

2025 Aviation Industry Review and Outlook

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1.

Introduction



Introduction

After a turbulent few years from a global pandemic to continued war and conflict, the commercial aerospace sector remains a cornerstone of modern global connectivity and economic development. While the sector still has its headwinds, it has consistently demonstrated remarkable resilience, overcoming numerous obstacles time and again. It is this unwavering resilience that will enable the sector to traverse both new and familiar challenges in the future.

The commercial aerospace sector is a US\$1.5 trillion industry that includes airlines, aircraft and engine manufacturers, supply chain component manufacturers, aircraft maintenance facilities, airports and infrastructure providers. The challenge of environmental sustainability is driving a major expansion of investment and resources into developing new technologies and sustainable fuel sources. The rapid advancement of AI will bring a spectrum of efficiency and operational enhancements across the industry over time as well as accelerating some of the technical solutions needed to address the sustainability challenges.

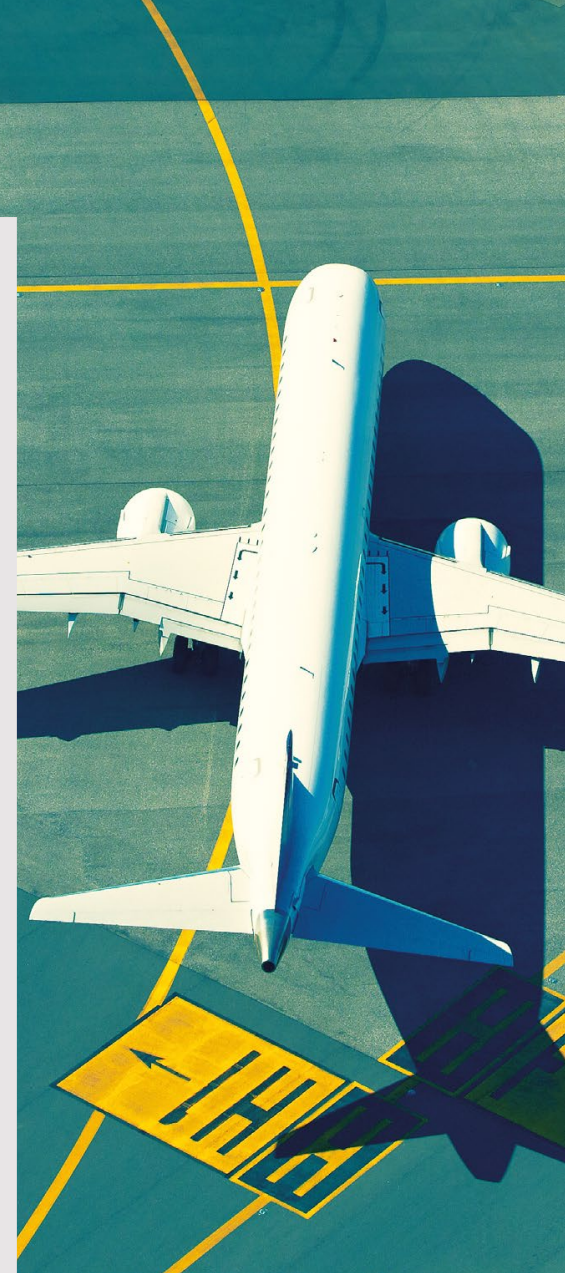
Collectively, the sector is a critical enabler of economic growth, social connectivity and globalisation, delivered through an airline industry that operates more than 30,000 aircraft, carries almost 5 billion passengers and transports 30% of world trade by value.

No industry has been more severely impacted by the COVID-19 pandemic than commercial aviation. However, as the pandemic

receded the demand for air travel, aircraft and support services rebounded more rapidly and strongly than had been predicted, despite the well-documented supply chain and production quality issues that continue to impact the availability of new aircraft and engines to fully meet the resurgent demand.

Many of these challenges are direct consequences of the pandemic. As they are overcome in the coming months and years, the industry's pent-up requirement for new capital to finance growth, develop and build aircraft, expand infrastructure capacity and absorb the costs associated with sustainability measures has never been greater.

Aviation has finally moved beyond the need to compare every metric with the pre-COVID equivalent. 2024 marked the industry's transition to focussing on the future – at a time when the challenges of sustainability are losing their big picture gloss and the realities of the task ahead are sinking in.



