FLY NET ZERO

Airline commitment to Net Zero 2050

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Our commitment:

TO ACHIEVE NET ZERO CARBON EMISSIONS BY 2050

- Target aligned with Paris Agreement goal to keep global warming under 1.5 °C
- Aimed at keeping the benefit of global connectivity for future generations

IATA

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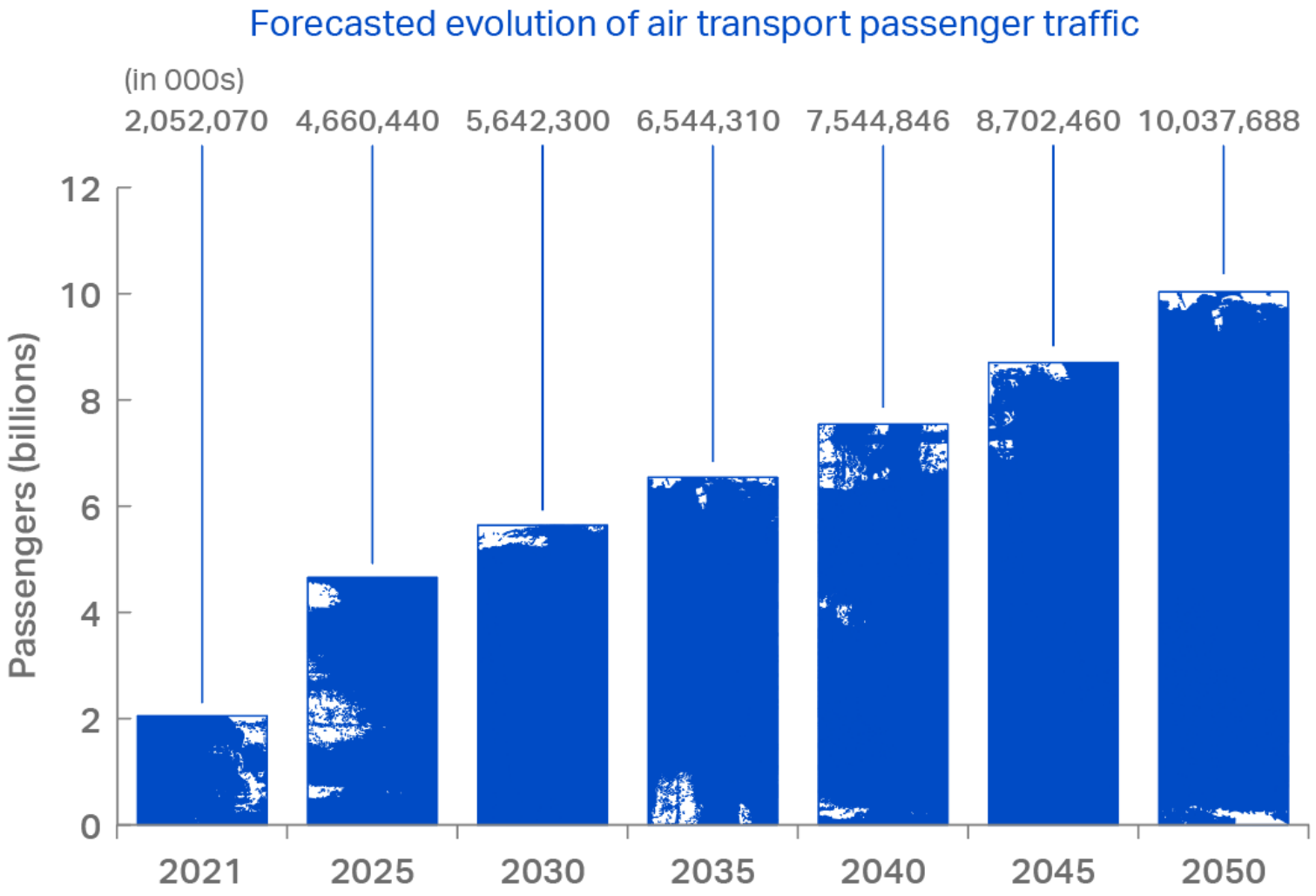
Our challenge

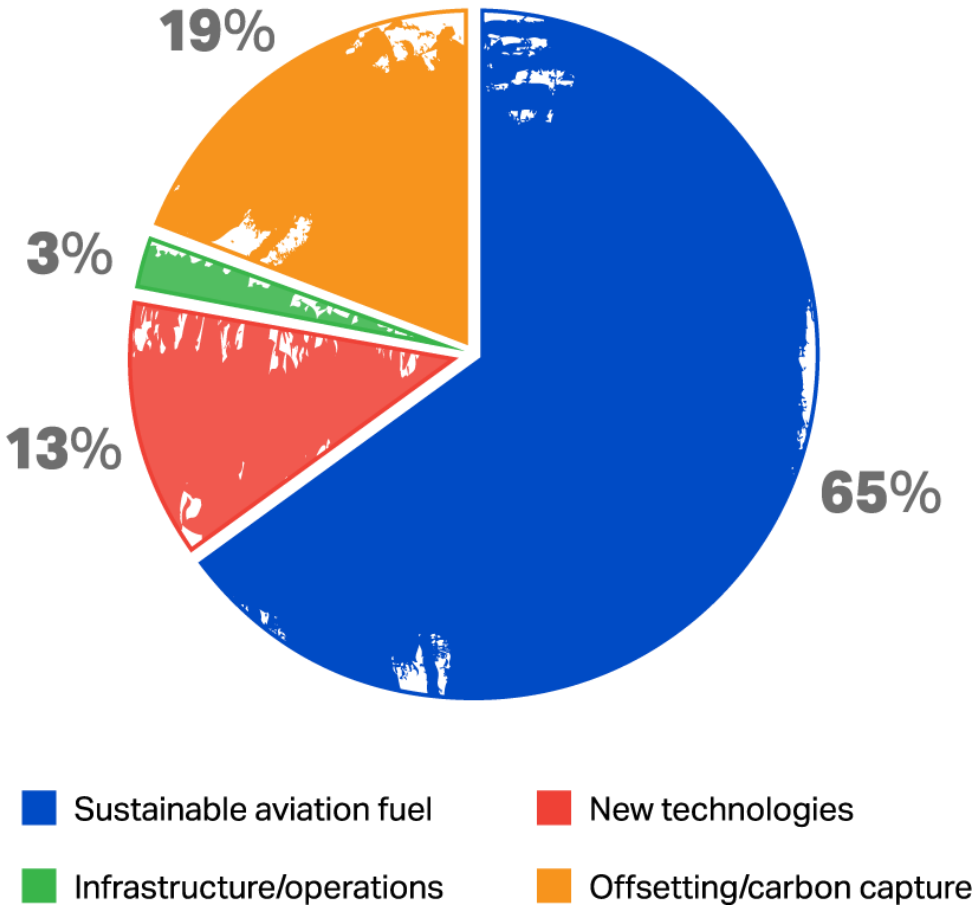


If Business-as-Usual in 2050

- over 10 billion passengers
- 1.8 Gigatons CO_2 to abate

The plan

Contribution to achieving Net Zero Carbon in 2050



Net Zero 2050 is achievable through:

Combination of measures

- Sustainable Aviation Fuel, new , technologies, operational and infrastructure improvements, and offsetting/carbon capture

Collective effort

- of the entire industry together with governments, oil producers and investors

Pathways for ambitious aviation climate action

www.aviationbenefits.org/W2050

- Air transport established sector-wide climate goals in 2009.
- Waypoint 2050 provides further details of the pathway to meeting the sector's long-term goal. Key takeaways:
    - Aviation's long-term climate goal for net-zero carbon by 2050 is in line with Paris Agreement 1.5°C, is a significant challenge, but is achievable.

Aviation's global climate strategy: goals and pillars of action

GOAL 1

1.5% AVERAGE ANNUAL FUEL EFFICIENCY IMPROVEMENT 2009-2020

Pre-Covid-19 tracking above average at around 2% per annum

GOAL 2

STABILISE NET AVIATION CO_2 EMISSIONS THROUGH CARBON-NEUTRAL GROWTH

To be delivered for international aviation through the UN (ICAO CORSIA)

GOAL 3

REACH NET-ZERO CO_2 EMISSIONS BY 2050

FLY NET ZERO

T — TECHNOLOGY

Investing trillions in researching, certifying, launching and purchasing new technology aircraft.

Including evolutionary designs and revolutionary new concepts such as electric, hybrid and hydrogen options.

O — OPERATIONS & INFRASTRUCTURE

Improving the operational performance of aircraft (cutting weight, retrofitting new technologies, working with flight crews to fly more efficiently).

Infrastructure efficiency such as streamlined air traffic management.

F — SUSTAINABLE AVIATION FUEL

Kick-starting an energy transition in aviation fuels away from fossil sources and towards fuels made from non-food crops, wastes and eventually from renewable electricity.

M — MARKET-BASED MEASURES

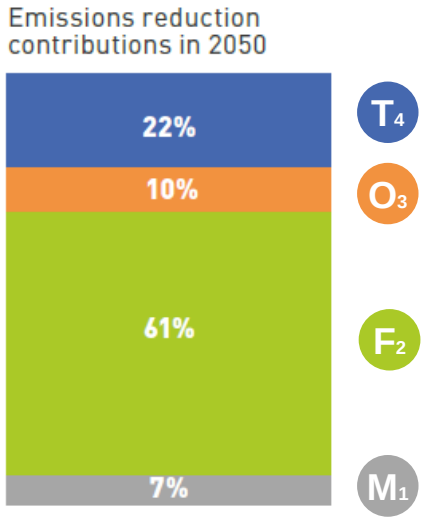
Committing to world's first sectoral carbon-pricing mechanism (CORSIA) and, by 2050, out-of-sector emissions reductions likely in the form of carbon removal opportunities.

Meeting the industry goal by exploring different levers

Scenario 1

Pushing technology and operations

Industry prioritizes technology and operational improvements

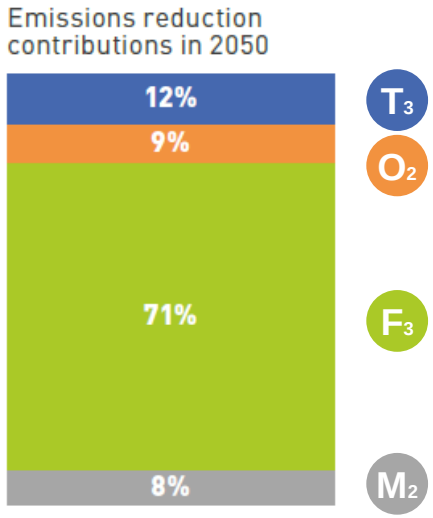


Electric and hybrid short-range (<100 seat) aircraft from 2035/2040. High-range operational improvements. 380 Mt of SAF by 2050.

Scenario 2

Aggressive sustainable aviation fuel deployment

Industry prioritizes investment in sustainable aviation fuel over technology

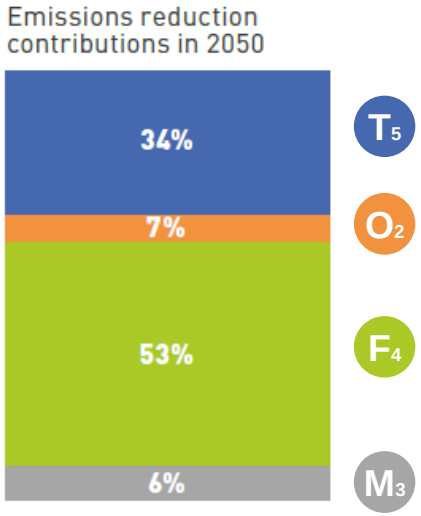


New airframe configurations such as blended wing body. Mid-range operational improvements. 445 Mt of SAF by 2050.

Scenario 3

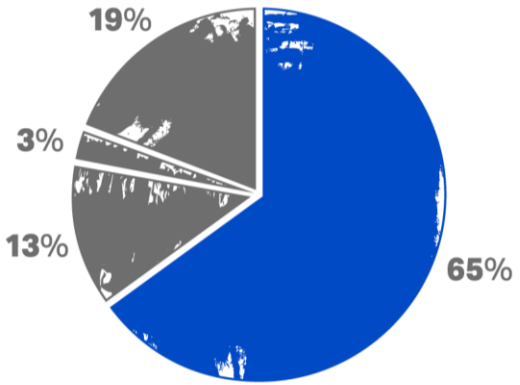
Aspirational and aggressive technology perspective

