



SUSTAINABLE AVIATION FUEL BROCHURE



NATIONAL
FOUNDATION FOR
AUSTRALIA-CHINA
RELATIONS
澳中基金会

Funded by the National
Foundation for Australia-
China Relations

University of South Australia

Issue No.3
15 Apr 2025



FOREWORD

”

Achieving net zero by 2050 is a common goal across all transport modes. Currently, the aviation industry contributes approximately 3% of global emissions, but this figure could rise to 22% by 2050 as air travel increases while other sectors decarbonise more rapidly. Unlike ground transportation, aviation faces limited alternative fuel options. Sustainable Aviation Fuels (SAF) have the potential to reduce carbon emissions by up to 80%, making them crucial for achieving net-zero greenhouse gas emissions in Australia by 2050.

As of 2024, SAF account for less than 1% of global jet fuels, largely due to their cost, which is three to five times higher than traditional fuels. However, regions such as the European Union, Japan, Singapore, and the UK are progressing towards mandating SAF use in the coming years.

There is significant potential for SAF production in Australia and China, given both countries' abundant bio feedstock and untapped market. Over the next two years (2024-2026), our research team will collaborate with airlines, airports, and other stakeholders in Australia and China to promote the production and adoption of sustainable aviation fuels, aiming to reduce carbon emissions in the aviation sector.

”

OUR RESEARCH TEAM



Professor Shane ZHANG

Shane is a Professor of Aviation at the University of South Australia (UniSA). He has published in leading economics and transport journals on economics of air transport regulation and deregulation, airline mergers and consolidations, airline pricing and competition, and aviation sustainability.

He has undertaken various aviation and logistics projects funded by the World Bank, APEC, Meat & Livestock Australia, Queensland Government, the Civil Aviation Safety Authority of Australia, and the Economic Research Institute for ASEAN and East Asia. His research have been published in the top journals, including Transportation Research Part A, Transportation Research Part D, Transport Policy, Journal of air transport management, Journal of Transport Geography and more.



Professor Alec ZUO

Alec is a Professor and ARC Future Fellow at Flinders University. As an applied economist specialising in agricultural, environmental, and resource economics, Alec's work has significantly contributed to understanding the impacts of climate change on irrigation farming, farmer adaptation strategies, and market-based instruments for water resource management.

His research has been published in leading international journals, including Global Environmental Change, the American Journal of Agricultural Economics, the European Review of Agricultural Economics, and Energy Economics. His research has been funded by the Australian Research Council, the Australian National Commission for UNESCO, among others.



Assoc. Prof. Paul LEE

Paul is an Associate Professor at the UniSA. His research focuses on Aviation Human Factors and Aviation Safety. Paul's current research interest is in the use of Artificial Intelligence (AI) to further improve Aviation Safety.

Before joining UniSA STEM Paul's last appointment was an Aviation discipline leader (Acting) at the University of Southern Queensland (USQ). Prior to becoming an academic, he was a flight instructor at Massey University in New Zealand where he instructed in Single-Engine and Multi-Engine aeroplanes under Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) as well as conducting night and aerobatic flight instructions. Paul was also an internal flight examiner conducting various flight exams within the flight practicums embedded within the Bachelor of Aviation. Paul holds an Australian Commercial Pilot Licence with a Grade 2 instructor rating and a Remote Pilot Licence.



Dr Xin DENG

Xin is a Senior Lecturer in Economics at UniSA Business. Her research encompasses a wide range of areas in applied economics and management. Her current research focuses on sustainability and diversity, with special attention to gender issues and corporate social responsibility.

She has led projects funded by UN Women, Australian government and industrial partners to address real world problems such as promoting gender equalities in the workplace and understanding the implications of globalisation on the labour market. She is a regular commentator for SBS radio's Mandarin program on Economic and Finance issues, and has provided commentary to many media outlets such as ABC and China Daily.



OUR PROJECT



The purpose of this Project is to raise awareness among Australian and Chinese stakeholders about opportunities for growing sustainable aviation fuel (SAF) industries through seminars, workshops, presentations and publications and prepare Australian farmers and investors to capitalise on emerging SAF business opportunities.

OUR FUNDING ORGANISATION



The National Foundation for Australia-China Relations is an Australian Government initiative established in 2020 to strengthen understanding and engagement between Australia and China.

The Foundation brings together government, business and communities to find and support ways to engage constructively with China, across greater China and to involve our diverse stakeholders and communities. It demonstrates the Australian Government's commitment to a mutually respectful relationship with China, one that is shaped by a strong sense of Australia's values and national interests, as well as mutual benefit.

OUR RESEARCH TEAM



Dr Yifei CAI

Yifei is a Lecturer with a PhD degree in Economics. His research expertise focuses on aviation economics, aviation finance, energy economics, and applied econometrics. His recent publications have been featured in prestigious academic journals, including Energy, Energy Economics, Scottish Journal of Political Economy, Journal of Environmental Management, Transport Policy, Applied Economics, and more.



Dr Zhifang WU

Zhifang is a Lecturer in UniSA Business with a PhD degree in Economics and Management. Her research interests lie in environment sustainability, sustainable water management, work-integrated learning, and behaviour economics. Her research has been published in top journals, including the Journal of Cleaner Production, Journal of Environmental Management and more.



Ms Zahra JAFFARY

Zahra is a PhD student at UniSA, where her research focuses on aviation sustainability, with particular emphasis on the utilisation of hydrogen and Sustainable Aviation Fuel within airport operations. She also serves as an airline representative for Air New Zealand at Adelaide Airport.



Mr Yuchao XU

Yuchao is a PhD student majoring in aviation management at UniSA. His interests lie in policies on decarbonisation and sustainability. Before moving to Adelaide, he worked as a student research assistant at the Energy Studies Institute in Singapore.



