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Airlines: Charting The Path To A Greener Future

At the 77th International Air Transport Association ("IATA") Annual General Meeting in October 2021, a resolution was passed by IATA member airlines committing them to achieve net-zero carbon emissions by 2050. This resolution aligns with the objectives of the 2015 Paris Climate Agreement to limit global warming to 1.5ºC.

Commercial aviation is critical to global trade and economic and social development, estimated to have supported USD 3.6 trillion in world economy activity in 2018 (~4.1% of global GDP).[1] Aviation remains a strong growth industry, with the IATA expecting overall traveller numbers to reach 4 billion in 2024, exceeding pre-COVID-19 levels (103% of the 2019 total).

Although aviation has been successful at decoupling emissions growth from actual growth thus far, with air traffic increasing at an average of 5% annually while CO_2 growth is lower at 3%, much work needs to be done. Air travel currently produces ~3% of global CO_2 emissions and is one of the fastest-growing sources of greenhouse gases. Aviation CO_2 emissions doubled between 1990 and 2019 to over 900 million metric tons.[2] In 2019, the sector consumed nearly 100 billion gallons of jet fuel (~8% of global oil demand), costing nearly $190 billion, or ~25% of airline operating expenditures.[3]

Airlines also produce ~12% of transport emissions – a percentage likely to increase as other modes of transport switch to alternative power sources (e.g., electricity) faster than currently appears possible for anything but the shortest flights. Post-pandemic forecasts also expect global commercial aviation CO_2 emissions to increase at least 1.8 times to 1.6 billion metric tons or higher by 2050, before any benefits from Sustainable Aviation Fuel ("SAF") and/or carbon offsets are factored in. This translates to 160 billion gallons of jet fuel demand (over 10 mmbl/d of oil demand). Even under more aggressive new technology scenarios, industry forecasts still have aviation emissions growing to 1.1 to 1.4 billion metrics tons by 2050.
Given the importance of aviation, it is crucial to pursue concrete actions that would make flying more sustainable rather than reduce the number of flights, allowing the sector to develop towards a path of long-term sustainability, balancing both growth and environmental needs.

Net Zero by 2050

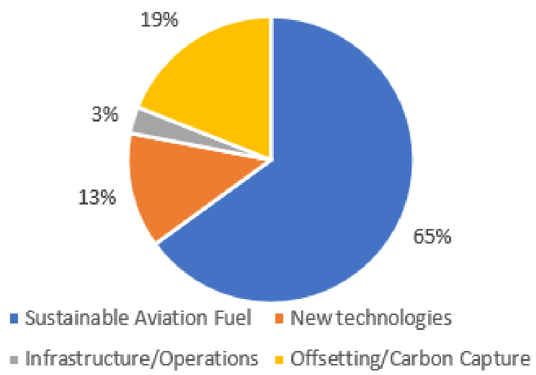
According to IATA, it is estimated that demand for individual air passenger journeys in 2050 could exceed 10 billion, with approximately 21.2 gigatons of CO_2 of carbon emissions expected to be produced over the 2021 – 2050 period. Achieving net zero by 2050 will require a combination of maximum elimination of emissions at the source, offsetting, and carbon capture technologies. The key elements of the emissions reduction strategy include:

- SAF, sourced from feedstocks that do not degrade the environment or compete with food or water;

[1] Aviation Beyond Borders: Global Fact Sheet (September 2020), https://aviationbenefits.org/media/167144/abbb20_factsheet_global.pdf
[2] Aviation Beyond Borders: Tracking Aviation Efficiency (February 2021) https://aviationbenefits.org/media/167475/fact-sheet_3_tracking-aviation-efficiency-v3.pdf
[3] International Air Transport Association (IATA): Industry Statistics Factsheet (October 2021), https://www.iata.org/en/iata-repository/publications/economic-reports/airline-industry-economic-performance---october-2021---data-tables/

- Investment in new aircraft technology, including radical new aerodynamic and alternative propulsion (electronic or hydrogen) solutions;
- Continued improvement in infrastructure and operational efficiency, with a particular focus on improved air traffic management; and
- The use of approved offsets including carbon capture and storage technology.

