, an increase of 12 Mt (4 Bgal) compared to the previous Market Outlook. However, in the near term, intensifying competition for waste oils and lipid-based feedstocks from the road sector has **reduced the aviation claim on available feedstocks.** As a result, estimated SAF feedstock potential available to aviation in 2030 was revised downward by 5 Mt to 15 Mt.

Applying updated conversion yield assumptions, this translates into a 3.4 Mt (1.1 Bgal) reduction in projected HEFA SAF potential in 2030, more than offsetting the 2.7 Mt (0.9 Bgal) downward revision in SAF demand under the *Current Trends* scenario. As a result, the modelled HEFA tipping point remains broadly unchanged, with waste oil feedstocks for aviation still expected to become constrained in 2030.

In regions were sustainability requirements allow for 1G feedstock use, first-generation AtJ pathways could help to partially bridge the gap to meet SAF demand. Feedstock availability for the 1G AtJ pathway is estimated at around 20 Mt in 2050. However, even when combining HEFA and 1G AtJ, the feedstock pools remain too constrained to meet post-2030 SAF demand. This means that scaling advanced biofuel and e-SAF pathways remain critical to developing a sustainable and resilient aviation fuel supply system.

Global HEFA SAF potential

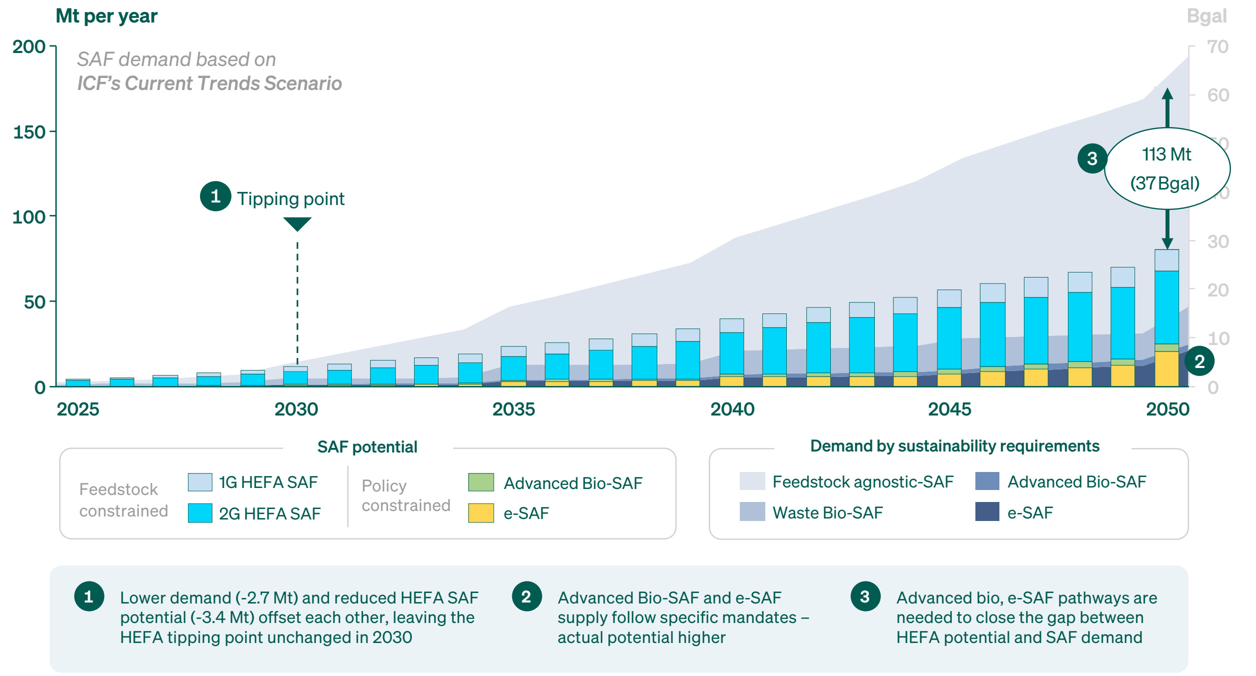


Figure 10: Overlaying SAF demand with HEFA supply potential suggests that the HEFA tipping point is reached by 2030

Fueling Energy Resilience through SAF

How can SAF contribute to energy resilience in countries dependent on fossil fuel imports?

Introduction

Geopolitical developments over the past year have reinforced that SAF carries broad strategic relevance, having brought energy security and fuel resilience back to the center of political and industrial debate. Recent disruptions, including the closure of the Strait of Hormuz, have highlighted a structural vulnerability in modern fuel systems: they have largely been optimized for efficiency and cost rather than resilience[26]. Aviation in particular, remains highly exposed due to its dependence on globally traded crude oil and refined jet fuel markets.

