



**This February 2024 issue covers developments during November 2023, December 2023, and January 2024. Future issues will be published bi-monthly, with the next Ishka SAVi Extra due in April 2024.**

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## SUSTAINABLE FINANCE

**- For developments on Sustainable Finance involving lessors, see Lessors and Asset Managers section -**

### Spring Airlines debuts China's first transition taxonomy-aligned loan

Shanghai-headquartered low-cost Spring Airlines has become the first company in China to close a loan aligned with what is reported to be the country's first transition finance taxonomy. According to a [report](#) by environmentalist non-profit *China Dialogue* in early January, the 310-million-yuan (\$43.7 million) loan was provided by Shanghai Pudong Development Bank (SPDB). According to a *People's Daily* [report](#) (in Chinese), Lianhe Equator Environmental Impact Assessment Co., Ltd (Lianhe Equator) provided the secondary opinion on the transaction. "Spring Airlines will set up Sustainability Performance Targets such as tonne-kilometre emissions and the proportion of SAF used, which will be linked to the floating interest rates of SLL [Sustainability-Linked Loan]." Proceeds from the loan will be used to support the introduction of fuel-efficient Airbus A320neo aircraft. The Shanghai Transition Finance Taxonomy (Trial) (approximated translation of its original title: 上海市转型金融

目录 ( 试行 ) ) was announced by the Shanghai Municipal Financial Regulatory

Bureau at the end of December 2023 for introduction in January 2024 – a PDF and Word (searchable) version in Chinese are available to download via the [SAVi Resource Library](#). According to the bureau's [announcement](#) (in Chinese), the taxonomy "is based on guiding the steady and orderly transformation of traditional carbon-intensive industries, promoting the synergy and complementarity of transition finance and green finance." At launch, the taxonomy supports six major industries including aviation. The Spring Airlines loan was added to the [Ishka SAVi Sustainable Finance Tracker](#) and is the first sustainable finance transaction identified by Ishka in 2024. A quick recap of 2023 sustainable finance transactions is available in Ishka's [latest webinar](#).

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**Singapore launches green and transition taxonomy, including aviation criteria** - The Monetary Authority of Singapore (MAS) on 3<sup>rd</sup> December [launched](#) the **Singapore-Asia Taxonomy for Sustainable Finance (Singapore-Asia Taxonomy)** – which sets out detailed thresholds and criteria for defining green and transition activities that contribute to climate change mitigation across eight focus sectors, including transportation. The Singapore-Asia Taxonomy uses a traffic light system to determine green, transition-eligible (amber), and ineligible (red) activities. **Aviation is included** among transportation activities (see pages labelled 45 to 53 of the [full document](#)). For airlines and lessors (both covered under 'Passenger Air Transport' and 'Freight Air Transport', page labelled 53), zero-emission air transportation assets powered by electricity or hydrogen are the only ones considered Green, while SAF purchases and projects (including supply chain) are considered Amber (with further SAF sustainability criteria yet to be defined by 2030). For low-carbon transport infrastructure, infrastructure to provide electrical power or hydrogen refuelling for stationary aircraft as well as other zero-emission aviation projects and infrastructure and considered Green.

**ECB: 90% of banks misaligned with Paris Agreement** – The **European Central Bank (ECB)** has published a [new report](#) quantifying the most pronounced transition risks in the credit portfolio of the banking sector. The ECB analysed 95 banks covering 75% of euro area loans and found that their portfolios are "substantially misaligned with the goals of the Paris Agreement." A summary of the findings can be found in [this blogpost](#). The shipping and aviation sectors are not yet taken into account in the PACTA (Paris Agreement Capital Transition Assessment) methodology on which the ECB analysis is based, which only covers six sectors. Expanding the analysis to include shipping and aviation – which the report hints could be done in the future – would expand the assets covered by a potential €64 billion (up from the approximately €251 billion in assets under the six sectors analysed). The only other notes on aviation in the report are in p. 46, where the report notes that direct financing for new airports and airport capacity expansion projects as well as loans intended for older (less energy-efficient) aircraft are often excluded in banks' sectoral lending practices, while special-purpose loans for SAF projects are included under "build-out and decarbonisation technologies."

**28 NGOs criticise SBTi criteria on aviation** – 28 environmental NGOs including **Greenpeace** and **Transport & Environment (T&E)** on 21st November published a [critical letter](#) addressed to the Science-Based Targets Initiative (SBTi) warning that SBTi-approved pathways by airlines "help the aviation industry sustain its growth path while blowing up the carbon budget." Their main concerns with the SBTi's aviation pathway include the fact that it only requires steep emissions reductions from 2030, does not take into account non-CO2 effects of aviation, it allows aviation to grow its share of the carbon budget, does not require absolute emissions reduction targets, does not differentiate between emerging and early industrialised economies, and omits lobbying efforts by airlines against climate measures.

**NGOs lead call in favour of transition finance ahead of COP28** – Eleven NGOs including **RMI** – whose Centre for Climate-Aligned Finance is working on developing the soon-to-be-launched Aviation Climate-Aligned Finance (CAF) framework – on 27<sup>th</sup> November published an open letter calling for the increased deployment of **transition finance**. The [letter](#), released ahead of COP28 and also supported by **UK Finance**, concedes that "uncertainty and debate still exist" around the definition and implementation of "transition finance" to decarbonise high-emitting and/or hard-to-abate sectors, but argues transition finance "can, if implemented credibly, deliver high impact transition-enabling solutions" for high-emitting counterparties and assets "which may

otherwise not be eligible for green finance.” The letter makes specific calls to action for the finance sector, issuers, borrowers, and governments.

## SUSTAINABLE AVIATION FUEL (SAF)

-- For details on SAF policy and regulation, see 'Policy and Regulation' section below --

-- For any updated related to lessors, see 'Aircraft lessors and asset managers' section below --

**IATA: SAF doubled in 2023, and will triple in 2024** - According to IATA, SAF production [doubled](#) in 2023 year-on-year and is set to triple in 2024. The aviation industry would have consumed between **450,000 and 500,000 tonnes of SAF in 2023** – around double the 240,000 tonnes produced in 2022. In 2023, the industry association believes SAF purchased by airlines averaged a price of approximately \$2,500 per tonne, or 2.8x jet fuel, for a total industry cost of \$756 million. For 2024, IATA expects the aviation industry to increase its use of SAF to 1.5 million tonnes, triple that of 2023 (see IATA's complete [SAF presentation](#) for more details). For a look at what airlines used the most SAF in 2022 (not 2023), Aaron Robinson (VP of SAF at IAG) has put together a great chart, [available on LinkedIn](#). While 2023 fuel and SAF usage numbers are yet to be published by airlines, **Air France-KLM** has already [claimed the top spot](#) with 80,000 metric tonnes of SAF incorporated by the group's airlines in 2023.

### 5. SAF production today

Year	2019	2020	2021	2022	2023e	2024f
Estimated SAF Output (Mt)	<0.02	0.05	0.08	0.24	<b>0.45-0.5**</b> (625 million liters or 3% RF output)	1.5*** (1.875 bn liters or 6% RF output)
Global Jet Fuel (Mt)*	287	157	189	233	<b>286*</b>	301
SAF % of Global Jet Fuel	<0.01%	0.03%	0.04%	0.1%	<b>0.2%*</b>	0.5%

2023 SAF Production: **~0.5Mt of SAF in 2023**  
Average SAF output only **~3%** of total Renewable Fuel output  
Need incentives for optimal SAF output

\*IATA Economics  
\*\*Based on current insights; Q4 2023 numbers to be confirmed in retrospect in Q1 2024  
\*\*\*Based on current projections and assumptions that delayed 2023 capacity will fully commercialize in 2024

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IATA December 2023 SAF Presentation

**World's first SAF AtJ opens in the US state of Georgia** – The world's first alcohol-to-jet (AtJ) SAF production facility was [opened](#) in the US state of Georgia by producer LanzaJet on 24<sup>th</sup> January. The **LanzaJet Freedom Pines Fuels** will produce 10 million gallons of SAF and renewable diesel (30,280 tonnes) per year. According to the [SAVi SAF Tracker](#), All Nippon Airways (ANA) and British Airways have offtake agreements with LanzaJet which may be fulfilled with SAF from the Freedom Pines facility. LanzaJet Freedom Pines Fuels is fully funded and has committed offtake agreements for all fuel produced in the next 10 years. The scale of the facility, however, remains orders of magnitude smaller than some of the larger HEFA SAF facilities in operation today. Neste's Singapore refinery, the world's largest, can produce up to one million tonnes of SAF per year, 33 times the volume of LanzaJet's new facility. And on **Neste**-related news, the Finnish producer [said](#) in December that it plans to invest some 2.5 billion euros (\$2.74 billion) to convert its Porvoo crude oil refinery in Finland into a biofuels production facility as it seeks to exit fossil fuel production over the long term.

