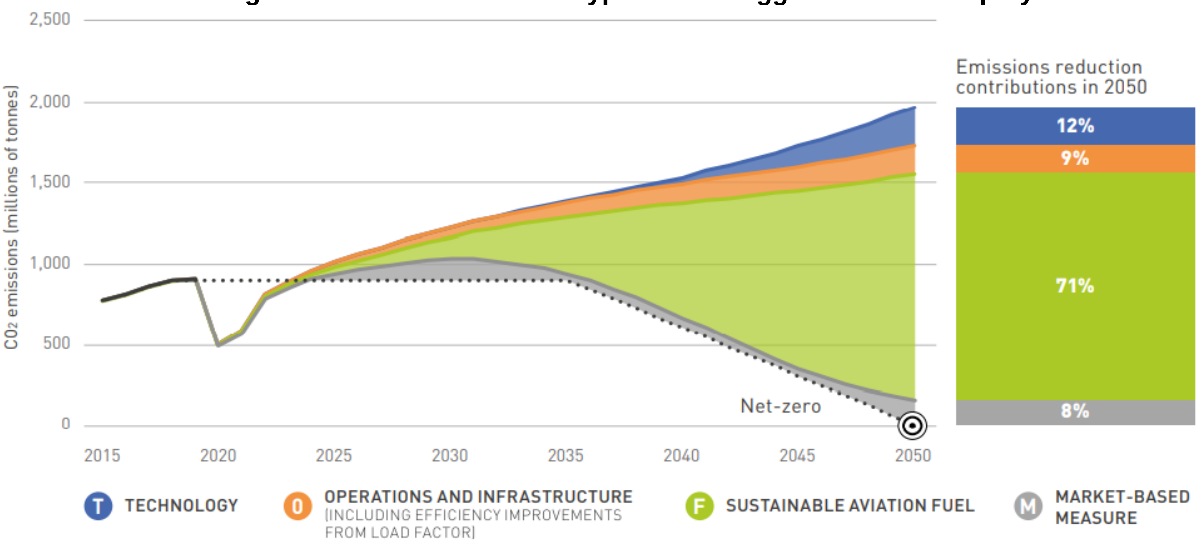
WaveStone ESG Report
Quarter ending June 2022

ESG Sector Spotlight – Airline Decarbonisation

In October 2021 members of the International Air Transport Association (IATA) voted in favour of a commitment to achieve Net-Zero carbon emissions from their operations by 2050, bringing the industry in line with the objectives of the Paris agreement to limit global warming to 1.5 degrees. We take a look at the various mechanisms available to the industry to achieve this goal and compare the Australian airline industries commitments to those of its offshore peers.

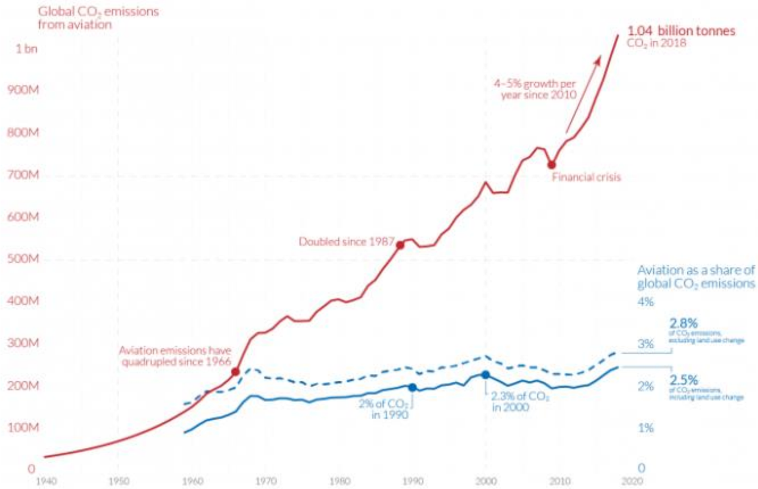
Factors contributing to Net-Zero under the Waypoint 2050 aggressive SAF deployment scenario



Source: Waypoint 2050 Report (www.aviationbenefits.org)

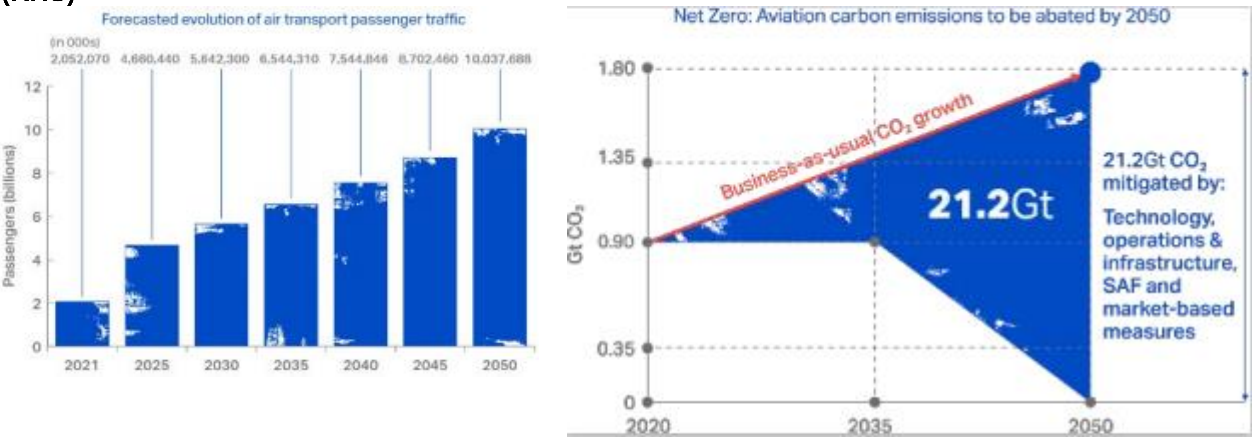
The aviation sector currently accounts for 2.5% of global CO2 emissions. Given the sector is difficult to decarbonise and typically grows at 3-4% per annum (Covid impacts aside), this contribution is expected to increase with time as other sectors decarbonise more quickly.

Global carbon dioxide emissions from aviation



Source: Our World in Data, Lee et al (2020), IEA and the Global Carbon Project.

IATA traffic forecast to 2050 (LHS) and Aviation industry CO2 emissions to be abated by 2050 (RHS)



Source: IATA, Waypoint 2050 (www.iata.org).

IATA assumes over 10 billion passengers will fly in 2050, covering a distance of 22 trillion revenue passenger kilometres. Without any intervention (keeping the current fleet and current level of operational efficiency), this activity would burn over 620 Mt of fuel, generating approximately 1.8 gigatons of carbon. In order to reach the target of Net-Zero carbon emissions by 2050, the industry will need to abate or offset these emissions. The industry plans to achieve its goal in part by modernising fleets and improving operational efficiency, but the bulk of the heavy lifting will need to come from a replacement of the fossil fuels used in propulsion. This is largely expected to be achieved via a broad-based adoption of Sustainable Aviation Fuel. As a drop in technology, it provides a readily adoptable solution given the current technical challenges associated with electric and hydrogen propulsion.

