



## Media Release

19 February 2024

To: The News Editor


### **FOR IMMEDIATE RELEASE**

## **LAUNCH OF SINGAPORE SUSTAINABLE AIR HUB BLUEPRINT**

*12 initiatives and 5 enablers to decarbonise Singapore's aviation sector and support sustainable growth*

The Singapore Sustainable Air Hub Blueprint was launched today by Mr Chee Hong Tat, Minister for Transport and Second Minister for Finance, at the Changi Aviation Summit. The Blueprint, which was developed by the Civil Aviation Authority of Singapore (CAAS) in consultation with industry and other stakeholders, sets out Singapore's action plan for the decarbonisation of its aviation sector. It will be submitted to the International Civil Aviation Organization (ICAO) as Singapore's State Action Plan this month.

2 The Blueprint adopts a balanced approach to the long term, sustainable growth of Singapore's aviation sector, taking into account the need for environmental sustainability while ensuring that the Singapore air hub remains competitive. It sets out Singapore's medium-term and long-term targets, as well as concrete steps that CAAS and the aviation stakeholders will take to decarbonise Singapore aviation.



3 Under the Blueprint, CAAS will work with aviation stakeholders to reduce domestic aviation emissions from airport operations<sup>1</sup> by 20% from 2019 levels (404ktCO<sub>2</sub>e) in 2030 and achieve net zero domestic and international aviation emissions<sup>2</sup> by 2050. To achieve these goals, 12 initiatives across the airport, airline and air traffic management (ATM) domains will be rolled out to decarbonise the Singapore aviation sector. CAAS will also put in place five enablers to create the conditions for the effective implementation of these initiatives.

4 Please see [Annex 1](#) for the Executive Summary of the Blueprint, which details the initiatives in each of the domains and the enablers. The full Blueprint can be downloaded from [here](#).

#### **Airport domain – maximal efforts to reduce energy use and deploy renewables**

5 CAAS will advance five initiatives to reduce energy use and deploy renewables at the airport. Of note, CAAS will work with Changi Airport Group to increase solar power deployment at Changi and Seletar Airports. CAAS will also work with the Changi Airport community to expand the use of cleaner energy for airside vehicles. In 2024, CAAS will work with stakeholders to commence a trial on the use of renewable diesel for airside vehicles, particularly heavy and specialised vehicles, to better understand the feasibility, cost, and operational impact of using renewable diesel as a cleaner energy source for airside vehicles. The other initiatives include improving building energy efficiency, leveraging low-carbon electricity imports, and exploring the feasibility of an on-site waste-to-energy facility for resource circularity.

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<sup>1</sup> These include emissions from the operations of vehicles, facilities and buildings for aircraft, passenger, baggage, and cargo handling at Changi and Seletar airports. It does not include targets for Changi East developments, including Terminal 5, which are not yet operational today. These will be determined separately.

<sup>2</sup> These include emissions from international flights operated by Singapore-based operators.




## **Airline domain – build ecosystem to support the use of Sustainable Aviation Fuel (SAF) in Singapore**

6 CAAS will undertake four initiatives to build a SAF ecosystem to support the use of SAF in Singapore and to progressively decarbonise airline operations.

7 **Of note, the use of SAF will be required for flights departing Singapore from 2026, and a SAF levy will be introduced for the purchase of SAF.** The use of SAF is a critical pathway for the decarbonisation of aviation and is expected to contribute around 65% of the carbon emission reduction needed to achieve net zero by 2050.

8 **To kickstart SAF adoption in Singapore, flights departing Singapore will be required to use SAF from 2026. We will aim for a 1% SAF target for a start, to encourage investment in SAF production and develop an ecosystem for more resilient and affordable supply. Our goal is to raise the SAF target beyond 1% in 2026 to 3 – 5% by 2030, subject to global developments and the wider availability and adoption of SAF.**

9 **CAAS will introduce a SAF levy for the purchase of SAF to achieve the uplift target.** As the market for the supply of SAF is still nascent and the price of SAF can be volatile, we will adopt a fixed cost envelope approach to provide cost certainty to airlines and travellers. The levy will be set at a fixed quantum, based on the SAF target and projected SAF price at that point in time. For example, the quantum of the SAF levy in 2026 will be set based on the volume of SAF needed to achieve a 1% SAF target and the projected SAF price in 2026. The amount collected through the SAF levy will be used to purchase SAF, based on the actual price of SAF at the time of purchase. The SAF levy will not change, even if the actual SAF price differs from what is projected. Instead, the actual uplift volume of SAF will be adjusted based on the pre-determined SAF levy and prevailing SAF price.