**Virgin 100% SAF flight draws attention and strong reactions** – Virgin Atlantic was [at the centre](#) in late November 2023 of one of the most publicised and globally reported sustainable aviation milestones to date. Flight100 (VS100) operated by a **Boeing 787** with Rolls-Royce Trent 1000 engines (and owned by [Griffin Global Asset Management](#)) flew from London Heathrow to New York JFK on 28<sup>th</sup> November, becoming the **first commercial transatlantic flight powered by 100% SAF** (88% HEFA made from used cooking oil or UCO and 12% SAK). In the process, the [cargo carried](#) also became the first to cross the Atlantic on 100% SAF. The long-awaited flight was the culmination of a UK government competition (won by Virgin) for a £1 million grant (\$1.26 million) to operate said flight. Besides the exposure merits of the initiative, it will also provide an "opportunity to generate important data that will accelerate SAF approval and boost understanding of its efficiency," the government explained in a [press note](#). Commercial aircraft today are only allowed to blend up to 50% SAF in their fuel mix, requiring [special approval](#) for 100% SAF flights (often for testing and scientific research, including Virgin's). In the days leading to the flight, [Gulfstream Aerospace](#) also completed a 100% SAF transatlantic flight as did Emirates with one of its [Airbus A380s](#). But the major media push by Virgin, the UK government, and other involved parties made these two recent flights easy to forget. It also – and regrettably – precipitated inaccurate statements. UK PM Rishi Sunak [incorrectly](#) referred to VS100 as a "net-zero" flight, while some media outlets [equated](#) cooking oil with SAF. NGO [Transport & Environment \(T&E\)](#) also criticised the fact that UCO-based HEFA SAF, such as the one used on this flight, will be capped over sustainability concerns under the incoming UK SAF mandate. Separately, but seemingly timed, on 30<sup>th</sup> November climate NGO **Possible** lodged a formal greenwashing' [complaint](#) with the OECD against Virgin Atlantic over its "Mission to Net Zero" plan. British Airways was also targeted. Meanwhile, for a look at the contrail impacts of VS100, aviation emissions data firm **Estuaire** has published a [handy visualisation](#).

**First Chinese SAF refiner receives CAAC approval** – Chinese news wire *Xinhua* [reported](#) on 24<sup>th</sup> January that **Junheng Biology**, a private petrochemical enterprise located in central China's Henan Province, has become the country's first refiner to obtain SAF airworthiness approval issued by the **Civil Aviation Administration of China (CAAC)**. The development marks a major milestone in the path to decarbonisation for the world's second-largest aviation market.

### In Australia, powerful pension funds share SAF policy ideas with eyes on investing

Australia's superannuation savings funds or "super" workplace pensions system is, according to the government, the fourth largest in the world with A\$3.5 trillion (\$2.33 trillion) invested. In December, the largest superannuation funds released a blueprint to accelerate investment in the energy transition, with the development of a SAF industry among its targeted sectors. The "super" providers called for 1) introducing a production tax credit to help catalyse investment in a domestic industry, 2) establishing a SAF certification framework, and 3) developing a market that enables SAF credits to be recognised and traded. The full blueprint can be [found here](#).

### T&E briefing: 45 e-kerosene projects in Europe – Transport & Environment (T&E)

in a [new briefing](#) published in January 2024 estimates there are now 45 e-kerosene projects in Europe, of which 25 industrial projects have the ambition to produce 1.7 million tonnes of e-kerosene by 2030, well beyond the 600,000 tonnes required by the EU SAF mandate by that year. However, no project has yet achieved final investment decision (FID). The associated briefing summary contains an [interactive map](#) of the 45 projects. T&E in November also warned that displacement of biofuels and e-fuels into road transportation [would make it harder](#) for aviation to decarbonise. Meanwhile, also in support of e-kerosene, German aircraft OEM **Deutsche Aircraft** in December published a [comprehensive study](#) commissioned to **LBST** comparing the economic and environmental performance of Liquefied Hydrogen (LH2) and Power-to-Liquids (PtL) SAF in aviation. For Deutsche Aircraft's takeaways, [see here](#). The study is focused on domestic production of e-SAF in North America and Europe, while also taking North Africa and the Middle East into account as export regions. Also in December, the **International Energy Agency (IEA)** published a [report](#) with a techno-economic assessment of e-fuel technologies., assessing implications in terms of needed cost reductions, resources and infrastructure investments of an assumed ambitious goal of achieving a **10% share of e-fuels in aviation** and shipping by 2030.



**Roland Berger makes a case for waste-to-SAF** – Consultancy **Roland Berger** in a report titled *Circular SAF: Waste-to-SAF as a critical bridge to a sustainable future for aviation* [published](#) on 5<sup>th</sup> December assesses the role that waste-to-SAF (WtS) might play in the net-zero transition of aviation. It examines the current state of global SAF production, SAF and WtS production pathways, the relative sustainability of different types of SAF, the supply potential of WtS and the economic case for WtS.

### Two new reports examine ammonia's potential for aviation and how US LCFS can boost SAF deployment

– The **UK's** Aviation Environment Federation (AEF) – an environmental non-profit – [published](#) on 17<sup>th</sup> January a [report](#) by the **University of Manchester** assessing the prospects for **ammonia** (a CO<sub>2</sub>-free gas) as a low-carbon fuel for aviation. The report reviews the current state of knowledge about ammonia as an aviation fuel and pinpoints the knowledge gaps that require investigation before ammonia can be considered a viable option in aviation decarbonisation scenarios. Meanwhile, **the International Council on Clean Transportation (ICCT)** [published](#) a working paper evaluating the role in the US of a national low-carbon fuel standard (LCFS) – like the one already in existence for several years in California and increasingly other states – to support SAF. In an LCFS, fuels with GHG intensities above the GHG intensity mandate generate deficits, which must be offset with credits from the use of fuels with GHG intensities below the mandate.

**101 Factsheets on SAF** - The **Roundtable on Sustainable Biomaterials (RSB)** with the support of **Alaska Airlines** and **Microsoft** have launched a website called [SAF-now.org](#) with useful educational factsheets on SAF.

**SAVi SAF Tracker update** – In the past three months 13 new SAF agreements, including for SAF certificates, were announced. Access these and other SAF deals through Ishka SAVi's [SAF Tracker](#).

## POLICY AND REGULATION



EU

**EU Taxonomy amendments (including aviation criteria) formally published** - The EU's Taxonomy Environmental Delegated Act and amendments to the Climate Delegated Act [were published](#) in the Official Journal on 21<sup>st</sup> November. The update ensures sustainable Taxonomy criteria for all modes of transport, including aviation (see Insight: ['Aviation's inclusion into the EU](#)

[Taxonomy approved by the European Commission](#)). The new activities have since been added to the [EU Taxonomy Compass](#) tool (for aviation, search under 'Transport'). Separately, in December the Commission adopted a [guidance document](#) addressing frequently asked questions on the interpretation and implementation. Despite its finalisation, a new **legal challenge** against the EU Taxonomy's inclusion of aviation emerged in mid-January. Five NGOs (Fossilvrij, Protect our Winters, Dryade, CLAW and Opportunity Green) launched a legal challenge against the European Commission, requesting it to review its green investment rules on aviation and shipping. "This is the first step in the challenge which may lead to court action before the European Court of Justice if the Commission does not address the legal issues raised," the NGOs [noted](#) on 16<sup>th</sup> January. They point out that 100% of Ryanair, easyJet and Wizz Air's order books, and 90% of Airbus' order books, could be considered best-in-class – an observation which Ishka notes is correct, but should not be confused with securing Taxonomy alignment, which also relies on other factors and is often limited by fleet replacement criteria or market ratios. Transport & Environment (T&E), the leading sustainable transport NGO in Brussels, does not form part of the legal action.