What options does the airline industry have to decarbonise

The lack of readily available decarbonisation solutions for aviation means the sector falls into the 'hard to abate' sector of the economy. Replacement fuels require a high fuel energy density given the forces required for take-off and sustained flight, and the development of alternative propulsion systems are as yet unable to solve for long haul travel or travel at scale. The industries decarbonisation opportunity set can be classified into 6 broad categories which we summarise below.

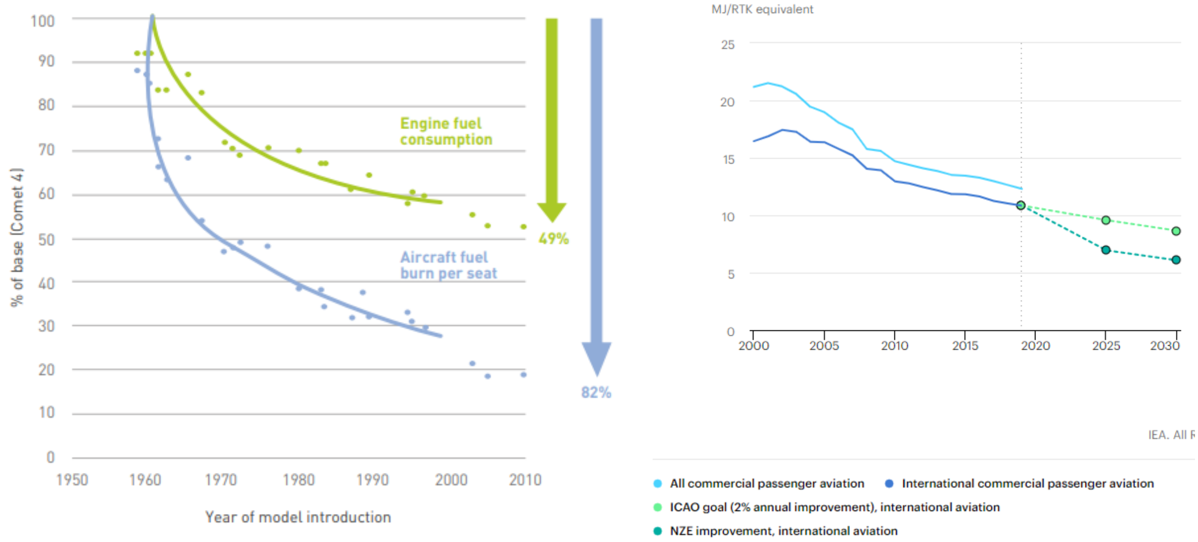
Investment in more efficient aircraft

The development of more efficient aircraft and engines have delivered an 80% improvement in aviation efficiency since the 1960's, as measured by the volume of fuel burn per seat. While improvements are ongoing, much of this efficiency gain was delivered early in the jet age with the IEA estimating the rate of fuel efficiency gain slowed to 1.9% per annum between 2010 and 2019.

Each generation of aircraft typically improves fuel efficiency further, with the current generation of new aircraft forecast to provide an immediate 20-25% efficiency saving compared to the prior generation. These efficiency gains are typically delivered through weight reduction (most recently via the use of composite materials) plus improvements in aerodynamics and engine efficiency.

With fuel bills representing about one quarter of operating expenses for an airline, there is a significant incentive for airlines to adopt new technologies to reduce fuel consumption. However, the rate of adoption will need to be weighed by airlines against the useful life (20-25 years) and significant capital cost of net airframes, which typically stretches into the hundreds of millions.

Fuel efficiency over time (LHS) and Energy intensity of under a Net-Zero Scenario, 2000-2030 (RHS)



Source: IEA – Aviation: Tracking Progress 2021 (LHS) and Waypoint 2050 (RHS)

Improved operational efficiency

Operational and technical solutions can be used to reduce fuel consumption and maximise efficiency in airline and airport operations. Some examples of these sorts of initiatives include:

- use of data and analytics to optimise flight paths, schedules and load factors;
- refinement of air traffic control systems to minimise taxiing and tarmac idle times; and,
- collaboration with airports to implement renewable alternative power sources at gates and on tarmac parking to avoid the need for engine driven auxiliary power.

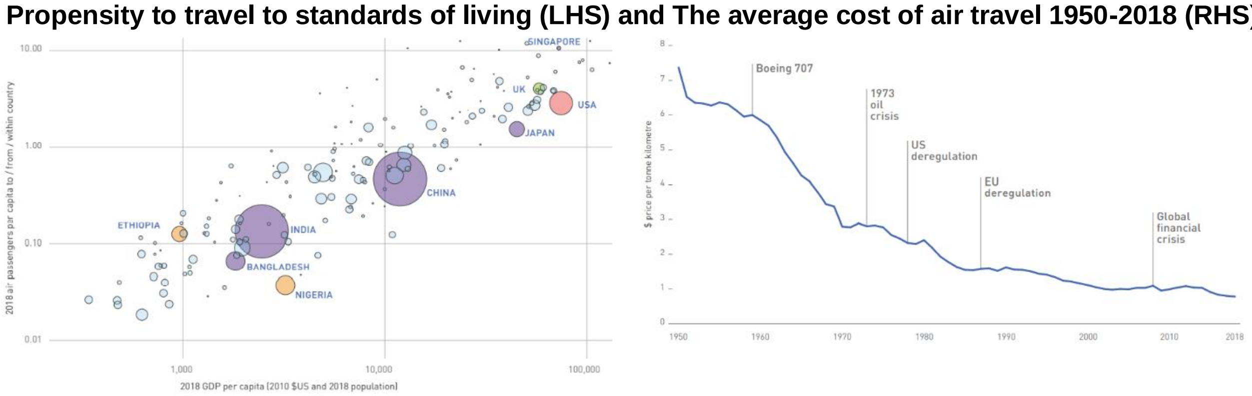
Regulatory regimes have a role to play here too with airline routings significantly influenced by where and how often inter country air service agreements allow flights as opposed to what may be the most efficient routing. A current example of this is Russia's ban on airlines from 36 countries, including all 27 members of the EU from flying to, from and over the country.

While operational initiatives on their own will not be sufficient to meet the industries Net-Zero goal, they can be implemented at scale faster than the aircraft-level technologies (which are constrained by development, testing, approvals and the rate of entry of aircraft into fleets) and thus could be a larger contributor to emissions reduction in the near term.