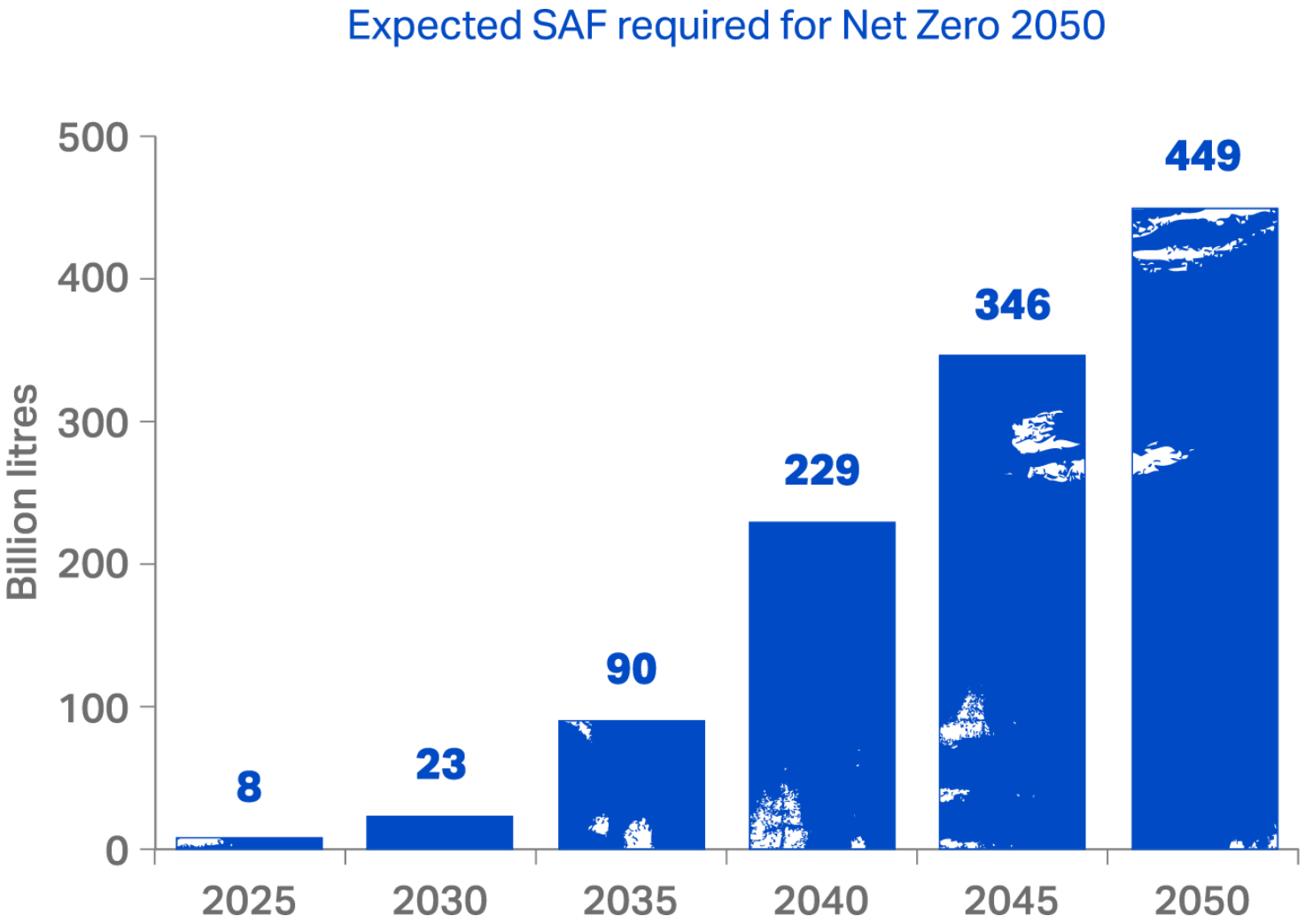
Highly ambitious technology developments: electric and/or hydrogen for up to 200 seat aircraft before 2035



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

The plan: sustainable aviation fuel





Big reliance on ramping up SAF production

- Production needs to go from 100 million liters today to at least 449 billion liters in 2050.
- SAF will contribute around 65% of the emissions reductions needed in 2050.

