

Business Breakthrough Barometer 2024


Aviation



World Business
Council
for Sustainable
Development

BAIN & COMPANY 


29 October, 2024



Key messages

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- **Confidence in a Paris-aligned transition is among the lowest of all sectors, but optimism has improved the past three years on policy action**
 - 67% thought the sector was “not on track” for a Paris aligned transition
 - 40% of business respond that their confidence increased in government support past 3 years
- **Airlines have seen an explosion of SAF deployment, fuelled by rising voluntary demand**
 - Uptake expected to grow 165% through 2024
 - Over 75% of the worlds 20 largest airlines have now committed to SAF targets, and fuel suppliers cite customers are increasingly “willing to pay”
 - Leading engine manufacturer also report that all their engines have the proven capability to run on all types and blends of SAF
- **The aviation industry is witnessing increasing ambitions from national governments to accelerate the adoption of SAF**
 - In the UK, new blending targets are set to outpace current EU mandates, requiring 2% of all domestic jet fuel to be sustainable by 2025, increasing to 10% by 2030, and reaching 22% by 2040
 - Turkey is also stepping forward with a proposed SAF mandate that would require blending to start at 1% in 2025, scaling up to 5% by 2030
 - In total, over 80% of the global passenger market has committed to or proposed SAF targets, a development that has given fuel suppliers more confidence in future demand, according to leading value chain actors
- **Despite advancements, sector leaders express concern that policy measures and implementation efforts are not yet sufficient**
 - A majority of industry participants view aviation as one of the sectors least likely to achieve its climate goals, citing a lack of policy support to catalyze demand
 - The slow implementation of mandates has created uncertainty about the commitment of governments to the set targets
 - However, there are signs of progress, with companies showing support for the UK’s recent investigation into a revenue certainty mechanism to reduce risks for new SAF plants
- **Without increased policy intervention, the early momentum in SAF deployment could falter**
 - Following the 2022 peak, offtake agreements fell last year, and the trend is expected to continue into 2025
 - Companies point to supply constraints given the weak SAF project pipeline, causing caution among producers in committing to new offtake agreements
 - Challenges include uncertainty over feedstock availability, high costs of waste fats, oils, and greases, and rising CapEx due to higher interest rates
 - Customers also prefer shorter-term offtake, conflicting with producers’ need for long-term agreements required for FID



Key messages

2/2

- **Aviation leaders are increasingly concerned that SAF markets will remain extremely tight over the next decade due to the lack of investment in supply**
 - Currently, only HEFA technologies are commercially viable at scale for SAF production, with companies citing ongoing feedstock constraints
 - The aviation sector also faces direct competition from renewable diesel (RD) production, especially in the U.S., where policy continues to favour road transport despite more advanced electrification in that sector.
- **Fuel providers view activating new feedstocks and technologies as the key challenge over the coming years**
 - Unconstrained pathways show some positive signs of investment growth, with the first commercial Alcohol-to-Jet (AtJ) plant set to be deployed in the U.S. in early 2024, though the pipeline remains small
 - Longer-term, experts warn that existing incentives will not be sufficient to drive FID at scale, given current CapEx requirements for AtJ and Gasification Fischer-Tropsch (GFT) technologies, which are 4-5 times higher than HEFA.
 - For Power-to-Liquid (PtL), the availability of affordable captured carbon is currently limiting investments, with feedstock costs 3-4x those of HEFA
- **Companies cite unattractive business case and lack of developed infrastructure as top barriers holding back aviation's transition**
- **Policy should focus on scaling SAF mandates, supporting fuel supply, book & claim systems, and international alignment on measures**

Confidence in a Paris-aligned transition is among the lowest of all sectors, but optimism has improved the past three years on policy action