The global economy is looking relatively robust, with the IMF edging up its medium-term GDP forecasts relative to recent outlooks, to an average of 3.2% over the next five years which is similar to the expected out-turn for 2024. Interest rates and inflation have also abated from their recent peaks, contributing to calmer financial waters over the past year and into the future. A 12% drop in fuel prices compared to 2023 brought a welcome tailwind for the industry, arising from a combination of lower crude oil prices driven by excess supply and a reduction in the jet fuel crack spread. Fuel prices are expected to remain moderated over the coming year.

However, the return of a Trump administration in the US could bring some turbulence in the form of trade tariffs, de-globalisation and labour shortages, all of which would lead to higher prices, weaker GDP in key trading economies and a reversal of inflation's progress.

Additional headwinds from regional conflicts affecting eastern Europe and the Middle East remain a concern, with more airspace today closed to some or all air traffic than was the case a year ago. The additional flight times involved in avoiding Russian airspace, for example, contributed to several European airlines withdrawing from a number of Asian destinations in 2024, citing the consequential impact on route profitability, exacerbated by market distortion from competing operators that continue to overfly Russia.



The core industry themes impacting 2024 and 2025 were neatly summed up in the title of a recent conference panel – “No Parts, No Planes, No People”. These three elements are of course closely interlinked and will take more than a little time and investment to resolve.

There is no shortage of subjects for this year's New Year predictions. Almost all of last year's forecasts were on target, proving that deeper analysis produces a luckier outcome. The big prediction miss in 2024 was the expectation that the OEMs would get back into their delivery stride – they missed our target by 20%. Predictions for 2025 appear at the end of this commentary.



2.

The Airlines

The Airlines

In many respects, 2024 exceeded IATA's predictions¹. Airlines carried more passenger and cargo traffic at higher average load factors, while fuel costs were lower than forecasted.

However, airlines did not increase flights and ASKs as fast as anticipated and average passenger RASM increased by less. Wage inflation and steep increases in maintenance costs also contributed to a higher increase in non-fuel costs than predicted by IATA. Nevertheless, both operating and net profitability were well ahead of IATA's forecast from December 2023, by 25% and 23% respectively.

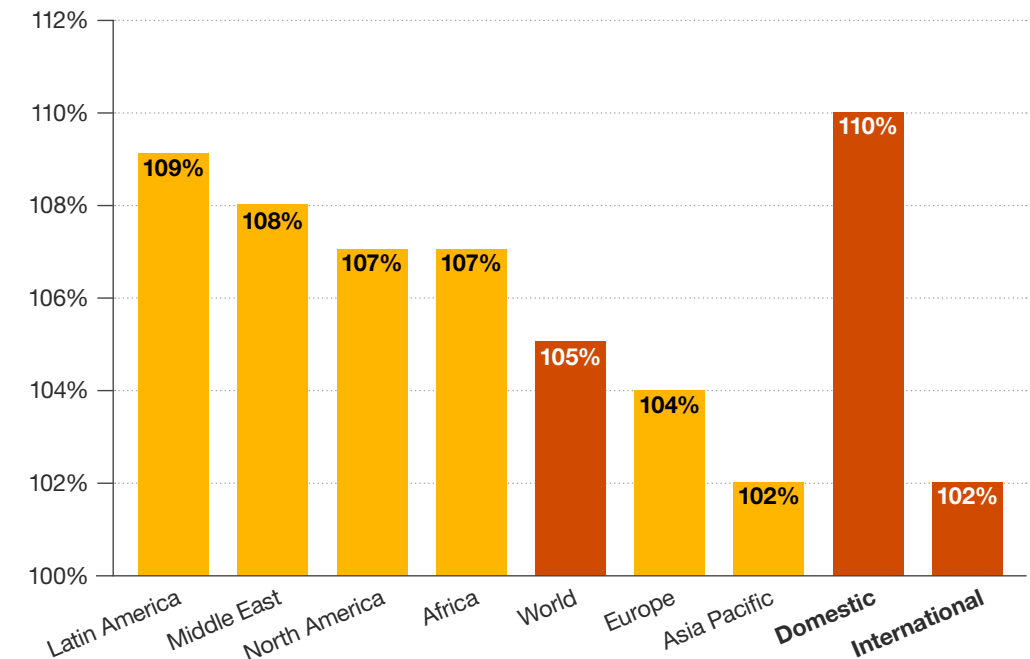
The common factor underlying most of these variations is the continuing shortfall in aircraft deliveries, compounded by an unprecedented level of aircraft non-availability due to engine unserviceability or component unreliability. The uncertainty faced by airlines around when they will actually receive their scheduled aircraft deliveries deteriorated further over the course of 2024 and complete fixes for the myriad of challenges facing the OEMs and their supply chains are unlikely to be in place much before the end of the decade, leaving airlines to deal with disruptive and costly network and fleet planning challenges for several years to come.