Demand reduction and alternative transportation modes

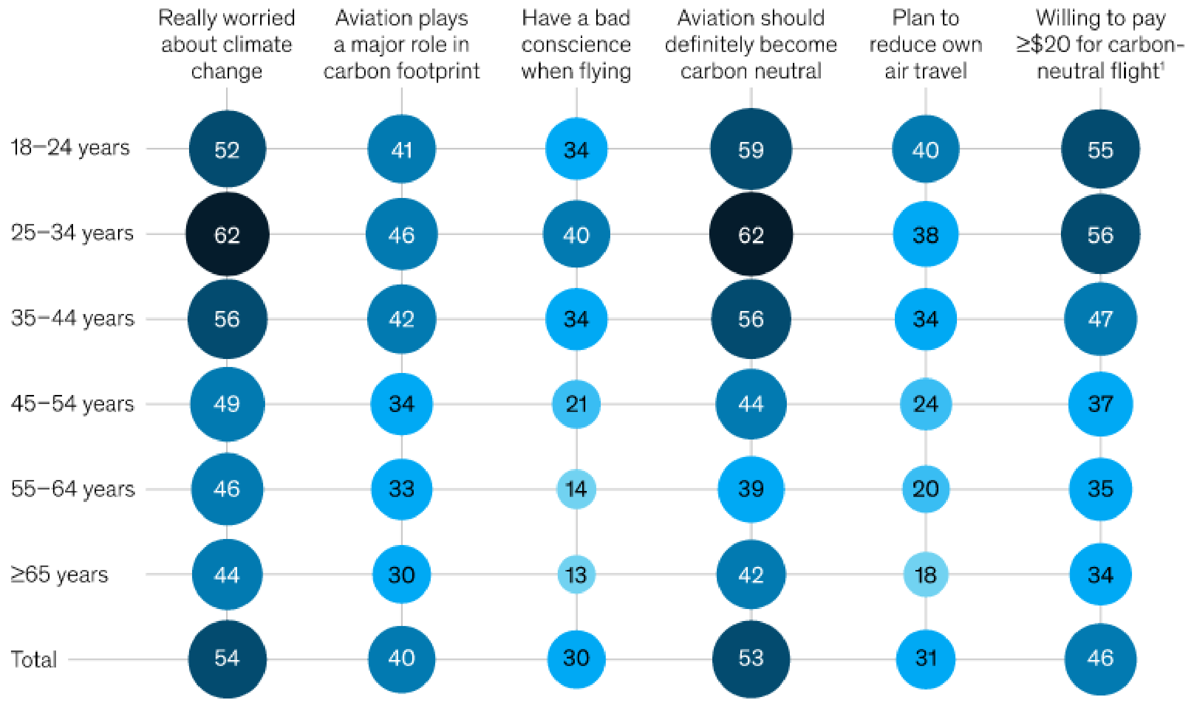
The potential for a reduction in the demand for air travel is also possible when considering potential decarbonisation scenarios. Air traffic has grown significantly as the cost of flying has fallen and wealth and living standards have grown. A more aggressive decarbonisation pathway has the potential to be inflationary to ticket prices which could slow this growth. Equally, carbon considerations may be factored into destination choice and could weigh on the desire to undertake air travel.

Propensity to travel to standards of living (LHS) and The average cost of air travel 1950-2018 (RHS)



Source: Waypoint 2050 (www.aviationbenefits.org)

Younger airline customers are more concerned about climate change
Attitudes toward carbon-neutral flying, by age group, % of respondents



Source: McKinsey Clean Sky Survey, July 2019.

For shorter distances other transport modes such as high-speed trains could substitute, however longer haul travel will be more difficult to displace. With approximately 17.5% of aviation CO2 emissions coming from flights under 1,000km, substitution of short haul flying could have a meaningful impact on industry emissions. There will be a limit to this substitution though as approx. 65% of these shorter flights take place outside of Western Europe, Japan or China (Waypoint 2050), where the opportunities for rail replacement are currently more limited.

Offsetting and Carbon Capture and Storage
The basic idea underlying flight carbon offsets is that purchasers can pay for an equivalent amount of CO2 to be sequestered as that emitted by an aircraft, thereby neutralizing a flight's climate impact. It is a key tool in aviation's plans to reach Net-Zero by 2050. Historically, offsets have been marketed to individuals on a trip-by-trip basis. Uptake of this option has however been limited with QAN for instance indicating 10% of its customers elect this option. A National Geographic survey also indicated only 8% of American's have ever elected this option.

In 2016, the International Civil Aviation Organization (ICAO) looked to address the issue of rising emissions from the sector by adopting a global market-based mechanism, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). The CORSIA aim was to cap international aviation's CO2 emissions at 2019 levels. The program requires that any remaining emissions above the cap, after the implementation of other efficiency initiatives (such as aircraft design, SAF, air traffic management), be offset by the airline. This will shift a responsibility for offsetting onto airline operators, who must purchase wholesale offsets to cover annual emissions growth above the CORSIA baseline.

Unfortunately, there are some well recognised problems with carbon offsetting. In theory, if every tonne of anthropogenic CO2 emitted around the world were genuinely offset, we would reach Net-Zero. In practice, the framework governing offsets can be problematic and poorly administered and there can be variability in the effectiveness of offsets purchased from different projects. Some of the criticisms include:

- capture term - when fossil fuels are burned it releases into the atmosphere carbon that has been stored (in the Earth's crust) for millions of years. Many offsets rely on biological carbon sequestration which can fail to keep carbon out of the atmosphere for long. A recent example of this occurred in America where an estimated 153,000 acres of forests that were a part of

California's carbon-offset project were burned by wildfires and a further 100,000 acres were lost in Oregon (www.nytimes.com/2021/08/23/us/wildfires-carbon-offsets.html).

- lack of additionality - In order to qualify as a genuine carbon offset, the reductions achieved by a project need to be "additional" to what would have happened if the project had not existed. Not all projects meet this quality threshold and assessment of additionality itself can be subjective.
- displacement - there are also concerns that carbon-offsetting projects that result in the acquisition of large tracts of land have displaced indigenous people from their lands.

Ideally airlines should minimise their reliance on offsets. Indeed, the airline industries expectation is that offsets are not primarily relied on to meet the goal, however there will be some emissions that offsets could help mitigate and these will be needed to meet the Net-Zero 2050 goal. High-quality offsets are likely to be key to aviation meeting its climate obligations until the sector is able to transition to the wider use of renewable energies.

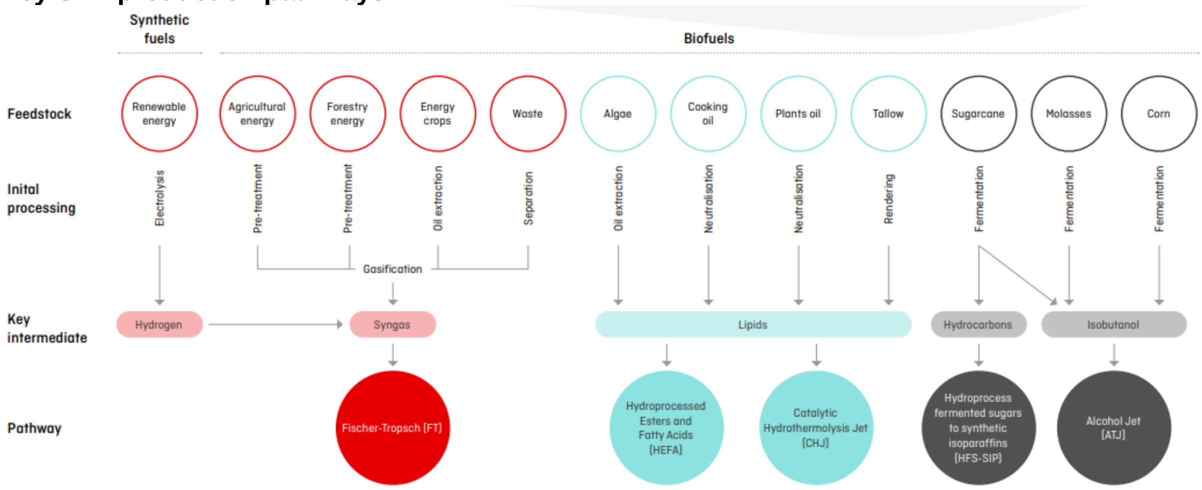
Sustainable Aviation Fuel (SAF)

Sustainable Aviation Fuel is a non-fossil derived aviation fuel. It is made from sustainable sources such as plant oils, algae, fats, greases, waste streams, agricultural residues, captured CO2 and Hydrogen.

