②

Aviation industry net-zero tracker

SAF are considered key to decarbonizing aviation, but current commercial limitations mean that SAF only provides around 40% emissions reduction.

Key emissions data[2,3,4,5]

2%

Contribution to global GHG emissions

0.98 $gtCO_2e$

Operational and fuel supply chain emissions

-25%

Emissions growth (2019-2022)

>99%

Fossil fuels in the fuel mix (2022)

83 gCO_2e

Emissions intensity emitted per passenger km (2020)

2-5 times

Expected demand increase by 2050

Readiness key takeaways

Technology

Two leading decarbonization pathways have emerged: mature SAF and less mature novel propulsion technologies. However, the most advanced pathway is 2-5 times higher cost than traditional jet fuel.[6]

Infrastructure

$2.4 trillion[7] in infrastructure investment is required to support the development and scaling of aviation technology by 2050.

Demand

Although SAF adoption was less than 1%[8] of flights in 2022, there is a growing shift towards sustainable business models and agreements supporting its use.

Policy

Current policies primarily target developed countries, but further policy advancements are needed, like tax subsidies, direct funding and additional fuel standards, to incentivize biofuels infrastructure.

Capital

The industry needs approximately $5 trillion by 2050[11], far exceeding current airline investments. Low-profit margins and a 7% weighted average cost of capital (WACC) make it hard to attract private capital for low-emission assets.[12]

Stated energy transition goals

- Net-zero emissions by 2050.[9]
- 73%[10] of large publicly traded aviation companies consider climate change in their decision-making processes.

Emission focus areas for tracker

Aviation emissions can be divided into two main categories:

1. **Well-to-tank** mainly upstream emissions from production and distribution of fossil fuels
2. **Tank-to-wake** primarily due to combustion of fossil fuels, predominantly jet fuel, used during flight operations.

Sector priorities

Exisiting transport

Reduce near-term emissions intensity by:

- Increasing the number of operational synthetic fuel projects
- Increasing biofuels refining capacity to support additional commercial scale hydroprocessed esters and fatty acids (HEFA) projects
- Using efficiency and design improvement opportunities at an accelerated pace.

Next generation transport

Accelerate battery electric and hydrogen technology development, to reduce absolute emissions by:

- Investing in next generation transport R&D and accelerating the learning curve
- Developing hydrogen storage capacity and refuelling capabilities
- Investing in clean power infrastructure.

Ecosystem

De-risk capital investment to scale infrastructure capacity by:

- Increasing the number of offtake agreements, strengthening market demand signals
- Accelerating power to liquids (PtL) development, mitigating biofuels supply chain limitations
- Implementing a blend of policies, primarily, tax subsidies, direct funding and additional fuel standards, incentivizing biofuels production.