10 The levy will vary based on factors such as distance travelled and class of travel. As an indication, we estimate that the levy to support a 1% SAF uplift in 2026 could increase ticket price for an economy class passenger on a direct flight from Singapore to Bangkok, Tokyo and London by around S\$3, S\$6 and S\$16 respectively. Passengers in premium classes will pay higher levies.

11 CAAS will continue its close consultation with stakeholders on the implementation of the SAF levy, before announcing more details in 2025 nearer the date of implementation. Please refer to [Annex 2](#) for a factsheet on SAF.

12 Other initiatives under the airline domain include the centralised procurement of SAF for the Singapore air hub, anchoring SAF production in Singapore and the region, and investing in airline fleet renewal and operational improvements.

### **ATM domain – operational improvements to increase efficiency and reduce fuel burn**

13 CAAS will undertake three initiatives to improve ATM operations to increase efficiency and reduce fuel burn over the next five years. This includes advanced demand-capacity balancing implementation, performance-based navigation enhancements, and gate-to-gate trajectory optimisation. Collectively, these initiatives are expected to bring about a 10% reduction in additional fuel burn and emissions, offering a win-win solution for the environment, airlines and passengers.

14 To enable these ATM initiatives, CAAS is collaborating with local and international stakeholders, such as airlines, other air navigation service providers, the recently established International Centre for Aviation Innovation (ICAI), as well as our local research institutes and institutes of higher learning, to develop and trial the solutions.

## **Five enablers to support effective implementation**

15 CAAS will also put in place five enablers to create the conditions for the effective implementation of these decarbonisation initiatives. They include policy and regulation, industry development, infrastructure planning and provision, workforce transformation, and international partnerships and collaborations. Of note, CAAS has rolled out a S\$50 million Aviation Sustainability Programme to support sustainable aviation projects, will build up sustainability capabilities in our workforce, and establish the Asia-Pacific sustainable aviation centre.

16 The Sustainable Air Hub Blueprint has incorporated and built upon the recommendations by the International Advisory Panel (IAP) on Sustainable Air Hub, which were published in September 2022. The IAP, formed in February 2022, brought together 20 industry, technology, and knowledge partners from Singapore and around the world. The IAP was chaired by Professor Chong Tow Chong, President of Singapore University of Technology and Design. Members of the IAP include Directors-General from key aviation International Organisations, as well as C-suite executives from major aviation industry and renowned knowledge and technology partners. Following the submission of the IAP recommendations, CAAS and stakeholders held extensive consultations and detailed studies before finalising the targets and initiatives of the Blueprint.

17 Mr Chee Hong Tat, Minister for Transport and Second Minister for Finance, said, “Singapore’s approach is to enable the aviation sector to achieve both growth and environmental sustainability, so that future generations can continue to enjoy the benefits of flying. The Singapore Sustainable Air Hub Blueprint demonstrates this balanced approach. The measures were developed after careful study and close consultation with domestic and international stakeholders, and we hope that they will help to catalyse the development of sustainable aviation in the region and around the world.”



[Annex 1](#) – Singapore Sustainable Air Hub Blueprint Executive Summary

[Annex 2](#) – Factsheet on Sustainable Aviation Fuel

**About the Civil Aviation Authority of Singapore**

The mission of the Civil Aviation Authority of Singapore (CAAS) is to grow a safe, vibrant air hub and civil aviation system, making a key contribution to Singapore's success. CAAS' roles are to oversee and promote safety in the aviation industry, develop the air hub and aviation industry, provide air navigation services, provide aviation training for human resource development, and contribute to the development of international civil aviation.