Currently there are three main ways to make SAF: from hydroprocessed esters and fatty acids (HEFA), Fischer-Tropsch synthetic paraffinic kerosene (FT-SPK), and alcohol-to-jet synthetic paraffinic kerosene (ATJ-SPK). HEFA based SAF is the only product that is commercially available today and has powered over 95% of all SAF flights to date (skynrg.com/sustainable-aviation-fuel). Over time additional commercial pathways (feedstock/technology) are expected to be developed.

SAF made from renewable and waste resources has the potential to deliver the performance of petroleum-based jet fuel but with a fraction of its carbon footprint. Life Cycle assessment methodologies suggest the use of SAF could deliver up to an 80% reduction in greenhouse gas emissions compared to fossil jet fuel. This reduction in CO2 emissions versus conventual fuel stems from the amount of carbon that is absorbed during the growth in the feedstock and varies depending on the feedstock and production pathway used.

Key SAF production pathways



Source: Qantas.

Estimate of lifecycle emissions of SAF - based on feedstock and pathway

Fuel Type	Carbon Intensity (gCO2e/MJ)	GHG Savings (%)
Soy oil HEFA	177.8 to 184.9	N/A
Palm oil HEFA	216.8 to 267.5	N/A
Palm fatty acid distillate (PFAD)	232.4	N/A
Used cooking oil (UCO) HEFA	19.4	78%
Municipal solid Waste (MSW) FT-SPK	14.8	83%
Agricultural residue FT-SPK	6.3	93%
Energy crop FT-SPK	-0.3	100%
Power-to-liquids (solar) FT-SPK	13.5	84%
Corn grain alcohol-to-jet (ATJ-SPK)	79.0	11%
Sugarcane alcohol-to-jet (ATJ-SPK)	65.1	27%
Agricultural residue alcohol-to-jet (ATJ-SPK)	14.9	83%
Energy crop alcohol-to-jet (ATJ-SPK)	20.3	77%
Molasses synthesised isoparaffins (SIP)	47.0	47%

Source: International Council on Clean Transportation (Working paper 2019).

The airline industry's decarbonisation plans are heavily reliant on the use of SAF to achieve Net-Zero by 2050. Depending on the decarbonisation pathway that ultimately evolves, it is expected that 53-71% of the emissions reduction in flying by 2050 will come from widespread deployment of sustainable fuel (Waypoint 2050).

SAF's advantage is that it is theoretically a drop in solution allowing airlines to reduce emissions with no modifications or investments in engines or airport infrastructure required. At this stage the current allowable limit for commercial flight is a 50:50 blend with traditional Jet Fuel, albeit with further testing and time this ratio is expected to rise. 100% SAF flights have been demonstrated as possible in the more recent generation of engines with United Airlines using 100% SAF in a commercial passenger flight in 2021 (100% SAF was burned in one engine and traditional jet fuel in the other effectively loopholing the maximum 50% blend limit). The current conservatism regarding mix relates in part to the importance of aromatics within fossil fuels for their lubricating properties. This is less of an issue with the most recent generation of engines.

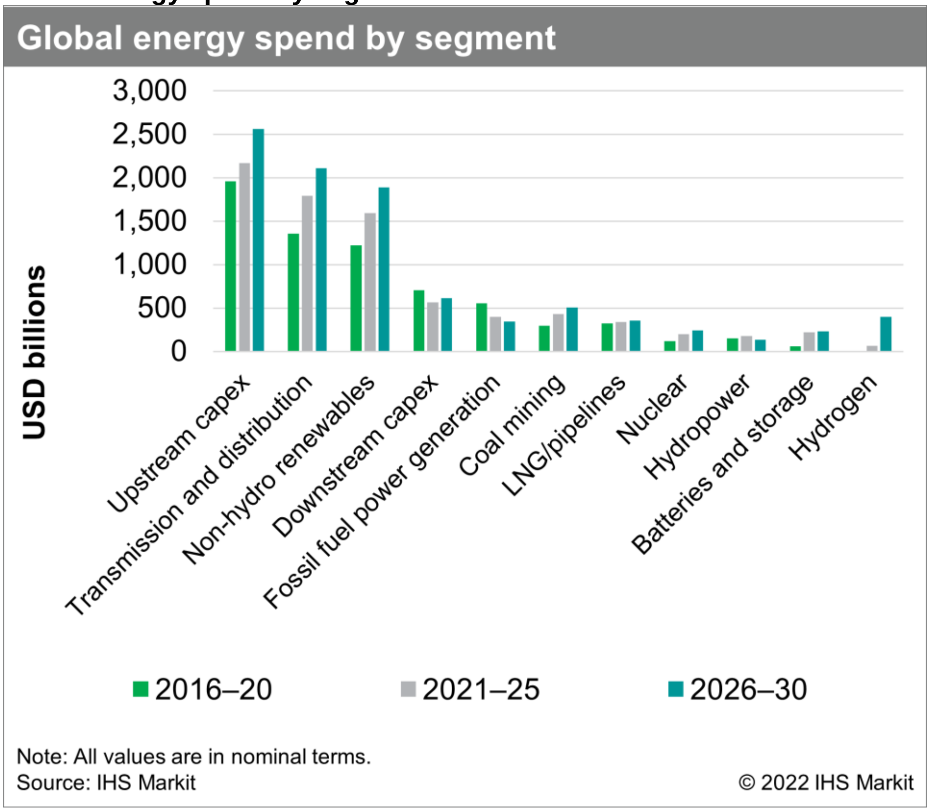
SAF has other non-CO2 benefits. As SAF's contain no sulphur or aromatic hydrocarbons, the exhaust is largely free of the particulate matter that catalyses water vapour to condense into contrails, which have been shown to have a warming effect on the planet.

<u>Two key issues the industry will need to address in order to drive broad adoption of SAF are supply and price.</u>

About 6.5 million litres of SAF are in use annually today which is less than 0.1% of the world's total consumption of Jet Fuel. IATA estimates that to reach Net-Zero by 2050, the aviation sector could require as much as 555 billion litres of the fuel (under its aggressive SAF deployment scenario) – a staggering c.85,000 times increase in production from today.

Significant investment will be required to scale up production to meet this anticipated need. IATA estimates the capital cost of this investment could be US $1.1-1.45 trillion over the next 30 years. Although this is a significant sum in totality, when annualised is only about 6-10% of typical downstream oil and gas capex.

