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# FEATURE ARTICLE: READY FOR TAKE OFF – HOW SUSTAINABLE AVIATION FUEL WILL PROPEL AIRLINES TO NET ZERO

WHITEHELM
ADVISERS

# INTRODUCTION

On 4 October 2021, the International Air Transport Association (IATA) – the global trade association of airlines whose members comprise 82% of the world's air traffic – announced their commitment to net zero emissions by 2050. With COP26 underway, publicly committing to net zero is undeniably in the air. Building a credible pathway to net zero emissions in less than 30 years is an enormously complicated undertaking for any business, but particularly so for airlines who in 2019 consumed 360 billion litres of fossil-fuels and generated somewhere between 2-2.5% of the world's carbon emissions. So how do airlines plan to get there? And just how credible are the proposed pathways to net zero by 2050?

In this feature article, we describe the key strategies outlined by the airline industry to reduce carbon emissions. We take a detailed look at sustainable aviation fuel (SAF), the technology slated to do much of the heavy lifting for airlines over the coming decades and the subject of recently announced tax incentives by the Biden Administration. We describe the regulatory changes and policy incentives implemented or under consideration in key jurisdictions. And of course, we consider the ramifications of the decarbonisation of the aviation industry for infrastructure investors.

Momentum behind sustainability is strong. Infrastructure investors and fund managers alike seeking to reduce the carbon footprint of their portfolios are running their magnifying glasses over airport and airline exposures, which tend to be flagged as a carbon intense part of any portfolio, whether investors own slices of listed companies or direct stakes. COVID-19 reduced the carbon footprint of the airline industry overnight as planes stayed on the ground but of course as air travel ramps up again, so too will carbon emissions. Understanding the trajectory of airlines to net zero is key for investors with existing aviation investments who wish to remain invested in the sector and prospective investors; those that pick the airlines that will best navigate this tricky pathway will be rewarded with both performance and lower financed emissions.

# HOW DOES AN AIRLINE DECARBONISE?

Figure 1: Airlines are a Carbon Intense Business

**The aviation industry is responsible for 2.5% of global emissions.**
This is forecast to increase to 4.6-20.2% of global emissions by 2050.

**More than 99% of airline emissions are related to the combustion of jet fuel.**
In addition, emissions from jet fuel comprise approximately 50% of airport emissions.

**Aircraft emissions are made at high altitude.**
This means their environmental impact is magnified[1].

**Every tonne of conventional aviation fuel used emits 3.16 tonnes of CO2.**
~343 billion litres of aviation fuel were consumed annually pre COVID-19, of which 0.015 billion litres were derived from sustainable sources.

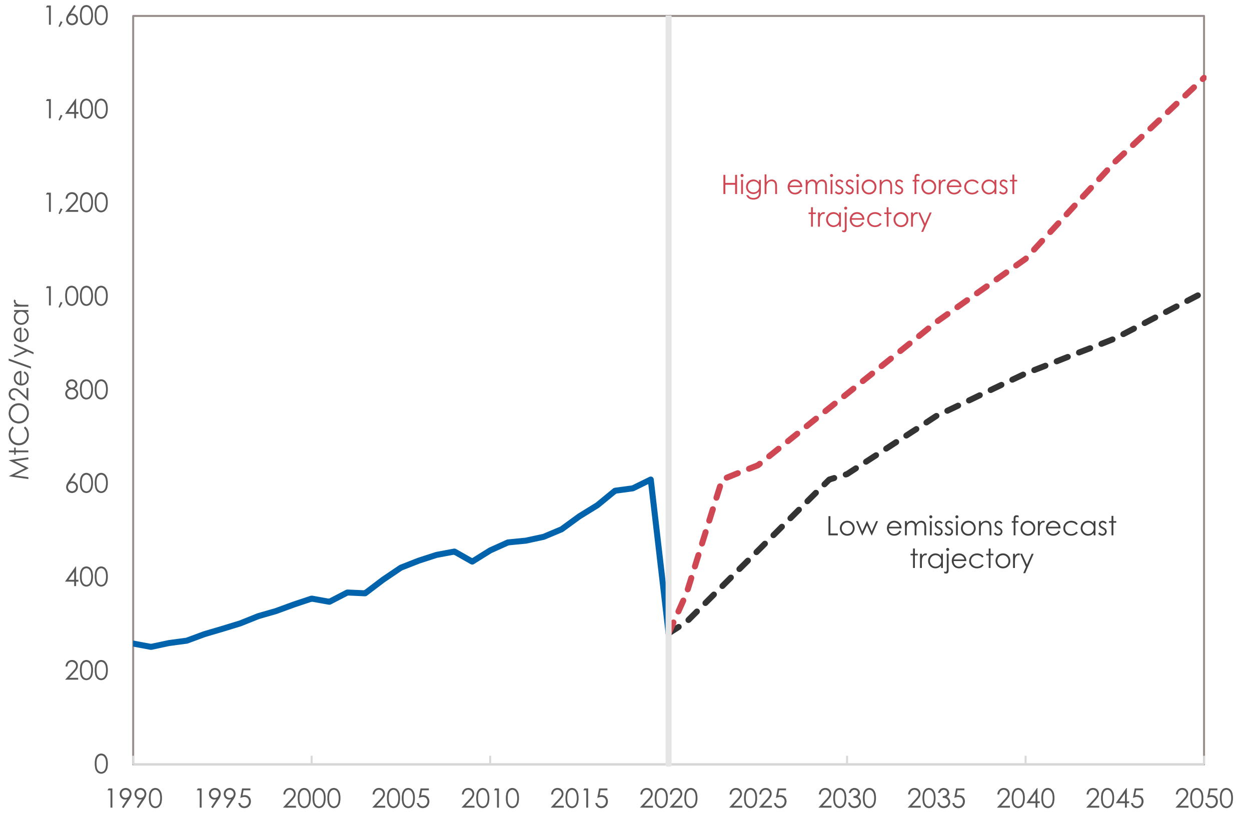
*Source: IATA, Environmental and Energy Study Institute, Whitehelm Advisers*

