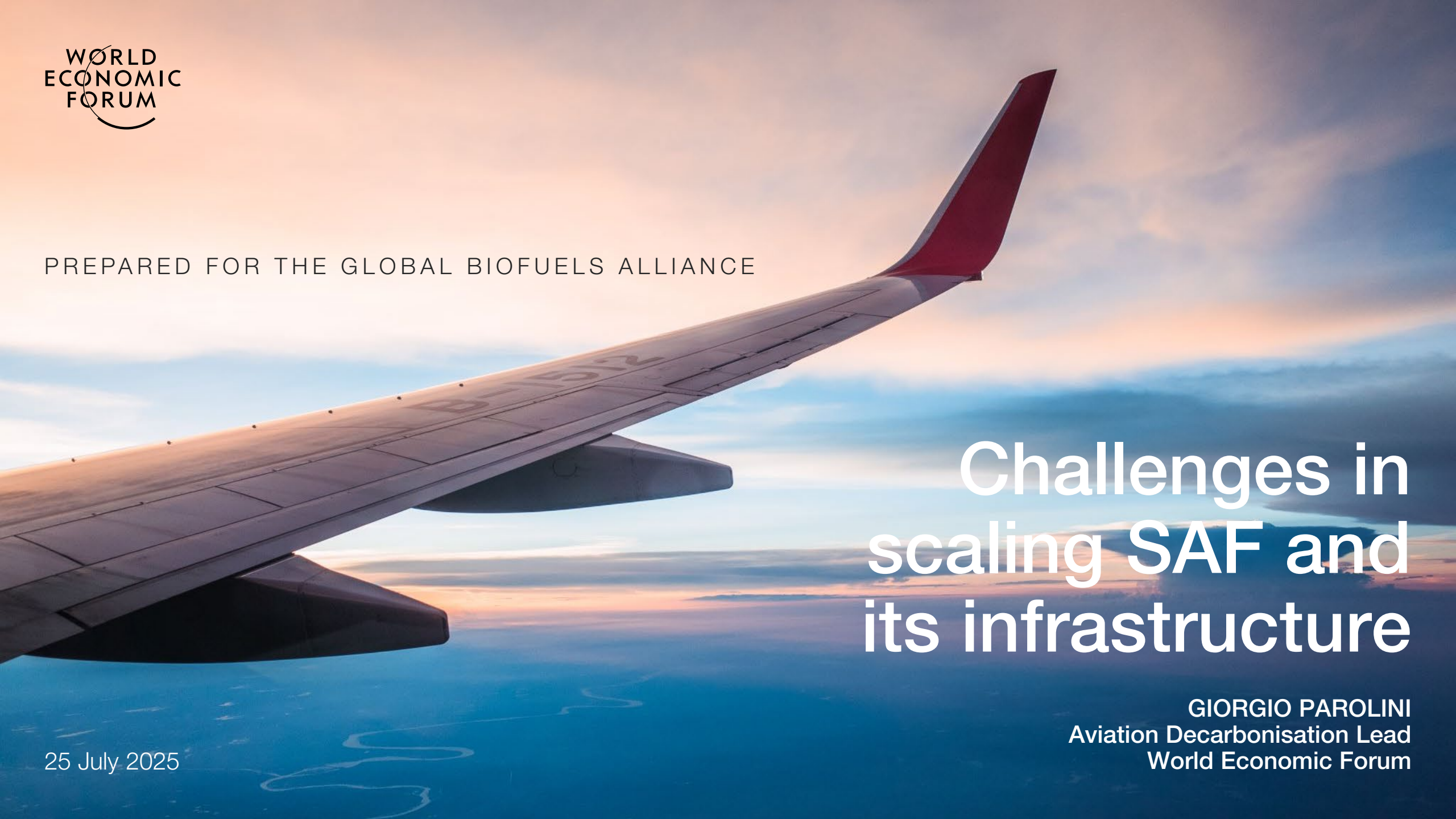


PREPARED FOR THE GLOBAL BIOFUELS ALLIANCE



Challenges in scaling SAF and its infrastructure

25 July 2025

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World Economic Forum

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2. Latest SAF market developments

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01

The global context



The Global Aviation Sustainability Outlook 2025 identified ten key risks affecting aviation decarbonisation progress

Aviation-specific risks

- 1 Availability/cost of SAF 
- 2 Alignment of SAF policy across regions and longevity of subsidies 
- 3 Implementation of CORSIA 
- 4 Traceability of sustainability criteria for SAF feedstocks 
- 5 Effectiveness of carbon pricing and emissions trading schemes 

Wider risks

- 1 Geopolitics 
- 2 Bankability and attractiveness of the aviation sector for investors 
- 3 Economic downturn and inflation 
- 4 Change in governments 
- 5 Competing priorities (e.g. climate resilience, growth, revenue) 

Technology Policy and geopolitics Economic Sustainability

<https://www.weforum.org/publications/global-aviation-sustainability-outlook-2025/>



