

MUFG TRANSIT

APAC Carbon Offsets – Taking Off with CORSIA

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MUFG Bank, Ltd. A member of MUFG, a global financial group



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Section I: Introduction



Decarbonising Aviation I Measures to reduce and offset emissions from International Aviation

CORSIA and SAF, the most critical measures for aviation sector to achieve carbon neutral growth



Aviation sector alone accounts for nearly 2% of global CO₂ emissions

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25%

APAC flights account for nearly 25% of global passenger transport related CO₂ emissions

To reduce emissions from international aviation and chart a path towards carbon neutral growth from 2020, International Civil Aviation Organisation (ICAO) identified the following four baskets of measures under Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) in 2016:

Aircraft Technology

Development of new aircraft technologies that could reduce emissions and enhance fuel efficiency E.g. Electric and Hybrid propulsion aircrafts

Operational Improvements

Operational improvements that help manage air traffic and reduce emissions E.g. Continuous descent operations that reduce fuel consumption

Sustainable Aviation Fuel (SAF)

Bio-derived renewable fuels that allow aircrafts to reduce emissions compared to conventional jet fuels. E.g. SAF produced from hydrogen or biomass

CORSIA Eligible Emissions Units (CEEUs)

Carbon pricing scheme that will require airlines to offset a portion of their CO₂ emissions using CORSIA eligible carbon credits (hereafter, *CORSIA Eligible Emissions Units*) that cannot be reduced using other basket of measures

Contribution trajectory of different measures towards carbon neutral growth of international aviation





Scope and Timeline of CORSIA I Progressing from Voluntary to Mandatory Phase

Airlines are required to offset a portion of their emissions resulting from international aviation that takes place between participating states in the voluntary phase and between all ICAO member states in the mandatory phase



Source: MUFG compiled from ICAO, IATA and various public sources

CORSIA I Understanding potential impact on airlines

The higher CEEUs required for the offset, the greater technology improvement and adoption needed by the airlines

		How many CORSIA cr	redits would an airline need to offset its emissions?
	CEEUs or CEFs ?	CO2 offsetting requirement each year = An airline's em international a covered	nission from aviation on X Sectoral Growth for routes A gear* - Emission reductions claimed via eligible fuels
		CORSIA Eligible Emissions Units (CEEU are the Emissions Unit Programmes approved b ICAO Council.	by the a) CORSIA Eligible Fuels (CEFs) includes:
(\$1.8 Offsetting cost arising from CORSIA	Phase I CEEUs require the Paris Agreement's 'Corresponding Adjustment' mechanism to av double-counting. Pilot Phase Firs	b) <u>CORSIA Lower Carbon Aviation Fuel (LCAF)</u> LCAF is a fossil-based aviation fuel produced using technologies such as carbon capture, renewable and
	billion requirements until 2026	Designated Prog Registry 2021-23 203	low-carbon intensity electricity, reduced venting, flaring, and fugitives etc.
		American Carbon Registry	CEFs need to meet <u>ICAO's sustainability criteria and</u> its
		BioCarbon Fund	<u>certification schemes</u> presenting a net GHG reductions of atleast 10% compared to the baseline life cycle
	Apstantial	China GHG VER Program	- emissions values for aviation fuel on a life cycle basis.
	reduction in the	Clean Dev Mechanism	- 21 ₽ Participation in offsetting
million offsetti via use CEFs	φ 330 offsetting cost	Climate Action Reserve	• requirements via use of CEFs
	million via use of	Forest Carbon Partnership	
	CEFS	Global Carbon Council	- <u>-</u> <u>-</u> <u>-</u>
		Gold Standard	●
	Source: ICAO	Social Carbon	
	11100	VCS	
		Source: ICAO, as of Mar 2024	
lote.	= 1 CEEU = 1 ton of CO ₂	Registries that are conditionally approved are asked to addr	ress 'double-counting' concerns as one of the main reasons

*Sectoral growth refers to International aviation sector's global average growth of emissions each year. Ref Appendix-1 for calculation methodology.

(•) MUFG

CORSIA Eligible Emissions Units (CEEUs) I Demand and supply landscape

Gradual pickup in demand, but uncertainty in securing Corresponding Adjustment/Letter of Authorisation limits supply in market for CEEUs



Landscape and Outlook of SAF I Demand to outstrip supply

The global demand for SAF will rise rapidly and overshoot supply by 2030



BNEF
 More than 38 countries have SAF-specific policies that clear the way for the market to develop.

*HEFA - Hydrotreated Esters and Fatty Acids method uses refines vegetable oils, waste oils, or fats into SAF through a process that uses hydrogen

Section II: APAC Market Developments



CORSIA Preparedness I Spotlight on APAC - SAF mandates and major exposed airlines

While recognizing SAF's vital role in decarbonising the aviation sector, advancing SAF mandates is hindered by capacity limitations and high production costs, highlighting the need for strong government support



Q Which airports and airlines would potentially be impacted from CORSIA?