The scramble for scarce capacity has led to airlines retaining their older, less efficient, aircraft for longer than planned.

Consequently, the average age of the global commercial fleet has been trending up for the past five years to hit 14.8 years in 2024, the highest on record and well above the 13.6 year long-term average. This adds to airlines' cost burden, principally through higher fuel burn and maintenance cost and lower utilisation. Passenger traffic, measured in RPKs, surpassed 2019 levels in all regions during 2024 for the first time. In aggregate, traffic in the period from January to October was 5% higher than for the same months in 2019, however there were substantial regional differences (Chart 1).

¹ Comparing IATA's industry outlook data in December 2024 & December 2023

Chart 1: Regional RPKs 2024 v 2019 Cumulative Jan–Oct



Led by Latin America, four regions exceeded 2019 RPKs by between 7% and 9%. European progress was slower, advancing by only 4%, whilst Asia Pacific surpassed 2019 by only 2%. And whilst domestic traffic (which accounts for 57% of the total, according to Airports Council International) is 10% ahead of 2019 levels, international traffic is still only 2% higher.

As we noted last year, although much has been made of passenger traffic having caught up to 2019 levels, in reality this is an inappropriate benchmark, as five years of compounding growth should have produced a number around 25% larger by now. It is unlikely that this shortfall will ever be recovered, however the proven robustness of passengers' desire to fly suggests that the gap is a good approximation of the quantum of unsatisfied demand, supporting continued strong traffic growth in the coming years to the extent allowed by capacity availability.

In absolute terms, IATA's member airlines carried 4.89 billion passengers in 2024, an increase of 10.2%, at an average load factor of 83%. RPKs increased slightly faster, by 11.2%, reflecting a 1% increase in average journey distance. Cargo tonnage increased by 11.6% to 68.5 million tons, reversing a persistent downward trend, however the share carried on dedicated freighter aircraft declined to 45% and is now below the long-term 50% average, with aggressive price competition from belly-hold capacity providers driving cargo yield down by more than 3.5%. Total airline revenues increased by more than 6% to \$965 billion, with ancillary income accounting for over 14% of the total.



However, although fuel cost fell by 3% compared to 2023, non-fuel costs increased by 11%, reflecting the pressures of wage inflation and operating cost increases. The latter includes an element of excess crew cost as airlines recruited additional pilots and flight attendants to cover expected fleet growth which, to the extent that that did not materialise, translated into an unproductive increase in actual and unit fixed costs. Nevertheless, although total labour costs increased by 11% in 2024, unit cost per ATK increased by only 1.3% due to a 4.7% improvement in productivity.

The combined effect of all of the above swings and roundabouts was to hold airline operating profits essentially flat at \$61.4 billion

and reduce net profit by 10% to \$31.5 billion, which represents a return on invested capital (ROIC) of 6.6%, below the average airline cost of capital and sustaining the drag on balance sheet recovery and investment.

Regional profitability continues to be concentrated in the mature markets of Europe and North America, accounting for 70% of the industry total according to IATA. Middle Eastern carriers contributed a further 15%, but Asia-Pacific carriers have still not recovered their full potential, with only 10% of the total.

Amongst broadly satisfactory airline results, several bankruptcies and restructurings during the year point to some underlying weaknesses, with several high-profile events in 2024 involving Gol, Azul, Spirit and Air Transat amongst others. The root causes included looming repayment deadlines for expensive debt raised during COVID, unmanageable lease obligations and the effects of GTF-powered fleet groundings. As the COVID era recedes, airlines are finding that the breathing space extended by lenders is running out, particularly where private (as opposed to Government) lenders are involved.

In addition, the differences between network carriers and LCCs are diminishing – LCCs are starting to offer some features of network carriers such as premium seating and the network carriers are increasingly charging for ancillaries like seat selection. At the same time, more passengers are combining business and leisure trips, blurring the line between what had been two distinct categories of traveller.



3.