02

Latest SAF market developments

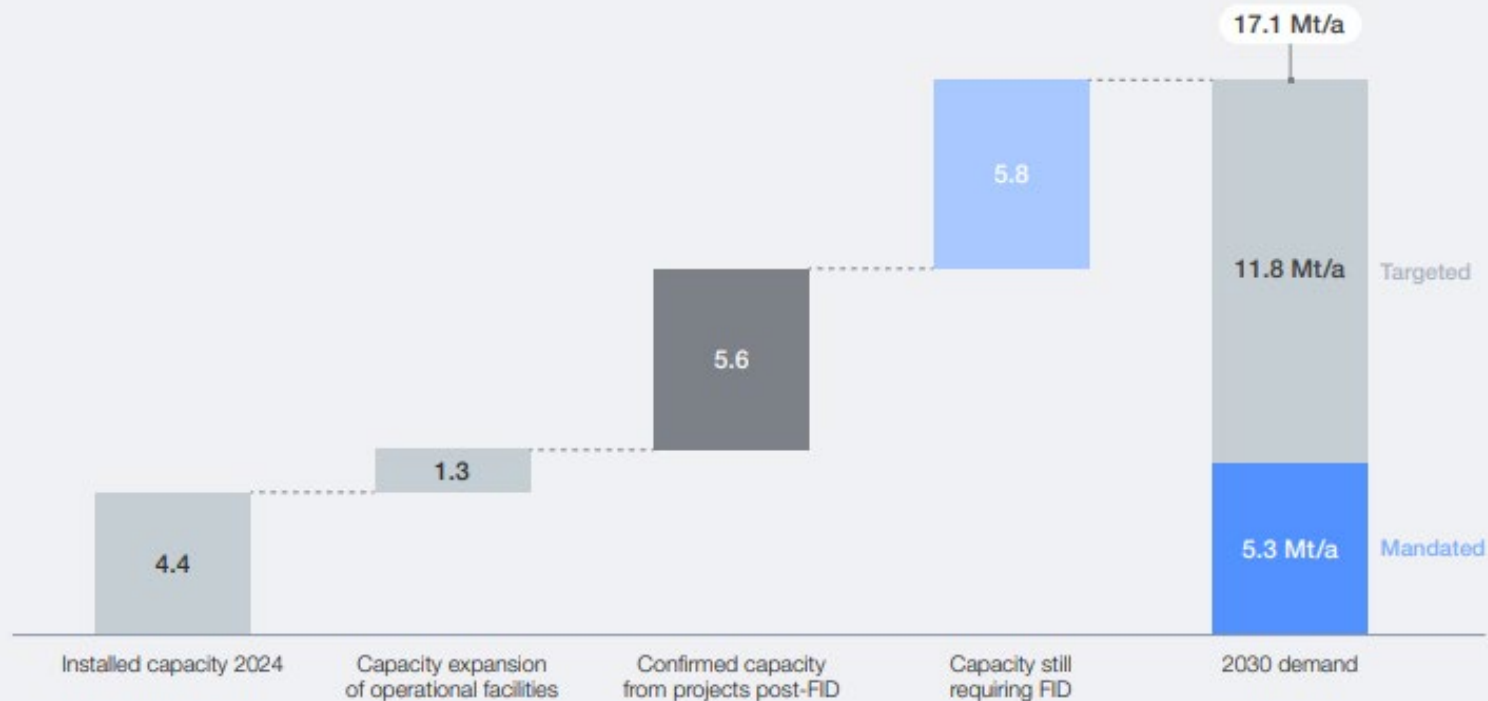


SAF capacity doubled in 2024 compared to 2023, with positive upward trajectory but potential supply gaps

Overview of SAF capacity ramp-up needed between 2024 and 2030

Global SAF production capacity at 4.4 Mt/a in 2024, with additional pipeline of ~7Mt/a confirmed by 2030.

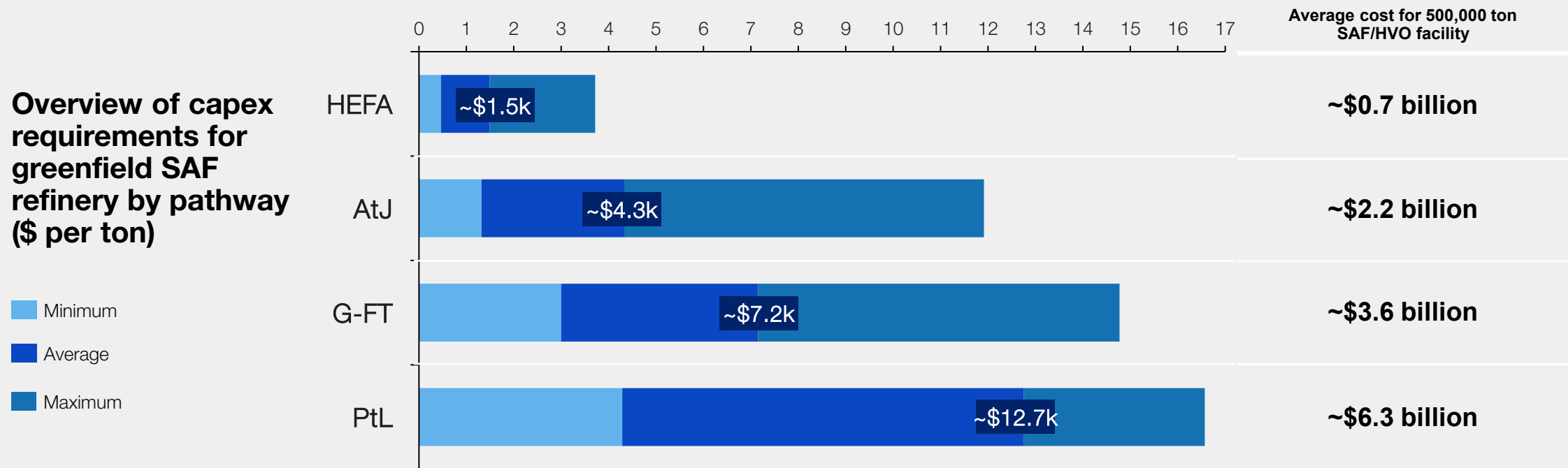
Reaching FID is a big challenge with a supply gap looming if more financing is not deployed, assuming targeted demand is firm.



Note: Mt/a = million tonnes per annum. FID = final investment decision.

Sources: Kearney analysis, S&P Platts, International Energy Agency (IEA), airline announcements. Capacity figures include co-processing.