Figure 1: Contribution to achieving Net Zero Carbon in 2050



Source: IATA

The resolution demands that all industry stakeholders commit to addressing the environmental impact of their policies, products, and activities with concrete actions and clear timelines, including:

- Fuel-producing companies bringing large scale, cost-competitive SAF to the market;
- Governments and air navigation service providers ("ANSPs") eliminating inefficiencies in air traffic management and airspace infrastructure;
- Aircraft and engine manufacturers producing more efficient airframe and propulsion technologies; and
- Airport operators providing the needed infrastructure to supply SAF, at cost, and in a cost-effective manner.

Table 1: SAF production timeline

Year	Milestone
2025	With appropriate government policy support, SAF production is expected to reach 7.9 billion litres (2% of total fuel requirement)
2030	SAF production is 23 billion litres (5.2% of total fuel requirement). ANSPs have fully implemented the ICAO Aviation System Block Upgrades and regional programs such as the Single European Sky
2035	SAF production is 91 billion litres (17% of total fuel requirement). Electric and/or hydrogen aircraft for the regional market (50-100 seats, 30-90 min flights) become available
2040	SAF production is 229 billion litres (39% of total fuel requirement). Hydrogen aircraft for the short-haul market (100-150 seats, 45-120 min flights) become available.
2045	SAF production is 346 billion litres (54% of total fuel requirement).
2050	SAF production hits 449 billion litres (65% of total fuel requirement).

Source: IATA

The combination of measures needed to achieve net zero emissions for aviation by 2050 will evolve based on the most cost-efficient technology available over the course of the commitment.

Key Strategies

Sustainable Aviation Fuel (SAF)

Jet fuel is the primary pollutant from aviation, accounting for over 90% of most airlines' value chain emissions.[4] As such, SAF production and use are critical to the aviation sector. As compared to other subsets of the transportation sector, energy alternatives in the form of electricity and hydrogen will not be viable for commercial aviation use in the near-term. Hence, the sector will rely heavily on the use of high-energy-dense liquid fuels, with SAF being the only viable means of meeting net-zero-emission targets.

Derived from non-fossil carbon feedstocks, such as used cooking oil, green and municipal waste, and non-food crops, SAF boasts lower life-cycle emissions than conventional jet fuel. The global SAF market is expected to grow from USD216mn in 2021 to USD14.7bn by 2030, at a CAGR of 59.91% during the forecast period 2022-2030. More than 370,000 commercial flights have used SAF since 2016, with more than 40 airlines and 13 major airports using and supplying SAF. Key players operating in the global sustainable aviation fuel market include Neste Oyj, Gevo Inc., SKYNRG, Eni SPA, and SG Preston Company.

Table 2: List of companies producing SAF (HEFA-SPK fuels) as of 2019

Company	Location	Capacity (L/yr)
Neste	Rotterdam	1.3 billion
	Singapore	1.3 billion
	Porvoo, Finland	385 million
	Porvoo 2, Finland	385 million
ENI	Venice and Gela, Italy	1 billion
Diamond Green Diesel	Norco, Louisiana	1 billion
UPM	Lappeenranta, Finland	120 million
World Energy (AltAir)	Paramount, California	150 million
Renewable Energy Group	Geismar, Louisiana	284 million

Source: International Renewable Energy Agency (IRENA)