Current state of deployment

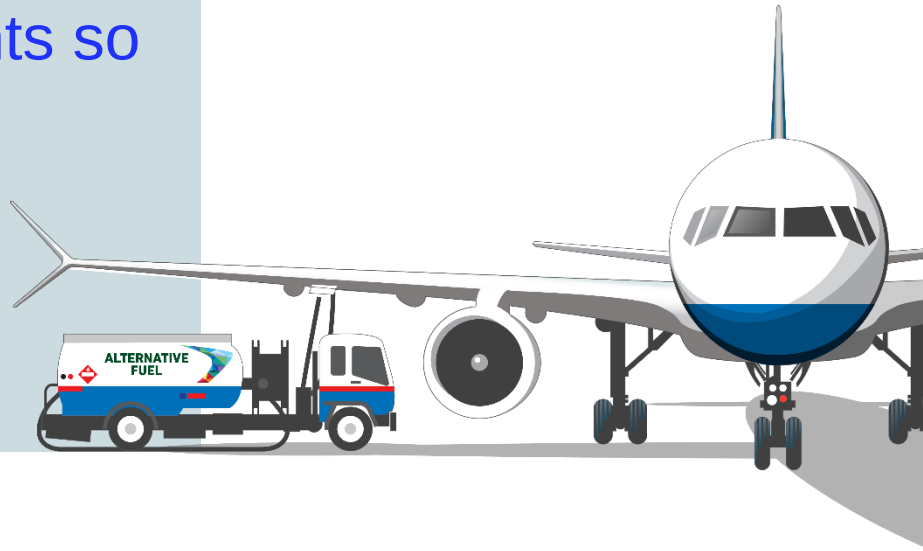
365,000+
Flights on SAF since 2011

7
technical pathways approved

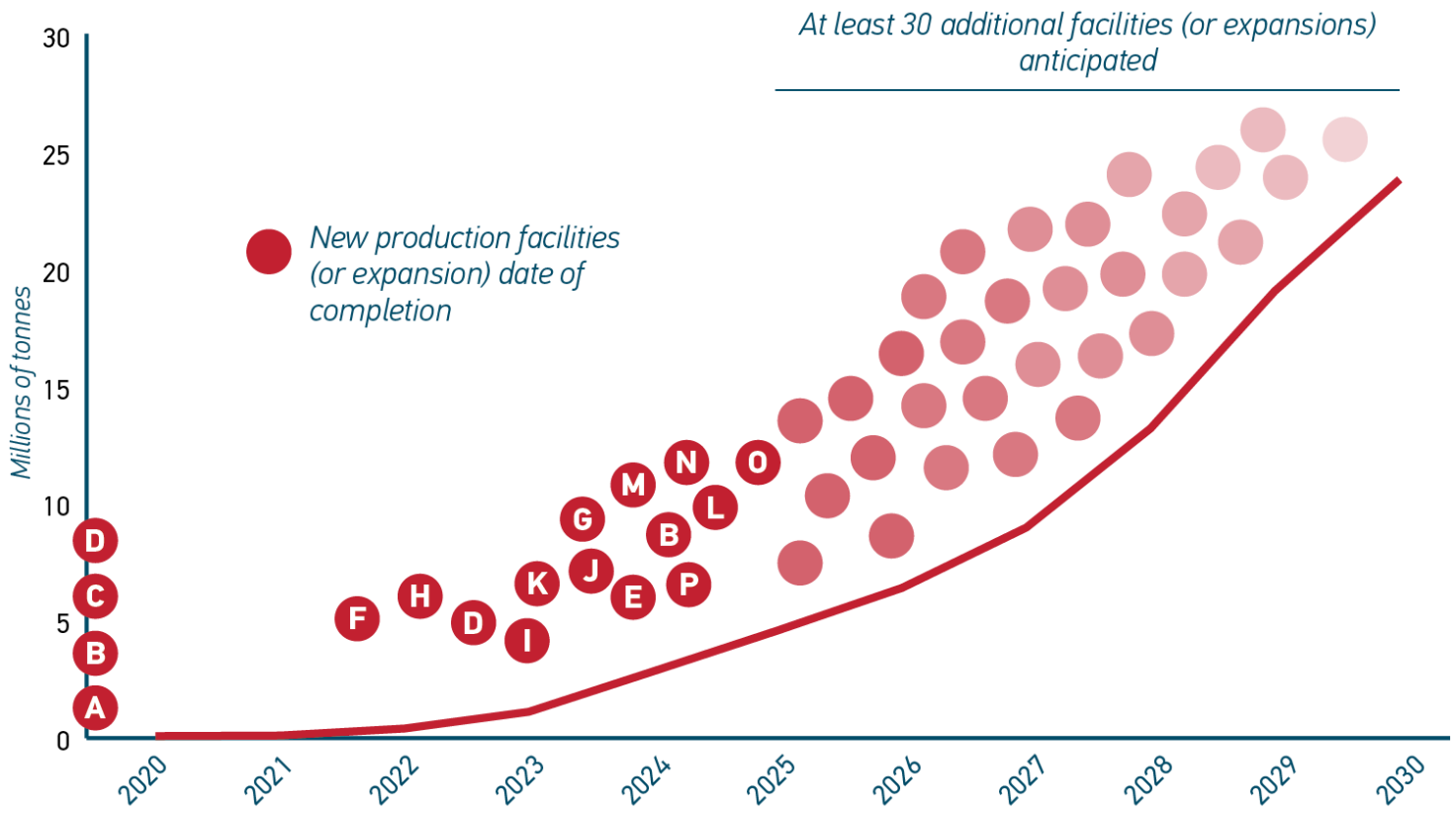
14 billion
litres of SAF in (public) airline forward purchase agreements so far…

<1%
of global jet fuel is SAF currently

14
plants operating or under construction

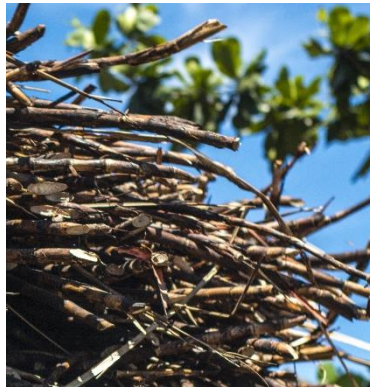


What is the short-term deployment ramp-up of SAF?



- A Neste (Singapore / Finland)
- B Gevo (USA)
- C Amyris (Brazil)
- D World Energy (USA)
- E ST1 (Sweden)
- F Fulcrum (USA)
- G Neste (Singapore)
- H LanzaTech (North Asia)
- I SkyNRG (Netherlands)
- J UPM (USA)
- K Red Rock (USA)
- L Total (France)
- M Marathon (USA)
- N Repsol (Colombia)
- O Preem (Sweden)
- P Velocys (UK)
- Q Phillips66 (USA)
- R Eni (Italy)
- S ECB (Paraguay)

Potential sources of SAF



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

Evolution of SAF will take place in three waves

Production today

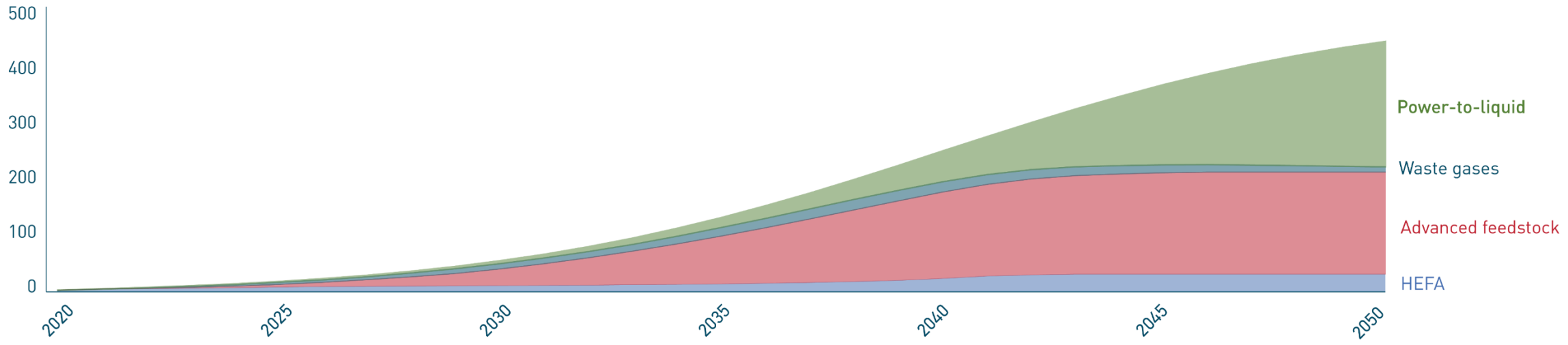
HEFA processes using waste fats and oils

