3 March 2023

ESG – Under the Hood

Air Transport: Asia's flight path to net zero

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ESG & Equities - EM Asia

- We map out the path to net zero emissions for Asia's aviation industry and find that progress so far has been slow
- Challenges include a lack of regulatory incentives, higher alternative fuel costs, technology hurdles and low industry returns on capital
- Near term, the impact looks limited, but longer term the shift to sustainable aviation fuels (SAFs) will likely add costs

Emissions watch. The aviation sector represents an estimated 4% of global GDP and 3% of global carbon dioxide (CO_2) emissions. While COVID-19 was disruptive to aviation traffic activity and reduced emissions, updated forecasts suggest air traffic volume growth rates of 3-5% over the longer term, producing a business as usual (BAU) case for emissions to double by 2050 (from 2019 levels).

Regulation. The aviation sector is excluded from the Paris Agreement and partly from the European Union Emission Trading System (EU ETS). However, the industry is directly addressing decarbonisation, despite the light regulatory overlay.

Over the next decade, SAFs are likely to play the most important role in decarbonising air transport. Use of SAFs requires limited changes to aircraft design. However, new production and delivery infrastructure will likely increase costs to airlines and consumers, raising potential concerns regarding equity of access to air transport. Efficiency gains, alternate propulsion and carbon offsets are also likely to contribute to decarbonisation over the longer term.

How does ESG impact our coverage? Over the longer term, given airlines have such large carbon footprints, we think a significant portion of the incremental operating and capital costs related to decarbonisation may be passed on to higher priced customer tickets. This is consistent with historical fuel costs/total revenue for a universe of Asian airline stocks. This expense ratio is volatile across a broad range and is a contributing component to margin volatility.

This is a redacted version of a report with the same title published on 3-Mar-23. Please contact your HSBC representative or email AskResearch@hsbc.com for more information.

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Integrating ESG: Our analytical approach

Stages of ESG integration

1 Identify issues

Identify ESG issues relevant to a sector (locally, regionally, globally)

Understand how the issues affect / are affected by various sectors

2 Apply to company

Determine whether the ESG issue is a risk / opportunity for the company

Consider how well the company has addressed the issue over varying time horizons

3 Integrate into financials

Make adjustments to valuations, ratings, and target prices accordingly

Adjust cash flows (revenues, costs), weight average cost of capital or multiple

How is ESG "priced in" to stock valuation?

Corporate performance

Business perspective – over time, the operational performance of a business improves because it manages various ESG issues well

Stock valuation

Investor perspective – investors (and analysts) consider how well the business is dealing with ESG-related risks and opportunities and how this relates to the current market value

Reputation perception

General public perspective – a shock (usually negative) which may arise as a result of a publicly reported negative ESG-related incident such as an environmental violation or a major governance failing

How do ESG issues affect companies?

ESG matters can be morphed into business opportunities which generate new streams of income.

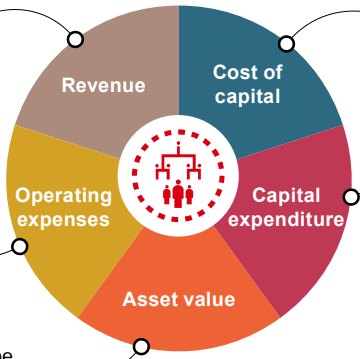
Example: Decarbonisation provides more business opportunities for the renewable energy value chain.

ESG issues can impact the operating cost of companies through efficiency enhancement and regulations.

Example: Increase in insurance costs for food delivery companies due to growing awareness of workers' rights and tightening regulations.

ESG factors may affect anticipated cash flows from company assets and thus the net present value.

Example: Fossil fuel assets of energy companies may be stranded or impaired long-term through energy transition.



Investors may require higher risk premiums for companies with poor ESG disclosures and practices. Green projects can enjoy more favourable rates in financing.

Example: Some central banks are providing lower-interest-rate loans to fund green projects.

The transition to a sustainable economy is likely to bring changes in capital expenditure for development and investment in more sustainable activities.

Example: Technology companies allocate capital, which enables them (and others) to be more sustainable.