Table 3: Key SAF production pathways

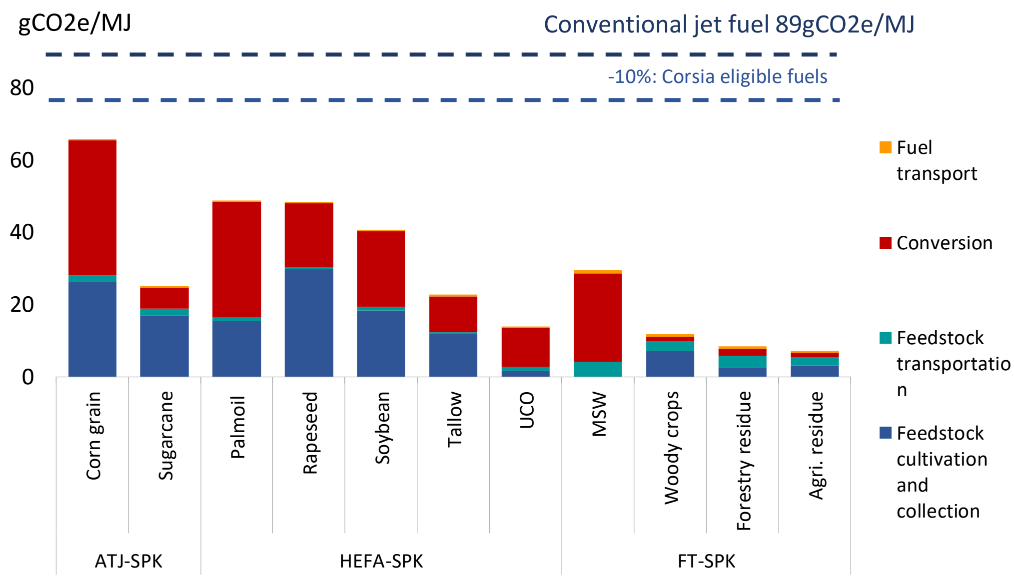
Fuel	Typical Feedstocks	Blend Level	Opportunity description	% LCA GHG reduction vs. fossil jet
Hydroprocessed Esters and Fatty Acids Synthetic Paraffinic Kerosene (HEFA-SPK)	Vegetable oils, waste fats, oils & greases	50%	Safe, proven, scalable and mature technology, with potential to cover 5-10% of total jet fuel demand	73%-84%
Fischer-Tropsch Synthetic Paraffinic Kerosene (FT-SPK)	Lignocellulosic crops, residues & wastes	50%	Potential in the mid-term, however, significant techno-economic uncertainty. High availability of cheap feedstock, but fragmented collection	95%-94%
Alcohol to Jet Synthetic Paraffinic Kerosene (ATJ-SPK)	Starchy & sugary crops, lignocellulosic crops, residues & wastes, industrial flue gases	50%		

Source: World Economic Forum

Depending on the carbon source, SAFs can produce a large range of greenhouse gases over their lifetime, including growing/collecting the carbon sources, synthesizing the fuels, and combusting them in an engine, and these three alternative fuels have differing impacts on the environment. Alternatively, new "generations" of SAF include synthetic fuels (PtL) made from renewable electricity, water and captured CO_2.

[4] Based on the average of 19 airline CDP disclosures (2018)

Figure 2: Lifecycle emissions of different feedstock and technologies



Source: BloombergNEF, ICAO

The FT-SPK segment led the market with a market share of 27.13% and market revenue of USD58.6mn in 2021 due to the rising number of fuel varieties with different feedstock compositions. However, the HEFA-SPK segment is estimated to dominate the market as the leading alternative replacement for conventional jet fuel by 2030. While biofuels are the only SAF option today, PtL is projected to enter the market at a large scale in the late-2020s and become cheaper in the mid-2030s, with its market share depending on how quickly the levelized cost of electricity falls over the next 15 years.

Although SAF meets all quality and performance requirements of conventional fossil fuels, it costs three to five times more, which has made carriers slow to warm up to SAF. For instance, the average worldwide price of jet fuel is about USD4.15 per gallon, according to the IATA, as opposed to the U.S. average price of SAF, which is about USD8.67 per gallon. This has, in turn, resulted in very low SAF production, with less than 0.1% of jet fuel estimated to be currently used by commercial airlines being SAF.

Table 4: Aviation Fuel Prices (US National Average)5

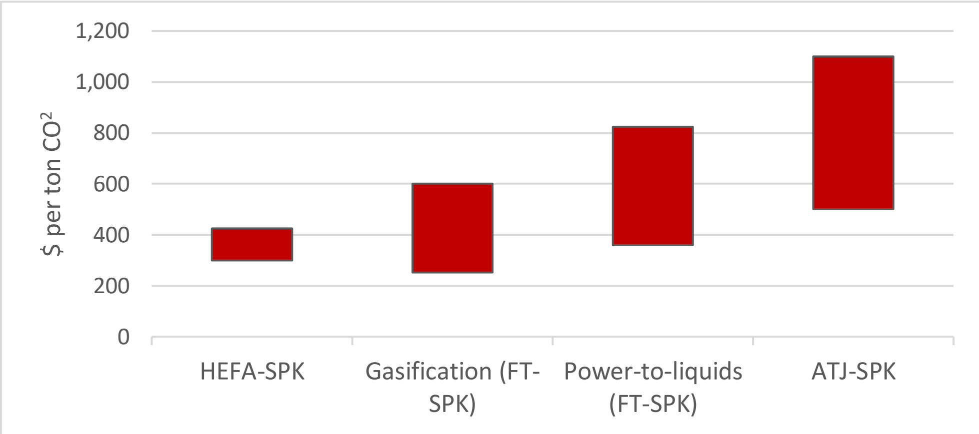
Type of fuel	JetA	100LL	SAF
Price/gallon (USD)	7.04	7.10	8.84