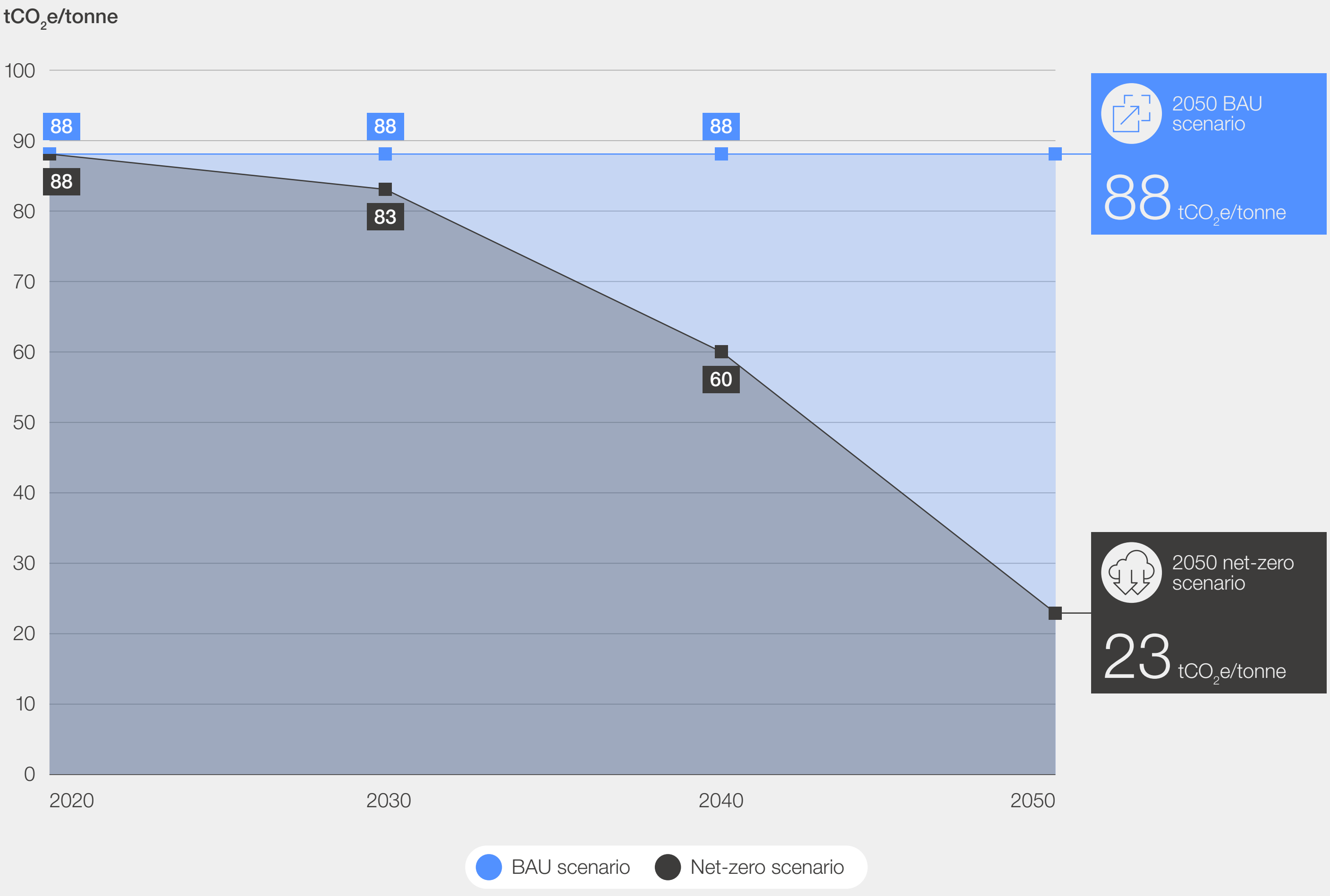
Performance

Emissions profile

Absolute emissions in gigatonnes of CO_2 are impacted by fuel burn, load factors, aircraft type and route operated, among other factors. The most significant emissions reduction, around 65%, is expected between 2030-2040 as SAF becomes more widespread. Further efficiency measures have the potential to enhance fuel efficiency by 30-40% by 2050.[13]

Emissions intensity, measured as CO_2 emitted per passenger kilometre, is influenced by aircraft type and routes. In 2022, emissions intensity per passenger kilometre was higher than pre-pandemic levels due to demand being around 80% of 2019 levels.[14] Emissions intensity is now decreasing in line with growing demand. However, aviation needs to reduce its emissions intensity to net zero by 2050, with over 70%[15] of the reduction expected between 2030 to 2050 as SAF adoption increases alongside increased efficiency measures and offsetting.

FIGURE 12 **Fuel GHG emissions intensity trajectory for aviation**



Source: Accenture Analysis based on ICAO and IEA data

BOX 4 **Offsets**

Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), mandates offsetting CO_2 emissions exceeding pre-pandemic levels (2019) that cannot be reduced by other methods.[16] In 2021, roughly 9% of aviation emissions were eligible for offsets, although precise figures remain uncertain. Although participation is currently voluntary, it is anticipated to increase, alongside associated regulations, as the scheme advances through defined phases. Phase 1 is set to commence in 2024.

Path forward

The key decarbonization strategy involves substituting traditional fuels with SAF to reduce in-flight emissions by 75-95%, coupled with efficiency measures.[17] Achieving 85% SAF adoption by 2050 necessitates coordinated efforts from stakeholders, governments and advisory bodies.[18] Priorities include promoting low-emission fuels, stimulating SAF demand and advancing sustainable feedstock R&D. Despite the current dominance of fossil fuels, projections indicate a 65% emissions reduction by 2030-2040 as SAF scales up to 50% of the fuel mix alongside increased efficiency measures, ultimately reaching an 85% reduction by 2050.[19] Further reductions by 2050 stem from novel propulsion technology, albeit in smaller proportions.

FIGURE 13 **2020 fuel mix**

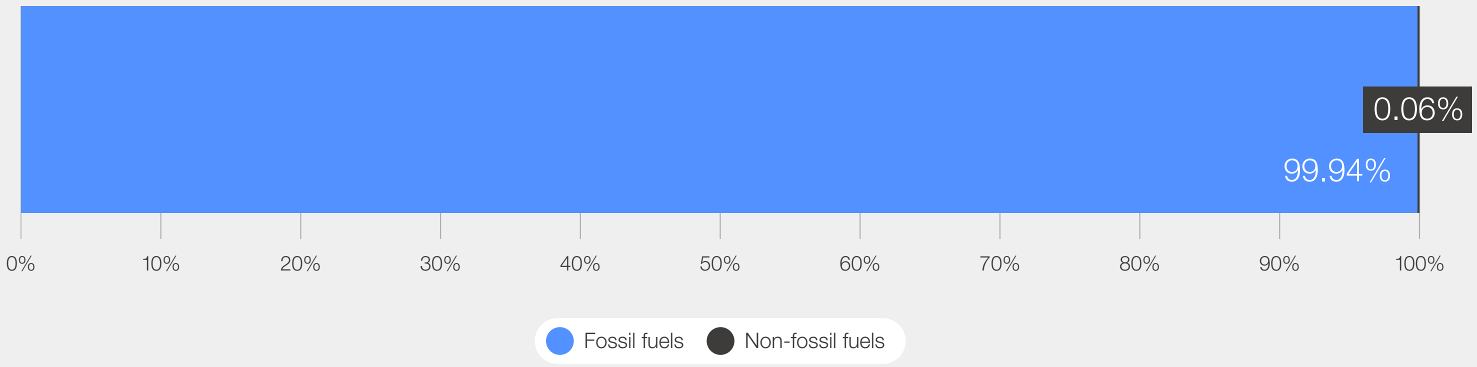
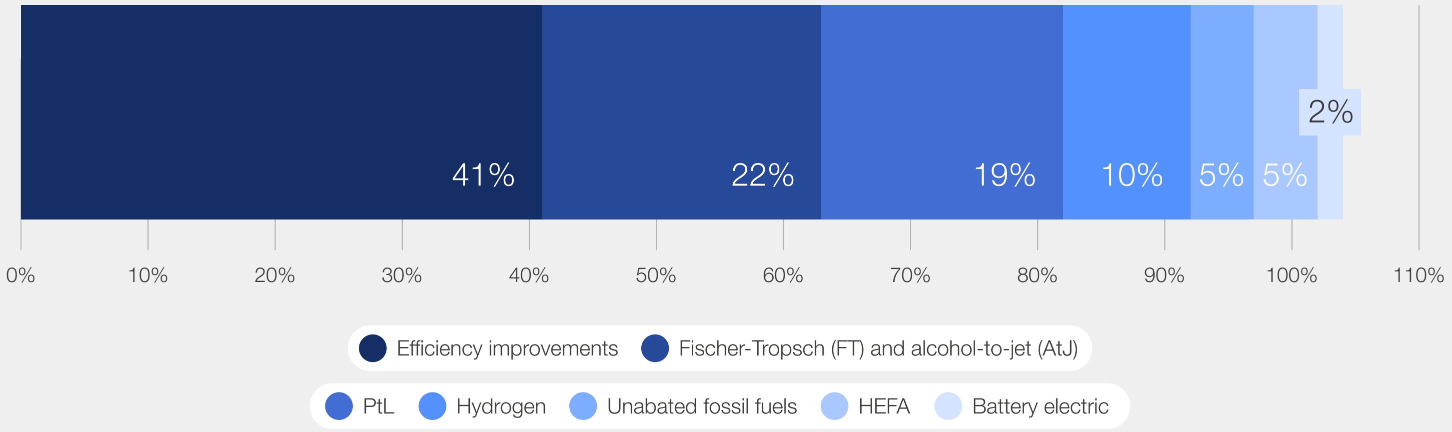