Global energy spend by segment

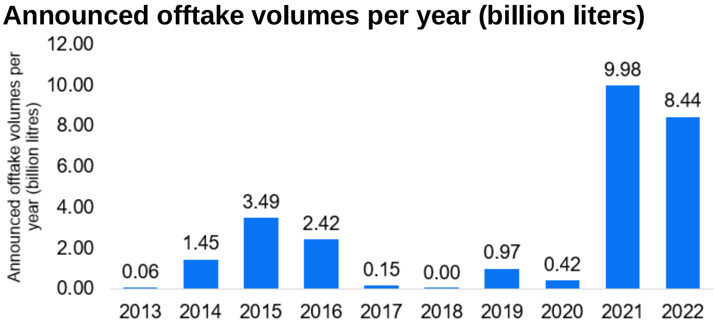


Source: https://ihsmarkit.com/research-analysis/global-energy-sector-capex-strong-rebound.html

Getting the appropriate feedstock and supply chains in place will take time. The development of a scaled SAF industry will depend on factors including the evolution of technology and its ability to scale and commercialise, the abundance and location of the underlying resource (cooking oil and grease, waste, agricultural products, algae and so on), its collection cost and environmental risks such as deforestation and monoculture development plus fuel versus food challenges for some feedstocks. Each SAF category also has a differing lifecycle carbon cost which will need to be weighed.

Attracting government support on the path to achieving industry scale, and/or the imposition of mandates, will help drive development. Industry support mechanisms have already accelerated uptake in the regions in which they are offered. California for instance is considered the most competitively priced market for SAF which is in large part due to the c.$1.25 (varies based on carbon intensity) economic incentive for SAF under the California Low Carbon Fuel Standard. Our discussions with Qantas indicate their realised cost of SAF ranges from approximate parity to traditional jet fuel in California to about 4x the cost in Australia. The primary difference being a lack of subsidies and support for SAF production in Australia. QAN has signed with BP in the UK at about 2x the cost of traditional fuel.

Announced offtake volumes per year (billion liters)



Source: International Civil Aviation Organisation.

Major milestones in SAF adoption by the aviation industry

Source: spglobal.com.

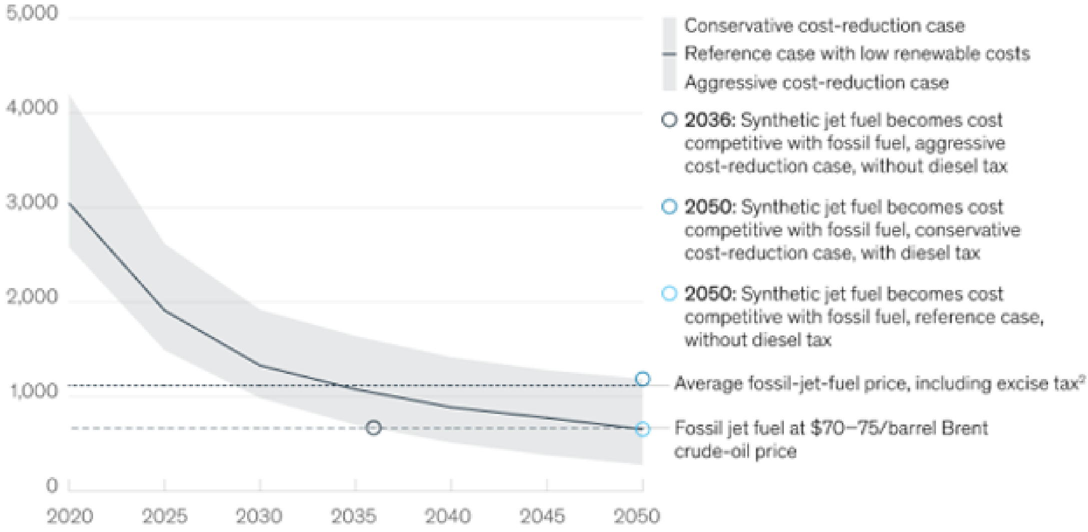
The cost of SAF is expected to reduce over time. Waypoint 2050 projections suggest that if a carbon cost is included, the price of SAF could come within an acceptable margin of fossil jet fuel. As we have seen in other renewable industries (such as wind and solar), government support in the initial development and scaling period could help establish SAF as the basis for the industry's longer term energy transition. Indeed, the current energy crisis highlights the energy security and price volatility benefits that could arise from diversification away from traditional fossil fuels.

Profitability within the global airline industry can be problematic to achieve with consistency and cost control can be a large determinant of outcomes. Capital, in this case aircraft, are easily transferable resulting in fierce competition amongst airlines with cost differentials between airlines playing a major role. Fuel costs, and even hedging strategies, are an important component of this. Cost is a particular concern for the uptake of SAF, which currently has a much higher cost than conventional fossil fuels. The key for airlines will not only be in finding customer cohorts prepared to pay for a greener solution but also defending their relative cost position which is easier when industry participants approach decarbonisation hand in hand. The sectors decarbonisation roadmap outlined within Waypoint 2050 provides a potential roadmap to this end. It will also aid planning decisions relating to safety and the investment in supporting infrastructure, which within aviation, is often shared (i.e airports).

If the issues surrounding supply and pricing of SAF can be addressed, a transition to SAF has the potential to benefit the industry by providing a greater geographic diverisfication in fuel sources. Economic benefits could also be realised through the reduction/elimination of the pricing volatility typically seen in traditional fuel sources.

Hypothetical cost curve for synthetic jet fuel as compared to fossil jet fuel

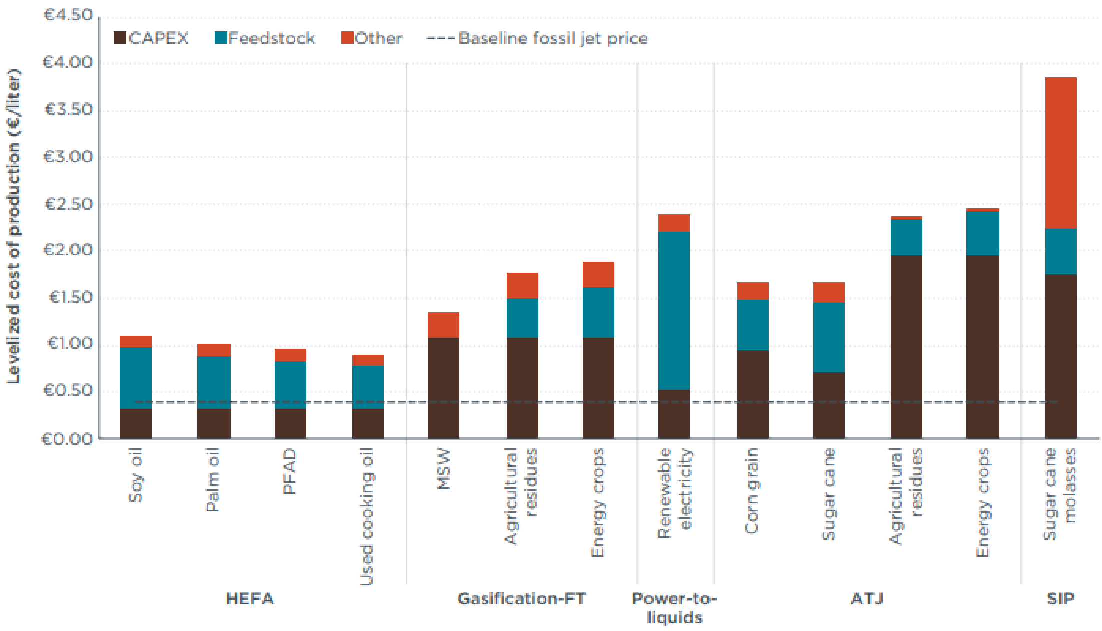
Cost of synthetic-jet-fuel production, $/metric ton, 2019[1]



[1]Costs of synthetic fuel produced in a facility built in the corresponding year. 1 metric ton = 2,205 pounds.
[2]Assumed similar to EU diesel tax for road use ($0.50/liter).