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**SINGAPORE SUSTAINABLE AIR HUB BLUEPRINT EXECUTIVE SUMMARY**

Climate change is an existential challenge that can cause widespread disruptions and impact air travel directly, affecting critical airport infrastructure and aircraft performance and causing operational delays and disruptions. Combating climate change is a matter of great urgency and priority. Recognising this, the International Civil Aviation Organization (ICAO) and its Member States have adopted a long-term global aspirational goal (LTAG) of net zero carbon emissions for international aviation by 2050. This sends a strong signal on the international community's commitment towards sustainable aviation. The realisation of LTAG requires global joint effort shared across all countries, sectors, and vocations, as well as greater climate consciousness amongst businesses and the travelling public.

As an international business, aviation and aerospace centre, the sustainable development of the Singapore air hub is a priority for Singapore as we press ahead to grow the air hub. The Civil Aviation Authority of Singapore (CAAS) has developed the Singapore Sustainable Air Hub Blueprint as Singapore's State Action Plan for the decarbonisation of its aviation sector and sustainable aviation growth. Through the Blueprint, Singapore also hopes to be a pathfinder and convenor for cross-sectoral and public-private partnership, to work with other countries and international organisations to support sustainable aviation growth.

The Blueprint adopts a balanced approach to the long term, sustainable growth of Singapore's aviation sector. Environmental sustainability needs to be balanced with the Singapore air hub's competitiveness to support the growth of the aviation industry in the upcoming decades. The Blueprint demonstrates this resolve and sets out Singapore's medium-term and long-term targets, as well as concrete steps that CAAS and the aviation stakeholders will take to decarbonise Singapore aviation.

Under the Blueprint, CAAS will work with aviation stakeholders to reduce domestic aviation emissions from airport operations<sup>1</sup> by 20% from 2019 levels (404ktCO<sub>2</sub>) in 2030 and achieve net zero domestic and international aviation emissions<sup>2</sup> by 2050. To achieve these goals, CAAS will roll out 12 initiatives across the airport, airline, and air traffic management (ATM) domains to decarbonise the Singapore aviation sector. CAAS will also put in place five enablers to create the conditions for the effective implementation of these decarbonisation initiatives.

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<sup>1</sup> This covers emissions from operations of vehicles, facilities, and buildings for aircraft, passenger, baggage, and cargo handling at Changi Airport Terminals 1 – 4 and Seletar Airport. It does not include targets for Changi East developments, including Terminal 5, which are not yet operational today. These will be determined separately.

<sup>2</sup> This covers emissions from international flights operated by Singapore-based operators.

**Singapore Sustainable Air Hub Blueprint**

*Reduce domestic aviation emissions from airport operations by 20% from 2019 levels in 2030 and achieve net zero domestic and international aviation emissions by 2050*

<p><b><u>Airport domain – Maximal efforts to reduce energy use and deploy renewables</u></b></p> <ul style="list-style-type: none"><li>➤ Solar power deployment</li><li>➤ Clean energy airside vehicles</li><li>➤ Building energy efficiency</li><li>➤ Low-carbon electricity imports</li><li>➤ Resource circularity through waste-to-energy</li></ul>	<p><b><u>Airline domain – Build ecosystem to support the use of Sustainable Aviation Fuel (SAF) in Singapore</u></b></p> <ul style="list-style-type: none"><li>➤ National SAF target and SAF levy</li><li>➤ Central SAF procurement</li><li>➤ SAF production in Singapore and the region</li><li>➤ Airline fleet renewal and operational improvements</li></ul>	<p><b><u>Air Traffic Management domain – Operational improvements to increase efficiency and reduce fuel burn</u></b></p> <ul style="list-style-type: none"><li>➤ Advanced demand-capacity balancing implementation</li><li>➤ Performance-based navigation enhancement</li><li>➤ Gate-to-gate trajectory optimisation</li></ul>
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**Critical Enablers – Build coalitions for action**

Policy and regulation  
Industry development  
Infrastructure planning and provision  
Workforce transformation  
International partnerships and collaborations



## **Airport domain: Maximal efforts to reduce energy use and deploy renewables**

Airports are complex ecosystems serving as gateways for air travel and connectivity. Due to their large-scale infrastructure, operational systems, and ground operations, they are highly energy intensive. CAAS will advance five initiatives to reduce emissions and scale up green energy use at Changi Airport. These include:

### **a) Solar power deployment**

CAAS and Changi Airport Group (CAG) are working to increase solar power deployment at Changi and Seletar Airports, by installing more solar photovoltaic (PV) systems on available rooftop spaces of airport buildings and studying the feasibility of airfield solar deployment. As of end-2023, Changi Airport has more than 20MWp of installed solar capacity, generating close to 4% of its 2019 electricity consumption of about 700GWh. Ongoing plans to install more solar PV systems on available rooftop will generate a further 6%. Solar panels will also be deployed at Seletar Airport.