Airlines have limited decarbonisation pathways and run the risk of becoming reliant on offsets to get to net zero. The most obvious way for an airline to make a big reduction in its carbon footprint is to stop flying and this happened over the past 18 months due to COVID-19. But of course, this is not a sustainable carbon reduction strategy – air travel is critical for economic activity, human connection, and social cohesion, and people are embracing the opportunity to fly again as borders reopen and lockdowns end.

Indeed, the aviation industry is set to grow over the coming years and decades. Global passenger numbers are forecast to increase at a compound rate of 3.1% annually to 2050, when it is expected that airlines will carry 10 billion passengers some 22 trillion kilometres every year[2]. This is despite anticipated structural changes including changing preferences of consumers for environmental reasons and the substitution by rail and other less carbon intense transport options for shorter trips. Based on current technology, this magnitude of passengers would generate close to 1,600 million tonnes of CO2 by 2050, as is shown in Figure 1, and this may mean up to 20% of global emissions could be attributed back to the aviation industry. So, something has got to give…but what?

[1] https://doi.org/10.1016/j.ijpe.2021.108156

Figure 2: International Aviation – Carbon Emissions –1990-2020 (historic) and 2021-2050 (forecast)



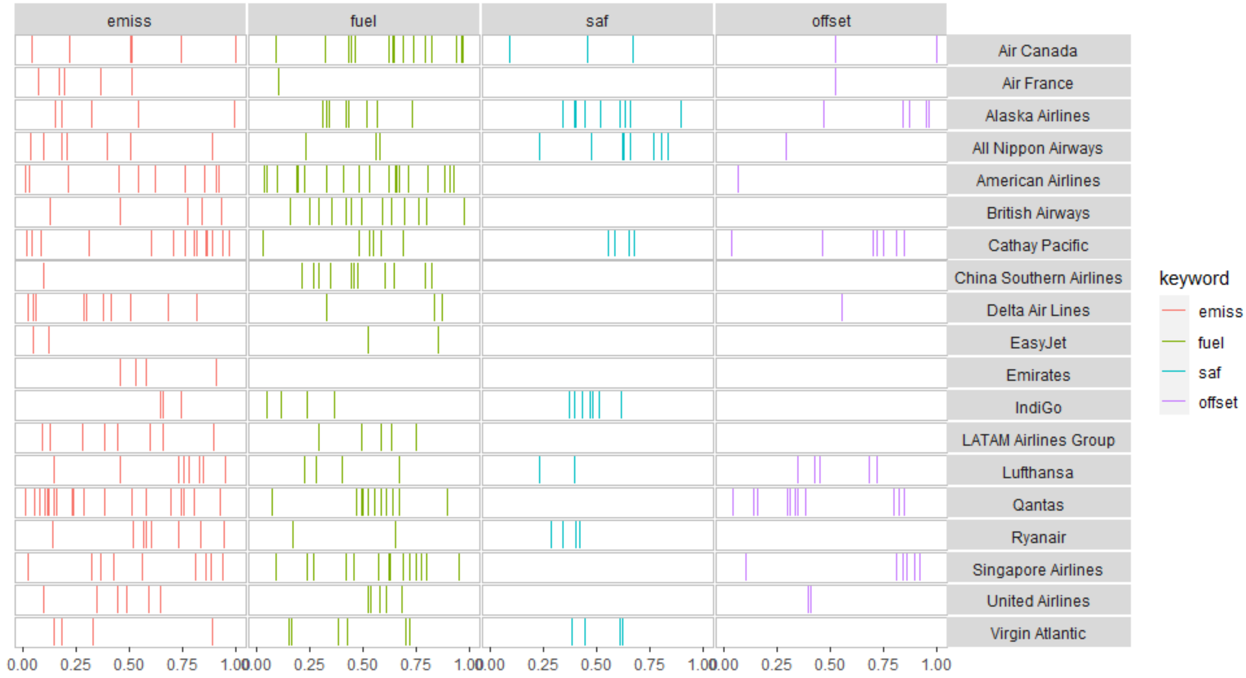

*Source: Climate Action Tracker*[3]