PROJECT SUMMARY

The project team will organise and deliver a series of eight events in Australia and China to facilitate knowledge exchange on sustainable aviation fuel (SAF) and promote cooperation and partnerships among industry and policy stakeholders. This initiative aims to capitalise on business opportunities associated with the commercialisation of SAF.

Stage 1: April - September 2024 (completed)

Roundtable in Adelaide: Host a half-day roundtable in August 2024 with industry stakeholders from the aviation, tourism, and agricultural sectors, Tourism Australia, government agencies, and aviation scholars to review and evaluate the e-brochure before its final release in September 2024.

Stage 2: Proposed October 2024 - April 2025

Beijing Seminar: Partner with the local university to explore SAF production cooperation and partnership opportunities between Australia and China (9 November 2024).

Adelaide Forum: Host a special SAF forum at the 34th Chinese Economic Society Australia Annual Conference on 27 November 2024, organised by the University of South Australia.

Shanghai Seminar: Collect views and opinions from the Chinese airline industry on the factors and barriers affecting SAF adoption and estimated future demand.

Stage 3: Proposed May - October 2025

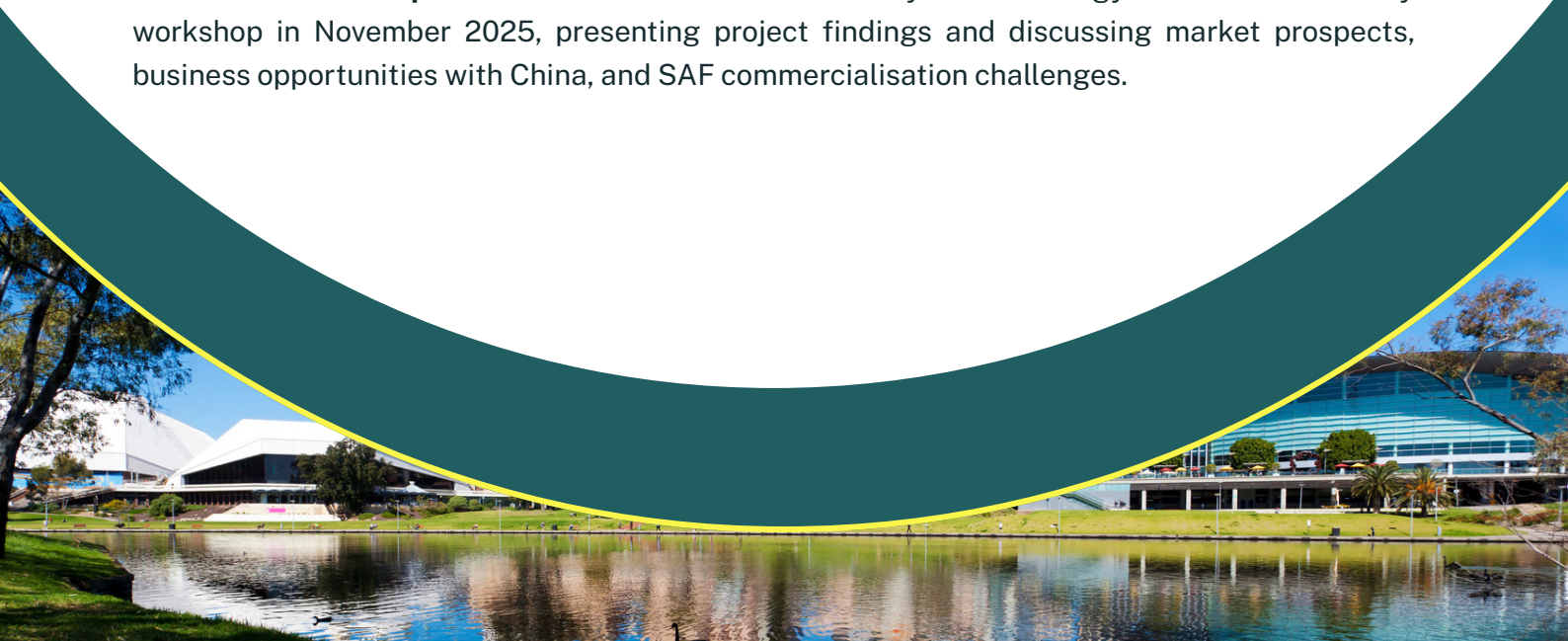
Guangzhou Seminar: Partner with China Southern Airlines, to discuss sustainability criteria for SAF and related policy and regulatory issues in July 2025.

Hong Kong Seminar: Partner with the Hong Kong Polytechnic University to host a special SAF session, inviting Cathay Pacific, Hong Kong Airlines, and other stakeholders.

Chengdu Seminar: Partner with Chengdu Shuangliu International Airport to host a one-day seminar, engaging with Air China, Sichuan Airlines, and SAF producers.

Stage 4: Proposed November - December 2025

Melbourne Workshop: Partner with Swinburne University of Technology to deliver a one-day workshop in November 2025, presenting project findings and discussing market prospects, business opportunities with China, and SAF commercialisation challenges.



SCHEDULES



Adelaide
August, 2024



Beijing
November, 2024



Adelaide
November, 2024



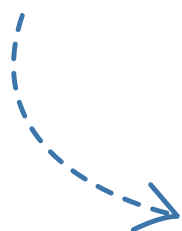
Hong Kong
July, 2025



Guangzhou
July, 2025



Shanghai
April, 2025



Chengdu
October, 2025



Melbourne
November, 2025



SUMMARY OF ACTIVITIES (BEIJING I)



On 9-10 November 2024, the UniSA SAF Project Team successfully hosted the SAF Roundtable Forum in Beijing – the first of its kind in China and the second in the series. In collaboration with the Air Transport Research Society China Chapter and Beihang University, this Beijing forum engaged more than 100 attendees from universities, research institutes, and industry. We sincerely appreciate the generous support of our guest speakers, who joined us to share their insights with the audience. In particular, we extend our heartfelt thanks to Patty Therrios for her consistent support from the early stages of this project. We also thank Rui Hou, Blake Yaoguang Li, and Jinjin Xu for bringing valuable perspectives from their work.