FIGURE 14 **MPP 2050 net-zero scenario**



Note: Totals do not add up to 100% as not a fuel mix

2

AVIATION

Technology

Two leading decarbonization pathways have emerged: SAF and novel propulsion technologies.

SAF includes biofuels made through the HEFA, FT and AtJ pathways, as well as synthetic aviation fuels made from captured carbon and green hydrogen electrolysis, called power-to-liquids (PtL). HEFA is the most advanced and is currently available in small quantities, though increased commercial availability is expected before 2025.[20] Novel propulsion technologies, such as battery-electric and hydrogen, are less mature and anticipated to be commercially ready by 2040.[21] Currently, the total cost of ownership (TCO) for HEFA is 2-5 times higher than traditional jet fuel, and less than 1% of the global fleet uses low-emission technologies.[22]

SAF pathways

Up to

95%

emissions reduction potential

Fuel switching to 100% renewable drop-in fuels has the potential to cut in-flight emissions by 75-95% while matching jet fuel's range (up to 15,000km).[23] However, with SAF currently limited to a 50% blend rate, emissions reduction potential stands at a maximum of around 40%.[24]

HEFA is the most mature, poised for commercial availability by 2025, while other FT and AtJ projects are mostly in large prototype-demonstration stage, also targeting commercial readiness by 2025.[25] However, commercial scalability is limited by the finite nature of bio-based feedstocks, insufficient refining capacity and increased production costs (up to 5 times jet fuel[26]).

Synthetic fuels, though less mature, are advancing, with commercial availability expected around 2025.[27] Despite higher production costs (up to 9 times jet fuel) and lagging clean hydrogen and direct air capture (DAC) infrastructure development, their synthetic nature addresses feedstock availability challenges. Accelerated R&D and adoption of PtL have the potential to alleviate supply chain challenges in SAF production.

Novel propulsion technologies

Battery-electric aircraft and hydrogen aircraft offer the lowest emission alternatives to jet fuel up to 100% emissions reduction. However, their limited range, prolonged safety approvals, high R&D costs and insufficient availability of clean hydrogen and clean power infrastructure delay widespread adoption until the 2040s.