### **b) Clean energy airside vehicles**

The Changi Airport community is committed to expand the use of cleaner energy for airside vehicles, to have the entire airside vehicle fleet operate on cleaner energy sources by 2040, and for all new light vehicles, such as cars, vans and minibuses, and selected new heavy vehicles like forklifts and tractors to be electric from 2025, along with the installation of additional charging stations. To support this transition, CAAS will work with stakeholders to commence a trial on the use of renewable diesel (RD) for airside vehicles, particularly heavy and specialised vehicles, in 2024. The trial will allow CAAS and the airport community to better understand the feasibility, costs, and operational impact of using RD as a cleaner energy source for airside vehicles.

### **c) Building energy efficiency**

CAAS, CAG, and other airport partners are working to continually improve the energy efficiency of Changi Airport's terminal buildings, especially for air-conditioning systems, which account for more than half of the buildings' total electricity consumption. Besides progressively upgrading the chiller systems in the terminal buildings, Changi Airport has been pursuing passive design strategy such as the use of heat reflecting facade materials to lower energy use from air-conditioning systems. The new Terminal 5 will also be designed to achieve the stringent Green Mark Platinum Super Low Energy Building standard.

#### **d) Low-carbon electricity imports**

As most of the carbon emissions from airport operations is due to electricity consumption at the airport, the airport will leverage the Energy Market Authority's (EMA) plans to reduce our national grid emission factor (GEF), including the use of low-carbon electricity imports, for the aviation sector to reach net zero domestic emissions by 2050.

#### **e) Resource circularity through waste-to-energy**

CAAS will work with stakeholders to study the potential and feasibility of an on-site waste-to-energy facility at Changi Airport, which could possibly use waste as a feedstock to generate electricity or biofuel for use within the airport. The study will entail waste audit and technical assessment to establish the viability and most effective waste-to-energy pathway.

### **Airline domain: Build ecosystem to support the use of SAF in Singapore**

Flight operations account for the bulk of international aviation emissions and emissions from aircraft operations are inherently hard to abate. The use of SAF is a critical pathway for the decarbonisation of aviation and is expected to contribute around 65% of the carbon emissions reduction needed to achieve net zero by 2050. CAAS will undertake four initiatives to build an ecosystem to support and sustain the use of SAF in Singapore and to progressively decarbonise airline operations. These include:

#### **a) National SAF target and SAF levy**

To kickstart SAF adoption in Singapore, flights departing Singapore will be required to use SAF from 2026. We will aim for a 1% SAF target for a start, to encourage investment in SAF production and develop an ecosystem for more resilient and affordable supply. Our goal is to raise the SAF target beyond 1% in 2026 to 3 – 5% by 2030, subject to global developments and the wider availability and adoption of SAF. CAAS will introduce a SAF levy for the purchase of SAF to achieve the uplift target. As the market for the supply of SAF is still nascent and the price of SAF can be volatile, this approach will provide cost certainty to airlines and travellers.

#### **b) Central SAF procurement**

To further manage the cost of using SAF, the procurement of SAF will be centralised, using the levies collected to aggregate demand and reap economies of scale. Businesses and organisations will also be invited to use the central procurement mechanism for their respective voluntary SAF purchases to reduce their carbon emissions from air travel in a credible and cost-effective manner.

### **c) SAF production in Singapore and the region**

CAAS and the Singapore Government will work closely with industry partners to increase SAF production capacity in Singapore and the region. We can tap into the wide availability of potential feedstocks in the region and the presence of an existing petrochemical sector in Singapore. This will support the increasing demand for SAF in Singapore and the wider region.

### **d) Airline fleet renewal and operational improvements**

Singapore carriers have continuously embarked on fleet modernisation, investing in newer and fuel-efficient aircraft, which also reduce emissions. Our carriers have also made operational improvements to reduce fuel burn, such as weight reduction initiatives and reduction of aircraft auxiliary power unit use on ground. In addition, flight plans and flight management are optimised for in-flight fuel savings; this includes improving airspace congestion and identifying more efficient routes, as well as the use of data analytics and digital solutions.