Most of the upcoming plants use HEFA, currently the cheapest and most commercial SAF production pathway



Key infrastructure needs or steps

HEFA

1. Feedstock pre-treatment
2. Hydro-processing units
3. Hydrogen production

AtJ

1. Ethanol production
2. Alcohol dehydration and oligomerization
3. Feedstock handling

GFT

1. Feedstock pre-treatment and handling
2. Gasification
3. Syngas cleaning and conditioning
4. Fischer-Tropsch reaction
5. Carbon capture and storage

Power-to-Liquid

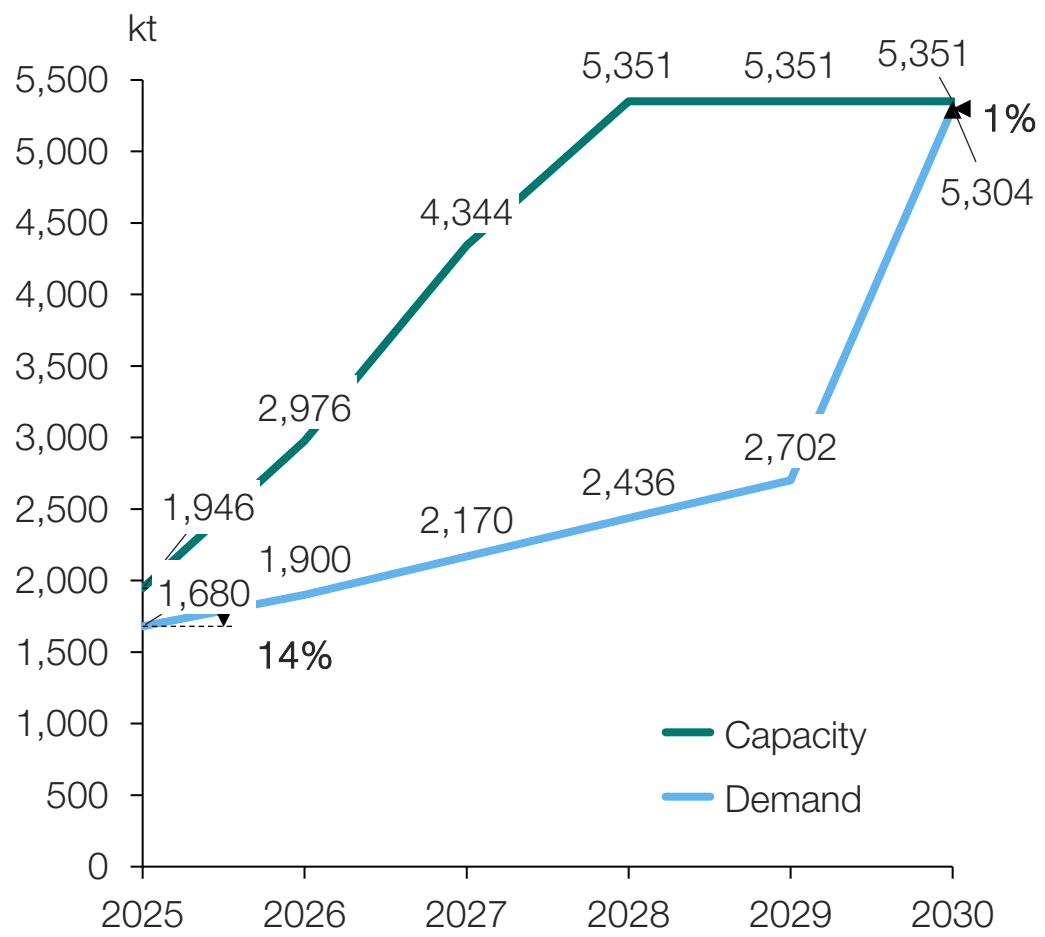
1. Electrolyzers for hydrogen production from water electrolysis
2. Renewable energy infrastructure
3. CO2 capture and conditioning
4. Reverse water gas shift and Fischer-Tropsch (FT) synthesis

Notes: HEFA is hydro-processed esters and fatty acids; AtJ is alcohol-to-jet; G-FT is gasification Fischer-Tropsch; PtL is power-to-liquid; HVO is hydro-treated vegetable oil. Pricing for PtL is approximate, given the lack of reliable datapoints.
Sources: disclosure from ~50 SAF bio-refineries with minimum capacity of 80 kt; Kearney analysis

Source: Kearney analysis for Airports of Tomorrow

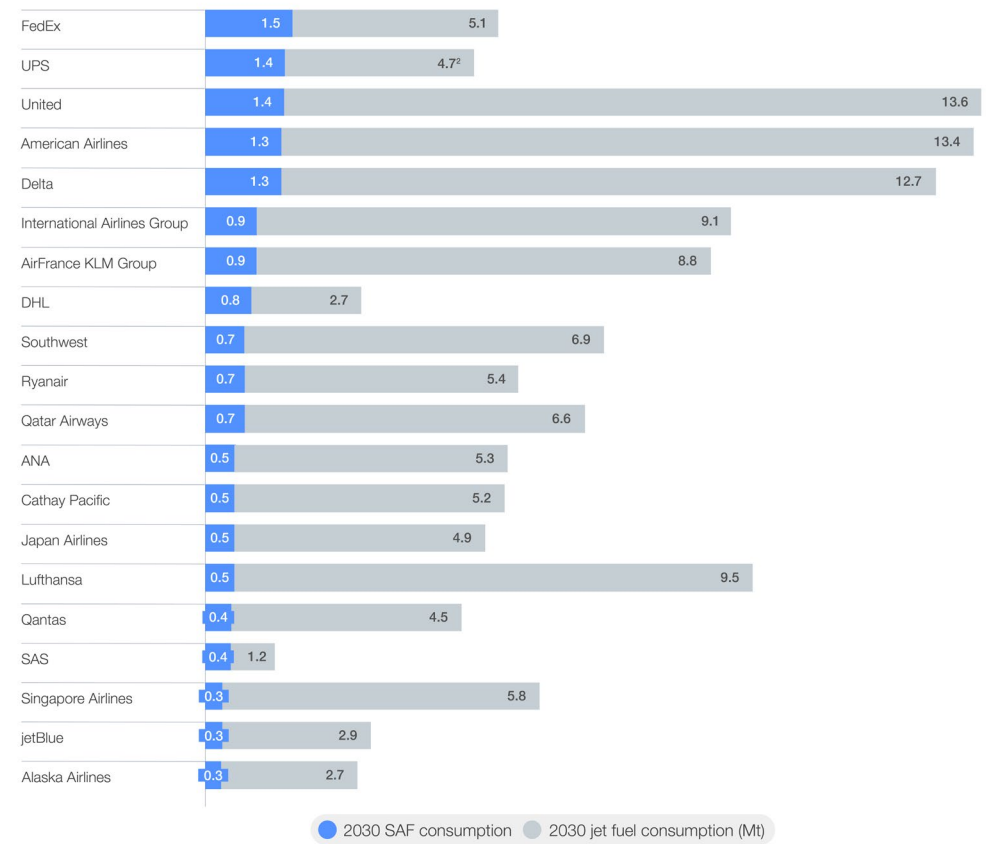
The likelihood of supply gaps can be impacted by the strength of the SAF demand signal

