FLY NET ZERO

ATAG
AIR TRANSPORT ACTION GROUP

Briefing on the financing of sustainable aviation fuel

New York | **17 October 2023**

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Welcome remarks

Haldane Dodd

Executive Director, ATAG

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- Airlines for Europe (A4E)
- Airlines International Representation in Europe (AIRE)
- Asociación Latinoamericana y del Caribe de Transporte Aéreo (ALTA)
- Comac
- European Regions Airline Association (ERA)
- Fédération Nationale de l'Aviation et de ses Métiers (FNAM)
- Genève Aéroport
- International Air Rail Organisation
- International Chamber of Commerce
- International Coordinating Council of Aerospace Industries Associations (ICCAIA)
- Pacific Asia Travel Association (PATA)
- Paris Aéroport
- Administratia Romana a Serviciilor de Trafic Aerian (ROMATSA)
- World Travel and Tourism Council (WTTC)

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Introduction: aviation's net-zero pathway

Haldane Dodd

Executive Director, ATAG

Pressure on climate impact from across stakeholder spectrum

Public

Including *flugskam* and public attitudes to climate change shifting, worldwide.

Governments

Shift to net-zero in a number of jurisdictions, as well as regulatory pressure.

Passengers

Surveys show desire to fly only if they think airlines are taking climate change seriously.

Investors

Increasingly looking at climate impact of companies and putting pressure on shareholders.

Corporate customers

Large purchasers of tickets are demanding climate accountability.

Employees

Want to work for companies that take climate change seriously.

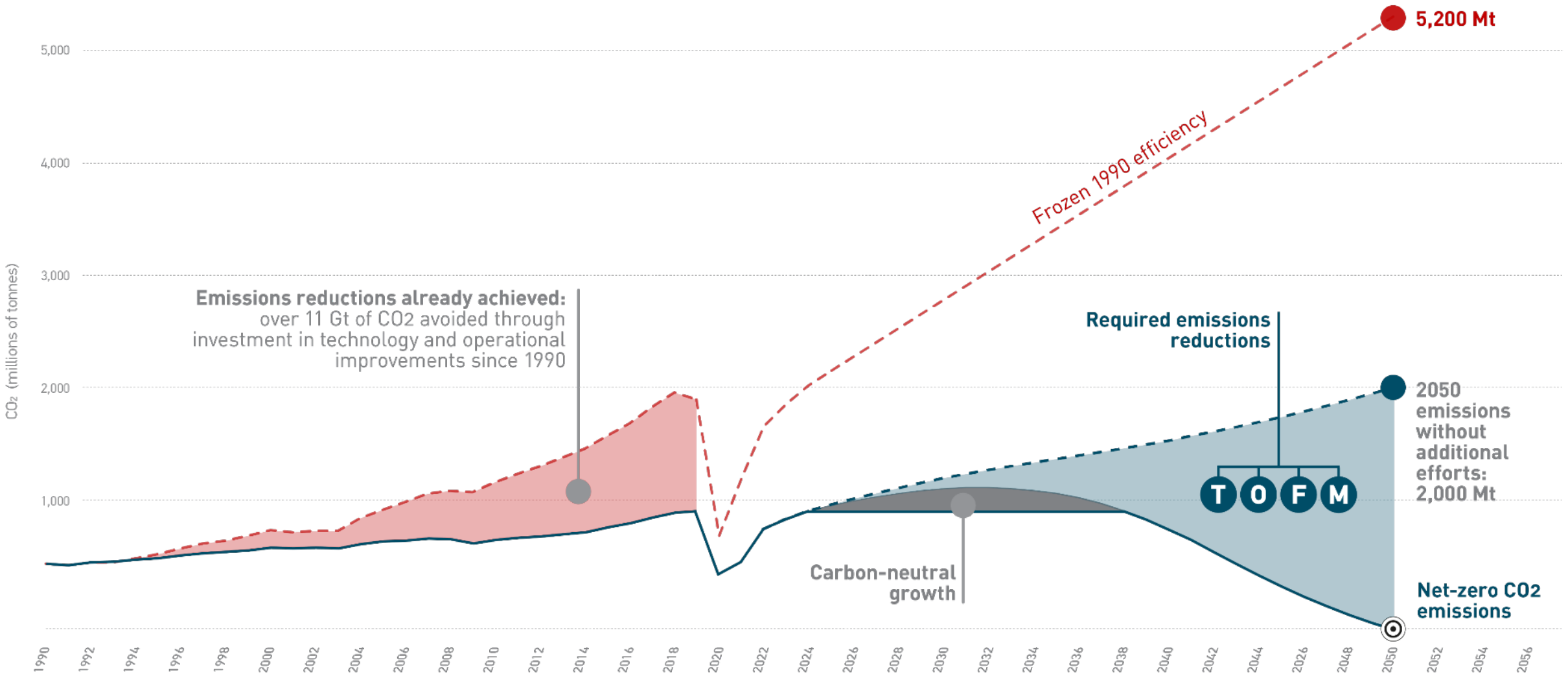
Legal

Increasing number of lawsuits (1,300 worldwide) to push for climate action – mostly aimed at governments, but increasingly on corporates.

The 'scopes' of carbon accounting for aviation

	Scope 1 *Direct company emissions*	**Scope 2** *Indirect company emissions from purchased energy*	**Scope 3: upstream** *Indirect emissions from products and services before your company acquires them*	**Scope 3: downstream** *Indirect emissions from your products and services once you sell them*
Airlines	▪ Aircraft fuel use during service life (including sustainable aviation fuel use) ▪ Owned ground equipment energy use	▪ Energy used in running maintenance facilities, offices	▪ Aircraft manufacturing emissions ▪ Fuel extraction and delivery ▪ Business travel ▪ Employee commuting ▪ Capital equipment costs (machinery, buildings, vehicles) ▪ Ground equipment emissions	▪ Sustainable aviation fuel usage (there may start being a split in the GHGP now where the SAF gets accounted for) ▪ Aircraft end-of-life emissions ▪ Products purchased with loyalty scheme points ▪ Cargo emissions from subcontracted carriers and haulers ▪ Emissions from franchises
Airports	▪ Owned ground vehicle energy use ▪ Construction of infrastructure?	▪ Energy used in running terminal buildings, offices, ground equipment	▪ Business travel ▪ Employee commuting ▪ Capital equipment costs (machinery, buildings, vehicles, airfield)	▪ LTO and flight emissions from aircraft using your airport (Airport Carbon Accreditation guidelines)
Air navigation service providers	▪ Owned ground vehicle energy use ▪ Inspection / calibration flights (if self-operated)	▪ Energy used in running ATC facilities, offices ▪ Energy used in operating CNS equipment, radars, navigational aides etc.	▪ Business travel ▪ Employee commuting ▪ Capital equipment costs (machinery, buildings, vehicles) ▪ Inspection / calibration flights (if contracted)	▪ Emissions from aircraft using your airspace and services, particular focus on reducing excess emissions from these flights
Manufacturers	▪ Flight test fuel use ▪ Ground vehicle fuel use ▪ Aircraft manufacturing emissions	▪ Energy used in running assembly lines, offices	▪ Supply chain emissions and reporting ▪ Emissions from production of raw materials (aluminium, etc) ▪ Capital equipment (machinery, buildings, vehicles) ▪ Business travel ▪ Employee commuting	▪ Aircraft fuel use during service life ▪ Aircraft end-of-life emissions
Lessors	▪ Company offices ▪ Aircraft fuel use during delivery flights to customers?	▪ Energy used in offices	▪ Aircraft manufacturing emissions ▪ Fuel extraction and delivery ▪ Business travel ▪ Employee commuting	▪ Aircraft fuel use during operations ▪ Aircraft end-of-life emissions

Charting a course for 2050: net-zero globally



Development of the analysis

Experts in five working groups developed forecasts and likely pathways

These were developed into consolidated scenarios to meet the industry goal

- Traffic forecasting
- T Technology developments
- O Operations and infrastructure
- F Sustainable aviation fuel
- M Offsetting (market-based measures)

Scenario 1

Scenario 2

Scenario 3

Industry **2050** goal

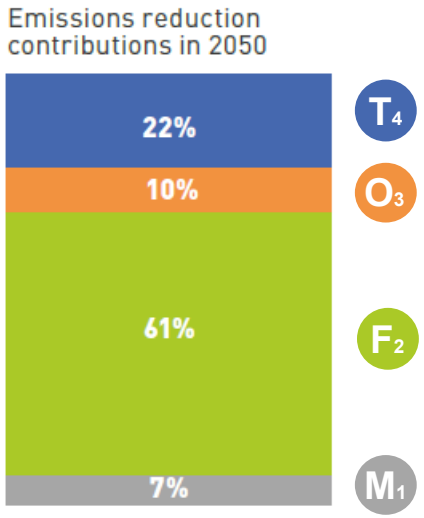
Net-zero CO_2

Meeting the industry goal by exploring different levers

Scenario 1

Pushing technology and operations

Industry prioritises technology and operational improvements

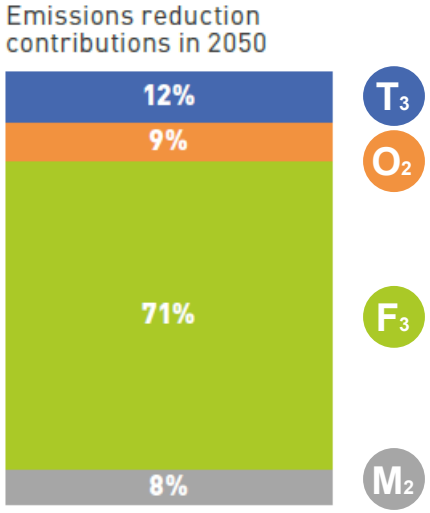


Electric and hybrid short-range (<100 seat) aircraft from 2035/2040. High-range operational improvements. 380 Mt of SAF by 2050.