**Jumping from Fit for 55 in 2030, to 'Fit for 90' in 2040** – The European Commission was set to recommend a 90% net reduction of greenhouse gases by 2040 in early February, Bloomberg [reported](#) on 18th January citing sources. The target was [ultimately approved in early February 2024](#) (see SAVi Five coverage of early February or the April 2024 issue of the SAVi Extra for further details). Ahead of its approval, the chairwoman of the powerful green lobby group the **German Renewable Energy Federation (BEE)**, [called](#) on the European Commission and Parliament to press ahead with a new 2040 decarbonisation policy agenda after the European Parliament election in June 2024.

**European Parliament adopts electric aviation resolution** - The **European Parliament** on 16<sup>th</sup> January adopted a [resolution](#) (*REPORT on electric aviation - a solution for short and mid-range flights*, sponsored by Socialist Swedish MEP Erik Bergkvist, and with the support of the [centre-right EPP Group](#)) calling on the **European Commission** to step up and support the development of electric planes and electric aviation. The resolution, which received 414 votes in favour to 118 against, and 93 abstentions, urges the creation of a strategy for electric aviation, including supporting infrastructure, as it recalls that the "scarcity of green hydrogen and the lack of infrastructure could delay the entry into service of hydrogen-powered aircraft." It nevertheless also urges the European Commission to "develop a targeted strategy for hydrogen production and storage. Conspicuously missing from the 12 private entities (including OEMs) that provided input to the Parliament's rapporteur was Airbus, which the same week announced the checking of a key [milestone](#) by powering, for the first time, its hydrogen ZEROe engine fuel cell (see further details under **OEM Future Programmes**).

**Report: EU jet fuel tax not making progress** – A diplomatic source speaking with Brussels-based publication *Euractiv* once again [confirmed](#) that there has been little progress on a Fit for 55 proposal to revise the Energy Taxation Directive (ETD), with disagreements over the phasing out of aviation tax exemptions among the key reasons bringing negotiations to a halt. The proposal to review the ETD was presented by the European Commission over [two years ago](#). The removal of an exemption for jet fuel taxation would mean the **effective introduction of a tax on kerosene** used for intra-EU flights of at least €10.75/GJ (approx. 0.38€ per litre). Jet fuel taxation is one of the key recommendations by the **European Scientific Advisory Board on Climate Change (ESABCC)**, an independent body providing the EU with expertise and advice relating to climate change, in its 358-page assessment report [published](#) in January 2024. The ESABCC [encourages](#) EU legislators to continue revisions to the ETD that would result in the effective introduction of a jet fuel tax. It also recommends targeting the deployment of carbon capture (CCU/CCS) towards "activities with no or limited alternative mitigation options" including aviation. It also encourages moderate growth in aviation and a shift towards other transport modes such as road and rail, and for aviation to shift towards non-fossil, low-carbon fuels. A summary table of policy inconsistencies, gaps, ambition gaps, and implementation gaps for transport policy can be found on page 127.

**EU Commission €4 billion net-zero fund opens, including for aviation** – The European Commission on 23<sup>rd</sup> November [opened](#) the Innovation Fund's 2023 call for proposals with a budget of €4 billion (\$4.34 billion). Projects located in the EEA are eligible to apply, and following a recent revision of the EU ETS Directive the Innovation Fund calls are now also open to aviation as well as other transportation and energy sectors.

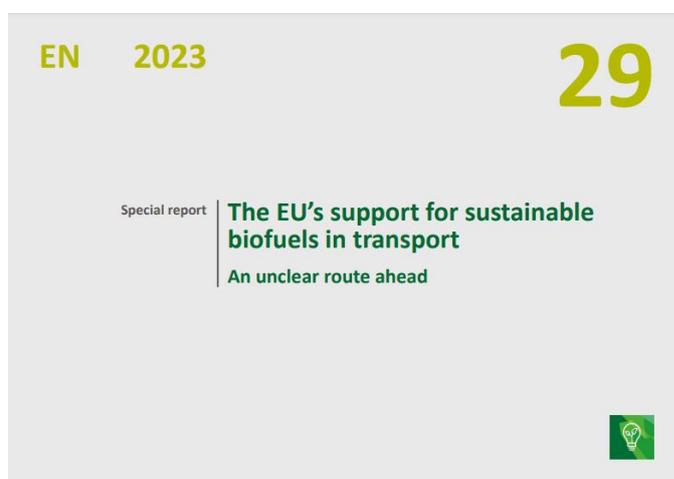
**Belgian EU presidency raises hopes of Single European Sky 2 (SES2) progress** – From 1<sup>st</sup> January to 30<sup>th</sup> June 2024, Belgium will hold the Presidency of the Council of the EU. Belgium will succeed Spain and will precede Hungary. The Belgian Presidency's [programme](#) includes (under Transport) a commitment to continue to work on the revision of the **Single European Sky** framework, which tackles the fragmentation of European airspace and aims at improving ATM performance, with the potential to result in reduced emissions. A dialogue on SES2 between the EU's top legislative bodies had been scheduled for December but was ultimately [cancelled](#).

**Dutch aviation calls on government and public to work together, not against it** – After a rocky year for Dutch aviation placating [greenwashing](#), [taxes](#), and [capacity limits](#), 31 Dutch aviation firms and institutions including **KLM** united in [calling](#) for a "joint action agenda" that "together with the Dutch public, politicians, partners and industry-wide parties" will make

the Dutch airline industry “cleaner, quieter and stronger.” The letter, published on KLM’s website on 11<sup>th</sup> January, includes comments by the Dean of Aerospace Engineering at the Delft University of Technology, the CEO of the Royal Netherlands Aerospace Centre (NLR), as well as the CEOs and executives of **KLM**, **Corendon**, **TUI Netherlands**, and **Transavia**. The joint agenda balances the “cleaner, quieter, and stronger” priorities with “keeping the Netherlands well connected to the rest of the world” and “keeping flying accessible to all Dutch people.” The letter follows plans by the government – later [abandoned](#) yet seemingly set for a [watered-down comeback](#)– to introduce limits on flight operations at Schiphol airport as well as proposed higher passenger taxes (which **KLM** CEO Marjan Rintel criticised in November in [this IATA article](#)). On a related note, on 25<sup>th</sup> January, the airport published a [study](#) on what is needed to maintain its emissions in line with the Paris Agreement which [includes](#) “significant demand management measures.”

**Denmark joins the Netherlands in proposing a green tax on air travel** - Under an agreement announced on 15<sup>th</sup> December, Denmark is set to [introduce](#) a **green tax for air travel** from 2025 and which will, by 2030, reach around 50 Danish crowns (\$7.35) per passenger for intra-European flights, 310 crowns (\$13.75) for medium-distance flights, and 410 (\$18.18) for long-distance, according to a statement from the taxation ministry. Transit flights will be exempted. The measure will help fund efforts to decarbonise aviation, including Denmark’s objective to enable fossil fuel-free domestic aviation by 2030.

**EU auditors warn of lack of SAF roadmap** – An analysis by the **European Court of Auditors (ECA)** published on 13<sup>th</sup> December noted ([page 45](#)) that while ReFuelEU Aviation (the legislation approved in 2023 to introduce a **SAF mandate**) has “set increasingly ambitious long-term objectives” for aviation, it also warned that “there is no roadmap on how to achieve them.” Also offering constructive criticism of ReFuelEU Aviation, particularly on feedstock scarcity and concerns of fraud, is a Dr Stephen Dooley of **Trinity College Dublin** in this *Euractiv* interview [published](#) on 19<sup>th</sup> December. According to [a study](#) published by Transport & Environment (T&E) on 14<sup>th</sup> December, Europe currently imports 80% of the used cooking oil (UCO) that it uses and the vast majority (60%) comes from China, which has been a transit point for potential fraudulent UCO. Separately in recent months, SAF producer **SkyNRG** [published](#) a useful summary of policy implications of ReFuelEU Aviation, including making some suggestions for its improvement.