Latest SAF demand vs capacity forecasts in Europe



Source: Argus

Estimated SAF and jet fuel consumption by 2030 by top 20 SAF consumers (Mt)¹



Note: 1. Estimates based on forecast 2030 fuel consumption and voluntary commitments.
2. UPS has a goal of 30% SAF by 2035, which is used here for 2030.
Source: US Energy Information Administration (EIA), airline annual reports and press releases; excludes airline-specific fuel efficiency programmes.

Incentives can help, with positive momentum in the US for SAF and major implications on feedstock

Previous measures enacted under IRA

Clean Fuels Production Tax Credit provides between \$0.35 - \$1.75 per USG of SAF until 2027

Clean hydrogen production tax credit for facilities starting construction before 2033

One Big Beautiful Act provisions

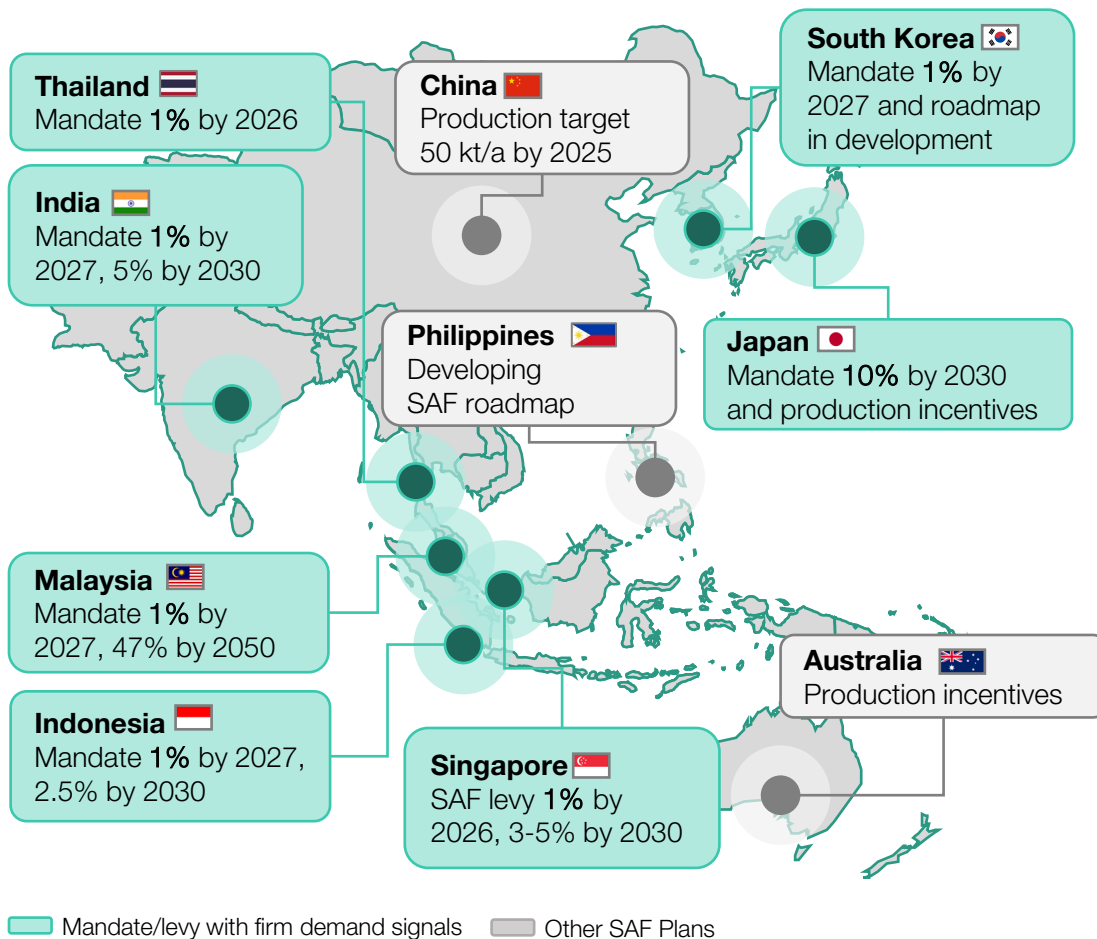
- Credit extension until end of 2029, but with new eligibility criteria from 2026 and enhanced rates for SAF phased out (up to \$1 per gallon)
- Restriction of feedstocks to US, Mexico and Canada, with limited credit for those coming from other regions
- LCA criteria exclude indirect land use changes in the GHG calculation

45V clean hydrogen production tax credits now remains available for production facilities that begin construction before 1 January 2028