Advanced SAF

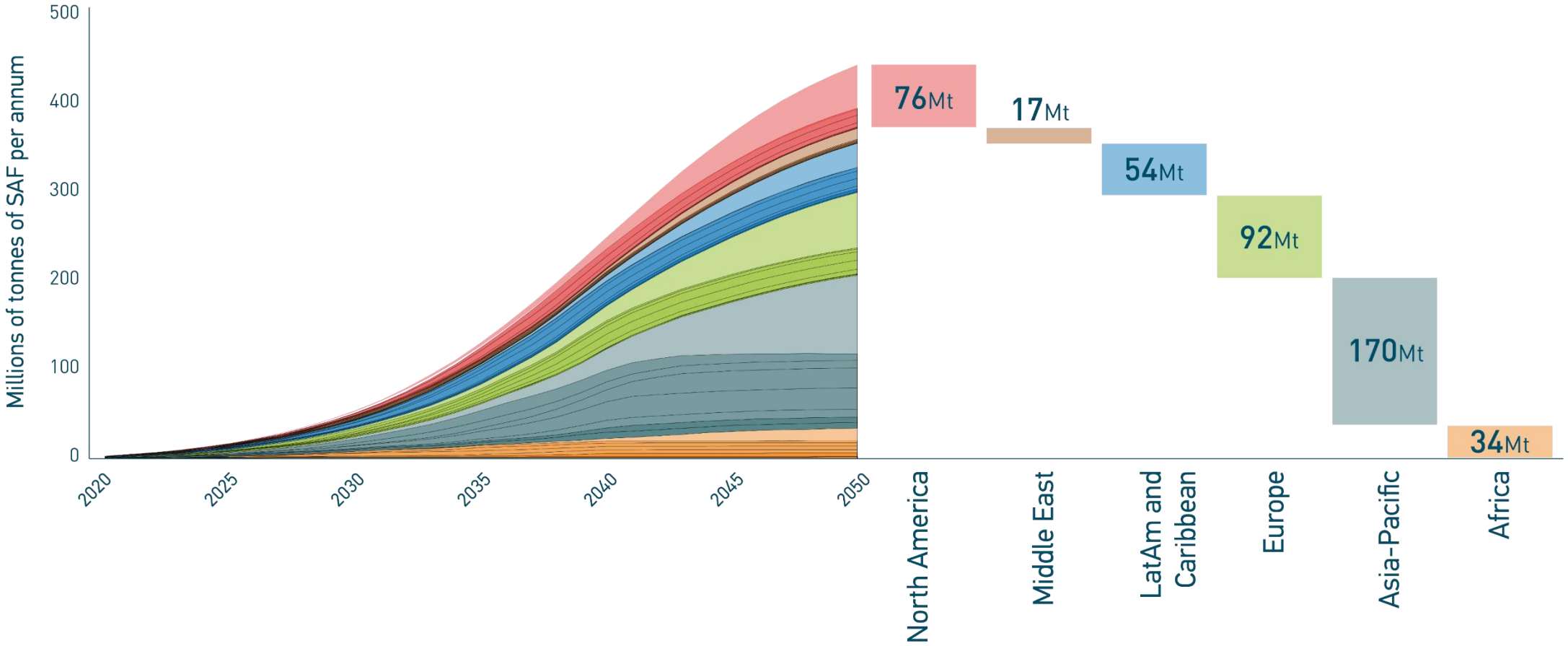
Alcohol-to-jet, fischer-tropsh or other using biological material

Power-to-liquids

Using low-carbon electricity and green hydrogen



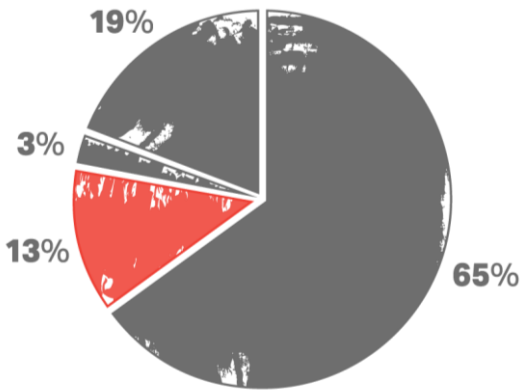
SAF production evolution on a regional basis



Call to Action: Sustainable Aviation Fuel

- Engage industry and policy stakeholders on all SAF topics and facilitate cooperation and promote partnerships between them
- Work towards removing barriers to the realization of a cost-competitive SAF market
- Promote the global harmonization of sustainability criteria for SAF
- Support the development of the SAF industry, including attracting capital to expand SAF capacity through loan guarantee programs (de-risking the early investment anxiety for new technologies), direct research and development activities for local SAF production pathways, and new energy industries, and committing to policy certainty.
- Implement SAF research programs into technology pathways, feedstock and emissions reduction factor improvements, and production efficiency improvements.

The plan: new technology



New aircraft technology

- Electric, Hybrid and Hydrogen propulsion will play a role in the path to net zero.
- New types of plane could come into service in 2030's and 2040s.
- New aircraft technologies will contribute around 13% of the emissions reductions needed in 2050.

	By 2025	By 2030	By 2035
Engine	Electric	Electric or Hydrogen	Hydrogen
Seats	9 to 19	50 to 100	100 to150
Flight time	< 60'	up to 90'	Up to120'

What types of technology developments can we expect?

Over

15,000

new aircraft have been ordered by airlines since 2009

(Many of these to replace older, less-efficient aircraft)

$15bn

annually spent on efficiency research by manufacturers

Each new generation of aircraft is

~20%

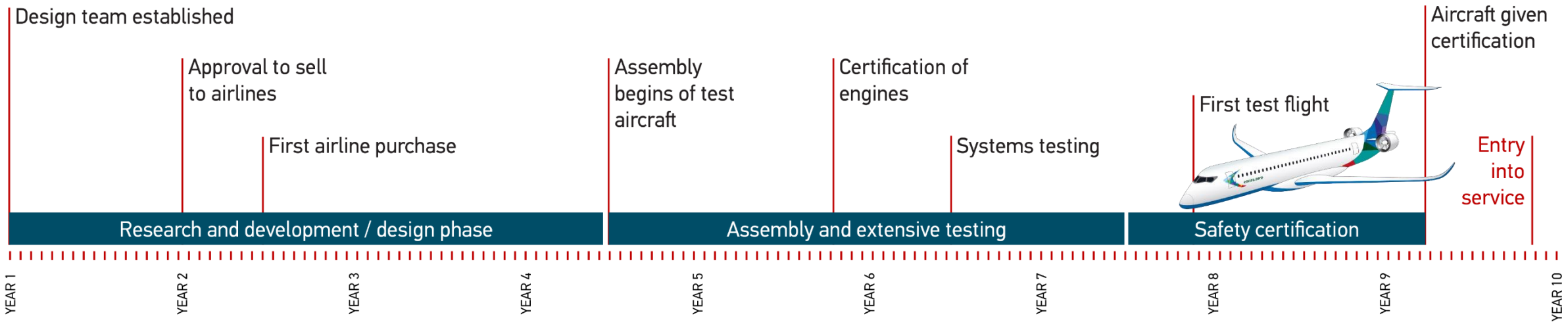
more fuel efficient

Advancing radical new technologies:

Electric, hybrid and **hydrogen** aircraft for

2035

How long does it take to develop and deliver a new aircraft?