European Court of Auditors



**UK aviation reiterates calls for SAF support amid ‘taxpayer vs industry’ debate** – An article [published](#) in the *Financial Times* on 12<sup>th</sup> January put the spotlight once again on the call by **UK airlines** for more state support towards SAF production, particularly the rollout of a [financial support mechanism](#) to encourage SAF investment. The fresh call by UK airlines followed a [letter](#) by environmental NGOs, including influential Brussels-based **Transport & Environment (T&E)**, on 15<sup>th</sup> December 2023 calling on the UK government to provide assurances that any SAF revenue certainty mechanism will “not be funded by the taxpayer.” The NGOs proposed instead an “industry-funded” mechanism solely paid for by the aviation sector. The NGO’s letter followed comments by UK Transport Secretary Mark Harper in November that the government was “absolutely prepared” to put taxpayer money into funding the transition towards cleaner aviation fuels. Meanwhile, as part of one of the existing UK flagship SAF support measures, the UK government on 17<sup>th</sup> November announced the [winning proposals](#) for window 2 of the **Advanced Fuels Fund (AFF)** competition, with around [£53 million](#) (\$67 million) in funding awarded to nine SAF producers including Willis Sustainable Fuels (Carbonshift PtL), a subsidiary of engine lessor **Willis Lease Finance Corporation**.

**UK Parliament committee pleased with decarbonisation progress, concerned with delivery** – The UK Parliament’s Environmental Audit Committee [published](#) its third report on *Net zero and the UK aviation sector* of the current session on 18<sup>th</sup> December. The report examines efforts to decarbonise aviation and commends the ambition of ongoing initiatives. However, it expresses concern that the UK government’s chief aviation decarbonisation policy (the Jet Zero Strategy) [carries](#) “significant risks to delivery to stem the rising emissions from the aviation sector.” A more detailed analysis of the report is [available](#) on *Green Air*.



**US Treasury kicks can on SAF requirements for IRA credits** – The **US Treasury Department** on 15th December issued much-awaited [guidance](#) on what SAF can qualify for IRA SAF credits, but as the **International Council on Clean Transportation (ICCT)** unpicks in an [analysis](#) on 20th December – the industry will need to wait until March 2024 for clarity. The Treasury has tasked multiple agencies to collaborate on an update to the GREET model (a lifecycle emission calculation method preferred by ethanol producers and, since November, [also airlines](#), over the more environmentally strict ICAO CORSIA). Airlines and ethanol producers are now grouped together under the newly established [American for Clean Aviation Fuels](#). As the ICCT analysis points out, how strict GREET will be on allowing subsidies for corn and soy ethanol-derived SAF will depend on the choices of data inputs. “Treasury’s recent guidance provides no answers about how the United States will ultimately handle these thorny-but-important questions. Answering them is not just a matter of collecting data and updating GREET, but also establishing the government’s tolerance for risk in assessing what constitutes a GHG reduction and what behaviour justifies a tax credit. Until those questions are answered in March, we’re left with the status quo,” concludes the ICCT. On a related note, to SAF, in December the US Treasury also released [guidance](#) on credits for clean hydrogen producers. In parallel to federal efforts, **Washington State**, one of several US states working on policies to incentivise SAF use and production, initiated [SAF rulemaking](#) under its **Clean Fuel Standard Programme**, which seeks harmonisation with similar programmes in California and Oregon.

### **Other countries**

**ICAO adopts target to reduce aviation emissions by 5% via cleaner energies** – The **Third ICAO Conference on Aviation and Alternative Fuels (CAAF/3)**, held in Dubai from 20<sup>th</sup> to 24<sup>th</sup> November, [culminated](#) in the adoption of a new ICAO Global Framework for Sustainable Aviation Fuels (SAF), Lower Carbon Aviation Fuels (LCAF) and other Aviation Cleaner Energies. Through these agreements, ICAO and its member states agreed, through the use of SAF and LCAF, to set a goal that aviation fuel in 2030 should be **5% less carbon intensive** than the fossil fuel which makes up nearly all of today’s aviation energy. The agreement has been welcomed by some of the largest industry associations including [ATAG](#), [IATA](#), and [all major European aviation associations](#). In Europe, the safety regulator EASA [also welcomed](#) the development.

**COP28 postpones Article 6 progress, but increases chances of aviation taxes** – The 2023 UN Climate Change Conference, also known as **COP28** ended in Dubai on 13<sup>th</sup> December (a day later than planned), with an [agreement](#) to “transition away” from fossil fuels in energy systems – a landmark achievement with long-term repercussions for aviation, a highly fossil fuel-dependent industry at present. The agreement also called for accelerating efforts towards zero and low-carbon fuels, and accelerating zero- and low-emission technologies “particularly in hard-to-abate sectors,” of which **aviation** would be one. At the same time, a key agenda item for aviation, ‘Article 6.4 carbon markets’ was postponed to the next gathering (see ‘status of the COP28 negotiations’ chart and table below it – by [Carbon Brief](#)). Work on Article 6.4 of the 2015 Paris Agreement is relevant for aviation as it is expected to create a global carbon market overseen by the UN that would reduce the risk of offset double counting. This is relevant for **CORSIA**, ICAO’s international offsetting scheme for international aviation. The **Air Transport Action Group (ATAG)** [welcomed](#) the outcome of COP28 noting that it “is in line with our expectations of the aviation energy transition,” but noted that “the lack of progress” on Article 6 is “of concern” to the aviation sector, in light of CORSIA offset requirements from 2024 (for an updated look into CORSIA, see IATA’s recently updated [CORSIA Handbook](#) published in January 2024). Meanwhile, another key development for aviation at COP28 was the [launch](#) of an **international taxation taskforce** by France, Kenya, Barbados, Spain, and other unnamed countries. Although details about the task force are scant, reports ahead of the summit said the task force was planning to consider a broad range of options, including levies on international shipping, aviation, financial transactions, and fossil fuels. [According to Le Monde](#), the Kenyan president’s special climate envoy, and Avinash Persaud, the Barbadian prime minister’s special envoy, “already mentioned the first taxation avenues at COP28” and include **“business seats in air transport.”** These levies would be dedicated to funding the loss and damage fund agreed in COP27. [France](#) and the EU have previously publicly supported aviation levies as a way of raising that funding, while a **UK** minister in December [said](#) London was unlikely to support it. (For details on aviation-related sessions during COP28, see **CO2 Emissions** section later in this report).

**Indian government working on SAF recommendations from 2027** – The civil aviation ministry of **India** – arguably the fastest-growing aviation market in the world – is [reportedly](#) working on making SAF “recommendations” from 2027, proposing that Indian airlines use “1-5% SAF” starting that year, aviation minister Jyotiraditya Scindia told *Mint* in an article published on 10<sup>th</sup> January. Oil minister Hardeep Singh Puri (formerly a minister in charge of civil aviation) commented in March 2023 that the country was looking at mandating 1% SAF blending from 2025. Seemingly commenting on that target, Scindia noted the 2025 goal “is easier said than done” given shortfalls on “production, storage and transport of SAF.”

**UAE unveils ‘1% by 2031’ locally-produced SAF target** – The **United Arab Emirates (UAE)** on 4<sup>th</sup> January [unveiled](#) its *General Policy for Sustainable Aviation Fuel* (see [full document](#)), which aims to decarbonise the aviation sector and position the UAE as a regional hub for low-carbon aviation fuel. To achieve this, the UAE intends to develop its local capacity for SAF enabling the production of 700 million litres of SAF annually. The policy includes a **voluntary target**, aiming to supply **1% of fuel to national airlines** at the UAE airports using locally produced SAF by 2031. The effort “involves exploring potential policies to support long-term economic operation of SAF facilities in the UAE” and sets standards for the production and use of SAF. In parallel, the UAE has [reportedly introduced](#) export taxes on used cooking oil (UCO) one of the most common feedstocks for the production of HEFA SAF.

### Qantas responds to Australian federal government Aviation Green Paper with policy recommendations

The Qantas Group on 14<sup>th</sup> December released its [response](#) to the Australian Federal Government's *Aviation Green Paper* as part of a process to help shape a 30-year strategy for the Australian aviation industry. The detailed 255-page submission recommends a number of reforms, including on decarbonisation and noise. [Key](#) sustainability policy recommendations are: 1) Setting SAF mandates for the domestic jet fuel supply, including 5% by 2030 rising to 28% by 2040. 2) Providing capital support to kickstart new production facilities. 3) Implementing a production incentive linked to carbon reduction from fuel to allow domestic producers to compete with overseas markets. 4) Providing tax incentives and credits to SAF producers, similar to what occurs in other government programs.