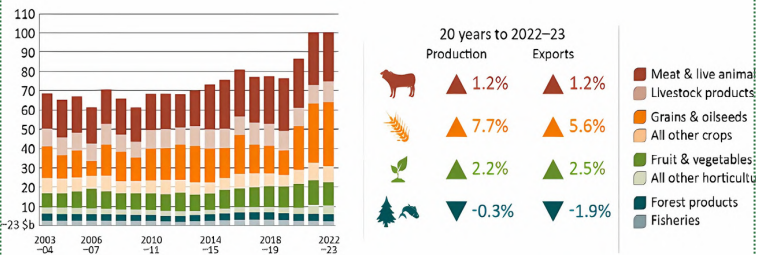
SUMMARY OF ACTIVITIES (BEIJING II)



SUMMARY OF ACTIVITIES (ADELAIDE NOV I)



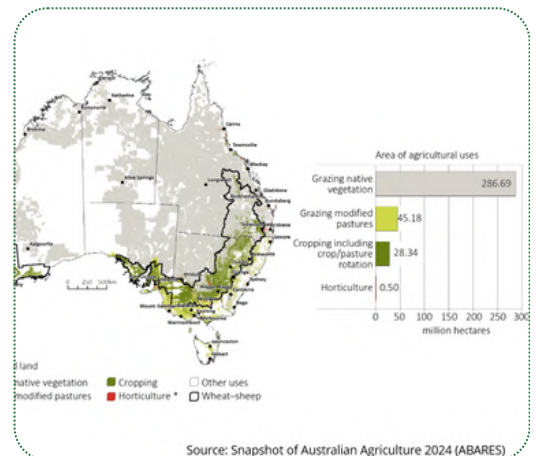
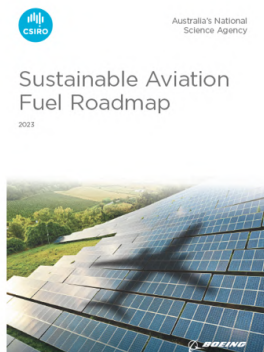
20 Year Production trend



Flinders University

Source: Snapshot of Australian Agriculture 2024 (ABARES)

SAF: Technology



Source: Snapshot of Australian Agriculture 2024 (ABARES)

On 27 November 2024, the SAF project team hosted the second forum in Adelaide, which was the third in the series. In collaboration with the Chinese Economics Society Australia (CESA), this Adelaide forum not only engaged with aviation industry representatives but also brought together economists and researchers focused on decarbonisation and the green economy.

We were delighted to welcome speakers who joined us both online and in person, flying in to Adelaide for the event. We sincerely thank all our speakers and panellists for sharing their insights on advancing SAF adoption.



SUMMARY OF ACTIVITIES (ADELAIDE NOV II)



OUR SPEAKERS & PANELLISTS

IN OUR BEIJING & ADELAIDE (NOV) FORUM



Blake Yaoguang Li

Executive Director and CEO,
Haixin International



Rui Hou

Sustainability, Airbus China



Patty Therrios

Head of Strategy and
Sustainability at
Adelaide Airport Limited



Jinjin Xu

Sustainability Lead, Boeing
China



Prof. Shane Zhang

Professor of Aviation, UniSA
Moderator

Disclaimer on Speakers and Panellists: While our project team greatly appreciates the presence of our guest speakers and panellists, we would like to clarify that their views do not necessarily represent those of their respective affiliations or indicate any official endorsement of our project.



OUR SPEAKERS & PANELLISTS

IN OUR BEIJING & ADELAIDE(NOV) FORUM



Stella Biggs

Department of State
Development, South Australia



Dr. Louise Brown

CEO, HydGene



Dr. Kimberly Camrass

Sustainability Lead -
Australia, New Zealand and
South Pacific, Boeing



Frosti Lau

Regional General
Manager South-West
Pacific, Cathay Pacific



Dr. Kun Wang

Assistant Professor,
Hong Kong Polytechnic
University



Samuel Wong

Vice President Sales-
Asia Pacific, PAC



Dr. Xin Deng

Senior Lecturer, UniSA
Moderator



Prof. Alex Zuo

Professor, Flinders



FIVE KEY TAKEAWAYS FROM THE LAST DECADE OF SAF RESEARCH (ECON & BUS)

Sustainable certification of pathways and feedstocks

SAF relies on certified pathways and sustainable feedstocks to ensure environmental integrity. While HEFA from waste oils is well-established, its scalability is limited. Future research should focus on lignocellulosic biomass, industrial waste gases, and algae-based oils.

Economic simulation of alternative solutions

SAF is a vital near-term decarbonisation option, but alternatives like enhanced aircraft efficiency, route optimisation, and demand management (e.g., carbon pricing) could support it. Simulations indicate that without SAF, airlines might cut flight distances by 27% or raise fares by 48% to meet climate targets, affecting tourism and connectivity.

Economic feasibility and market challenges

SAF costs 3.5 times more than conventional jet fuel (USD 2,500 vs. USD 690 per tonne). High production costs, limited incentives, and inconsistent policies hinder adoption.

Supply chain dynamics and stakeholder involvement

The SAF supply chain links feedstock suppliers, refineries, airlines, airports, and regulators. Coordinated efforts and international collaboration are key to ensuring a stable, equitable supply without market fragmentation.