The net zero roadmaps released by global airlines have much in common, including continued innovations in the structural design of aircraft, optimised flight paths, improved propulsion to increase fuel efficiency, ground fleet electrification and carbon offsetting. But it is sustainable aviation fuel (SAF) that will do the heavy lifting in reducing the carbon emissions of airlines around the world over the coming decades. We looked at the net zero carbon announcements made by the world's biggest airlines. The results are shown below in Figure 3, and found that 'fuel' was the second most frequent word used by the airlines in their net zero announcements ('emissions' was the most used word). This high frequency highlights fuel as the source of emissions as well as the solution. We also counted the frequency of 'saf' and 'offset' and as Figure 3 shows, both terms were used more selectively and in a more concentrated way throughout the net zero announcements.

As individual airlines have committed to net zero by 2050, so too has the IATA. Unsurprisingly, IATA's strategy is highly consistent with the pathways described by the major global airlines and include abatement via sustainable aviation fuels, new aircraft technology, more efficient operations and infrastructure, and eventually the development of zero emission electric and green hydrogen powered flight. Further, IATA state that any emissions that cannot be avoided will be eliminated by carbon capture and credible offsetting, meaning carbon offsets that permanently reduce emissions and cannot be reversed[4]. We note that while carbon capture technology may become viable in the future, for now it is not accessible for carbon reduction.

[3] https://climateactiontracker.org/sectors/aviation/
[4] https://www.iata.org/en/pressroom/2021-releases/2021-10-04-03/

Figure 3 – Content Analysis of Net Zero Announcements




*Source: Whitehelm Advisers*

Electrification will be the key to global energy transition but for aviation it is a tricky proposition and likely to only play a meaningful role in decarbonising the aviation sector over the very long term (likely post 2050). Currently, batteries used by other types of transport are too expensive, too heavy and don't have the capacity required to power a passenger aircraft, particularly during take-off. Of course, this will change, and we are likely to see hybrid aircraft flying short-haul routes first and perhaps some medium haul routes by 2050. In fact, in July this year United Airlines announced its intention to buy up to 100 small, 19-seater electric planes known as ES-19's currently being developed by Heart Aerospace[5]. ES-19's will have a maximum range of up to 400km and are due to be certified for commercial flight by 2026 making them fit for use on short-haul flights. However, wide scale use of alternative propulsion technologies for aircraft including electricity and hydrogen is still decades off, with the European Union considering it unlikely that hybrid, full electric or hydrogen powered aircraft will account for a substantial share of its airline's fleets before 2050.

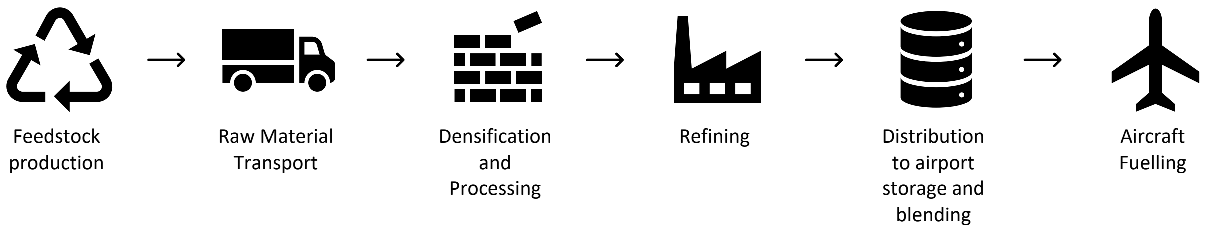
So, while there are multiple levers to be used by airlines to reduce carbon emissions, the bottom line is that SAF will be the most likely pathway that gets the aviation industry to net zero by 2050 in a way that does not rely too heavily on offsetting. Moreover, SAF is recognised as '*perhaps the single largest opportunity to meet and go beyond the industry's 2050 goal*'[6] in the Waypoint 2050 report published by the Air Transport Action Group (ATAG), a member organisation that includes companies from all aspects of the aviation industry including airports, airlines, navigation providers and manufacturers. This pivotal analysis provides three pathways to net zero by 2050, which between them rely on somewhere between 330-445 Mt of SAF by 2050.