Source: HSBC

Under the Hood

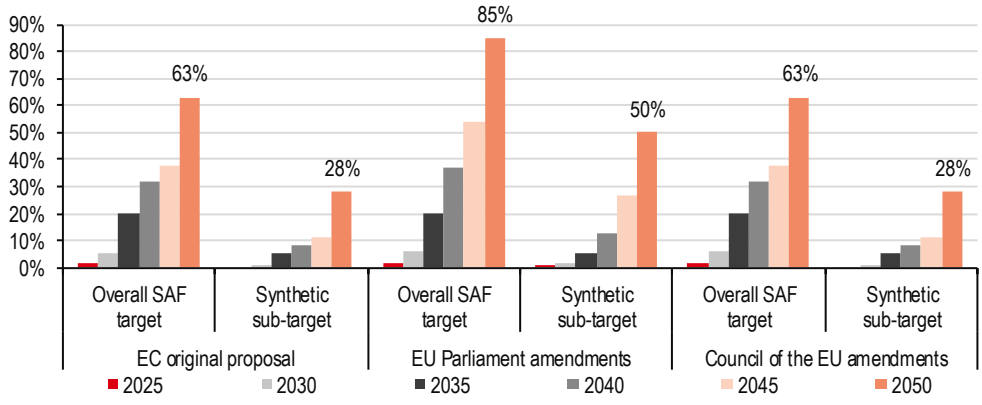
- Industry organisations seek to cut aviation emissions by c90% and, if required, use offsets to reach net zero emissions (NZE) by 2050
- Challenges include a lack of regulatory incentives, higher alternative fuel costs, technology hurdles and low industry returns on capital
- Decarbonisation will initially be driven by SAF availability/adoption; but higher costs may lower equity of access to airline travel

The aviation industry is intent on achieving NZE by 2050

International aviation organisations have blueprints for air travel decarbonisation and pathways to NZE by 2050. However, achieving NZE will require significant new investments, most importantly in production, delivery and storage capacity of SAFs. This is required upstream supply chain investment. Within the sector, in the 2030-2040 timeframe, airlines will likely need fleet upgrades by adding aircraft that are specifically designed to burn SAFs, potentially burning hydrogen, and are more fuel efficient than existing aircraft. Electric aircraft may also have a role.

Blueprints: International Council on Clean Transportation (ICCT) recently released a detailed report entitled 'Vision 2050: Aligning aviation with the Paris Agreement, June 2022', targeting a 90% reduction in emissions, which can be achieved mainly through the broader use of SAFs. The cumulative abatement reductions can be broken down as follows: 1) SAFs ~60%; 2) improved aircraft efficiency ~33%; and 3) use of hydrogen ~5%. The ICCT concluded ticket prices, incorporating higher fuel costs, may rise significantly by c35% in 2030 and 70% in 2050.

EU SAF target volumes as legislation has progressed (% of total fuel used)



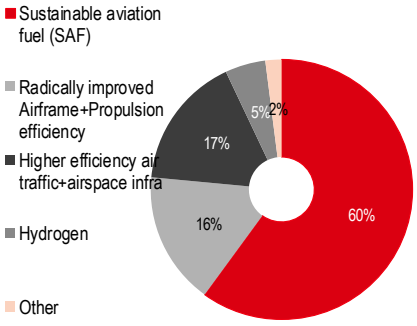
Source: ICCT, 'Vision 2050: Aligning aviation with the Paris Agreement', June 2022

In the EU, targets for SAF use have been established for 2025-2050, through an original proposal and subsequent adjustments by the EU Parliament and the Council of the EU. The EU Parliament was most ambitious, although the Council of the EU backtracked in the final target setting. Other groups seeking to advance the industry's response and position on aviation for NZE include:

- **International Civil Aviation Organization (ICAO)** – The ICAO is a United Nations-specialised agency. This inter-governmental organisation has 193 members and operates with the objective of maintaining an administrative and expert bureaucracy, supporting diplomatic interactions, and researching new air transport policy and standardisation innovations as directed and endorsed by the member governments. The ICAO is also advancing a new initiative: Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).
- **CORSIA** – CORISA seeks to be the "first global market-based measure for any sector and represents a cooperative approach that moves away from a "patchwork" of national or regional regulatory initiatives. It offers a harmonised way to reduce emissions from international aviation, minimising market distortion, while respecting the special circumstances and respective capabilities of ICAO Member States."
- **The International Coalition for Sustainable Aviation (ICSA)**, a member of the ICAO, recently released recommendations for a net zero Long-Term Aspirational Goal (LTAG) for international aviation. The recommendations are based on a cumulative CO_2 budget with an interim milestone. It also recommends that the LTAG is updated to include non-CO_2 climate impacts.
- **The International Air Transport Association (IATA)** approved a resolution for the global air transport industry to achieve net zero carbon emissions by 2050.
- **EU "Fit for 55" adjustments** – seeks to cut EU emissions by 55% by 2030 and will phase out free EU Emissions Trading System (ETS) allocations awarded to the aviation industry by 2027, and stimulate the adoption of SAFs by ending subsidies of aviation fossil fuels.
- **The Global Sustainable Aviation Fuel (SAF) Declaration** signatories aim to decarbonise the aviation industry by accelerating the development, production and consumption of SAFs.

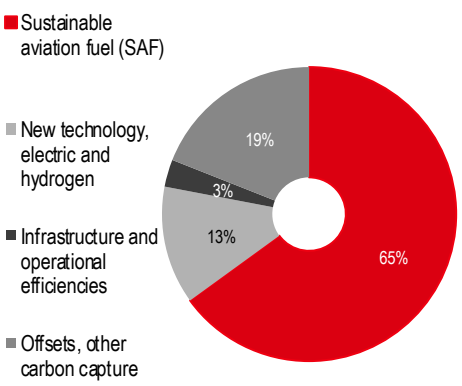
The IATA Fly Net Zero plan addresses the industry's path to NZE by targeting the creation of: 1) radically more efficient airframe and propulsion technologies (manufacturing) (33%); 2) large-scale SAF capacity (fuel) (c60%); 3) higher efficiency in air traffic management and airspace infrastructure; and 4) airport infrastructure to supply SAFs, at cost, and in a cost-effective manner. The IATA plan employs a strategy that relies more on offsets and carbon

ICCT net zero plan



Source: ICCT, 'Vision 2050: Aligning aviation with the Paris Agreement', June 2022

IATA Fly Net Zero



Source: IATA Fly Net Zero

capture, for up to c20% of overall emission reductions, compared to the ICCT blueprint, which assumes no use of offsets and carbon capture.

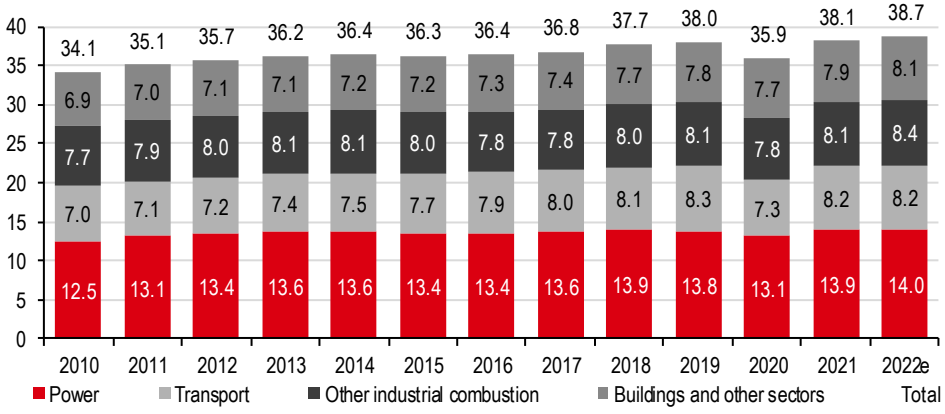
Transport – current and future carbon footprint

The aviation sector represented just under 9% of total final oil consumption in 2019, which represented c8.7mbd. Fuel consumption dropped sharply in 2020-2021 but is expected to recover to 2019 levels this year and move sharply higher in the decades ahead.