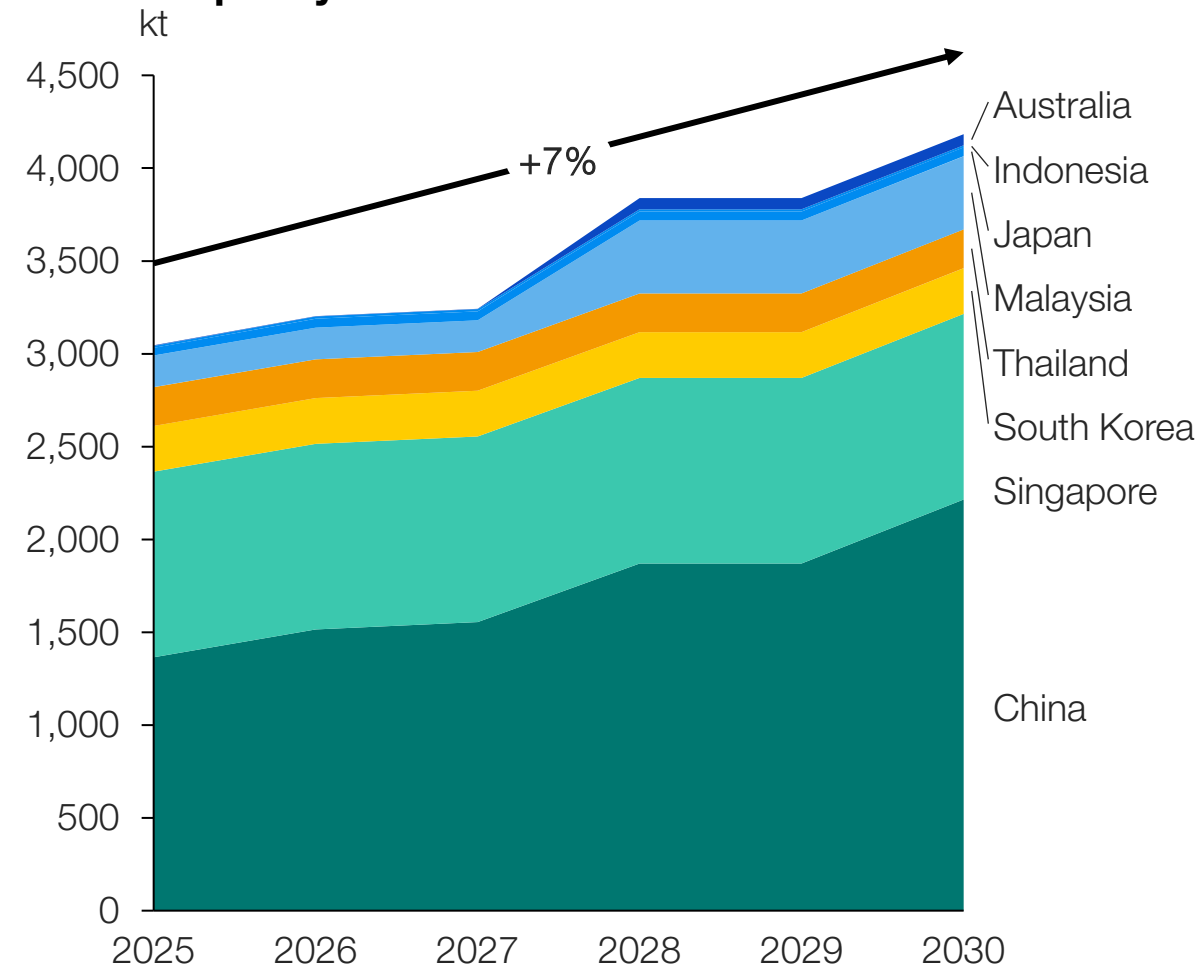
+ more recent developments from EPA on the RFS biofuels blending requirements

Asia Pacific is also increasingly looking into SAF policy, aiming to leverage its industry potential

Nascent SAF regulatory environment in Asia-Pacific



SAF capacity forecasts in Asia Pacific



Source: Argus

Green Fuel Forward aims to raise awareness of SAFc to boost demand and scale supply in APAC

Driving greater SAF demand

Encouraging members to **undertake test* purchase** of SAF/SAFc with a view to use SAF/SAFc as part of their decarbonisation toolkit

2025

2026

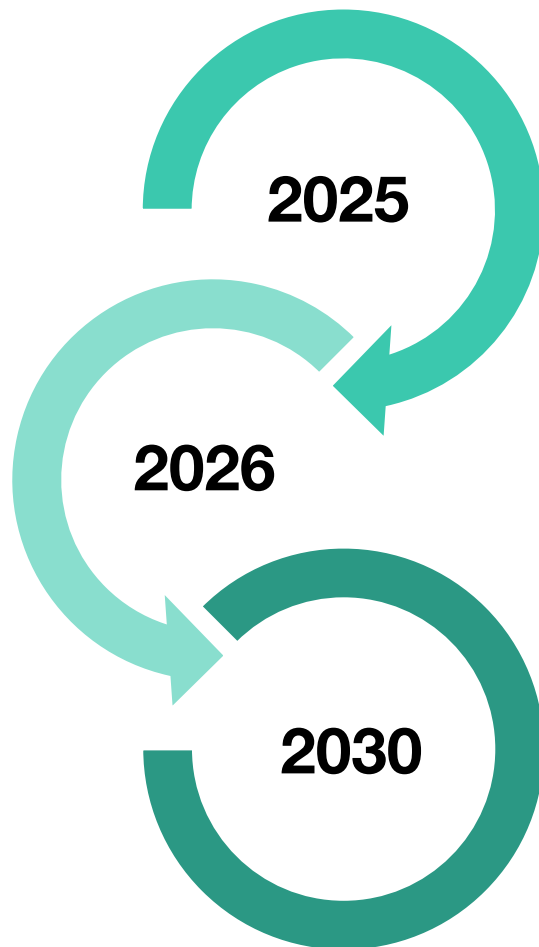
2030

Building SAF capability

Improving knowledge of SAF, SAF certificates (SAFc), book-and-claim mechanisms, procurement options and sustainability standards