Policy interventions and market incentives

Governments drive SAF uptake. The EU, Japan, and Singapore have SAF mandates, but poorly designed policies risk market distortion. Carbon pricing, subsidies, and research incentives could better encourage scaling.

Summarised by Tanya Wilkins, Centre for Enterprise Dynamics in Global Economies, University of South Australia (in press). Source: Xu, Y., Zhang, Y., Deng, X., Lee, S.-Y., Wang, K., & Li, L. (2025). Bibliometric analysis and literature review on sustainable aviation fuel (SAF): Economic and management perspective. Transport Policy. <https://doi.org/10.1016/j.tranpol.2024.11.014>



Bibliometric analysis and literature review on sustainable aviation fuel (SAF): Economic and management perspective

Yuchao Xu ^a, Yahua Zhang ^a , Xin Deng ^b, Seung-Yong Lee ^a, Kun Wang ^c, Linbo Li ^d

[Show more](#) 

[+ Add to Mendeley](#) [Share](#) [Cite](#)



Centre for Enterprise
Dynamics in Global
Economies

At C-EDGE, we provide soli
promoting learning and ei

【文章推介】可持续航空燃料的文献计量分析和文献综述:经济和管理观点

民航环境与可持续发展智库 2025年04月01日 14:33

01 研究简介

可持续航空燃料 (SAF) 是航空部门努力实现净零目标的关键因素。本文对2014年至2024年期间来自社会科学和定量分析的243篇SAF相关出版物进行了文献计量分析和文献综述。主要突出了技术途径、原料和政策干预的经济分析的最新研究趋势。尽管截至2024年, SAF在商用航空中的使用率低于0.1%, 但其脱碳潜力可能超过68%, 特别是在中长途航班上。虽然基于生物质的SAF由于原料供应而面临限制, 但电转液 (PtL) 的途径可能提供长期解决方案。研究中确定了五个关键主题: (1) 途径和原料的可持续认证, (2) 替代解决方案的经济模拟, (3) 途径和原料的经济可行性, (4) 供应链动态和多个利益攸关方的参与, 以及 (5) 政

Our research paper, which presents a bibliometric analysis and literature review mapping the trends in existing research on Sustainable Aviation Fuel (SAF) from economic and management perspectives, has been published in the academic journal Transport Policy. We are pleased to share that this work has also been featured by the Civil Aviation Environmental and Sustainable Development Think Tank at the Civil Aviation University of China, as well as the Centre for Enterprise Dynamics in Global Economics (forthcoming).





IMPACTS OF AVIATION DECARBONISATION (FROM OECD-ITF)

Extended timeframe to 2060:

The ITF (The International Transport Forum at the OECD) has extended its analysis from 2050 to 2060 to allow for the potential significant adoption of new liquid fuels and technologies. Even if these innovations are deployed rapidly, they are unlikely to decarbonise the sector by 2050.

Impact on connectivity and costs:

Under the NZE (Net Zero Emission) scenario, air ticket prices are expected to be 25–30% higher. Combined with the increased availability of cleaner alternative modes, such as high-speed rail, and shifts in traveller behaviour, air passenger kilometres in 2060 are projected to be around 30% lower than in the Baseline scenario.

Rising demands:

The NZE scenario anticipates major emissions reductions from SAFs, with an equivalent annual demand of approximately 500 billion litres by 2060—more than 1,000 times the current production levels.

Support for regional and remote areas:

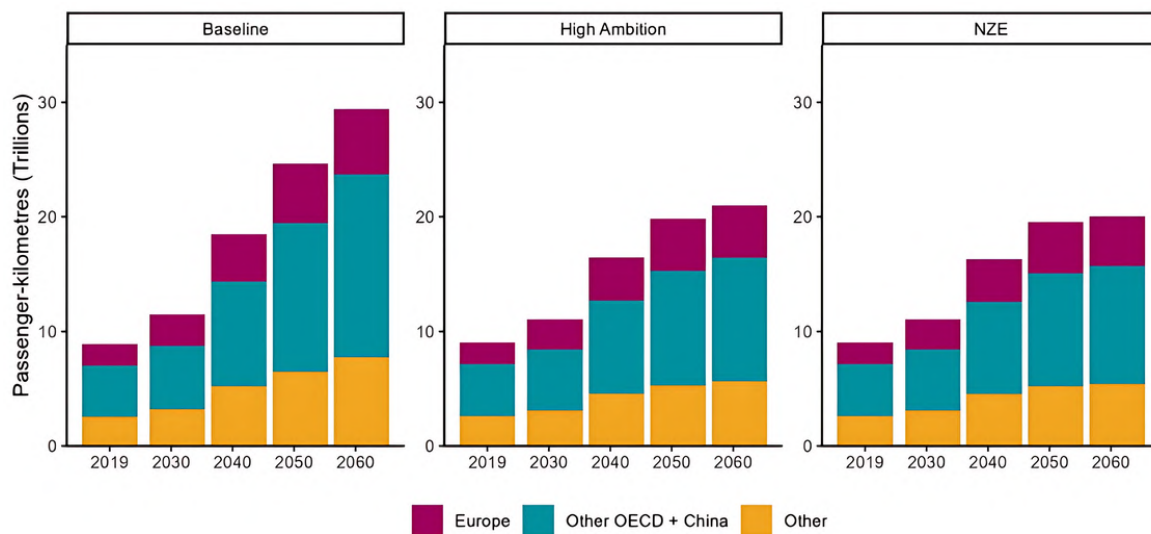
Not all air transport routes in regional and remote areas are commercially viable without government support. The increased costs due to decarbonisation could lead to a rise in such circumstances, necessitating public intervention.