Aviation's growing fuel security challenge

Aviation's exposure extends beyond fuel price volatility alone. The sector also depends on complex global supply chains, maritime transport routes and refining infrastructure that can be disrupted by geopolitical tensions, trade restrictions or physical supply interruptions. These disruptions come at a significant cost. Research has shown that the post-Ukraine energy shock resulted in Europe paying 643 billion EUR above the expected baseline cost for fossil fuels, in little over a year[44]. Data has yet to point out the cost of the ongoing Middle East conflict, but early estimates predict that on jet fuel alone, the cost runs into the tens of billions of additional annual fuel cost for just Europe's three largest carriers[45].

At the same time, several regions are experiencing declining domestic refining capacity and increasing structural dependence on fewer external suppliers[46,47]. These are likely to be suppliers that can produce at the lowest marginal cost of oil. As refining capacity continues to consolidate globally while aviation demand remains relatively inelastic, exposure to external fuel shocks may increase further over time[48,49]. These dynamics create a broader strategic challenge for aviation: ensuring access to secure, affordable and resilient fuel supply in an increasingly uncertain geopolitical environment.

Regional self sufficiency for crude oil and jet fuel, 2023

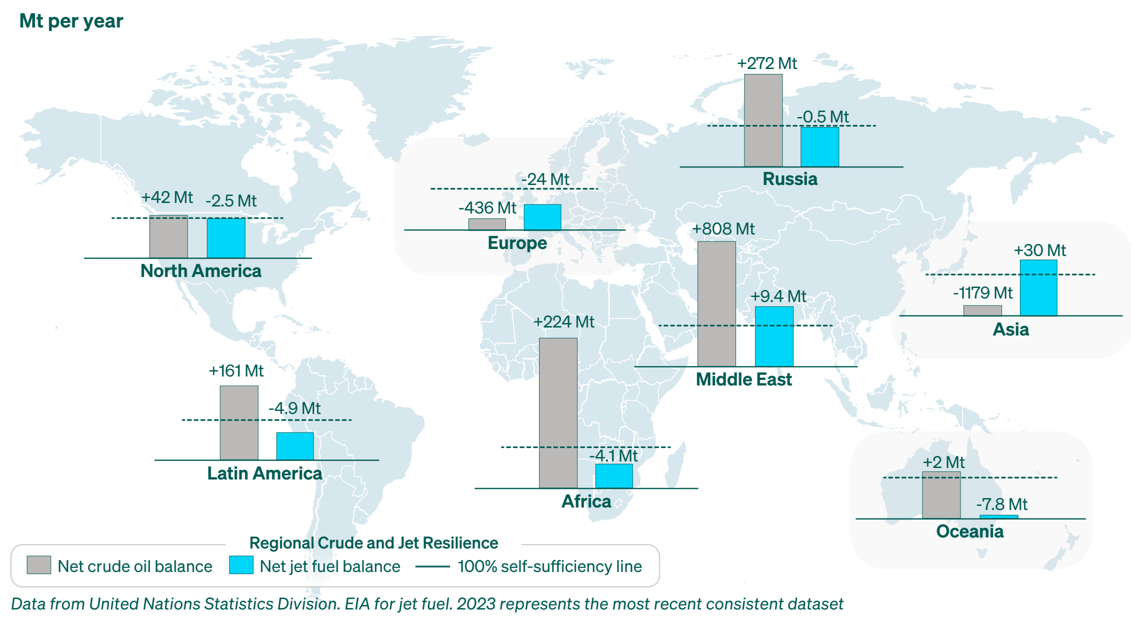


Figure 11: Europe, Asia and Oceania are particularly exposed to imports of crude oil or jet fuel

SAF as a lever for strategic resilience

Historically, periods of energy insecurity have accelerated investment in alternative energy systems that improve supply security and strategic autonomy. While elevated energy prices may create short-term political pressure against SAF policies due to concerns over fuel affordability and cost of living, they may simultaneously strengthen the longer-term strategic case for SAF and biofuels more broadly.

SAF can play a strategic role by broadening the aviation fuel supply base, creating a more diversified and flexible fuel system. Where SAF production is based on domestically available resources and supported by regional supply chains, it can reduce reliance on imported fossil fuels and strengthen resilience against external supply shocks.