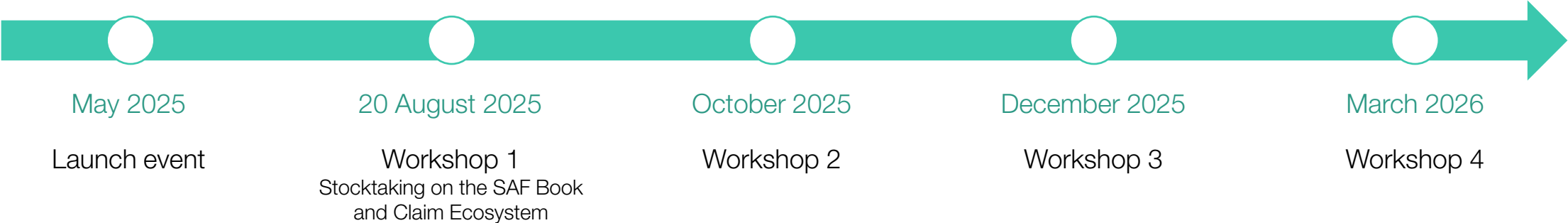
Strengthening APAC market

With greater number of local airlines and corporates exploring and using SAF and SAFc, we can **unlock greater SAF production**. This will also contribute to global targets, such as ICAO's goal to **reduce international aviation emissions by 5% by 2030**

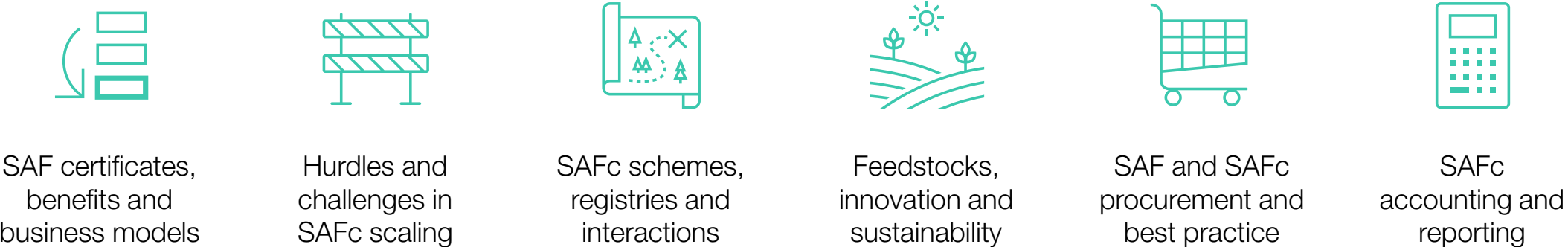


In the next year, Green Fuel Forward will focus on capability building activities and workshops

Indicative timeline



Potential workshop topics



03

Levers to scale SAF



Ten levers can help SAF projects scale

Methods for attracting more funding into a SAF production facility

- Public funding
- Industry funding
- Institutional funding

Relevance of guideline by pathway

Low Medium High
(nice to have) (must have)

Relevance of guideline by life-cycle phase

Low Medium High
(rarely applicable) (very common)

Financial levers	Pathways				Life-cycle phases				
	HEFA	AtJ	G-FT	PtL	Pre-feasibility	Feasibility + FEED	FID	Construction	Commissioning
1 Research and innovation grants	Low	Medium	High	High	Medium	High	High	Low	Low
2 Multilateral development bank support	High	High	High	High	Medium	High	High	Low	Low
3 Guarantees and insurance	Medium	High	High	High	Low	High	High	High	Low
4 Strategic investments	Medium	High	Medium	Medium	Low	Medium	High	Medium	Low
5 Long-term offtake agreements	High	High	High	High	Low	Low	High	Low	Low
6 Book-and-claim mechanisms	High	High	High	High	Low	Low	High	Medium	High
7 Private equity investment	High	High	High	Medium	Low	Low	High	High	High
8 Infrastructure investors	Medium	High	High	High	Low	Low	High	High	High
9 Tolling model	High	High	High	High	Low	Low	High	High	High
10 Green bonds	Medium	High	High	High	Low	Low	Low	High	High

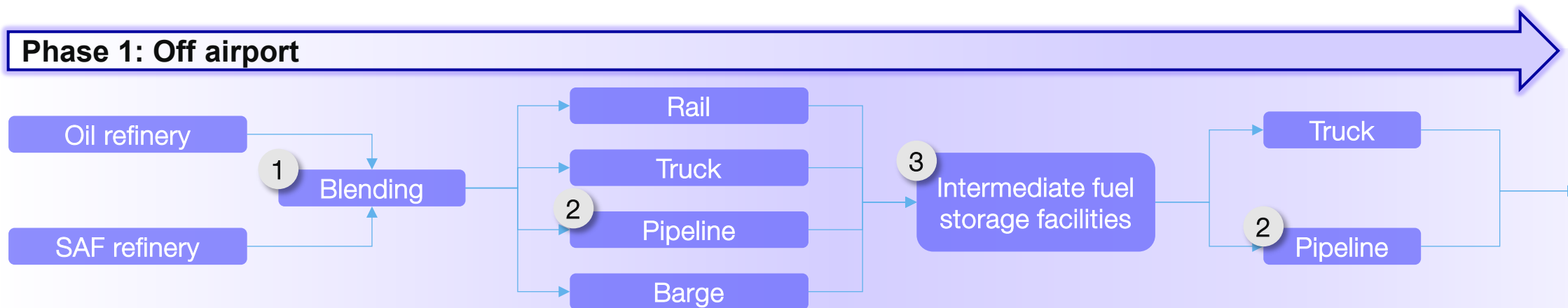
Notes: HEFA is hydro-processed esters and fatty acids; AtJ is alcohol-to-jet, G-FT is gasification Fischer–Tropsch; PtL is power-to-liquid.
Sources: World Economic Forum Airports of Tomorrow; Kearney analysis