[5] https://heartaerospace.com/
[6] https://aviationbenefits.org/environmental-efficiency/climate-action/waypoint-2050/

# WHAT IS SUSTAINABLE AVIATION FUEL?

Sustainable aviation fuel, or SAF as it is known, is an umbrella term for aviation fuels that are not derived from fossil fuels. There are currently two types of SAF, advanced biofuels produced from biomass including vegetable oils, plant materials and animal waste, and synthetic aviation fuels. SAF is a 'drop-in fuel', meaning it conforms to existing petroleum derived hydrocarbon fuels (diesel, gasoline, kerosene etc) specifications and can be blended with conventional jet fuel and re-certified as Jet A or Jet A-10 without the need for costly engine modifications or any change to infrastructure. We provide a very simplified, feedstock and technology agnostic description of how SAF is produced in Figure 4 below.

Figure 4: From Feedstock to Fuel Tank – Simple Diagram of SAF Production




Safety considerations are paramount when it comes to aviation fuel. Any new aviation fuel must be certified by the American Society for Testing Material (ASTM) before it can be used in a commercial flight. Currently, there are seven technology processes that produce alternative aviation fuel (AAF) that have been approved by the ASTM D7566 standard (the Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons, the standard that regulates the technical certification of SAF). These technologies are described in Table 1 over the page, which includes the maximum blending amount and the primary feedstocks used in production.

Table 1: AAF Production Technologies Approved by ASTM D7566

| ANNEX | TECHNOLOGY | ABBREVIATION | PRODUCTION PLATFORM | MAXIMUM BLENDING (%V/V) | ASTM APPROVAL YEAR | FEEDSTOCKS |
|---|---|---|---|---|---|---|
| 1 | Fischer Tropsch synthesized isoparaffinic kerosene | FT-SPK | Gas-to-jet | 50% | 2009 | Natural gas*, coal*, biomass. |
| 2 | Hydroprocessed fatty acid esters and fatty acids | HEFA-SPK | Oil-to-jet | 50% | 2011 | Fats, oils, greases, oilseed crops, algae. |
| 3 | Synthesized iso-paraffins | SIP | Sugar-to-jet | 10% | 2014 | Sugar cane juice. |
| 4 | Synthesized kerosene | FT-SKA | Gas-to-jet | 50% | | Natural gas*, coal*, biomass. |
| 5 | Alcohol to jet | ATJ-SPK | Alcohol-to-jet | 50% | 2016 | Sugarcane, sugar beet, sawdust, lignocellulosic residues (straw) |
| 6 | Catalytic Hydrothermolysis Jet fuel | CHJ | Oil-to-jet | 50% | 2020 | Waste oils, energy oils. |
| 7 | Hydroprocessed Hydrocarbons-synthesized isoparaffinic kerosene | HH-SPK or HC-HEFA | Oil-to-jet | 10% | 2020 | Oils produced from (botryococcus braunii) algae |

* These feedstocks are not renewable and so cannot be used for SAF production but could be used to produce alternative aviation fuel (AAF) for military applications.

*Source: International Civil Aviation Organization (ICAO), IATA*

The key advantage of SAF is its low carbon footprint, with emissions profiles estimates from 18% all the way up to 95% lower than that of conventional jet fuel derived from fossil sources. The overall carbon saving is different depending on technology and feedstock, as quantified below in Table 2.

Table 2: Biofuel Carbon Emissions Savings vs Conventional Jet Fuels

| TECHNOLOGY | FEEDSTOCK | SAVINGS CO2E (%) |
|---|---|---|
| Gassification and Fischer-Tropsh | Energy crops | 85-90 |
| | Forestry residues | 95 |
| Pyrolysis | Forestry residues | 54-75 |
| Alcohol to jet | Corn | 37 |
| | Corn stover | 60 |
| | Sugar cane | 70 |
| Direct sugar to hydrocarbons (DSHC) | Sugar cane | 18 |
| Hydroprocessed esters and fatty acids (HEFA) | Oilseed rape, soy | 20-54 |
| | Jatropha | 37 |
| | Camelina | 46 |
| | Used cooking oil | 69 |

*Source: Imperial College London*

Currently, SAF makes up a miniscule portion of total aviation fuel used (less than 0.005% as per Figure 1) and the principal reason for this is cost; SAF is significantly more expensive than conventional jet fuel. The cost drivers include feedstock price, feedstock transportation costs, densification and storage and pre-treatment processes, all of which differ depending on the feedstock and technology. In addition, the SAF market is relatively small, meaning the production economies of scale available for other fuel types are not available.

The widespread production of SAF using biomass has important ethical implications in relation to indirect land-use change (known as ILUC). If SAF producers were willing to pay higher prices for feedstocks like oil seed, sugar and starchy crops including canola, soybean, sunflower, corn, wheat and sugarcane, landowners would be incentivised to move away from food production to meet demand, meaning the shift towards sustainable aviation fuel may result in an indirect sustainability cost relating to food production. This unintended consequence of a large shift towards biofuel would be particularly felt in developing countries including Indonesia, Malaysia and Brazil. Well-designed policy in relation to SAF production such as that being implemented in the European Union can address this unintended consequence by incentivising producers to use other abundant feedstocks including wood and wood wastes, municipal solid wastes and agricultural, forestry and livestock waste.