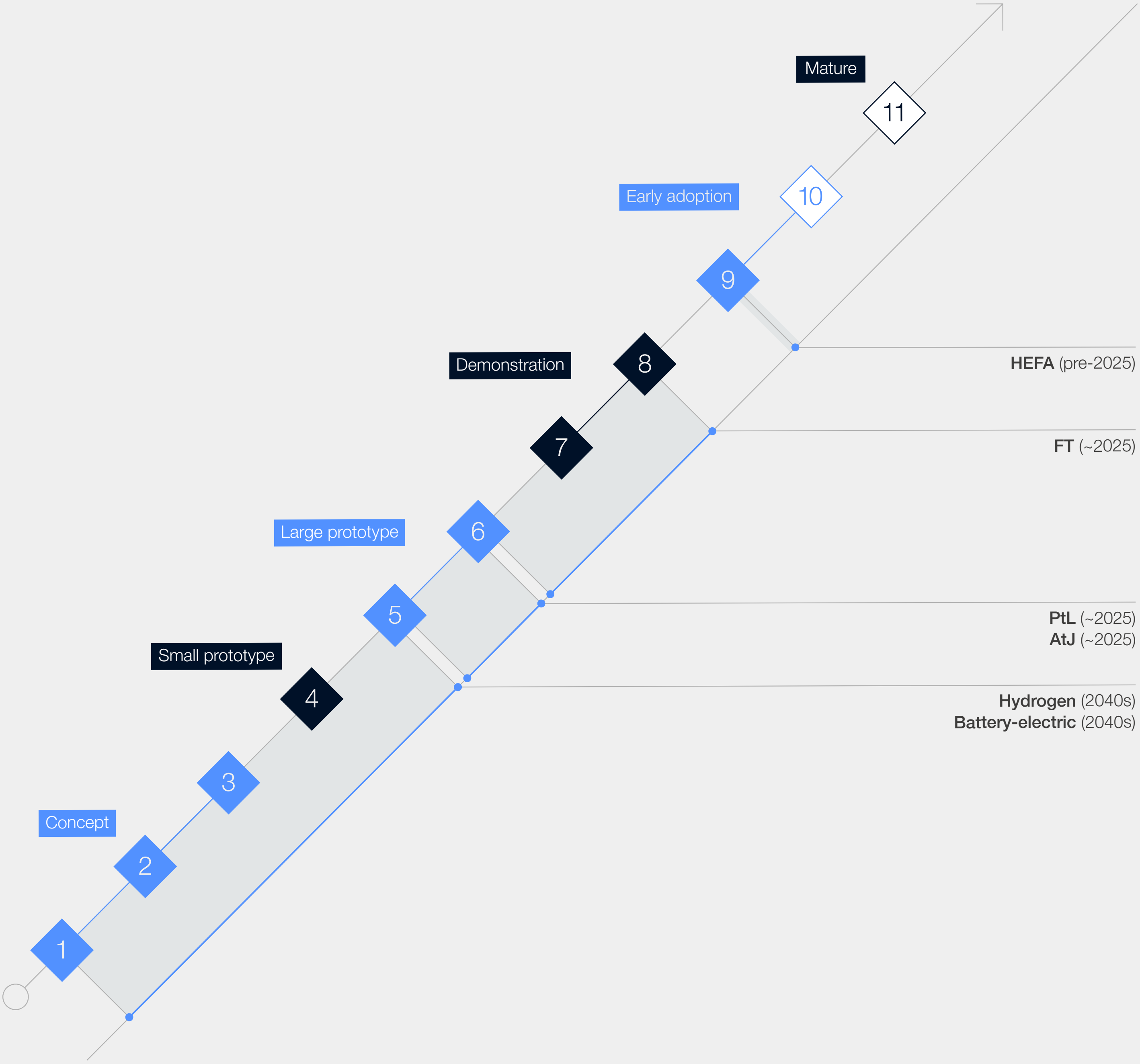
In September 2022, Eviation[28] conducted the first test flight of "The Alice", the world's first commercially scalable fully electric aircraft. Commercial operations are set to begin in 2027, with over 50 orders by June 2023 valued at $4 billion, indicating strong market demand and confidence in electric aviation.

Recharging and refuelling technologies

With on-board battery-electric and hydrogen fuel cell technology limited at prototype stage, technology provisions for fast charging and refuelling technologies are nascent, in line with their required availability. As novel propulsion technologies develop, additional R&D to improve the technical capabilities to match current aviation business models will be needed.

Technology pathways

FIGURE 15 **Estimated TRL and year of availability for key technology pathways**



Source: Accenture analysis based on multiple sources, including IEA and MPP

2

AVIATION

Infrastructure

The current infrastructure is inadequate to support the development and scaling of decarbonization pathways, especially regarding SAF production capacity and feedstock availability for SAF. Less than 1% of the required SAF infrastructure currently exists. It's estimated that $2.4 trillion[29] in infrastructure investments will be necessary to meet SAF demand by 2050, with $0.9-1.5 trillion within the aviation industry's immediate scope.[30]

The majority of these investments should focus on developing upstream SAF production infrastructure:[31] About 18% of total investments should go towards biofuels refining capacity, resulting in establishing approximately 7,000 biorefineries, equivalent to 12 exajoules (EJ) of HEFA and other biofuels by 2050.[32] The remaining 73% should be directed towards creating clean hydrogen infrastructure and implementing DAC, equivalent to 95 million tonnes per annum (MTPA) of clean hydrogen and 490 MTPA of captured carbon as feedstock for PtL production.[33]

As clean hydrogen and clean power technologies advance, downstream infrastructure requirements are expected to emerge, including clean hydrogen storage, charging stations, electrified ground power and grid connection infrastructure or on-site power generation capacity. Industry players are already taking steps in this direction. For instance, in November 2022, Airbus joined HyPort,[34] a venture by ENGIE Solutions and AREC, to develop a pioneering clean hydrogen production and distribution station. The facility is set to commence hydrogen production in 2023, capable of powering up to 50 ground vehicles and scalable for future hydrogen aircraft use.

FIGURE 16 **2050 investment requirements**

Source: Accenture analysis based on multiple sources including IATA MPP, IEA and Global CCS Institute

AVIATION

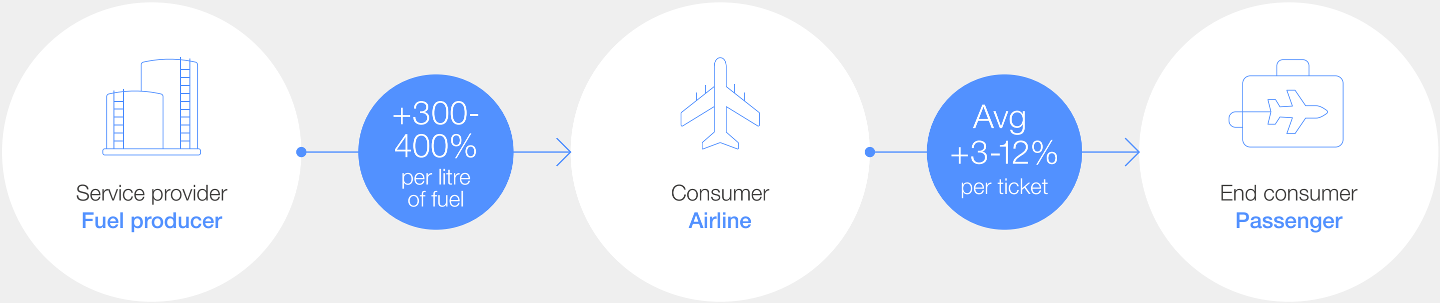
Demand

SAF, which represents less than 1% of the current aviation fuel mix, remains untested in terms of its ability to absorb the green premium due to 2022's market demand being less than 1%.[35,36] However, there is a growing shift towards sustainable business models and SAF offtake agreements.

