SimpliFlying

Why sustainable aviation fuel is the only answer that works today

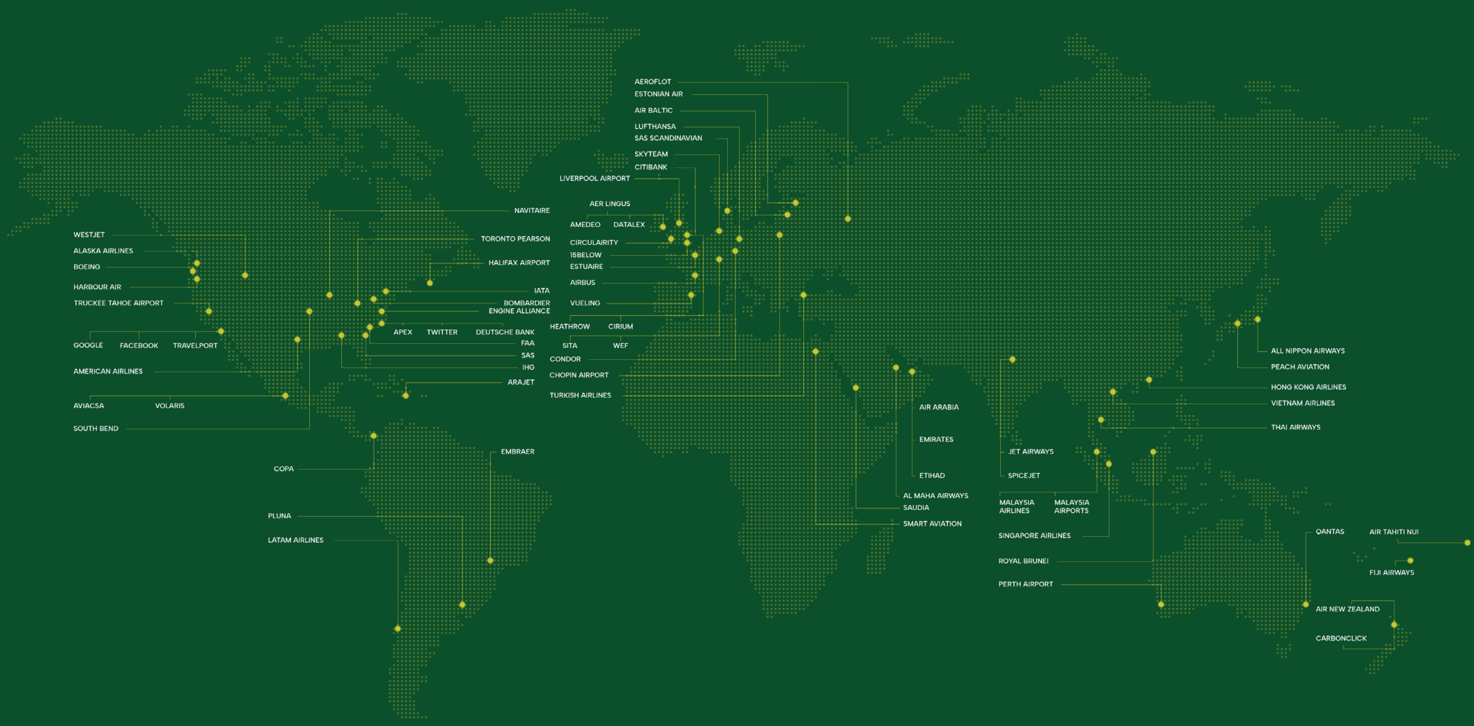
September 2026

Welcome

For over 18 years, **SimpliFlying** has been a trusted partner to airlines, airports, and technology firms worldwide. We have been on a mission to help build trust in aviation. To empower the industry to soar to new heights through digitalisation, innovation, and a steadfast commitment to **sustainability**.

> **We're not just sought after strategy consultants, we are passionate advocates for meaningful change. Headquartered in Singapore, our global team based out of Canada, India, Spain and the UK is dedicated to equipping aviation and technology executives with the tools, insights, and strategies needed to navigate the complexities of sustainable aviation.**

From major airlines and airports to aircraft manufacturers and travel technology companies, our extensive client base underscores our reputation as a trusted partner in the aviation industry since 2008.



How can we help?

At SimpliFlying, we're committed to helping you navigate the complexities of sustainable aviation and thrive in an ever-changing landscape.

Here are some ways we can help you in your sustainability journey:

Connect sustainable tech startups with investors and industry

SimpliFlying Immersions pioneer a new era of real-life connections through immersive experiences, deep learning, and cutting-edge innovation exchange. We do this by facilitating site visits and bringing aviation leaders to startup facilities to offer a platform for tangible collaborations to take shape.

Share your vision with a global audience

Like 80+ other CxOs in the industry, enlist your CEO or Head of Sustainability to be interviewed by Shashank Nigam. Share your vision for the future of travel on the world's best-known sustainable aviation podcast "Sustainability in the Air". **Find out more on becoming a partner.**

Grow your brand in aviation

SimpliFlying has helped a multitude of technology firms scale up in aviation – from **launching an airplane** to marketing an **Airbus A380 engine**. We can help you amplify your brand and help build awareness with key decision-makers.

Stay informed, stay ahead

We deliver in-depth monthly or quarterly briefings to the senior leadership teams on a topic/issue of your choosing. You can also sign up for a series of briefings that cover key aspects of the present and future of sustainable aviation.

Stay Informed. Stay Ahead.

simpliflying.com/green

Contents

Foreword

Everyone in aviation knows sustainable aviation fuel (SAF) exists. Far fewer people know where things actually stand: how much is being made, what it really costs, who is using it, and what has to happen for it to scale. The conversations we have had over the past few years kept circling back to the same gaps. The information is scattered across trade publications, regulatory filings, company disclosures and LinkedIn posts. Nothing exists for a non-specialist reader.

This report is a plain-language account of where SAF stands in 2026, what is working, what is not, and what the people with the power to change things need to do next.

When SimpliFlying started in 2008, the job was helping airlines build trust with their passengers through a new thing called social media. The tools have changed since then, but the thread running through everything we have done has stayed the same: trust in air travel, how it is built, how it is lost, and what it takes to earn it back.

For the past six years, that work has been in sustainability. Through more than 160 episodes of our Sustainability in the Air podcast and a series of industry reports, we have interviewed SAF founders, airline sustainability leads, airport operators, policymakers and the scientists behind new fuel production pathways. That body of work is what this report draws on.

Two things happened while we were writing it that made the case sharper than we expected.

1. The first two years of binding SAF mandates played out across Europe, the UK and beyond, producing both real progress and real problems.
2. The Strait of Hormuz crisis reminded the entire industry, in the most expensive way possible, what it means to depend on a single fuel carried through a handful of contested waterways.

SAF remains a climate story, but it is also now an energy security story, an industrial strategy story, and for an industry built on passenger confidence, a trust story too.

The operators and countries that show their working, publish their numbers, and commit transparently to the transition will be the ones that earn the trust of their customers, investors and regulators. We hope this report helps its readers see that clearly.

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Executive summary

Five numbers that tell the story of aviation's fuel problem, and its way out.

50,000

That's the number of aircraft in the world's working fleet, commercial and business aviation combined (1, 2). Almost all of them burn fossil jet fuel. A jet delivered this year will still be flying in 2050, the year of the industry's net-zero deadline. Any solution that works in the short- and medium-term needs to work with the planes already in the sky. New aircraft designs running on hydrogen or batteries will matter eventually, but they will not arrive in time or at the scale needed to move the needle before mid-century. The fuel has to change before the fleet does.

90%

That's the lifecycle emissions reduction that sustainable aviation fuel can deliver, depending on what it is made from and how (11, 18, 19). SAF is jet fuel made from something other than crude oil: used cooking oil, agricultural waste, ethanol, sewage, even captured carbon dioxide. The finished product is standard jet fuel. It goes into the same tanks, through the same pipes, and works in every aircraft flying today. No new planes, engines or airports are required. Planes have already crossed the Atlantic on 100% SAF (14–16).

Less than 1%

That's SAF's current share of global jet fuel. The world produces roughly 2.4 million tonnes of SAF a year (63,64,96). It needs to reach around 500 million tonnes by 2050 (61,62). The technology exists and the feedstocks (the raw materials SAF is made from) are available at a scale that gets most of the way there. What is missing is the confidence to build: stable rules, transparent pricing, and long-term commitments from producers, operators and their customers. More than half the world's airlines, by fuel volume, used no SAF at all in 2023 (103).

$1,550

That is what it cost to produce a tonne of the most common type of SAF in Rotterdam in early 2026. On the same day, fossil jet fuel at the same location cost $1,633, inflated by the Strait of Hormuz crisis (65,71). For comparison, in the two years before the crisis, fossil jet fuel averaged roughly $700 to $800 a tonne. The crossover was temporary, driven by an oil shock rather than a lasting shift. But the production cost is real regardless of what oil does, and it is falling as refineries scale. The gap between SAF and fossil fuel is narrower than the headlines suggest, and much of what remains is oil-price volatility rather than a permanent SAF premium. In the United States, federal and state tax credits have already made SAF production competitive enough to grow volumes by 325% in a single year (154).

20+

That is the number of jurisdictions that now have SAF mandates in force, in legislation, or in active development (66,67). The EU, UK, Singapore, Japan, Brazil, South Korea, Turkey, India, Indonesia, Thailand and others have committed to requiring a rising share of jet fuel to come from sustainable sources. Three years ago that list barely existed. The demand is now written into law across a growing share of the world's flights. What has not caught up is production: the refineries, the investment and the pricing systems needed to turn that demand into fuel.

What these five numbers add up to

Aviation cannot change its fleet fast enough to meet its climate targets. But, it can change its fuel. SAF is the only tool that works at scale, in the aircraft already flying, right now.

The obstacle is coordination.

- Governments need to write rules that last long enough for producers to invest against them.
- Producers need to build pricing that reflects what SAF actually costs to make rather than what oil happens to be doing.
- Operators need to lock in supply while the market is soft and report what they burn so that customers and investors can see the real numbers.
- And corporate buyers need to use their purchasing power to pull supply forward rather than wait for it to arrive.

There is also a reason to act that has nothing to do with emissions targets. SAF is made from local waste, local crops and local power. It does not travel through the Strait of Hormuz or through other geo-political choke points. It can be produced locally from local feedstocks. As a result, domestically produced SAF is both a climate and an energy-security asset.