UAE Government

### US government launches initiative to advance SAF among APEC economies

The US government together with Boeing on 16<sup>th</sup> November [launched](#) an initiative to catalyse the development and use of SAF among **Asia-Pacific Economic Cooperation (APEC)** member countries. According to APEC's website, the association's **21 member economies** are Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; The Philippines; The Russian Federation; Singapore; Chinese Taipei; Thailand; US; and Vietnam. The project, part of APEC's Transportation Working Group, will address potential challenges for APEC economies in creating and growing nascent SAF markets, including: Identifying the availability of sustainable feedstocks for SAF, analysing new pathways to optimize SAF production, leveraging existing industries and infrastructure for SAF production, enabling the development of SAF-specific policies for production and use, and exploring SAF accounting mechanisms, including book and claim.

## CO2 EMISSIONS

-- For details on CORSIA or EU ETS, see Policy and Regulation section below --

**New ICCT paper warns against applying carbon pricing by country of registration** – A [new working paper](#) by the **International Council on Clean Transportation (ICCT)** support the idea that carbon pricing or similar taxation measures determined by an operator's country of registration could create market distortion. The analysis focuses on the market impacts of two different regulatory methods by analysing 30 major international routes in China, Europe, and the US. The study applies regional carbon taxes to airfares based on the operator's country of registration and on the country of departure and found that regulating by country of registration introduces market distortions.

**New paper discusses aviation's emission-reduction scenarios** – A new academic [paper](#) that was set to be published in the February 2024 edition of the *Science of The Total Environment* journal, discusses **four different scenarios for alternative air transport business models** that will reduce emissions more reliably. All scenarios have a starting point in limitations and, the paper notes, may be considered "radical", including CO2 taxation, a CO2 budget, biofuel mandates, and capacity limits. The paper concludes that all scenarios would lead to reduced growth rates for the sector, but among them, the blending obligation would allow for faster growth in RPK (if the production of alternative fuels can be upscaled more rapidly), while the ASK limitation is the most desirable scenario for airlines, as it will generate profits that exceed the expected cost of the fuel/technology transition by a large margin. The two authors do not see realistic the introduction of any of the four measures globally but hope to inform policymaking discussions.

**COP28 Transport Day brings aviation into the spotlight** – The 2023 UN Climate Change Conference, also known as **COP28**, took place in Dubai in early December. Transport Day (on 6<sup>th</sup> December) saw a number of events dedicated to aviation including SAF; to pinpoint a few: [EU's SAF event](#), [ATAG's Global Sustainable Aviation Forum](#), [Aviation Impact Accelerator](#) events, and [RMI's SAFc registry launch](#). A larger list of aviation-related events is [available](#) on *Green Air*. Abu Dhabi-based news daily *The National* [summarised](#) some of the takeaways from these events. SAF has also been mentioned in the context of VIP delegates attending the event. The UK government said Prime Minister Rishi Sunak's plane was to use 30% SAF and that carbon offsetting was to be used to minimise its impact, while SAF was also [reportedly](#) used for King Charles III's flight to Dubai. Meanwhile, of relevance to aviation, non-profit Climate TRACE on 3<sup>rd</sup> December [published](#) an inventory of unprecedented granularity that pinpoints nearly every major source of greenhouse gas (GHG) emissions around the world and provides independently produced estimates of how much each emits. An impressive [interactive tool](#), Climate TRACE data is free and publicly available. In the same announcement, the non-profit said it would work with Boeing to understand how they can leverage their digital tools including Boeing's [Cascade](#).

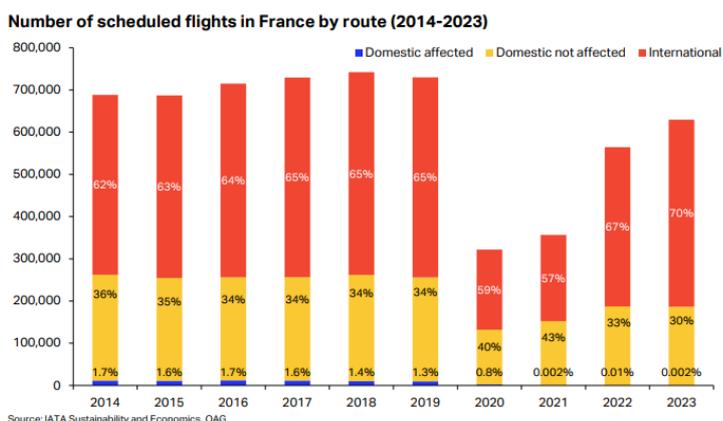
**Business travel down, young people travel up** – A consumer trends [report](#) by the UK Civil Aviation Authority (CAA) published on 11<sup>th</sup> January suggests people aged 18 to 34 are leading the increase of air travel demand ahead of other age groups. The finding contrasts with climate-consciousness among age group, and opposite trends in the corporate sector, where business travel in some regions appears to be declining. [Analysis](#) by the Travel Smart campaign shared by member NGO Transport & Environment (T&E) in December shows just under half of the world’s biggest companies (217) did not return to 2019 levels of flying in 2022. In addition to the advent of online meeting and collaboration tools during the pandemic, many large companies have also vowed to cut their travel emissions. Most recently, notable travel-heavy Big Four firm PwC UK started to [cut down](#) on business class flights for partners.

**American and Air Canada join other airlines in carbon removal efforts** – American Airlines [announced](#) on 28<sup>th</sup> November it is joining a number of other airlines in funding carbon removal start-ups. The US carrier will be the inaugural customer of **Graphyte**, a carbon removal startup backed by Breakthrough Energy Ventures, with a purchase of 10,000 tonnes of permanent carbon removals to be delivered in early 2025 – roughly the emissions of 10,000 passengers on a return transatlantic economy class flight. The airline said that with its purchase it aims to accelerate and scale the CO2 removal market. Graphyte captures carbon through a process called Carbon Casting, which it says permanently removes and stores CO2 using “significantly less energy and at a substantially lower cost.” Meanwhile, **Air Canada** [announced](#) on 30<sup>th</sup> November it is joining Airbus’ carbon removal initiative with a similar purchase. The two airlines join **EasyJet** and **Lufthansa Group** in carbon removal efforts, both part of Airbus’ carbon removal initiative.

**Google ties up with ICAO and ICCT on air travel emissions** - ICAO and Google, each offering emissions assessments tools for aviation, on 7th December [announced](#) a new collaboration focused on sharing expertise around methodologies for calculating carbon emissions and the broader decarbonisation of the aviation industry. As for Google, whose **Travel Impact Model** is a publicly accessible methodology and serves to power emissions estimates on **Google Flights**, the technology giant has been working closely with the **International Council on Clean Transportation (ICCT)** on expanding its coverage. The ICCT on 31<sup>st</sup> January [provided](#) a detailed list of updates, including taking into account all 6 Kyoto greenhouse gasses, including well-to-tank emissions by default, and integrating belly cargo.

**IATA questions the emissions reductions from France’s domestic travel ban** – In a market analysis [published](#) on 19<sup>th</sup> January 2024, **IATA** used a graph to point out the “unjustifiably small” contribution to mitigating climate change of a ban on short-haul domestic flights introduced by France in 2023. According to IATA, until the ban was proposed in 2021, the three affected routes (three city pairs with rail alternatives lasting no more than 2 ½ hours) accounted “for a mere” 0.002% of all flights and about 4% of domestic flights in France.

**French domestic flight bans and carbon emissions reductions**



*IATA*

**Wizz Air on track to revalidate claim to lowest emission intensity** – European LCC **Wizz Air** finished 2023 with another annual reduction on its emission intensity figures, which it claims are the lowest in the industry. According to Wizz Air’s [monthly CO2 emissions report](#) posted on its website, the airline averaged 51.45 CO2 grams per passenger/km in 2023, compared to 55.4 in 2022, or a -7.13% reduction.

**NON-CO2 EMISSIONS**

**CE Delft examines non-CO2 impacts of Schiphol departures** – CE Delft university in January 2024 [published](#) a [report](#) titled *Aviation non-CO2 estimator (ANCO)*. A tool for quantifying the non-CO2 climate impact of aviation detailing the CO2 equivalent factor for flights departing from Dutch airports – chiefly Schiphol airport – using its ANCO tool, which is based on the German Aerospace Institute DLR’s CO2eEstimator. For Schiphol, flights to Svalbard Airport (the northernmost airport in Norway) have the highest average CO2e factor (12.8). By comparison, flights to Barcelona have an average CO2e factor of 2.6.