By 2030, SAF production is expected to reach approximately 17.3 billion litres, driven mainly by North America, Europe and Asia. To meet the 2050 target of around 475 billion litres annually, production capacity needs to increase by 27 times from 2030 to 2050.[37]

Comparing the TCO to jet fuel use, the adoption of HEFA carries a 300% fuel cost increase, resulting in a business to business (B2B) green premium of more than 45-60%.[38] HEFA carries an average B2C green premium of 3-12% per plane ticket.[39] Although passengers and airlines currently cover these higher costs, this market scenario is not sustainable and poses risks for early investors, hindering commercial scalability and adoption. Cost reduction is essential to ensure both supply and demand of low-emission technologies.

FIGURE 17 **Estimated B2B and B2C green premium**



Source: Accenture Analysis, based on MPP and Accenture data

The adoption of SAF technologies will require business model diversification in the upstream aviation fuel value chain. There are eight American Society for Testing and Materials (ASTM) certified production pathways,[40] however, the diversity of biomass options and blend rates presents challenges in standardization and supply chain stability. Existing business models are relatively simple. However, sourcing a stable feedstock supply for biobased SAF and access to gas markets to source captured CO_2 and clean hydrogen for PtL will require the creation of new markets, contracts, ecosystems and supply chains. These activities add complexity to the market environment. Still, they are necessary to ensure the stability of SAF supply and provide opportunities for smaller industry players to drive innovation in SAF development.

There are early signs of growing market demand with industry players adopting measures to boost demand. Airlines like Lufthansa offer optional fare increases to offset carbon, while Air-France KLM imposes mandatory green surcharges. In December 2022, Air France-KLM and Total Energies[41] signed a memorandum of understanding (MoU) for Total Energies to supply 800,000 tonnes of SAF to Air France-KLM over 10 years. Moreover, approximately 42 offtake agreements were announced in 2022, totalling around 22 million litres of SAF. However, regulatory incentives and an increase in public-private contracts are required to ensure demand growth, alongside these industry efforts.

3

AVIATION

Policy

Policies are scarce in developing economies and need to expand to achieve the projected SAF production targets.

Aviation's decarbonization will require a mix of policy tools. Current policies have mainly focused on developed countries, but further policy advancements are needed, such as tax subsidies, direct funding and additional fuel standards, to incentivize biofuels infrastructure.

While aviation operates globally, individual countries handle airline registration, and fuel production extends beyond carrier regions. To effectively drive aviation sector decarbonization, international regulations must be complemented by regional policies.

Developed economies, notably the US, have taken the lead in implementing policies that address various readiness enablers.[42] However, similar policies are scarce in developing economies, and policy coverage needs to expand throughout the 2020s to achieve the projected 2 billion litres of SAF production in Asia by 2030.[43]

Lower carbon aviation fuel (LCAF) is fossil-based jet fuel that is produced with at least 10% fewer emissions compared to the baseline of 89 MJ/kg as defined by CORSIA. While certain SAF alternatives can reach up to 95%, with a minimum threshold of 65% required to qualify for sustainable certification.[44]

Although CORSIA has certified eight SAF production methods, the availability of diverse biomass options, feedstocks and blend rates presents challenges in establishing consistent standards and regulations. As such, the emissions reduction potential of CORSIA-approved fuels can range from 10% with LCAF to SAF, which has the potential to reduce 95% of emissions. The diversity in SAF production also hampers standardization, regulation and traceability of use across the value chain.

To meet ICAO targets, policies should encourage low-emission fuel use and operational efficiency. Key actions include enforcing fuel standards, streamlining approvals, enhancing R&D policies and considering SAF mandates, Carbon Contracts for Differences (CCfDs), book-and-claim systems like Avelia[45] and fiscal incentives.

Existing policy landscape

TABLE 5

Policy summary[46]

Enabler	Policy type	Policy instruments	Key examples	Impact
Technology	Market-based	Carbon pricing	– EU-Emission Trading Scheme (ETS)[47]	Incentivizes emission reduction among airlines but is constrained by free allowances and reduced carbon prices. Currently limited to intra-EU flights, expanding to all EU entries in 2024.
		Emissions cap	– CORSIA[48]	Projected emission mitigation potential is around 2.5 gigatonnes of CO_2 equivalent ($gtCO_2$) by 2035 via offsets.[49] Limited to voluntary participation, mandatory offsets from 2027, with increasing emissions reduction as progress continues.
	Mandate-based	Performance standards and certification		Projected to decrease EU aircraft emissions by 66% by 2050[50]
		Direct taxation	– Energy Taxation Directive: Fit for 55 (proposed)[51]	Incentivizes SAF adoption via taxation of jet fuel.
	Incentive-based	Subsidies, tax credits	– US Blender's Tax Credit (BTC)[52]	$1.25-1.75 per gallon tax credits for SAF producers – around 17% higher than other fuels such as biodiesel.[53]
Infrastructure	Mandate-based	Direct regulation	– Alternative Fuel Infrastructure Regulation (AFIR)[54]	Mandatory deployment targets for clean power infrastructure to boost development of battery-electric aircraft.