Source: Global Air

According to BloombergNEF, the lowest theoretical carbon price that would bring conventional jet fuel in line with each of the main SAF pathways was for gasification of Fischer Tropsch (a chemical process), at USD252 per ton of CO^2. By comparison, the European Union Emissions Trading System (EU ETS) carbon price averaged EUR24.80 per ton in 2020 (~USD28 per ton CO^2), with estimates projecting that the EU ETS price could rise to over EUR100 per ton CO^2 by 2030.

[5] Average fuel prices on October 17, 2022, for National Business Aviation Association's regions. The price of airplane and jet fuel is averaged over 3,207 Fixed-Base Operators (FBOs) reporting aircraft fuel prices over the past 30 days.

Figure 3: Carbon price required to make SAF competitive with fossil jet fuel



Source: BloombergNEF

Additionally, some SAFs do not offer very many, if any, greenhouse gas savings at all. For instance, according to NGO Transport & Environment, the estimated CO_2 footprint of palm oil is three times that of conventional fossil diesels. Depending on the carbon source, SAFs can produce a large range of greenhouse gases over their lifetime, including growing/collecting the carbon sources, synthesizing the fuels, and combusting them in an engine. When comparing these fuels' carbon footprints by analyzing the life-cycle carbon intensity, it was found that ATJ-SPK fuels tend to have higher emissions. On the other hand, biofuels made from wastes and by-products tend to have lower greenhouse gas emissions than crop-based ones.

To enable the massive scale-up that will be required to achieve net-zero by 2050, stakeholders must invest in about 300 to 400 new fuel production plants and associated upstream infrastructure. Given that it typically takes at least five years to build a new SAF plant and get it to full operation, stakeholders will need to plan new SAF plants within the next two to three years. Increased policy measures are hence necessary to achieve such climate goals.

Table 5: Main SAF-related policies

Region	Before-2021	2022
US	• 2017: Incentives for the supply of SAF in the RFS2 (Renewable Fuel Standard 2) • 2019: Incentives for alternative jet fuels began in California's Low Carbon Fuel Standard ("LCFS").	• Aug: Tax credit of USD1.25-USD1.75 per gallon of SAF determined in the Inflation Reduction Act • Sep: SAF Grand Challenge Roadmap released
EU	• 2018: Preferential treatment for SAF under the EU Renewable Energy Directive ("EU RED II")	• Jun: Adopted a general approach in aviation as part of Fit for 55 and decided to impose SAF blending above standards on fuel suppliers
UK	• 2015: Incentives for SAF in Renewable Fuel Certificates under the UK Renewable Fuel Transfer Obligation ("RTFO")	• Jul: Jet Zero Strategy released (1) Mandate that 10% of jet fuel be SAF by 2030 (2) Advanced SAF projects can apply for GBP165mn Advanced Fuels Funds
China	• 2018: Announced non-participation in the pilot phase of the CORSIA	• Sep: Released "2022 China Civil Aviation Green Development Policy and Action", targeting a cumulative use of 50,000 tons of SAF by 2025.

Source: ICAO

Singapore is well-positioned to become an established, regional petrochemical hub that can offer a conducive environment for developing and introducing sustainable aviation products. For instance, Neste, the world's largest producer of SAF, is expanding its production capacity in Singapore in 2023. It aims to be able to roll out as much as 1 million metric tons of SAF per annum at its facility, making Singapore Neste's main SAF production site globally. Shell also has plans to build a 550,000-ton a year biofuels plant in Singapore, which would supply SAF to air travel hubs including Changi Airport and Hong Kong Airport. Changi Airport also has an ongoing collaboration with Exxon Mobil, creating a pilot program providing sustainable aviation fuel for Singapore Airlines and Scoot flights from Changi Airport from July 2022.

Investment into Aircraft Technologies

Jet fuel has a major impact on airline profitability, representing an estimated one-quarter of direct operating costs. Every kilogram of kerosene produces 3.15 kilograms of CO_2. Airlines therefore have an intrinsic motivation for adopting more fuel-efficient flying, taxiing and airport operations.