67%

40%

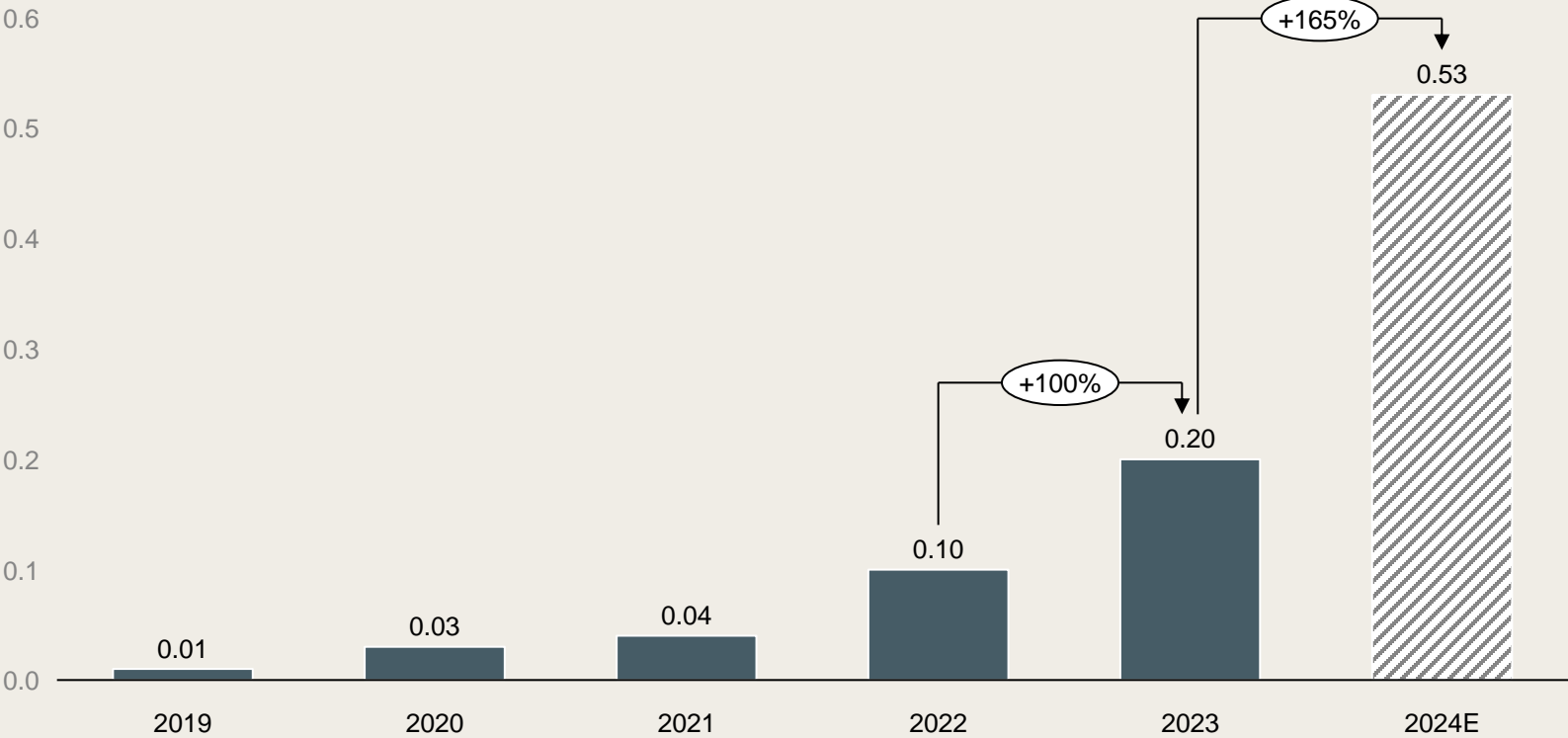
67% thought the sector was “not on track” for a Paris aligned transition

40% of business respond that their confidence increased in government support past 3 years

Source: Business Breakthrough Barometer Sector Survey (N=250)

Airlines have seen an explosion of SAF deployment, fuelled by rising voluntary demand