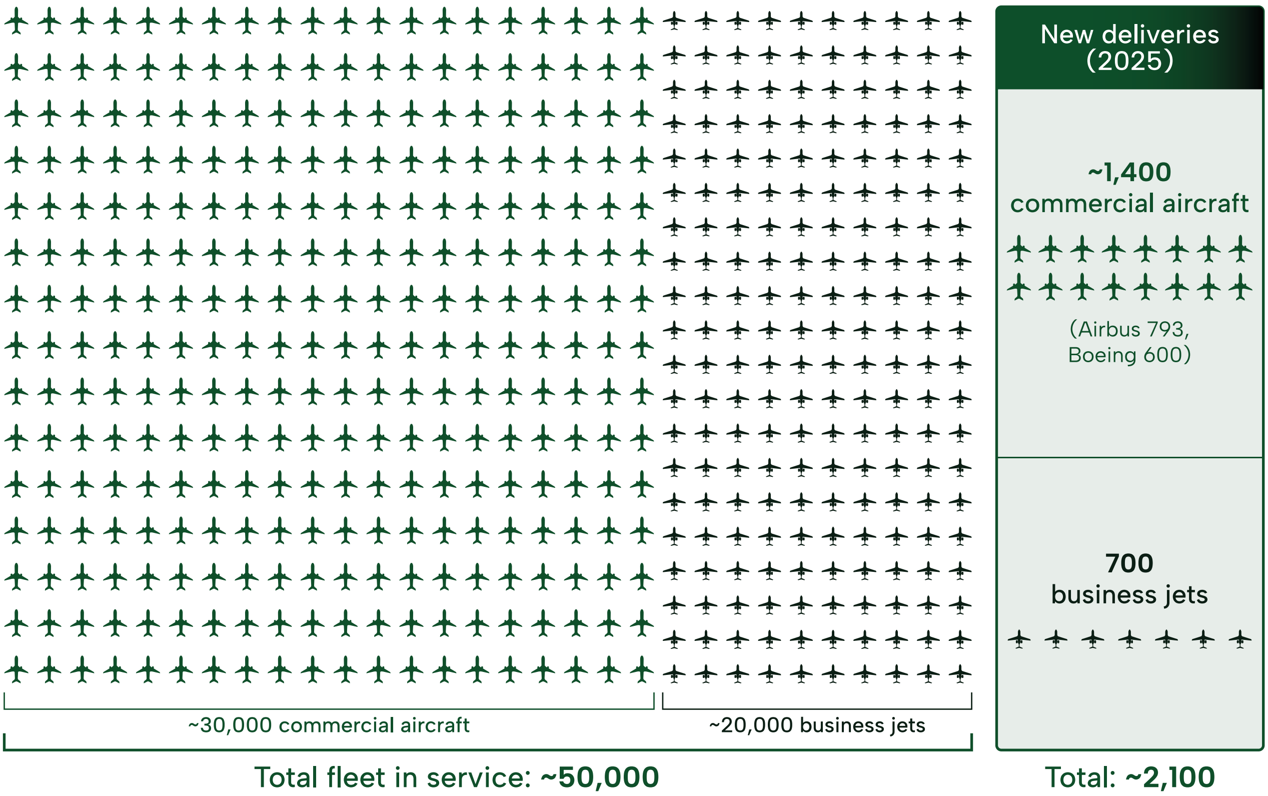
Part one
The basics

Chapter 1: 50,000 aircraft and nowhere to go

There are just under 30,000 commercial aircraft in service worldwide, and about 20,000 business jets on top of that (1,2). Every one of them burns jet fuel made from crude oil.

Here's how things actually play out. In 2025, a record recovery year, Airbus delivered 793 aircraft and Boeing delivered 600 (3,4). Call it 1,400 new commercial jets, plus around 700 new business jets (2,5). However, most of these new aircraft don't replace old ones, instead joining the existing fleet.

The fleet reality check



Sources: IATA, JETNET, Cirium, Airbus and Boeing delivery reports, 2025 to 2026

This is because as air travel keeps growing, airlines use new deliveries to add routes and capacity first and retire old aircraft second (5,6).

Cirium, an aviation analytics firm, expects 46,500 new commercial aircraft to be delivered over the next twenty years, and projects the global fleet will be substantially bigger in 2044 than it is today (6). A jet built this year will typically fly for 25 years or more. Which means an aircraft delivered in 2026 will still be in the sky in 2050, the year of the industry's net zero deadline (7,8).

This results in an increase in aviation's carbon footprint, as even the newest aircraft, while being more efficient than earlier models, still run on jet fuel. A factory-fresh Airbus A321neo or Bombardier Global 7500 burns 15 to 20 per cent less fuel than the model it replaces, which is genuine progress, but 80 per cent of a problem is still a problem (7,9). Fleet renewal makes aviation more efficient, not cleaner.

Moreover, the queue for new aircraft has never been longer. Airbus and Boeing ended 2025 with a combined backlog close to a decade of production at current rates (3,4,6,10). An airline ordering aircraft today will take delivery sometime in the mid 2030s.

This is the box aviation finds itself in, with an infrastructure and ecosystem revolving around aircraft burning fossil jet fuel, where there's a years long waiting list for those aircraft thanks to growing demand.

As a result, whatever cuts aviation's emissions this decade has to work with the aircraft already flying, the engines already certified and the airports already built (6,8).

That points to exactly one conclusion: if the aircraft stay the same, the fuel that goes into them needs to be different.

It needs to be Sustainable Aviation Fuel, or 'SAF.'

Chapter 2: The fuel that already exists

SAF is jet fuel made from something other than crude oil.

The finished product going into the wing is standard jet fuel (the technical name is kerosene), chemically equivalent to what aircraft have burned for years. What changes is where the carbon comes from. Instead of being pumped out of the ground, it can start as used cooking oil, agricultural waste, household rubbish, alcohol, or carbon captured from the air (11,12).

However, SAF needs no new engines, no modified aircraft and no rebuilt airports. Under the standards that govern aviation fuel, once SAF is blended with conventional jet fuel and tested, the resulting blend is certified to the same specification as standard jet fuel (11,13). It travels through the same pipelines, sits in the same airport tanks and goes into the same wings. A pilot cannot tell the difference, and neither can the engine.

And it works just as well.

In November 2023 a Gulfstream G600 flew from Savannah, Georgia to Farnborough, UK on 100 per cent SAF, no fossil fuel in the tanks at all (14).

Nine days later Virgin Atlantic flew a Boeing 787 from London to New York the same way, the first commercial airliner to cross the Atlantic on 100% SAF (14–16). Both were one-off demonstration flights requiring special permission, as regular commercial flights today have a certification ceiling of 50% SAF, with the other 50% being conventional jet fuel.

However, work toward raising that certification ceiling to 100% is already underway (11,13,17), so that those flights from November 2023 can become the norm.

Let's now look at the climate benefit of SAF.

While burning SAF still produces CO2, the saving happens across the fuel's life cycle: the cooking oil, the crops, the waste that SAF is made from absorbed or displaced carbon recently, rather than releasing carbon locked underground for millions of years (11,12,18).

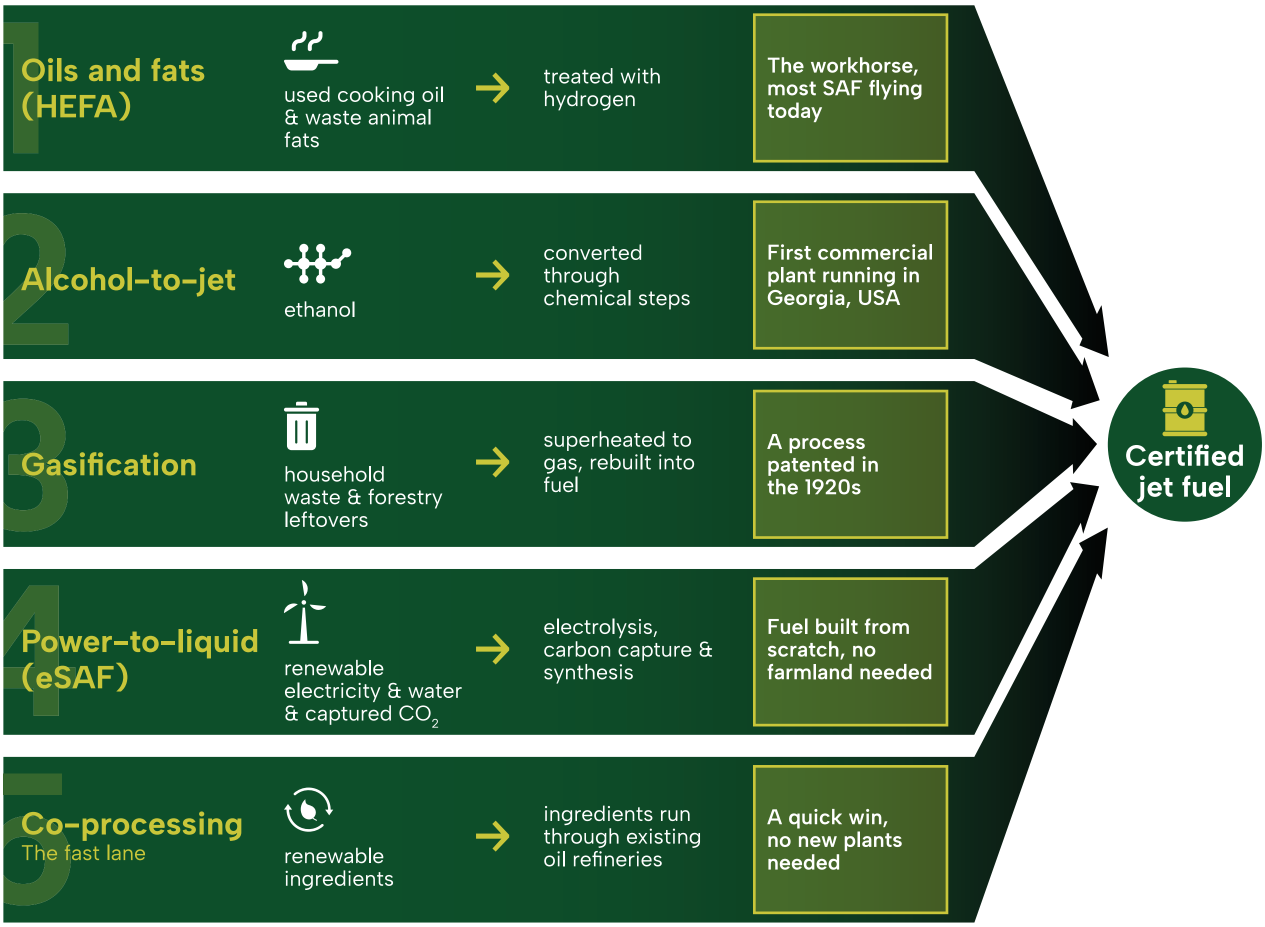
Measured from feedstock (the raw material the fuel is made from) to wing, today's SAF can cut emissions by up to 90 per cent compared with fossil jet fuel, depending on what it is made from and how (11,18,19).

There is however another important climate bonus. SAF burns cleaner than fossil jet fuel, producing far less soot, the particles that ice crystals in contrails (those white streaks we see in the sky) form around.

Flight tests by DLR, the German aerospace centre, and NASA found that pure SAF cut soot particle numbers sharply, meaning fewer and thinner contrails (20,21). Since contrail warming is one of aviation's biggest climate effects beyond CO2, this is a second substantial benefit of SAF (20,21).

Chapter 3: From cooking oil to jet fuel: How SAF gets made

Every litre of SAF flying today comes from a set of authorised production pathways. (23,24).



Sources: SkyNRG, World Energy, IEA Bioenergy

Here's what SAF today is made of:

1. Oils and fats (HEFA).

This is the mainstay currently: the workhorse. Used cooking oil, tallow and waste animal fats are treated with hydrogen to become jet fuel (23,25).