# REGULATORY CHANGES

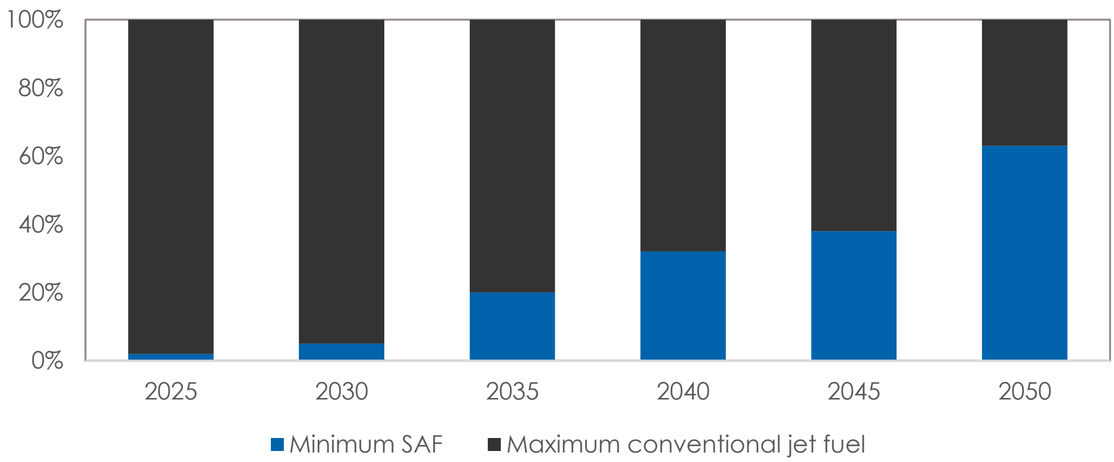
SAF production will not scale without government incentives and support. Currently SAF is uneconomic, costing somewhere between two and six times that of conventional fuel depending on the SAF production method. Indeed, in an industry where fuel comprises somewhere between 17-25% of operating costs, no commercial airline could afford to switch to such a high cost alternative without adequate incentive particularly following 18 months of devastating, COVID-19 related economic shutdowns and border closures that have left airlines cash-strapped and debt laden.

Further, airlines and aerospace and energy companies will be more likely to invest in nascent technology where they are confident that policy and regulatory risks are manageable. We now look at several jurisdictions around the world that are offering incentives for investment, starting with the United States where a major support package has recently been announced.

In September 2021, the Biden Administration announced a goal for all aviation fuel consumed in the United States to be sustainable by 2050; to put this in context, demand for aviation fuel in 2050 is forecast to be around 130 billion litres per year. In the nearer term, President Biden is seeking to dramatically increase the production of SAF to at least 11 billion litres by 2030 (equivalent to about 10% of current jet fuel uses), a move that would cut emissions by an estimated 20%. To get there, the Biden Administration has proposed a package of key incentives, including a US$1.50-$2 per gallon SAF tax credit for fuels that reduce lifecycle greenhouse gas emissions by at least 50%.

In July 2021, the European Union proposed a SAF blending mandate for fuel suppliers, requiring aviation fuel at all EU airports to comprise minimum amounts of SAF by the milestone dates described below in Figure 5. This proposal contains strict rules on the type of SAF that will satisfy the mandate, addressing the risk of ILUC we described earlier.

Figure 5: EU SAF Mandate Milestone Dates



The United Kingdom ran a consultation on a SAF mandate in 2021, with the deadline now passed and the results currently under consideration. In its Net Zero Strategy, the UK government committed GBP180 million of funding to support the development of UK based SAF plants aimed at enabling the delivery of 10% SAF by 2030[7].

Frustratingly, when we looked for information on what the Australian government was doing to incentivise the production of SAF, the most recent publication – a feasibility study of Australian feedstock and production capacity to produce sustainable aviation fuel[8] - was dated 2013. We contacted the Minister for the Environment Sussan Ley to enquire as to whether the Government was undertaking work in this area but have yet to receive a response.

[7] https://www.gov.uk/government/news/uks-path-to-net-zero-set-out-in-landmark-strategy
[8] https://arena.gov.au/assets/knowledge-bank/aviation-biofuel-report.pdf

# IMPLICATIONS FOR INFRASTRUCTURE INVESTORS

The decarbonisation of the aviation industry will undoubtedly open up opportunities for infrastructure investors across asset types, and public and private markets. In this next section, we take a close look at three quite divergent investment opportunities that we consider may appear as airlines head towards net zero.