Source: Energy insights, McKinsey.

Comparison of curent levelised costs of production for alternative jet fuel conversion pathways



Source: https://theicct.org/sites/default/files/publications/Alternative_jet_fuels_cost_EU_20190320.pdf

Potential measures for spurring sustainable aviation fuel production and growth

Source: How airlines can chart a path to zero-carbon flying (Mckinsey.com)

<u>Emerging technologies</u>
Longer term new solutions are expected to evolve that could eliminate CO2 emissions from flight. The two most commonly referred to are Hydrogen and Battery electric powered aircraft.

Battery powered aircraft have been proven to fly small distances with a small number of passengers. Battery technology is limited in its application to aviation by the energy density required to achieve take off and that batteries, unlike fuel tanks, do not get lighter during flight. Hybrid-electric concepts have the potential to address this issue, with a combustion and electric system used in take-off to provide maximum thrust and the combustion engine throttled back for cruise and descent. Hybridisation is expected to form an intermediate step for larger airplanes toward electrification. Waypoint 2050 envisages battery deployment in small aircraft from 2030, with the possibility of lager aircraft from 2040.

Hydrogen powered flight is showing slightly more potential with Airbus planning to develop for service from 2035, a set of short-haul (<3,500km) aircraft capable of carrying up to 200 passengers (www.iea.org). Hydrogen can be used for propulsion to replace jet fuel or in fuel cells as an electrical power source. The limitation with hydrogen lies in its lower energy density, for instance, while the weight of hydrogen is 3x lower than jet fuel with the same amount of energy, its volume (even in liquid form) is 4x larger. The use case for hydrogen also needs to solve for availability at scale and the need for new supply infrastructure. Aside from the above technical issues all new technologies will face safety scrutiny and testing, training and potentially new supporting infrastructure which will slow their adoption.

Summary of potential emission reduction pathways for the aviation sector

Cost buckets	Primary actors involved
Research into new aircraft, engines and supporting technologies (batteries, hydrogen storage, etc)	» Aircraft and engine manufacturers » Research institutions » Government support
Development, industrialisation and certification for new architecture aircraft, engines and systems	» Aircraft and engine manufacturers » Government support
Purchase and operationalisation of new aircraft (training of flight and cabin crews, maintenance, etc)	» Airlines
Deployment of new air traffic management technologies and airspace infrastructure design	» Air navigation service providers
Installation of fixed electrical ground power at all airport gates	» Airports
New distribution systems for green electricity for aircraft supply, hydrogen and low-carbon energy at airports	» Energy providers » Airports » Government support
Scale-up of sustainable aviation fuel production facilities	» Airlines » Energy providers » Government support
Research for new sources of sustainable aviation fuel	» Research institutions » Government » Energy producers / providers
Emission reductions purchased from 'out-of-sector' projects to compensate for unavoidable CO_2 emissions in aviation.	» Airlines » Governments (for policy and accounting)
'Offsetting' opportunities such as forestry, natural carbon sinks and novel approaches such as carbon capture or direct air capture must be matured and brought to market	» Carbon markets » Governments » Airlines and airports (as purchasers)
Research on understanding the impact of non-CO_2 aviation emissions	» Research organisations (with government support) » Aircraft and engine manufacturers » Airlines

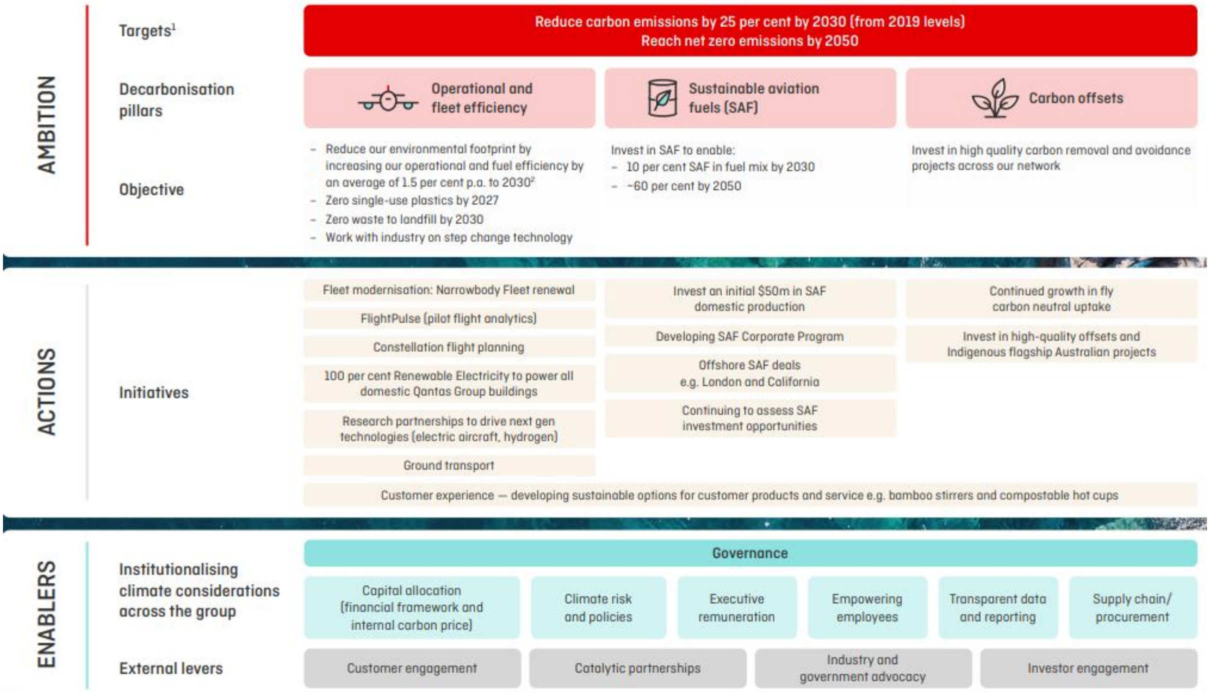
Source: IATA, Waypoint 2050.