The technology is mature and the economics work at commercial scale right now: in 2024, most of the SAF supplied at European airports was HEFA made from used cooking oil and waste animal fats (26).

Neste, the Finnish producer that pioneered the route, now makes SAF on three continents, with its Singapore refinery alone able to produce on the order of a million tonnes a year (27). HEFA's limit is its ingredient list. The world only fries so many chips, and the supply of genuine waste oils won't keep pace with aviation demand (23,26,28).

2. Alcohol-to-jet.

Ethanol, the same alcohol that is already blended into petrol, but now converted into jet fuel through a chain of chemical steps (24,29).

US firm LanzaJet has brought the world's first commercial-scale ethanol-to-jet plant into operation at its Freedom Pines facility in Georgia, USA, and a first European plant is planned for Ghent (29,30). Brazil, India and the United States already run enormous ethanol industries, so an existing ecosystem is already there at scale on three continents (31).

3. Gasification.

Household waste, forestry residue and other solid leftovers are superheated into a gas, then transformed into liquid fuel using Fischer-Tropsch synthesis, a process invented over 100 years ago (24,32).

4. Power-to-liquid fuel, also called eSAF.

Renewable electricity splits water into hydrogen, which is combined with captured CO2 and synthesised into jet fuel (24,33). Theoretically this means no farmland, no waste stream, and no biological limit.

The first commercial plants are running, with US producer Infinium and German company Ineratec, delivering e-fuels, including aviation-range products, from their respective facilities in Texas and near Frankfurt Airport (33,34). In June 2026, US producer Twelve opened AirPlant One at Moses Lake in Washington State, the first commercial-scale plant in the country making jet fuel from captured CO2 and renewable electricity, with Alaska Airlines and Microsoft as launch buyers (157). The constraint is cost, because eSAF is dependent on renewable energy to create green hydrogen through electrolysis (33,35).

There is also a fast lane through existing infrastructure: conventional refineries can co-process renewable feedstocks alongside crude in their existing units, a small but quick win that needs no new plants at all (36,37).

This diversity of pathways is a strength, as it means aviation does not have to bet on a single feedstock, a single technology or a single region (23,24).

Chapter 4: Novel pathways and the fuels of 2030

As we highlighted in the previous chapter, the dominant SAF pathway involves used cooking oil, where supplies are unlikely to meet the needed SAF demand (39).

There is however a new generation of producers looking for plentiful feedstocks in unusual places. Here are four currently in development.

1. Jet fuel from human sewage

Wherever there are people, there is sewage. Nobody has to import it.

That observation comes from Firefly Green Fuels chief executive James Hygate (40). The British company pressure-cooks biosolids, the treated residue from sewage works, into a bio-crude that refines into jet fuel (40,41).

An independent Cranfield University analysis found the fuel cuts lifecycle emissions by more than 90 per cent, and the process could end up carbon negative once the carbon locked into its biochar byproduct is counted (41–43).

Firefly's pathway is moving through formal certification, its first UK plant is designed for around 45,000 tonnes a year, and European budget airline Wizz Air has already signed a long-term offtake deal (44). The current target for commercial production is 2029.

2. Jet fuel from seaweed

Since 2011, vast blooms of sargassum seaweed have been washing up on Caribbean and West African coasts, rotting on beaches in quantities measured in millions of tonnes (45).

MacroCarbon, co-founded by marine biologist Dr Mar Fernández-Méndez and based in the Canary Islands, intercepts the blooms at sea and converts them in a thermal biorefinery that generates its own hydrogen (46). As a result, this is a feedstock that needs no land, no freshwater and no fertiliser, harvested from a waste crisis. The company received permits for a scaled-up seaweed farm in October 2025 and projects fuel costs below recent SAF market prices (46).

3. Jet fuel from insects

Larvae will eat almost any organic waste, and they fatten as they do it. Circa Biotech in Abu Dhabi feeds them food waste diverted from landfill, then harvests the larvae for protein, fertiliser and an oil that refines into SAF feedstock via the same hydroprocessing route as used cooking oil (47). A trial with the supermarket Spinneys cut food waste to landfill by 54 per cent while producing the raw material for fuel (48).

In Israel, startup BugEra is going further, genetically engineering a modified fly that carries roughly double the oil, aiming to make insect oil cost-competitive with the waste oils that feed today's dominant pathway (49). The pitch solves two problems with one insect: rotting food waste emits methane, and aviation is short of feedstock.

4. Jet fuel from plastic

More than 80 per cent of the world's plastic is never recycled (50). The world's first pilot facility dedicated to converting hard-to-recycle waste plastics into SAF opened in the UK in April 2026, built by

Clean Planet Technologies with backing from the Department for Transport's UK SAF Clearing House (51,52).

It is true that none of these will fuel your flight this summer, but they still matter because each one unlocks a feedstock the current industry cannot touch, and sewage, seaweed, insects and plastic waste share a useful property: we have all four in large quantities, whether anyone wants them or not (39,46,47,50).

Chapter 5: Debunking myths about SAF

Every conversation about SAF runs into a series of objections about why it's not actually a solution to aviation's global warming problem. Though a few have some kernel of truth, most are long out of date.

Here are eight you will hear often, along with what the evidence says in 2026.

1. *"Is it actually safe?"*

Yes. SAF is certified under the same international standards as conventional jet fuel. Once blended and tested, the resulting fuel is certified to the same specification as standard jet fuel (13).

Commercial flights have been using SAF blends since 2011. Every batch has to meet the ASTM D7566 specification, and once blended into conventional jet fuel it is recertified as ordinary Jet A1 under ASTM D1655, the same standard the industry has used for decades (13,17).

2. *"SAF barely cuts emissions."*

Depending on pathway and feedstock, SAF cuts lifecycle carbon emissions by 50% to around 90% compared with fossil jet fuel (54,55). The variation depends on the feedstock and pathways, but the reductions are audited by independent certification bodies including the International Sustainability and Carbon Certification scheme (ISCC) and the Roundtable on Sustainable Biomaterials (RSB), and recognised under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) eligibility rules (54,56).

As we detailed in the previous chapter, some emerging routes, such as Firefly's sewage pathway, may even prove carbon negative once byproducts are counted (57,58).

3. *"SAF competes with food."*

This is a fair challenge, and worth taking seriously. It applies directly to virgin food-grade oils, and also to alcohol-to-jet when the ethanol comes from food crops grown on farmland.

However, certification frameworks under the EU Renewable Energy Directive, ISCC, RSB and CORSIA restrict or exclude feedstocks that displace food production (56,59). In effect, SAF feedstocks today don't displace the food on people's plates, and the certification systems are built to keep it that way.

4. *"There isn't enough feedstock."*

IATA's 2025 global feedstock assessment found enough sustainable feedstock to make roughly 400 million tonnes of SAF a year by 2050, against the 500 million tonnes aviation needs for net zero (61,62). The gap could well be filled from some of the novel feedstocks we explored in the previous chapter.

5. *"It's just greenwash."*

SAF replaces fossil jet fuel molecule for molecule, in the same tanks and the same engines, with carbon savings certified by independent auditors (54,56). Every litre of SAF used displaces a litre of fossil-based fuel.

6. *"SAF will always cost more. Passengers will end up paying"*

It is true that market prices still carry a premium, but SAF is a relatively new technology, and is walking the same curve as others. Solar faced it, and so did batteries. However, innovation and scale is causing that so-called green premium to shift.

Moreover, it's important to note that fossil fuel prices can fluctuate widely based on geopolitical realities, which can cause SAF to become competitive (as we've mentioned earlier).

Notwithstanding external factors, HEFA SAF costs roughly $1,500 to $1,600 a tonne to produce today, and that number will fall further as refineries scale. For comparison, fossil jet fuel (known as Jet A1) averaged roughly $700 to $800 a tonne in the two years before the crisis, and more than double that at the crisis peak.

7. *"It's a European obsession, the rest of the world does not care"*

SAF mandates or active mandate policy now span the EU, UK, Singapore, Japan, Brazil, India, Turkey, Indonesia, Thailand, Norway, South Korea and Malaysia, among others (66,67).

A growing number of global departures will soon be covered by some form of SAF policy or low-carbon aviation fuel requirement (66,67).

8. *"Hydrogen will fix this, unlike SAF it's a 'true zero' fuel source"*

One day, perhaps. But Airbus has delayed its hydrogen aircraft programme by up to ten years, and Europe's updated industry roadmap now expects hydrogen to deliver about 6% of the 2050 target, down from 20% in the earlier roadmap (68,69).

Aircraft delivered today will still be flying in 2050, and they will fly on liquid fuel. (Chapter 11 covers what hydrogen, as well as electric, can realistically do, and when.)

Eight myths

1 “Is it actually safe?”

Verdict: settled years ago.

Fact: certified to the same standards as conventional fuel; aircraft crossed the Atlantic on 100% SAF in 2023.

2 "SAF barely cuts emissions."

Verdict: false.

Fact: 50 to 90% lifecycle cuts, independently audited.

3 "SAF competes with food."

Verdict: fair challenge, managed.

Fact: certification rules exclude ingredients that displace food.

4 "There is not enough feedstock."

Verdict: mostly false.

Fact: identified feedstock covers about 400 of the 500 million tonnes needed (IATA, 2025).

5 "It is just greenwash."

Verdict: false.

Fact: replaces fossil fuel molecule for molecule, with an audit trail.

6 "SAF will always cost more."

Verdict: false.

Fact: production cost roughly $1,500 to $1,600 a tonne and falling.

7 "It is a European obsession."

Verdict: out of date.

Fact: mandates and policies across more than 20 jurisdictions.

8 "Hydrogen will fix this."

Verdict: not in time.

Fact: hydrogen is now expected to deliver about 6% of the 2050 target.

Sources: IATA, ISCC, ICAO, Airbus, General Index. Full references in Chapter 5

Part two

The numbers

Chapter 6: The green premium is not what you think

Ask what SAF costs and you will usually hear a multiple: three times jet fuel, or five times. Sometimes even more. Framed like that, SAF sounds permanently out of reach. It is not.

Yes, as we have shown in previous chapters, SAF does cost more than fossil jet fuel today. The premium is real, and IATA estimates that buying SAF rather than ordinary jet fuel (Jet A1) cost airlines around $3.6 billion extra in 2025 (74).

But two things are true at the same time. Firstly, the gap is shrinking. Secondly, most of what makes it look alarming has nothing to do with SAF at all.

Consider the gap. SAF is a young fuel, and new technologies always start expensive and get cheaper as they scale. Solar power did it. Batteries did it. SAF is on the same path, just earlier along. The cheapest type, made from used cooking oil, already costs far less to produce than the newest synthetic types. Every new refinery that opens and every improvement in the process brings the cost down further (59,92).

The Strait of Hormuz disruption in early 2026, the same event discussed in the previous chapter, showed where the volatility in fuel prices really lives. Fossil jet fuel soared as crude supplies tightened. SAF production costs barely moved, because SAF refineries do not run on crude oil (71-73). The fuel that everyone calls the expensive option suddenly looked like the stable one.

