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SAF ASSOCIATION

A roadmap for scaling Sustainable Aviation Fuel in India

September 2025

Table of contents

Foreword

India's aviation sector is entering a pivotal phase of transformation—one that demands a strategic balance between growth and sustainability. As global attention intensifies on climate action, Sustainable Aviation Fuel (SAF) has emerged as a critical enabler of aviation decarbonisation. For India, this is not merely an environmental imperative—it is a strategic opportunity.

India is uniquely positioned to become a global SAF leader, with a robust refining ecosystem, abundant feedstocks, a growing aviation market, and favourable factors of production. With the government's participation in international frameworks such as CORSIA and the announcement of indicative blending targets, the policy landscape is evolving to support this transition. However, unlocking SAF at scale will require coordinated action across stakeholders, targeted investment, and a clear roadmap.

This report presents a comprehensive strategy to scale SAF in India. It outlines the structural challenges—fragmented supply chains, infrastructure gaps, and conversion risks—and proposes actionable solutions across six strategic levers. From establishing SAF hubs and marketplaces to enabling modular infrastructure and integrating SAF into India's climate taxonomy, the recommendations are designed to catalyse systemic change.

At Deloitte, we believe sustainability and economic growth are not mutually exclusive. Through this report, we aim to support policymakers, industry leaders, and investors in shaping a resilient, future-ready aviation ecosystem. The time to act is now. With the right vision and execution, India can not only meet its domestic SAF demand but also emerge as a key supplier in the global aviation fuel market.

This report, built on in-depth conversations with senior leaders across India and the global aviation ecosystem, aims to mark a meaningful industry milestone. As you read it, we hope it catalyses action and a shared ambition to navigate the complexities of this transition. Together, we can accelerate the sector's shift to sustainability and ensure aviation remains a symbol of progress and opportunity for future generations.

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Foreword

Civil aviation is a well-acknowledged contributor to global carbon emissions, prompting the international community—under the leadership of ICAO—to adopt a coordinated set of mitigation measures. Among the most promising of these is the use of Sustainable Aviation Fuel (SAF), recognized as a critical lever in reducing aviation's life-cycle emissions.

Some countries have already begun SAF deployment, setting a precedent that India is well-positioned to follow. With the rapid growth in air traffic projected for India, now is an opportune moment to convene stakeholders across the value chain to build a cohesive, forward-looking SAF ecosystem. This aligns with the broader global momentum toward sustainability, as industries worldwide integrate environmental responsibility into core strategies.

The decarbonization of aviation will not rely on a single solution. It will require a mix of advanced technologies, operational efficiencies, and—crucially—a significant scale-up of SAF production and use. Importantly, this energy transition must be inclusive and truly global. It must engage all nations, regardless of geography or stage of development, to ensure equitable progress toward climate goals.

SAF offers the aviation industry a unique opportunity to dramatically reduce emissions while leveraging existing aircraft and fueling infrastructure. However, realizing this potential requires overcoming challenges across the SAF lifecycle—from feedstock availability and conversion technologies to logistics, cost parity, and policy support.

India's SAF roadmap must capitalize on its diverse, indigenous feedstock base—particularly agricultural residue, waste oils, and municipal solid waste. Several ASTM-approved technology pathways offer viable routes for SAF production.

Each of these pathways brings strategic advantages, but success depends on coordinated efforts across multiple fronts—policy support, investment in R&D and infrastructure, robust supply chains, and the scaling of early pilot successes, such as the Panipat refinery, into national and regional models for SAF production and adoption.

This platform provides a timely opportunity to galvanize action, bring together critical stakeholders, and shape a shared roadmap for SAF deployment in India. By aligning ambition with collaboration, we can ensure that SAF becomes not just a technological innovation but a cornerstone of sustainable aviation—and a meaningful contribution to global climate action.

Jimmy Olsson
President
SAF Association; and
Founder, ZR2 Group

The global aviation sector stands at the crossroads of two urgent imperatives, meeting the demands of a rapidly expanding air travel market and ensuring that this growth is aligned with our collective responsibility to decarbonize. Sustainable Aviation Fuel (SAF) is not merely an alternative; it is the single most impactful lever available today to reduce lifecycle emissions in aviation without compromising on safety, scale, or speed of deployment.

India is uniquely positioned to shape this future. Blessed with a rich agrarian economy, an entrepreneurial spirit and enabling policy frameworks, the nation has both the capacity and the responsibility to lead. As the world's fastest-growing aviation market, our dual challenge and opportunity lie not only in meeting domestic blending mandates, but also in positioning India as a trusted global hub for SAF.

This report captures both the complexity and the promise of that journey. It explores the evolving global and Indian SAF landscape, technology pathways, feedstock economics, and the policy frameworks influencing supply, demand, and trade. Equally, it highlights the opportunities across the value chain whether for farmers aggregating biomass, innovators advancing conversion technologies, airlines securing offtake, or governments designing supportive policy.

I personally see SAF not as a standalone fuel but as a cornerstone of a broader bioeconomic transition, one that links agriculture with industry, rural livelihoods with global markets, and climate commitments with economic growth. The road ahead may seem challenging, but the vision is clear: **"India must seize this moment to lead."**

I trust this report will serve as both a compass and a catalyst guiding airlines, policymakers, financiers, technology providers, and entrepreneurs toward collective action in scaling SAF. The decisions we take in this decade will shape the sustainability of aviation, define India's place in the global clean energy economy, and secure a cleaner, more resilient future for generations to come.

Vijay Nirani
Senior Vice President
SAF Association; and Managing
Director, TruAlt Bioenergy

Foreword

At the World Sustainable Development Summit 2021, our Hon'ble Prime Minister, Shri Narendra Modi, reminded us that the ideals of Bahujan Hitay, Bahujan Sukhay—the well-being and happiness of the greatest number—can only be realized through development that is both inclusive and sustainable. Aviation is a powerful symbol of progress. It connects cities, strengthens economies, and opens opportunities across borders. But this progress must not come at the cost of our environment. As India rapidly emerges as one of the world's fastest-growing aviation markets, we must act decisively to ensure that our skies remain not only open—but clean.
In this context, Sustainable Aviation Fuel (SAF) presents a transformative opportunity. It is not just a technological solution; it is a strategic enabler of climate action, green growth, and economic resilience.

The SAF Association—an industry-driven coalition—has brought together a wide spectrum of stakeholders: policymakers, investors, researchers, refineries, airlines, technology providers, and financial institutions. Together, we aim to build a thriving SAF ecosystem in India.

SAF is the most feasible and immediate pathway to decarbonize air travel in India and globally over the next 15 to 20 years. Its potential extends well beyond carbon reduction. The benefits of scaling SAF are multi-dimensional—waste reduction, energy diversification, rural income, innovation, and employment generation.

By investing in SAF production, India can create tens of thousands of green jobs across the value chain—from feedstock collection and bio-refining to logistics and distribution, Improve air quality and public health by reducing emissions and improving waste management, support farmers, particularly those involved in collecting agricultural residues, by creating new income streams and enhance national energy security by reducing dependence on imported fossil fuels. Feedstock selection, land use, and water resource management must be carefully regulated to avoid unintended ecological consequences. A holistic life-cycle assessment is essential to safeguard environmental integrity and ensure the long-term success of this initiative.

Economic modeling suggests that scaling the SAF sector in India could unlock up to $2.8 billion in annual macroeconomic benefits, with multiplier effects extending far beyond aviation. The urgency for SAF adoption in India is not just about reducing emissions. It is about future-proofing our aviation sector, ensuring economic resilience, and creating a sustainable growth model that serves both people and the planet. Let us make our skies not just a symbol of progress, but a beacon of sustainability!!

Rohit Kumar

Secretary General
SAF Association

Aviation is a key enabler of economic development, connecting people, markets, and ideas across the globe. However, expanding access to aviation and its benefits cannot come at the cost of the environment. The COVID-19 pandemic has further underscored the urgent need to balance economic growth with environmental preservation. If aviation is to continue its trajectory of growth while reducing its environmental footprint, a transition to **Sustainable Aviation Fuel (SAF)** is not just desirable — it is essential.

India has demonstrated a steadfast commitment to achieving the targets of the Paris Agreement, and we are on track to meet them, likely ahead of schedule. We also possess a unique advantage — abundant biomass resources, much of which currently go unused or are burned, contributing to air pollution and health hazards. By converting this biomass into SAF, India has the potential to harness a powerful, sustainable resource — one that could not only meet our domestic aviation fuel needs but also position us as a global leader in SAF production and export.

Adopting SAF as the primary fuel for the Indian aviation industry is undoubtedly an ambitious goal. It comes with significant challenges — technological, financial, and regulatory. Overcoming these will require strong collaboration across stakeholders, from government and industry to academia and civil society.

I am heartened by the enthusiastic response from SAF stakeholders for the first-of-its-kind SAF Conclave, organized by the SAF Association. The participation of key leaders from the aviation and energy sectors reflects a collective willingness to explore new opportunities and work together toward a sustainable future.

Together, we can reshape the future of aviation, positioning India at the forefront of clean energy innovation and helping fulfill the vision of Atmanirbhar Bharat (self-reliant India) as envisioned by our Honourable Prime Minister.

Dr. Shantanu Gupta

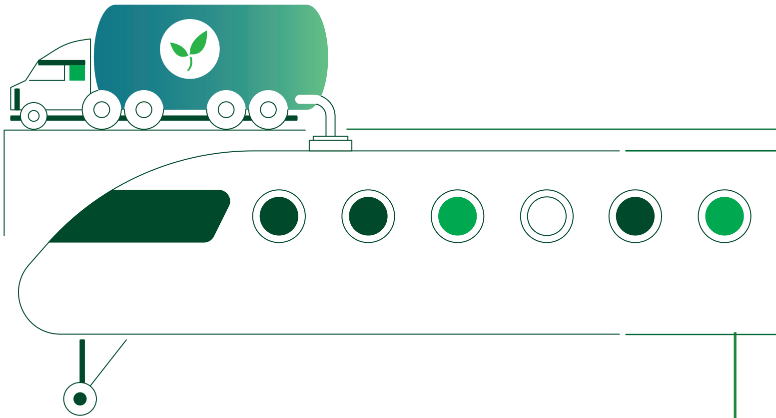
Co-Chair
SAF Marketing Committee, SAF Association;
and Former ED, Indian Oil

Executive summary

India's aviation sector is forecasted to grow at ~11 percent over the next few years due to evolving passenger preferences for air travel, increasing Tier 2/3 cities connectivity, aircraft capacity addition and infrastructure development. With growing passenger and freight traffic, India's demand for Aviation Turbine Fuel (ATF) will also increase. Additionally, with the Indian government's push for electrification in road transportation, the share of aviation in India's transport emissions will likely double from ~5 percent to 8 percent to 10 percent by 2030.[1]

Aviation decarbonisation can be achieved through multiple levers such as operational improvement, hydrogen fuel, electric aircraft and Sustainable Aviation Fuel (SAF). Operational improvement initiatives, which have helped the aviation sector reduce fuel consumption in the last two decades, can deliver only a limited impact in the future. New technologies such as hydrogen fuel and electric aircraft are still nascent, and the forecast for any meaningful and commercial-scale deployment is only after 2040. As a result, SAF is emerging as a key decarbonisation lever expected to contribute between 53 percent and 66 percent to achieving the net-zero targets for the aviation sector.

Globally, policy momentum is driving SAF demand. The International Civil Aviation Organisation (ICAO) has launched the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which caps emissions from 2024 at 85 percent of 2019 levels to drive decarbonisation. In parallel, countries are introducing SAF blending mandates , with the EU and UK setting the most advanced and stringent frameworks, including clearly defined emission thresholds, feedstock eligibility rules and pathway-specific sub-targets for advanced technologies. Countries across Asia-Pacific, Latin America and the Middle East are also introducing blending mandates, emissions-reduction targets and national SAF roadmaps. While policies vary in scope and maturity, many now include clear timelines, enforcement mechanisms and formal roadmaps that signal strong market potential.



India accounts for only ~2.5 percent of the global ATF demand yet has a strong presence in the ATF supply ecosystem with ~50 percent of its ATF production getting exported. The country also has abundant feedstock resources such as Agricultural Residues, Used Cooking Oil, and Municipal Solid Waste, which can be harnessed for SAF production. To realise this potential, the Indian Government has set indicative SAF blending targets of 1 percent by 2027 and 2 percent by 2028, positioning India to capitalisze on the rising global demand for SAF.

However, realising India's SAF potential will require addressing key structural barriers. Market mechanisms are evolving, with limited transparency and coordination between feedstock suppliers, producers and off-takers. Infrastructure development is early and significant investment will be required in blending, logistics and midstream facilities to ensure SAF availability at airports and demand hubs. Economics also remain challenging, as SAF currently costs two to five times more than conventional jet fuel, depending on the technology pathway and chosen feedstock and entails high upfront capital requirements. In addition, while Agricultural Residues, Used Cooking Oil and Municipal Solid Waste are available, supply chains are fragmented and seasonal, making it challenging to aggregate feedstock at a consistent, bankable scale.