## **Air Traffic Management domain: Operational improvements to increase efficiency and reduce fuel burn**

ATM initiatives offer a win-win solution for the environment, airlines, and passengers. Operational improvements to increase efficiency and the optimisation of flight routes can reduce track miles and flight durations. This enables airlines to reap fuel savings and for passengers to get to their destinations quicker, while reducing emissions. These benefits can be multiplied over many flights. CAAS will implement three initiatives over the next five years to improve ATM operations to increase efficiency and reduce fuel burn. Collectively, these initiatives are expected to bring about a 10% reduction in additional fuel burn and emissions. These include:

### **a) Advanced demand-capacity balancing implementation**

CAAS will work with stakeholders to enhance the management of air traffic vis-à-vis available capacity, including improving coordination and management of longer-haul flights, as well as enhancing the reliability, timeliness, and accuracy of weather forecast information through the use of predictive tools to support decision making.

### **b) Performance-based navigation enhancement**

CAAS will collaborate with partner Air Navigation Service Providers (ANSPs) in the region to implement more direct routings on a wider scale and in the longer-term, work towards introducing Free Route Airspace to bring about optimised

capacity and flexible flight trajectories. CAAS will also develop smart tools to facilitate the optimisation of descent flight profiles within Changi Airport which will help reduce fuel burn and emissions.

### **c) Gate-to-gate trajectory optimisation**

CAAS is collaborating with stakeholders and partner ANSPs to work towards Trajectory-Based Operations. CAAS is also implementing a decision support tool to optimise the departure intervals between aircraft, which will enhance runway efficiency.

## **Critical Enablers: Build coalitions for action**

The effective implementation of sustainability initiatives across the three domains will require strong government action and close collaboration with the industry. As such, key enablers are necessary for providing the right conditions for success. These include:

- a) Policy and regulation** are key instruments for the government to set the sustainability direction for the aviation sector and provide standardisation across the industry when required. CAAS has set domestic and international emissions reduction targets to spur the local aviation community to be more sustainable, including a national SAF target to encourage SAF production and kickstart adoption in Singapore.
- b) Industry development** is key in supporting the green transformation of the sector. To promote industry development, a S\$50 million Aviation Sustainability Programme (ASP) was established by CAAS in 2023 to fund sustainable aviation projects. The first call for proposals was conducted in April 2023 and a second call will take place in April 2024. CAAS has also set up an International Centre for Aviation Innovation (ICAI) to drive innovation partnerships and initiatives across all aspects of aviation including sustainability.
- c) Infrastructure planning and provision** is necessary for aviation sustainability initiatives to be implemented smoothly. CAAS, CAG, and other stakeholders will undertake important infrastructure planning to ensure future developments can achieve high sustainability standards. The new Terminal 5 is being designed and developed to achieve the Building and Construction Authority's (BCA) Green Mark Platinum Super Low Energy standard.
- d) Workforce transformation** is necessary for the aviation sector to achieve its sustainability initiatives. Through a tripartite effort, including the Singapore Government, companies, and unions, we will identify new and emerging sustainability-related job roles, accompanied by upskilling and job redesign

efforts supported by the National Trades Union Congress' (NTUC) Company Training Committees, relevant lifelong learning and skills-upgrading initiatives under SkillsFuture Singapore (SSG), and Workforce Singapore's (WSG) Career Conversion Programme. CAAS will also work with Institutes of Higher Learning to embed aviation sustainability resources and content into the curriculum and stimulate interest through sustainability-linked internships and learning journeys.

- e) **International partnerships and collaborations.** Singapore can play an important role as pathfinder and convenor for international collaborations and partnerships to advance sustainable aviation. For example, Singapore has forged agreement on an ASEAN Sustainable Aviation Action Plan (ASAAP), which is a ten-year plan that will detail milestones and activities to drive sustainable aviation growth in ASEAN. To better address the Asia-Pacific region's unique circumstances, CAAS will work with partners to establish the Asia-Pacific sustainable aviation centre to develop capabilities for sustainable aviation policy research specific to the needs of the Asia-Pacific region. This includes building deeper scientific understanding of regional SAF feedstocks, validating prevailing policy recommendations against the region's context to add new perspectives, and providing capacity-building activities for countries and companies.