TABLE 5 **Policy summary[46] (continued)**

Infrastructure	Incentive-based	Subsidies, tax credits	– Clean fuel production credit[55] – UK: £580 million towards commercialization of SAF plants and fuel testing[56] – Inflation Reduction Act (IRA) clean power and green hydrogen production tax credits[57]	Encourages SAF, clean power and hydrogen infrastructure for advancing technology in developed economies.
Demand	Mandate-based	Fuel standards	– California Low-Carbon Fuel Standard (CALCFS)[58] – ReFuelEU Aviation: SAF blending mandate for fuel suppliers at EU airports[59]	Proposed regulation to penalize jet fuel use and boost SAF demand.
Capital	Incentive-based	Direct funding	– Clean Aviation Joint Undertaking (CAJU)[60]	Public-private partnership that funds technologies that reduce aviation emissions by 20-30% per aircraft. Targets regional/short-medium haul flight technologies; not applicable to long-haul flights.
		Technical roadmap	– SAF Grand Challenge[61]	Incentivizes SAF production through $4.3 billion in investments. Projected to reduce 20% of US aviation emissions by 2030.[62]

1

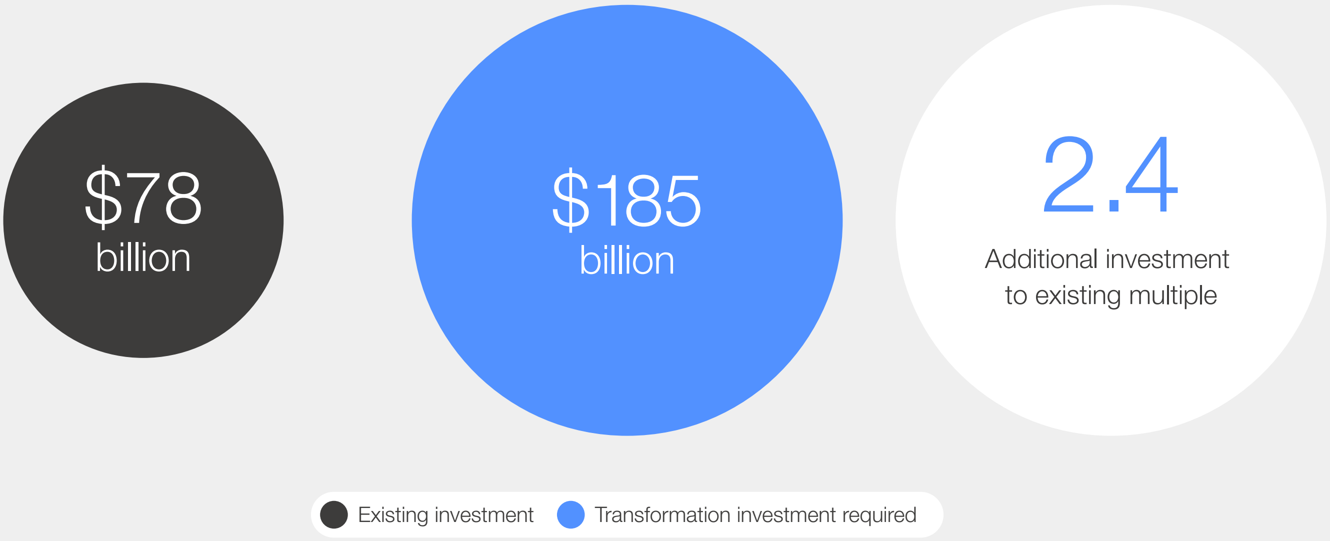
AVIATION

Capital

The aviation industry faces a $5 trillion[63] CapEx requirement for its 2050 net-zero transformation, necessitating an annual investment of approximately $185 billion, 2.4 times the current passenger airline investments.[64]

The argument in favour of investing in aviation assets with low emissions continues to lack strength. Given the aviation industry's tight profit margins and a weighted average cost of capital (WACC) at 7%,[65] the sector isn't ready to assimilate these extra expenses and generate satisfactory returns exclusively from internal funds or to allure private investments.

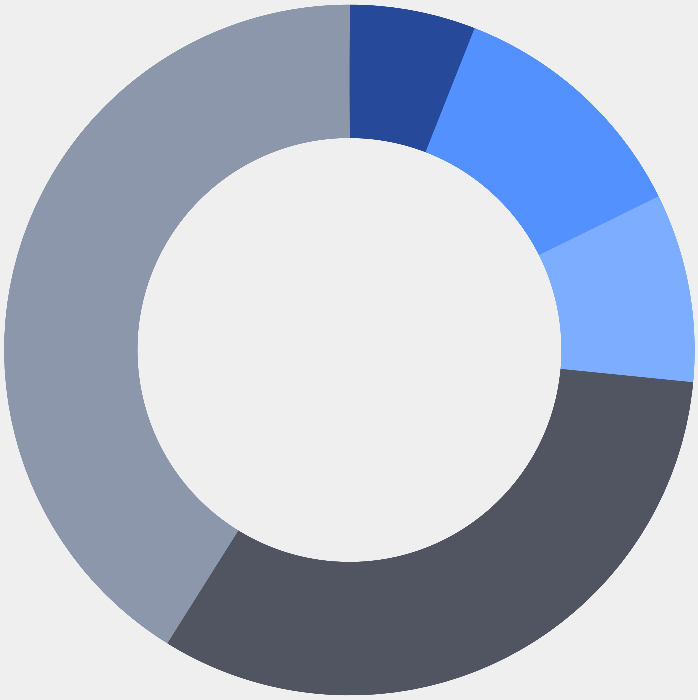
FIGURE 18 **Additional investment required to existing investment ratio**



According to IATA, actors involved in investing in aviation's net-zero transition will require access to different funding and financing mechanisms depending on the maturity of the investment opportunity. This is because the risk is the highest at the R&D stage and decreases as the commercial viability of the solution grows.[66] In order to channel funds into revolutionizing the industry, policy measures such as carbon pricing, incentives for technology development and the promotion of SAF adoption become essential to ensure profitable returns. The pivotal role played by banks and other financial institutions is to grant access to affordable capital aligned with sustainability objectives.