**SAS/DLR research confirms SAF lowers particulate matter** - Non-volatile particulate matter (nvPM) or soot emitted from aircraft engines using SAF is reduced, a large-scale international [study](#) using **SAS** aircraft at Copenhagen Airport has concluded. The study, published at the end of October 2023, measured an aircraft with 34% bio-based SAF, in the tank while it was taxiing

between the runway and the gate at the airport. Ground measurements show a reduction in the emission of ultrafine particles by about 30 percent. The measurements were conducted by researchers from DLR, The German Aerospace Center. At higher altitudes, when conditions are suitable, emissions of soot and water vapour can trigger the formation of contrails which can spread to form extensive contrail-cirrus cloud coverage. To find out what other airlines are taking action to understand and mitigate the climate impacts of contrails, see the [Airline Contrail Index](#) by NGO **Blue Lines**. The findings of the **SAS/DLR** study coincide with the publication of a critical review [academic paper](#) on 28<sup>th</sup> November examining the 'Uncertainties in mitigating aviation non-CO2 emissions for climate and air quality using hydrocarbon fuels'. The six researchers determine that because of the uncertainties and tradeoffs involved, "it is problematic to recommend definitive courses of action on aviation non-CO2 emissions since they may be of limited effect or have unintended consequences." To u

**Eurocontrol contrails conference paper now published** – Eurocontrol has [published](#) a 59-page conference summary and responses to key questions on the major conference on non-CO2 events held in Brussels at its headquarters in November 2023. Full minutes and lists of takeaways are available in the document, making it one of the best and most up-to-date resources available to learn about the scientific and regulatory progress toward tackling the non-CO2 effects of aviation. The first day (available in full [here](#)) focussed on presenting the latest scientific insights and ongoing research on contrails, while the [second day](#) featured panel debates and more strategic discussions. Eurocontrol also released [findings](#) from contrail operational mitigation trials at its Maastricht control centre and [launched](#) ContrailNet, a new network to create a common repository of contrail observation data. Several speakers at the Eurocontrol gathering were also present at the [Aviation Carbon 2023 conference](#) in London in early November 2023.

**European Commission workshop on aviation non-CO2 emissions** – A **workshop on Aviation non-CO2** emissions held in mid-December and organised jointly by the European Commission (DG RTD, DG MOVE, DG CLIMA, DG ENV), including the two aviation Horizon Europe Partnerships (Clean Aviation and SESAR) and the European Union Aviation Safety Agency (EASA), is now available to view [here](#) (free registration needed).

## AIRCRAFT LESSORS AND ASSET MANAGERS

**CDB Aviation and CALC sust-linked issuances** – **CDB Aviation** on 7<sup>th</sup> December announced it entered into an inaugural **Sustainability Linked Loan** on 1<sup>st</sup> December, anchored with a \$625 million syndicated term loan facility. The SLL parameters of the facility are contingent on three sustainability performance targets (SPTs): (1) reducing the carbon intensity of CDB Aviation's fleet; (2) pursuing a target to reach 60% new-generation aircraft by number of aircraft by the end of 2025; and increasing the level of Diversity, Equity, and Inclusion (DEI)-related training for the workforce. Moody's Investors provided the Second Party Opinion as to the appropriateness of the KPIs and SPTs and awarded a "best-in-class" SQS2 rating. The facility was financed by a group of mandated lead arranger (MLA) banks, including Crédit Agricole Corporate and Investment Bank, BNP Paribas, The Hongkong and Shanghai Banking Corporation Limited, Natixis Corporate & Investment Banking, China Minsheng Banking Corp., Ltd. Hong Kong Branch, China Guangfa Bank Co., Ltd. Shenzhen Branch and China Construction Bank Corporation London Branch. See CDB Aviation's [press release](#) for more details on the transaction parties. To Ishka's knowledge, this is only the second sustainability-linked loan by an aircraft lessor after **SMBC Aviation Capital's** debut sustainability-linked loan [in October](#) 2023. Separately, Hong Kong-headquartered lessor **China Aircraft Leasing Group (CALC)** closed an unsecured revolving syndicated loan totalling a maximum of \$500 million, becoming the first lessor to [announce](#) a sustainable debt raise in 2024. It is the lessor's third sustainable finance transaction. According to CALC, it is the largest aircraft PDP financing in 2023 (when it closed) and represents the aircraft leasing industry's first-ever sustainability-linked PDP loan facility. China Construction Bank Shanghai Branch served as the lead arranger. It is the lessor's third sustainable finance transaction after issuing a RMB 1 billion (\$140 million) debut low-carbon transition bond in 2022 and the completion of the first and second tranches to raise RMB 1.5 billion (\$210 million) of low-carbon transition corporate bonds in 2023.

**Novus and SAF One MoUs combine VietJet's leasing and SAF priorities** – In early December, lessor **Novus Aviation Capital** and LCC **VieJet** [signed](#) a Memorandum of Understandings (MOUs) to explore the establishment of an aircraft financing and leasing vehicle as well as collaborating on the supply of SAF in Vietnam [alongside](#) SAF One, a SAF platform established by Novus earlier in 2023. The MoU, which was signed ahead of COP28, is an unprecedented example of a lessor supporting (in this case through a dedicated SAF subsidiary) the development, supply, and usage of SAF for an airline. The agreement makes Vietjet "a pioneering airline engaging in research, development, and utilisation" of SAF. Mounir Kuzbari, Co-Founder and Director of **SAF One**, was among those participating in the "SAF: The Challenges, The Opportunities" panel at COP28, which is [available to view](#). Also in Southeast Asia, **Thai Airways** made its [first SAF flight](#) the same week.

**Macquarie Asset Management makes major investment in Dutch SAF producer** - **Macquarie Asset Management**, a 50% owner of aircraft lessor and asset manager Macquarie AirFinance, has made an initial investment of up to €175 million (\$188 million) in Dutch SAF producer **SkyNRG** via the Macquarie GIG Energy Transition Solutions (MGETS) Fund. This investment, led by Macquarie Asset Management's specialist Green Investments team (MAM Green Investments), will support SkyNRG's next phase of growth.

**ALI and SMBC Aviation Capital commit to SAF with Trinity College funding and partnerships – Aircraft Leasing Ireland (ALI)** on 20<sup>th</sup> November [announced](#) the funding of a new research project on SAF production during the sector's second Global Aviation Sustainability Day Conference at the Convention Centre Dublin. The four-year research project, a collaboration between **Trinity College Dublin** and the **University of Limerick**, will examine potential avenues for manufacturing SAF in Ireland. Meanwhile, the world's second-largest aircraft lessor **SMBC Aviation Capital** on 25<sup>th</sup> January announced a separate partnership with **Trinity College Dublin** to establish a SAF research facility at SMBC AC's new headquarters in Dublin. The facility, which first became known [last year](#), will play a crucial role in identifying and validating potential new fuels and in ensuring their sustainability. It will also host Trinity's contribution to the soon-to-be-announced EU SAF Clearing House. The partnership marks a long commitment by the lessor to support the certification of new types of SAF under development. Separately, SMBC Aviation Capital in December published its **first TCFD report**, available [here](#) and released a [video](#) outlining its ESG commitments.

**Lessor ESG rating updates** – Aircraft lessors **Avolon** and **DAE** have received ESG risk rating updates as part of annual reviews. Dubai Aerospace Enterprise (DAE) on 28<sup>th</sup> November [announced](#) that it had completed its annual review with Morningstar Sustainalytics. DAE's ESG Risk Rating has been assessed as 'Low Risk', with a score of 12.5, which DAE says is the lowest Morningstar Sustainalytics ESG Risk Rating of all rated aircraft lessors, and an improvement over the previous score of 14.6. Avolon on 15<sup>th</sup> November [announced](#) a 'Low Risk' score of 16 from Sustainalytics.

**Amedeo to support e-VTOL financing** – Aircraft asset manager **Amedeo** on 21<sup>st</sup> November [announced](#) a partnership with Ascendance to become a "preferred financier" of **Ascendance's** e-VTOL products. Amedeo said it will support Ascendance in the expansion of its network of partner airlines around the globe, notably by growing its sales force through a Marketing Services Agreement.