Sustainable aviation fuel as share of jet fuel consumption, %



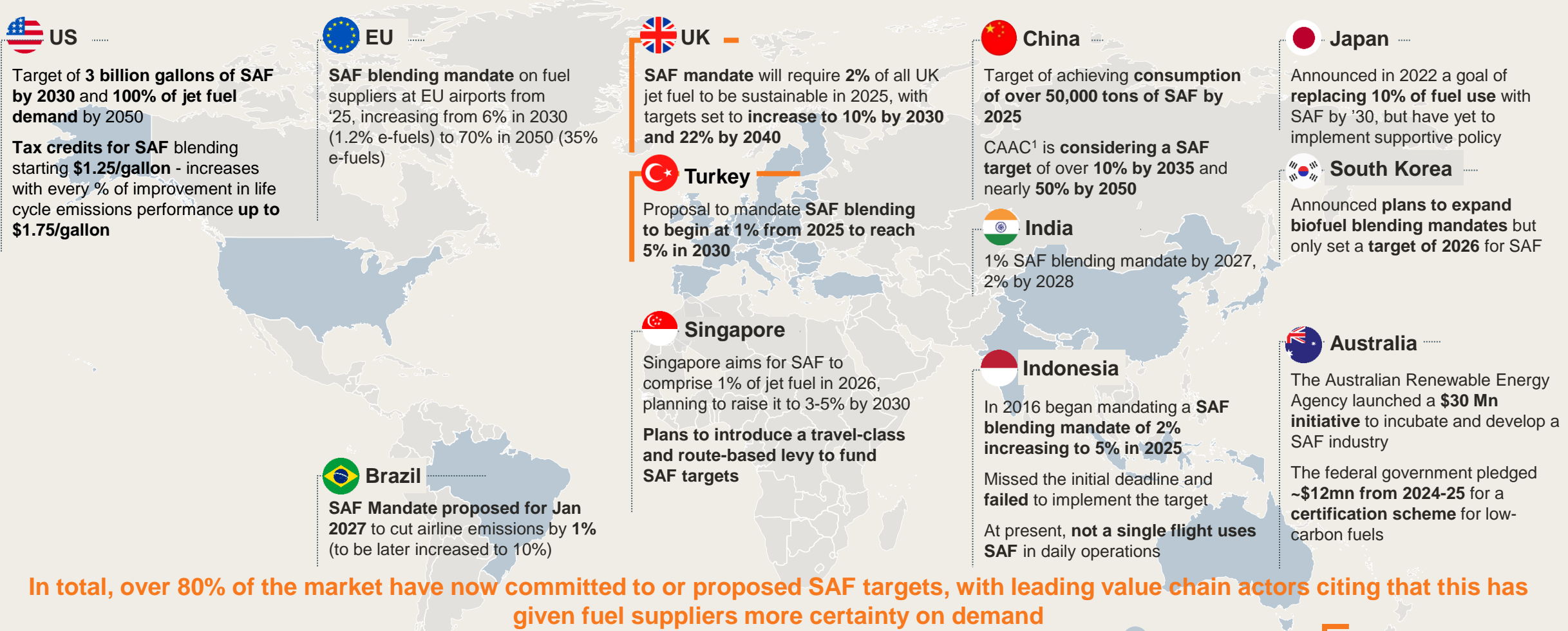
- Over 75% of the world's 20 largest airlines have now committed to SAF targets, and fuel suppliers cite customers are increasingly “willing to pay”
- Leading engine manufacturer also report that all their engines have the proven capability to run on all types and blends of SAF

I think airlines have not been sending that demand signal [of SAF]; they're starting to come around to it. And in part, that's because their customers are now showing an increased willingness to pay.

VP SUSTAINABLE SUPPLY CHAINS, SAF PRODUCER

Source: IATA, GlobalData data; Civil Aviation Authority of Singapore; Company websites; Lit. search; Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain analysis

The aviation industry is witnessing increasing ambitions from national governments to accelerate the adoption of SAF