The Lessors

The Lessors

Although the supply/demand imbalance has created some headwinds for lessors, the sector has been a net beneficiary of the capacity shortage. 2024 saw virtually all remaining flyable aircraft on lessors' books placed on lease. Direct orders are fully placed out to the end of 2026, with 2027 inventory already almost 50% secured.

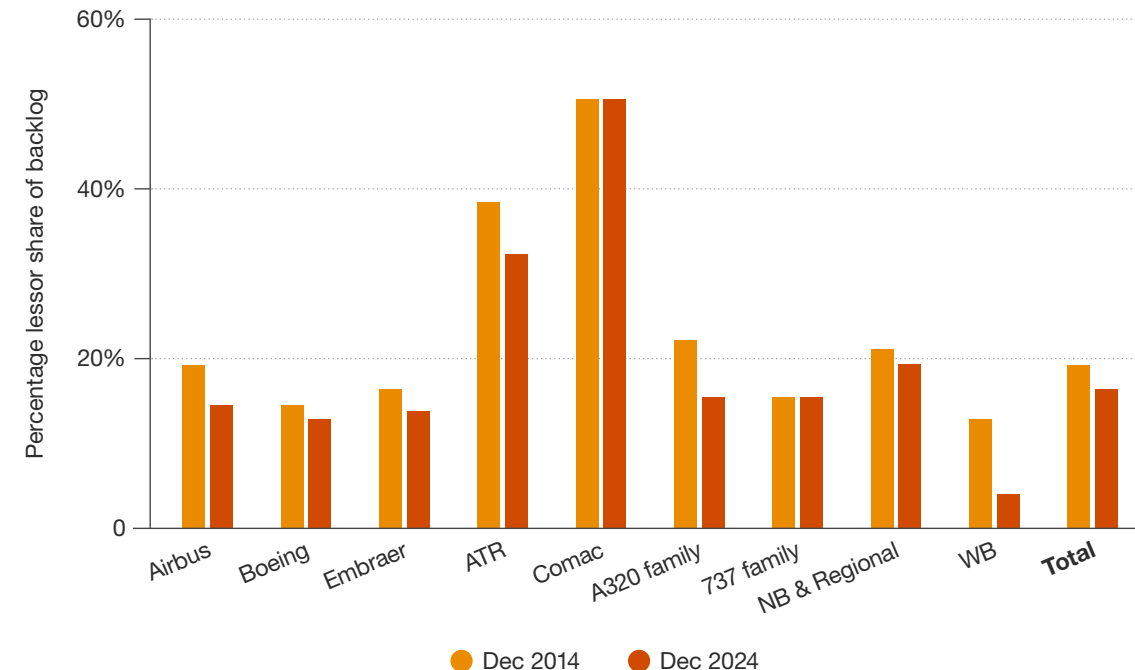
Lessors continued to top-up their order books during 2024, placing orders for 224 Western jets and accounting for 12% of the total orders booked by Airbus and Boeing.

Lessor participation in the OEMs' backlogs has changed little over the past decade. With a current backlog of 2,900 aircraft, lessors now represent 17% of OEM orders – only 2% lower than at the end of 2014 (Chart 2). Each of the OEMs has reduced their exposure to lessors since then, with the exception of COMAC which still has 50% of its backlog with lessors. Within the totals, however, there are two marked differences – the lessor share of the A320 family backlog has fallen from 22% to 16%, whilst 737s are unchanged, and the lessor share of widebodies on backlog has fallen dramatically across the board, with an average decline from 13% to 4%.

As a consequence of the capacity shortages, an unprecedented level of lease extensions is being experienced, with some lessors receiving requests to extend 90% or more of maturing leases, compared to typically 1/3rd in a balanced market. The time

horizon for extension requests has also extended from 9-12 months out to 18-24 months, and although extensions are