To move from ambition to action, India must adopt a strategic approach built around six key levers:

- Set binding SAF blending mandates with a clear roadmap, outlining eligible feedstocks, sustainability criteria, and enforcement mechanisms
- Establish SAF production and offtake hubs to integrate stakeholders, scale infrastructure, aggregate feedstock, and mobilise finance
- Establish a marketplace, both physical and digital, to connect feedstock aggregators (farmers, cooperatives, municipalities , used cooking oil suppliers, etc.) with off takers (SAF producers, refineries)
- Develop a decentralized SAF registry to enable transactions between producers and off takers
- Recognisze SAF as a green activity within India's Climate Taxonomy, aligning qualification criteria with global frameworks, to unlock access to sustainable and blended finance
- Incentivise and develop modular blending and storage units at key airports and offtake hubs to enable on-site SAF blending

India's emissions are expected to grow

Aviation has led to a more connected India and continues to play a key role in the country's economic growth. While India is currently the third-largest domestic aviation market by passenger traffic, behind the US and China,[2] it is also highly under-penetrated in domestic and international seats per capita compared with some of its global counterparts.[3] India's passenger traffic is forecast to register ~10 percent CAGR from ~220 million in 2023-24 to ~390 million in 2030.[4] Furthermore, its freight traffic is expected to post ~13 percent CAGR from ~2.4 million tonnes in 2023 -24 to ~5.1 million tonnes in 2030.[5] This growth is expected to be driven by evolving passenger preferences for air travel, increasing Tier 2/3 cities connectivity, aircraft capacity addition and infrastructure development.

In this context, the severity of aviation emissions is estimated to increase. The demand for Aviation Turbine Fuel (ATF) in India is estimated to double from ~8.2 million tonnes in 2024 to 15–16 million tonnes in 2030.[6] Moreover, the Indian government has set an ambitious target of achieving 30 percent EV penetration in domestic sales of automobiles by 2030; the Council on Energy, Environment and Water (CEEW) estimates that one-third of the four-wheelers and half of the two-wheelers sold in 2030 could be electric.[7] As a result, domestic aviation is forecast to emerge as one of the key sources of emissions within India's transportation sector, doubling from 5 percent to nearly 8–10 percent by 2030.

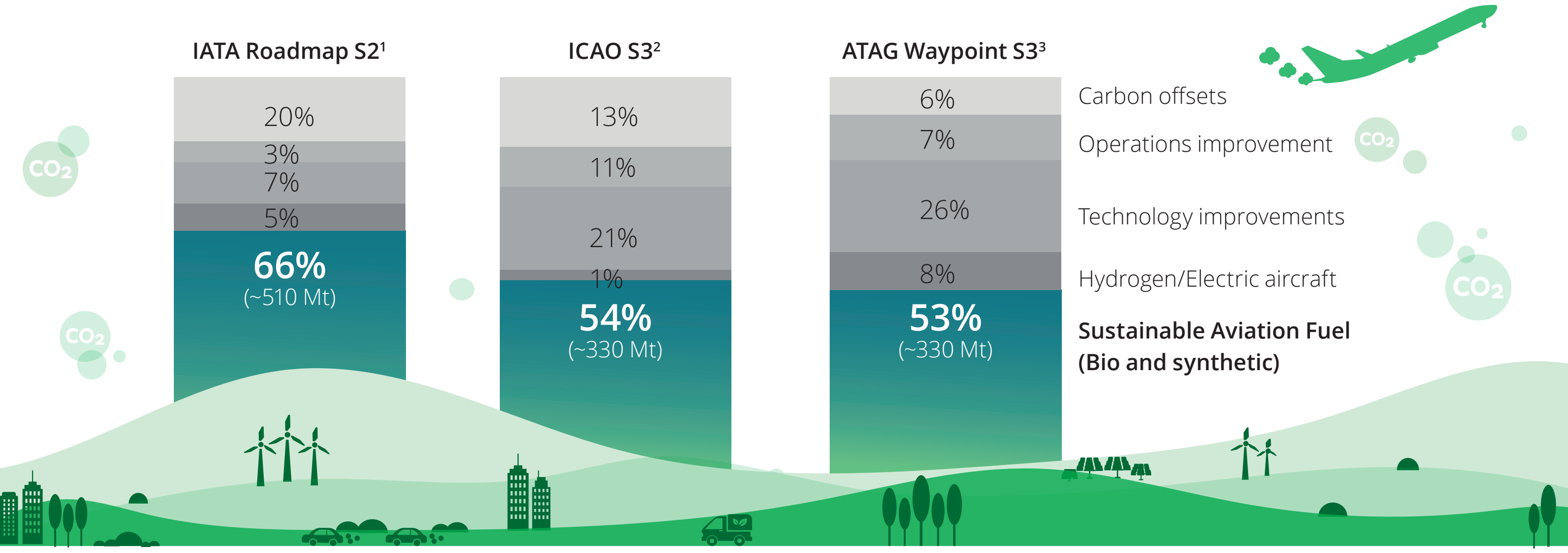
SAF will play a key role in decarbonising aviation

For the last few years, **operational improvements** have been used to decarbonise aviation. Operational improvement measures, such as weight reduction, aerodynamics optimisation and system improvements, have improved fuel efficiency, resulting in ~55 percent improvement in fuel burn per passenger per km since the 1990s.[8] Other improvement measures, such as optimised air traffic management operations, limited use of auxiliary power units and reduced taxi time, have also contributed to decarbonisation efforts. While these measures can be scaled rapidly, they can only deliver a limited impact in the future. Developing **new aircraft technologies** is a crucial second lever, although it is still in its early stages. Despite its promising potential, the difficulty in developing and deploying emerging aircraft technologies could lead to delays in attaining commercial maturity.

Carbon offsetting is the third lever that indirectly impacts carbon emissions. It involves compensatory measures such as carbon credits and green certificates to offset emissions. As an indirect carbon emission reduction mechanism, carbon offsetting has faced criticism in recent years for being poorly regulated, with concerns about greenwashing, temporary reduction and inaccurate or non-standard measurements prevailing across the market.

Due to feedstock availability and rapidly scaling technology pathways, **SAF** emerges as one of the most essential decarbonisation levers. SAF refers to liquid biofuel produced sustainably from feedstocks with no environmental challenges, such as used oils and agricultural residues, or synthetically through a process that captures carbon directly from the air.

Decarbonisation levers for aviation sector across 2050 net-zero roadmaps.



Note: 1. IATA Roadmap S2 refers to IATA's Net Zero Roadmap published in 2023; 2. ICAO S3 refers to ICAO's roadmap considering Aggressive/speculative scenario, medium traffic growth; 3. ATAG Waypoint S3 refers to roadmap with aspirational and aggressive technology perspective

Source: IATA, Aviation Benefits, ICAO, Deloitte analysis

Mandates and Net Zero commitments are driving SAF demand

CORSIA: A key framework introduced by ICAO to address carbon emissions from international aviation.
International Civil Aviation Organization (ICAO) has introduced the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) to limit aviation emissions to 85 percent of 2019 levels for 2024–2035, requiring airlines to offset or reduce emissions above this threshold. The implementation strategy is phased out. Until 2026, only flights between States that volunteer to join CORSIA are subject to offsetting. From 2027, compliance becomes mandatory for all international flights, except those to/from least developed, small island, landlocked countries, or states with <0.5 percent of 2018 global revenue tonne-kilometre (RTKs), unless they opt in voluntarily. To date, 130 states have confirmed their voluntary participation in CORSIA from 1 January 2026, signalling their commitment to contributing to global efforts to achieve carbon-neutral growth in international aviation.[9] Airlines can lower offsetting obligations using SAF, but only fuels certified against 14 sustainability criteria defined by ICAO qualify as CORSIA-eligible.[10]

Sustainability standards for SAF operators to meet CORSIA eligibility

1. **Greenhouse Gases (GHG)** CORSIA SAF should achieve at least a 10% net GHG reduction compared to baseline aviation fuel life-cycle emissions
2. **Carbon stock** CORSIA SAF should not be made from biomass obtained from land/aquatic systems with high biogenic carbon stock
3. **GHG reduction permanence** Emission reductions attributed to the CORSIA SAF should be permanent
4. **Air quality** CORSIA SAF production should minimize negative effects on air quality
5. **Water Quality** CORSIA SAF production should maintain or enhance water quality and availability
6. **Conservation** CORSIA SAF production should maintain biodiversity, conservation value and ecosystem services
7. **Waste and Chemicals** CORSIA SAF production should promote responsible management of waste and use of chemicals
8. **Soil** CORSIA SAF production should maintain or enhance soil health
9. **Seismic and vibrational** Production of CORSIA SAF should minimize seismic, acoustic, and vibrational impacts
10. **Human and labour rights** CORSIA SAF production should respect human and labor rights
11. **Land use rights and land use** CORSIA SAF production should respect land use rights including indigenous and/or customary rights
12. **Water use rights** CORSIA SAF production should respect prior formal or customary water use rights
13. **Local and social development** CORSIA SAF production should contribute to social and economic development
14. **Food security** CORSIA SAF production should promote food security in food insecure regions

- Compliance with Themes 1 through 9 will be assessed by CORSIA approved sustainability certification schemes (SCS)
- Themes 10, 11, and 12 can be demonstrated to the SCS through a national attestation from the State of production, without further assessment by the SCS
- For Themes 13 and 14, the economic operator will report the actions taken to meet the criteria to the SCS, with no further judgment required by the SCS

Source: CORSIA Sustainability criteria for CORSIA eligible fuels, Deloitte analysis.

Global SAF markets are ready for takeoff

Policy momentum for SAF is no longer concentrated in the US, EU and UK. Across Asia-Pacific, Latin America and the Middle East, governments are actively implementing SAF blending mandates and targets.

Global SAF mandates and targets

REFuelEU mandates 2 percent SAF at all union airports by 2025, rising to 70 percent by 2050, with e-SAF reaching 1.2 percent by 2030 and 35 percent by 2050

UK SAF mandate targets 10 percent SAF blending (including a 0.5 percent PtL sub-target), rising to 22 percent by 2040

Asia Pacific

China
50,000 ton target by 2025 in its 14th Five-Year Plan, a 5 percent SAF blending mandate by 2030 is expected.

Japan
10 percent SAF mandate by 2030, covering all departing flights and fuel suppliers, with a minimum 50% lifecycle GHG reduction.

Indonesia
Proposes a 1 percent blend by 2027, increasing a 2.5 percent by 2030, under a formal SAF roadmap.

Singapore
1 percent SAF blending target by 2026, with the potential to increase to 3-5 percent by 2030.

Thailand
Non-binding targets of by 1 percent by 2026, 1-2 percent by 2030, and upto 8 percent by 2036.

Middle East and Latin America

UAE
Voluntary 1 percent SAF target by 2031, with a goal to produce 700 million litres annually by 2030.

Turkey
Proposed a 1 percent blend by 2025, rising to 5 percent by 2030 for international flights.

Saudi Arabia
Exploring SAF policies, but no mandates or targets have been announced to date.

Brazil
Binding SAF policy introduced in 2024 requires annual GHG reductions from domestic aviation of 1 percent starting in 2027, 3 percent by 2030 and 10 percent by 2037.

Chille
Launched a SAF roadmap targeting 50 percent SAF use by 2050, prioritizing domesic PtL production.

Source: Desk research, Policy documents, Deloitte analysis

What sets leading SAF mandates apart

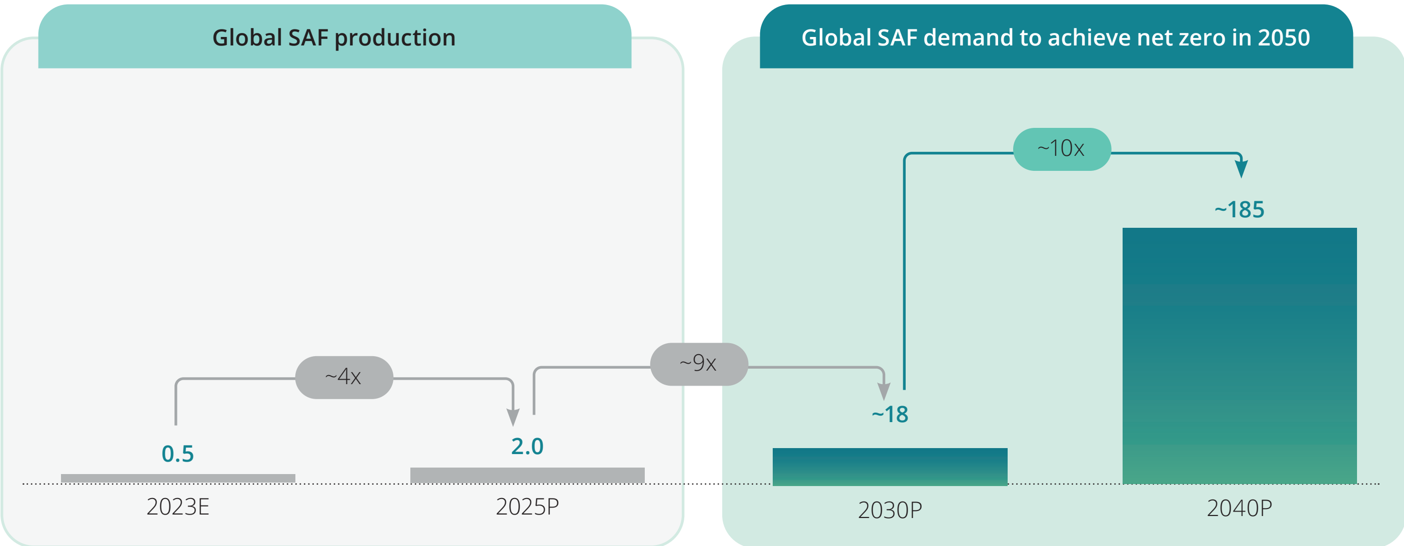
Comparison of CORSIA, UK and EU SAF mandates