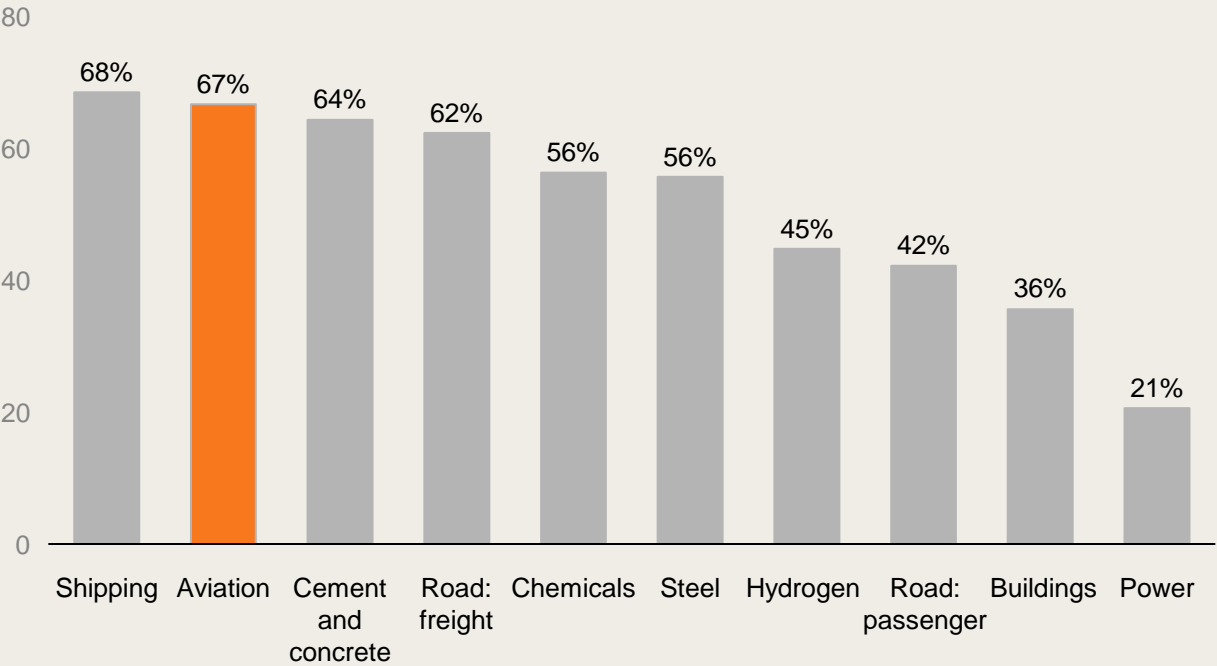


In total, over 80% of the market have now committed to or proposed SAF targets, with leading value-chain actors citing that this has given fuel suppliers more certainty on demand

Note: (1) CAAC – Civil Aviation Administration of China.
 Source: World Trade Organisation; IATA; Sustainable Aviation Fuel: Primer - Credit Suisse, March 2023; World Bank; ICAO; Business interviews; Bain analysis

Despite advancements, sector leaders express concern that policy measures and implementation efforts are not yet sufficient

In your opinion, how on track are the following sectors generally for a 1.5C / net zero target?
Share of responses selecting not on track¹, %



Note: 1) Respondents answering "I don't know" excluded from responses.
Source: Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain Analysis.

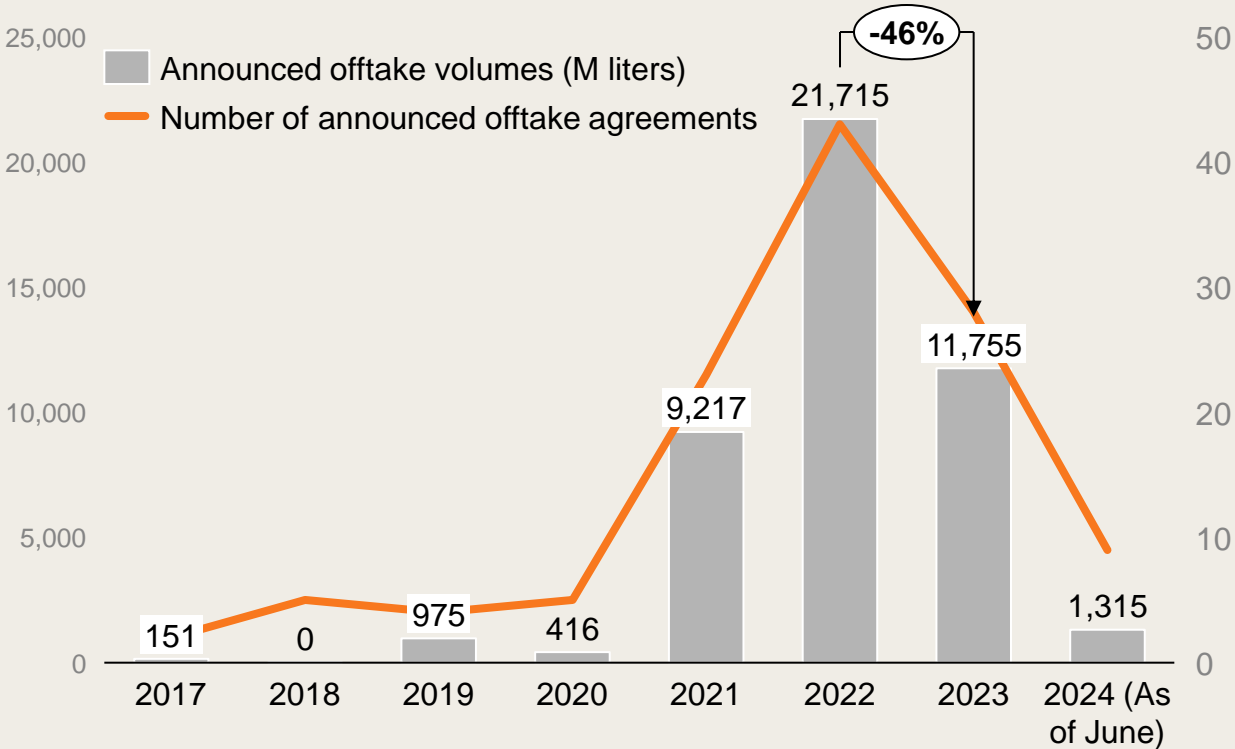
- A majority of industry participants view **aviation as one of the sectors least likely to achieve its climate goals**, citing a lack of policy support to catalyze demand
- The **slow implementation of mandates has created uncertainty** about the commitment of governments to the set targets
- However, there are signs of progress, with companies showing support for the **UK's recent investigation into a revenue certainty mechanism** to reduce risks for new SAF plants