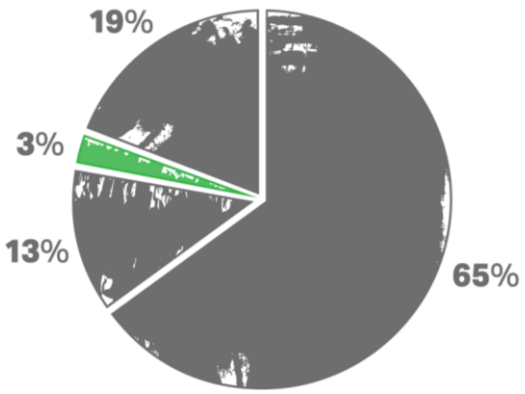
$10-30bn

Cost of developing a brand-new aircraft, depending on complexity

Call to Action: Technology

- Investment in new aircraft technology, including radical new aerodynamic and alternative propulsion (electric or hydrogen) solutions
- Accelerate research into radical airframe designs, and electric and hydrogen propulsion.
- Form partnerships with non-aviation technology providers.
- Provide incubator opportunities for new green technology start-ups.
- Work to prepare for new energy requirements for electric and hydrogen aircraft.

The plan: operations/infrastructure



Operations and infrastructure improvements can be implemented to deliver immediate emissions reductions

Examples:

- Retro-fitting winglets
- Light-weight seating
- Fuel efficiency management systems
- Reduced engine taxiing
- Air traffic management programs such as Single European Sky and NextGen can deliver significant savings

Operations and infrastructure can contribute

around 3%

of the emissions reductions needed in 2050.

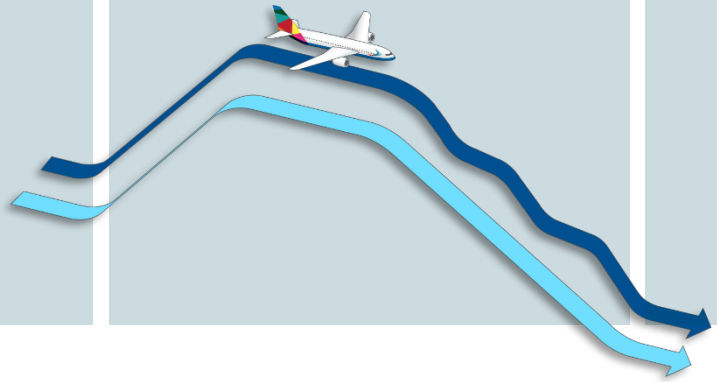
Operational measures that can be deployed

Flying better

- Wingtips reduce fuel use 4%
- Continuous descents save 150kg per landing
- Green departures to save fuel
- Cleaning engines to improve efficiency
- Single-engine taxiing (electric taxiing soon)

Collaboration

- Real time information sharing between all operational partners (airport collaborative decision-making, A-CDM)



Aircraft diet

- Lightweight seats
- Using tablets instead of paper flight documents
- Cabin equipment made of new materials
- Refuelling and loading water at the last minute

Investment needed in infrastructure

Shortening flying times by a minute saves ~100kg CO_2 per flight

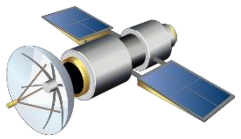
Political commitment needed

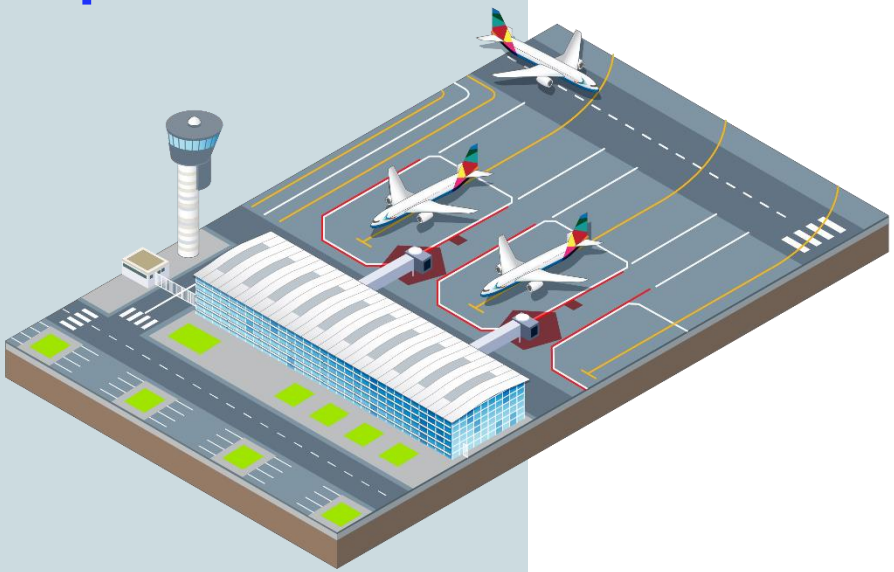
Electric vehicles

Reformed **air traffic management** in the US, Asia and Europe will cut emissions significantly

Satellite-based navigation can help reduce CO_2 emissions

ACI Airport Carbon Accreditation: **Carbon-neutral airports**





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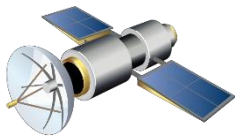
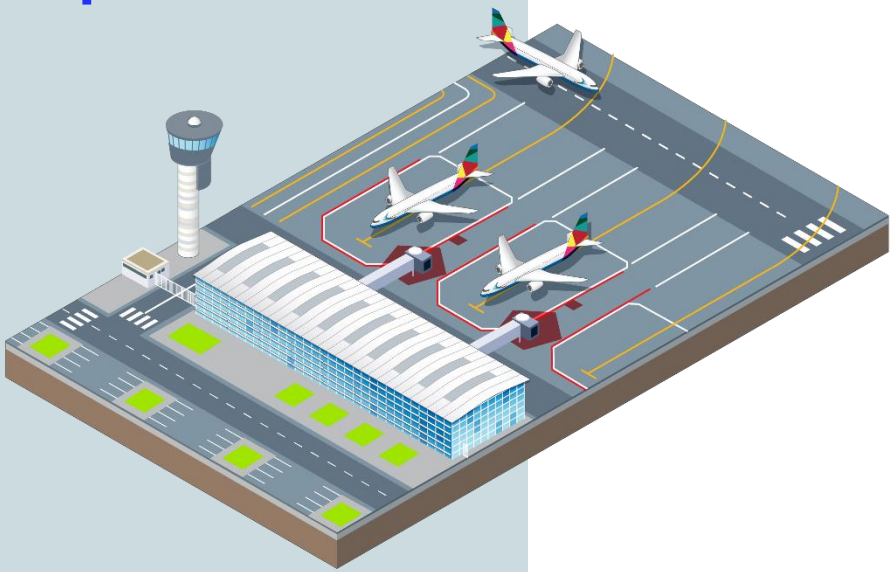