## Airport Investors

Airports around the world are also decarbonising, and their pathway to net zero on scope 1 and scope 2 emissions is much smoother than for airlines. The scope 1 and 2 carbon footprint of an airport is overwhelmingly driven by the electricity they purchase, and this means the primary lever for emissions reduction is to switch to renewable power. This can be achieved by installing solar panels and/or battery storage onsite, on airport buildings and adjacent available land or by negotiating power purchase agreements for renewable power generated offsite. Other initiatives airports are implementing to reduce carbon emissions include electrification of ground transport, more efficient airport design to reduce aircraft taxing distances, increased resource efficiencies including waste and water, and installation of electric vehicle infrastructure like charging stations.

Emissions generated by aircraft in taxiing, take-off and landing are captured in the carbon footprint of airports as Scope 3 ('indirect' emissions). The decarbonisation of airlines will therefore reduce the airports Scope 3 emissions. As airlines progress towards net zero, so too will these Scope 3 emissions of airports however, importantly, the decarbonisation of airlines will not directly reduce the Scope 1 or 2 emissions of airports.

Currently targets made by companies and countries, including net zero pledges, have tended to focus on Scope 1 & 2 emissions, or so-called direct emissions where an entity has control. This means airlines have the greatest incentive to reduce the carbon emitted from their aircraft. But there is no doubt that quantum of Scope 3 emissions will come into sharper focus in coming years. For example, the TCFD framework recommends the disclosure of Scope 3 emissions 'where appropriate'[9], despite them being indirect emissions outside the control of the reporting entity. At this stage, airports engage with airlines on emissions, but many do not to quantify them in publicly available documents nor include them in targets and pledges. However, we consider it is only a matter of time before this practice changes.

The current airport business model is ultimately dependent on airlines achieving zero emission flight. Failure and delays in achieving this increases the risk of direct intervention to force a reduction in emissions such as limiting the number of flights, higher taxes and forced closures in favour of ground transport. This would have significant impacts not only on airlines, but also on an airport's aviation revenues. However, assuming that cost impacts in the next few decades are moderate rather than severe, and flight and passenger numbers are not severely curtailed, airports are less directly exposed than airlines. Airports generate a significant proportion of revenues from non-aviation activities, and it is possible to de-couple airport aviation revenues from passenger

[9] https://www.fsb-tcfd.org/recommendations/

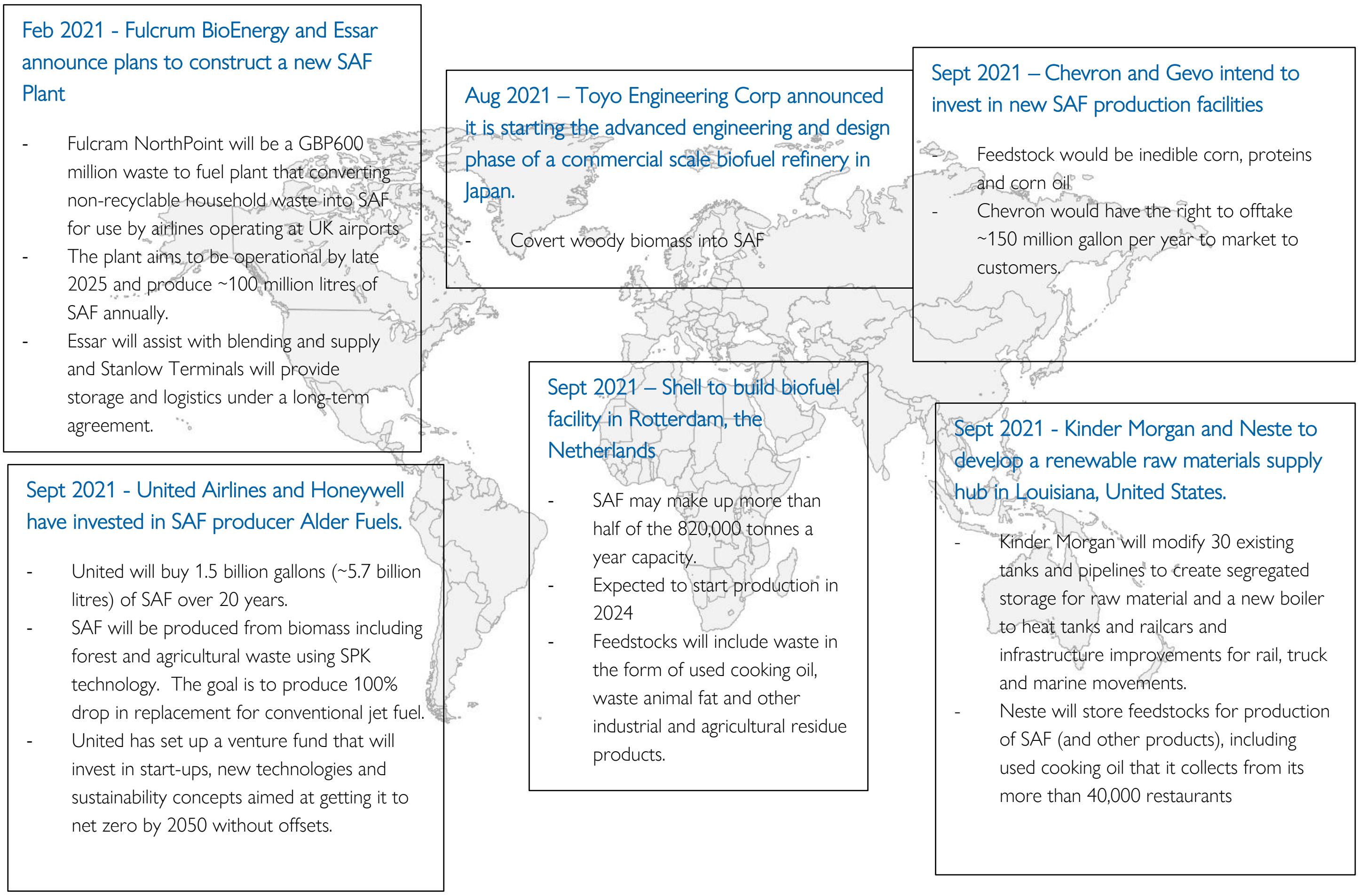
numbers, with alternative charging models likely to emerge.