Qantas Group Climate Action Plan

In 2019 Qantas committed to placing a cap on their emissions at 2019 levels and announced a target of Net-Zero emissions by 2050. More recently in March 2022, QAN released an interim target to cut carbon emissions by 25% by 2030 (from 2019 levels).

QAN plans to achieve its goal by increasing the use of sustainable aviation fuel to 10% of its fuel mix by 2030 and 60% by 2050. It also aims to increase the fuel efficiency of flying by 1.5% a year. Carbon offsets will be used to meet any shortfall with QAN committing to investment in high-quality projects (in recognition that offsetting can be problematic) and including those supporting indigenous projects. Other decarbonisation initiatives include a commitment to sending zero waste to landfill by 2030 and shifting electricity usage within domestic QAN buildings to 100% renewable energy.

Summary of QAN's Climate Action Strategy



Source: Qantas Group Climate Action Plan.

One point with noting is QAN's commitment to 10% SAF use by 2030 despite 70% of its fuel being sourced in Australia and the current lack of a SAF industry in this country. QAN has allocated $50m of seed investment to assist in the development of new projects and expects that with time, and Government and other domestic airline support, a SAF industry will develop within Australia. Even if this doesn't happen QAN believes its SAF supply contracts in California and the UK will be of sufficient volume to meet its 10% 2030 target.

We have compared the sustainability targets of QAN to selected airlines globally. While most airlines are making a Net-Zero 2050 commitment (in line with IATA) not all have articulated a plan for getting there. At this stage, Qantas's targets appear largely consistent the efforts being made by other top tier carriers globally (see tables below), which lowers the risk for the airlines as it should deliver a greater level of cost parity through the transition than a less co-ordinated approach.

Undertaking a carbon transition is a necessity but also an additional risk that airlines will need to manage in what is already a complex operating environment. The key question we have for airline operators is how they plan to balance the inflationary impact of sustainability initiatives against customer propensity to pay and the implications of relative competitive positioning arising from both action (higher costs/capex) or inaction (loss of customers looking for a better carbon solution and/or higher taxes as a relatively higher carbon emitter).

Analysis of global airline transition pathway initiatives, pledges and interim targets: Australia & NZ

Airline	2050 Pledge	Transition Pathway Initiatives, Pledges and Interim Targets
Air New Zealand	Net Zero 2050	10% of Air New Zealand's total fuel uplift to be SAF by 2030
Qantas	Net Zero 2050	25% less CO2 emissions by 2030 (vs 2019) 10% SAF by 2030 & 60% SAF by 2050
Rex	None	
Virgin Australia	Net Zero 2050	

Americas

Airline	2050 Pledge	Transition Pathway Initiatives, Pledges and Interim Targets
Air Canada	Net Zero 2050	20% less GHG emissions from flights vs 2019 by 2030
		30% less GHG emissions from ground operations vs 2019 by 2030
		$50m investment in SAF
American Airlines	Net Zero 2050	10% SAF usage by 2030
		Offtake from Prometheus for 10m gallons of SAF from captured CO2 and renewables by 2050
		Achieve absolute reduction of 50m gallons of jet fuel from fuel-efficiency initiatives by 2025
		Achieve validation from SBTi for their 2035 GHG reduction goal (submitted in 2021)
Delta Air	Net Zero 2050	10% SAF usage by 2030 - with 5% achieving 85% reduction in lifetime GHG
		50% of ground transport electrified by 2025
		21-24% emission reduction from fleet renewal by 2035
EVA Air	Net Zero 2050	Unclear
Frontier	Unclear	Unclear
JetBlue	Net Zero 2040	Reduce emissions by 25% per seat from 2015 levels (no deadline specified)
		10% of fuel to be blended SAF through Neste by 2030
		40% of ground service equipment vehicles converted to electric by 2025, and 50% by 2030
LATAM	Carbon Neutral 2050	Offset 50% of domestic emissions by 2030
		5% SAF use by 2030
Southwest	None	10-year plan for carbon neutrality at 2019 levels
		Ultimate objective for carbon neutrality by 2050
		10% SAF usage by 2030
Spirit	None	Unclear
United Airlines	Net Zero 2050	Net Zero by 2050 without the use of carbon offsets
		Reduce carbon intensity by 50% vs 2019 levels by 2035
		Pledge to invest in direct air capture of CO2 over the use of carbon offsets

Europe:

Airline	2050 Pledge	Transition Pathway Initiatives, Pledges and Interim Targets
Air France-KLM	Net Zero 2050	Net Zero for ground operations by 2030
		50% less CO2 emissions vs 2005 by 2030
		5% SAF usage by 2030
Easy Jet	Net Zero 2050	Since Nov 2019 have been flying carbon-neutral by offsetting CO2 from fuel and operations
IAG	Net Zero 2050	10% of fuel as SAF by 2030
		US$400m investment into SAF development, production and supply
		Net Zero by 2050 includes Scope 3 emissions
		Climate targets included in within REM structure
Lufthansa	Net Zero 2050	Plans to halve net carbon emissions by 2030
Ryanair	Net Zero 2050	34% decarbonisation through the increased use of sustainable aviation fuels (SAF)
		32% decarbonisation through technological & operational improvements
		24% decarbonisation through offsetting & other economic measures
		10% decarbonisation through the introduction of better Air Traffic Management
SAS Scandinavian	Net Zero 2050	Decrease total CO2 emissions by 25% relative to 2005 by 2025 via ongoing fleet renewal
		10% of fuel via SAF by 2025
Virgin Atlantic	Net Zero 2050	By 2026: 15% gross reduction in CO2/RTK through fleet & operational efficiency
		By 2030: 15% net reduction in total CO2 & 10% of fuel sourced from SAF
		By 2040: 40% net reduction in total CO2 emissions
Wizz Air	Net Zero 2050	25% reduction in CO2 emissions by 2030

Asia:

Airline	2050 Pledge	Transition Pathway Initiatives, Pledges and Interim Targets
Air Asia	50% reduction in CO2 emissions by 2050	Between 2023-2025, establish a voluntary offsetting & move to carbon neutral growth
		Move to carbon neutral growth for international flights by 2023
Air China	None	None Found
Bangkok Airways	None	None found
ANA Holdings	Net Zero 2050	Below FY19 levels by 2030 for aircraft emissions
		>33% reduction of emissions from Non-aircraft based activities
Cathay Pacific	Net Zero 2050	SAF to be 10% of consumption by 2030
		Reduce ground emissions by 32% by 2030 and 55% by 2035, from 2018 baseline
China Airlines	Net Zero 2050	Unclear
China Eastern	None	None Found
China Southern	None	Petitioned IATA for a Net Zero by 2060 goal in place of the 2050 target
Garuda Indonesia	None	Unclear
Hainan Airlines	None	None Found
Japan Airlines	Net Zero 2050	Replace 1% of total fuels to SAF by FY25
		Lower CO2 emissions by 2.5% by 2025
Korean Air	None	Unclear
Singapore airlines	Net Zero 2050	Use SAF, carbon offsets but no individual targets
Thai Airways	None	Unclear
Middle East		
Qatar	Net Zero 2050	10% SAF by 2030
Emirates	Net Zero 2050	Supports IATA strategy but specific targets not found
Etihad	Net Zero 2050	50% of 2019 emissions 2035
		25% lower CO2 intensity 2025
		100% greenliner CO2 offset in 2021 through 39 B787 planes

Source: Individual airline website disclosures, annual reports & sustainability reporting, WaveStone analysis.