Scenario 2

Aggressive sustainable aviation fuel deployment

Industry prioritises investment in sustainable aviation fuel over technology

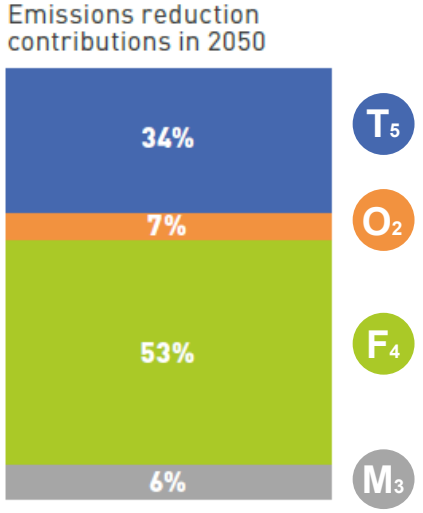


New airframe configurations such as blended wing body. Mid-range operational improvements. 445 Mt of SAF by 2050.

Scenario 3

Aspirational and aggressive technology perspective

Highly ambitious technology developments: electric and/or hydrogen for up to 200 seat aircraft before 2035



Very aggressive zero emissions aircraft (electric, hydrogen) by 2035-2040. Mid-range operational improvements. 330 Mt of SAF by 2050.

When will passengers fly on hydrogen or electric planes?

	2020	2025	2030	2035	2040	2045	2050	
Commuter » 9-50 seats » <60 minute flights » <1% of industry CO_2	SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	~27% of CO_2 emissions
Regional » 50-100 seats » 30-90 minute flights » ~3% of industry CO_2	SAF	SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	Electric or hydrogen fuel cell and/or SAF	
Short-haul » 100-150 seats » 45-120 minute flights » ~24% of industry CO_2	SAF	SAF	SAF	SAF potentially some hydrogen	Hydrogen and/or SAF	Hydrogen and/or SAF	Hydrogen and/or SAF	
Medium-haul » 100-250 seats » 60-150 minute flights » ~43% of industry CO_2	SAF	SAF	SAF	SAF	SAF	SAF	SAF potentially some hydrogen	~73% of CO_2
Long-haul » 250+ seats » 150 minute + flights » ~30% of industry CO_2	SAF	SAF	SAF	SAF	SAF	SAF	SAF	

Will aviation need to rely on offsets to meet its goals?






Current most common options → Most likely mid-century

Industrial carbon reduction	Renewable energy	Carbon reduction	Forestry	Natural carbon solutions	Carbon removal technology

Scope of Waypoint 2050

	ICAO	UNFCCC Paris Agreement
Included in industry 2050 goal: emissions from the global (commercial) use of jet fuel	▪ CO_2 emissions from international aviation (fuel burn gate-to-gate)	▪ CO_2 emissions from domestic aviation (fuel burn gate-to-gate)
Emissions from military, government, general aviation and air taxi mobility services not included in the industry goals.		▪ Airport emissions ▪ Emissions from ground service equipment and road vehicles ▪ Terminals, maintenance facilities, offices ▪ Air traffic control

ICAO Assembly/41 in 2022 delivered

Outcomes at CAAF/3

~80% reduction

in the carbon intensity of the fuel used in 2050 through the use of SAF

ICAO Vision

Global framework

- Capacity building
- Financing
- Enabling mechanisms

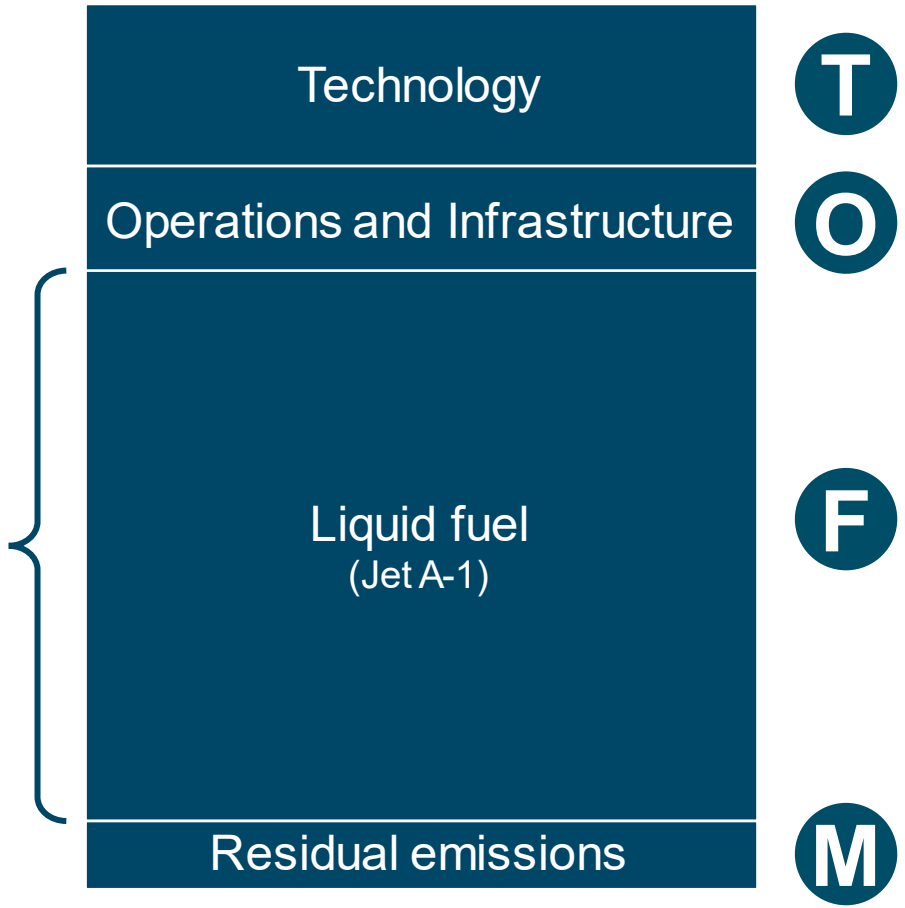
How SAF fits in to the overall decarbonisation roadmap

~80% reduction

in the carbon intensity of the fuel used in 2050 through the use of SAF

380Mt – 490Mt+

of SAF per year in 2050 (depending on the lifecycle carbon and other demand factors)



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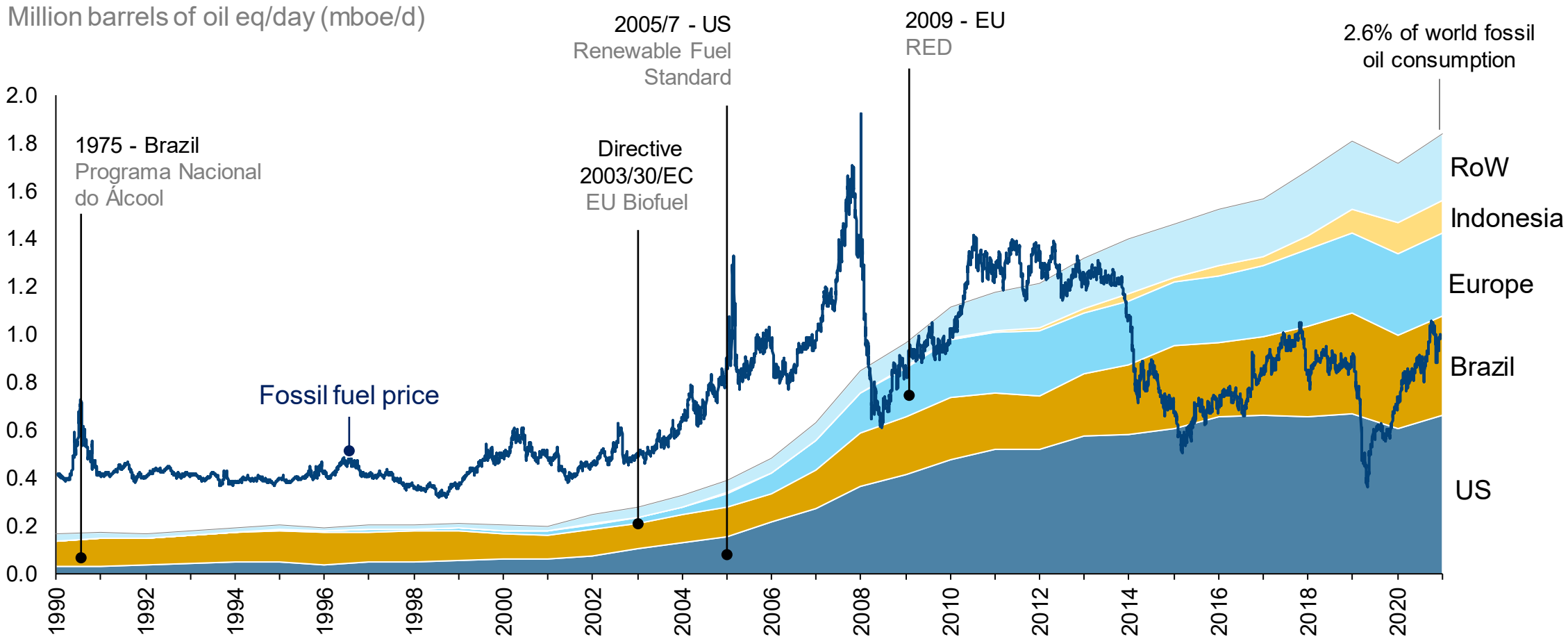
The role of SAF in net-zero aviation