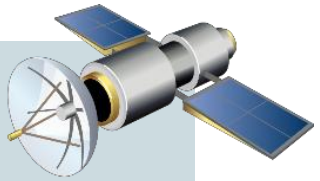
Investment needed in infrastructure

Shortening flying times by a minute saves ~100kg CO_2 per flight

Flexible use of **military airspace**

Commitment to ICAO GANP needed

Air traffic management modernisation will cut emissions significantly



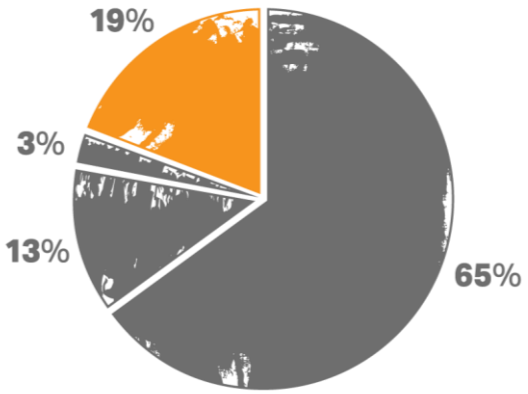
Satellite-based navigation can help reduce CO_2 emissions

New capabilities will eventually enable **trajectory-based operations**

Call to Action: Operations & Infrastructure

- Work in partnership to implement optimized flight profiles as air traffic volumes recover to pre-pandemic levels.
- Work towards full implementation of fixed electrical ground power, weight-based efficiency measures, continuous approach, and departure, airport collaborative decision making, aerodynamic efficiency opportunities and assisted taxiing opportunities.
- Collaborate to speed up investigating, testing, and certification of new efficiency measures.
- Encourage efficient action throughout the system.
- Investigate new approach technologies and procedures at all applicable airports

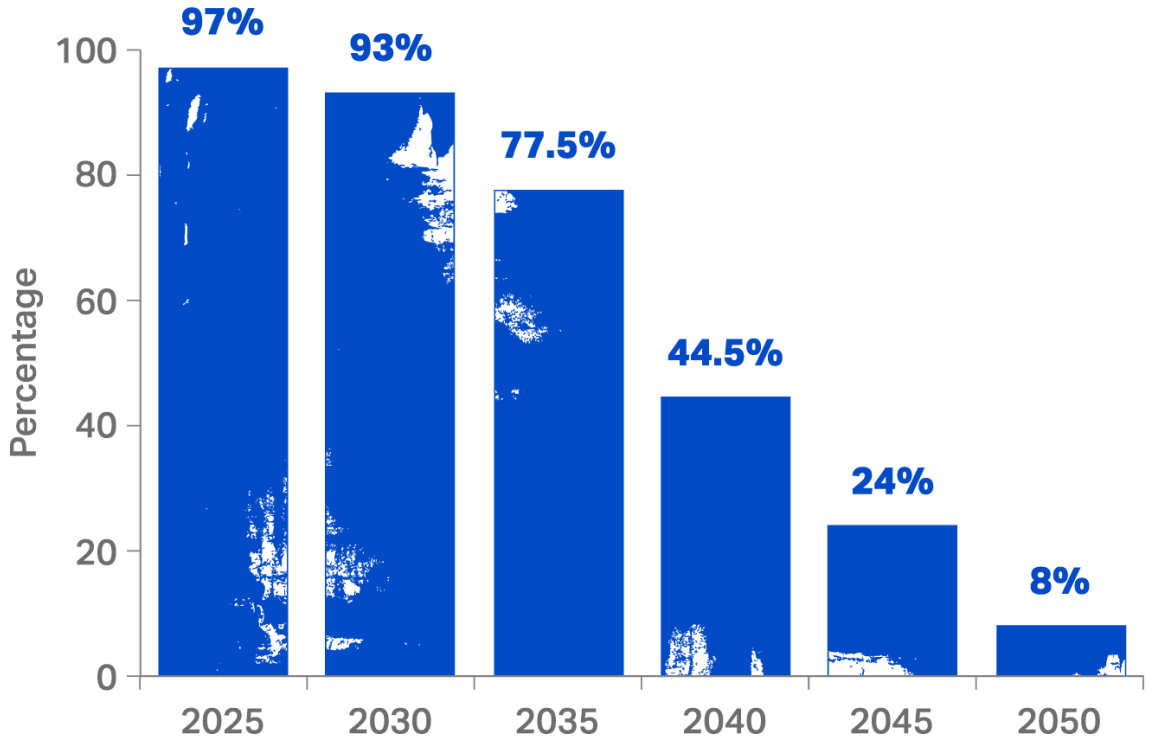
The plan: offsetting/carbon capture



Offsetting will play a diminishing role in the industry strategy as other technologies develop

CCUS* removes carbon from the atmosphere and could be used for SAF production

Estimated percentage reliance on offsets for industry CO_2 reduction



Offsetting and Carbon Capture can contribute

up to 19%

of the emissions reductions needed in 2050.

*Carbon Capture, Utilization and Storage

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What is offsetting?

- A way to reduce CO_2 emissions through funding emissions reduction projects in other sectors.
- Used when emissions reductions technologies are not yet available in a sector, or too expensive to deploy.

What's in a name?