	CORSIA	UK SAF mandate	ReFuelEU
	Applicability: International flight operators	**Applicability:** Suppliers providing ≥15.9 TJ (~468,000 litres) of fossil aviation fuel annually	**Applicability:** Fuel suppliers to Union airports (>800,000 passengers or >100,000 tons freight) and aircraft operators (≥500 passenger flights or ≥52 cargo flights from Union airports)
1 **Emission reduction thresholds that are clear and ambitious**	SAF life-cycle emissions must be at least 10 percent lower than the life-cycle emissions of fossil-based fuel.[10]	SAF must achieve a minimum 40 percent reduction in life cycle Green House Gas (GHG) emissions compared to the fossil jet fuel baseline.[11]	Bio SAF must achieve at least a 65 percent reduction in net life-cycle emissions, while e-SAF (RFNBO) life-cycle emissions savings must exceed 70 percent.[12]
2 **Feedstock eligibility criteria that safeguard sustainability and prevent land-use conflicts**	Only certified feedstocks, aligned with ICAO sustainability criteria, are eligible for SAF production.	Eligible feedstocks include wastes, Agri residues and non-food cellulosic or lignocellulosic materials, with a clear definition of feedstocks applicable for Hydrotreated Esters and Fatty Acids (HEFA) cap.[13]	The EU Renewable Energy Directive (RED II) defines eligible feedstocks (wastes, residues, oils, fats, etc.). SAF is restricted from feed- and food-crop-based feedstocks (e.g., crude palm oil, sugarcane, molasses).[14]
3 **Pathway-specific targets that promote advanced technologies and next-generation feedstocks**	No specific mandate.	A power-to-liquid obligation requires e-SAF to make up 0.2 percent of jet fuel demand by 2028, rising to 3.5 percent by 2040.[15] HEFA's allowable share will decline annually from 100 percent in 2025 to 42 percent in 2040, encouraging the use of advanced feedstocks.	Synthetic aviation fuels (e-SAF) must account for 1.2 percent of jet fuel use at all EU airports by 2030, increasing to 35 percent by 2050.
4 **Enforcement mechanisms that ensure compliance and accountability**	Penalties for non-compliance with CORSIA requirements for Airline operators are to be determined by individual national regulators.	Fuel suppliers must pay a buy-out price per megajoule (MJ) of unmet obligation, which translates to US$23.55/gallon of unmet SAF obligation and US$24.92/gallon of unmet e-SAF obligation.[16] This translates to UK penalties that range from 3 to 13 times the cost of compliance.	Fuel suppliers are liable to pay a fine of at least twice the difference between the price of ATF and SAF in a year in which the minimum share of SAF is not complied with. Aircraft operators failing to meet the 90 percent uplift obligation results in a fine of twice the price of ATF for the fuel the aircraft operator failed to tank relative to the obligation.[17]

SAF demand is expected to grow multifold

SAF demand is expected to increase significantly globally due to various blending targets taken by countries and voluntary SAF blending targets taken by various airline operators across the globe. According to International Air Transport Association (IATA) estimates (Net Zero), global SAF demand is expected to reach ~18 million tonnes by 2030. However, current production is limited: ~0.5 million tonnes in 2023, projected to increase to ~2 million tonnes in 2025. Current production will need to be increased 9 times to serve the global demand forecasted in 2030 to achieve net zero in 2050, underscoring the need for accelerated scale-up of SAF production.

SAF current production & projected demand for net zero in 2050, in million tonnes



Source: IATA, Literature research, Deloitte analysis

Strategic choices to be made to meet this growing demand

To meet this increasing demand, SAF producers must make strategic choices across technology, feedstock and offtake. Technology gates which feedstocks can be converted, at what yields, CI and cost, under ASTM-approved pathways; feedstock drives cost, scale, and sustainability eligibility; offtake underwrites revenue and financing. Each choice constrains the others: local feedstock and CI targets narrow technology options; technology gates market/credit access; bankability of offtake back-solves scale and feedstock strategy. Hence, it becomes imperative for producers to optimise their strategic choices.

Strategic Choices for SAF producers

Technology to deploy

Key considerations include capital requirements, process efficiency and technological maturity

1

Feedstock to use

Eligibility, access, cost, and sustainability of production are key considerations

2

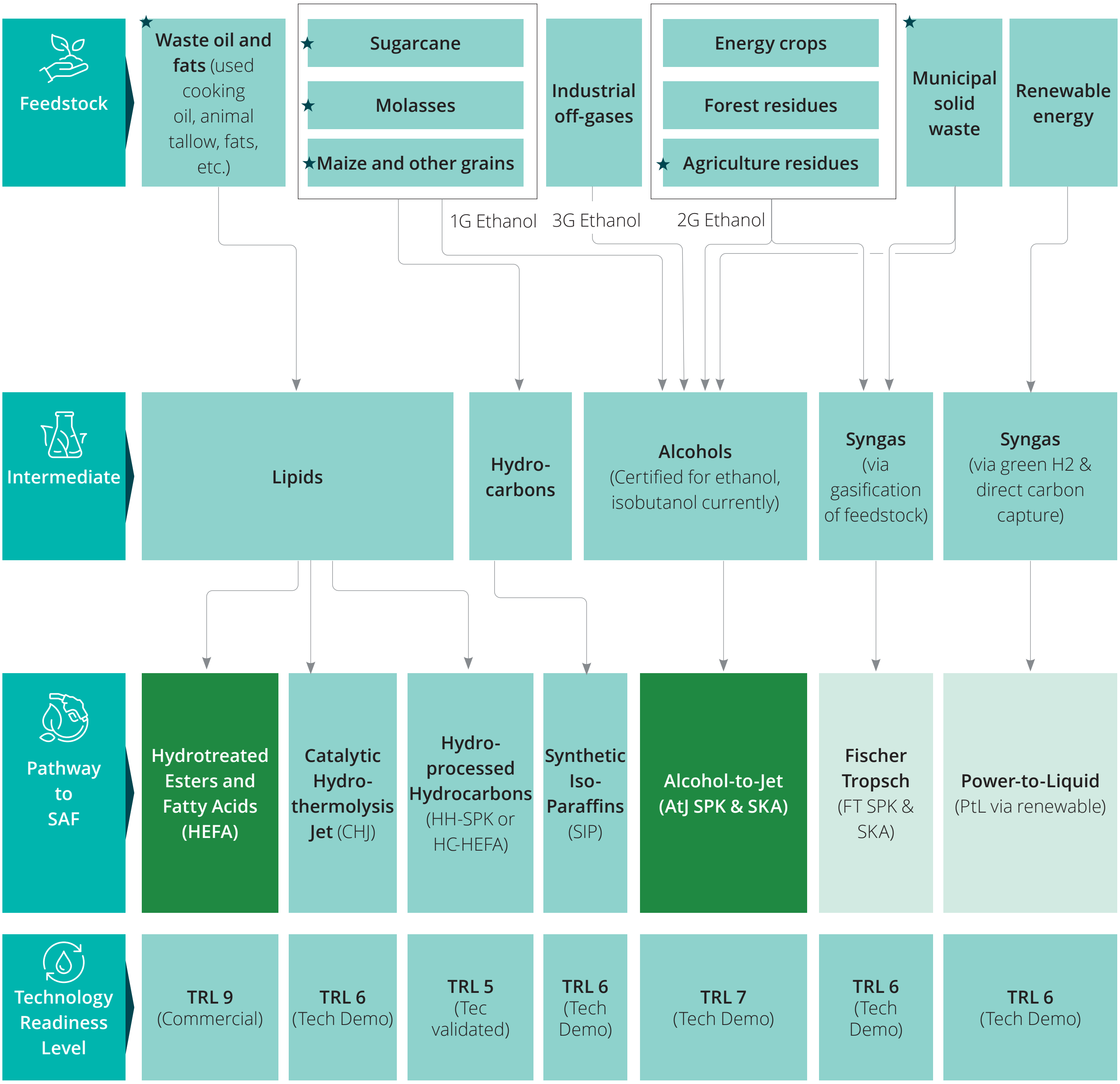
Offtake to secure

Determined by buyer, contract tenure, volume, pricing formula and delivery terms

3

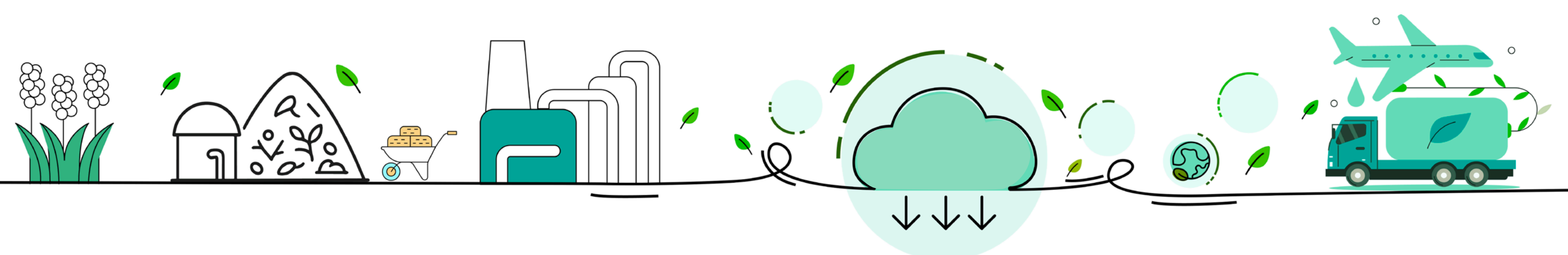
Technology

Multiple pathways exist for producing SAF – 11 conversion processes approved by ICAO as of July 2023, with another 11 processes under evaluation.[18] The processes can convert a range of feedstocks into biofuels. The share of SAF, renewable diesel and other light ends varies across technology pathways and feedstocks.



Legend: ★ Key feedstocks available in India ■ Mature/Emerging pathway relevant for India ■ Nascent pathway relevant for India

Source: CORSIA, Literature Research, Deloitte analysis



Hydroprocessed Esters and Fatty Acids (HEFA) is the most technologically mature pathway that uses waste oils or used cooking oils (UCO)/fats as a feedstock. Currently, all operational SAF facilities globally are based on the HEFA pathway. The process involves the removal of oxygen by hydrodeoxygenation, followed by cracking and isomerisation of paraffinic molecules to jet fuel chain length. The path offers a high biofuel yield of 70–80 percent depending on the feedstock and other operating parameters.

Alcohol-to-Jet (AtJ) is another crucial pathway that involves dehydration, oligomerisation and hydro-processing to convert alcohol feedstock to SAF. This pathway offers a high biofuel yield of ~60 percent, potentially achieving a higher share of SAF (~70–90 percent) in the product yield, the remaining being renewable diesel and light ends.[19] Unlike lipids intermediate in HEFA, alcohols have a standard chemical formula (such as C_2H_5OH for ethanol) and thus exhibit limited variation, with no differences arising from the feedstock used for alcohol production. While each of the individual processes is prevalent in industry, scaling up and integrating these processes at a large scale for SAF manufacturing could pose engineering challenges.

Fischer–Tropsch (FT) is one of the earliest ASTM-approved routes for gasifying carbonaceous waste/residues to syngas (H_2, CO) and catalytically upgrading it to jet/diesel. Two FT jet specs are certified: Synthetic Paraffinic Kerosene (SPK) and Synthetic Kerosene Aromatics (SKA). Despite being one of the oldest processes, gasification is feedstock-specific, capex-heavy, slow to build and hard to stabilise, constraining scale.

Power-to-Liquid (PtL) makes SAF by combining green hydrogen (from renewables) with CO derived from captured CO_2 to form syngas and then converting it via Fischer–Tropsch. With carbon capture and green-H_2 still nascent and costly, PtL's maturity is low today, but as capex falls and scale improves, it could become an attractive option.

Given the limited availability of feedstocks such as UCO, HEFA is projected to contribute less than 10 percent to the overall SAF production by 2050. The AtJ and FT pathways, which rely on advanced feedstock, such as agricultural residue, forestry residue and Municipal Solid Waste (MSW), are expected to be promising technology pathways until 2035–2040. After 2040, PtL will emerge as a key pathway due to the increased maturity of green hydrogen and carbon capture technologies and potential constraints in feedstock availability for AtJ and FT.

Hence, it becomes essential to decide on the technology options as it:

- Locks unit economics: Capex/Opex, jet yield and demonstrated reliability set the levelised cost of production and de-risk financing
- Defines feedstock fit and flexibility: Pre-treatment and multi-feed capability will determine resilience to supply shocks
- Sets carbon performance and credits: Conversion efficiency and H_2/power coupling drive the lifecycle CI
- Controls timeline and execution risk: Technology Readiness Level (TRL), licensor ecosystem, reference plants and co-processing vs standalone choices set speed-to-market and delivery risk

Feedstock

India's HEFA feedstocks, such as waste oils, UCO and tallow, are fragmented and complex to aggregate. India is estimated to have ~2.4 Mt UCO, of which ~65 percent comes from commercial sources and the remaining from households. Approximately 60 percent is still improperly reused and re-enters the food chain despite government disposal/collection guidelines. However, structured aggregation, quality control and traceability can convert this fragmented operating model into bankable volumes and support near-term HEFA scale-up in India. UCO can also produce SAF via co-processing in a petroleum refinery. Many oil companies in India are in the process or have plans to produce SAF by co-processing.