Eliot Lees

Vice President and Managing Director, Clean Transportation, ICF

The SAF industry will be built on the existing foundations



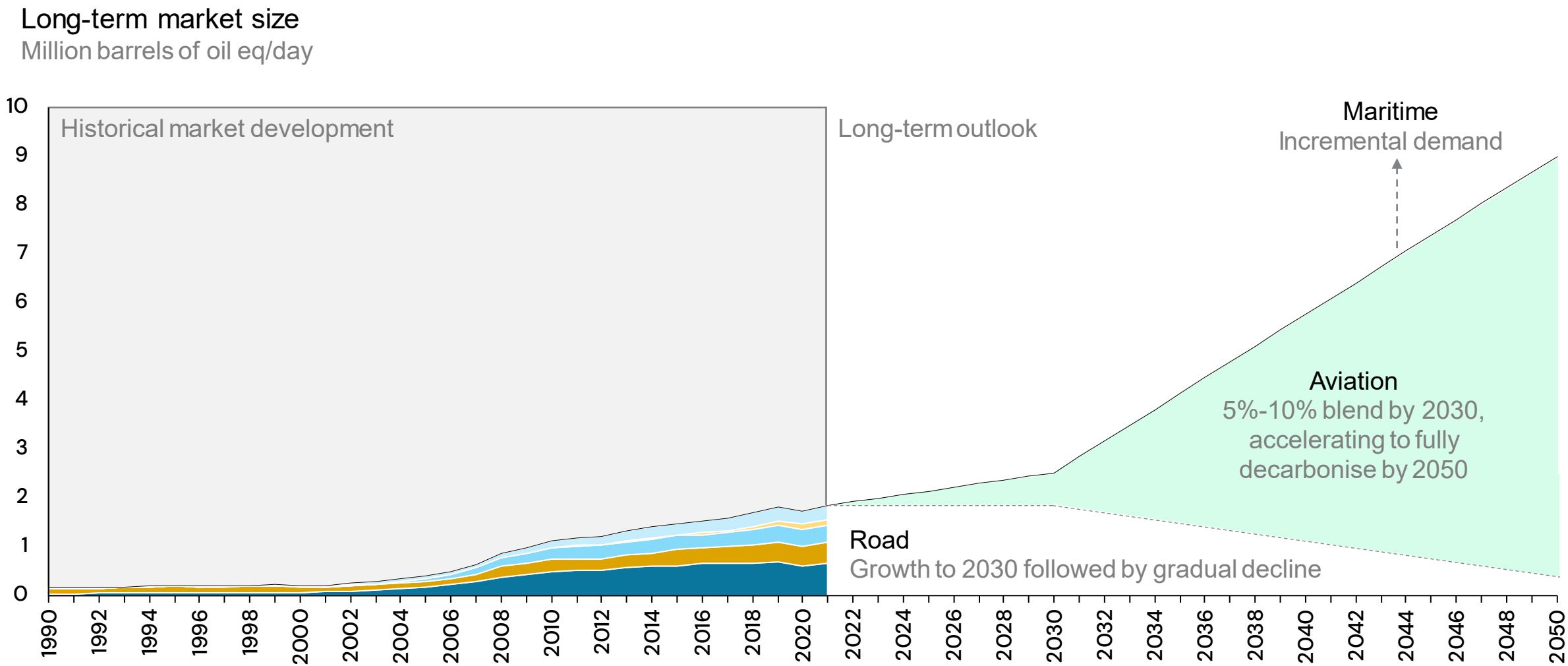
Source: BP Statistical Review of World Energy, 2022, EIA

Aviation is the dominant opportunity, combining push and pull factors

		Market size (mboe/d)	Decarbonisation pressures	Outlook	Implication for Biofuels
	Light vehicles	27	Included in NDCs Rapid adoption of EV	The peak has passed	Blends increase in many markets, but [biofuel] volumes decline Peak estimated at c. 2 mboe/day around 2030
	Heavy Vehicles	19		Peak around 2030	
	Aviation	6.2	Highly visible. Net zero by 2050	Fuel demand growth of 1-2% CAGR	Up to 8.5 mboe/day required
	Maritime	3.5	Low visibility, emerging ambition	Activity growth of 0.9%, offset by efficiency measures	?

Source: https://assets.bbhub.io/professional/sites/24/BloombergNEF-Road-Fuel-Outlook-2022.pdf

(1) Larger scale, (2) different customers, (3) shifted focus

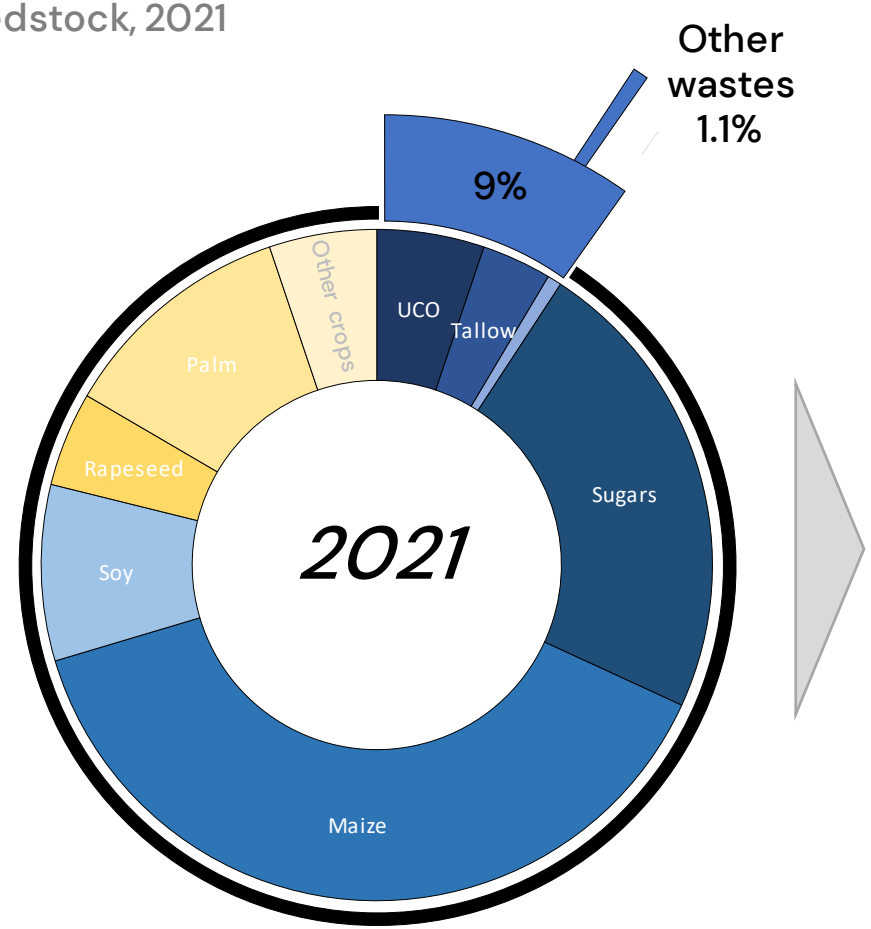


Over 90% of current biofuel production uses crops as feedstocks.