Companies are waiting on **actual country implementation of RED III** and other hydrogen regulation to drive clarity.
GOVERNMENT RELATIONS,
HYDROGEN PRODUCER

We are **very supportive of the proposed UK revenue support mechanism** for fuel suppliers.
VP SUSTAINABILITY STRATEGY,
ENGINE MANUFACTURER

Without increased policy intervention, the early momentum in SAF deployment could falter

Development of sustainable aviation fuel offtake agreements (2017-2024 June)



- Following the 2022 peak, **offtake agreements fell last year**, and the trend is expected to continue into 2025
- Companies point to **supply constraints** given the weak SAF project pipeline, causing caution among producers in committing to new offtake agreements
- Challenges include **uncertainty over feedstock availability**, **high costs** of waste fats, oils, and greases, and **rising CapEx** due to higher interest rates
- **Customers also prefer shorter-term offtake**, conflicting with producers' need for long-term agreements required for FID

"
 We know what needs to be done, **but the investment isn't there** [for SAF projects].

VP SUSTAINABILITY STRATEGY,
ENGINE MANUFACTURER

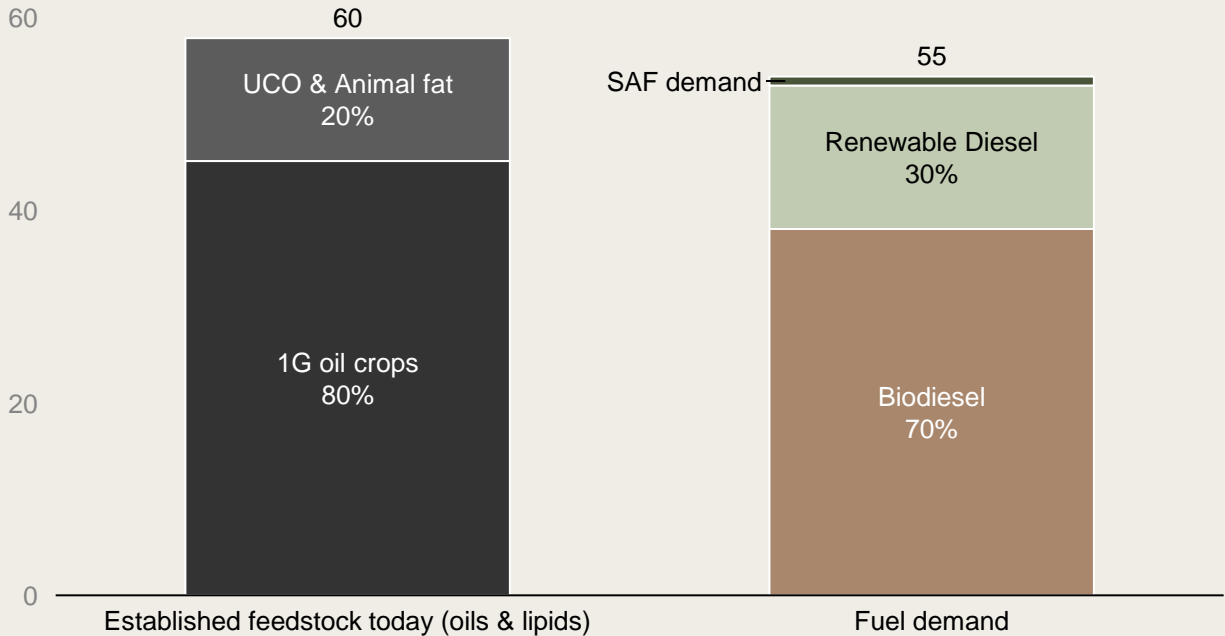
Producing Sustainable Aviation Fuel in **volumes required to meet targets in the short-term will be difficult.**