As the SAF market matures and develops pricing of its own, the prices operators pay will more closely track those steady production costs.

This matters for the question travellers actually care about: what does SAF add to a ticket? Less than the headlines suggest.

Transport & Environment found that Europe's SAF mandate currently adds only a few euros to a typical short or medium-haul fare (75). Over the same months, swings in the oil price added far more than that (71,73,75). When flying got more expensive in 2026, crude oil was the reason, not SAF.

A few euros is also something airlines have already learned to handle, and even to turn into a selling point. Lufthansa's Green Fares let passengers pay a little extra for SAF and lower-carbon flying, with loyalty perks in return, and millions of travellers have chosen them. SAS offers much the same, and KLM runs a SAF surcharge alongside a voluntary scheme. Far from hiding the cost, these airlines have made paying it feel like a benefit (74): modest, well-explained costs are ones passengers will accept, and sometimes welcome.

The US picture

The pricing story in the United States looks different from Europe's, and in some ways it is further along.

The US does not have a federal law requiring airlines to use SAF. What it has instead is tax credits, and they have moved the market fast.

Under the Inflation Reduction Act, SAF producers have been able to claim a federal tax credit of up to $1.75 per gallon. California adds a state-level incentive on top. Stack the two together and it becomes significantly cheaper to produce SAF in California than almost anywhere else in the world.

The effect on volumes has been dramatic. US SAF supply grew by 325% in 2024, and through the first half of 2025 was running at more than double the year before. The US also became an exporter, shipping roughly a fifth of its renewable diesel and SAF to Europe and Asia in the second half of 2025 (154,156).

The risk is political. When the federal credit structure changed in 2025, imported SAF's share of US supply dropped overnight, from 65% to 27%.

States are filling the gap on their own. For example, Kentucky signed a SAF tax credit into law in April 2026, worth up to $3 per gallon to producers. But the broader point stands. The US has the refineries, the feedstock and the engineering to lead the world in SAF production. What it does not have, compared with Europe, is a long-term legal guarantee that SAF will be needed.

Where the premium is heading

Put the European and US evidence side by side and a pattern appears.

The cost of making SAF is falling as refineries get bigger and new production methods come online. The cost of making fossil jet fuel meanwhile swings with every crisis and settles back, but the floor has not moved. The two lines are getting closer together.

Nobody can say exactly when they will cross. The most established kind, made from used cooking oil, is already close: production costs sit around $1,500 to $1,600 a tonne in 2026, against a fossil jet fuel price that has spent most of the past year in the same range or higher (65,71). SAF made from ethanol costs less in countries where ethanol is cheap, like Brazil and the United States.

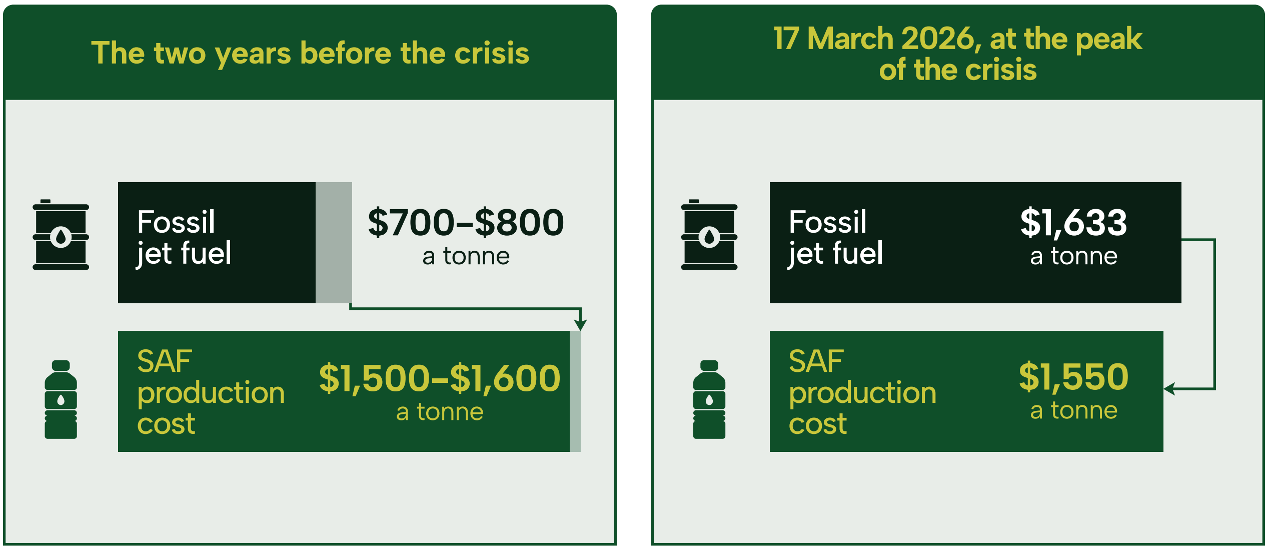
The fully synthetic type, made from renewable electricity and captured carbon, is still the most expensive but is also coming down the fastest as clean electricity gets cheaper.

This process is being sped up by the same thing that brought solar panels and batteries down in price: volume. Every refinery that opens improves the numbers for the next one. Every mandate that sticks gives producers the confidence to keep building. The green premium has not disappeared, but it is no longer a fixed feature of the landscape. It is a moving number, and it is moving towards parity.

None of this means the job is done. Feedstock prices rise and fall, competition for waste oils is pushing some costs up (76), and oil will keep swinging with world events. But the direction is clear on both sides of the Atlantic. As production scales, as the number of ways to make SAF grows, and as the raw materials expand from cooking oil today to sewage, seaweed and captured carbon tomorrow, the cost will come down and stop depending on any single ingredient or any single government's tax policy.

Fossil jet fuel only looks cheap because its price ignores its own risks: the carbon it puts into the atmosphere and the supply shocks that arrive every time there is a major conflict (71,73). SAF does not come with those surprises attached.

The premium, then and now



Comparing what SAF costs to make against what fossil jet fuel costs to buy. The March 2026 crossover happened because of the oil shock, and it did not last.

Europe's SAF mandate adds only a few euros to a typical short-haul fare (Transport & Environment).

Sources: General Index (Rotterdam assessments), IATA jet fuel price monitor, Transport & Environment

Chapter 7: The mandate decade

Building a SAF refinery costs billions of dollars and takes years. The plant EcoCeres is building in Dongguan, designed to turn locally collected cooking oil into around 450,000 tonnes of fuel a year, carries a price tag of HK$10 billion, roughly 1.3 billion US dollars, and is not due for completion until 2030 (155). No company will commit that money unless it is confident the fuel will sell once the plant opens. So how do you give producers enough confidence in future demand to build?

The answer, increasingly, is a mandate. In aviation terms, that means a government requirement that a rising share of jet fuel must come from sustainable sources rather than crude oil.

It is a simple mechanism: it turns voluntary demand into compulsory demand. Fuel producers get the certainty they need to finance billion-dollar refineries, and airlines get a clear compliance path.

The map

The European Union requires SAF to rise from 2% of total jet fuel today to 6% in 2030 and 70% by 2050, with a separate requirement for synthetic e-fuels starting at 1.2% in 2030 (81,82).

The UK tracks a similar path, starting at 2% in 2025 and reaching 10% by 2030, with a higher share reserved for second-generation fuels, and a 22% target by 2040 (83–85). The two schedules differ in shape. The UK obligation rises in small annual steps, giving suppliers a predictable increment to plan against, while the EU holds at 2% and then steps up to 6% in 2030, concentrating the increase into a single jump (81–85).

Beyond Europe, the obligation has gone global. Singapore, South Korea and Brazil begin in 2027. Japan has a 10% SAF supply obligation by 2030. Turkey is targeting a 5% emissions cut on international flights. Formal proposals are advancing in India, Indonesia, Thailand and Malaysia (80,86).

Four different approaches

Look closer and you can see four different ways of getting to the same place.

1. Europe and the UK oblige fuel suppliers to blend a rising SAF percentage at the point of delivery (81,82,87).
2. Brazil and Turkey take a different route, mandating emissions reductions instead and letting operators meet the target with whichever fuel delivers the carbon saving (80,86).
3. Singapore charges passengers a small fixed levy and buys the fuel centrally, which caps what travellers pay regardless of where SAF prices go (80).
4. In North America, the Canadian province of British Columbia adds a fourth variation: a hybrid that combines a carbon-intensity requirement with a small but binding renewable-content rule for jet fuel (91).

The next decade will show which design works best.

Year-one friction

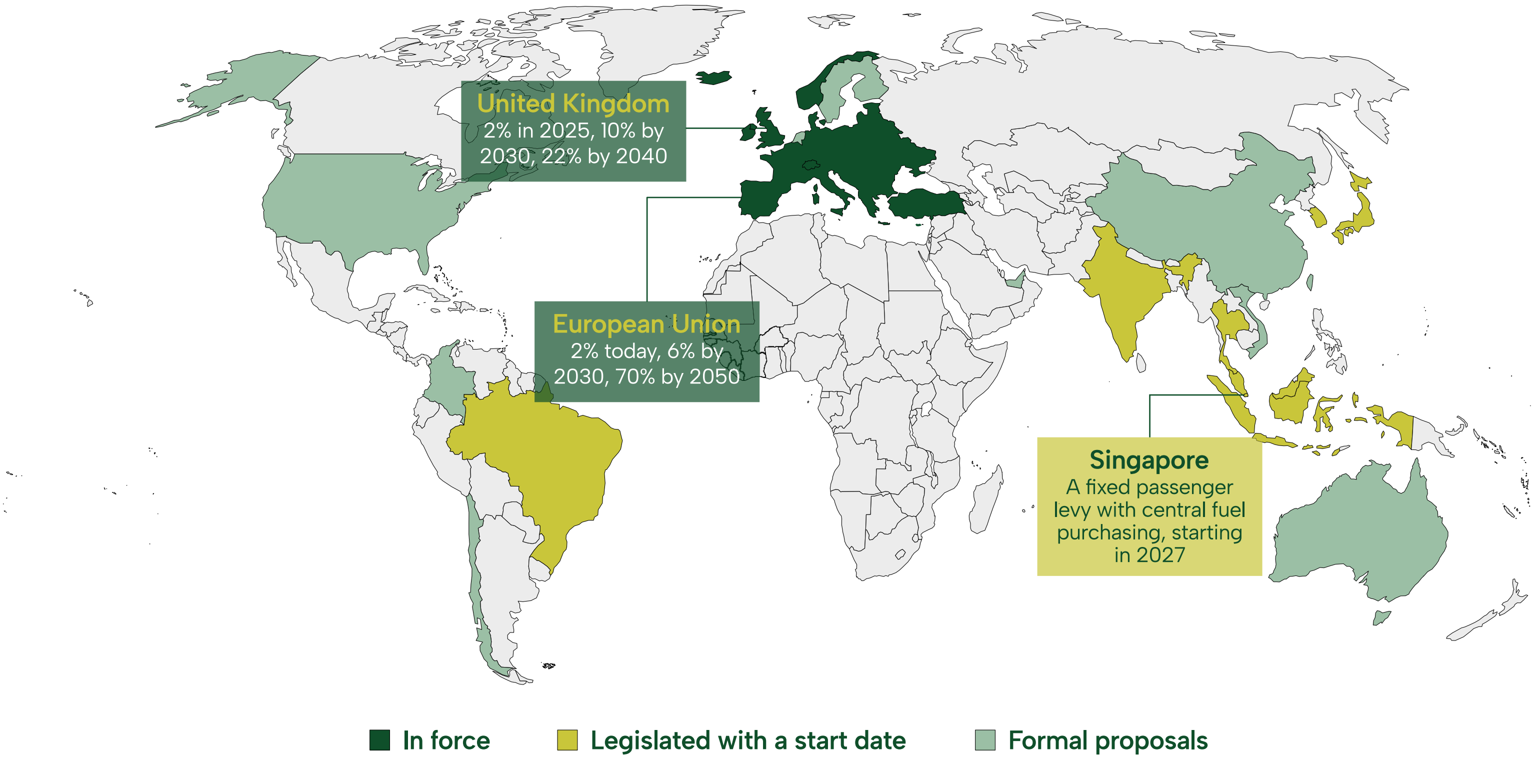
The first compliance year also came with growing pains. IATA, the airline industry's global trade body, put the extra cost of SAF to airlines at about $3.6 billion in 2025 and argued that some mandates had pushed up prices without enough new fuel to show for it (74,88).