**NAC renews contract with Estuaire to calculate non-CO2 effects - Nordic Aviation Capital (NAC)** [announced](#) on 20<sup>th</sup> November it has renewed its contract with **Estuaire** to incorporate for a second year non-CO2 effects such as contrails and nitrous oxides emissions to its emissions. In 2023, NAC became the first lessor to report non-CO2 effects from its fleet's operations.

**Avolon outlook report reveals expectations on aviation sustainability** – Avolon in late January [released](#) its 2024 Outlook: New Horizons report, produced by Chief Risk Officer Jim Morrison and SVP Portfolio Strategy Marc Tembleque-Vilalta. Among the eight [key forecasts](#) introduced for 2024 is that the next clean-sheet large commercial aircraft enters service in 2036, and that a global framework for a SAF book-and-claim system is agreed. A broader summary of other sustainability-related insights is available in this [summary](#) by *Green Air*. Separately, Avolon CEO Andy Cronin [told Reuters](#) in early January that SAF will likely need "significant policy and state intervention" to provide the necessary certainty on large scale infrastructure development, innovation and maintaining the right cost level. **AerCap** CEO Aengus Kelly was quoted on the same article saying that governments would need to devote "extraordinary" sums of taxpayer's money to increase SAF usage among airlines.

**Sustainable finance: LCI and SMFL develop helicopter social loan framework** – Aviation lessor **LCI** and **Sumitomo Mitsui Finance and Leasing (SMFL)** on 9<sup>th</sup> November [announced](#) the development of the world's first Social Loan Framework for helicopter leasing, finance and operations. Although Ishka's coverage is primarily centred on commercial aircraft, the framework represents a relevant innovation for the financing of aircraft with non-commercial uses and it expands the range of sustainable finance structures applied to aviation. LCI and SMFL's Social Loan Framework has been established initially for LCI's joint venture leasing operation with SMFL and in accordance with the Social Loan Principles developed in 2023 by the Loan Syndications and Trading Association (LSTA). It will require funds to be used for eligible and verified Social Projects, which in LCI's case will include search and rescue and emergency medical services. The framework received the highest rating of "Social 1(F)" from the Japan Credit Rating Agency.

## OEM FUTURE PROGRAMMES

**Rolls-Royce looks to exit electric propulsion** – As part of a strategy update [unveiled](#) during **Rolls-Royce's** Capital Markets Day on 28<sup>th</sup> November, the engine OEM said it is looking at "options to exit in the short run or alternatively for the right value, reduce" its position to a minority one on **Rolls-Royce Electrical**. "We believe, given the world-class capability we have built in Advanced Air Mobility, that this will represent good value to a third party and will allow us to focus on our core electrical engineering activities in Power Systems, Defence and Civil Aerospace," the update noted. Rolls-Royce Electrical was created in 2022 with the goal to achieve the world's first certification of an electric engine for commercial aircraft by the mid-2020s.

**Eurocontrol and AZEA publish CONOPS for electric, hybrid-electric, and hydrogen-powered aircraft** – The **Alliance of Zero Emission Aviation (AZEA)** with **Eurocontrol** leading the responsible Working Group in January 2024 [released](#) a Concept of Operations (CONOPS) for electric, hybrid-electric and hydrogen-powered aircraft. The document addresses the requirements for a future network integrating zero-emission aircraft and is focused on those aircraft that are expected to enter into service in the "short and medium term," in the e-VTOL, general aviation, and regional air transport market segments.

## Electric

**Former Eviation and MagniX chairman expresses battery-electric tech doubts** - Dominique Spragg, a Canadian aerospace engineering who formerly served as chairman of both battery electric clean-sheet aircraft and motor OEMs **Eviation** and **MagniX**, have expressed doubts about the potential for current battery electric propulsion technologies to deliver on their promise. In an [interview](#) published by *The Globe and Mail* on 30<sup>th</sup> December, Spragg says there was previously a tendency in the electric aviation sector "to whitewash" problems such as a lack of range "as, 'we'll solve those later' [...] unfortunately, I'm not sure the solutions are readily at hand."

**Lifecycle analysis of electric aircraft shows major climate benefits** – Researchers at **Chalmers University of Technology** in Sweden have performed the world's [first life cycle assessment](#) (LCA, or cradle-to-grave) of an existing, two-seater, all-electric aircraft (the Pipistrel Alpha Electro manufactured in Slovenia) with a direct comparison to an equivalent fossil fuel-powered one. According to the [study](#), after just one quarter of the expected lifespan of the electric aircraft, the climate impact is lower than that of the fossil fuel-based aircraft, provided that green electricity is used. For a related read, see SAVi Report: ['Investor briefing: The problematic sustainability argument of extending an aircraft's life'](#).

**Commercial electric aviation notable updates** include:

- Dutch start-up **Elysian Aircraft** was formally [launched](#) with the goal of developing a 90-seater aircraft with an 800-km range solely based on batteries. The [Hawaii Seaglider Initiative](#) was formally [launched](#) as a consortium of local government and private sector stakeholders aimed at laying the path to the roll-out of all-electric, zero-emission aircraft that would fly at low altitudes over water between islands by the middle of the decade.
- US-based air mobility platform **Surf Air Mobility** (which is both developing proprietary electrified powertrain technology and developing a US operator network to use them) [announced](#) deals with Kenya Cessna Caravan operators to convert aircraft to electric propulsion.
- **Air New Zealand** on 6<sup>th</sup> December [announced](#) the battery-powered **BETA ALIA e-CTOL** (the CTOL variant of the eponymous e-VTOL) as the airline's first purchase of a next-generation aircraft in its Mission Next Gen Aircraft **programme**. The aircraft, which is expected to join Air New Zealand's fleet in 2026, came ahead of other options after an 18-month evaluation and diligence period. The three other final contenders were: Eviation's Alice, VoltAero's Cassio, and Cranfield Aerospace (CAeS) hydrogen-electric conversion of the Britten-Norman Islander. The programme has set Air New Zealand apart as not only one of the few major airlines to commit to flying new propulsion technology aircraft this decade, but (to Ishka's knowledge) as the only one to do so through a multi-stage public process. "While this aircraft will add to, not replace our existing fleet, it is a catalyst for that change. By flying the ALIA, we hope to advance our knowledge and the transformation needed in the aviation system in Aotearoa for us to fly larger, fleet-replacing, next-generation aircraft from 2030," Air New Zealand CEO Greg Foran commented.

## Hybrid-electric

**JSX goes on new propulsion shopping spree, cementing US domestic's interest in future tech** – The US regional domestic sector is continuing its foray into new propulsion technology commitments. In the second half of December, **JSX** – a carrier launched in 2016 and now the largest public charter carrier in the US – signed letters of intent with three separate OEMs for up to 332 hybrid-electric aircraft. On 19<sup>th</sup> December, **Heart Aerospace** [announced](#) that JSX had signed an LOI for 50 30-seater ES-30 aircraft with options for a further 40. The same day, **Aura Aero** [announced](#) an agreement with JSX for 50 19-seater ERA aircraft plus 100 additional options. Thirdly, the airline [signed](#) an LOI with e-STOL OEM Electra for 32 firm orders and 50 options of the **Electra eSTOL** aircraft. The orders – which likely place JSX as the operator with the most fixed-wing new propulsion commitments in the world – follow previous major commitments by US counterparts United Airlines, Rose Cay, Mesa Air, and Surf Air among many others.

**Maeve upgauges design to 80 passengers with shift to hybrid-electric** – Just six months after Dutch upstart **Maeve Aerospace** launched a revamped all-electric design for a 44-passenger aircraft at the Paris Air Show, the company has now [introduced](#) a new, hybrid-electric 80-seater design. Maeve, which also announced an expansion at Munich's Oberpfaffenhofen Airport (the location of the German Aerospace Centre, or DLR), said the **M80** will be a **hybrid-electric aircraft** with 800 NM (1,482 km) of range, 40% higher energy efficiency, and no impact on infrastructure. The clean-sheet design would have a "newly integrated hybrid propulsion system resulting in a significant reduction of mission energy and fuel consumption," which would make it "the perfect replacement of both the regional jets and turboprops." The firm expects entry into service in 2031.