Tourism and labour market implications:

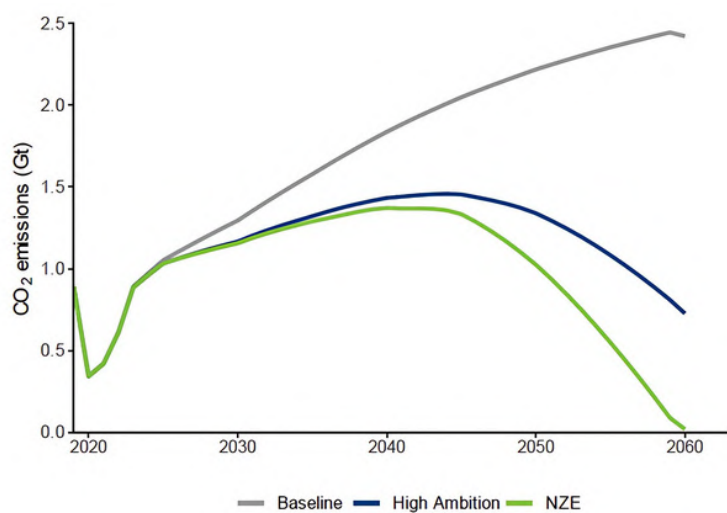
Around 75% of the tourism sector's CO₂ emissions stem from transport, with air travel alone contributing 40%. Although air passenger-kilometres are expected to grow strongly between 2024 and 2060, decarbonisation may result in fewer direct aviation jobs. However, this might be offset by job creation in scaling up SAF production, potentially benefiting rural communities in middle- and low-income countries by including them in the global energy market.

Source: International Transport Forum. (2024, November). Decarbonising aviation: Exploring the consequences (International Transport Forum Policy Papers No. 140). OECD Publishing.

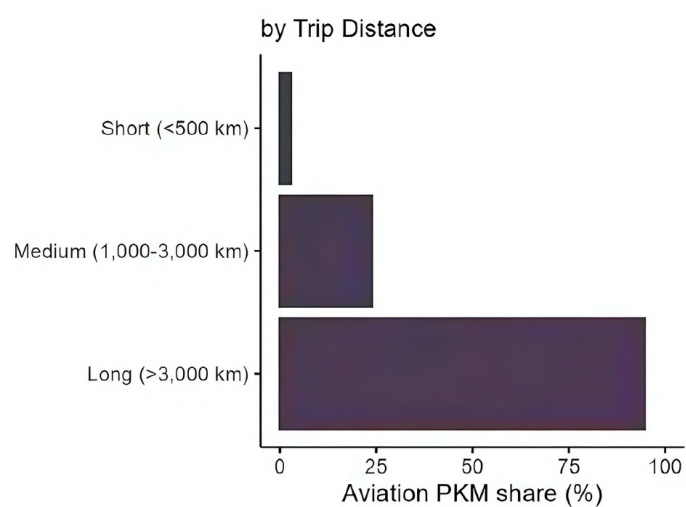




Air transport demand by world region



Global tailpipe GHG emissions from aviation to 2060, by scenario



Dependence on air transport connectivity



TOP FIVE RISKS OF SUSTAINABLE AVIATION (FROM WEF)

SAF availability and cost:

The limited availability and high cost of SAF are major challenges. Long-term offtake agreements, robust de-risking mechanisms, and increased corporate involvement, supported by favourable policies, are needed to attract capital and promote SAF projects globally.

Policy alignment and consistency:

Consistent and enduring policy support is vital. While regions such as Asia Pacific, Brazil, Chile, Oman, Saudi Arabia, and Europe are advancing supportive measures, the US faces uncertainty. Harmonised policies and stable subsidies are essential for driving consistent SAF adoption worldwide.

CORSIA implementation:

Effective implementation of ICAO's CORSIA is critical for standardising global carbon reduction efforts. Despite expanding participation and new carbon credit programmes, challenges persist with the non-participation of key nations.

Sustainability traceability:

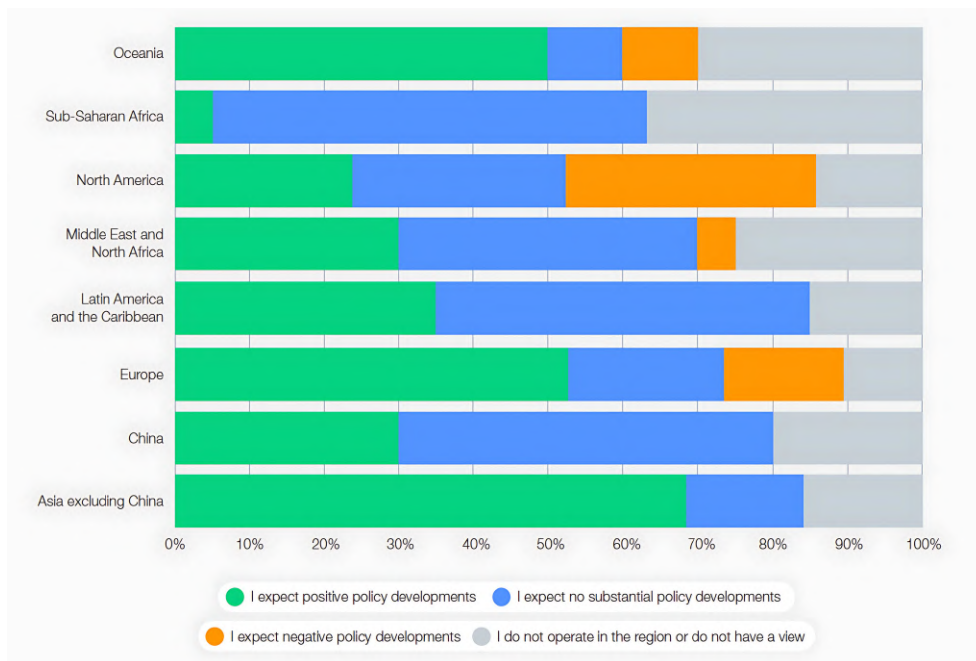
With rising reliance on SAF, ensuring the sustainability of feedstocks is increasingly important. Issues such as land-use change, deforestation, and impacts on food security and biodiversity necessitate improved transparency, research, and uniform sustainability standards.