This can be mainly done through the replacement of older aircraft with newer, more fuel-efficient designs. Each new generation of aircraft is roughly 15%-20% more fuel efficient. Key technologies include the use of more fuel-efficient engines, improved aerodynamics, lightweight materials, plus advanced systems, and integrated design. Historically, fleet upgrading has led to modern aircrafts producing 80% less CO_2 per seat than the first jets in the 1950s. Replacing the current commercial aircraft fleet with the most fuel-efficient aircraft in service today would also reduce fuel consumption by about 20%.

The IATA estimates that around 16,000 commercial passenger and cargo planes have been retired worldwide in the past 35 years. Meanwhile, every year up to 700 jets are getting closer to the end of their lifespan. According to the IATA, the global pandemic has prompted airlines worldwide to bring forward early retirement programs of older and less efficient planes, especially wide-body passenger aircraft. But the aircraft decommissioning process must be properly managed to prevent environmental and flight safety-related risks, according to the IATA.

Increased technological innovations can also increase fuel efficiency. For instance, Lufthansa Technick and BASF jointly developed AeroSHARK - a riblet film that mimics the skin of a shark and reduces skin friction drag. Lufthansa Cargo and Swiss International have recently applied AeroSHARK to their B777F and B777-300ER aircraft and believe that the technology can reduce fuel consumption by 1.1% compared to aircraft that do not use the technology. Since August 2022, SIA has also been rolling out SITA's OptiClimb technology across its Airbus A350 fleet and utilizing the tail-specific machine learning-driven system to cut up to 5% of fuel usage during climb out (15,000 tons per year). The technology employs a mix of 4D weather forecasting to recommend ideal climb speeds before departure and previous flight data to predict fuel burn across a wide range of flight scenarios to optimize fuel utilization after take-off. According to company estimates, the technology has the potential to optimize up to ~5 million tons of CO_2 emissions each year if all carriers were to make the switch.

Collectively, airlines typically reduce their GHG intensity by 1.5 to 2.0% per annum over the mid to long term via these strategies. Accelerated action, likely supported by government regulation and incentives, can support about 2.5% per annum reductions over the long-term. Faster reductions - as high as 8% over one year -- have been seen for smaller airlines pursuing aggressive fleet renewal strategies.

In the long term, hydrogen and battery-electric aircraft can make global aviation more efficient, starting in the late 2030s.

According to a report published by McKinsey, hydrogen aircrafts could enter the market in the 2030s and scale up through 2050, when they could potentially account for roughly a third of aviation's energy demand and market share. This can be achieved through direct combustion via a hydrogen turbine or via a fuel cell. Given that hydrogen emits no CO_2 during combustion and allows for significant reduction of other elements that drive global warming, such as soot, nitrogen oxides, and high-altitude water vapor, this could result in greater potential greenhouse savings. By redesigning airframes and storage technology, hydrogen aircraft could unlock longer ranges beyond its current limit of 2,500 kilometers.
However, liquified hydrogen would require four times the volume of kerosene, so its use would reduce space for customers or cargo. Additionally, significant, and safe hydrogen refueling infrastructure has yet to be developed at airports. Hence, although smaller aircraft powered with hydrogen could become feasible in the next decade, significant aircraft-technology development would be required, and infrastructure constraints would need to be overcome for aircraft with more than approximately 100 passengers.

On the other hand, assuming technological breakthroughs, battery-electric aircraft could potentially power regional flights by 2050. However, given the lower energy density of batteries compared to fuels, aircraft would need to carry more than 50 kilograms of battery weight to replace one kilogram of kerosene with today's technology. Carrying that battery weight for an entire flight would require more energy than burning off traditional jet fuel, thus creating a penalty for longer flights. Hence, electric propulsion could start with hybrid- or turboelectric flying, enabling further improvements in fuel efficiency as jet engines become smaller and lighter, using less fuel. For example, Ampaire, a Los Angeles–based start-up, is working with Mokulele Airlines, an inter-island carrier in Hawaii, on hybrid-electric flights for aircraft with around ten passengers.

<u>Improvements in Infrastructural and Operational Efficiency</u>
Fuel efficiency can also be achieved through the improvement of operations to carry more payload per flight. Payload can be increased by better filling a given capacity (e.g., flying with fewer empty seats) or by expanding capacity (e.g., swapping out premium seating in favor of economy seats). Until the pandemic, the aviation industry saw a trend of continuous improvement in efficiency, with the passenger load factor reaching a record average of over 82% in 2019 per the IATA. Operational efficiencies have also resulted in a 55% improvement in fuel burn per passenger km since 1990, and typically reduce the fuel intensity of airlines by an additional 0.5% per year.