Beyond fuel diversification, SAF development can also contribute to economic resilience by supporting domestic feedstock industries, enabling new industrial value chains, repurposing existing refinery infrastructure and retaining a greater share of fuel-related economic activity within regional economies.

Regional Resilience Pathways

A truly resilient SAF strategy is unlikely to look the same across regions. Regional differences in feedstock availability, refining infrastructure, industrial capabilities, geography and trade exposure mean that pathways toward resilient SAF supply will differ significantly across markets.
Some regions may be well positioned to develop SAF industries based on agricultural residues, municipal solid waste or biomass resources, while others may rely more heavily on electricity-based fuels enabled by renewable electricity or imported intermediates. Likewise, regions with existing refining infrastructure and integrated fuel logistics networks may face different transition pathways than those that are highly dependent on imported fuels from the outset.
In this chapter, we examine resilience pathways for regions most exposed to jet fuel supply shocks, identifying the specific vulnerabilities, structural dependencies and strategic levers through which SAF could strengthen regional fuel resilience over time.

Europe

Europe faces growing exposure to external fuel supply risks due to declining regional refining capacity and continued dependence on imported crude oil and jet fuel. Around 30% of jet fuel consumption is met through imports, while over 85% of crude oil supply to the EU is imported from outside of Europe[50]. This exposure is expected to increase further as European fossil fuel refining capacity could decline by more than 5 mbpd by 2050[46], driven by falling fossil fuel demand, tightening regulation, and growing competition from newer and more efficient refining hubs in Asia, the Gulf, and Africa[46,48].

SAF could help offset part of this decline by maintaining regional fuel production capacity and supporting new industrial value chains. If the current capacity outlook for Europe is fully realised, SAF projects would add 5 Mt (1.7 Bgal) of annual refining capacity on top of Europe's projected 53 Mt (18 Bgal) fossil jet fuel capacity by 2035. If regional SAF production scales in line with European mandates, a further 8 Mt (2.6 Bgal) of capacity could be added, reducing the projected regional jet fuel supply gap to around 2 Mt (0.7 Bgal), equivalent to roughly 5% of fuel consumption[c,51,52].

However, Europe's dominant SAF pathway also creates new structural dependencies. HEFA and co-processing account for almost 100% of current and nearly 85% of 2030 SAF production capacity.

[c] Depending on the refiner and region, utilization rates typically range between 80-90% and jet fuel yields can range between 8-15%. Estimates assume a 100% utilization rate and average regional jet fuel yields. Actual deficits are likely larger and surpluses smaller than capacity-based estimates. Data on regional refining capacities from Oil & Gas Journal's (OGJ) Worldwide Refinery Survey (2022) and OPEC World Oil Outlook 2050 (2025).

At the same time, Europe already relies heavily on imported waste oils. In 2022, approximately 70% of UCO used in EU biofuel consumption came from imported raw feedstocks, while across the EU and UK, 68% of net UCO imports came from China, Malaysia and Indonesia alone. By 2025, this figure reduced slightly to 57%, though net imported volumes of UCO overall have remained stable[53,54]. By 2035 projected HEFA SAF potential, based on regional feedstock, is estimated at only approximately 2 Mt (0.7 Bgal) annually[55], compared to roughly 3.9 Mt (1.3 Bgal) of projected HEFA and co-processing SAF capacity. This increases exposure to trade restrictions, export controls, and rising domestic demand in exporting regions such as China, Indonesia, Malaysia, and the United States. If these trade flows become disrupted, European HEFA facilities could face tightening feedstock access and increasing competition with renewable diesel and other biofuel sectors.

Europe jet fuel demand and capacity outlook for 2035

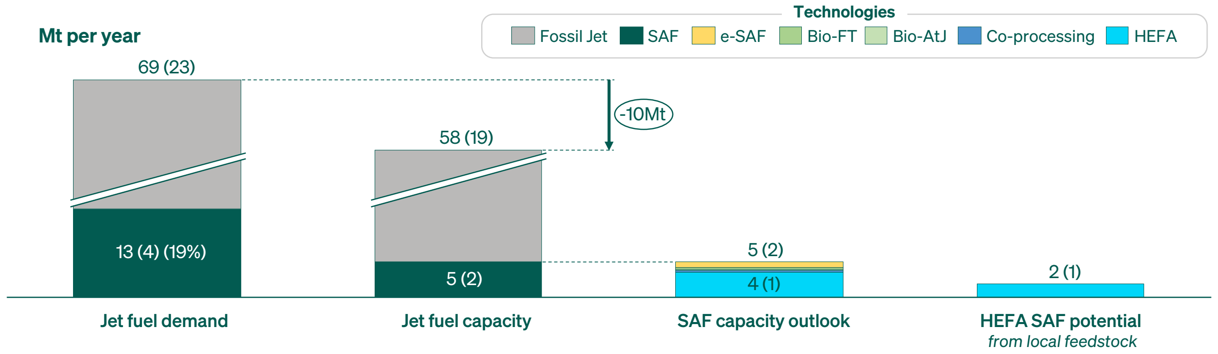


Figure 12: Europe's capacity outlook contains 3.9 Mt (1.3 Bgal) of HEFA SAF capacity, exceeding regional feedstock potential