Carbon pricing and emissions trading:

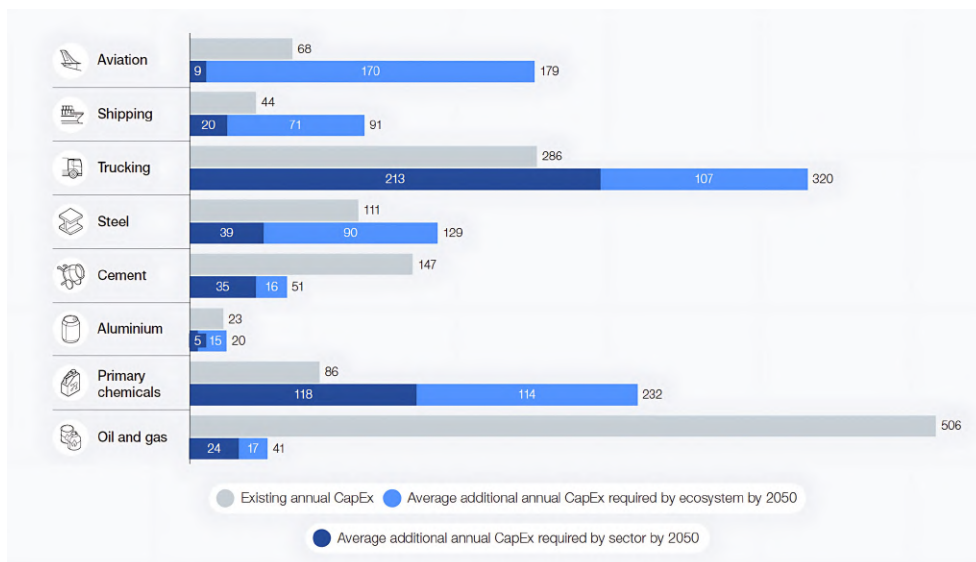
Airlines must navigate the complexities of both CORSIA and local emissions trading schemes. Variations in regional policies and the inclusion of non-CO₂ emissions contribute to additional compliance costs and complexity.

Source: World Economic Forum. (2025, March). Global aviation sustainability outlook 2025 (White paper). World Economic Forum.

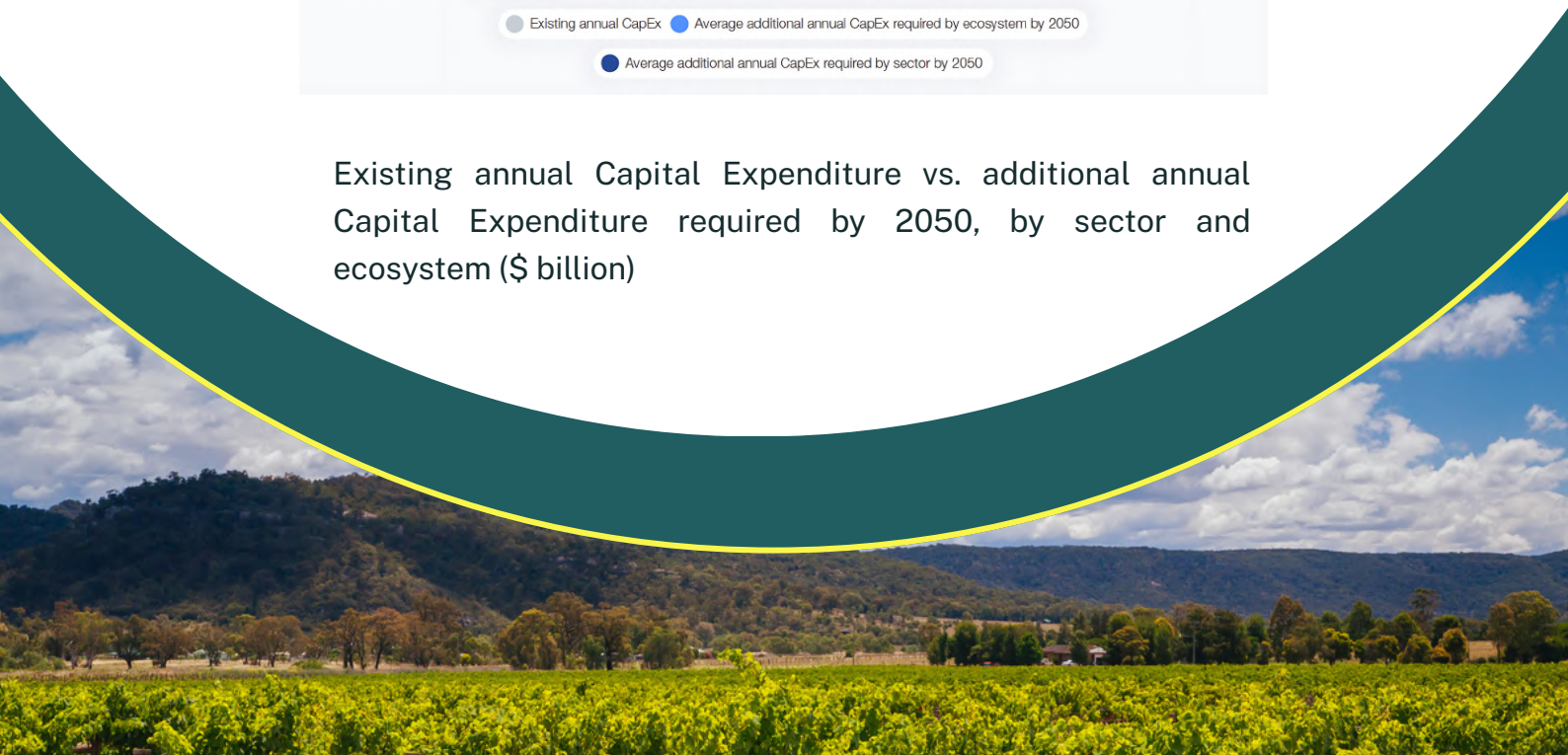




Expectations for the evolution of aviation decarbonisation policy, by region



Existing annual Capital Expenditure vs. additional annual Capital Expenditure required by 2050, by sector and ecosystem (\$ billion)