In developing the Blueprint, CAAS has incorporated and built upon the recommendations by the International Advisory Panel (IAP) on Sustainable Air Hub, published in September 2022. The IAP was formed in February 2022, bringing together 20 industry, technology, and knowledge partners from Singapore and around the world. The IAP was chaired by Professor Chong Tow Chong, President of Singapore University of Technology and Design. Members of the IAP include Directors-General from key aviation International Organisations, as well as C-suite aviation industry executives and renowned knowledge and technology partners. To canvass ideas from a wider array of stakeholders, the IAP engaged more than 120 representatives from 40 local and international partners. Following the submission of the IAP recommendations, CAAS conducted extensive consultations with stakeholders and detailed studies before finalising the targets and initiatives of the Blueprint.

The Singapore Sustainable Air Hub Blueprint is part of CAAS's strategy post-COVID-19 to make the Singapore air hub more competitive, resilient, and sustainable.

# SUSTAINABLE AVIATION FUEL (SAF)

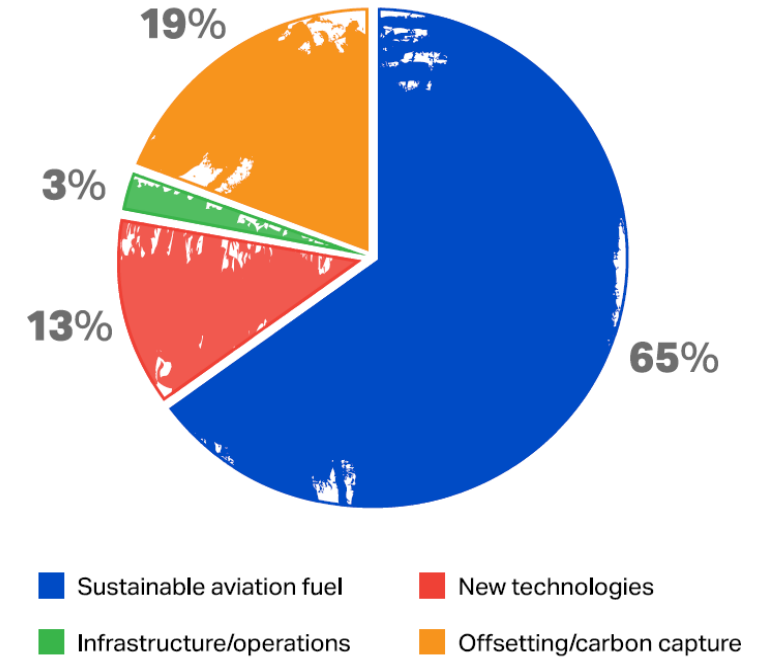
Background on SAF



# SAF is a Critical Aviation Decarbonisation Lever

- Aviation is currently responsible for approximately 2% of global CO<sub>2</sub> emissions<sup>1</sup>, and could grow to 22%<sup>2</sup> by 2050 if no action is taken.
- ICAO and its Member States are committed to achieving net-zero carbon emissions by 2050<sup>3</sup> and adopted a collective global vision to reduce carbon emissions by 5% by 2030<sup>4</sup> using cleaner energies, including SAF.
- SAF is estimated to reduce 65% of global aviation emissions by 2050. New aircraft technologies, operations/infrastructure improvements and carbon offsetting measures will make up the remaining.
- SAF represented around 0.2% of global jet fuel consumption in 2023<sup>5</sup>.

Contribution to achieving Net Zero Carbon in 2050



Source: IATA Net Zero Resolution Factsheet

<sup>1</sup> Aviation is currently responsible for approximately 2.4% of global CO<sub>2</sub> emissions. Without action, those emissions are estimated to reach around 2 gigatons by 2050 (Source: IATA Economics Report, July 2023).

<sup>2</sup> Source: European Parliament Policy Department A for the Committee on Environment, Public Health and Good Safety, “Emission Reduction Targets for International Aviation and Shipping”.