Improving long-term resilience will therefore require diversification beyond HEFA toward pathways better aligned with Europe's industrial base and resource availability. E-SAF represents a particularly important long-term opportunity, accounting for around 70% of announced feasibility-stage capacity and supported by dedicated sub-mandates under ReFuelEU and the UK SAF mandate. Advanced biofuel pathways also offer an important diversification lever, particularly as Europe has significant brownfield advantages through ongoing refinery conversion projects, ethanol, and fuel logistics infrastructure[56]. Europe's roughly 8.5 Mt ethanol production base could provide selective long-term opportunities for 2G alcohol-to-jet conversion, although additional upstream and downstream infrastructure investment would still be required[57].

Asia

Asia has a stronger starting position than Europe in terms of physical refining capacity. The region has excess jet fuel refining capacity and remains a net exporter of jet fuel[c]. However, this does not fully translate into energy security, as around 60% of crude oil supply is sourced from the Gulf region[58]. This leaves the region exposed to crude supply shocks, even where domestic refining capacity is available.

Many countries in Asia are already using renewables and biofuels as part of broader energy security and industrial strategies. China's leadership in solar and wind demonstrates the region's ability to rapidly scale new energy industries, while biofuel and bioethanol blending mandates across Southeast Asia support domestic agriculture and refining industries. Recent oil market volatility has further reinforced this trend: Thailand reversed earlier plans to reduce biodiesel blending and implemented a 7% blend in 2026[59], Vietnam accelerated its E10 ethanol mandate[60], while Indonesia is moving towards a B50 biodiesel blend target.

This growing focus on domestic fuel resilience is also reshaping feedstock trade. Several countries are seeking to retain more value locally by limiting exports of waste-based feedstocks. Indonesia already restricts exports of POME and UCO, Malaysia is considering similar measures, and China has removed export tax incentives and introduced controls on UCO[61,6]. These policies support domestic refining and energy security, but could reduce the availability of Asian feedstocks for international markets.

SAF policy momentum is building across the region, but the resilience benefit will depend on whether emerging policies translate into firm domestic consumption rather than export-led production. Under the *Current Trends* scenario, Asia reaches only a 11% SAF blend by 2035, compared with 19% in Europe and 15% in Oceania. While most countries participate in CORSIA[62], only Singapore and South Korea have firm demand policies in place today, with others still moving from targets and roadmaps towards implementation. This creates a risk that capacity continues to develop ahead of domestic demand, with SAF volumes locked into export contracts rather than strengthening regional fuel resilience.

While Asia does enjoy comparatively large availability of waste oils, it also represents the fastest growing aviation region in the world. This means that regionally available lipid feedstocks are insufficient to meet projected 2035 SAF demand. Without investment in alternative pathways, Asia risks moving from crude import exposure toward new constraints around oils and fats.

Asia jet fuel demand and capacity outlook for 2035

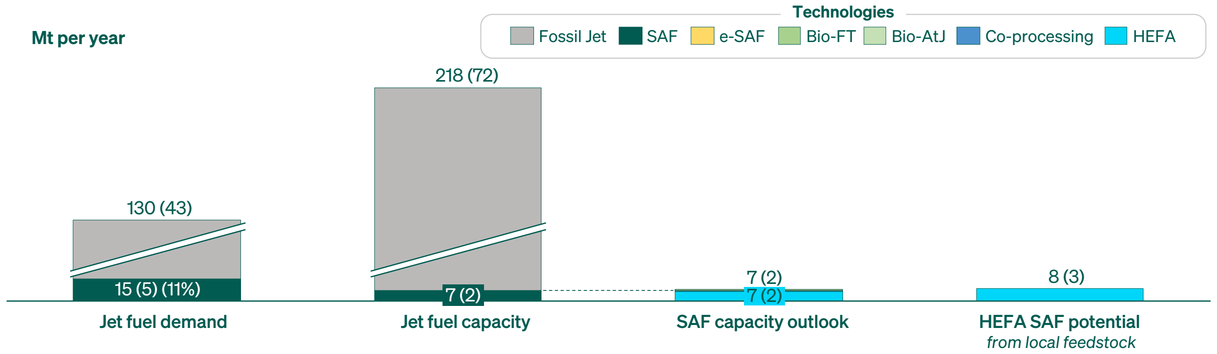


Figure 13: At 8 Mt (2.6 Bgal), Asia has a comparatively large HEFA SAF potential, but will still need to diversify pathways to meet 2035 demand