The numbers bear that out, up to a point. In some European markets, what airlines were actually charged for SAF, once compliance fees and administrative costs were added, reached $3,000 to $3,500 a tonne. The fuel itself was trading at around $1,750 to $1,900 (73,88). Something between the refinery and the aircraft was adding costs that had nothing to do with making the fuel.

That is a problem with how the rules were designed, not with the idea behind them. Mandates work because they give producers the confidence to build, and the fixes are already coming: better cost transparency in Europe, a UK price-floor mechanism that guarantees producers a minimum return, and Singapore's approach of charging passengers a small fixed levy (82,83,89).

Of course, legislation is not production. The mandates have created global demand that did not exist three years ago, but they have not yet guaranteed that the fuel will be there to meet it. In some places, notably Europe, the first targets have already been met, producing a temporary glut.

In much of the rest of the world, SAF production is still a rounding error against total jet fuel use.



In force	European Union, United Kingdom, Norway, Turkey, Switzerland
Legislated	Singapore, South Korea, Japan, Brazil, India
Proposals	Indonesia, Thailand, Malaysia, China, Taiwan

Switzerland applies the ReFuelEU blending obligation, currently at Geneva and Zurich.

Source: compiled by SimpliFlying from national government and regulatory publications, July 2026.

Chapter 8: Are we making enough?

The mandates climbing through the late 2020s and beyond will require SAF in quantities the industry does not yet produce. Today the whole world makes about 2.4 million tonnes of SAF a year, less than 1% of the fuel aviation burns (63,64,96).

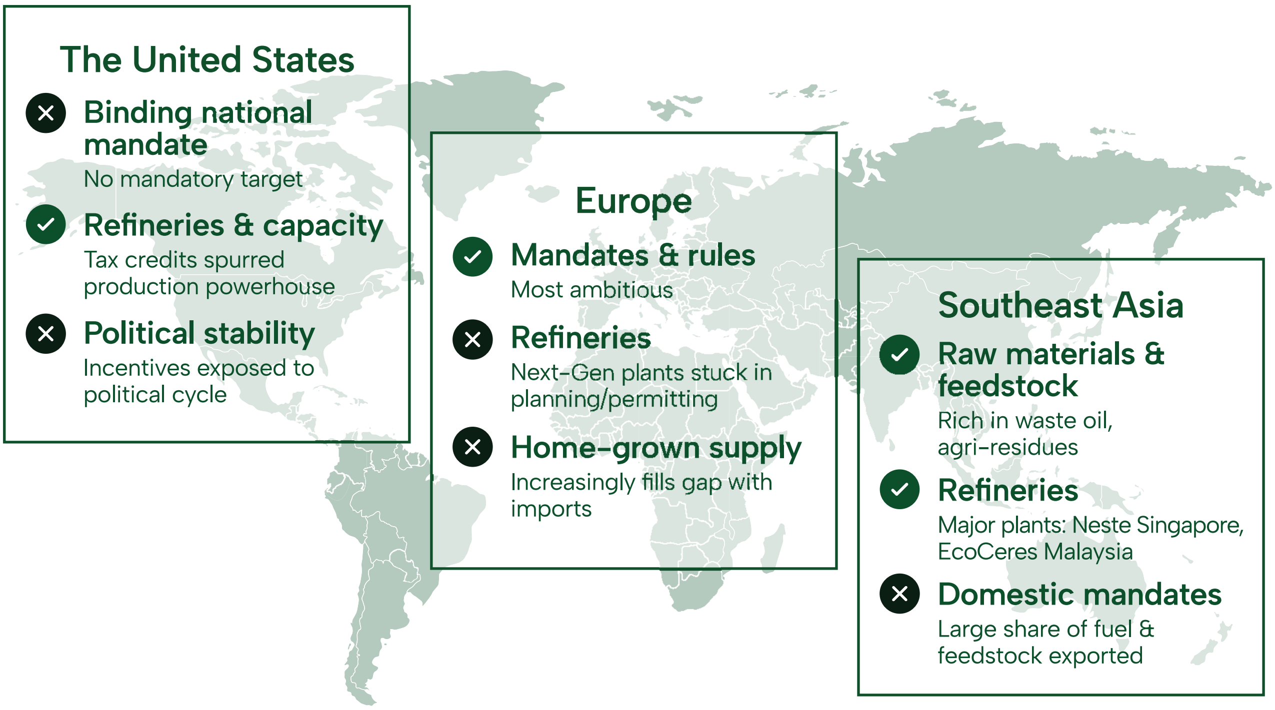
Meeting the 2050 targets means scaling to roughly 500 million tonnes a year, more than two hundred times current output (61,62).

So is that growth on the way? In some places, yes. In others, the pieces are scattered in a way that holds the whole thing back. The clearest way to see the problem is to look at three regions, because each has part of what SAF needs and none has all of it.

1. Europe has the rules but not the refineries. Its mandate is the most ambitious in the world. But Europe cannot make all the fuel its own rules require. Many of the next-generation plants meant to supply it are still stuck at the planning or permitting stage, short of a final decision to build (89,97). So Europe increasingly fills the gap with imports, which works for now but is not the home-grown supply the mandate was meant to create.
2. The United States has the refineries but not the rules. America has the production base, the feedstocks and the engineering to be the world's SAF powerhouse, and its tax credits have spurred capacity. But it has no binding national mandate, and the incentives that do exist are exposed to the political cycle and can be rewritten or removed (74).
3. Southeast Asia meanwhile has the raw materials and, increasingly, the refineries, but fragmented rules. This is the region that complicates any lazy assumption that SAF is a Western story. Some of the largest SAF plants in the world are here: Neste's Singapore refinery is among the biggest anywhere, capable of producing on the order of a million tonnes a year, and EcoCeres has opened a major new capacity in Malaysia (27,95). The region is also rich in the feedstocks SAF needs: used cooking oil, agricultural residues and other wastes. What it mostly lacks is binding domestic mandates, so a large share of the fuel and feedstock produced here is exported to markets with rules, chiefly Europe, rather than burned at home.

The three-region mismatch

Getting rules, refineries & raw materials aligned



Look wider still and the feedstock picture turns brighter. Much of the world's untapped raw material for SAF sits in the global south: agricultural waste across Africa, South and Southeast Asia; used cooking oil in fast-growing cities; sugarcane and ethanol industries in Brazil and India; and the novel feedstocks of Chapter 4.

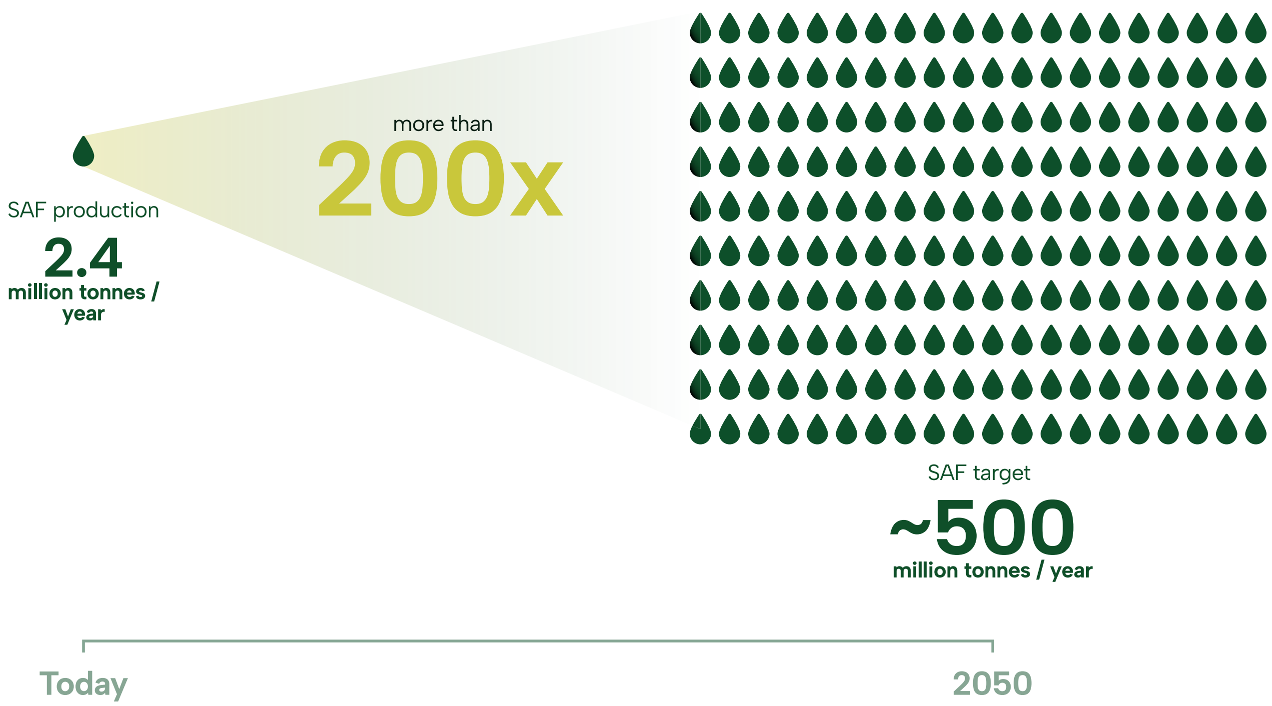
These are regions often treated as bystanders in the energy transition. In SAF they hold some of the most valuable cards, and the countries that build the capacity to process their own waste into fuel stand to gain energy security and industry, not just lower emissions.

Put all this together and the problem is not that the world is short of any one ingredient. It is that the rules, the refineries and the raw materials sit in different places. The fuel gets made only where enough of them line up at once, and too often they do not.

Finally, underneath it all is the same missing link: money. Building a SAF plant is a twenty-year bet, and it's hard to finance without confidence in the rules, the incentives and the price. Several major energy companies have slowed or reworked their low-carbon fuel plans. As one industry figure put it, when the rules keep moving, the people with the money stay home.