Approximately 74% of large publicly traded aviation companies consider climate change as a key consideration for their strategic assessment and integrate it into their operational decision making.[67] Meanwhile, 9% of companies are building basic emissions management systems and process capabilities. Finally, 12% of companies acknowledge climate change as a business issue.

FIGURE 19 **Distribution of companies in the airlines sector according to the management of their GHG emissions and of risks and opportunities related to the low-carbon transition**



0	**Level 0:** Unaware	6.1%
1	**Level 1:** Aware	12.1%
2	**Level 2:** Building capacity	6.1%
3	**Level 3:** Integrating into operational decision-making	33.3%
4	**Level 4:** Strategic assessment	42.4%

Source: Transition Pathway Initiative Centre, London School of Economics and Political Science (LSE-TPI Centre). LSE-TPI Centre is not responsible for any of the sectoral summaries in which their data is used.

Endnotes

2. International Energy Agency (IEA), *Aviation*, https://www.iea.org/energy-system/transport/aviation#tracking.
3. Accenture analysis based on Accenture carbon calculator.
4. International Civil Aviation Organisation (ICAO), *Methodology for Actual Life Cycle Emissions*, June 2022, https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_Eligible_Fuels/ICAO%20document%2007%20-%20Methodology%20for%20Actual%20Life%20Cycle%20Emissions%20-%20June%202022.pdf.
5. Aviation Benefits, *Waypoint 2050*, September 2021, https://aviationbenefits.org/media/167417/w2050_v2021_27sept_full.pdf.
6. Mission Possible Partnership (MPP), *Making Net-Zero Aviation Possible,* October 2021, https://missionpossiblepartnership.org/wp-content/uploads/2023/01/Making-Net-Zero-Aviation-possible.pdf.
7. International Air Transport Association (IATA), *Energy and New Fuels Infrastructure Net-Zero Roadmap*, May 2023, https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/energy-and-new-fuels-infrastructure-net-zero-roadmap.pdf.
8. Accenture analysis based on Accenture carbon calculator.
9. MPP, *Making Net-Zero Aviation Possible,* October 2021, https://missionpossiblepartnership.org/wp-content/uploads/2023/01/Making-Net-Zero-Aviation-possible.pdf.
10. Transition Pathway Initiative, *Management Quality: Airlines*, https://www.transitionpathwayinitiative.org/sectors/airlines.
11. Accenture analysis based on: IATA, *Net Zero Roadmap*, https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/finance-net-zero-roadmap.pdf.
12. Accenture analysis based on S&P Capital IQ Data and Stern NYU Data.
13. MPP, *Making Net-Zero Aviation Possible*, October 2021, https://missionpossiblepartnership.org/wp-content/uploads/2023/01/Making-Net-Zero-Aviation-possible.pdf.
14. Ibid.
15. International Council on Clean Transport (ICCT), *Vision 2050 - Aligning Aviation With The Paris Agreement*, June 2022, https://theicct.org/wp-content/uploads/2022/06/Aviation-2050-Report-A4-v6.pdf.
16. ICAO, *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*, July 2023, https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx.
17. MPP, *Making Net-Zero Aviation Possible*, October 2021, https://missionpossiblepartnership.org/wp-content/uploads/2023/01/Making-Net-Zero-Aviation-possible.pdf.
18. Ibid.
19. Ibid.
20. Ibid.
21. Ibid.
22. Ibid.
23. Ibid.
24. Ibid.
25. Ibid.
26. Ibid.
27. Ibid.
28. Euronews, *All-Electric Aircraft "Alice" Makes its First Test Flight in a Milestone for Zero Carbon Aviation*, 30 September 2022, https://www.euronews.com/next/2022/09/30/all-electric-aircraft-alice-makes-its-first-test-flight-in-a-milestone-for-zero-carbon-avi.
29. MPP, *Making Net-Zero Aviation Possible,* October 2021, https://missionpossiblepartnership.org/wp-content/uploads/2023/01/Making-Net-Zero-Aviation-possible.pdf.
30. Ibid.
31. IATA, *Energy and New Fuels Infrastructure Net-Zero Roadmap*, May 2023, https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/energy-and-new-fuels-infrastructure-net-zero-roadmap.pdf.
32. Ibid.
33. Ibid.

34. Airbus, *Airbus Teams Up to Advance Green Hydrogen Availability at Airports*, November 2022, https://www.airbus.com/sites/g/files/jlcbta136/files/2022-11/EN_Press%20Release_Airbus_teams%20up%20to%20advance%20green%20hydrogen%20airport.pdf.

35. Travel and Leisure, *Airfare Dollars Breakdown*, 29 November 2022, https://www.travelandleisure.com/airlines-airports/airfare-dollars-breakdown.

36. Accenture analysis based on Accenture carbon calculator.

37. Aviation Benefits, *Waypoint 2050*, September 2021, https://aviationbenefits.org/media/167417/w2050_v2021_27sept_full.pdf.