Although the IATA considers improving operational efficiencies to be only around 3% of the required contribution to meeting the net-zero carbon emissions by 2050 goals, Aviation Benefits Beyond Border's Waypoint 2050 research found that operational and infrastructure improvements could contribute at least 10% towards the same goal. Regardless, this strategy presents a simple and cost-effective way for carriers to meet short and medium-term goals, especially until low carbon fuels like SAFs can be fully scaled up and become cost competitive with fossil jet fuel.

<u>Offsets/Carbon Capture</u>
The Carbon Offsetting and Reduction Scheme for International Aviation ("CORSIA") is the world's first global scheme to offset the growth in international aviation CO_2 after 2020. It aims to stabilize aviation's net CO_2 emissions, alongside the pursuit of other emissions reduction measures and to mitigate around ~2.5 billion tons of CO_2 between 2021-2035, which equates to an annual average of 165 million tons of CO_2. CORSIA helps aviation towards its midterm goal of carbon-neutral growth and allows aircraft operators to claim emissions reductions from the use of SAF, provided they deliver at least 10% in greenhouse gas savings and are not made from biomass obtained from land with high carbon stock.

Offsets currently permitted are those from the American Carbon Registry ("ACR"), Architecture for REDD+ Transactions ("ART"), the UN Clean Development Mechanism, China's GHG Voluntary Emission Reduction Program, the Climate Action Reserve ("CAR"), the Gold

Standard and the Verified Carbon Standard ("VCS"). Only credits that were generated for offsetting activities that occurred between 2016 and 2020 will be permitted for use in the pilot phase.

Table 6: Overview of CORSIA

Stage	Pilot Phase	First Phase	Second Phase			
	2021-23	2024-26	2027-29	2030-32	2033-35	2036 onwards
Monitoring CO_2 emissions	Mandatory for all ICAO members					
Obligation to reduce CO_2 emissions	Voluntary participation by ICAO member countries (193 nation-states as of October 2022)		Mandatory for all ICAO members to participate, except for some exempted countries			
Method of prorating the excess	Offset the industry-wide exceedance from the standard value by the participating countries			Factoring in individual companies (over 20%)	Factoring in individual companies (over 70%)	Factoring in individual companies (100%)

Source: ICAO

High-quality offsets that remove additional carbon from the atmosphere are extremely rare. Credits based on avoiding emissions made up 96% of all contracts issued in 2020, mostly by seeking to prevent trees from being cut down or supporting renewable energy projects. Additionally, Brussels-based NGO Transport & Environment (T&E) claims that with CORSIA, only 0.4% of operating costs for a transatlantic flight will be taken up by purchasing carbon credits. In contrast to the EU's ETS scheme, 7% of transatlantic flight operating costs would be covered by carbon credits if the scheme were to be applied to non-EEA flights.

As of 28 September 2022, members of the 193-nation International Civil Aviation Organization ("ICAO") are under pressure to reach consensus to change the baseline of the UN aviation agency's landmark CORSIA and are weighing an industry backed goal of net zero emissions by 2050. This will be up for review in 2025, as speakers broadly agreed that the current level of ambition was not stringent enough to be compliant with a Paris Agreement warming trajectory.

There have been greater moves to develop Singapore as a green financing and carbon trading center. Climate Impact X ("CIX"), jointly established by DBS Group Holdings Ltd, Singapore Exchange, Standard Chartered PLC, and Temasek Holdings (Private)Ltd in 2021, is a global exchange and marketplace for high quality carbon credits. The launch of CIX's Project Marketplace, a platform that will allow firms to discover, compare and purchase carbon credits from various projects around the world, will allow businesses of all sizes to gain access to the voluntary carbon market.

Customer and Investor Trends

Consumers are becoming increasingly conscious of the environmental impact of air travel. In a McKinsey survey in 2021, around 54% of respondents said aviation should "definitely become carbon neutral" in the future, and more than 30% of respondents have paid to offset their CO2 emissions from air travel. Additionally, almost 40% of travelers globally are willing to pay at least 2% more for carbon-neutral tickets, and 36% plan to fly less to reduce their climate impact.