FORMER POLICY EXECUTIVE,
SUSTAINABLE FUEL PRODUCER

Note: In case of blended SAF announcements, the volumes refer to fraction of SAF in the blend
 Source: RMI; ICAO as of June 2024; Lit. search; Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain Analysis

Aviation leaders are increasingly concerned that SAF markets will remain tight over the next decade due to the lack of investment in supply

Global SAF, RD, and BD demand vs. HEFA & FAME pathway practically available feedstock (Mtoe/yr, 2023)



- HEFA is the only commercially viable route for scaled SAF production, but is facing severe feedstock constraints
- The aviation sector also faces direct competition from renewable diesel production, especially in the U.S., where policy tends to advantage road transport adoption

Feedstock is what limits scaling [biofuel] supply, ... companies are currently fighting over existing supply.

CEO, FEEDSTOCK SUPPLIER

There is only so much supply of green fuels from current technologies, new technologies will need to be deployed at large scale to meet increasingly tougher mandates in the next decade. And the first movers need to be supported now to be ready to scale when required.

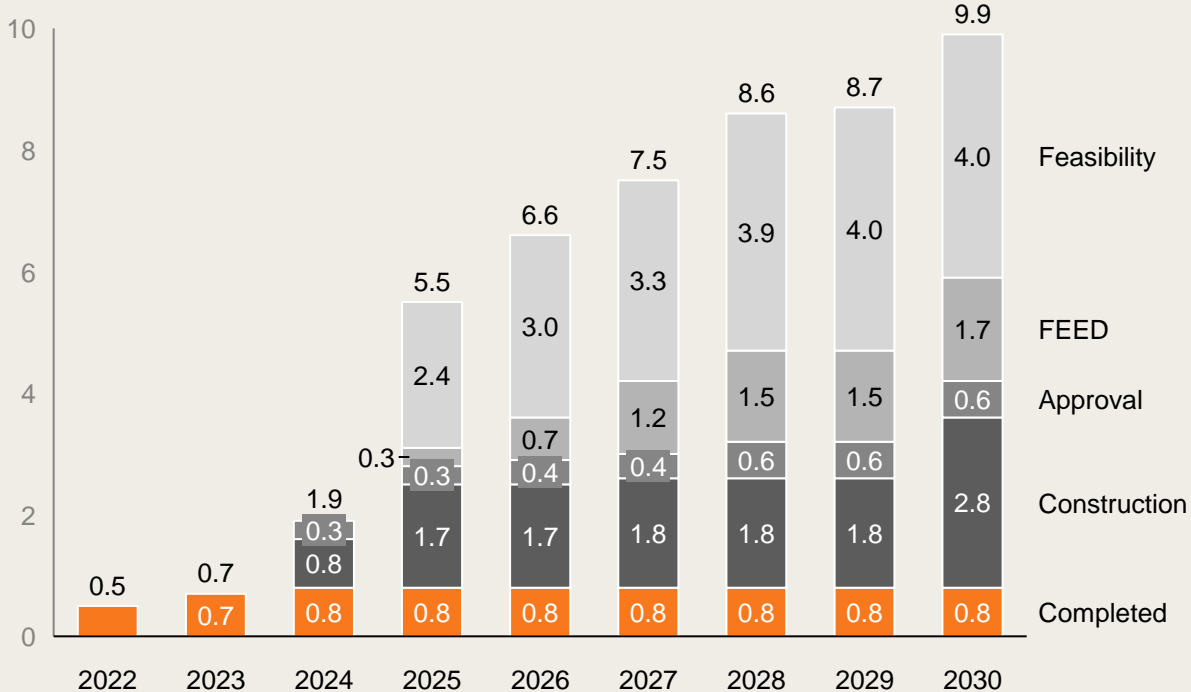
CEO, SUSTAINABLE FUEL PRODUCER

Note: Available feedstock in 2023 refer to practically available – not all practically available feedstock is turned into fuel due to lack of refineries or collection processes (e.g. oil cover crops such as winter camolina is not harvested for biofuels today). HEFA and FAME production technology require oils/lipid as feedstock (animal fat, oil crops, UCO, PFAD, POME and 1G oils).