The encouraging part is that none of this is a technology problem. The pathways work, the feedstocks exist, and the demand is now written into law across a growing share of the world. What is missing is alignment: getting the rules, the refineries and the raw materials into the same places at the same time.

The scale of the climb



Sources: IATA; IATA and Worley 2050 feedstock and production assessment, 2025

Chapter 9: Who actually uses this fuel?

Ask an airline about SAF and you will hear about commitments, partnerships and millions of litres. What you will rarely see is the figure that actually matters: what share of the fuel was SAF, and whether that fuel was physically pumped into their aircraft or accounted for through certificates purchased elsewhere in the system.

This latter, indirect mode of SAF use is called 'book and claim'. Right now, sustainable aviation fuel is still produced in only a limited number of refineries worldwide. An aircraft flying from Dubai to Tokyo cannot physically tank SAF in most places because the fuel simply is not available at the airport yet.

So, the operator purchases SAF from a location where it is available, say Los Angeles or Amsterdam, and receives a verified certificate confirming that the equivalent volume of SAF has been produced, certified to international standards (ISCC), and injected into the aviation fuel system.

One more note on how the numbers are quoted. SAF figures come in two forms: neat SAF, which is the pure product before mixing, and blended fuel, which is the mix of SAF and conventional jet fuel that actually goes into the aircraft. The same purchase looks larger when quoted on a blended basis, so wherever an operator states which basis it uses, this report does too.

The leader by share is DHL, a freight operator, for whom 3.5% of its fuel burn was SAF. This is mostly because companies shipping goods will pay extra for lower-carbon delivery in a way individual travellers mostly will not (102,103), and because its owner, Germany's Deutsche Post, gives it an extra sustainability push.

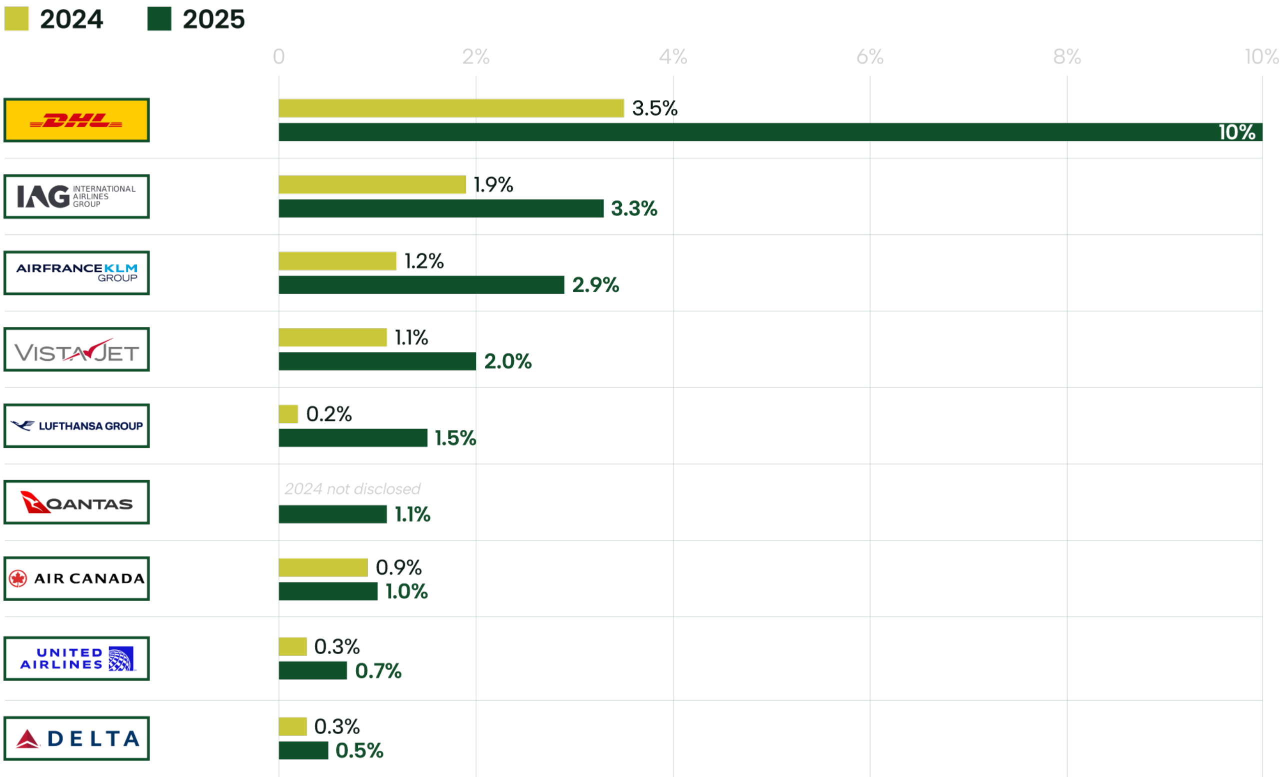
DHL's SAF is a mixture of physically uplifted fuel and certificates purchased through its GoGreen Plus programme, and the company has since gone further, reporting a 10% SAF blending ratio across its own aircraft in 2025, a multi-year high, on the way to its stated aim of 30% by 2030 (152).

By 2025, the picture had shifted. IAG reached 3.3% of its fuel burn, Air France-KLM reached 2.9%, Lufthansa Group climbed to 1.5%, Qantas Group reached 1.1%, and Air Canada hit its stated 1% target. United Airlines doubled its SAF use to around 0.7% of fuel, and Delta reached roughly 0.5%. The direction of travel is clear, though the ceiling remains low.

Industry benchmarking data shows that 52% of airlines globally, weighted by fuel usage rather than carrier count, did not use any SAF at all in 2023 (103). More than half the industry, by volume, was still entirely dependent on fossil jet fuel. The concentration is striking too: the majority of global SAF consumption was concentrated among just three carriers (102).

The signal for operators is that scrutiny is moving beyond how much SAF is bought, to what kind, and whether the numbers can be checked.

SAF as a % of fuel – 2024 vs 2025



All percentages show neat (unblended) SAF as a share of total fuel consumed, on each operator's own published basis.

What about private aviation?

Business jet operators are buying SAF, some in serious quantities. What varies is how much a reader can check from outside. Right now, disclosure across the segment comes in two broad categories.

1. Some operators publish the full picture: how much SAF was used and how much fuel was burned in total, so the percentage can be worked out rather than taken on trust. VistaJet reports on this basis through its annual greenhouse gas accounting, prepared with the climate consultancy South Pole (150,151). VistaJet has grown its neat SAF procurement each year: from 101,285 US gallons in 2023 to 923,711 US gallons in 2024 (1.1% of total fuel) and 1,789,950 US gallons in 2025 (2% of total fuel). Cumulative procurement has passed 2.8 million US gallons since 2022. For context, VistaJet's 2025 SAF share places it above several major commercial airline groups, though comparing a business jet fleet with a commercial airline is not a straight like-for-like. The fuel is independently certified, made from used cooking oil, and sourced from a range of suppliers (150).
2. Others report the specific volumes of SAF they have purchased, showing year-on-year growth in buying. These figures demonstrate commitment and direction, but without total fuel consumption stated alongside them, the percentage share of fuel cannot be independently calculated.
3. Others set public targets. Flexjet has said it aims for 12% of its fleet's fuel to come from SAF by 2030 (149). It has not published a figure for any current year, so progress towards the target cannot be tracked from outside.

The wider point for the segment is simple. As regulation tightens and investors pay closer attention, the operators whose numbers can be checked will carry more weight than those whose numbers cannot, whatever the volumes involved.

A Gulfstream G600 has already crossed the Atlantic on 100% SAF (104,105). The aircraft are ready. The fuel exists. What business aviation needs now is for more of its operators to show the full picture.

1 Full picture	2 Volumes bought	3 Future targets
Reveals: Total fuel burn, specific SAF volume used, and the precise SAF percentage. Progress can be verified.	**Reveals:** The specific volume of SAF purchased. Year-on.year growth in purchases.	**Reveals:** The operator’s ambitious goals and general commitment to decarbonization.
Does not disclose: Nothing. All key figures for verification are publicly stated in annual accounting.	**Does not disclose:** Whether volumes are neat SAF or blended fuel. Percentage share of total fuel.	**Does not disclose:** Current annual SAF usage or percentages. Actual progress made towards achieving the future target.

Part three

The bigger picture

Chapter 10: Some quick wins

Most of this report has been about one answer: SAF, the fuel that works in the aircraft already flying. But it is not the only thing the industry can do. Some measures save fuel today, for free, with no new technology at all. Others, electric and hydrogen aircraft, carbon removal, will matter later, for particular slices of the problem.

This section looks at those other pieces. The point is not that they replace SAF. It is that they sit alongside it, each doing a job SAF cannot, and together they shrink the problem SAF has to solve.

Operational efficiencies

The cheapest, cleanest jet fuel is actually the fuel a flight never uses. Most aircraft do not fly the most direct route available, following fixed corridors in the sky, circling while waiting to land, and flying at altitudes set by norm rather than efficiency. That wastes a lot of fuel resulting in a lot of extra carbon being burnt.

Closing that gap costs nothing in new aircraft or new fuel, and the savings start immediately (106,107).

Rachel Gardner-Poole of NATS, the UK's air navigation service provider, leads a network called GAIN that shares these route-efficiency fixes between countries (106,108). The early numbers are striking.

The network's first five members are saving over 450,000 tonnes of CO2 a year between them, from efficiency gains of just about 1 to 1.5% (106,108).

Grow the club to around 90 organisations and the potential saving approaches 9 million tonnes a year, with no new technology involved beyond better use of existing systems (106,108). The target is to sign up around 40% of the world's air navigation service providers by 2030 (106,108).

The aircraft themselves keep improving too: fuel burned per mile flown for new commercial jet aircraft has fallen by roughly 40% over recent decades, according to industry analysis cited by NATS and independent technical studies (109).

There is another item in aviation's climate ledger: contrails. These are thin cloud-like trails left behind by aircraft that in some cases trap heat. Their total warming effect is believed to be substantial. According to some studies, it is comparable to half of aviation's CO2 emissions, depending on the time horizon considered, though the science carries some uncertainty (110,111).

However, only a small share of flights creates the persistent, warming kind of contrails. They form in specific patches of air, and those patches can increasingly be forecast (110,111). Altering the altitude of those few flights can make a large slice of the warming disappear, for a tiny fuel penalty. The benefit comes from better data about which altitudes to avoid.

None of this replaces SAF of course, but it does shrink the problem SAF has to solve. Every percentage point of fuel saved through smarter flying is a percentage point of new fuel that never has to be produced.

Chapter 11: Electric and hydrogen

Three technologies are regularly offered as the real answer to aviation's emissions: battery-electric aircraft, hydrogen, and removing carbon from the air and storing it.

Each has a role. However, none will replace the need for large quantities of SAF in the short to medium term.

Let's look at **electric aircraft** first. As with cars, you have all electric aircraft (like a Tesla in the air), and hybrid-electric aircraft (like a Prius in the air). These show a lot of promise, but initially only for shorter hops with lighter loads.