COMMERCIAL PATHWAY OF SAF (FROM US DOE)

SAF grand challenge targets & market momentum

The SAF Grand Challenge aims for 3 billion gallons of domestic SAF production by 2030 (10% of U.S. jet fuel demand) and 35 billion gallons by 2050 (100%). This could create over 70,000 jobs by 2030. As of August 2024, only 16.5 million gallons have been produced—less than 0.6% of the 2030 target. However, announced projects could surpass 3 billion gallons annually by 2030, with \$44 billion in investment committed.

Scaling production & technology pathways

The U.S. has just four operational SAF plants with a combined capacity of 64 million gallons per year (MGPY). To reach 2030 goals, 8-12 commercial-scale plants (100 MGPY each) must be operational. SAF made via the HEFA pathway—using fats, oils, and greases—could represent 70% of production by 2030. Post-2030, AtJ and PtL pathways must scale to avoid feedstock constraints.

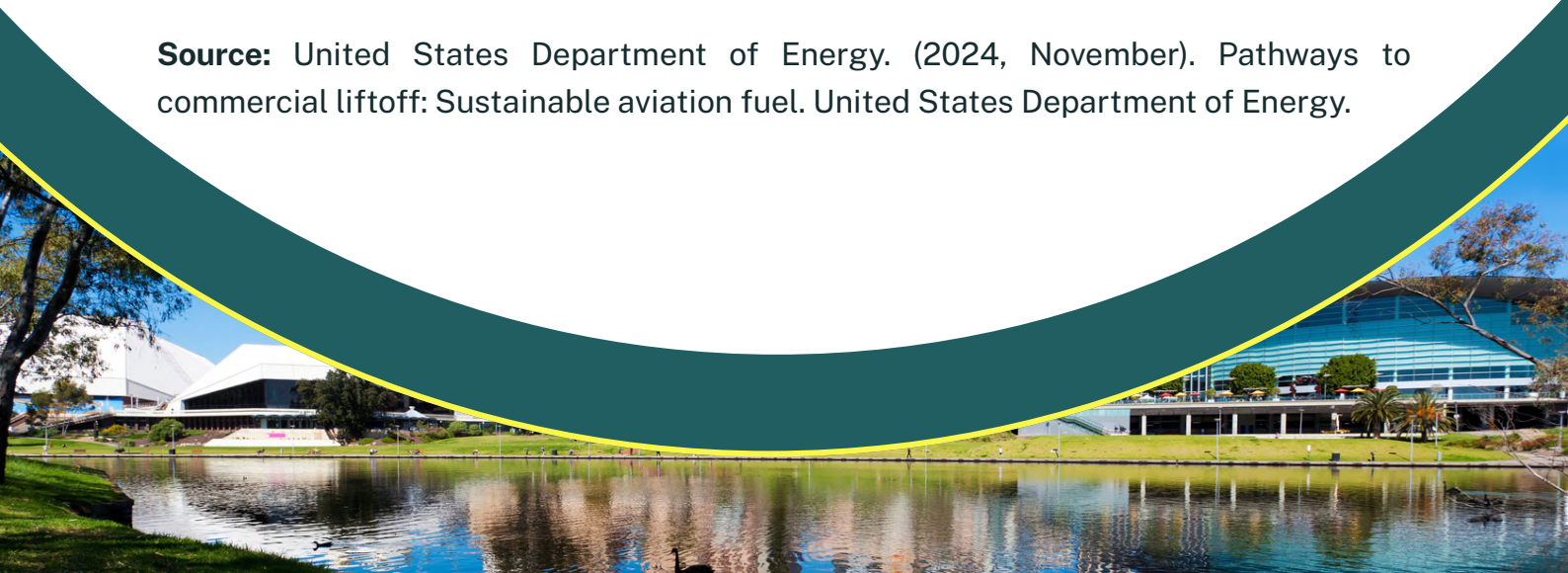
High costs & demand uncertainty

SAF is 2-10 times more expensive than fossil jet fuel. Airlines, operating on thin margins, cannot absorb these costs, leading to low voluntary demand. SAF credits (SAFc) allow companies to buy emissions reductions, but U.S. demand remains short-term and uncertain. Long-term offtake agreements (10+ years) are essential to secure investment and scale supply.