These cannot be scaled, and policy is shifting to incentivise wastes as feedstocks

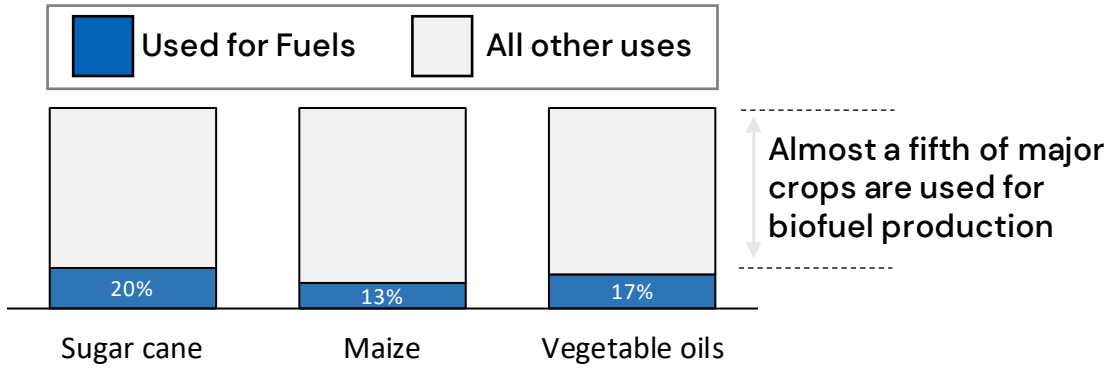
Global biofuel production

By feedstock, 2021



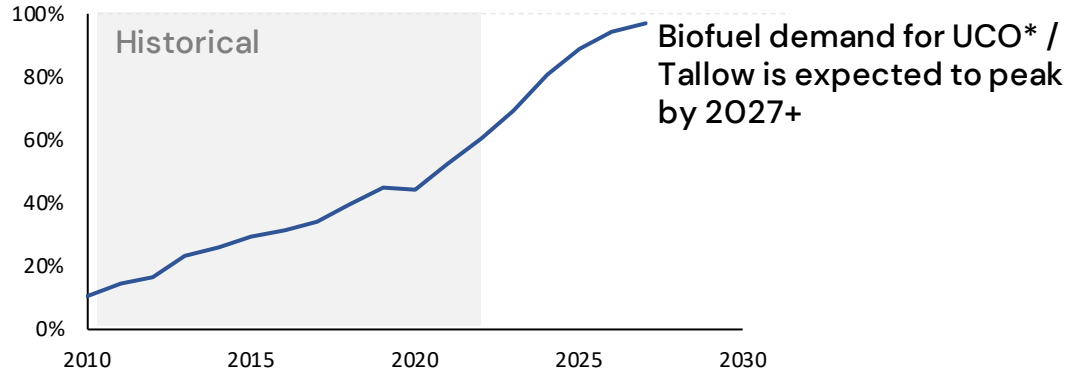
Biofuel share of global crop production

Percentage, 2021



Biofuel Demand of UCO / Tallow

Percentage of demand



*Source: IEA – https://www.iea.org/reports/is-the-biofuel-industry-approaching-a-feedstock-crunch | * UCO: Used cooking oil*

SAF feedstocks are evolving and improving

1st Generation Feedstocks

Edible biomass derived from food crops

Oil-seed, Sugar and starchy crops

Not allowed as a part of ReFuelEU

2nd Generation Feedstocks

Waste and non-food crops

Oil-seed / grass / wood crops

Agricultural and forestry residues

Food, animal and municipal waste

3rd & 4th Gen Feedstocks

Advanced Methods

Non-biological feedstocks (Power to Liquid [PtL], etc)

Microalgae / GMO's

Mature Technology
High feedstock competition & cost
Low capital cost

Low Scalability

Low Technology Readiness Level
Low feedstock competition & cost
Requires abundant clean energy
High capital cost

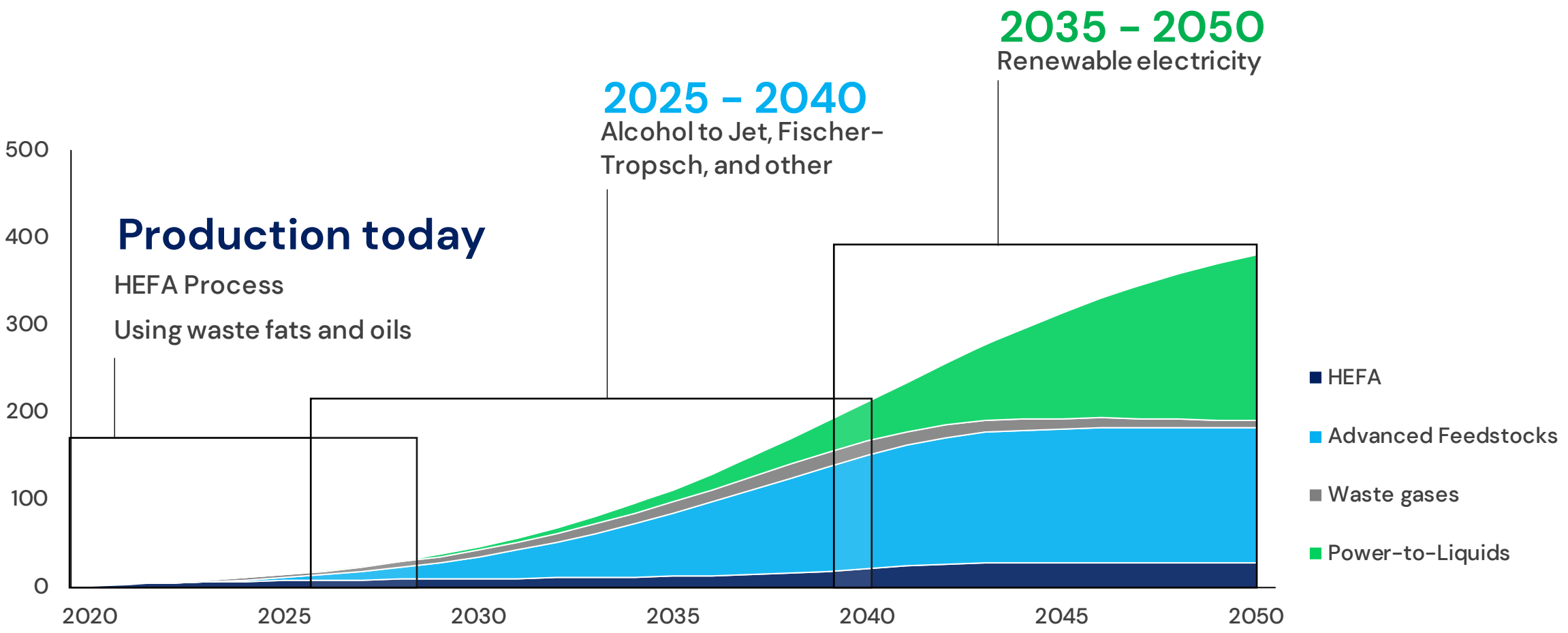
Very High Scalability

We are mostly here

...but trying to get here

The new feedstock sources will be highly diversified

The SAF industry will follow three waves of deployment



Source: https://www.icf.com/insights/transportation/deploying-sustainable-aviation-fuel-to-meet-climate-ambition

There are scale and logistics implications for the next phase of SAF production, all of which will require new capital

Feedstock sources → **Production** → **Transportation** → **Storage**

Source: https://www.icf.com/insights/transportation/deploying-sustainable-aviation-fuel-to-meet-climate-ambition

The aviation energy transition will create global opportunities

Building:

5,000 – 7,000 production facilities

Improving energy security and resilience

Creating opportunities in all countries – 90% of current oil production is in 22 countries

Investment of:

$1.0-1.45 trillion

~6% of annual fossil and gas investment

And will create:

Up to 14 million jobs

With 90% across the supply chain

Supporting collection of feedstock and construction of facilities

Helping to support a just transition from fossil fuel jobs to clean energy

ICF *Source: https://www.icf.com/insights/transportation/deploying-sustainable-aviation-fuel-to-meet-climate-ambition*

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Technical developments

François Collet

Head of Trading, Commercial team, Airbus

Pushing us to 100% SAF around 2030

Commitment by aerospace to ensure **100% SAF compatibility** by around 2030

- **Today up to 50% SAF blends can be used to fuel aircraft.**
- **Important to reach 100% capability to prevent bottleneck in SAF ramp up.**
- **Two approaches:**
  - “Drop-in” meeting JET A-1 spec and
  - Non drop-in (new fuel type)

Approved technical pathways

	Process / pathway	Feedstock	Blending limit
1	FT-SPK	Biomass (e.g. trash/rubbish, forestry residues, grasses)	up to 50%
2	HEFA-SPK	Oil-bearing biomass (e.g. UCO, algae, jatropha, camelina)	up to 50%
3	HFS-SIP	Sugars to hydrocarbon (e.g. molasses, sugar beet, corn dextrose)	up to 10%
4	FT-SPK / A	Same feedstock as Annex A1, but slightly different process	up to 50%
5	ATJ-SPK	Agricultural waste (e.g. forestry slash, crop straws)	up to 50%
6	CH-HK	Plant and animal fats, oils and greases (FOGs)	up to 50%
7	HC-HEFA-SPK	Bio-derived hydrocarbons, fatty acid esters	up to 10%
8	ITJ	Industrial Sugars	up to 50%

	Co-processing	Feedstock	Blending limit
9	FOG-CP	Waste fats, oils, greases (FOGs) from vegetable and animal sources	up to 5% (could inc. to 30%)
10	FT-CP	Fischer-Tropsch biocrude	up to 5% (could inc. to 30%)
11	CP-HB	Co-processing of hydroprocessed biomass	up to 5% (could inc. to 30%)