Developments with regard to passenger traffic and SAF capacity, and production targets under the IATA plan illustrate the expected expansion in both passenger traffic and available sustainable fuel volumes. Passenger traffic is expected to grow 5x and at a CAGR of about 3-4% to 2050, while SAF fuel production is expected to grow 20-30% p.a. to 2040, before slowing to single digits.

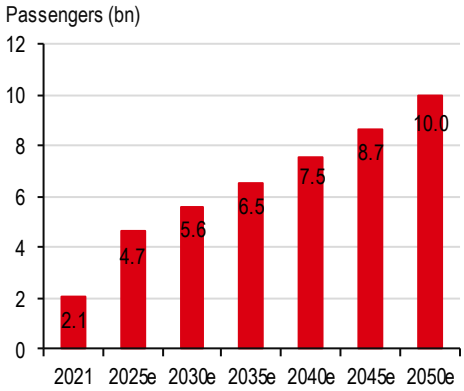
The transport sector released an estimated 8.2 gigatonnes (Gt) of CO_2 in 2022, increasing at a 10-year CAGR of 1.3%. In cumulative terms, emissions over the last 10 years totalled about 80Gt and represented about 20% of total CO_2 emissions over the period. In 2019, the ICCT presented passenger emissions data by region, and intra-Asia/Pacific air travel represented the single largest amount of carbon emissions of all the regions: almost 200mtpa or 25% of the total (see 'ICCT: CO_2 emissions from commercial aviation, 2013, 2018, and 2019', published 2020).

Global carbon dioxide emissions by sector and year (gigatonnes)



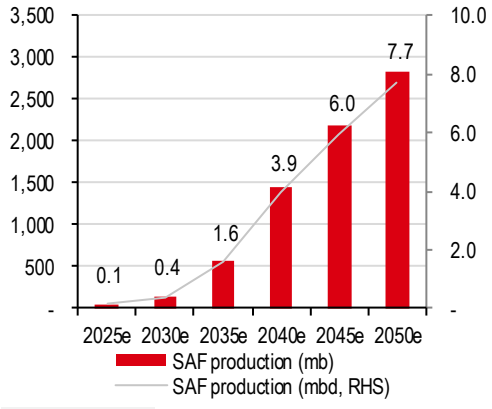
Source: EDGAR, EPA, Rystad Energy estimates

Forecast evolution of air transport passenger traffic, 2021-2050



Source: IATA Fly Net Zero

Targeted SAF production, 2025-2050

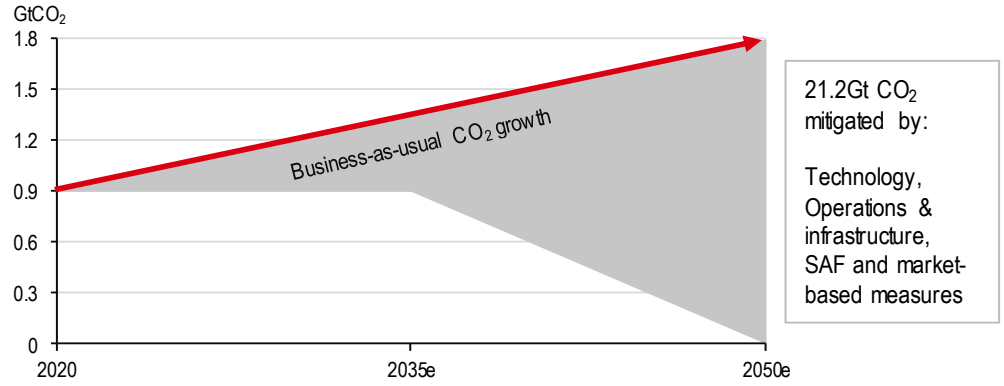


Source: IATA Fly Net Zero

Based on the IATA passenger forecasts, annual airline passenger traffic is expected to increase from c2bn passengers in 2021 to more than 10bn passengers by 2050, a CAGR of c5% over the period.

With the rise in passenger traffic in the business as usual (BAU) case, emissions could be expected to rise from 0.9Gt in 2020 to 1.8Gt by 2050. Abatement strategies are designed to eliminate over 21Gt of CO_2 emissions over the 30-year period.