The region has several levers to reduce this risk. Advanced biofuels could make use of large volumes of agricultural residues, including rice straw and husks, bagasse, cassava residues, forestry residues, and municipal solid waste[63]. E-SAF also offers significant long-term potential, particularly in China and India, where renewable electricity deployment is accelerating. China's large electrolyzer manufacturing base and growing e-SAF project pipeline could position it as a regional anchor for synthetic fuel scale-up[64]. At the same time, Asia's large ethanol production base creates long-term opportunities for AtJ, although scaling this sustainably would require a shift toward 2G feedstocks[62].

Greater regional coordination will also become increasingly important as SAF demand policies develop across Asia. Without some degree of harmonization, fragmented sustainability frameworks and feedstock rules could create additional supply chain complexity and reduce market liquidity. Existing CORSIA sustainability principles could provide a useful starting point for regional alignment, helping to balance energy security objectives with environmental integrity and facilitating cross-border SAF trade.

Oceania

Oceania is one of the regions most vulnerable to disruptions in fuel supply. New Zealand and the Pacific Islands are completely dependent on imports of jet fuel, with most volumes coming from South Korea and Singapore, despite Papua New Guinea being a net exporter of crude[65,66,67,68]. Australia imports nearly 80% of its liquid fuels, with approximately 90% coming from Asia and approximately 60% linked to Gulf countries[69]. Prior to the 2026 Iran war, Australia reportedly only held 3 to 5 weeks of fuel reserves, well below the 90-day strategic reserve obligation under IEA guidelines[70]. This exposure is particularly large because several sectors central to the Australian economy, such as aviation, mining and heavy freight, remain highly dependent on liquid fuels[69].

Unlike Europe and parts of Asia, Oceania also has relatively limited domestic refining capacity and fuel logistics infrastructure. Australia previously had eight operating refineries, now reduced to two due to competition from large-scale Asian refineries and challenging economics[26]. Overall, the region has around 1.7 Mt (0.6 Bgal) of jet fuel refining capacity and is projected to face a roughly 9 Mt (3.0 Bgal) gap between regional jet fuel demand and refining capacity by 2035[c]. Fuel supply chains are also geographically fragile, nations are ocean-locked and dependent in large part on shipping and long-distance road transportation due to limited pipeline and storage infrastructure[69].

This creates a different challenge from Europe and Asia: Oceania starts from a more vulnerable position, with limited refining capacity and fragmented fuel logistics. The region has relatively limited brownfield conversion opportunities, meaning much of the future SAF industry would likely need to be built through new greenfield developments. However, this also comes with the potential to improve the economic resilience of regional communities, by adding new regional jobs and value creation opportunities across the SAF value chain.

While there is little policy development in New Zealand and the Pacific islands[71], momentum in Australia is promising, with the government increasingly positioning SAF within a broader fuel security and industrial strategy. The federal government recently reaffirmed supply-side support through its A$1.1 billion Cleaner Fuels Program and A$250 million for low carbon liquid fuels through the Future Made in Australia Innovation Fund. An additional A$14.8 billion has been committed toward strengthening fuel reserves and supply chain resilience, including support for domestic refining infrastructure[72]. The government also confirmed in the 2026-27 budget that it will introduce a demand measure, with the consultation process led by ARENA[73]. This ambition is also supported by industry – Qantas has set a voluntary 10% SAF target by 2030 and also invests in SAF project development via the Qantas Climate Fund[74]. However, the region's SAF market remains at an early stage, with no projects having reached post-FID stage despite a growing development pipeline concentrated in Australia.

Nevertheless, the region has a strong long-term resource position. Agricultural residues, municipal solid waste, sugarcane residues, sawmill residues, canola oil, coconut oil and tallow all represent potential feedstock opportunities[47,75]. Today, around 70% of Australian canola and approximately 80% of UCO are exported, much of which already supports low-carbon fuel production overseas. Existing sugarcane and bagasse supply chains in Queensland could also provide relatively near-term opportunities for SAF production[45]. While Australia boasts strong agricultural practices, sustainability standards for SAF should be in place to ensure any planned usage of 1G agricultural feedstocks strikes the right balance between sustainability, energy security and economic benefits.