Meanwhile, AtJ can be deployed with Ethanol produced from multiple sources such as sugar and molasses, grains, agricultural waste, industrial waste (including off-gases, etc.) and MSW. These feedstocks are first used to manufacture alcohol (ethanol predominantly) and then converted to SAF. Agri-residues are available in surplus quantity.

Sweet sorghum, a sugar crop with high bioenergy and ethanol production potential, is also manifesting as an important crop that can meet food, fodder and fuel demands.

Characteristics	Sugarcane	Sweet sorghum
Crop duration	12-14 months	4 months
Water required	~36,000 m3/ha	~8,000 m3/ha
Sugar yield	5-12 tonnes/ha	3-7 tonnes/ha
Cane yield	65-80 tonnes/ha	90-120 tonnes/ha (2 cycles/ year)
Ethanol Yield	~3.5-5.6 tonnes /ha	~3.2-4.8 tonnes/ ha (2 cycles/ year)

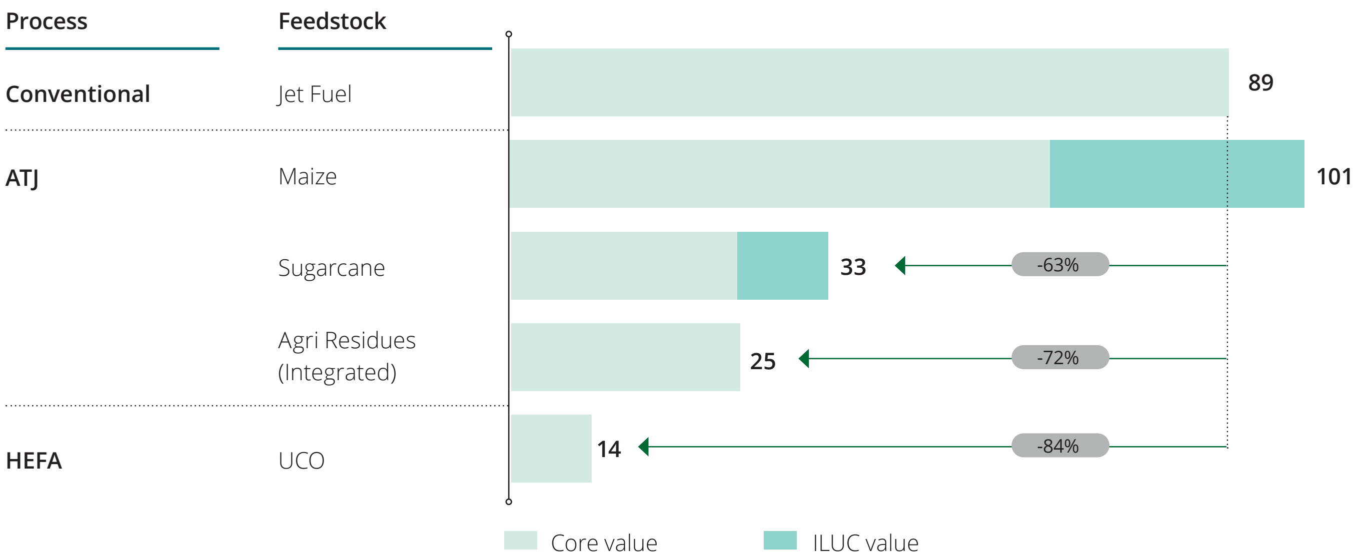
Source: ICAR, deloitte analysis

Apart from much lower water use, sweet sorghum also has the added advantage of feedstock availability for ethanol production during May–June and October–September, the lean period of sugarcane crushing (April–October).[20] Hence, while per-hectare yields are marginally lower, sweet sorghum delivers a step-change in water efficiency, crop-cycle speed and semi-arid adaptability. It can extend mill runs beyond the cane season. Indian Council of Agricultural Research-Indian Institute of Millets Research (ICAR-IIMR) and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), along with other partners, had organised pilot studies in collaboration with several sugar manufacturers. The ethanol yields realised in various pilot studies are ~40–50 litres per tonne of sweet sorghum, compared to ~70–90 litres per tonne for sugarcane.[21]

Carbon Intensity and Carbon Abatement Cost

A fuel's total carbon intensity (CI) equals its core life-cycle emissions plus any indirect land-use change (ILUC) factor. Waste and residue feedstocks (e.g. UCO, tallow, lignocellulosic residues) are assigned zero ILUC under CORSIA, so their CI is driven primarily by process energy, transport and conversion efficiency. This structural advantage typically yields a lower CI than crop-based alternatives, improving compliance headroom and the abatement value of waste/residue-based SAF pathways.

Carbon Intensity Values (gCO2e/MJ, global) and emission reduction (percent) from Jet fuel

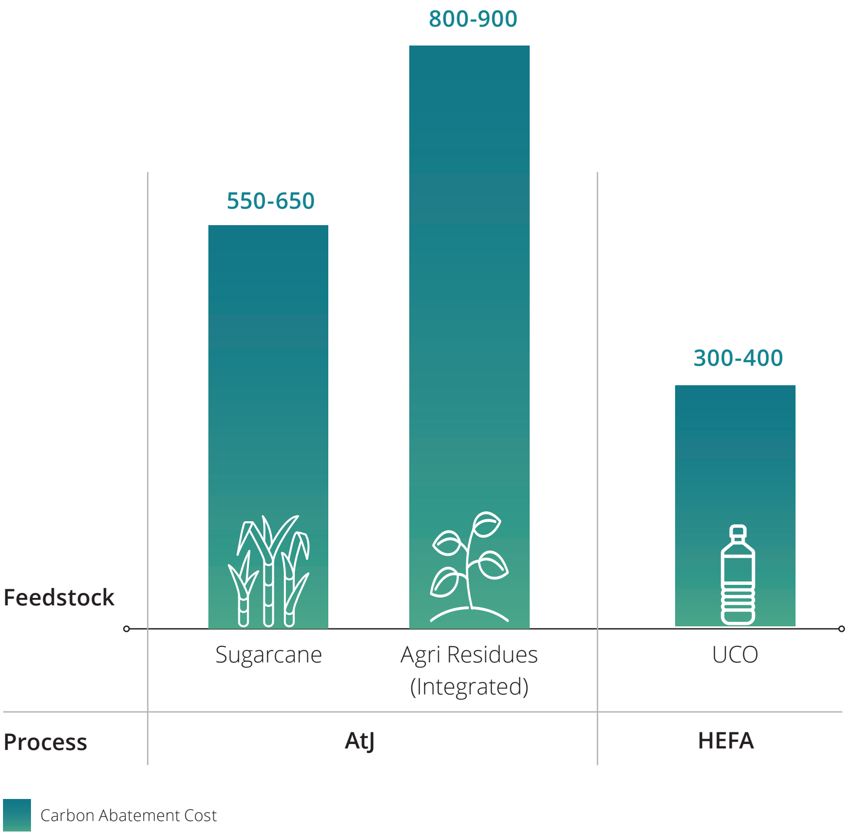


Source: ICAO, Deloitte Analysis

CORSIA requires at least 10 percent less CO2 emissions on a life-cycle basis than a reference fossil fuel value of 89.1 gCO2e/MJ. Global maize/corn-based SAF have lifecycle carbon emissions values higher than those of jet fuels; however, various levers can be employed to reduce the CI values, decarbonized source of heat can give 25-30 percent reduction, decarbonized source of electricity can give 5-10 percent and green hydrogen can give 1-5 percent reduction. Similarly, for sugarcane based SAF, decarbonised source of hydrogen can reduce CI value by 8–12 percent; other levers have a limited impact (less than 5 percent).[22] However, CI value of maize/corn-based SAF, with decarbonised levers of heat, electricity and hydrogen, is still higher than CI value of sugarcane-based SAF.

Unit cost and carbon intensity determine the carbon abatement cost (US$/tonne of carbon abated). This cost ultimately matters to airlines and corporates. Experts suggest that airlines in developed nations prefer CI values less than 25 gCO_2e/MJ. Hence, it becomes imperative for producers to prioritise low-CI feedstocks and process pathways.

Carbon Abatement Cost (US$/tonne of carbon abated) for key production pathways



Source: MoPNG (PPAC – petroleum products)
Note: SAF levelized cost is assumed to be US$2,000-2,200 per tonne for UCO (HEFA), US$2,400-2,600 per tonne for Sugarcane (AtJ), and US$3,400-3,600 per tonne for Agri Residues (AtJ); CORSIA default CI values are used.

HEFA (using UCO as feedstock) typically offers the lowest carbon-abatement cost amongst the SAF pathways by combining substantial CI reduction with comparatively low production costs, making it an attractive near-term option for SAF production. However, limited availability and variation in the quality of used cooking oil can hinder the adoption of HEFA on a large scale in India.

Feedstocks are a strategic anchor in SAF's decision matrix as they:

- Set Lifecycle Carbon Intensity (CI): Feedstock largely determines CI and thus eligibility value under schemes, such as CORSIA, RefuelEU and the UK, impacting market access.
- Limit scaling: Volumes, seasonality, competing uses and quality variability govern aggregation effort, impacting supply reliability and achievable plant utilisation.
- Determine technology: Feedstock choice decides potential pathways (HEFA, AtJ, FT), jet fuel yields, pre-treatment needs and CAPEX/OPEX, driving ultimately the unit cost and carbon abatement cost.
- Define sustainability: Food vs. fuel, environmental impact drives certification and stakeholder acceptance.

Offtake

SAF is significantly more expensive than conventional jet fuel, often 2–5 times more costly. The price differential means that producers are reluctant to invest in new facilities without guaranteed buyers and airlines are wary of buying SAF without incentives or requirements. This is where offtake agreements play a key role.

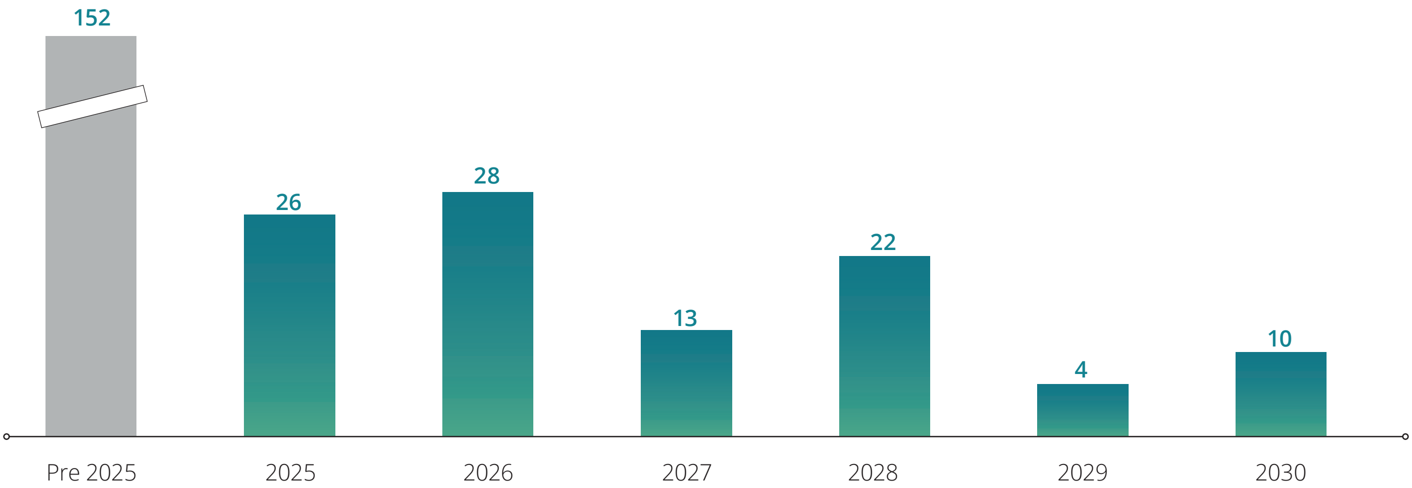
Globally, there has been a surge in offtake deals in the last few years. Leading airlines have signed MOUs or contracts with SAF producers. Consortiums often facilitate these deals or are part of airlines' net-zero pledges. Additionally, large corporate flyers are partnering in programs to buy SAF certificates to cover their business travel emissions, effectively providing a revenue stream for SAF even if those companies do not physically deliver the fuel.

Key mechanisms deployed by buyers to secure offtake are:

- Offtake agreement: Multiyear supply contracts with volume/ price details, crucial for increasing bankability of projects
- Direct Investment: Equity investments/ JVs, give the airline priority access to the SAF
- Partnerships: Ecosystem alliances (including consortium partnerships) with producers, airports, OEMs and corporate buyers to secure access to SAF

Airlines are locking in offtake from SAF projects under development, boosting bankability while securing future supply. Over 100 contracts commence from 2025 and beyond, highlighting the need to ensure future supply in a constrained market.

No. of agreements by project commencement dates (Year, N=255).