04

Infrastructure challenges

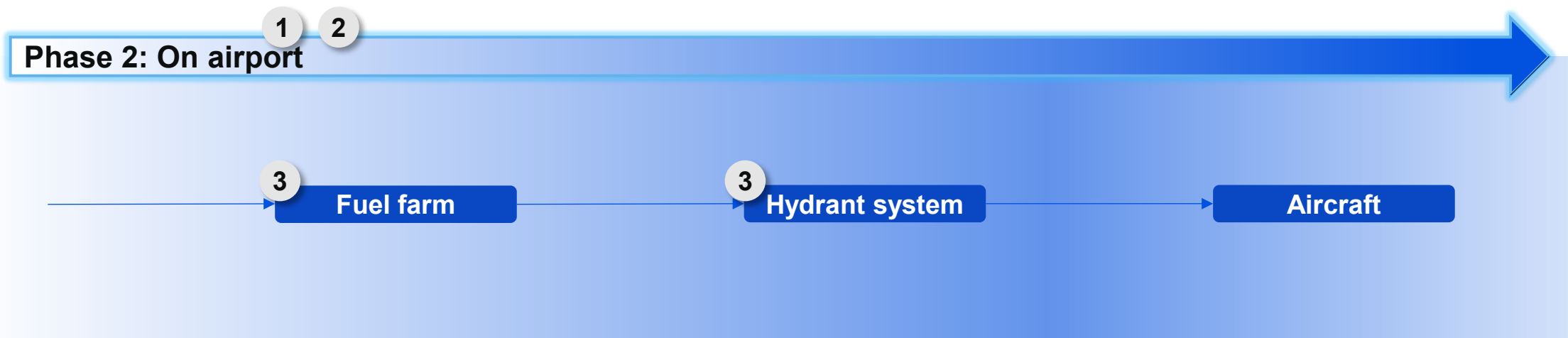


New SAF developers can face infrastructure challenges to move the fuel along the value chain



#	Challenge	Description
1	Blending	Segregation requirements: Different SAF pathways require separate blending processes, complicating logistics and duplicating infrastructure. Only blended SAF (now compliant with jet fuel specs) can then be blended. Fuel specifications: Even though SAF could be blended up to 50% in volumes, the need to add aromatics and the quality of the fuel currently produced limit actual blending to 30-40%.
2	Pipeline access	Dominance of incumbent players: Existing fuel infrastructure is owned by private companies that can restrict access for new SAF producers. Direct access to airport fuel systems is often not possible without going through incumbents. Without pipelines or access to infrastructure, reliance on truck and rail transportation increases costs, with challenging optimisation due to low SAF volumes.
3	Intermediate storage	Storage size mismatch: Competition with fossil fuel refiners for tankage, who often have long-term agreements, limits available blending and storage capacity and increases cost. Availability/access: Particularly in emerging markets, availability of storage is limited, and, across regions, where storage is available to SAF it is catered to HEFA and not e-SAF.

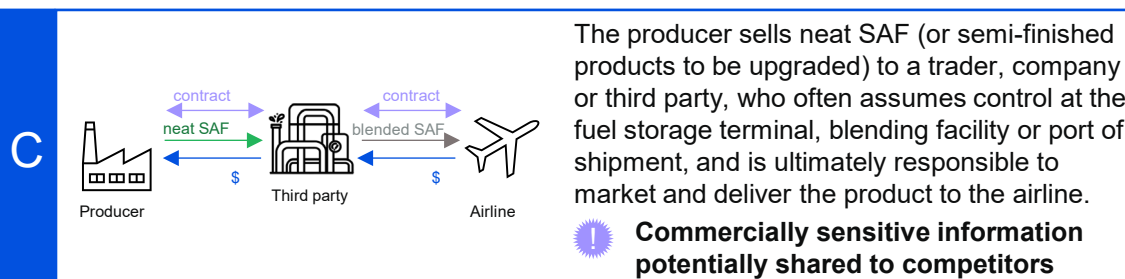
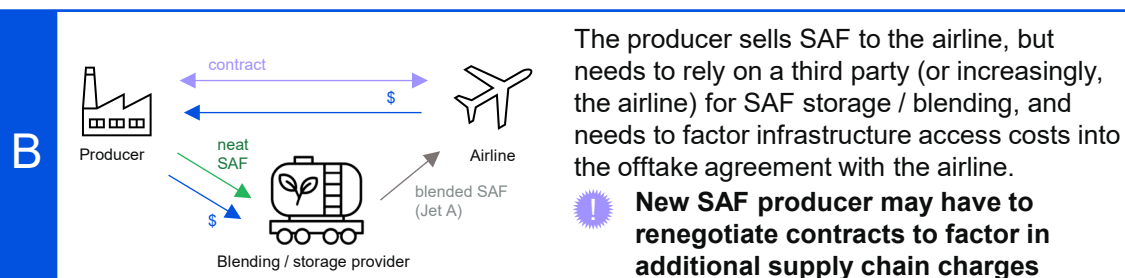
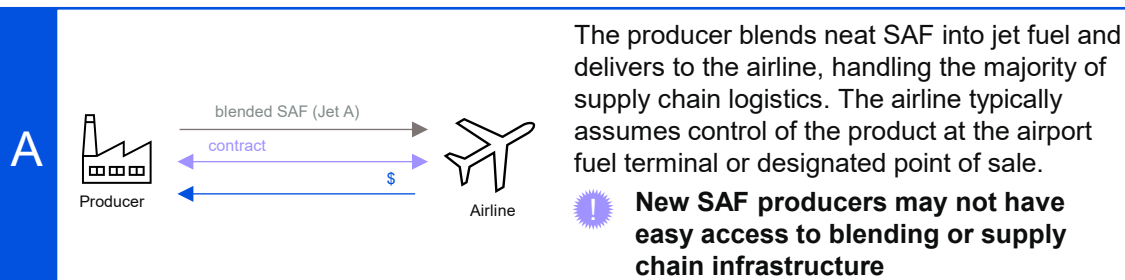
Some of these challenges include access to airport infrastructure and ability to deliver SAF there