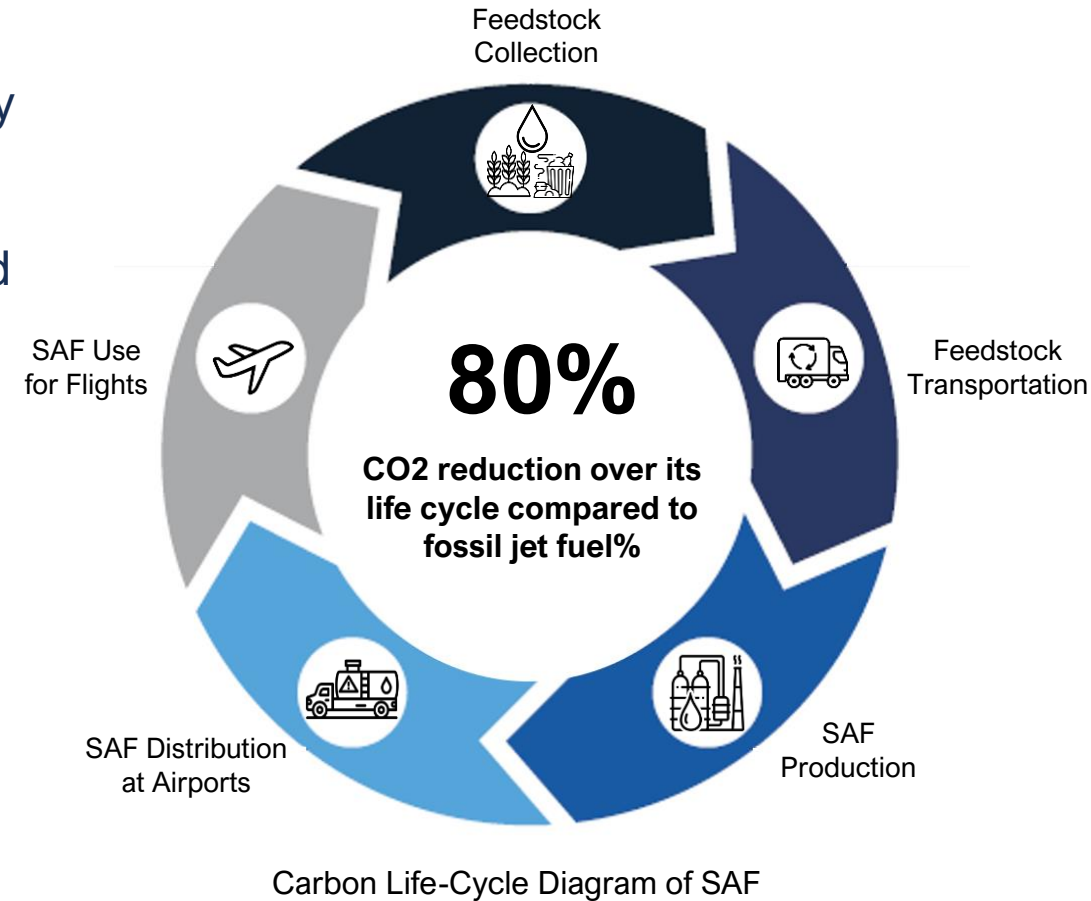
<sup>3</sup> At its 41st Assembly in 2022, ICAO adopted a collective long-term aspirational goal for international aviation of achieving net-zero carbon emissions by 2050.

<sup>4</sup> At the Third ICAO Conference on Aviation and Alternative Fuels (CAAF/3) in 2023, ICAO and its Member States agreed to strive to achieve a collective global aspirational Vision to reduce CO<sub>2</sub> emissions in international aviation by 5 per cent by 2030, through the use of cleaner energies.

<sup>5</sup> In 2023, SAF production doubled to 600 million liters from 300 million liters in 2022, representing 0.2% of global jet fuel use (Source: IATA Net Zero 2050 - SAF Factsheet)

# What is SAF?

- Cleaner fuel that can reduce CO2 emissions over lifecycle by up to 80%, compared to fossil jet fuel.
- Can be produced from feedstock such as waste fats, oils and greases, municipal solid waste, agricultural and forestry residues as well as crops cultivated on marginal land. Also produced synthetically by capturing carbon directly from the air.
- Chemically similar to fossil jet fuel and can be safely used as a drop-in fuel with no modifications to aircraft or infrastructure. Today, commercial flights can fly with a 50-50 blend of SAF and fossil jet fuel (i.e., 50% SAF blend). The industry is working towards commercial aircraft being permitted to fly with 100% SAF by 2030.
- HEFA (Hydroprocessed Esters & Fatty Acids) is currently the predominant SAF pathway, given that it is the most commercially mature. HEFA uses feedstock such as waste fats, used oils and grease. AtJ (Alcohol-to Jet) and GFT (Gasification Fischer-Tropsch) are undergoing commercial pilots while PtL (Power-to-Liquid) technology is still under development.