Technical pathways in the process of ASTM approval

	Process / pathway	Feedstock	Blending limit	Timeline
11	SAK	synthesized aromatic kerosene (Virent)	tbc	2-5 years
12	IH2	Integrated hydropyrolysis and hydroconversion (Shell)	tbc	2-5 years
13	ATJ-BI	ATJ derivative biochemical production of isobutene (Global Bioenergies)	tbc	2-5 years
14	ATJ-MA	ATJ derivative starting with the mixed alcohols (Swedish Biofuels)	tbc	2-5 years
15	DILSAAF	Single reactor HEFA (Indian CSIR-IIP)	tbc	2-5 years
16	ReOIL	Pyrolysis of non-recyclable plastics (OMV)	tbc	2-5 years
17	MtJ	Methanol to Jet (Honeywell, Topsoe and Nacero)	tbc	2-5 years
18	CP-UT	Co-processing of pyrolysis oil from used tires	up to 5%	2-5 years
19	CP-HB	Co-processing of hydroprocessed biomass	up to 5%	2-5 years

Leading manufacturers have committed that commercial aircraft will be capable to fly on 100% SAF by 2030

Power-to-Liquid (aka e-fuels)

Airline	PtL partner	Details	Date
SWISS	Synhelion	Plant one: 1,000 tonnes per year from sunlight	from 2024/5
CATHAY PACIFIC	国家电力投资集团公司 STATE POWER INVESTMENT CORPORATION	4 plants at 50,000-100,000t per plant	from 2024
ICELANDAIR	IÐUNN H_2	45,000t SAF	from 2028
norwegian	norsk e-fuel	40,000t of e-Fuel (a proportion for SAF)	from 2026

Whilst PtL is expected to be a longer-term solution, already airlines are investing

There's no point in pursuing this if it is not truly sustainable

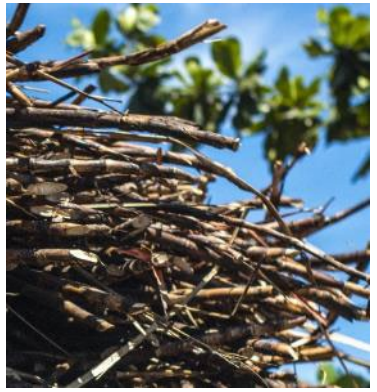
So far, aviation has taken a very responsible approach

- 'Small' sector with good coordination – including through industry bodies and ICAO / the UN
- Airlines are very reputation-aware
- Able to learn from the mistakes made in the road transport sector before SAF was seen as a possibility

- However, as the sector expands rapidly, there will be increasing pressure in some parts of the world on feedstock opportunities.
- Need to keep vigilant on this.

There's no point in pursuing this if it is not truly sustainable



Current most common options → Most likely mid-century

Waste oils	Municipal solid waste / industrial off-gasses	Wood processing and forestry waste	Agricultural waste	Oil and cellulosic crops	Power-to-liquid sources

There's no point in pursuing this if it is not truly sustainable

CORSIA Eligible Fuels

- Global, ICAO administered
- 12 criteria covering carbon emissions, social and land use
- Is a robust set of sustainability criteria for a measure developed by States, industry and civil society

Roundtable on Sustainable Biomaterials

- Global, WWF-founded
- 12 criteria addressing environmental, social economic metrics.
- Standards maintained by stakeholders: growers, producers, end users, social, environmental and research experts.
- Approved certification body for CORSIA.

International Sustainability and Carbon Certification

- Global, German Government founded.
- Criteria covering carbon emissions, social and land use.
- Approved certification body for CORSIA.

Renewable Energy Directive 2

- EU-focused for fuels used in EU
- Uses positive feedstock lists rather than treating feedstock as agnostics and relying on sustainability criteria.
- Will be updated with RED3 soon.

There's no point in pursuing this if it is not truly sustainable

CORSIA

Sustainability standards covering not only climate impacts, but social and environmental security as well.

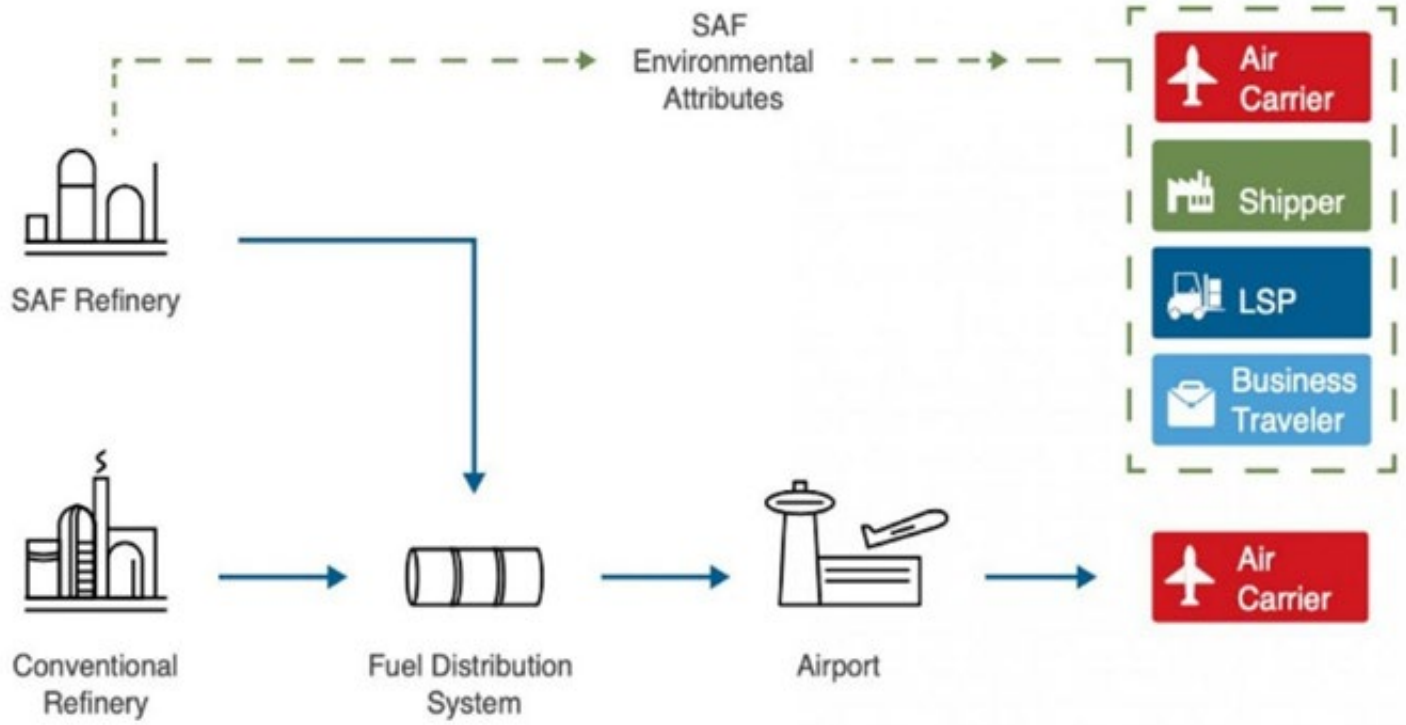
	Theme	Principle
1	Greenhouse Gases	*CORSIA SAF should generate lower carbon emissions on a life cycle basis. (Currently at least 10%)*
2	Carbon stock	*CORSIA SAF should not be made from biomass obtained from land with high carbon stock.*
3	Water	*Production of CORSIA SAF should maintain or enhance water quality and availability.*
4	Soil	*Production of CORSIA SAFs should maintain or enhance soil health.*
5	Air	*Production of CORSIA SAF should minimize negative effects on air quality.*
6	Conservation	*Production of CORSIA SAF should maintain biodiversity, conservation value and ecosystem services.*

	Theme	Principle
7	Waste and Chemicals	*Production of CORSIA SAF should promote responsible management of waste and use of chemicals.*
8	Human and labour rights	*Production of CORSIA SAF should respect human and labour rights.*
9	Land use rights and land use	*Production of CORSIA SAF should respect land rights and land use rights including indigenous and/or customary rights.*
10	Water use rights	*Production of CORSIA SAF should respect prior formal or customary water use rights.*
11	Local and social development	*Production of CORSIA SAF should contribute to social and economic development in regions of poverty.*
12	Food security	*Production of CORSIA SAF should promote food security in food insecure regions.*

Book and claim: a solution for mid-term action

Chain-of-custody model allowing "de-coupling" of environmental benefits from physical transfer of SAF via book and claim registry

- Allow companies to contribute to goals of Paris Agreement;
- Provide return on investment on innovative climate solutions;
- Allow for efficient capital deployment;
- Provide real emissions reductions.