APAC airports with large footprint of international passengers

International Airports	Intl' Passengers*
Singapore Changi Airport	38 mn
Hong Kong - International	24.3 mn
Seoul – Incheon Airport	35 mn
Bangkok Suvarnabhumi	25.5 mn
Taiwan - Taoyuan Airport	21.8 mn

*International passengers' data of the respective airports from Jan – Aug 2023.

Source: Bangkok Post

Major exposed airlines from above airports**



** Based on a number of international departures for each Airline as of 30th Aug 2024

Source: Flightradar24



APAC Airlines I Understanding decarbonisation strategies

Carbon offsets serve as a viable short-term measure but in the long run the major decarbonisation in aviation will come from SAF and new aircraft technologies

Airlines	SAF Target	Aircraft Technology	Use of Credits/Offsets
KSREAN AIR	SAF target not disclosed	Phase out old aircrafts and introduce 143 new low- carbon ones by 2030	Minimise offset procurement diverting decarbonisation cost to other basket of measures
CATHAY	10% SAF usage by 2030	Phase out old aircrafts and introduce over 70 new-gen low carbon aircrafts from 2024	Invest in both offset projects and source high quality credits to offset residual emissions
🗳 THAI	5% SAF usage by 2030	Phase out old aircrafts and introduce 80 next-gen aircrafts from 2027 including low-carbon GEnx engines	Operated an offset program for customers and aims to adopt CORSIA measures with less focus on offsets and more on SAF
	5% SAF usage by 2030	Phase out old and introduce new low-carbon aircrafts with an order of 92 fleets in Mar 2024	Continued focus on sourcing high-quality credits to meet offset obligations
EVA AIR	5% SAF usage by 2030	Phase out old and introduce 44 new next-gen, low- carbon aircrafts starting from 2024	Procurement of carbon credits to offset a portion of its emissions

	APAC Airlines that have Internal Carbon Pricing (ICP) incorporated in their decarbonisation strategy
🥝 JAPAN AIRLINES	Japan Airlines has introduced an ICP with a base price of JPY 15,000/tCO ₂ wherein they intend to invest on various decarbonisation measures such as SAF, improvement of flight operations, introduction of environment friendly aircrafts, carbon capture technologies etc.
QANTAS	Qantas Airways has also introduced an ICP however with an undisclosed price/tCO ₂ . Qantas' ICP reflects expected cost of decarbonisation measures such as cost based on secured SAF/Low-carbon fleet deals and expectations for forward prices of SAF as well as offsets.
	China Airlines has implemented ICP with a price of € 100/tCO₂ and this will serve as a decision-making framework for the airlines' operations and carbon reduction initiatives such as accounting for SAF and other renewable energy costs.





Case Study I Qantas Airways' broader action plan for carbon offsets

Qantas Airways has put together a holistic action plan to decarbonise its operations and reach net zero emissions by 2050

AUD 400 mn

A climate fund setup by Qantas Airways to invest in sustainable technologies and carbon offset programs





AUD 110 mn will be allotted to source various **carbon credits (including CEEUs)**, Offshore SAF and operational efficiency technologies

Qantas has joined Sustainable Aviation Fuel Financing Alliance to accelerate global production of aviation biofuel. The initial partners have committed around USD 200 mn, with

Key highlights



Qantas in FY2022 purchased and retired a total of **3,08,329 carbon credits**.

Qantas initially committing USD 50 million (AUD 75 mn) from its Climate Fund.



Invests directly in **offset programs** to manage liabilities arising from both domestic (safeguard mechanism) and international compliance (CORSIA)



Internal Carbon Pricing in place with an undisclosed price/tCO₂, reflecting anticipated costs for decarbonisation, including secured SAF deals and expected prices for SAF and offsets.

Activities under Qantas' Carbon offset governance forum



Source carbon credits with **CORSIA eligibility** as a key priority, to ensure verifiable highguality credit and actively monitor the shifting standards for CORSIA eligibility.



Internal Carbon offset framework with minimum integrity standards aligning with **CORSIA's** credit assessment principles.

Future sourcing approaches, identifying strategic opportunities for **offsetting investment** under the group's climate fund.



Sustainable Financing I A closer look into airlines in APAC

Sustainable financing serves airlines' needs to invest in not only the green activities, but also transition activities that support the airlines to move away from brown to green



*Deals are sourced from public sources and may not include all the bonds and loans that were issued/borrowed during the period under consideration. E.g., Private placements



Case Study I Japan Airlines' Transition Bond & Transition-linked Loan

MUFG reaffirms its commitment to sustainability by taking the lead as a structuring advisor & lender towards JAL's sustainable transition

• Japan Airlines Group, along with several other airlines and industry associations, pledged to achieve net-zero emissions by 2050.