38. MPP, *Making Net-Zero Aviation Possible,* October 2021, https://missionpossiblepartnership.org/wp-content/uploads/2023/01/Making-Net-Zero-Aviation-possible.pdf.

39. Accenture, *Fly SAF(E)*, November 2022, https://www.accenture.com/ch-en/blogs/travel/fly-safe.

40. ICAO, *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*, July 2023, https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx.

41. Boeing, SAF Dashboard, IATA, *SAF Deployment Policy*, 2023, https://www.iata.org/contentassets/d13875e9ed784f75bac90f000760e998/saf-policy-2023.pdf.

42. IATA, *Policy Net-Zero Roadmap*, 2023, https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/policy-net-zero-roadmap.pdf.

43. IATA, *SAF Deployment Policy*, 2023, https://www.iata.org/contentassets/d13875e9ed784f75bac90f000760e998/saf-policy-2023.pdf.

44. International Civil Aviation Organization (ICAO), *CORSIA Eligible Fuels – Life Cycle Assessment Methodology*, June 2019, https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Supporting%20Document_CORSIA%20Eligible%20Fuels_LCA%20Methodology.pdf#page=12.

45. Shell Global, *Accenture and Amex GBT Launch One of the World's First Blockchain-Powered Digital Book-and-Claim Solutions for Scaling Sustainable Aviation Fuel (SAF)*, 20 June 2022, https://www.shell.com/business-customers/aviation/news-and-media-releases/news-and-media-2022/shell-accenture-and-amex-gbt-launch-one-of-the-worlds-first-blockchain-powered-digital-book-and-claim-solutions-for-scaling-sustainable-aviation-fuel-saf.html.

46. IATA, *Policy Net-Zero Roadmap*, 2023, https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/policy-net-zero-roadmap.pdf.

47. European Commission, *EU Emissions Trading System (EU ETS)*, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en.

48. ICAO, *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*, July 2023, https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx.

49. Aviation Benefits, *CORSIA explained*, https://aviationbenefits.org/environmental-efficiency/climate-action/offsetting-emissions-corsia/corsia/corsia-explained/.

50. European Commission, *European Green Deal: New Law Agreed to Cut Aviation Emissions by Promoting Sustainable Aviation Fuels*, 26 April 2023, https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2389.

51. European Council, *Infographic: Fit for 55: How the EU Plans to Revise Energy Taxation*, https://www.consilium.europa.eu/en/infographics/fit-for-55-energy-taxation/.

52. U.S. Department of Energy, *Alternative Fuels Data Center: Biodiesel Production and Blending Tax Credit*, 22 August 2007, https://afdc.energy.gov/laws/5831.

53. NBAA, *What Will the SAF Blenders Credit Mean for Operators*?, January/February 2023*,* https://nbaa.org/news/business-aviation-insider/2023-jan-feb/will-saf-blenders-credit-mean-operators/.

54. European Council, *Alternative Fuels Infrastructure*, https://www.consilium.europa.eu/en/press/press-releases/2023/07/25/alternative-fuels-infrastructure-council-adopts-new-law-for-more-recharging-and-refuelling-stations-across-europe.

55. U.S. Energy Communities, *Clean Fuel Production Credit*, https://energycommunities.gov/funding-opportunity/clean-fuel-production-credit-26-u-s-code-%C2%A4-45z/.

56. Department of Transport, *Pathway to Net Zero* Aviation: *Developing the UK Sustainable Aviation Fuel Mandate*, March 2023, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147350/pathway-to-net-zero-aviation-developing-the-uk-sustainable-aviation-fuel-mandate.pdf.

57. Center for Strategic and International Studies (CSIS), *How the 45V Tax Credit Definition Could Make or Break the Clean Hydrogen Economy*, 22 May 2023, https://www.csis.org/analysis/how-45v-tax-credit-definition-could-make-or-break-clean-hydrogen-economy.

58. California Air Resources Board, *Low Carbon Fuel Standard*, https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard.

59. European Union Aviation Safety Agency (EASA), *Fit for 55 and ReFuelEU Aviation*, https://www.easa.europa.eu/en/light/topics/fit-55-and-refueleu-aviation.

60. European Union, *Clean Aviation Joint Undertaking*, https://european-union.europa.eu/institutions-law-budget/institutions-and-bodies/search-all-eu-institutions-and-bodies/clean-aviation-joint-undertaking_en.

61. Office of Energy Efficiency & Renewable Energy, *Sustainable Aviation Fuel Grand Challenge*, https://www.energy.gov/eere/bioenergy/sustainable-aviation-fuel-grand-challenge.

62. Kirstie Pickering, Airport Industry Review, *What's Inside Biden's New SAF Grand Challenge Roadmap?*, https://airport.nridigital.com/air_oct22/biden_us_saf_grand_roadmap.

63. Accenture analysis based on: IATA, Net Zero Roadmap, https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/finance-net-zero-roadmap.pdf.

64. Accenture analysis based on S&P Capital IQ Data.

65. Stern NYU, *WACC Data*: *Cost of Equity and Capital*, January 2023, https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/wacc.html.

66. Accenture analysis based on: IATA, *Net Zero Roadmap*, https://www.iata.org/contentassets/8d19e716636a47c184e7221c77563c93/finance-net-zero-roadmap.pdf.

67. Transition Pathway Initiative, *Management Quality: Airlines*, https://www.transitionpathwayinitiative.org/sectors/airlines.

WORLD
ECONOMIC
FORUM

COMMITTED TO
IMPROVING THE STATE
OF THE WORLD

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation.

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

World Economic Forum
91–93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744
contact@weforum.org
www.weforum.org