However, such trends differ in each market and demographic. The survey found that passengers in the UK, US, and Saudi Arabia, for example, were more likely to feel "flygskam," (shame about flying) while those in Spain, Poland, and Australia felt significantly less guilty about flying. Evidently, consumers from certain markets may reward airlines that meet rising demands for environmental sustainability more than others.

Investors are also becoming increasingly concerned about the effects of climate risk on airline valuations, with climate-related financial disclosures becoming more common. The frequency of climate-related discussions in European earnings calls with investors increased nearly sevenfold since 2017, according to HSBC data. At the same time, because of increasing consumer pressure, institutions and governments are also announcing policies on CO2 or SAF. In 2018, Norway mandated that 0.5% of aviation fuel in the country must be sustainable by 2020, growing to 30% by 2030. It also decreed for all short-haul flights to be 100%electric by 2040. Additionally, Canada implemented a carbon tax of 30 Canadian dollars (~USD21) per metric ton of CO2 in most of its regions, based on the amount of loaded fuel for domestic travel.

In November 2021, Australian airline Qantas Airways Ltd ("Qantas") launched a new "green tier" within its loyalty program, designed to "encourage, and recognize the airline's 13 million frequent flyers for doing things like offsetting their flights, staying in eco-hotels, walking to work, and installing solar panels at home". Qantas expects to see 100,000 of the airline's 13 million Frequent Flyer members achieve this membership within the first year. Overall, Qantas has also found that 11% of its travelers tick the carbon offset box when booking their flight, for which they earn 10 Qantas Points per dollar, with the airline matching those contributions on a dollar-for-dollar basis.

Collaboration with other Industries

Corporate customers also increasingly turn to airlines for ways to reduce scope-3 emissions incurred from their employees' business travel. As part of its 2030 SAF goals, Bank of America has in place a partnership with several organizations to support its SAF efforts, and in February 2022, was the first global financial institution to set a SAF usage and capital deployment goal. This involves a three-year agreement supporting the purchase of one million gallons of SAF annually for 2021-2023. To date, this is the largest publicly announced SAF agreement by volume between an airline and corporate customer for reducing emissions for employee travel.

Australia and New Zealand Banking Group ltd also has in place a partnership with Qantas, as part of its commitment to fund and facilitate low carbon and sustainable solutions. For instance, the duo has a collaboration with INPEX, one of Japan's largest energy companies, in Western Australia's Wheatbelt region to integrate native reforestation and carbon farming with the production of biomass for renewable biofuels. This large-scale integrated forestation and carbon farming program that will generate offsets to help meet the airline's emissions targets and provide a source of renewable biofuels production.

Explanation of Issuer Profile Rating / Issuer Profile Score

Positive ("Pos") – The issuer's credit profile is either strong on an absolute basis or expected to improve to a strong position over the next six months.

Neutral ("N") – The issuer's credit profile is fair on an absolute basis or expected to improve / deteriorate to a fair level over the next six months.

Negative ("Neg") – The issuer's credit profile is either weaker or highly geared on an absolute basis or expected to deteriorate to a weak or highly geared position over the next six months.

To better differentiate relative credit quality of the issuers under our coverage, we have further sub-divided our Issuer Profile Ratings into a 7-point Issuer Profile Score scale.

IPR	Positive		Neutral			Negative	
IPS	1	2	3	4	5	6	7

Please note that Bond Recommendations are dependent on a bond's price, underlying risk-free rates and an implied credit spread that reflects the strength of the issuer's credit profile. Bond Recommendations may not be relied upon if one or more of these factors change.

Explanation of Bond Recommendation

Overweight ("OW") – The bond represents **better relative value** compared to other bonds from the same issuer, or bonds of other issuers with similar tenor and comparable risk profile.

Neutral ("N") – The bond represents **fair relative value** compared to other bonds from the same issuer, or bonds of other issuers with similar tenor and comparable risk profile.

Underweight ("UW") – The bond represents **weaker relative value** compared to other bonds from the same issuer, or bonds of other issuers with similar tenor and comparable risk profile.

Other

Suspension – We may suspend our issuer rating and bond level recommendation on specific issuers from time to time when OCBC is engaged in other business activities with the issuer. Examples of such activities include acting as a joint lead manager or book runner in a new issue or as an agent in a consent solicitation exercise. We will resume our coverage once these activities are completed.

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