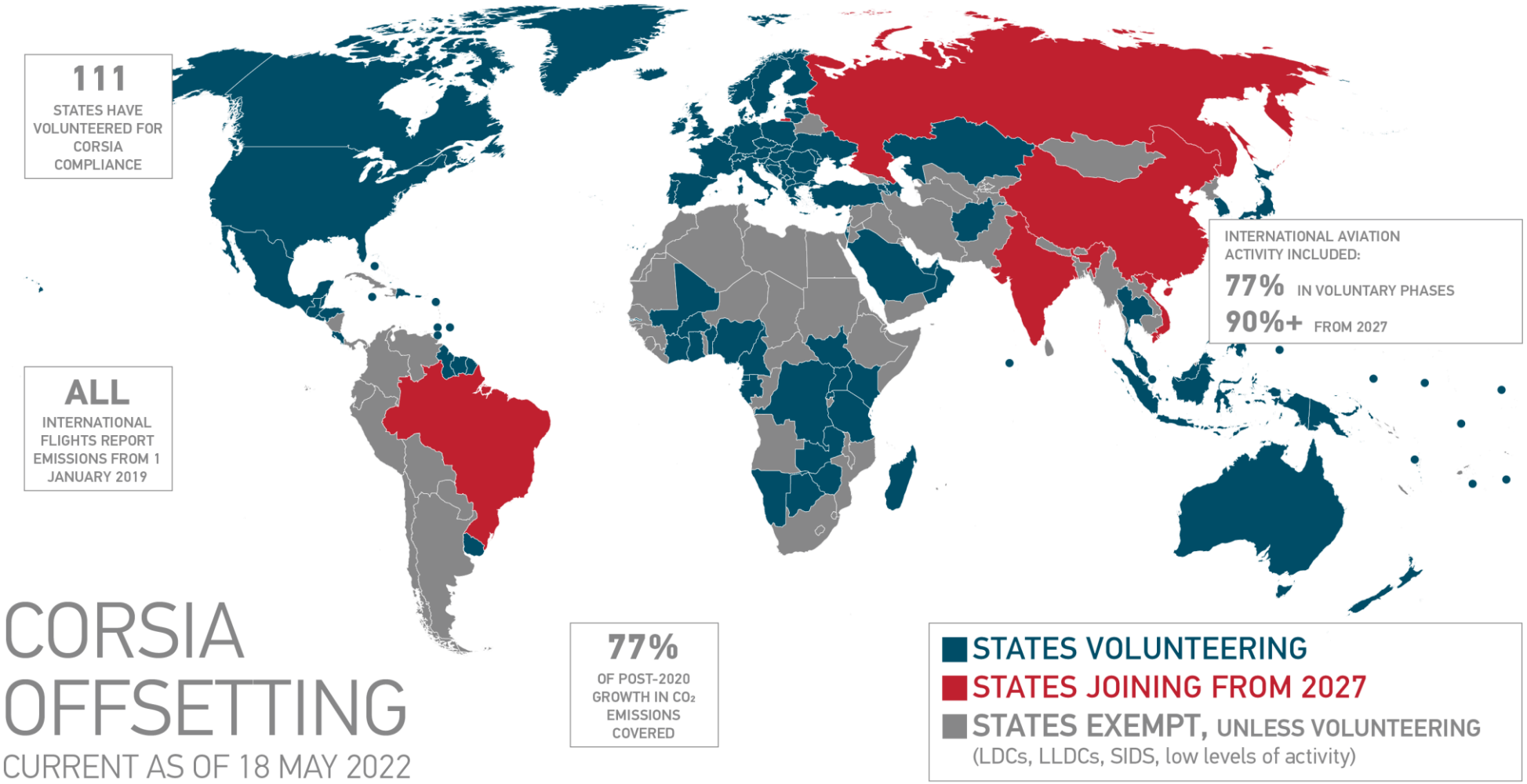
Similar terms (all with slightly different implications) but for simplicity are referred to in Waypoint 2050 as 'offsetting':

- Market-based measures
- Out-of-sector emissions reductions
- Carbon trading
- Carbon removal
- Carbon offsetting

The role of market-mechanisms in Waypoint 2050 scenarios

- Waypoint 2050 scenarios do not rely on offsetting / carbon removals as a central pillar of meeting net-zero 2050:
  - Offsetting will be needed in the near-term as new technologies are developed and SAF is scaled-up.
  - In the long-term, carbon removals will still be needed to deal with remaining residual emissions, or if they make more sense (economically or environmentally) than shifting to in-sector reductions.
  - However, the expectation is that net-zero are achievable without large-scale offsetting as the core component of action: it will be needed to account for residual emissions. Between 115 and 155 million tonnes in 2050.

ICAO CORSIA: the world's first global, sectoral market mechanism



ICAO CORSIA: the world's first global, sectoral market mechanism

AS OF MAY 2022, **111 STATES** HAVE VOLUNTEERED TO BE PART OF CORSIA

ICAO CORSIA: phases

MRV	PILOT PHASE			FIRST PHASE			SECOND PHASE								
2019 2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
MONITORING, REPORTING & VERIFICATION TO SET THE BASELINE *Due to the extraordinary impact of Covid-19 on global aviation, the baseline is being set using 2019 emissions: more representative of a normal year.*	**VOLUNTARY** *States are volunteering to be part of the scheme from 2021 (more States are encouraged to volunteer).*						**MANDATORY** *With exemptions for: Small Islands, Least Developed Countries, Land-locked Developing Countries and States which have less than 0.5% of air traffic (although they can still volunteer).*								
	Operators flying routes between volunteering States will offset emissions based on the average CO_2 growth of the aviation sector.						Operators will offset based on average CO_2 growth of the sector.			Offset obligations shift to include over 20% of individual operator growth.			Offset obligations shift to be over 70% based on individual operator growth.		

OVER **75%** OF THE GROWTH IN AIR TRAFFIC CO_2 AFTER 2020 WILL BE OFFSET

Call to Action: Offsetting/Carbon Reduction

- Support the ICAO Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and ensure it continues to evolve:
  - by ensuring the exclusivity of the scheme and avoiding duplication of mechanisms
- Ensuring synergies and cooperation between the different actors (i.e. AASA, AFRAA, AFCAC, ICAO, EASA) to strengthen the role/the importance of CORSIA as a global market-based mechanism.
- Capacity building sessions on ICAO SARPs annex 16 volume IV to create a deeper understanding of the mechanism and the benefits/opportunities linked to it
- Promote and support the development of carbon capture and removal opportunities.

What we need to achieve net zero by 2050

Manufacturers	**Accelerate research** on airframe designs, electric/hydrogen propulsion
Air Navigation Service Providers	**Catch up:** implement Aviation System Block; upgrade programs (e.g., SES); collaborate on efficiencies, and prepare for electric and hydrogen aircraft
Governments	**Policy support** for SAF, and implement ICAO standards
Oil industry	**Cost-competitive production of SAF**
Corporates	**Boost SAF** purchase agreements
Researchers	**Fast-track R&D** on electric/hydrogen aircraft and CCUS
Investors & the carbon markets	**New financial products** to de-risk investment, and work with the aviation sector
Passengers	**Be aware and support** aviation's decarbonization efforts

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IATA's work in Africa

TO ACHIEVE NET ZERO CARBON EMISSIONS BY 2050

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Regional Support to Reach Net-Zero by 2050 in Africa

- Capacity Building: CORSIA, Long-term Aspirational Goal, Sustainable Aviation Fuel Acceleration
- Advocacy Support: ICAO Assembly, national legislations
- Regional cooperation: AASA, AFRAA, AFCAC, ICAO, EASA
- Certifications and products: Aviation Carbon Exchange, IEnvA

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IATA's Support Role in Africa

Environment and Sustainability Programs

Regional Support on Environment and Sustainability Issues

- Combating Wildlife Trafficking
- Cabin Waste
- Aircraft Noise and Local Air Quality
- Aircraft Decommissioning

Q & A