Over the longer term, Oceania, and Australia in particular, holds some of the world's strongest structural advantages for e-SAF production. The region benefits from exceptional solar resources, abundant land availability, and one of the lowest projected green hydrogen cost trajectories outside China[40]. However, realizing this opportunity will require substantial enabling infrastructure, including CO_2 supply, transmission upgrades, hydrogen infrastructure, and long-term policy frameworks capable of supporting large-scale project development.

Oceania jet fuel demand and capacity outlook for 2035

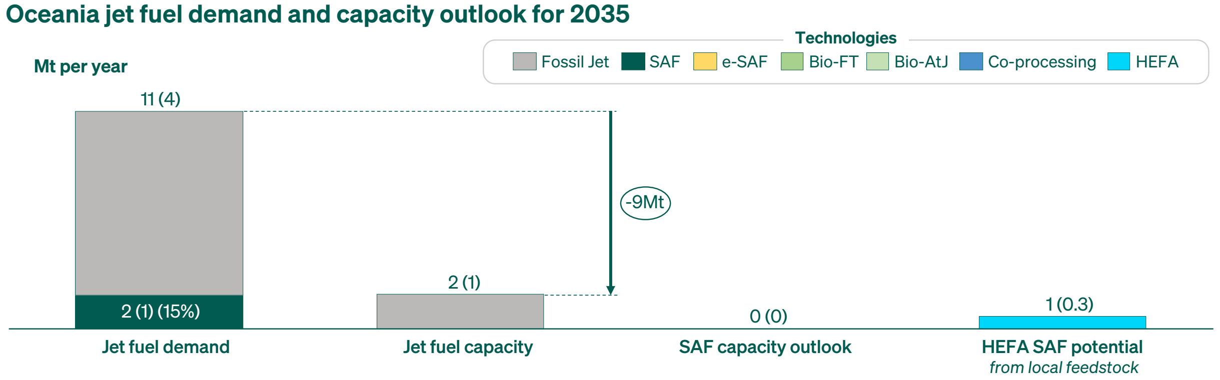


Figure 14: New SAF production capacity could help Oceania close its approximately 9 Mt (3.0 Bgal) jet fuel supply gap in 2035

Conclusion

The transition from fossil jet fuel to SAF does not automatically improve fuel resilience.
In several regions, current SAF pathways remain dependent on imported feedstocks, globally traded intermediates, or externally concentrated supply chains. As a result, SAF strategies should increasingly be evaluated not only through the lens of emissions reduction, but also in terms of energy security, resilience, and strategic autonomy.

These objectives are related, but not identical. Energy security is primarily concerned with ensuring sufficient and affordable fuel supply. Resilience requires diversification across feedstocks, technologies, and supply chains to reduce exposure to disruption. Strategic autonomy goes one step further, focusing on domestic industrial capability, local value creation, and reducing dependence on external actors for critical fuel supply chains.

The optimal balance between these objectives will differ by region. Regions with limited domestic feedstock availability may prioritize resilience through diversified imports and flexible supply chains, while regions with abundant renewable power or biomass resources may seek greater strategic autonomy through domestic production. In all cases, long-term resilience will require diversification beyond HEFA, and investment in advanced biofuels and e-SAF pathways aligned with regional industrial capabilities and resource availability.

List of Abbreviations

ARENA	Australian Renewable Energy Agency
ASTM	American Society for Testing and Materials
AtJ	Alcohol to Jet
Bgal	Billion gallons
CAAF/3	Third Conference on Aviation and Alternative Fuels
CI	Carbon Intensity
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DAC	Direct Air Capture
EPC	Engineering, Procurement, and Construction
ETS	Emission Trading Scheme
EU	European Union
FEED	Front-End Engineering Design
FID	Financial Investment Decision
FT	Fischer Tropsch
GHG	Greenhouse Gases
HEFA	Hydroprocessed Esters and Fatty Acids
HVO	Hydrotreated Vegetable Oil
iLUC	Indirect Land Use Change
kt	Kilo metric tonnes
LCFS	Low Carbon Fuel Standard
LNG	Liquefied Natural Gas
Mgal	Million gallons
MO	Market Outlook
Mt	Million metric tonnes
MtJ	Methanol to Jet
POME	Palm Oil Mill Effluent
R&D	Research and Development
RD	Renewable Diesel
RFS	Renewable Fuel Standard
RIN	Renewable Identification Number
SAF	Sustainable Aviation Fuel
U.S.	United States
UAE	United Arab Emirates
UCO	Used Cooking Oil
UK	United Kingdom