Carbon Emission and Intensity Tracker:

WaveStone - Australian Share Fund (WASF)	Carbon Emissions Scope (tonnes CO2e)		
	Scope 1	Scope 2	Total
Portfolio - WASF	18,199	5,937	24,136
Benchmark - S&P ASX 300 Accumulation Index	35,700	11,633	47,333
Difference	-49.0%	-49.0%	-49.0%

Source: MSCI ESG (as at 30/06/2022)

WaveStone - Australian Share Fund (WASF)	Carbon Intensity Scope (tonnes CO2e/sales)		
	Scope 1	Scope 2	Total
Portfolio – WASF	92.26	25.56	117.82
Benchmark - S&P ASX 300 Accumulation Index	114.65	47.99	162.64
Difference	-19.5%	-46.7%	-27.6%

Source: MSCI ESG (as at 30/06/2022)

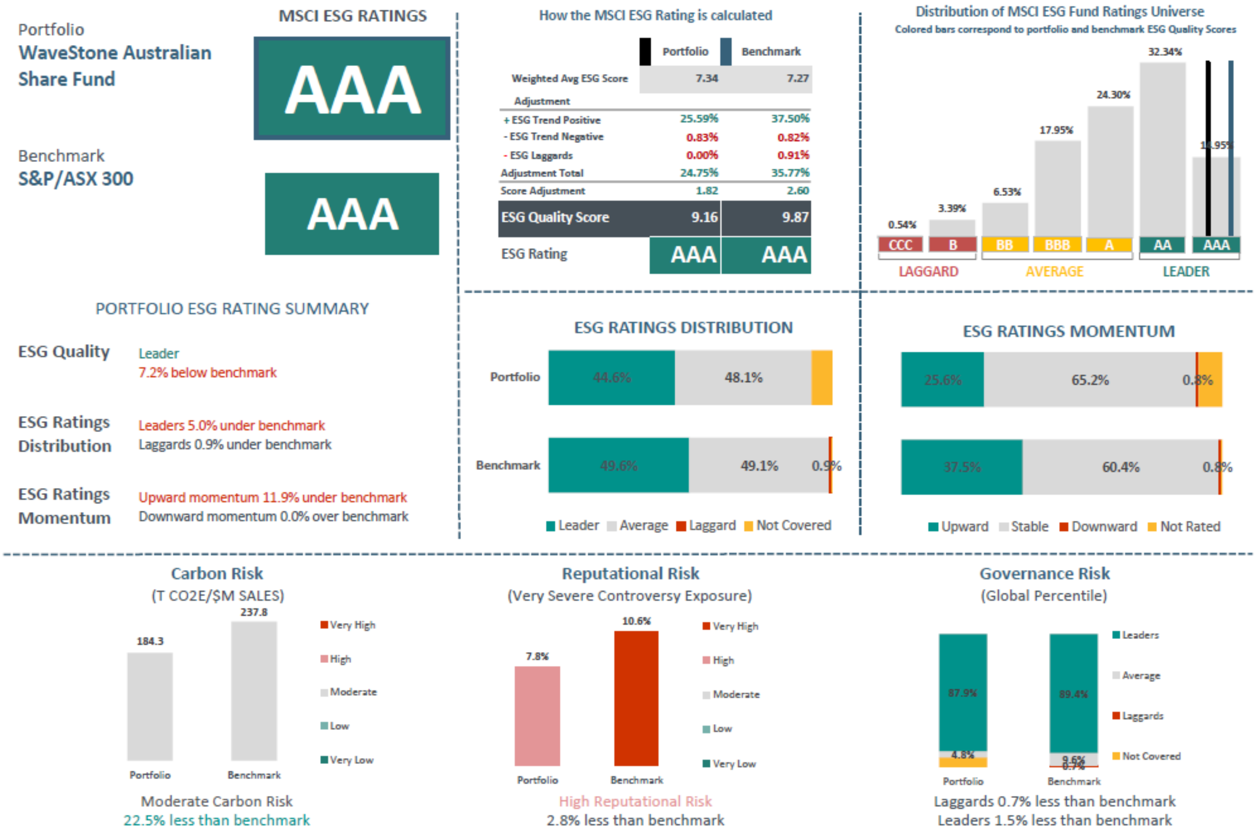
Engagement

ESG-related Engagements during the Quarter

Company	ESG Category	Topics
ANN	Environment	Sustainability – strategy for increasing the proportion of sustainably produced gloves
BXB	Environment	Need for a scope 3 emission reduction plan; Broadening the HSI outcomes for management to include factors helping to ensure outsourced operations (supply chain) achieve equitable pay and safety outcomes (logistics a focus here); Wood versus plastic in a circularity context.
CKF	Social	Update on CKF's progress of reducing its carbon footprint by 25% by 2026 (announced in 2021) through solar panel rollouts and waste diversion from landfill
COH	Social Governance	General update which included discussion on BOD interaction with EXCO
EDV	Social Governance	Sustainability, Community responsibility in lower socio-economic areas, Problem Gambling, Governance, Remuneration
HPG	Governance	CEO Remuneration
IGO	Environment Social Governance	Understanding IGO's total ESG framework, including targets, scorecard and KPIs
LIC	Environment Social Governance	Sustainability – strategy for increasing the use of renewable energy and introducing storage solutions to help individual villages be Net-Zero emissions, Governance
NAB	Environment	Integration of ESG outcomes in STI/LTI, Sustainability Reporting; Implication of election outcome on climate targets
NEC	Governance	Rationale for supporting acquisition of Realbase by DHG
QAL	Governance	Governance, Remuneration framework for mid-level employees, Diversity strategy

	Social	
QAN	Environment Social	Decarbonisation plans and sustainability initiatives, Green premium, Competitive positioning - ESG standpoint, Pricing and refund policies in context of social licence
STO	Environment Social Governance	Climate Change, Governance, Environment Understanding climate change trends in the European market
TCL	Governance Social	Remuneration balance in light of WGT outcomes; Corporate positioning and social licence with Government clients; balance of yield with growth ambitions.
TPG	Governance	Remuneration, Governance framework for minority investors
WDS	Environment	Understanding climate change trends in the European market
SVW	Environment Social Governance	Understanding SVW's governance framework and ESG targets across its subsidiaries

MSCI ESG Ratings



Memberships and initiatives

- Principles of Responsible Investment (PRI)
- Climate Action 100+
- 40:40 Vision

Links to WaveStone Policies

- ESG Policy: **WaveStone ESG Policy**
- ESG Activity Report: **WaveStone ESG Activity Reports**
- Proxy Voting Policy: **WaveStone Proxy Voting Policy**
- Proxy Voting Records: **WaveStone Proxy Voting Records**
- Engagement Policy: **WaveStone Engagement Policy**
- **WaveStone PRI Transparency Report 2020**
- **WaveStone PRI Assessment Report 2020**

Want more information?

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