Chain-of-custody model allowing "de-coupling" of environmental benefits from physical transfer of SAF via book and claim registry

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The driver for SAF at an aviation system level

Christopher Diamond

Director of the Office of Sustainability, PANYNJ

The driver of SAF at an aviation system level

- Why SAF is important from a strategic level
- How airports are working to build new energy into long-term thinking

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Demand drivers and policy outlook

Haldane Dodd

Executive Director, ATAG

Some airlines are making longer-term SAF commitments: **10% by 2030**

Aer Lingus
BRITISH AIRWAYS
IBERIA
vueling
American Airlines
CATHAY PACIFIC
SriLankan Airlines
ROYAL JORDANIAN
FINNAIR
QANTAS
Jetstar
JAPAN AIRLINES

AIRFRANCE
KLM
transavia
jetBlue
malaysia airlines
Southwest
cebu pacific
virgin atlantic
DELTA
Alaska
ANA

QATAR AIRWAYS القطرية
royal air maroc
AIR NEW ZEALAND
LATAM
5% commitment
HAWAIIAN AIRLINES
AEROMEXICO.
FIJI AIRWAYS
CARGOJET
SpiceJet
IndiGo

RYANAIR
12.5% commitment

SAS
25% “in the 2030s”
norwegian
28% commitment
DHL
30% commitment
ups
30% commitment
FedEx
30% commitment

40+ airlines

32% Global passengers

35% Global RTKs

Demand intentions:

Significant growth in offtakes since CAAF/2

- Aegean Airlines
- Air Canada
- Air France
- Air Greenland
- Air Transat
- Alaska Airlines
- All Nippon Airways
- Amazon Air
- **American Airlines**
- Asiana
- Austrian Airlines
- British Airways
- Cathay Pacific
- Cebu Pacific
- **Delta**
- DHL Express
- EasyJet
- FedEx
- Finnair
- Hawaiian Airlines
- IAG
- IAG Cargo
- Iberia Airlines
- Icelandair
- ITA Airways
- Japan Airlines
- **JetBlue**
- **KLM**
- Korean Air
- LOT Polish Airlines
- **Lufthansa Group**
- Netjets
- Qantas
- Qatar Airways
- **Ryanair**
- SAS
- Scoot
- Singapore Airlines
- Southwest Airlines
- Sunclass Airlines
- **United Airlines**
- Verijet
- Virgin Atlantic
- VistaJet
- Wizz Air

Some airlines with several offtakes (portfolio approach)

7 airlines with 4 or more offtakes

Weighted average offtake term: ~10 years

Predominantly voluntary SAF procurement

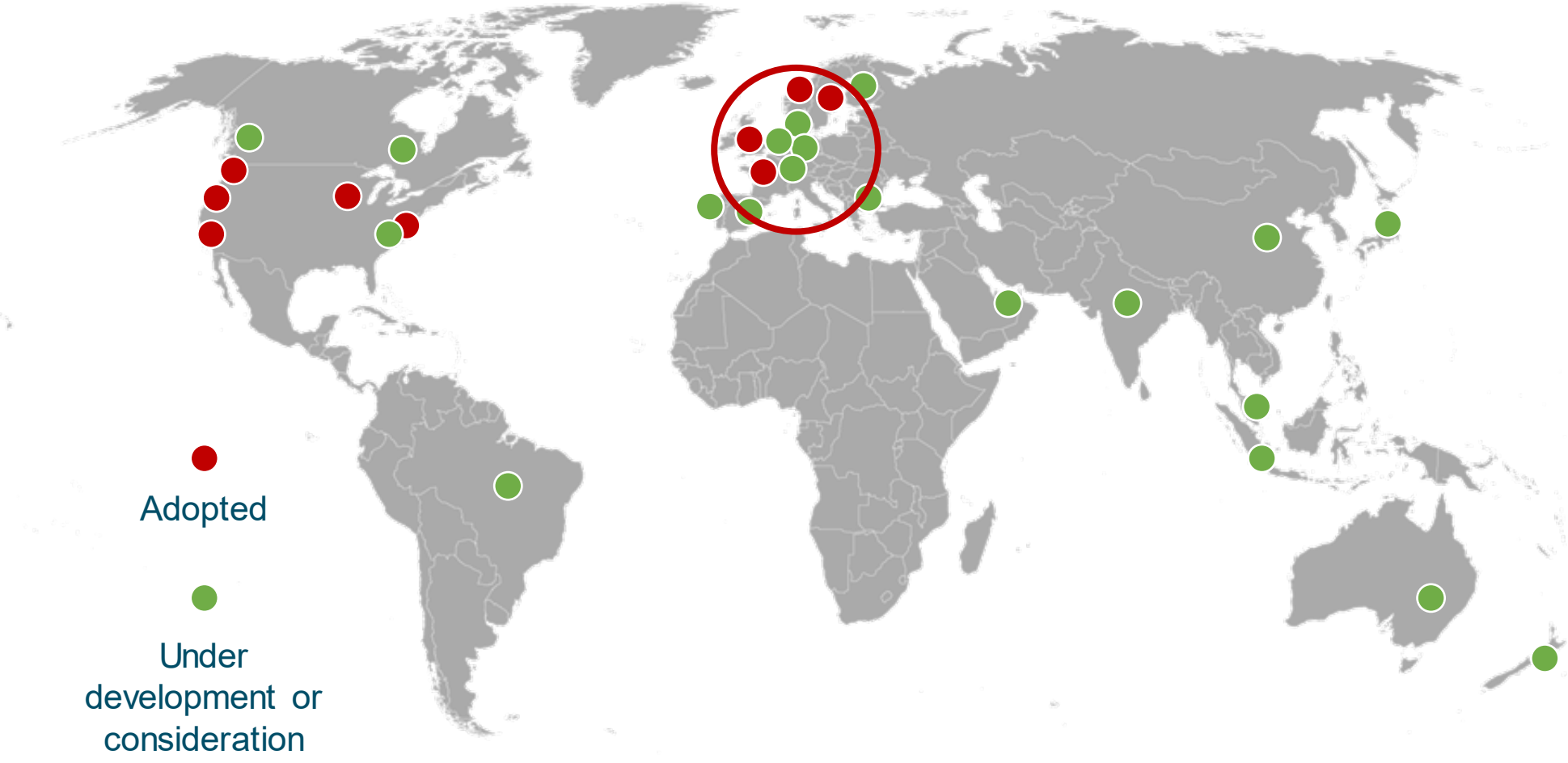
45

airlines with offtake agreements for SAF totalling over

37 Mt / ($45bn)

so far…

Government policy to add demand: **global picture**



Around 40 countries covering about 65% of global jet fuel use are implementing or considering SAF policy options.

From those with detailed policy measures, around **20Mt of SAF** would likely be required in 2030.

Other initiatives, studies and roadmaps

By individual passengers

(as part of a ticket or separately through the booking process)

SAS
Lufthansa
brussels airlines
Eurowings
AirDolomiti
BRITISH AIRWAYS
airBaltic
SWISS
jetBlue
Austrian

By corporate customers

(large purchasers of tickets or air services)

CATHAY PACIFIC
KLM
DHL
virgin atlantic
UNITED
cargolux
BRITISH AIRWAYS
DELTA
AIRFRANCE
Alaska

Separate to airline

(direct purchase of SAF into the system)

SABA
SUSTAINABLE AVIATION BUYERS ALLIANCE
Fly Green Fund
First Movers Coalition
SKYNRG
Avelia

Global roadmaps

(Global roadmaps that provide SAF guidance)

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Supply ramp-up in the **United States**

Estimated year-end production forecast

(millions of tonnes)

~0.17Mt **2023**	~1.2Mt **2024**	~3Mt **2025**	~4.3Mt **2026**	~4.4Mt **2027**	~4.9Mt **2028**
LanzaJet Freedom Pines / 0.03	Phillips 66 Rodeo / 0.9	Diamond Green Diesel Port Arthur / 0.7	Aemetis Riverbank / +0.066	SkyNRG NW#1 / 0.09	Velocys Natchez / 0.075
Montana Renewables Great Falls / 0.1	Aemetis Riverbank / 0.66	World Energy Paramount B / 0.77	LanzaJet Hennepin / 0.36		Green Plains Tallgrass tbd, Midwest / 0.4
	Montana Renewables Great Falls / +0.1	USA BioEnergy Bon Wier / 0.08	World Energy Houston / 0.76		
		Fulcrum BioEnergy Centerpoint / 0.09	Fulcrum BioEnergy Trinity / 0.09		
		gevo Net-zero 1SD / 0.17			

Unannounced or in-development:

- 180+ additional new-entrants
- Expansion plans for: LanzaJet, Gevo, Alder, Fulcrum +
- Refinery co-processing / conversion
- Renewable diesel switching

Year-end production, CAAFI estimates, doesn't include substantial renewable diesel capacity that could be re-purposed to SAF

Supply ramp-up **renewable fuel capacity in 2028**

Announced production capacity for 2028
(millions of tonnes).