Note: 25 agreements have not declared the duration of contracts

Source: ICAO, Desk search, Deloitte analysis

Airlines are signing offtake agreements across short (1–4 years), medium (5–10 years) and long-term (>10 years), with different regions exhibiting different preferences for tenures. Globally, most SAF offtake volume is secured through medium- to long-term contracts. However, APAC airlines are predominantly engaging in short-to-medium contracts. Contract tenure preference also varies by pathway: HEFA is typically contracted on short- to medium-term horizons, while PtL projects rely on medium-to long-term agreements.

In India, the SAF market is in infancy, so offtake agreements are just beginning to emerge. India's current standing is that of a market in waiting. There is clear interest from all sides. Still, the enabling conditions are not in place yet.

SAF producers need to secure offtake as it:

- De-risks revenues and unlocks financing: Long-tenure offtakes provide price/volume certainty that underpins Final Investment Decision (FID) and attracts project finance
- Enables right-sizing: Firm demand justifies scale, drives technology, and aligns plant location with logistics and feedstock catchments
- Stabilises upstream supply: Bankable offtakes cascade into durable feedstock contracts, reducing operational volatility

SAF ecosystem is evolving in India

India can produce SAF for the world

India's significant role in the global aviation fuel market, coupled with its high ATF exports, presents a substantial opportunity for the country to expand into SAF production. India exports ~50 percent of its ATF production, accounting for 2–3 percent of the global demand. This existing capacity and experience in ATF production and trade position India favourably to become a leading supplier of SAF as global demand rises. Moreover, the SAF production potential of 8–10 million tonnes far exceeds the potential domestic demand of 4.5–4.6 million tonnes of SAF at 15 percent blending rates in 2040. Domestic supply surplus manifests as an attractive export opportunity for India.

India also emerges as a competitive geography vis-à-vis other potential SAF producers such as China, Malaysia and Thailand for supplying SAF to major airline hubs such as the Middle East (Dubai) and Europe (Germany, Amsterdam, etc.). This is driven by India's competitiveness across two key areas. Firstly, India offers a lower cost of construction, machinery and labour. Except for the price of construction, where India is second to Malaysia among the four APAC countries under consideration for SAF, India offers a more optimal cost structure in terms of machinery cost and minimum wages. Secondly, proximity to demand hubs translates into lower shipping costs. For example, the shipping distance from India to the Netherlands is two-thirds of that from China.

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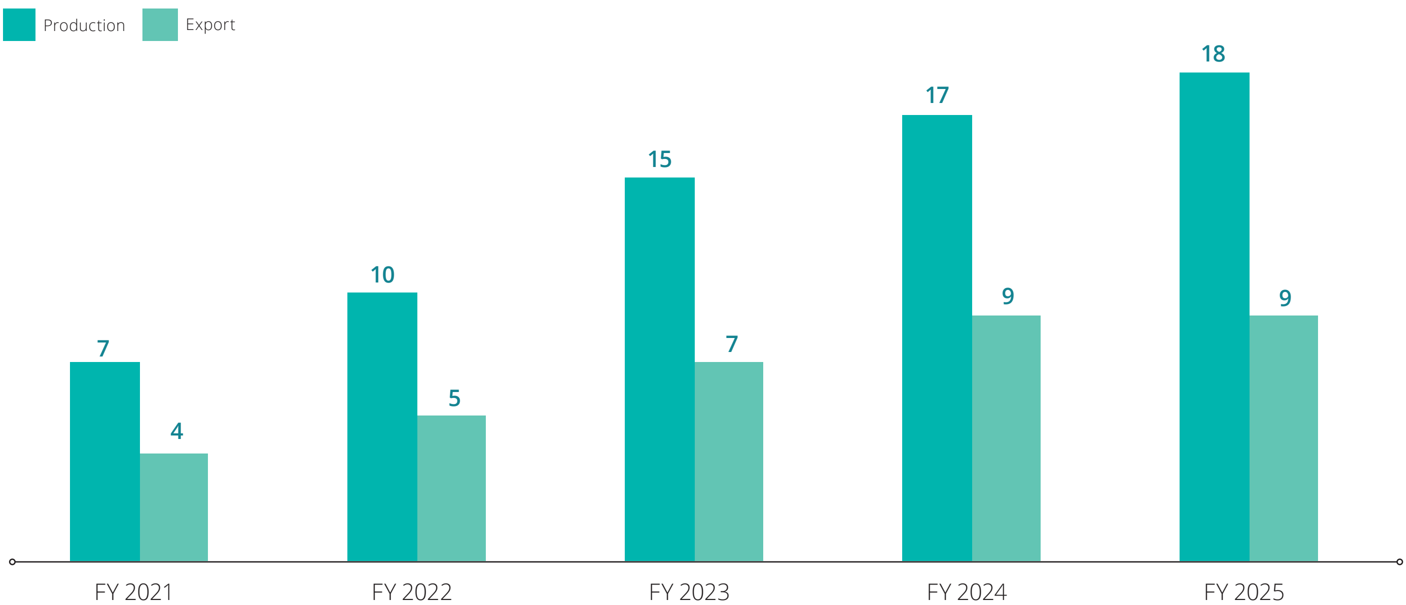
ATF Production & Export - India (Million MT)



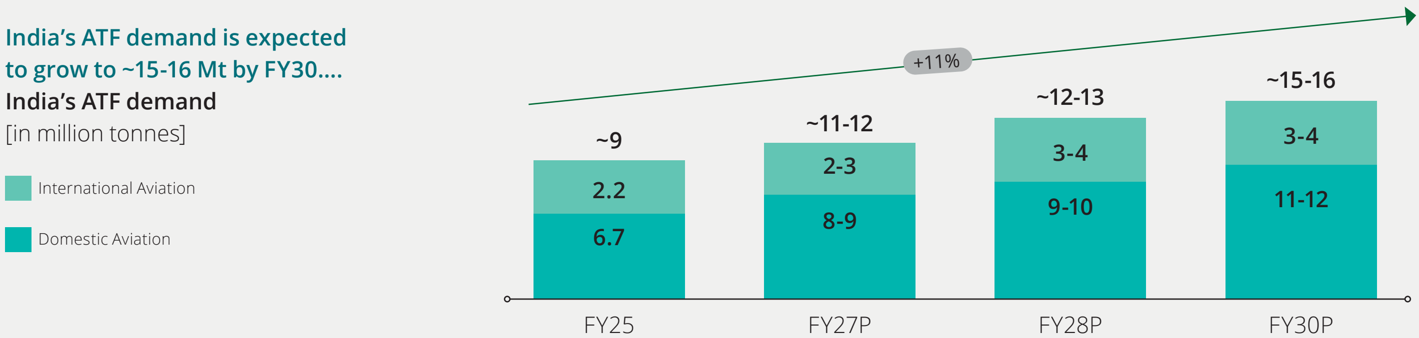
Source: PPAC, MoPNG, Deloitte analysis

India's SAF journey and the progress so far

The Government of India has laid out laid out indicative SAF blending target of 1 percent in 2027, 2 percent in 2028 and 5 percent in 2030, initially for international flights, and affirmed India's entry into CORSIA's mandatory phase from 2027. India is advancing its SAF ambitions through a series of policy incentives and industry initiatives.

India's ATF demand is expected to grow to ~15-16 Mt by FY30....

India's ATF demand [in million tonnes]



However, India has set "indicative" SAF blending targets for "international" flights...

SAF blending targets [in %]

Year 2027 **1%**

Year 2028 **2%**

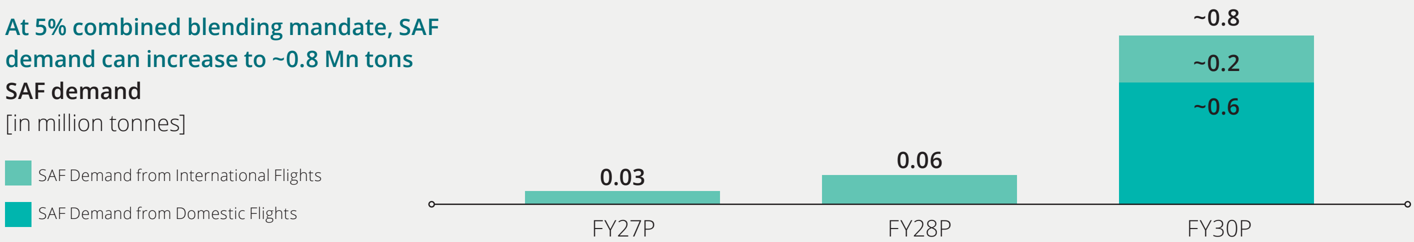
Indicative blending targets announced for international flights

Year 2030 **5%**

Expectation of extension to domestic flights as well

At 5% combined blending mandate, SAF demand can increase to ~0.8 Mn tons

SAF demand [in million tonnes]



Source: PIB, FIPI, PPAC, DGCA, Ministry of Civil Aviation, Deloitte Analysis

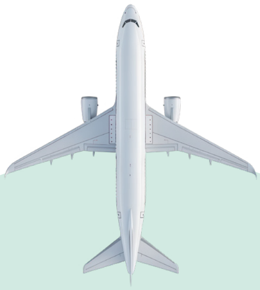
At a 5 percent combined blending mandate, SAF demand is expected to increase to ~0.8 Mn tonnes by 2030. However, given that India currently exports 50 percent of its ATF production, there is a significant opportunity for the country to expand its exports to include sustainable aviation fuel in the coming years.

A leading Indian oil company has received ISCC CORSIA certification for SAF production through co-processing used cooking oil at its refinery. This demonstrates alignment with ICAO's sustainability criteria and paves the way for airlines to uplift CORSIA-eligible SAF.

Uttar Pradesh is in the process of drafting a first-of-its-kind SAF policy (Uttar Pradesh Sustainable Aviation Fuel Manufacturing Promotion Policy 2025), to position Uttar Pradesh as a hub for SAF production by using its unique advantages, such as a rich agricultural base, robust infrastructure and proactive industrial policies. The SAF industry's demand for biomass and grain-based feedstock, such as sugarcane bagasse, rice husk, wheat straw and surplus grains, will create new market opportunities for farmers. The policy plans to offer a comprehensive package of incentives, ranging from capital subsidies and interest subventions to stamp duty waivers and substantial land support, with up to 80 percent subsidy in eastern Uttar Pradesh and Bundelkhand, and 75 percent in the central and western regions, already attracting investment interest of over INR 3,000 crore.[23]

In August 2024, the central government extended the timeline of PM JI-VAN scheme to 2028–2029. It broadened the scope of the PM JI-VAN scheme to include advanced biofuels, such as SAF from lignocellulosic feedstocks such as agricultural residues, forestry waste, industrial waste, syngas and algae. The scheme offers Viability Gap Funding of up to 20 percent of project cost or INR5 crore per 10 lakh litres of annual capacity (capped at INR 150 crore per project), along with INR 15 crore for demonstration projects, and now also covers bolt-on and brownfield projects.[24]

Pathway to scale in India: Addressing current challenges through strategic recommendations



Blending policy uncertainty
Ambition exists, but clear, binding blending targets aligned with realistic supply have not been put in place

Binding mandate with a clear roadmap
India should institutionalize a binding blending mandate with a phased roadmap, with detailed rules on what qualifies as SAF, sustainability criteria, penalties for non-compliance and support infrastructure development

Fragmented feedstock supply chain
Agricultural residues, UCO and MSW exist in volume, but supply chains remain unorganized and availability is seasonal, limiting feedstock access

Marketplace to secure and scale feedstock access
India needs to establish a central marketplace platform, both physical (in key producing regions) and digital, dedicated to linking feedstock aggregators (farmers, cooperatives, municipalities, used oil collectors) with SAF producers and refineries. Digital market platform can leverage the on-time and scale tested playbook of the digital infrastructure in India

Conversion risk
HEFA/ATJ/FT/PtL are proven in principle, but Indian deployment is thin; lenders still see technology, uptime and yield risks at commercial scale

Mobilise climate linked finance by aligning with National Green Taxonomy
India should formally classify SAF production and deployment as a green, sustainable activity under its upcoming climate finance taxonomy and related frameworks

Infrastructure lags
Fuel supply pipelines exist for major airports, but SAF downstream logistics remains undefined.
Road transport (for longer distances) increases costs and carbon intensity, undermining carbon abatement cost.
Rail transport needs substantial volume, full rake capacity unless special permission granted, making it unviable for early capacities

Dedicated SAF production and offtake hubs
India should develop SAF hubs, geographic clusters where feedstock aggregation, SAF production, and demand (airline offtake) co-locate to create an efficient ecosystem

Decentralised blending with last-mile infra builds
India should deploy on-site modular blending and storage infrastructure at major airports and strategic offtake hubs

Verification uncertain
Volumes and LCA claims stay opaque, double-count-prone, and limited acceptable to global buyers

Creation of a domestic SAF registry to enable SAF transactions
India should develop a government-backed registry that issues unique digital certificates for each batch of SAF produced, capturing feedstock type, production pathway, lifecycle GHG reductions and volume

Build mandates with a clear roadmap

A binding mandate provides the demand certainty and level playing field needed for industry investment. It essentially guarantees a market for SAF producers. Global experience shows mandates are a powerful driver: the EU and UK mandates are forcing suppliers to line up projects now to meet demand. An indicative blend (1–2 percent) is announced for India to kickstart the supply chain. However, a clear roadmap with binding mandates is needed to convert uncertain intent into bankable offtake by specifying who must blend, how much, and by when, with a gradual increase over time and transparent compliance rules.