The reason is physics. Batteries are heavy for the energy they hold, and the penalty grows brutally with distance (112,113). The realistic picture is electric aircraft taking over parts of the regional and commuter market through the 2030s, while the medium and long-haul flying that produces most of aviation's emissions stays far out of reach (112,114).

Even so, the progress is real. Dutch company Elysian is developing a battery-electric aircraft in the 90-seat class with a projected range of roughly 750 to 800 kilometres, with testing targeted around 2030 and entry into service in the early to mid 2030s (115–118). That is a serious advance, and the right way to think about electric aviation: as a potentially meaningful solution for a slice of short-haul flying in the 2030s.

Hydrogen attracts a lot of hope and doubt. The hope: when you use hydrogen as a fuel, it's a 'true zero' solution, with no carbon at all at the point of use. The doubt: it needs entirely new aircraft, entirely new airport fuel systems, and a supply of clean hydrogen barely exists today (119,120).

The economics are hard as well. Green hydrogen, hydrogen made with renewable electricity, remains expensive, and aviation would need not just the fuel itself but new liquefaction, storage, transport and airport delivery infrastructure built around it (119,121).

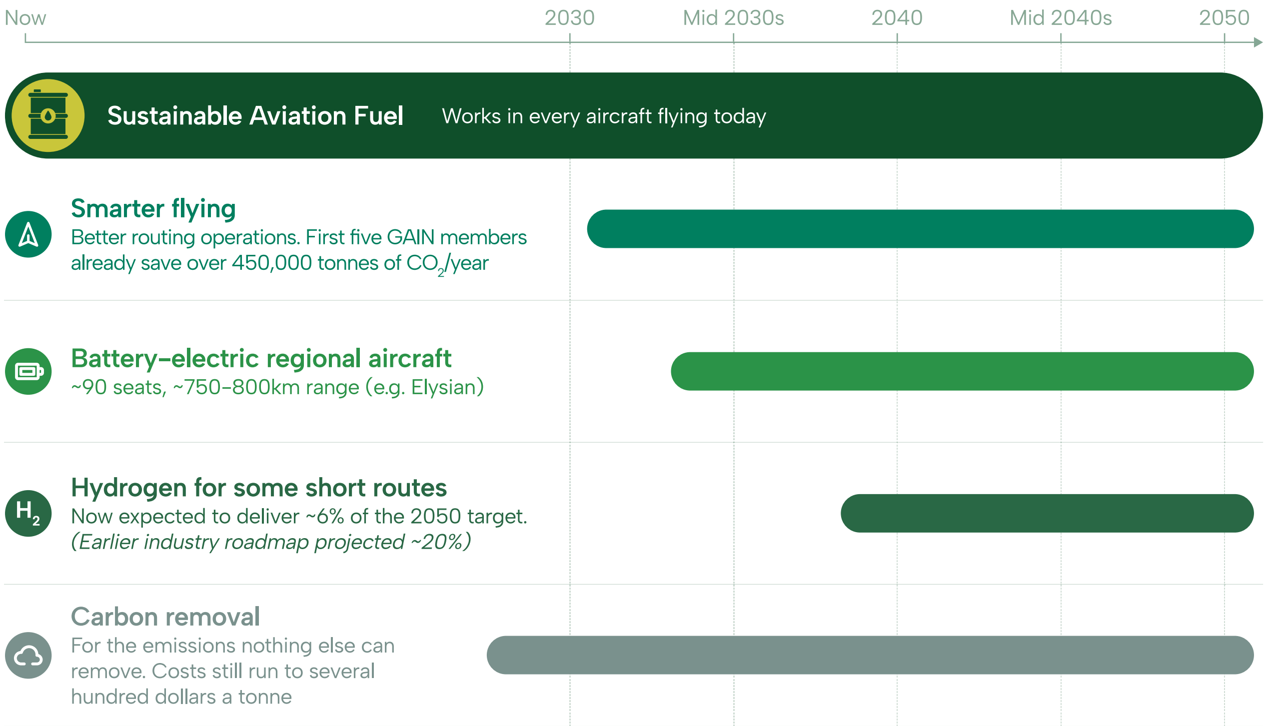
The companies who were initially bullish about a hydrogen future have already adjusted.

Airbus has pushed its hydrogen aircraft programme back by as much as ten years, and the European industry's own updated roadmap now expects hydrogen to contribute about 6% of the 2050 climate target, down from 20% in the earlier version (68,119). The honest reading is hydrogen for some short routes in the 2040s, with anything resembling today's long-haul network well beyond that.

Carbon removal is the third way. Pulling CO2 out of the air with machines through a method called 'Direct Air Capture' (DAC) and locking it away in rocks deep underground can deal with residual emissions. That same captured carbon can also be a feedstock for the synthetic fuels described earlier in this report (122,123). The trouble is that DAC is still very expensive as an early stage technology, with current costs running to several hundred dollars per tonne of carbon removed and the leading facilities charging $600 or more. The practical assessment is that it can be used for what is left over, otherwise there are fears that it is a stalling tactic.

Realistically, there are strong reasons to believe that SAF will carry the burden of decarbonisation for the next 25 years with other technologies playing bit parts.

SAF carries the load today.



The other technologies arrive at different points between now and 2050.
SAF is the one that works in the aircraft flying today.

Sources: NATS GAIN, Elysian, Destination 2050 roadmap, DLR

Chapter 12: The last hundred metres

A SAF commitment means nothing if the airport cannot get the fuel into the wing. Though it sounds trivial, it can stop whole programmes. Airport fuel systems were built for exactly one product arriving through long-established pipes, and a second fuel, blended in varying ratios and arriving by new routes, requires storage, handling, and coordination (124,125).

Copenhagen shows what taking this seriously looks like, and this report draws on an interview with Sabrina Tekle Krarup Jensen, who works on the airport's sustainability partnerships (124).

In March 2026, after the airline Norwegian won a government tender, Denmark launched its first green domestic route, Aalborg to Copenhagen, flying on a 40% SAF blend on all departures through 2026 and 2027 (125–127). Getting there took years longer than anyone wanted, partly because today's rules only permit blends of up to 50% SAF in commercial service, with full 100% certification still working through the system, the same process behind the test flights in Chapter 2 (128).

The most surprising Copenhagen finding has nothing to do with climate. In 2023 the airport ran an experiment with a dedicated SAS aircraft: one week shuttling to Stockholm on ordinary jet fuel to set a baseline, then the same plane, same route, on a 40% SAF blend, with a mobile laboratory from the German Aerospace Center (DLR) parked on the tarmac measuring what came out of the engines (129,130).

The result was about 30% fewer ultrafine particles, the invisible pollution linked to heart and lung disease (129,130). Cleaner fuel made cleaner air. For airport neighbours and ground crews, SAF is a health story too, as well as a climate one.

The lesson of Copenhagen as well as other forward looking airports like Amsterdam Schiphol and Los Angeles is that a hub that invests early in handling and blending becomes a place where using SAF is easy (124,125). An airport that does not becomes a bottleneck for the whole system.

About 30% fewer ultrafine particles.

Same aircraft, same route, 40% SAF blend, measured by the German Aerospace Center's mobile laboratory at Copenhagen Airport in 2023.

Ground crews and people living under the approach breathe this air every day.

Source: Copenhagen Airports and German Aerospace Center (DLR), 2023

Part four

What comes next

Chapter 13: What has to happen

As we have detailed in this report, the fuel works. The feedstocks exist. The aircraft are ready. What remains is coordination: bringing together the policy, pricing, purchasing and demand signals that turn a promising technology into a functioning market.

There is one more thing that bears consideration.

SAF has mostly been framed as a climate measure: valuable, but expensive. A cost to be managed rather than a capability to be built. The events of 2026 have changed that framing.

Currently, aviation runs on a fuel carried through a handful of contested waterways, refined in a shrinking number of plants, and priced by events the industry cannot control. Every time a strait closes or a refinery goes offline, the repercussions are immediate.

SAF does not travel through the Strait of Hormuz or depend on a functioning relationship between any two governments. It is made from local waste, local crops and local power, in refineries that can be built wherever the feedstock and the electricity exist.

That makes SAF an energy-security asset, not just a climate one. Countries that build domestic SAF capacity will insulate their aviation sectors from price shocks like those that have hit twice in four years. Operators that secure SAF supply are reducing their exposure to a commodity they cannot influence. The case for acting is no longer only about emissions targets. It is about the resilience of the fuel supply itself.

Ultimately, climate policy is politically fragile: it rises and falls with governments and economic cycles. Energy security is not. The imperative to keep planes flying on fuel you can control does not change with an election. If SAF is treated as strategic infrastructure in the same way countries have learned to treat semiconductor plants, battery factories and domestic energy capacity, then the investment case holds regardless of who is in power.

That is the context for what has to happen next.

1. Governments need to make the rules investable

A fuel plant is a 25-year bet, and the past two years have shown that smart policy design matters as much as ambition. The difference between a mandate that builds supply and one that merely inflates prices lies in the details.

Singapore offers a template. Its levy-and-procurement model puts a visible ceiling on what gets passed through to travellers and operators, combining a clear mandate with transparency and relatively modest costs (132–135).

The EU’s first mandate year showed what happens when the design is less careful. Compliance fees, reporting requirements and the balance between physical uplift and book-and-claim all shaped outcomes as much as the percentage target itself.

In some cases, compliance fees pushed effective prices far above the fuel’s actual cost, and the system worked against itself (88,92). The answer is not to weaken the targets. It is to engineer the rules better: transparency on compliance costs, stable long-term frameworks, and careful attention to the mechanics of how fuel reaches the wing.

2. Producers and markets need to give SAF a pricing system of its own

Today SAF is still largely sold as a premium on top of fossil benchmarks, which is why SAF invoices spiked during fuel crises that did not disrupt a single SAF plant (73,136). That is the signature of an immature market.

Natural gas spent decades priced off oil before developing its own benchmarks. SAF is following the same trajectory, with exchange-traded contracts, long-term offtake agreements, and price-risk-sharing instruments now entering the market (98,136).

The foundations are being laid. What will accelerate the transition is ordinary commercial behaviour: producers offering long-term contracts, buyers committing to multi-year purchases, and banks financing plants against predictable revenue streams rather than spot-price exposure.

3. Operators have a rare opportunity to lead while market conditions are still favourable

Europe is oversupplied through the late 2020s. Prices are softer than many expected. Producers are actively looking for long-term buyers to anchor new capacity (92).

The blending obligation itself sits with fuel suppliers rather than with operators, so an operator's route to SAF is commercial rather than regulatory. Multi-year purchase agreements, book-and-claim contracts and direct partnerships with suppliers are what secure volume, and operators that sign them while supply is loose are better placed than those competing for it once mandates step up and capacity tightens (92).

There is also a real reason to report honestly. Publish SAF as a share of fuel actually burned, show certificates separately, and let customers and regulators see the real number. In a market where the global leader is still below 4% of fuel burn, transparency is a competitive advantage rather than a compliance burden. IAG, Air France-KLM and VistaJet all report SAF volumes against fuel consumption in their annual reporting, which is what allows a share of fuel to be quoted at all.