Further, the sentiment we described at the start of this feature article holds for airports as well as airlines – there will be winners and losers. Regional airports that already face competition from rail and other transport routes, those that are not international flight hubs, will be more susceptible to volume reductions either driven by higher cost or by direct curtailment. Where a particular airport falls out on this spectrum will also depend on the quality of management, and the success or otherwise of the airlines that principally use their runways.

## Direct Infrastructure Investors

The scaling up of SAF production and use presents significant opportunities for investors in real assets. This is despite that one of the key advantages of SAF is that it is a drop-in fuel and as such is it is fully compatible with current infrastructure including pipelines, tankage hydrant systems and engines. Further down the transition pathway - decades from now - if hydrogen and/or electrification become incumbent propulsion technologies, significant new infrastructure will be required to accommodate these new fuel delivery systems. But for now, infrastructure investors are more likely to see opportunities to invest in new production facilities. Figure 6 below provides a snapshot of recent deal activity in this space. And looking ahead, we expect to see such projects increase in number and scale.

Figure 6: Recently Announced SAF Projects round the World



**Feb 2021 - Fulcrum BioEnergy and Essar announce plans to construct a new SAF Plant**

- Fulcram NorthPoint will be a GBP600 million waste to fuel plant that converting non-recyclable household waste into SAF for use by airlines operating at UK airports
- The plant aims to be operational by late 2025 and produce ~100 million litres of SAF annually.
- Essar will assist with blending and supply and Stanlow Terminals will provide storage and logistics under a long-term agreement.

**Aug 2021 – Toyo Engineering Corp announced it is starting the advanced engineering and design phase of a commercial scale biofuel refinery in Japan.**

- Covert woody biomass into SAF

**Sept 2021 – Chevron and Gevo intend to invest in new SAF production facilities**

- Feedstock would be inedible corn, proteins and corn oil
- Chevron would have the right to offtake ~150 million gallon per year to market to customers.

**Sept 2021 - United Airlines and Honeywell have invested in SAF producer Alder Fuels.**

- United will buy 1.5 billion gallons (~5.7 billion litres) of SAF over 20 years.
- SAF will be produced from biomass including forest and agricultural waste using SPK technology. The goal is to produce 100% drop in replacement for conventional jet fuel.
- United has set up a venture fund that will invest in start-ups, new technologies and sustainability concepts aimed at getting it to net zero by 2050 without offsets.

**Sept 2021 – Shell to build biofuel facility in Rotterdam, the Netherlands**

- SAF may make up more than half of the 820,000 tonnes a year capacity.
- Expected to start production in 2024
- Feedstocks will include waste in the form of used cooking oil, waste animal fat and other industrial and agricultural residue products.

**Sept 2021 - Kinder Morgan and Neste to develop a renewable raw materials supply hub in Louisiana, United States.**

- Kinder Morgan will modify 30 existing tanks and pipelines to create segregated storage for raw material and a new boiler to heat tanks and railcars and infrastructure improvements for rail, truck and marine movements.
- Neste will store feedstocks for production of SAF (and other products), including used cooking oil that it collects from its more than 40,000 restaurants

*Source: Tank Storage Magazine, Alder Fuels, Neste, Fulcram, Shell, Whitehelm Advisers*

## Natural assets

Natural asset development could become an innovative space for real asset investors as demand for credible carbon offsets grows. As we have discussed throughout this article, the aviation industry will be one of the hardest industries to decarbonise and offsets will be necessary right up to 2050. That companies include the word 'credible' when describing their offsetting strategy implies not all carbon offsets are equal and highlights the significant reputation risks associated with offsetting (both the strategy and implementation). Demand for offsets is set to escalate as companies who have promised to decarbonise approach milestone dates and real assets investors are well placed to meet some of this demand through natural asset projects.