**Airbus-backed EcoPulse aircraft demonstrator makes first flight** – The **EcoPulse**, a hybrid-electric distributed propulsion aircraft demonstrator jointly developed by **Daher**, **Safran** and **Airbus**, successfully [performed](#) its first flight test in hybrid-electric mode on 29<sup>th</sup> November in Tarbes, France. The demonstrator flew with its ePropellers activated, powered by a battery and a turbogenerator. The flight test lasted approximately 100 minutes. The demonstrator aims to evaluate the operational advantages of integrating hybrid-electric distributed propulsion, with specific emphasis on CO2 emissions and noise level reduction.

**Hydrogen**

**ZeroAvia signs EcoJet for 70 engines in bid to become first electric airline – Ecojet** – a proposed British regional airline aiming to offer zero-emissions flights – [announced](#) on 28<sup>th</sup> November that it signed an agreement with **ZeroAvia** for up to 70 hydrogen-electric **ZA600** engines with **MONTE** as a preferred lessor partner. EcoJet aims to begin operations in 2024 with conventionally powered aircraft operating routes to and from Edinburgh, before converting its fleet to become fully electric.

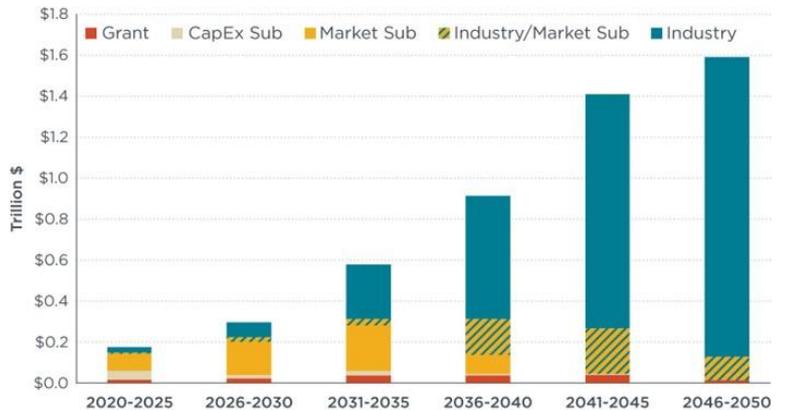
**Deutsche Aircraft secured new LOI for D328eco turboprop** – Although not a hydrogen-powered aircraft, **Deutsche Aircraft's** upcoming D328eco (a re-engined version of the Dornier 328) in December [signed an LOI](#) with an undisclosed customer for four D328eco, adding to another LOI with launch customer Private Wings announced in May 2023. The D328eco is a precursor to the 328ALPHA technology demonstrator which will evaluate electric propulsion, fuel cells and liquid hydrogen (the latter via a partnership with H2FLY).

**Testing, testing: Airbus ZEROe engine, Safran engine, and Stralis motor** – Airbus [announced](#) on 16<sup>th</sup> January that in late 2023 its **ZEROe** teams powered on the **iron pod**, the future hydrogen-propulsion system designed for Airbus' electric concept aircraft. As well as the hydrogen fuel cell system, the iron pod contains the electric motors needed to spin a propeller and the units that control and keep them cool. Its successful power on at 1.2 megawatts is a "pivotal step on Airbus' ZEROe roadmap to put a hydrogen-propulsion aircraft into service by 2035," the OEM said. Airbus is also [strengthening](#) its presence in Germany with the opening of a ZEROe Development Centre (ZEDC) for hydrogen technologies at its Stade site, and has [signed an MoU](#) with Swedish and Norwegian institutions to investigate the feasibility of hydrogen infrastructure in those regions. Airbus also [made](#) its **first-ever hydrogen-powered flight** over Nevada on 8<sup>th</sup> November using a modified glider for a contrail-studying experiment. Meanwhile, **Turbotech** and **Safran** [announced](#) on 29<sup>th</sup> January they have tested the first hydrogen-fuelled gas turbine engine for the light aviation market at ArianeGroup's facility in Vernon, France. The project leverages ArianeGroup's experience with hydrogen propulsion for the Ariane rocket. Meanwhile, Australian hydrogen-electric propulsion OEM **Stralis** [conducted](#) a landmark test of its electric motor at Brisbane Airport in January ahead of plans for a first test flight later in 2024. Stralis is developing a technology demonstrator, a Bonanza A36-HE. The learning will feed into its 15-seat **Beechcraft B1900D-HE Retrofit**, with an 800km range, and entry into service late 2026, with launch customer **Skytrans**.

**SAVi New Propulsion Tracker** – In the past three months 20 new propulsion technology agreements (LOI and MoUs as well as firm orders) were announced, including for some of the commitments mentioned above. Access these and other new propulsion deals through Ishka SAVi's [New Propulsion Tracker](#).

**OTHER DEVELOPMENTS**

**ICCT: Govts should front 20% of \$5tn bill to decarbonise aviation** – A [new working paper](#) by the International Council on Clean Transportation (ICCT) [published](#) on 9<sup>th</sup> November tackles a recurring question for aviation finance stakeholders: What role should governments play in the estimated \$5 trillion cost of decarbonising aviation by 2050? The answer to that, according to the ICCT, appears to be something in the region of **20% or \$0.8 trillion to \$1.4 trillion**. The working paper advocates for a strategic approach, emphasising that fiscal support should initially focus on research and development (R&D) and early capital expenditure (CapEx) for emerging clean aviation technologies before market subsidies aimed at narrowing cost gaps with fossil fuels. The study highlights the importance of frontloading public investments and gradually shifting the cost burden towards the industry. It also advocates for a low carbon fuels contract for difference (CfD) mechanism, as the one currently being considered in the UK.



Source: ICCT

**Chatham House paper examines demand management to buy aviation time to decarbonise** – A [research paper](#) published by UK think tank **Chatham House** on 15<sup>th</sup> November assesses the possibility of managing the demand for flights in order to set the sector on an achievable path for reaching net zero. The model developed for the paper generates different scenarios that consider the main supply-side decarbonisation solutions, and notes the ‘acceptable’ level of aviation demand under each scenario to remain within carbon budgets. The model claims to demonstrate that “acting prudently, and reducing demand for flights in the short term, would offer the best chance of enabling the sector to play its role in achieving net zero.”

**An overview of pressures on the airline industry to decarbonise** – The **Society of Actuaries** in Ireland [published](#) in December a paper entitled *‘Drivers of Change in the Environmental Impact of the Aviation Industry’*, which provides an overview of the consumer, regulatory, litigation, and financial pressures on the airline industry to reduce its carbon footprint. The paper illustrates possible routes to the decarbonisation of the aviation sector including EU initiatives, and considers the greenhouse gas emissions outlook for the aviation industry. The [paper](#) is authored by Ana Magdalena, VP of Research and Analysis at aircraft lessor **FPG Amentum**, and John Caslin, who chairs the Society’s Banking and Aviation Finance Committee and is a director of **Formidion Aviation Capital Limited**.

**Air France, Lufthansa, and Etihad ads banned over greenwashing** – The UK advertising watchdog in [late November](#) banned three adverts identified in July using artificial intelligence that suggested flights operated by **Air France, Lufthansa, and Etihad** were sustainable. In each case, the **Advertising Standards Authority (ASA)** said the ads could not corroborate their environmental claims, because the UK ad code required such absolute claims to be “supported by a high level of substantiation.” It was the second time in 2023 that Lufthansa and Etihad saw ads banned by the ASA on similar grounds. Law firm **Bird & Bird** reacted to the ASA’s efforts in comments featured in this [BTN Europe article](#) published on 23<sup>rd</sup> January, including reflections on how the [Empowering Consumers Directive](#) adopted by the European Parliament in January 2024 could intensify the trend of greenwashing scrutiny.

**Davos week: Aviation in the WEF’s annual gathering** – Much like in previous years, the **World Economic Forum’s (WEF)** annual gathering in Davos (Switzerland) in January created positive and negative aviation headlines. The rampant use of private jets to attend the elitist gathering (in recent years, [1 in 10 people](#) in attendance travelled by private jet) again drew scrutiny to aviation. At the gathering, the WEF announced the 16 finalists of its [Sustainable Aviation Innovation Challenge](#) together with UpLink and the First Movers Coalition. The 16 firms include new propulsion aircraft OEMs (Ampaire, Beyond Aero, HyFlux, H3X), as well as several firms working on advanced fuels and feedstocks, which are all now “plugged into WEF formal programming and a support ecosystem of industry partners and investors.”