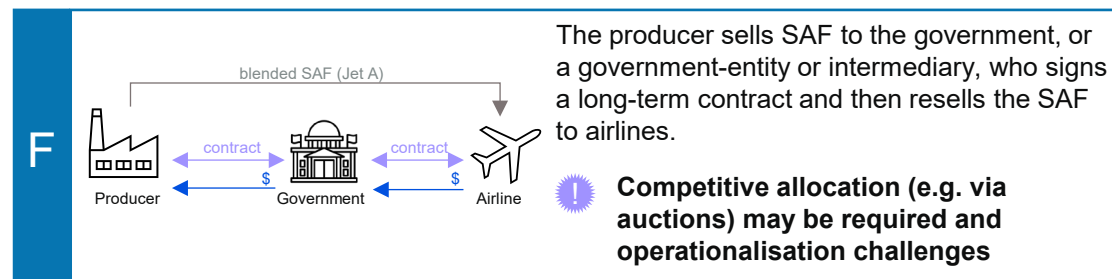
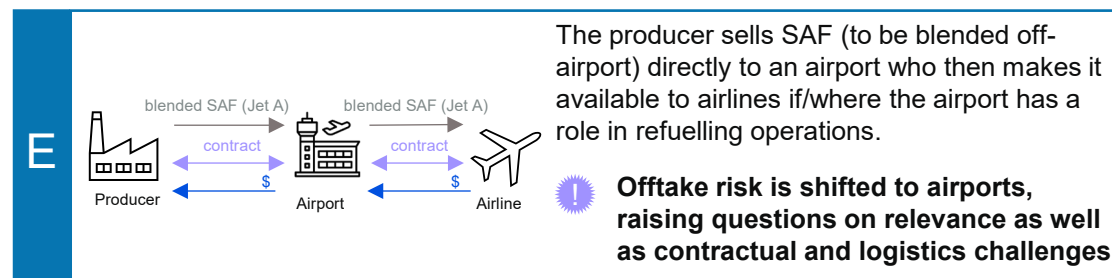
#	Challenge	Description
1	General infrastructure access and control	Ownership of fuel infrastructure: Airports' fueling infrastructure (storage, pipelines, hydrant systems) can be controlled by a small group of fuel producers (e.g. in Europe), or by airlines and their consortia (e.g. in the US). Access to airport fuel infrastructure may thus not be possible or, where allowed, can incur additional costs set by controlling entities.
2	Regulatory and policy gaps	Lack of mandates or incentives for SAF integration: the provision of enabling infrastructure or incentives at airports are not, per se, sufficient to offer physical SAF delivery in the absence of a wider regulatory framework that make SAF supply attractive in that location. Not all airports are thus expecting to see SAF in the short term, even if there is willingness to offer SAF from their side or to facilitate its logistics.
3	Operational rigidity	Lack of flexibility for new fuels: Airport systems are optimized for conventional jet fuel, not for handling small, segregated, or variable SAF volumes, that thus get blended off airport.

Multiple SAF business models and supply chain options have emerged, with different challenges

More established business models raised by stakeholders



Emerging or potential business models raised by stakeholders



There are many potential supply chain combinations and regional variations, and this overview does not aim to be comprehensive

05

Upcoming opportunities for engagement



The World Economic Forum is planning several aviation decarbonisation discussions, incl. on SAF



Book-and-claim schemes and business models

To review existing book-and-claim schemes, registries, business models and partnerships to assess similarities and differences

Summer and Autumn 2025
GFF workshop 20 August 8-10am CET



Fuel resource allocation and best use

To align on overarching principles across sectors in the allocation of biomass, renewable electricity, hydrogen as well as CO2 to produce fuels

Autumn 2025
Workshop 7 October 15.00-16.30 CET



Innovation driving aviation decarbonisation

To identify potential applications of innovation, digitisation and artificial intelligence across the aviation value chain to drive decarbonisation further

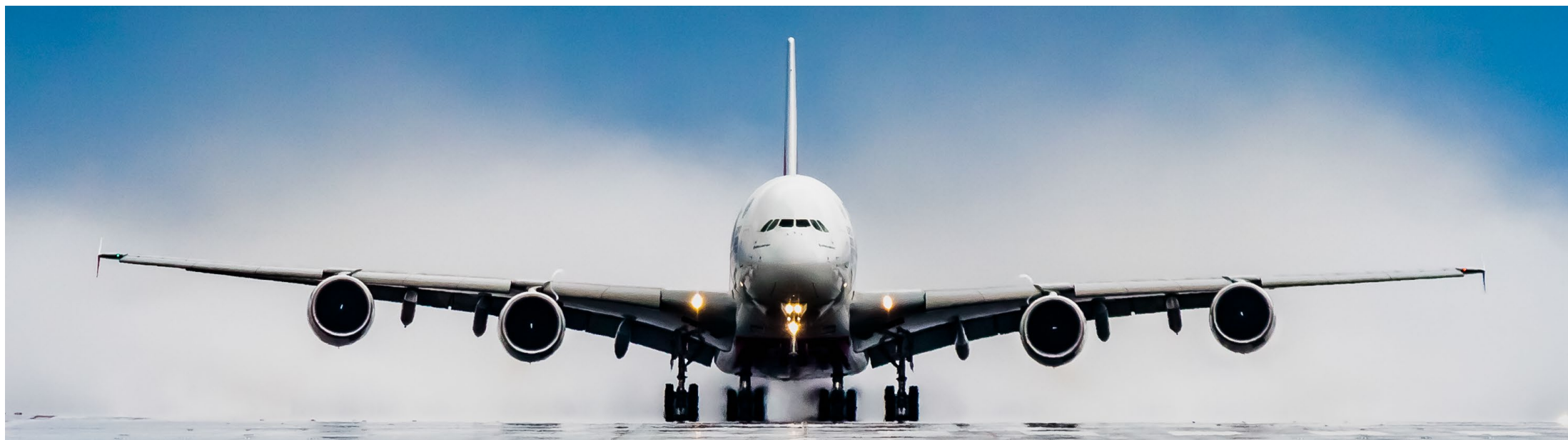
Autumn 2026 and Winter 2026



The Future of Aviation at the Dubai Airshow

To discuss the future of aviation on the ground and in the air, with special focus on the topic of SAF financing and investment

17-21 November 2025



WORLD ECONOMIC FORUM

A blue circular arc, part of the World Economic Forum logo, is positioned behind the text, starting from the left side of the word 'WORLD' and curving downwards and to the right, ending behind the word 'FORUM'.