For example, a 5 percent SAF blend by 2030, then progressively increasing to 10 percent by 2035 and 15 percent by 2040 (contingent on supply growth). This mandate must be backed by detailed rules on what qualifies as SAF, sustainability criteria, penalties for non-compliance and support infrastructure development. The figure below gives an overview of the key aspects that should be covered in the National policy on SAF.

Key policy tenets to drive the scaling and adoption of SAF

1 **Blending mandate**
SAF fuel blended with conventional Jet fuel basis international and domestic commitments

2 **Sustainability criteria**
Criteria to ensure minimal environmental impact, and aligned with global standards, covering feedstocks, GHG reduction (CI), production pathways, and certifications

3 **Feedstock**
Policies to ensure long-term feedstock security - covering aggregation, logistics, pricing, and incentives for farmers/collectors

4 **Infrastructure**
Development of supply chains, refueling systems, and production facilities necessary for the production, transportation, and distribution of SAF

5 **Financing mechanisms**
Financial tools and incentives designed to support the development and scaling of SAF technologies, infrastructure, and production capacity

6 **Pricing**
Pricing mechanisms based on factors like volume, carbon intensity (GHG reduction), and book and claim method, aligned with global pricing mechanism

Given India's high ATF exports (~50 percent of its production), the policy roadmap must also provide policy clarity on exports, covering eligibility to export SAF, treatment in SEZ/EOU regimes, customs/GST implications, export incentives (if any), cross-border book-and-claim recognition and safeguards against double counting. India has announced indicative SAF blending targets for international aviation and now should institute a binding blending mandate for aviation fuel, with a phased roadmap over the following decades.

To enable the SAF scale-up, the **government** should draft a comprehensive policy framework covering key policy tenets (in consultation with industry stakeholders), issue a blending mandate via regulations, define criteria and set up a compliance monitoring and penalty collection system. **Feedstock suppliers** must provide inputs on policy intervention required for making feedstock available, e.g. MSP, fixed price, logistics cost and highlight challenges. **SAF producers**, on the other hand, must provide inputs on the fiscal and pricing levers that will make projects bankable, such as capex support required (capital subsidy, accelerated depreciation, VGF, interest subvention, etc.), operating support and stable tax/customs (zero-rating, SEZ, EOU clarity, etc.). They should also flag infrastructure gaps (blending, storage, pipeline access, etc.) and highlight export/registry interoperability requirements so that the assets can serve domestic and export demand. On the consumption side, **airlines** should provide policy inputs on mandate design and market rules. Airlines can also volunteer to use higher-than-mandated blends for additional CORSIA benefits and demonstrate climate leadership.

Case in point: The EU's RefuelEU mandate is a well-laid-out, long-term and stringent roadmap globally, with clear blending targets, defined feedstock eligibilities and penalties for enforcement. The rules apply to all flights departing EU airports, creating uniform demand and preventing leakage across hubs. Non-compliance triggers dissuasive fines at no less than twice the price gap between conventional jet and SAF multiplied by the shortfall, alongside meeting obligations shortfall in the next period.

Europe's ReFuelEU legislation has the most clear, long-term and stringent path

Fuel Suppliers

Deliver minimum blends of SAF and synthetic aviation fuel to Union airports
(passenger traffic of ≥ 800,000/year or freight ≥ 100,000 tons; covers 95% of all EU aviation traffic)

Year	2025	2030	2035	2040	2045	2050
SAF	2%	6%	20%	34%	42%	70%
eSAF	--	1.2-2%	5%	10%	15%	35%

Aircraft Operators

Uplift a minimum of **90% of their annual aviation fuel** needs from EU airports within scope

Feedstock

Unlike ICAO, RefuelEU **restricts SAF produced from feed and food crop-based feedstocks however SAF can be imported**

Compliance flexibility

From 1st Jan'25 until 31st Dec'34, aviation fuel suppliers have the **flexibility to average supplies of SAF to Union airports for compliance** with the minimum shares i.e. choose to supply SAF at one or more of the airports as long as it meets the SAF% (of total ATF supplied) norms for their supply

Penalty Mechanism

Fuel suppliers: Suppliers are liable to pay a **fine of at least twice the difference between the price of ATF & SAF** in a year in which minimum share of SAF is not complied.

Aircraft operators failing to meet the 90% uplift obligation results in a **fine of twice the price of ATF for the amount of fuel the aircraft operator failed to tank** relative to the obligation.

Co-processed SAF

Renewable share of fuels produced through **co-processing** should be **eligible under the definition of SAF,** as long as the renewable share is produced from feedstock listed in Directive (EU) 2018/2001 with the exception of biofuels produced from 'food and feed crops' as defined in that Directive

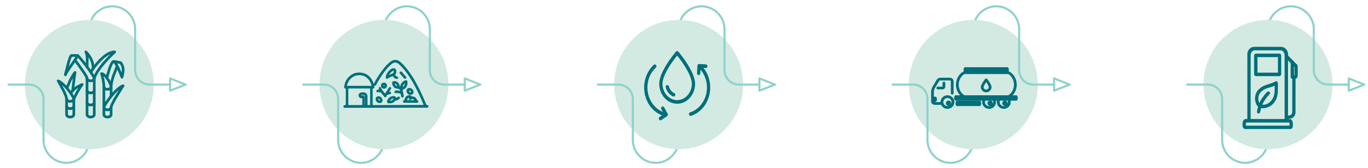
Note: [1] Minimum shares increase in discrete steps, whereas sub-targets for synthetic aviation fuel between 2030 and 2035 are defined averages and minimum shares. This means that fuel suppliers can fall short of the sub-target.
Source: Policy documents, Desk research, Deloitte analysis

Set up dedicated SAF production and offtake hubs

The SAF value chain, which includes feedstock collection and pre-treatment, certification, financing, storage/blending, airport delivery, offtake contracting, etc., is fragmented, and the economics will not be viable unless the volumes are aggregated and logistics/transaction frictions are cut. Hubs can solve for this fragmentation and lower costs through shared infrastructure and better coordination. It also sends a focused investment signal, i.e. resources (policy support, funding, talent) can be channelled to specific regions to build success stories that can be replicated.

Integrating feedstock-to-fuel-to-flight in one region optimises the overall purchase price of SAF. It also makes it easier to solve logistical issues by addressing them holistically in that area. To solve this, India should develop SAF hubs, which are geographic clusters where feedstock aggregation, SAF production and demand (airline offtake) co-locate to create an efficient ecosystem. These hubs could be around major airports or logistics centres. The concept is to integrate stakeholders: farmers, waste collectors, fuel producers, airports, financiers and airlines in a concentrated value chain that achieves economies of scale. Essentially, creating a few "SAF valleys" or corridors in India, rather than having isolated, disjointed efforts.

Initiatives to be taken across the SAF value chain to scale production [Illustrative example]



Feedstock	SAF Production	Blending	Distribution	Consumption
Western UP with abundant crop sources, like sugarcane, provides for feedstocks	Either convert an existing ethanol fuel facility in Western UP into a fully integrated AtJ SAF fuel facility or establish a new plant	Develop a facility to blend SAF at/ near Mathura refinery	• Deliver via existing pipeline to IGI (Delhi Airport) • Expand to upcoming Jewar Airport through proposed pipeline	Demand Consortium of major companies (including airlines)

To make SAF hubs successful, the **Central Government** should identify hub regions, provide necessary funding support via schemes such as VGF and coordinate inter-ministerial support (agriculture ministry for crop/ crop-waste management, urban ministry for municipal waste, etc.) within those hubs. It should also set up a dedicated team to oversee hub development. **State Governments** are expected to play a critical role, too. For the states housing the hubs, the State Government should streamline local approvals, offer additional fiscal incentives (e.g. SGST waiver on SAF sale or state capital subsidy), facilitate plant land allocation and mobilise local feedstock networks (through state agencies or Mandis). **Feedstock Aggregators** such as Farmer Producer Organisations (FPOs), cooperatives and waste management companies should organise farmers or waste collectors to supply feedstock to the SAF facility at agreed prices consistently. This can be further bolstered with long-term supply contracts or a minimum price agreement for agri residue to give farmers confidence. **SAF Producers** should engage with the local community, e.g. contract farming for energy crops if needed, or agreements with municipalities for MSW supply. They might need to build the last-mile pipeline or blending facility at the airport as part of their projects. **Airlines** operating from the hub's airport should pool to provide the hub with a bankable demand and sign multi-year contracts, possibly with price commitment and delivery flexibility. **Airport operators** should leverage their position as hubs of activity to encourage building an ecosystem that supports SAF adoption at scale, integrating production, storage, distribution and demand, reducing costs and increasing efficiency. **Financial Institutions** can offer green financing options. Development banks or sovereign funds could be tapped for soft loans.

Case in point: Multiple SAF hubs around the world are now preparing to co-locate the whole chain, feedstock aggregation and conversion, shared storage and in-line blending and airport hydrant access, so that production, storage, distribution and demand scale together. By pooling infrastructure and operating rules, hubs cut logistics miles and soft costs, making airport uplift routine rather than bespoke. Anchor offtakes from airlines and corporates, backed by targeted policy and concessional finance, create predictable volumes and bankability.[26]

Select SAF Hubs

Minnesota SAF Hub

- Launched in August 2023 with a commitment to implement an ambitious shared strategy for decarbonising the airline industry
  - Aggregates demand by forming demand consortium including major airlines
  - Use of existing infrastructure (pipeline) at MSP airport for blended fuel
  - Minneapolis–Saint Paul International Airport serves as a vital transportation hub, and is also Delta's second largest hub

Hong Kong Sustainable Aviation Fuel Coalition (HKSAFC)

- HKSAFC programme, launched by BEC (Business Environment Council) in Jan'24,to engage stakeholders in developing Hong Kong's position as a regional and global hub for SAF
- Purpose:
  - Deliver forefront research on SAF feasibility and strategies
  - Scale SAF supply chain and adoption
  - Promote SAF industry-related support policies

PIT Hydrogen SAF Hub

- The hub is a collaborative effort between Pittsburgh International Airport, and two energy companies
- PIT has partnered with SkyClean to have an SAF production plant right on site
- The facility can produce up to 70 million gallons of SAF annually or 68,000 metric tonnes of hydrogen

Source: Desk research, Deloitte Analysis

Establish a marketplace to secure and scale feedstock access

One of the biggest bottlenecks identified is feedstock procurement. The current feedstock supply chain is fragmented across millions of small generators, quality is inconsistent and informal trade keeps transaction costs high. Farmers often do not know who would buy their crop waste, and SAF producers fear they cannot get enough reliable feedstock at steady prices. A marketplace reduces information asymmetry and transaction costs. It helps discover prices for feedstocks, such as rice straw, making it a commodity that farmers might collect and sell rather than burn. Similarly, a digital marketplace for used cooking oil can register small restaurant owners and connect them to biodiesel/SAF producers offering pickup and payment, formalising that supply chain. This platform can become the backbone of the SAF feedstock economy, ensuring producers can source materials competitively and suppliers get fair payment.

India needs to establish a central marketplace platform, both physical (in key producing regions) and digital, dedicated to linking feedstock aggregators (farmers, cooperatives, municipalities, used oil collectors) with SAF producers and refineries. It can be manifested as an exchange or organised supply chain network for SAF raw materials and intermediate products. This could involve an online portal where suppliers post available feedstock quantities and producers post demand, enabling efficient transactions and long-term contracting. Additionally, physical marketplaces or collection centres in rural areas would serve as hubs where biomass can be traded and pre-processed (chipped, baled) for delivery to SAF plants.Digital market platforms can use the on-time, and scale-tested playbook of the digital infrastructure in India, which solves similar problems with features, such as small transactions, high volume, low cost, etc., to unlock value at scale.

Digital infrastructure adopted at scale in India

Platforms

Aadhaar	UPI	FastTag	ONDC	Namma Yatri
Digital ID (1.4 bn+ registered users)	**Payments** (~20 Bn transactions monthly)	**Toll Networks** (~390 Mn transactions monthly)	**Commerce Networks** (200 Mn+ cumulative transactions)	**Mobility Networks** (0.6 Mn+ registered drivers)

Features

Population scale · Low Cost · Small Transactions · Huge Volume · Open Architecture · Interoperable · Layered · Unified

Source: Desk research, Deloitte Analysis

Development of a robust marketplace will require support from multiple stakeholders. Within the **government,** ministries, such as the ministry is Ministry of Agriculture & Farmers' Welfare could champion this marketplace, as it already deals with agricultural produce trade. They can support the development of the digital platform and coordinate with state agriculture departments to set up physical depots. **Farmers and Cooperatives** should organise supply. Cooperatives can register on the platform and aggregate as member producers. They should also help educate farmers about the benefits of selling residues (earning extra income, avoiding burn, etc.) and facilitate training on how to bale or store residues. **Municipal Corporations** can play a key role in urban waste and used cooking oil. Municipal Corporations can participate by channeling collected waste (segregated organics, etc.) to the marketplace. For example, a city could tender out its collected waste to biofuel producers via the platform. Also, FSSAI's RUCO program participants (restaurants) can be linked here.