Pathway (Mt)	Africa and Middle East	Americas	Asia Pacific	Europe	North Asia	Total
ATJ		2.29	0.70	0.46		**3.45**
CHJ			0.20			**0.20**
HEFA		29.78	5.66	8.64	3.39	**47.30**
PtL		0.02		0.24		**0.26**
Syngas FT	0.42	0.97	0.10	1.36		**2.34**
Co-Process			0.02	1.29		**1.32**
Total	**0.42**	**33.06**	**6.69**	**11.99**	**3.39**	**55Mt**

IATA analysis

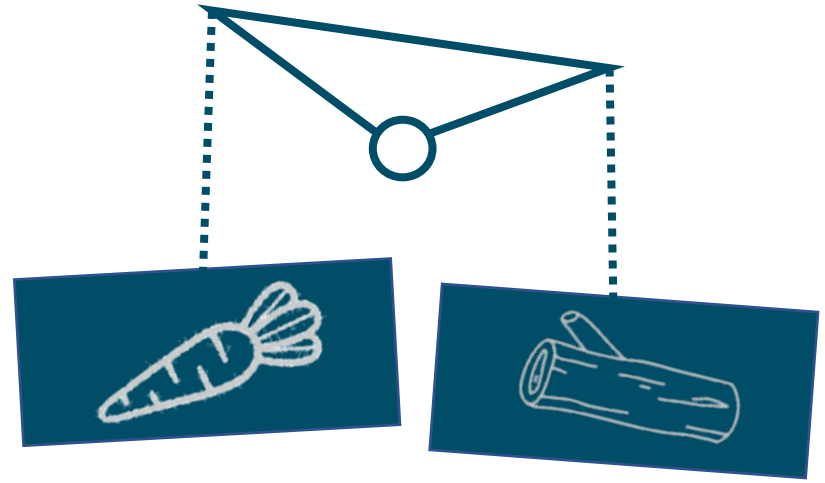
Policy options: What is the intent?

Broadly speaking, policy mechanisms can:

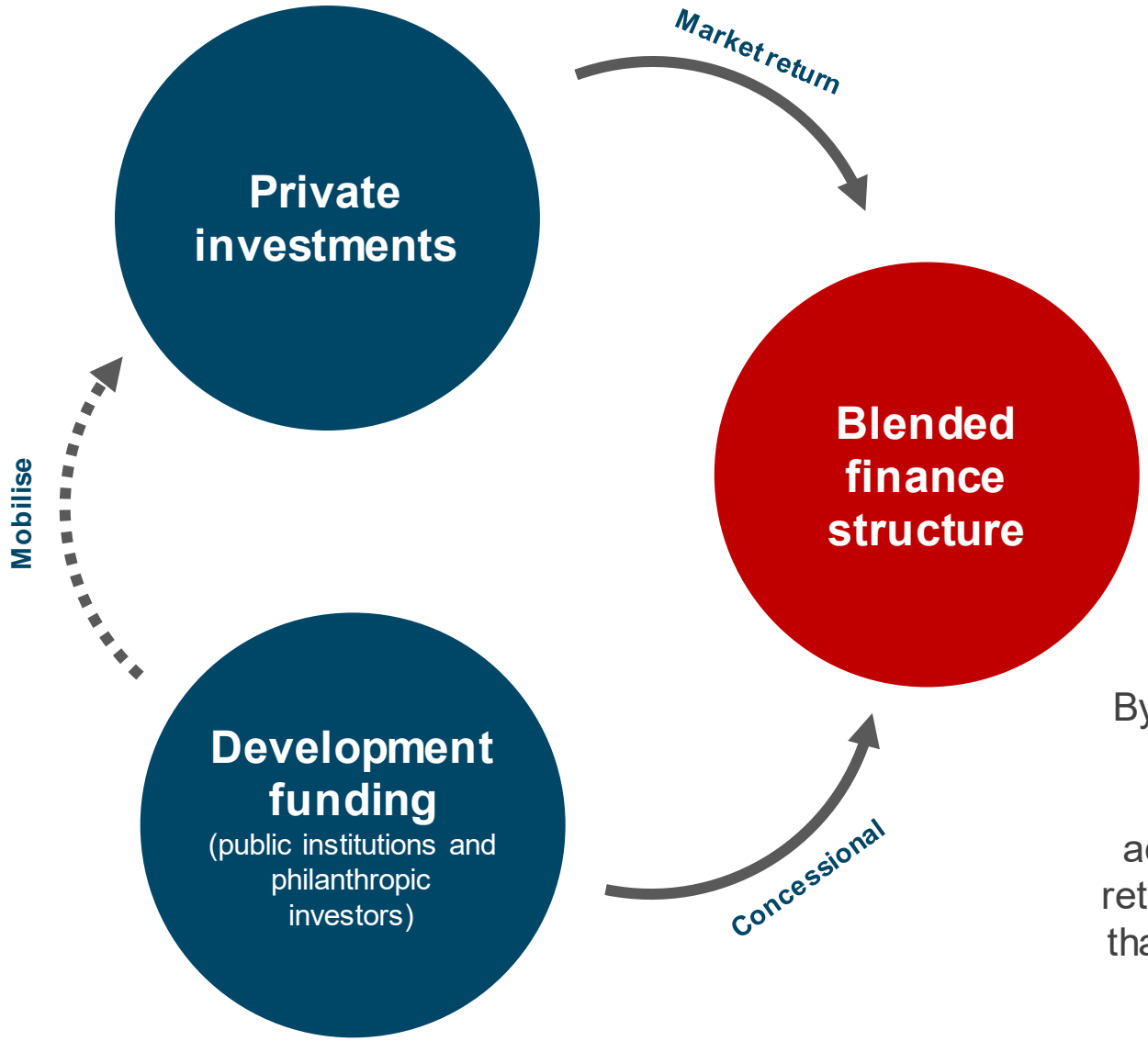
1. **Stimulate** growth of the SAF supply (via R&D, investment, finance etc.)

2. Create SAF **demand** (via mandates, subsidies and commitments)

3. **Enable** the SAF marketplace (via standards)



The mechanism: blended finance



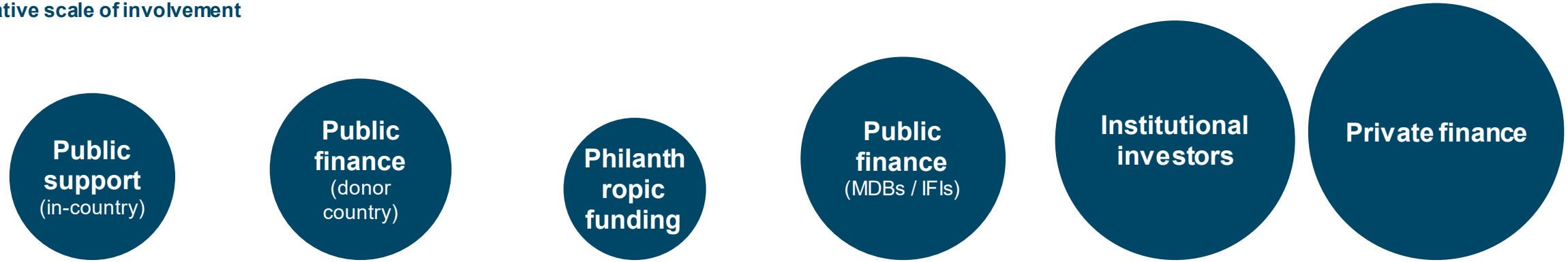
Private investors (e.g. private equity and venture capital firms, institutional investors, commercial investors) have the capacity to participate in blended finance transactions as arrangers and distributors, with the ability to provide commercial capital and leverage expertise from various divisions as well as global networks.

Public and private institutions should all play a critical role for the blended finance ecosystem to function efficiently and in proper synergy.

By offering catalytic capital (such as concessional capital), public institutions (MDBs, DFIs, etc.) can accept higher risk and concessional returns to enable private investments that otherwise would not be possible and help bridging financing gaps.

The mechanism: blended finance

Relative scale of involvement



- Tax and regulatory assistance for construction and operation (use of SAF).
- Project leadership.
- Limited initial financing.

- Assistance with capacity building and knowledge / technology transfer.
- Financing of initial de-risking of plants.

- Assistance with capacity building.
- Financing feasibility studies and collaboration initiatives.

- Financing of first series of plants.
- Assisting with the de-risking of projects across countries and for institutional and private finance.

- Providing scale investment, working alongside the MDBs and IFIs to fund plants 2, 3, 4 etc.

- Providing scale investment, working alongside the institutional investors to fund plants 5+.

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Break

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Panel discussion: how will the demand for SAF evolve, how is financing being rolled-out?

Panel discussion: how will the demand for SAF evolve, how is financing being rolled-out?