The operators that establish credible reporting now will be the ones that corporate customers, investors and regulators trust when the scrutiny intensifies.

4. Corporate customers hold more power than they often realise

The proportional leader in SAF use is DHL, a freight operator, as its customers asked for lower-carbon shipping and were willing to help pay for it (102,103).

That same logic extends across aviation. Any company that flies people or cargo can support SAF through book-and-claim systems and certificate purchases, regardless of where its aircraft physically refuel. Voluntary corporate demand built the early SAF market. There is no reason that momentum has to stop with freight. In fact, as Scope 3 emissions reporting becomes standard for large companies, aviation-related emissions are becoming one of the most visible categories, and SAF certificates are one of the most credible reduction tools available.

None of this requires a scientific breakthrough. The gap between SAF at 1% and SAF at scale is a coordination gap. And aviation, as an industry with 50,000 aircraft across 200 countries every single day, knows how to coordinate.

Chapter 14: Three roads to 2030

Closing that gap comes down to one question: can the money-and-rules problem get fixed?

There are three routes to the answer.

1. **The first is the one that comes from doing nothing – from waiting for the perfect policy before moving at all.**

Rules keep shifting, capital stays cautious, and SAF remains stuck at around 1% of global fuel use. But this road is already becoming less likely.

The reason is simple: too many governments have already made the decision. The EU's ReFuelEU mandate is in force. The UK's SAF mandate is running. Singapore's levy launches in 2027. In the USA, California, Washington, Illinois and a growing list of US states have put incentives in place. The policy architecture is now law as opposed to theory, and it is generating demand that producers are already responding to (96,140).

2. **The second is where aviation is headed today, and it is further along than the headlines suggest.**

New production capacity is being announced and financed. This is perhaps not as fast as the optimists hoped, but still faster than the pessimists claimed. By 2030, SAF will reach a few per cent of global jet fuel, concentrated in markets with firm policy support: Europe pulling in imports and building domestic capacity, Asia adding supply from agricultural waste and power-to-liquid pathways, and the United States leveraging its tax credit infrastructure into a production base (140,141,144).

SAF pricing will begin to develop its own benchmarks. Long-term contracts will become standard. Hedging tools will emerge so that banks and buyers can plan beyond the next quarter (137,143). On this road, aviation will make real progress.

3. **The third is where things get exciting. This is the road where the energy-security case does what the climate case alone has struggled to do: it makes SAF politically durable across the political spectrum.**

Governments begin treating fuel plants as strategic infrastructure – using loan guarantees, co-investment vehicles and revenue support to de-risk them in the same way they learned to back solar farms, battery factories and semiconductor plants (145,146).

The logic is compelling: SAF is made from local waste and local power. It creates jobs in industrial regions. It insulates aviation from the geopolitical chokepoints. Countries that secure domestic SAF supply chains will build energy independence and cut emissions at the same time.

On this road, price benchmarks will deepen quickly. Capital will start to move in size (138,146). In some regions, supply will outrun mandates, and when that happens, prices will detach from fossil fuel, so the next oil shock lands less heavily on SAF buyers.

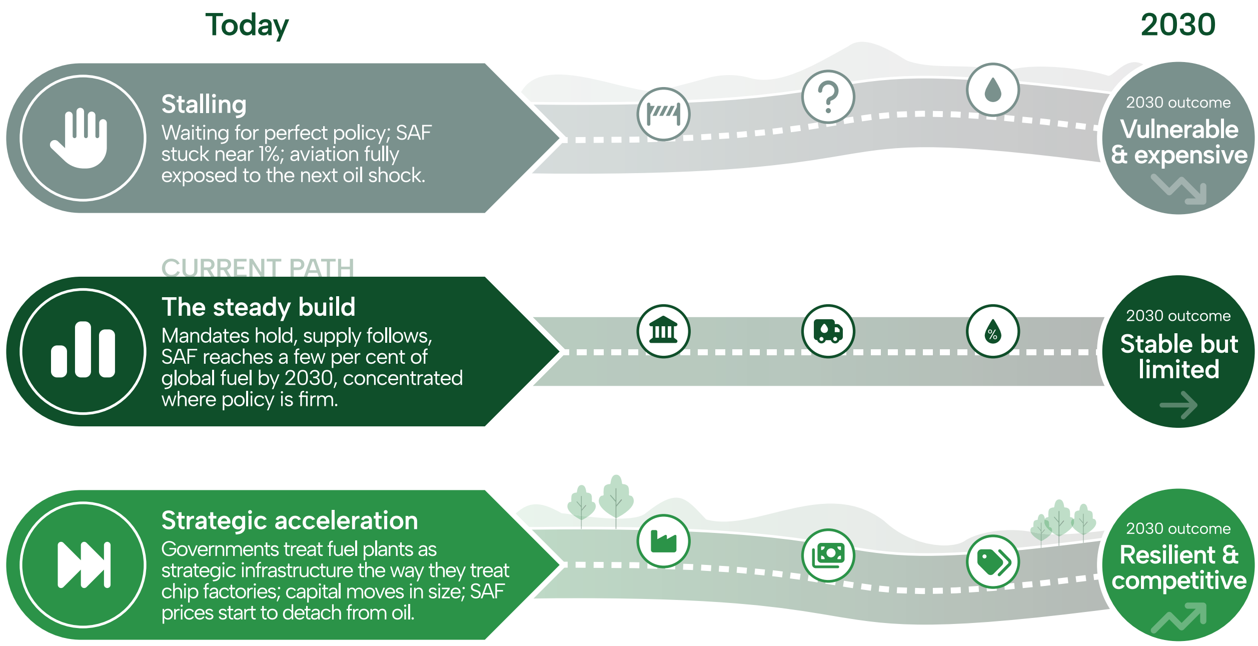
The advantage will shift to the countries and operators that moved early: the ones that signed long-term offtake agreements in the late 2020s, that locked in supply when it was available, and that built the transparency and credibility to attract corporate customers and institutional capital.

Which road gets taken will come down to decisions made over the next three or four years by governments, lenders, producers and major buyers.

What changed in 2026 is that the argument for SAF no longer rests on climate commitments alone. It rests on whether an industry that moves six billion passengers a year is willing to keep betting everything on a fuel it cannot secure. The operators, the countries and the investors that answer that question first will hold the advantage. The rest will be explaining why they waited.

Three roads to 2030.

Same technology on all three roads. What differs is what governments, lenders and buyers decide over the next four years.



Which road gets taken will be settled by decisions made over the next three or four years.

Source: SimpliFlying analysis

Methodology

This report was researched and written by SimpliFlying between May and September 2026. It draws on publicly available data, published industry analysis, regulatory filings, and interviews conducted for SimpliFlying's Sustainability in the Air podcast, which has published more than 160 episodes since its launch. The podcast archive is available at **simpliflying.com/green**.

All interviews cited in the report are drawn from published episodes. No off-the-record material has been used.

The operator comparison in Chapter 9 follows a consistent methodology applied equally to all carriers: SAF is measured as a percentage of total fuel consumed, using figures from each operator's own published reporting. Where an operator publishes SAF volumes but not total fuel consumption, the report notes the published figure and explains what cannot be calculated from it.

The framework draws on the benchmarking approach developed by Aaron Robinson of International Airlines Group, whose analysis is published openly on LinkedIn and covers more than 80 airlines representing around 81% of global jet fuel use.

Pricing data cited in the report is drawn from General Index, Argus Media, S&P Global Commodity Insights and IATA published estimates. Mandate data is drawn from official government sources, supplemented by legal analysis from firms including Watson Farley & Williams, Clifford Chance, and White & Case.

Production volumes and capacity data are drawn from IATA, the International Energy Agency, EASA, the US Renewable Fuel Standard, the California Low Carbon Fuel Standard, and individual producer disclosures.

The editorial content, methodology, findings and conclusions are solely those of SimpliFlying. Where any operator's own SAF data appears, it is assessed using the same framework applied to every other operator.

Endnotes are numbered in the order they were added during research and drafting. They are not sequential within the body text.

Glossary

- **SAF (Sustainable Aviation Fuel):** Jet fuel made from something other than crude oil. The finished product is chemically equivalent to conventional jet fuel (kerosene) and works in existing aircraft and engines without modification.
- **HEFA (Hydroprocessed Esters and Fatty Acids):** The most established SAF pathway. Used cooking oil, animal fats and other waste oils are treated with hydrogen to produce jet fuel. Most of the SAF flying today is HEFA.
- **Alcohol-to-Jet (AtJ):** A pathway that converts ethanol into jet fuel through a series of chemical steps. The world's first commercial-scale AtJ plant opened in Georgia, USA in 2025.
- **Power-to-Liquid (PtL) / eSAF:** Synthetic jet fuel made from renewable electricity, water and captured CO2. No biological feedstock is needed. Sometimes called e-fuel or e-kerosene.
- **Fischer-Tropsch (FT):** A chemical process, originally developed in the 1920s, that converts gas into liquid fuel. Used in gasification pathways where solid waste or biomass is heated into a gas and then rebuilt into jet fuel.
- **Feedstock:** The raw material used to make SAF. Examples include used cooking oil, agricultural waste, sewage, ethanol, seaweed, and captured carbon dioxide.
- **Book and claim:** A system that allows an operator to purchase SAF at a location where it is available and receive a verified certificate for the equivalent volume, even if the operator's own aircraft refuel elsewhere. The physical fuel enters the aviation system at the point of production; the environmental benefit is transferred to the buyer through the certificate.
- **ISCC (International Sustainability and Carbon Certification):** An independent certification body that verifies the sustainability credentials of SAF, including feedstock origin and lifecycle emissions.
- **CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation):** An ICAO programme that sets global standards for emissions reductions from international flights, including SAF eligibility criteria.
- **Blending:** The process of mixing SAF with conventional jet fuel. Current certification allows blends of up to 50% SAF for commercial flights, with work underway to approve 100%.
- **Neat SAF:** Pure, unblended sustainable aviation fuel before it is mixed with conventional jet fuel.
- **Lifecycle emissions:** The total greenhouse gas emissions produced across the full chain of making and using a fuel, from growing or collecting the feedstock through to burning it in an engine. SAF's climate benefit is measured on this basis.
- **Contrails:** The white lines aircraft leave across the sky. In certain atmospheric conditions they persist and trap heat. SAF produces less soot than fossil jet fuel, which means fewer and thinner contrails.
- **Mandate:** A government requirement that a specified share of jet fuel must come from sustainable sources. Mandates vary in design: some set a percentage of fuel, others set an emissions reduction target, and some use a passenger levy to fund centralised SAF procurement.

- **Green premium:** The difference in cost between SAF and conventional fossil jet fuel. Sometimes expressed as a multiple (e.g. "three times jet fuel") and sometimes as a price per tonne.
- **Offtake agreement:** A long-term contract in which a buyer commits to purchasing a set volume of SAF from a producer over several years. These agreements give producers the revenue certainty needed to finance new refineries.
- **Drop-in fuel:** A fuel that can replace conventional jet fuel without any modification to aircraft, engines, fuel systems or airport infrastructure. SAF is a drop-in fuel.

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