Source: Bain Sustainable fuels supply and demand balance model; Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain Analysis .

Fuel providers view activating new feedstocks and technologies as the key challenge over the coming years

Announced eSAF, GFT & AtJ production capacity by development stage¹ and start year, (in Mt, 2019-'30)



Note: 1) Listed refineries without stated max capacity adjusted to average capacity of 220kt
 Source: GlobalData 2024; IEA; Bain integrated supply and demand model; Business Breakthrough Barometer Sector Survey (N=250); Business interviews; Bain Analysis.

- Unconstrained pathways show some positive signs of investment growth, with the first commercial Alcohol-to-Jet (AtJ) plant set to be deployed in the U.S. in early 2024, though the pipeline remains small
- Longer-term, experts warn that existing incentives will not be sufficient to drive FID at scale, given current CapEx requirements for AtJ and Gasification Fischer-Tropsch (GFT) technologies, which are 4-5 times higher than HEFA.
- For Power-to-Liquid (PtL), the availability of affordable captured carbon is currently limiting investments, with feedstock costs 3-4x those of HEFA

We need to get the first green fuels projects going now to scale up to serve the maritime market by 2030, but I can imagine my growth from 2030 onwards will be much more oriented to aviation.

CEO, SUSTAINABLE FUEL PRODUCER

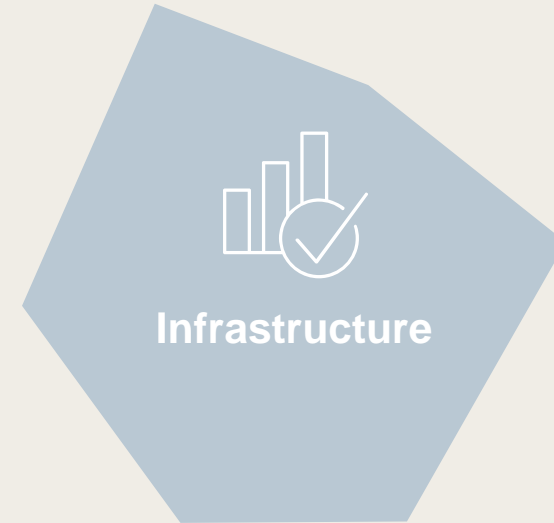
Companies cite unattractive business case and lack of developed infrastructure as top barriers holding back aviation's transition



Limited availability and high costs of feedstocks (like waste fats, oils, and greases) to develop fuel supply

High capital expenditure and complexity of sustainable aviation fuel production (SAF) deter investments to expand supply

Sustainable aviation fuel has remained 2-3 times more expensive than regular jet fuel in recent years, with no sign of price convergence. This puts significant pressure on airlines to pass costs to customers, as fuel generally accounts for about 30% of operating costs




Limited infrastructure to enable cross-border procurement and use of sustainable aviation fuel


Policy should focus on scaling SAF mandates, supporting fuel supply, book & claim systems, and international alignment on measures


Policy focus


National  International 



 **CapEx support** for first-of-a-kind sustainable aviation fuel supply projects is crucial to encourage investment in new production capacity

 **Developing book and claim systems** are fundamental for the most rational production of sustainable aviation fuel at early stages of adoption

 **Mandated demand** is critical for building long-term business cases on the supply side and should focus on driving adoption of advanced sustainable fuels leveraging unconstrained feedstocks

 The adoption of sustainable aviation fuel would be most effectively accelerated through **multilateral approaches to aviation regulation**; a voluntary inter-governmental agreement to introduce common, ratcheting sustainable aviation fuel blending mandates across the major airport hubs by leading governments could be a catalyst for wider adoption

Source: Business Breakthrough Barometer Sector Survey (N=250); Business interviews.

Thank
You



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