Global carbon dioxide emissions mitigated to 2050e (gigatonnes)



Source: EDGAR, EPA, Rystad Energy estimates

Biofuels and SAF: the most viable path to reduce carbon intensity

Biofuels are already an important part of the overall liquid hydrocarbon supply, comprising 2.8-2.9mbd or just under 5% of world liquid oil supply over the last two years. Many of these products are derived from the fermentation of grains and other agricultural products and have some seasonality in production.

In an effort to meet the UN climate targets, the companies providing products and services in the transportation sector, particularly road transport and aviation, are prioritising decarbonisation, which will likely drive strong growth in demand for these fuels, even though their cost is currently higher than the cost of conventional fuels, and they also can impact the availability of and raise the cost of important foods.

SAFs can be derived from waste oil feedstock but on the scale to meet the growing demand would require low indirect land-use change (ILUC)/cover crops, which could be a concern, given there is a global food supply crisis.

SAFs typically produce 80% lower lifecycle CO_2 emissions compared with conventional jet fuel. Ramping up of biofuels requires using novel production pathways to develop feedstock with renewable liquid or gaseous transport fuels for which none of the energy content of the fuel comes from biological sources (RFNBO) and other lignocellulosic materials to bridge the costs between sustainable and fossil fuels and meet the demand beyond 2030.

In support of increasing SAF supply, five companies signed The Global Sustainable Aviation Fuel Declaration in April 2022: Airbus, Rolls Royce, Safran, Singapore Airlines and RD Shell. In particular, the mission of the group is to:

- minimise the production cost of SAFs, allowing the switch from fossil fuels to SAFs at the lowest incremental cost
- maximise the availability of SAFs, with an ambition to create an annual production capacity of 500mtpa by 2050

According to a 2022 study by McKinsey, 'Sustainable fuels and their role in decarbonising energy', c70% of the expected USD40-50bn of investment required to produce SAF in the targeted volume by 2025 has passed the Financial Investment Decision (FID); this could lift SAF production capacity to 46mtpa by 2025, according to the report.

However, this is just the beginning. To expand capacity toward 500mtpa and meet decarbonisation targets, more than USD1.0-1.4trn of incremental investment will be required over the coming decades to 2040, per the SAF Declaration.

As an initiative to gradually switch to low-carbon fuel technology, Hong Kong carrier Cathay Pacific has taken a step forward to include Airbus's new 'SAF aircraft' such as A321, A330 and A350. Also, according to recent news articles, Air India has just finalised orders with Airbus and Boeing for nearly 500 aircraft, which will improve the efficiency of its fleet and prepare the carrier to better serve the 80 new airports that India is opening over the next five years (Reuters, 15 February 2023).

Airbus estimates the global aircraft fleet will increase from c22,850 aircraft (2020) to more than 47,000 by 2041, with over 50% of the passenger aircraft added by Asia-based carriers. Airbus estimates that only 20% of the existing service fleet has new generation, fuel efficient aircraft. Airbus aircraft currently in production are certified for up to a 50% SAF blend, with a goal to reach 100% SAF within 10 years (see 'Airbus Global Market forecast, 2022-2041', 8 July 2022).

Time horizon for the ESG impact on the share price and valuation

In the full report, we consider the impact of ESG/sustainability issues on three key areas: corporate performance, stock valuations and reputation perception. In this note on airlines, we are particularly focused on factors influencing corporate performance over the short and medium term.

In the short term, we expect corporate performance to be driven mainly by the recovery in mobility following the pandemic. Over the medium and long term, we think corporate performance is likely to be driven by: **1)** the use of and cost of SAFs and the degree to which jet kerosene is taxed in certain jurisdictions; **2)** other decarbonisation regulatory incentives provided by governments; and **3)** the use of and cost of carbon offsets, including nature-based offsets.

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HSBC Global Research clients can access the full report which includes sections on: emissions causes and scope; emissions solutions – SAFs; policy challenges and the policy toolbox to enable SAFs; pathways, cost reduction potential routes to SAFs; social & governance considerations; corporate materiality updates and controversies; and individual airline company updates.

Disclosure appendix

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