Annex

Asia	Europe	North America
Afghanistan Azerbaijan Bangladesh Bhutan Brunei Darussalam Cambodia China Hong Kong India Indonesia Japan Kazakhstan Korea, Democratic People's Republic of Korea, Republic of Kyrgyzstan Laos Macao Malaysia Maldives Mongolia Myanmar Nepal Pakistan Philippines Singapore Sri Lanka Taiwan, Province of China Tajikistan Thailand Timor-Leste Turkmenistan Uzbekistan Vietnam	Albania Austria Belarus Belgium Bosnia and Herzegovina Bulgaria Croatia Cyprus Czechia Denmark Estonia Faroe Islands Finland France Georgia Germany Gibraltar Greece Hungary Iceland Ireland Italy Latvia Lithuania Luxembourg Malta Moldova, Republic of Monaco Montenegro Netherlands North Macedonia Norway Poland Portugal Romania Serbia Slovakia Slovenia Spain Sweden Switzerland Ukraine United Kingdom	Canada Mexico United States **Oceania** American Samoa Australia Christmas Island Cocos (Keeling) Islands Cook Islands Fiji French Polynesia Guam Kiribati Marshall Islands Micronesia, Federated States of Nauru New Caledonia New Zealand Niue Norfolk Island Northern Mariana Islands Palau Papua New Guinea Samoa Solomon Islands Tonga Tuvalu Vanuatu Wallis and Futuna

Rest of World		
Algeria Angola Anguilla Antigua and Barbuda Argentina Armenia Aruba Bahamas Bahrain Barbados Belize Benin Bermuda Bolivia, Plurinational State of Bonaire, Sint Eustatius and Saba Botswana Brazil Burkina Faso Burundi Cabo Verde Cameroon Cayman Islands Central African Republic Chad Chile Colombia Comoros Congo Congo, The Democratic Republic of the Costa Rica Côte d'Ivoire Cuba Curaçao Djibouti Dominica Dominican Republic Ecuador Egypt El Salvador Equatorial Guinea Eritrea	Eswatini Ethiopia Falkland Islands (Malvinas) French Guiana Gabon Gambia Ghana Greenland Grenada Guadeloupe Guatemala Guinea Guinea-Bissau Guyana Haiti Honduras Iran, Islamic Republic of Iraq Israel Jamaica Jordan Kenya Kuwait Lebanon Lesotho Liberia Libya Madagascar Malawi Mali Martinique Mauritania Mauritius Mayotte Montserrat Morocco Mozambique Namibia Nicaragua Niger Nigeria Oman Panama Paraguay	Peru Puerto Rico Qatar Réunion Russian Federation Rwanda Saint Barthélemy Saint Helena, Ascension and Tristan da Cunha Saint Kitts and Nevis Saint Lucia Saint Martin (French part) Saint Pierre and Miquelon Saint Vincent and the Grenadines Sao Tome and Principe Saudi Arabia Senegal Seychelles Sierra Leone Sint Maarten (Dutch part) Somalia South Africa South Sudan Sudan Suriname Syrian Arab Republic Tanzania, United Republic of Togo Trinidad and Tobago Tunisia Turkey Turks and Caicos Islands Uganda United Arab Emirates Uruguay Venezuela, Bolivarian Republic of Virgin Islands, British Virgin Islands, U.S. Yemen Zambia Zimbabwe

Table 1: Regional classifications are applied consistently throughout the outlook. In certain cases, specific countries, such as the U.S. may be treated as standalone categories when explicitly mentioned. Additionally, countries in Oceania are generally included under "Rest of World" unless stated explicitly.

HEFA Tipping Point Methodology

Step 1: Model the SAF demand by sustainability requirements

- We classify projected SAF demand through 2050 according to sustainability categories: feedstock-agnostic SAF, waste-based SAF, advanced bio-SAF, and e-SAF. These categories are aligned with regional policy frameworks and follow the *Current Trends* demand scenario.
- For feedstock-agnostic demand, where no specific production pathway is mandated, we assume that supply will follow the cost merit order, influenced by both carbon intensity (CI) scores and available incentives. Under current conditions, this results in a preference for HEFA production.

Step 2: Assess the SAF production potential per pathway

- We estimate the global availability of major feedstock groups through 2050, focusing on:
  - → Waste oils
  - → Animal fats
  - → Oil cover crops
  - → Vegetable oils
  - → 1G sugars
- We then estimate aviation's accessible share of these feedstocks and apply pathway-specific conversion yields to calculate total SAF production potential for each category.