Municipalities could even enforce transparency by requiring large eateries to register their UCO disposal on the platform. **Biofuel Producers** should actively post their demand forecasts to drive the market development. They can also form contracts with depot operators for a steady supply through the marketplace, not just spot buying. **Technology Providers** can build systems & platforms, leveraging advanced technologies, such as blockchain, etc., for traceability, especially since sustainability criteria require tracking feedstock origin. New-age technology companies or startups can be roped in to build the platform. Ensuring the platform's ease of use so farmers can use it via assisted service at a common centre is crucial. **Financial Institutions** can tie into the marketplace by offering trade financing. For instance, a farmer might get an instant payment (with bank underwriting) when they drop biomass at a depot, while the actual producer pays the bank on delivery. This smoothens cash flow for small players.

Case in point: Burning of residue has been a persistent problem in North India, especially Punjab, Haryana and Uttar Pradesh, causing environmental problems and posing health-related hazards for people. In 2021 alone, approximately 80,000 fire incidents led to ~13 million tonnes of stubble burn. This stubble is a store of value (energy) and can be used in various industries (including biofuels production). Deloitte implemented a Crop Residue Management (CRM) programme, starting with a pilot in Karnal, Haryana, which achieved a ~69% reduction in stubble burning in 2022. The programme was then expanded across Haryana, resulting in a ~54% reduction in 666 villages and a ~45% reduction in 441 villages in 2023 and 2024, respectively. This was achieved by facilitating land clearance through an Uberised platform (Krishi Yantra Saathi), creating awareness campaigns, providing CRM equipment based on gap assessment and building an ecosystem to facilitate efficient end use of stubble. End-user industries such as bio-energy plants, briquette production and paper mills were connected for the aggregated biomass.[27]

Impact of CRM programme in Haryana and Punjab

~5,00,000 tonnes reduction in stubble burnt	**~10,00,000 tonnes** decreased in CO_2 emissions	**US$ ~14 million** increase in farmers' income	**~10,350** lives saved

Alignment with SDGs

- 3 Good Health and well being
- 8 decent work and economic growth
- 13 Climate action

Develop a centralised SAF Registry, integrated with the CCTS, to enable transactions between producers and off-takers

SAF producers, airlines and corporates face uncertainty about how SAF volumes will be verified, how lifecycle emissions savings will be validated and credited and how to prevent double-counting environmental claims. Without a credible system, SAF transactions risk being fragmented, opaque and vulnerable to greenwashing. This undermines domestic adoption and India's ability to participate in global SAF trade, where buyers demand internationally recognised proof of sustainability. Establishing a centralised SAF registry addresses this problem by creating a secure, auditable ledger of every SAF batch and its environmental attributes.

The initiative would involve developing a government-backed registry that issues unique digital certificates for each batch of SAF produced, capturing feedstock type, production pathway, lifecycle GHG reductions and volume. These certificates can then be transferred to off-takers such as airlines, airports, or corporates and retired once claimed to avoid double-counting. The registry would enable a book-and-claim system, allowing an airline in Delhi, for example, to purchase the environmental benefit of SAF, even if the physical fuel was consumed at another airport. This flexibility unlocks demand across the country and ensures liquidity in the market. Integrating the registry with India's CCTS adds a layer of value, allowing SAF certificates to be monetised as tradable credits for compliance and voluntary offsetting.

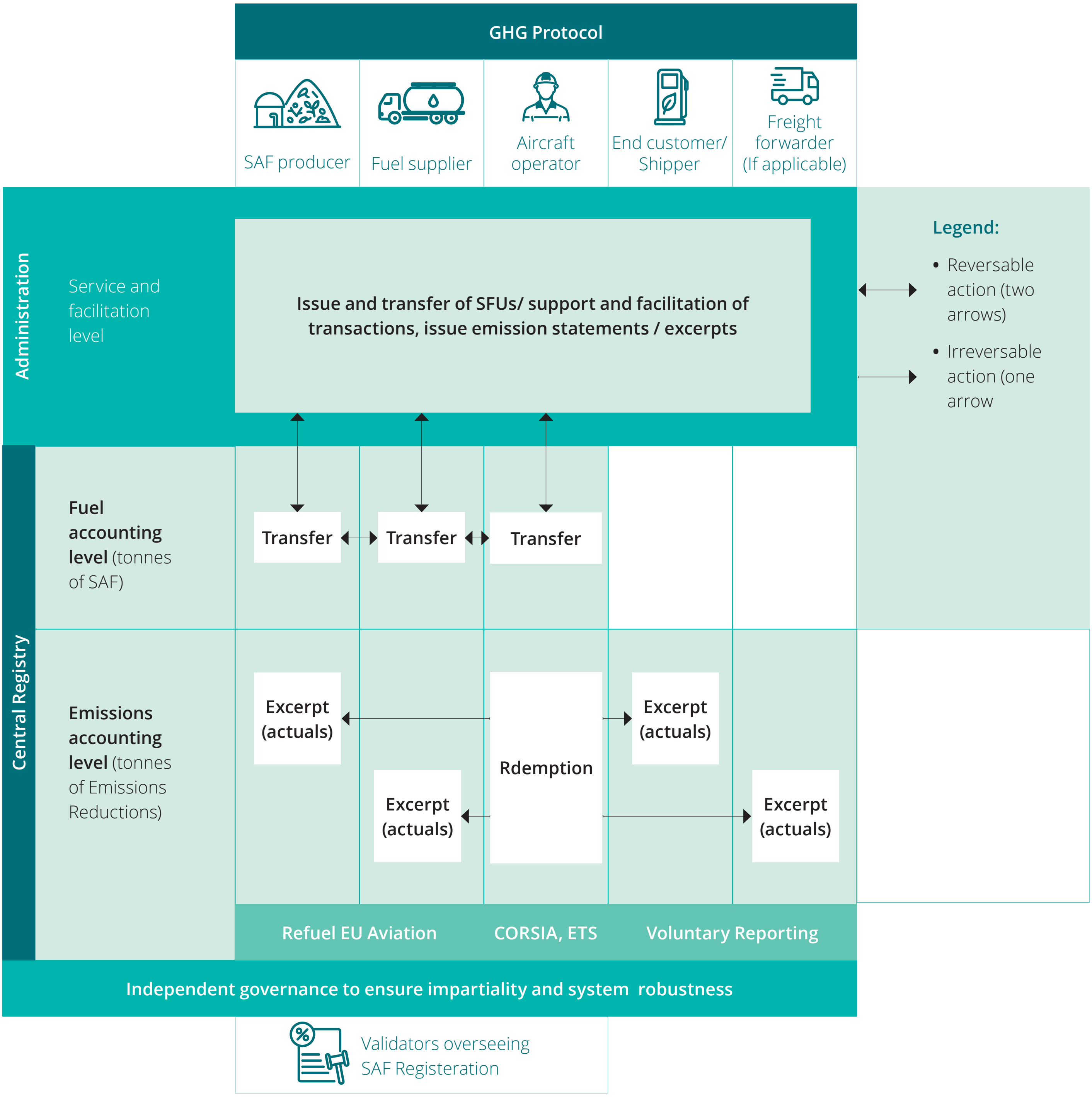
Key elements of this registry would include a tamper-proof digital ledger, batch-level traceability protocols and compatibility with global systems such as the IATA SAF Registry or the EU's book-and-claim framework, ensuring Indian SAF certificates are recognised internationally. Producers would be required to upload production data validated through accredited certification schemes such as ISCC or RSB, while independent auditors would regularly verify compliance. Off-takers such as airlines, airports and corporates would be able to acquire SAF through three chain-of-custody models, namely, book and claim, mass balance and segregated physical supply and retire the corresponding certificates once claimed, ensuring transparent accounting of environmental benefits and preventing double-counting. The SAF Registry must also remain technology- and feedstock-neutral, encouraging the growth of diverse SAF production pathways.
In its initial phase, participation could be subsidised or free (mirroring IATA's approach of waiving fees until 2027), allowing broad adoption and familiarisation across the value chain. Over time, the registry could move to a cost-recovery model, ensuring financial sustainability while maintaining transparency.

To support this initiative, the **government** can play a key role in establishing the registry framework and governance model. They would ensure the system is aligned with international standards such as the EU's book-and-claim framework and underpinned by clear rules on transparency, pricing and reporting. By doing so, they provide the credibility and oversight needed for airlines, corporates and global markets to trust Indian SAF credits. **Biofuel Producers** will be responsible for uploading verified production data into the registry, detailing the feedstock used, the conversion pathway, lifecycle emissions and batch volumes. Each SAF batch must be validated through accredited sustainability certification schemes such as ISCC or RSB. Producers would also initiate the issuance of SAF certificates against their batches and undergo periodic independent audits to ensure compliance and integrity, giving confidence to buyers and regulators. **Airlines, Airports and Corporate Offtakers** will be responsible for purchasing certificates to meet compliance obligations or voluntary net-zero commitments, retiring certificates once claimed to avoid double-counting and signalling demand by committing to multi-year forward purchases. **Technology Partners** can support by developing and maintaining the digital ledger that records SAF transactions, ensuring it is tamper-proof and cyber-secure. Their role includes embedding traceability protocols such as batch IDs or QR-based tracking, guaranteeing data quality and building interfaces with global systems such as the IATA SAF Registry.

Case in point: In April 2025, IATA launched a global SAF Registry, creating an independent and standardised platform for tracking SAF transactions worldwide. The registry is managed by the newly formed Civil Aviation Decarbonisation Organisation (CADO), a nonprofit entity separate from IATA, and is designed to ensure transparency, immutability and accountability across all SAF exchanges. At its core, the system supports a book-and-claim model that allows airlines, regardless of where they operate, to claim the environmental attributes of SAF even if the fuel is produced or consumed elsewhere. This approach solves the geographical mismatch between where SAF is produced and where airlines want to claim decarbonisation benefits, making SAF accessible to carriers and corporates across markets.

The registry is technology- and feedstock-neutral and can accommodate SAF from a wide range of production pathways while aligning with global frameworks such as CORSIA, the EU ETS and the IATA accounting methodology. It has already gained strong stakeholder backing, with over 30 early adopters including major airlines such as American, Lufthansa and Emirates, as well as OEMs such as Airbus and Boeing and several fuel producers signing on during the pilot phase. Participation has been made free until April 2027 to encourage broad uptake, after which the system will transition to a cost-recovery model.[28]

Registry architecture (referenced from the IATA SAF Registry)



Recognise SAF as a green activity within India's Climate Taxonomy, aligning qualification criteria with global frameworks

SAF projects are capital-intensive and rely on relatively new technologies, which raises the risk perception among investors and lenders. Banks and institutional investors currently lack a standardised framework to evaluate SAF projects as "green," preventing access to global ESG funds, climate-linked concessional finance, or even lower-cost domestic green capital. Without intervention, India risks underfunding SAF just as global demand for decarbonised aviation fuel begins to surge.

To close this gap, India should formally classify SAF production as a green, sustainable activity under its upcoming climate finance taxonomy and related frameworks.

By defining SAF within the taxonomy, complete with lifecycle GHG reduction thresholds and feedstock sustainability requirements aligned with international standards such as the EU Taxonomy and CORSIA sustainability criteria, India would signal to domestic and global investors that SAF projects are credible climate-aligned investments. Such recognition would unlock access to climate-aligned financing channels, including green bonds, sustainability-linked loans and blended finance from multilateral development institutions. Moreover, aligning SAF taxonomy rules with global frameworks would ensure that foreign investors, who are often required to channel funds into taxonomy-compliant activities, can confidently direct capital into Indian SAF ventures.

This can be facilitated with the **government / regulatory body** defining clear eligibility criteria for SAF-related activities within India's green taxonomy, such as lifecycle emissions thresholds for produced SAF. It should also ensure that India's taxonomy standards are aligned with global frameworks such as the EU Green Taxonomy, thereby providing interoperability and enabling climate-aligned capital flows from international investors. **Financial institutions** (banks, NBFCs, green funds and multilateral development banks) should integrate taxonomy criteria into their lending and investment due diligence processes and prioritise funding for eligible SAF projects. They should also provide risk guarantees and develop innovative financing mechanisms that can help de-risk early-stage or first-of-kind SAF technologies, such as Power-to-Liquid and 2G Alcohol-to-Jet. They can also promote innovative de-risking mechanisms such as Technology Insurance. Some of these are prevalent in the Global markets, including US and EU. **Biofuel Producers** need to structure their projects to meet taxonomy-aligned eligibility requirements, including feedstock sourcing and lifecycle emissions reduction thresholds. They are responsible for disclosing detailed information on lifecycle emissions, sustainability performance metrics and certification status to ensure transparency and credibility. Producers should also work closely with financiers to align their projects with investment objectives and improve overall bankability. **Certification and standards bodies** (Cotecna, ISOQAR, etc.) will have to provide independent assurance that SAF production complies with environmental and social safeguards, thereby reinforcing market trust. They must also develop transparent reporting frameworks that investors, regulators and producers can use to assess SAF projects consistently and comparably.

Case in point: The EU Taxonomy Regulation provides a classification system for sustainable activities designed to direct investments to those which are most needed for the net-zero transition.