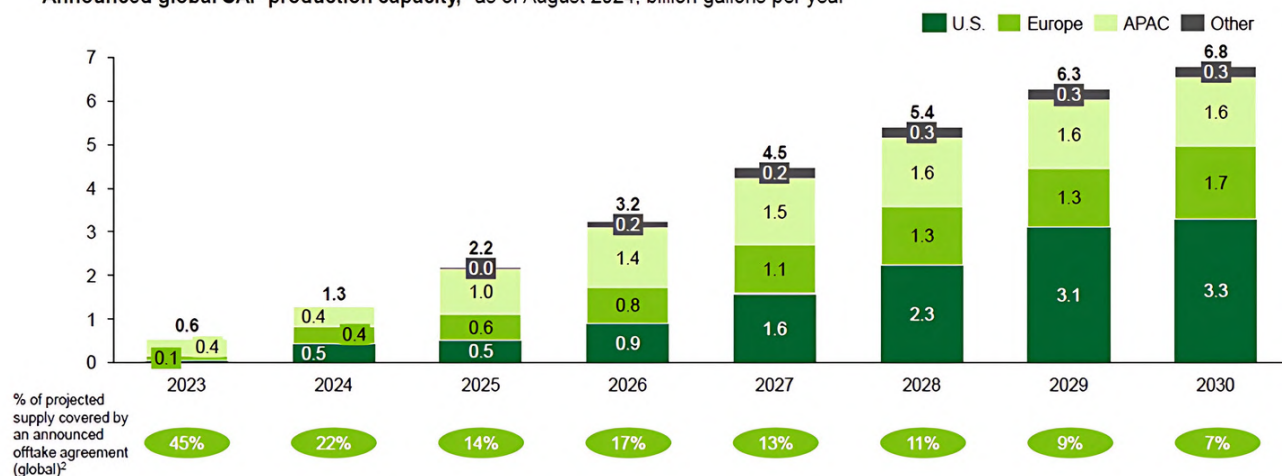
Policy Support & market potential

U.S. SAF policy is primarily supply-focused, with tax credits (e.g. 40B, 45Z) helping reduce production costs. However, these incentives expire between 2024 and 2027, while state-level incentives often favour renewable diesel over SAF. Demand-side policies—such as mandates in Europe and Asia—could drive over 2 billion gallons of global SAF demand by 2030. If targets are met, the U.S. SAF market could be worth \$4-11 billion by 2030 and \$175-315 billion by 2050.

Source: United States Department of Energy. (2024, November). Pathways to commercial liftoff: Sustainable aviation fuel. United States Department of Energy.

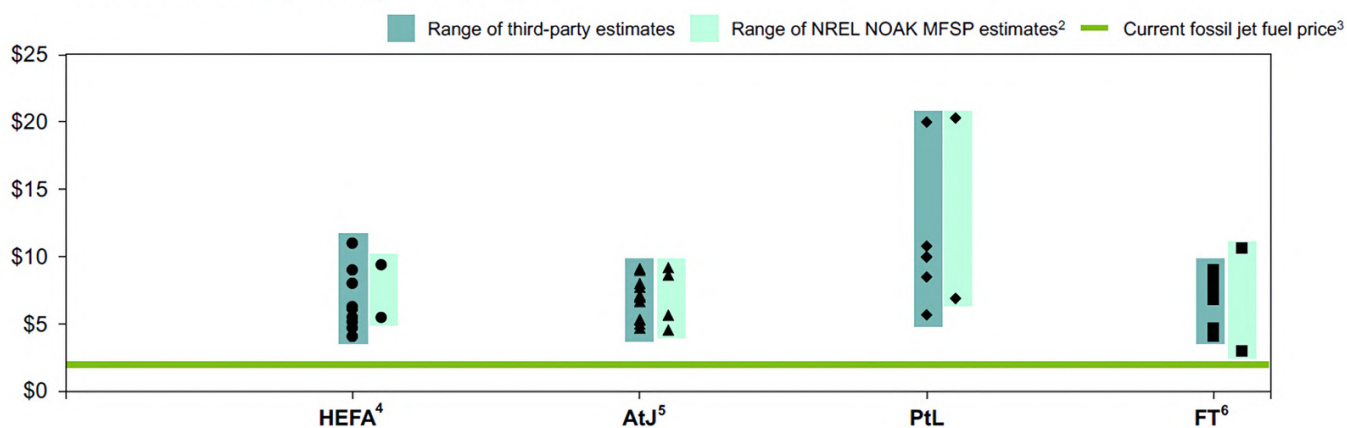


Announced global SAF production capacity,¹ as of August 2024, billion gallons per year



Announced global SAF production capacity

SAF cost estimates by pathway,¹ USD per gallon



SAF cost estimates by pathway

Feedstock requirements for SAF and RD compared to total U.S. feedstock available in 2030¹

Production Pathway	Feedstock	Total % of U.S. 2030 feedstock supply used for SAF	Total % of U.S. 2030 feedstock supply used for RD	Total % of U.S. 2030 feedstock supply used for SAF and RD ¹
HEFA	Oilseed and FOG	46%	148% ²	194%
AtJ	Starch-based	4% ³	0.0%	4%
FT	Forest wastes	1%	0.8%	1%
FT	MSW and dry wastes	0.1%	0.0%	0.1%
FT	Agricultural residues	2%	0.0%	2%
FT	Wet wastes	6%	0.0%	6%

Feedstock requirements for SAF and renewable diesel (HVO)



DISCLAIMER

The contents of this brochure, including the views expressed and statements made, reflect solely the opinions of the research team members. They do not necessarily represent the official stances, positions, or views of the funding organisation, affiliated organisations, or any other entity. The logos in this brochure are copyrighted by their respective organisations.

GET IN TOUCH

This brochure was created by the Sustainable Aviation Fuel research team at the University of South Australia for internal, non-commercial use only. Please do not distribute it without written consent. This is part of the deliverables of the project 'Growing Sustainable Aviation Fuel Industries in Combatting Climate Crises: Opportunities for Australia and China,' funded by the National Foundation for Australia-China Relations.

For more information, please contact us.



Linkedin Profile:



+61 8 830 23026



shane.zhang@unisa.edu.au

UniSA respectfully acknowledges the Kaurna, Boandik and Barngarla First Nations Peoples and their Elders past and present, who are the First Nations' Traditional Owners of the lands that are now home to our campuses in Adelaide, Mount Gambier and Whyalla