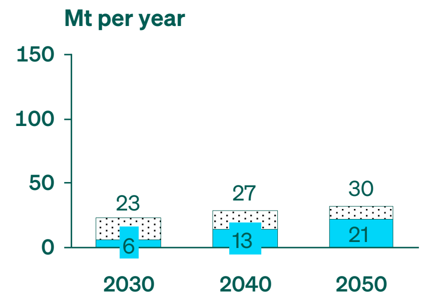
Step 3: Determine the HEFA tipping point

- By comparing modelled HEFA-SAF demand against its production potential based on feedstock availability, we can identify the tipping point—the moment when demand for HEFA feedstocks exceeds supply capacity.

Step 4: Assess the SAF production potential per region

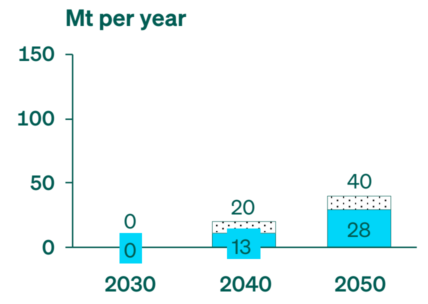
- Given the lack of harmonized data, we estimate regional feedstock availability based on multiple global and regional SAF and biofuel feedstock assessments by IATA, RSB, the European Commission, CSIRO & Boeing, supplemented by SkyNRG internal analysis.

Waste oils availability



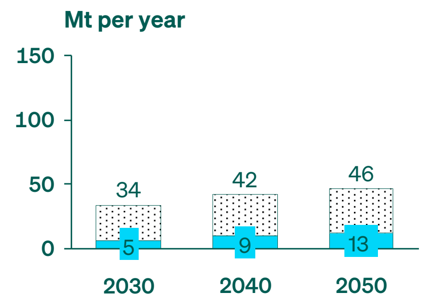
- → Decrease since last year, based on methodological refinements and trend impacts
- → Growth in availability driven by population growth and improvements in collection efficiency
- → Aviation claim expected to grow, as other modes electrify and adopt alternative fuel options

Oil cover crops availability



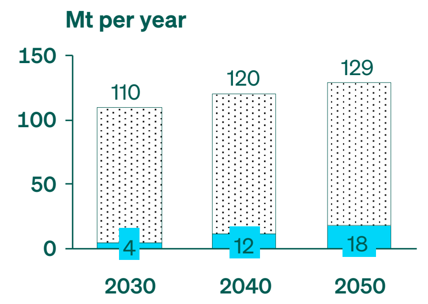
- → Increase in long-term outlook since last year, based on trend impacts
- → Assuming cover crops become available from 2030 onwards, reaching full potential by 2050
- → Aviation claim expected to grow, driven by electrification and evolving fuel options in other transport modes

Animal fat cat 1,2 & 3 availability



- → Decrease since last year, based on trend impacts
- → Growth in availability based on expected industry growth, factoring in sustainability trends
- → Aviation claim expected to grow, driven by electrification and evolving fuel options in other transport modes

Vegetable oils availability



- → Decrease in short term; increase in long term since last year, based on trend impacts
- → Growth in availability based on industry outlooks
- → Aviation claim expected to grow slightly, limited by distortion concerns and constraints in growth of agricultural acreage

Aviation claim

Figure 15: Based on the different HEFA feedstock availabilities and their conversion factor to SAF, the HEFA SAF potential is estimated to be 10.4 Mt (3.4 Bgal) in 2030, growing to 56 Mt (19 Bgal) by 2050

End Notes

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About SkyNRG
Since 2009, SkyNRG has been a change maker in the aviation industry. We are dedicated to supplying and producing high-integrity Sustainable Aviation Fuel (SAF), making sustainable aviation a reality. Collaboration is fundamental to achieving our ambition. We nurture genuine relationships with global partners in our drive to make SAF *the* alternative to fossil jet fuel.
Our in-house team of SAF experts have helped over 60 airlines and corporates reduce their climate impact using the Book & Claim mechanism; the most transparent and traceable way to support aviation sustainability with real emission reductions.
Sustainability is woven into the fabric of our company. We maintain an independent Sustainability Board, which advises the company on feedstocks and provides strategic guidance on wide-ranging sustainability issues. SkyNRG operations are certified against the RSB EU RED, CORSIA, and Book & Claim standards.

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