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 To achieve this target, JAL would need to upgrade its aircraft to more fuel-efficient models that emit less carbon dioxide, while increasing its use of sustainable aviation fuel (SAF)

Issuer	Japan Airlines
Loan Execution	1 March 2023
Product	Transition-linked loan
Size	26.5 billion yen
Use of Proceeds	Purchase of 2 fuel-efficient A350-900 aircraft
SPTs	SPT 1: Maintain total GHG emissions (direct emissions Scope1) in FY2025 compared to FY2019 (Less than 9.09 million tons) SPT 2: Reduce total GHG emissions (direct emissions, Scope1) by 90% in FY2030 to FY2019 (Less than 8.18 million tons)
MUFG Role	Structuring Advisor & Lender

JAL's Latest Transition Bond

JAL's first Transition-linked Loan

Timing of issue	23 May 2024
Product	Transition Bond
Size	15.0 billion yen
Maturity	15 years
Use of Proceeds	Upgrading to fuel-efficient aircraft (Airbus A350, Boeing-787, etc.)

Key highlights

- Use of Proceeds: Through upgrading to fuel-efficient aircraft (Airbus A350, Boeing-787, etc.)
- By upgrading to fuel-efficiency aircraft, JAL will accelerate efforts to achieve its CO_2 reduction targets for fiscal years 2025 and 2030, the interim stages toward its overall target of net-zero emissions by 2050.



The Way Forward I It is only the beginning

As the only harmonised international market mechanism to offset sector-specific emissions, CORSIA will have far reaching implications

Future implications of CORSIA-



Lookout for the impact on domestic rulebooks

- While CORSIA only covers emissions from international aviation, its implementation will set a course for APAC regulations to halt the growth in aviation emissions counted towards the respective country's NDCs especially among the three of the world top-5 busiest departure countries in APAC.
 - China: The current compliance national ETS only covers power sector, but Ministry of Ecology & Environment is expanding to require 7 sectors including civil aviation to start annual emission reporting & verification. The trial ETS in certain cities e.g. Shanghai started to include domestic airlines.

Who is in charge?

- Uptake of CEEUs would hinge on member states' ability to integrate CORSIA into domestic legislations
 - Establishment of provisions for non-compliance to enable airlines to price in & weigh opportunity cost of CEEUs vs penalties e.g. South Korea passed 'International Aviation Emission Bill' in Feb 2024 mandating annual CO₂ emission reporting & fines, on carriers failing to maintain emissions at 2019 levels
 - Development of infrastructure to accommodate a cross-border movement of CEEUs (LoA issuance + national NDC registry for corresponding adjustment)



Deeper skin in the game

- Cross-industry partnership between airlines and decarbonisation solution providers, a lever to de-risk new innovations
 - Aug 2024: Qantas joined hands with Rio Tinto and BHP to finance a development of high-integrity nature-based carbon projects in Australia
 - Sep 2024: British Airways signed \$11mil 6-year offtake agreement with CUR8 to secure 33,000 tonnes of carbon removal credits



Appendix





Appendix – I

Term	Definition
Baseline emissions	It determines the standard level of emissions or activity against which future reductions or offsets are measured
Carbon Pricing	Pricing mechanism to reduce GHG emissions by assigning a cost on emissions, generally through a carbon tax or emission trading system.
Carbon Standard	A framework for verifying and certifying carbon emission reductions or removals achieved through various projects. E.g., Upgrading industrial equipment to energy-efficient models helps to reduce CO_2 emissions.
Decarbonization	Process to reduce or eliminate CO ₂ emissions.
Ethanol	An alcohol obtained from the fermentation of sugars and starches or by chemical synthesis.
Floor price	A minimum or lowest price at which a product or a commodity can be sold.
Nationally Determined Contributions (NDCs)	A country's self-defined climate pledge with detailed plans and procedure to help meet the goal of limiting global temperature rise to 1.5°C above pre-industrial levels.
Internal Carbon Price (ICP)	ICP helps incorporate the cost of carbon into decision-making process where the business charges itself a fee based on carbon emissions. The fee is typically used to fund decarbonization measures such as investment in low-carbon technologies or to fund sustainability projects.
Accrued Income	Accrued income refers to the revenue that has been earned by a company and therefore recorded in the books but is yet to be received.
Maximum Takeoff Mass	It is the maximum weight at which the aircraft is certified to take off due to structural or other safety limits.

Sectoral growth refers to International aviation sector's global average growth of emissions each year.

*Sectoral Growth for a year =

Participating states' emissions from international flights in a year - 85% of 2019 emissions from international flights of participating states

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*ICAO methodology to be followed from 2024-2032

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Source: MUFG compiled from Fact Sheet CORSIA published by IATA (May 2024)



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