Natural asset types and processes that could be harnessed for carbon removal include peatlands and wetlands, afforestation, reforestation and soil carbon sequestration. Wetlands are critical in mitigating climate change because they capture and store carbon. In particularly, peatlands and coastal systems store vast amounts of carbon both in plant biomass and especially in their soils. Protecting and restoring them will be critical in the world getting to net zero by 2050. Potential projects include peatland restoration using techniques such as rewetting and re-saturating would effectively decrease CO2 emissions and preserve carbon stocks. Restoring coastal wetlands has the potential to decrease GHG emissions, increase rates of carbon sequestration and build long-term carbon stocks[10]. Afforestation means planting trees where they did not previously grow while reforestation refers to the conversation of previously forested land back to forest. Finally, soil carbon sequestration means, in simple terms, restoring carbon to the soil achievable by changing agricultural practices.

We underline that natural asset projects that generate revenue from selling carbon offsets will only be credible with sound frameworks that ensure that the carbon sequestration is robust and long term. We further note the comments from the IPCC that '*land-based options that deliver carbon sequestration in soil or vegetation, such as afforestation, reforestation, agroforestry, soil carbon management on mineral soils or carbon storage in harvested wood products do not continue to sequester carbon indefinitely (high confidence)*' but that '*peatlands…can continue to sequester carbon for centuries (high confidence)*'[11]. Credible carbon offsets can only be generated by projects that are subjected to a rigorous system of management and verification, and that are trusted by investors and their stakeholders.

It is difficult to estimate the size of this so-called natural capital market, but the World Economic Forum has estimated that US$44 trillion or more than half of the world's total GDP involves activities that are moderately or highly dependent on nature[12]. The asset types that could fit into the definition of natural capital include agriculture, timber and water, which are very capable of generating a positive IRR already; in theory, unlocking carbon sequestration capability could slot in on top of this baseline return. But of course, valuing natural assets – literally valuing nature – is a challenging concept, insulting to some and practical to others. The possibilities of this market are enormous but so are the limitations and constraints. As a philosophy, it sits at the impact end of the investment spectrum, but we are certainly not ruling out that such investments might align to more than just the sustainable development goals in a diversified infrastructure portfolio. As always, the merits of investing in natural assets will depend on the individual deal characteristics and regulatory developments.

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[10] https://www.ramsar.org/sites/default/files/documents/library/bn10_restoration_climate_change_e.pdf
[11] https://www.ipcc.ch/site/assets/uploads/sites/4/2020/02/SPM_Updated-Jan20.pdf
[12] https://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf

# CONCLUSION

Decarbonising flying is no easy task. Despite this, airlines around the globe have signed up for net zero by 2050 and are now nutting out what their credible pathways look like. Across the industry, there is broad consensus on what needs to be done – widespread use of SAF alongside credible offsetting while this ramps up, continued implementation of other efficiencies and ultimately a shift to electric and hydrogen propulsion technology. The decarbonisation of airlines will in turn reduce the carbon footprint of other aviation companies, including airports, who currently account for aircraft emissions relating to take off and landing in their Scope 3 ledgers.

SAF will only become economic and scalable with government incentives and regulatory certainty. Aviation has been one of the hardest hit sectors from COVID-19 and despite enormous government assistance packages, airlines the world over are cash-strapped and debt-laden. Flying has restarted (even in Australia, with Qantas announcing its first long-haul scheduled flight in 18 months to take off this month) and long-term passenger forecasts paint a rosy picture for demand out to 2050. But airlines are a low margin business with fuel comprising somewhere between 17-25% of operating costs. A spike in the cost of fuel due to a move towards SAF, whose current price is 2-6 times higher than conventional fuel, would have implications for profitability, tickets costs and overall passenger numbers.

The trajectory for airlines to get to net zero has a fat tail, reflecting the fact that the industry is still powered by conventional jet fuel made from crude oil. Currently SAF makes up the smallest fraction of overall fuel usage; there is a long way to go before SAF comprises 65% of the overall fuel mix but this is certainly achievable by 2050. There are seven technologies that can be used to produce SAF and likely this number will increase as research and development continues. But in an industry where safety is paramount, any change to fuel specification will take time to implement.

SAF is a drop-in fuel and as such can use all existing infrastructure, including tanks, pipelines and engines. So, the role of real asset investors in the transition of aviation to net zero will play out in SAF production and longer term in the infrastructure that will be needed for aircraft propelled by hydrogen and electricity. There is also the potential for investors to participate in this transition through the investment in natural assets that generate the credible carbon offsets required by the aviation industry to hit interim and long-term carbon reduction targets.

Investors in the aviation sector will know too well that airlines currently have a hefty carbon footprint. While the path to zero emission flight is less clear than for other sectors, we do see that there is a way forward. Of course, there will be winners and losers and where particular companies fall will depend on the quality of management and their strategy.

# Disclaimer