Under the EU Taxonomy, the activity "Manufacture of liquid biofuel such as SAF for use in transport" qualifies as making a substantial contribution to climate goals if it meets the following eligibility criteria:

- Sustainable feedstocks: The biofuel must be produced from agricultural or forest waste, or food waste, and must not involve feedstocks derived from food or feed crops. The choice of feedstocks must comply with sustainability criteria under RED II
- GHG emissions savings: The biofuel must deliver at least 65 percent reduction in lifecycle GHG emissions compared to the fossil fuel comparator, following the EU's GHG methodology
- Carbon capture and storage: If the manufacturing process includes capturing CO_2 that would otherwise be emitted, this CO_2 must be transported and stored underground in compliance with dedicated technical screening criteria

By meeting these eligibility criteria, biofuel/SAF producers are considered taxonomy-aligned, enabling access to green/concessional finance instruments such as green bonds and climate funds [29]

Decentralise SAF blending with modular last-mile infrastructure builds

Scaling SAF adoption depends on downstream blending and storage infrastructure matching upstream supply, so that availability is ensured where and when required. Although fuel supply pipelines exist, SAF-specific downstream logistics remain undefined and the limited availability of blending facilities and quality control mechanisms at airports further compounds the challenge. Road transport of SAF over longer distances will be suboptimal due to its high costs and carbon intensity, which undermine the life cycle emissions footprint. Moreover, the initially low SAF volumes will prevent utilisation of the full rake capacity, thereby limiting the feasibility of rail transport.

To accelerate SAF adoption, India should encourage and support the deployment of modular blending and storage facilities at major airports and strategic hubs like fuel blending terminals, ports, etc. These facilities could comprise skid-mounted, containerised, open-access units that can be installed rapidly and scaled up as demand grows. In the early years, they would be capable of handling smaller SAF volumes, providing flexibility in markets where uptake remains limited.

Modular last-mile blending creates distinct advantages for both producers and off-takers. For SAF producers, it lowers the need for costly refinery upgrades or new blending infrastructure builds during the early years of scale-up, while providing a more direct route to market by enabling delivery of neat SAF closer to airports, where it is blended with CAF.

For airports and airlines, modular last-mile blending brings flexibility, as aircraft operators can blend SAF closer to the wingtip in line with mandate requirements (e.g., 1 percent for international flights) or voluntary commitments (airlines participating in the WEF's Clean Skies for Tomorrow initiative, which aims for 10 percent blending). In addition, it reduces logistical complexity; when blending is done at refineries, transport infrastructure needs to ensure segregation of blended and unblended (for use in domestic flights) ATF batches. This logistical complexity is minimized when blending is carried out at the last mile using modular infrastructure.

For India, proactively building such infrastructure would prevent a scenario where SAF is produced but cannot be effectively utilised due to last-mile bottlenecks.

This can be enabled with **government and regulatory bodies** providing targeted policy support and fiscal incentives to encourage the deployment of modular blending units at airports and hubs. They must also coordinate with aviation regulators to ensure compliance with ASTM D1655 standards and to streamline the approval process for integrating modular blending infrastructure into existing fueling systems. **Airport operators,** in turn, should allocate dedicated space for modular blending and storage units, while enabling open access for multiple suppliers. At the same time, they will have to maintain rigorous safety, quality and operational standards, ensuring that blending activities integrate smoothly with existing hydrant and fueling networks.

SAF producers, meanwhile, need to deliver neat SAF directly to airports for on-site blending, reducing the need for costly refinery retrofits. They are also expected to provide certified batch-level data, ensure compliance with quality standards and coordinate pooled supply when multiple producers are involved to achieve efficiency and consistency. Complementing this, **technology providers** should design, supply and maintain skid-mounted modular blending units that are safe, scalable and compliant with international fueling standards. They will also need to integrate digital monitoring systems that can ensure the accuracy of blending ratios, enhance traceability of individual fuel batches and provide transparent reporting for regulators, operators and investors alike.

Case in point: Singapore Changi Airport's on-site SAF Blending (2022–2025)

Singapore has actively developed on-airport SAF infrastructure through modular solutions. In the initial phase, the first batches of SAF for Singapore were blended overseas and imported to test the supply chain. By 2023–24, however, Singapore had moved to local blending at its airport fuel facilities. During a pilot in 2022–23, around 1,000 tons of neat SAF were imported and then blended on-site at Changi's fuel system before being delivered into the airport hydrant for use in commercial flights. This demonstrated that existing fuel infrastructure could handle SAF blends with only minor modifications, setting a precedent for scalable, on-airport blending models in Asia.

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References

1. "Green wings: India's SAF revolution in the making," Deloitte, 2024, https://www.deloitte.com/in/en/issues/climate/sustainability-and-climate/sustainable-aviation-fuel-report.html
2. "India's Domestic Aviation: A Deep-Dive into a Decade of Growth," OAG, June 2024, https://www.oag.com/blog/indias-domestic-aviation-market
3. "InterGlobe Aviation Ltd Company Presentation," Indigo, March 2024, https://www.goindigo.in/content/dam/goindigo/investor-relations/presentation/2023-24/Company-Presentation-2024.pdf
4. "Handbook on Civil Aviation Statistics," DGCA, FY 2023–24, https://www.dgca.gov.in/digigov-portal/?baseLocale=en_US?page=jsp/dgca/InventoryList/dataReports/aviationDataStatistics/handbookCivilAviation/HANDBOOK%202023-24%20Final%20Draft.pdf&mainnull
5. "Vision 2040 for the Civil Aviation Industry in India," FICCI, January 2019, https://static.investindia.gov.in/s3fs-public/2020-02/VISION-2040-FOR-THE-CIVILAVIATION-INDUSTRY-IN-INDIA.pdf
6. "Aviation Turbine Fuel demand," PNGRB, May 2024, https://www.pngrb.gov.in/pdf/public-notice/COII_15052024.pdf
7. "Electric Vehicles," Office of the Principal Scientific Adviser to the Government of India, https://www.psa.gov.in/mission/electric-vehicles/36
8. "Net Zero 2050: Operational and Infrastructure Improvements," IATA, June 2024, https://www.iata.org/en/iata-repository/pressroom/fact-sheets/fact-sheet-netzero-operations-infrastructure/
9. "CORSIA Newsletter," IATA, July 2025, https://www.icao.int/sites/default/files/environmentalprotection/CORSIA/Newsletter/CORSIAnewsletter_July-2025.pdf
10. "Sustainability Criteria for CORSIA Eligible Fuels," ICAO, June 2025, https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIApercent20Eligiblepercent20Fuels/ICAO-document-05-Sustainability-Criteria-June-2025.pdf
11. "The SAF Mandate: An Essential Guide," UK Government, 2024, https://www.gov.uk/government/publications/about-the-saf-mandate/the-saf-mandate-an-essential-guide
12. "Renewable Energy Recast 2030 (RED II)," European Commission – Joint Research Centre, 2024, https://joint-research-centre.ec.europa.eu/welcome-jec-website/reference-regulatory-framework/renewable-energy-recast-2030-red-ii_en
13. "RTFO and SAF Mandate: List of Feedstocks including Wastes and Residues," UK Government, 2024, https://www.gov.uk/government/publications/rtfo-and-saf-mandate-feedstock-materials-used-for-creating-low-carbon-fuels/rtfo-and-saf-mandate-list-of-feedstocks-including-wastes-and-residues
14. "ReFuelEU Aviation," European Commission, 2024, https://transport.ec.europa.eu/transport-modes/air/environment/refueleu-aviation_en
15. "The SAF Mandate: An Essential Guide," UK Government, 2024, https://www.gov.uk/government/publications/about-the-saf-mandate/the-saf-mandate-an-essential-guide
16. "How SAF Mandates in the EU and UK Are Reshaping Aviation Fuel Markets," Carbon Direct, 2024, https://www.carbon-direct.com/insights/how-saf-mandates-in-the-eu-and-uk-are-reshaping-aviation-fuel-markets
17. "ReFuelEU Aviation – Main Documents," European Commission, 2024, https://transport.ec.europa.eu/transport-modes/air/environment/refueleu-aviation_en#main-documents
18. "Conversion Processes," ICAO, July 2023, https://www.icao.int/environmental-protection/GFAAF/Pages/Conversion-processes.aspx
19. "Sustainable Aviation Fuels Pathways and Product Slate," IATA, May 2024, https://www.iata.org/en/iata-repository/publications/economic-reports/sustainable-aviation-fuels-pathways-and-product-slate/
20. "Sorghum – A Sweet Proposition for Sustainable Biofuel Production in India," AIDA, 2024, https://www.aidaindia.org/Presentations2024/Bengaluru/Day1/Sorghumpercent20-percent20Apercent20Sweetpercent20Propositionpercent20forpercent20Sustainablepercent20Biofuelpercent20Productionpercent20inpercent20India.pdf
21. "Sorghum for Sustainable Biofuel Production," Journal of Scientific Research and Reports, 2024, https://journaljsrr.com/index.php/JSRR/article/view/1883/3714
22. "CORSIA Eligible Fuels – LCA Methodology (V7)," ICAO, 2024, https://www.icao.int/sites/default/files/environmental-protection/CORSIA/Documents/CORSIApercent20Eligiblepercent20Fuels/CORSIA_Supporting_Document_CORSIA-Eligible-Fuels_LCA_Methodology_V7.pdf
23. "SAF Roundtable Press Release," Invest UP, June 2025, https://invest.up.gov.in/wp-content/uploads/2025/06/1-English_PressRelease_SAF_RT_01_June_2025_020625.pdf
24. "Press Release on SAF Developments," Press Information Bureau (PIB), Government of India, 2025, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2043925
25. "Beyond the Transatlantic Core: Emerging SAF Mandates in Global Markets," Carbon Direct, 2024, https://www.carbon-direct.com/insights/beyond-the-transatlantic-core-emerging-saf-mandates-in-global-markets
26. "Minnesota SAF Hub Launches First-of-Its-Kind Coalition to Scale Sustainable Aviation Fuel," Ecolab, 29 August 2023, https://www.ecolab.com/news/2023/08/minnesota-saf-hub-launches-first-of-its-kind-coalition-to-scale-sustainable-aviation-fuel
27. "Crop Residue Management," Deloitte, 2025, https://www.deloitte.com/in/en/issues/climate/sustainability-and-climate/crop-residue-management.html
28. "IATA SAF Registry," International Air Transport Association (IATA), April 2025, https://www.iata.org/en/pressroom/2025-releases/2025-04-03-01/
29. "EU Taxonomy Compass," European Commission, 2021, https://ec.europa.eu/sustainable-finance-taxonomy/taxonomy-compass/the-compass
30. "Tackling Emissions in the Air and on the Ground," Changi Airport Group, 28 April 2025, https://www.changiairport.com/en/corporate/our-sustainability-efforts/environment/tackling-emissions.html#:~:text=In%202020%2C%20CAG%20initiated%20and,emissions%20by%20approximately%202%2C500%20tonnes

SAF Association – Powering the future of sustainable aviation

SAF Association is the only industry body (section 8, not for profit) actively building a comprehensive ecosystem for Sustainable Aviation Fuel (SAF) in India and focusing on development, certification, and commercialization. SAFA connects all key stakeholders across the value chain for scaling SAF production including both bio-based and synthetic pathways and achieving its decarbonization potential of aviation. SAFA is committed to advancing net-zero aviation by accelerating SAF production and adoption, in close collaboration with policymakers, industry leaders, and civil society etc.

Governing bodies of SAF Association includes Mr Jimmy Olsson President, SAF Association and Founder ZR2; Mr Vijay Nirani Senior Vice President SAF Association and Managing Director, Trualt Bioenergy; Mr Upendra Tripathi, Advisor, SAF Association and former secretary, MNRE and Dr Ajay Mathur Mentor (Former DG , ISA & BEE) , SAF Association; Mr Vinod Dhaaka, Director (Former ED IGL) , Mr Shantanu Gupta (Former ED, IOCL),Mr Manish Dabkara Chairman Carbon Markets Committee (CMD, EKI Energy) and Mr Rohit Kumar Secretary General, SAF Association.

SAF Association invites the member across the SAF ecosystem. Members of SAF Association are Reliance , L&T, Mahindra, Tata Power Renewable Energy, Trualt, ZR2 Energy, Grownet, IIT Kharagpur, Glencore, Xpansiv, SAFE, Clean Incentive, Clean Incentives and EKI Energy etc. SAF Association working to empower member by various activities such as capacity enhancement, engaging with them for policy suggestion and recommendation, assisting industry to meet CORSIA obligation, attracting investment for SAF Production and economic development, promoting research and innovation etc.

SAF Association has done multiple capacity building program earlier such as decarbonization of aviation sector chaired by Aviation secretary in the month of February this year and a workshop with DGCA focusing on ""India Emerging as Global Hub for Sustainable Aviation Fuel" attended by various stakeholder aiming to position India as a global SAF hub

Expected Outcome of the SAF Association -

01. **Actionable Policy Recommendations:** Developed through collaborative consultations with government, industry, and academia.
02. **SAF Investment Roadmap:** Highlighting public-private financing, incentives, and de-risking mechanisms.
03. **Launch of Sector Reports:** Knowledge reports Including SAF market readiness, blending targets, and technology pathways.
04. **Showcase of Indigenous Solutions:** From Indian startups, farmers, and biofuel innovators.
05. **Partnership and collaboration:** Between SAF developers, airlines, fuel refiners, and international players.
06. **Foster innovation and R&D collaborations** across public and private sectors
07. **Create inclusive growth opportunities** for farmers, feedstock aggregators, and green entrepreneurs

Further SAFA is proud to host the **India SAF Conclave & Awards 2025**—a landmark event aims to bring together policy makes, industries and civil societies across the globe. This high-impact conclave will to establish as India a global SAF Hub and promote circularity and improvise rural economy.