# SAF Price Premiums and Volatility

- The SAF industry is very nascent.
- High price premium of 3-5 times over fossil jet fuel, mainly due to the high feedstock prices (due to limited supply) and production costs.
- Greater price volatility compared to fossil jet fuel, likewise due to small supply and high demand.
- Still niche market with no global price index or futures market for risk management or price discovery.

## SAF trades at a premium compared to conventional jet fuel



Note: All prices in U.S. cents per gallon

An indicative price trend and volatility of SAF price relative to fossil jet fuel.  
Source: Argus Media (Copyrights: Reuter Graphics)

# SAF Policy in other regions

- Within Asia-Pacific region
  - Japan is planning a SAF mandate of 10% by 2030
  - India is considering a SAF mandate of 1% by 2027 and increasing to 5% by 2030 for international flights.
  - In its Aviation Green Paper released in September 2023, Australia is considering setting a SAF mandate and providing supply-side support measures to encourage SAF production in Australia.
- Other regions
  - Norway implemented SAF mandate of 0.5% in 2020. Sweden and France started 1% SAF mandate in 2021 and 2022 respectively.
  - The EU is planning a SAF mandate of 2% in 2025, increasing this to 6% and 70% by 2030 and 2050.
  - The UK planning a SAF mandate of 10% by 2030.
  - The US adopted incentives to support SAF production and use.

Country	SAF Uptake Level	Status
European Union	<b>2% by 2025</b> , 6% by 2030 (of which 1.2% synthetic fuel), 20% by 2035 (5%), 34% by 2040 (10%), 42% by 2045 (15%) and 70% by 2050 (35%)	Approved by EU Parliament in Sep 2023; approval by each EU Member State needed before passing into law
France	<b>1% by 2022</b> , 2% by 2025, 5% by 2030	In force today
Germany	0.5% from 2026, 1% from 2028, 2% from 2030 (synthetic fuel)	Approved
India	1% by 2027, 2% by 2028, 5% by 2030 (for international flights only)	Under consideration
Japan	10% by 2030	Under consideration
Norway	<b>0.5% in 2020</b> , 30% in 2030	In force today
Sweden	<b>1% in 2021</b>	In force today
United Kingdom	10% by 2030	Published under UK Jet Zero Strategy; pending approval

# Airline SAF Commitments

Airlines	SAF Uptake Level
<b>Association of Asia Pacific Airlines (AAPA)</b> (Air Astana, Air India, All Nippon Airways, Bangkok Airways, Cathay Pacific, China Airlines, Eva Air, Garuda Indonesia, Japan Airlines, Malaysia Airlines, Philippine Airlines, Royal Brunei Airlines, Singapore Airlines, Thai Airways, Vietnam Airlines)	Collective ambition to strive for SAF utilisation target of 5% by 2030
<b>Oneworld Alliance</b> (Alaska Airlines, American Airlines, British Airways, Cathay Pacific, Fiji Airways, FinnAir, Iberia, Japan Airlines, Malaysia Airlines, Oman Air, Qantas, Qatar Airways, Royal Air Maroc, Royal Jordanian, SriLankan Airlines)	10% by 2030
Air France-KLM Group	10% by 2030
All Nippon Airways	10% by 2030
Cathay Pacific	10% by 2030
Delta Airlines	10% by 2030, 35% by 2035, and at least 95% by 2050
Japan Airlines	10% by 2030
Qantas	10% by 2030, and approximately 60% by 2050
Singapore Airlines Group (Singapore Airlines and Scoot)	Target to use SAF for 5% of total fuel requirements by 2030
United Airlines	100% green (CO2 reductions) by 2050, including SAF



THANK YOU