Kevin Welsh
Vice President of Environment and Chief Sustainability Officer
A4A

Jill Blickstein
VP and Chief Sustainability Officer, American Airlines

Jonathon Counsell
Group Head of Sustainability, IAG

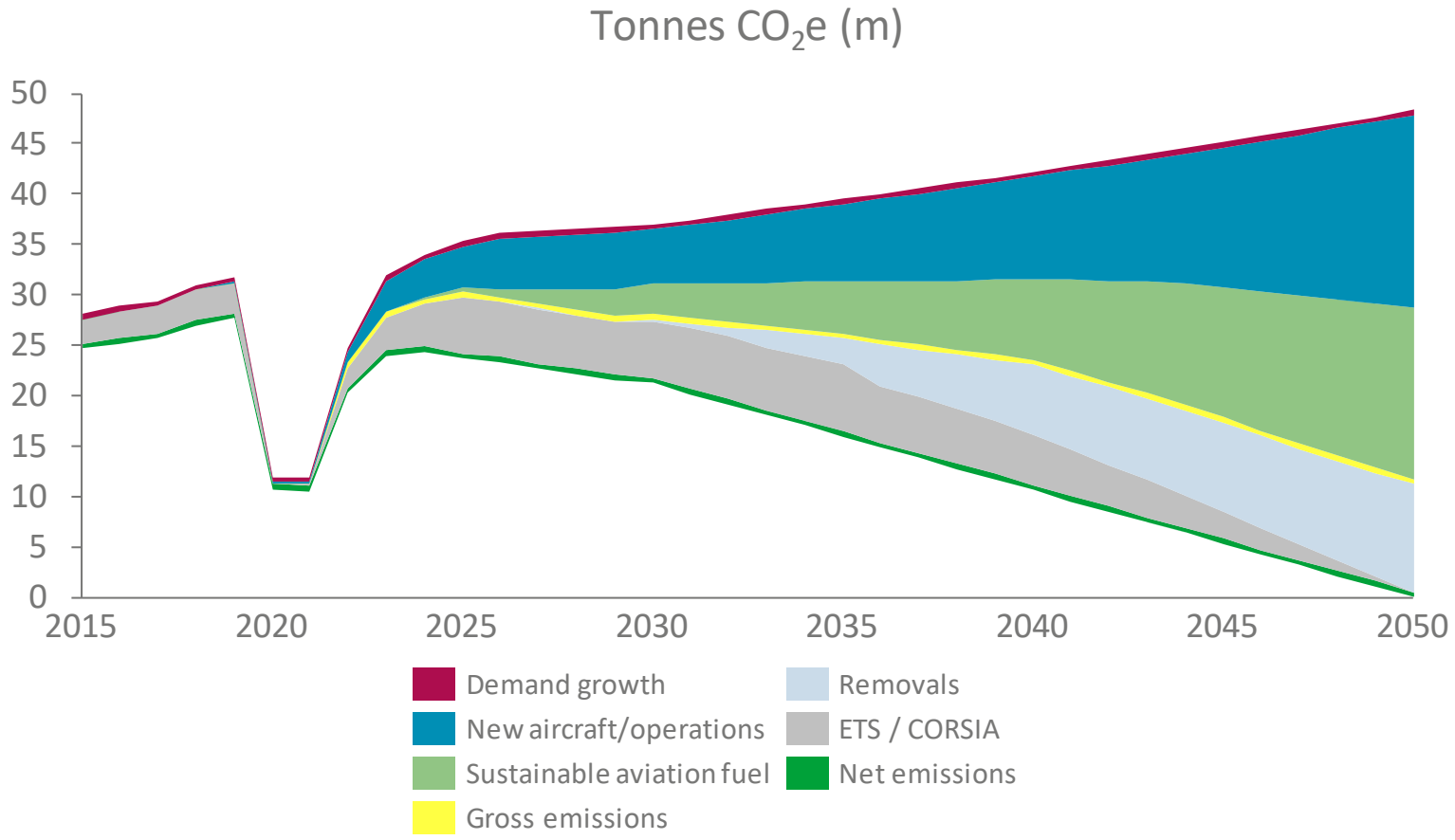
Leke Agiri
Vice President Finance, Gevo

Connor Rehm
Chief Financial Officer, 4Air

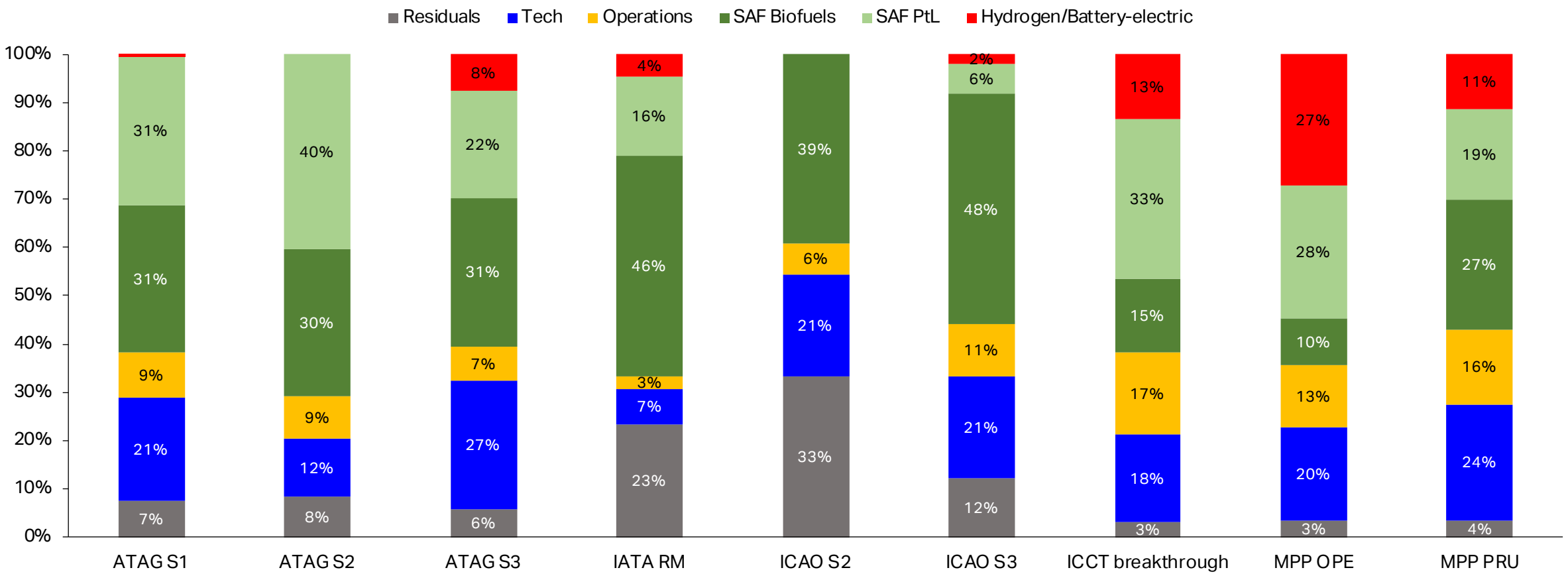
IAG Roadmap to achieve net zero carbon emissions

INTERNATIONAL AIRLINES GROUP

- ~95% of our greenhouse (GHG) emissions coming from aircraft operations
- By 2050 70% of our fuel will be SAF
- To date we have committed $865m in future SAF purchases and investments



Aviation decarbonisation roadmaps: net zero carbon by 2050



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Open discussion

Lead by Michael Foley, Associate Director of Sustainability, Business Development and Partnerships, **Pratt & Whitney**

Open discussion: turning roadmaps into bankable SAF scale-up

What does the finance community need from policymakers to support accelerated investment in SAF scale-up?

- Do emerging mandates provide sufficient demand certainty?
- Are the technology risks sufficiently well understood?
- Do airline offtake agreements provide sufficient demand and price certainty?
- How is the finance community thinking about bridging the cost gap for SAF production?

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Concluding remarks

Haldane Dodd

Executive Director, Air Transport Action Group

Key conclusions of *Waypoint 2050* research

1

Industry long-term goal of net-zero CO2 from aviation globally by 2050 is **very challenging, but achievable.**

(there are several pathways to meeting the goal)

2

We will need a significant scale-up of sustainable aviation fuel: **up to 445 million tonnes a year by 2050.**

(long-haul routes will rely on SAF)

3

SAF energy transition will rely on **investment of ~6% of annual oil and gas capex**, but could sustain 14m jobs all around the world.

(a transition away from fossil fuel)

4

New technology such as electric and hydrogen aircraft, **need accelerated research & development**

(could enter service around 2035 on short-haul routes)

5

Operations and infrastructure efficiencies are **vital for early action** and to maintain capacity efficiency in the future.

(mainly relates to air traffic management)

6

Offsetting is important in the near-term, but net-zero may rely on some **carbon removal options**.

(by 2050, offsetting will mainly be in carbon removal opportunities)

What support does the industry need to achieve net-zero?

- **Support from governments:** the right policy environment and programmes to help foster innovation, rather than place blunt costs on the sector.
- **Finance community:** significant investment required globally.
- **Energy industry:** need to get serious about the transition away from fossil fuels.
- **Research institutions:** investigate radical technology approaches, SAF pathways and production efficiencies.
- **Customers:** to help develop the market for SAF in particular

- This is a very fast-moving space in the future of air transport
- It will be a messy transition, but it will happen
- Support needed from all: aviation, energy, finance, governments
- We are in unchartered territory, but we have good guidance
- Despite daunting challenge, I am more and more confident this can be done

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Where do I get more information?

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www.aviationbenefits.org/W2050

www.aviationbenefits.org/FlyNetZero

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Thank you