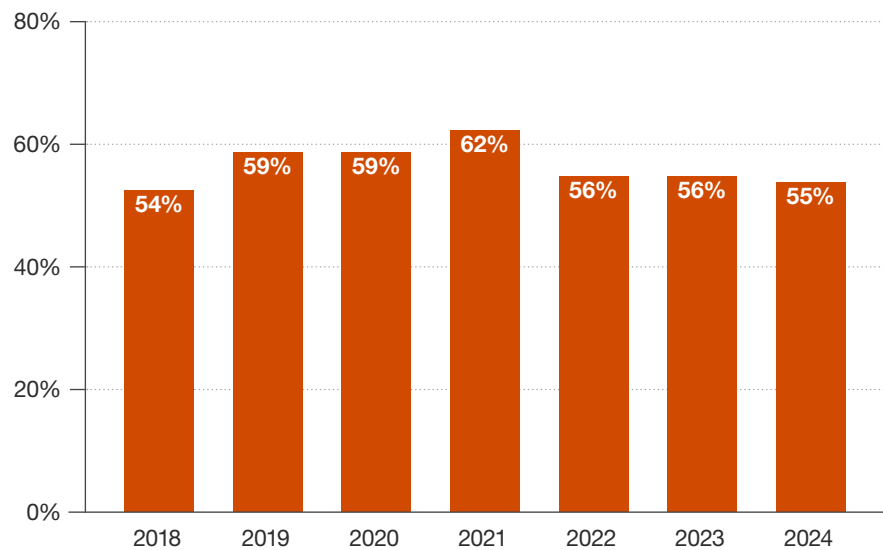
Chart 2: Lessor share of backlog by fleet 2024 v 2014



normally favoured by lessors as attractive low friction options (avoiding transition costs and down time) lessors are now more likely to refuse an extension in favour of re-marketing the aircraft elsewhere at higher lease rates than the incumbent is expecting or willing to pay. Extensions are also coming with longer lease terms than would be typical, with lessors looking to match the terms achievable from a new lessee.

It follows then that lease rates are substantially higher than a year ago across almost all aircraft types and vintages. For some single aisle variants, rates are as high or higher than in previous up-cycles. Whilst these increases are painful for lessees, the

Chart 3: Lessor share of deliveries

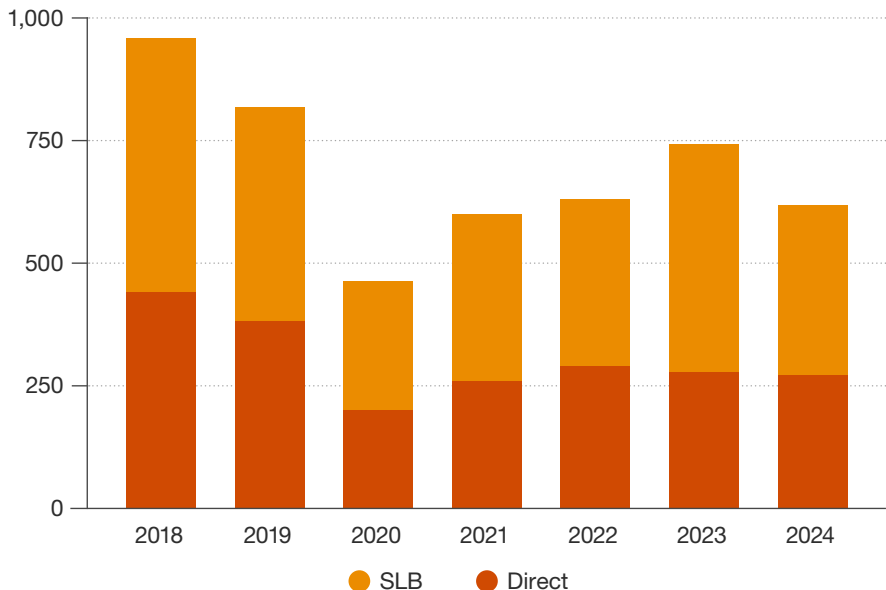


majority have accepted the reality of supply/ demand pressures and, since lease costs represent a relatively small proportion of their operating expenses, have been willing to pay the asking price to secure capacity – the cost of not doing so being substantially higher.

The lessor channel continued to account for well over 50% of deliveries during 2024 (Chart 3), and a similar proportion of delivery dollars. The reporting of sale and leaseback transactions at delivery is invariably lagged, so the final lessor component will be a little higher. Although not reaching peak mid-COVID percentages, these numbers support the thesis that a share in the mid-50s is sustainable over the medium term.

The number of lessor-financed deliveries fell by 11% compared to 2023 and remains significantly below pre-pandemic levels, reflecting the wider capacity supply issues. Around 55% of lessor volume originated through the SLB channel, with the balance from direct orders (Chart 4).

Chart 4: Lessor delivery mix



Asset values

Aircraft values trended strongly upwards through 2024, with older narrowbodies seeing the largest increases in market values over the past 12 months and some of the strongest rebounds from the low points of COVID. Chart 5 shows changes in values across the most popular narrowbody and widebody models², presented as an index where December 2021 equals 100.

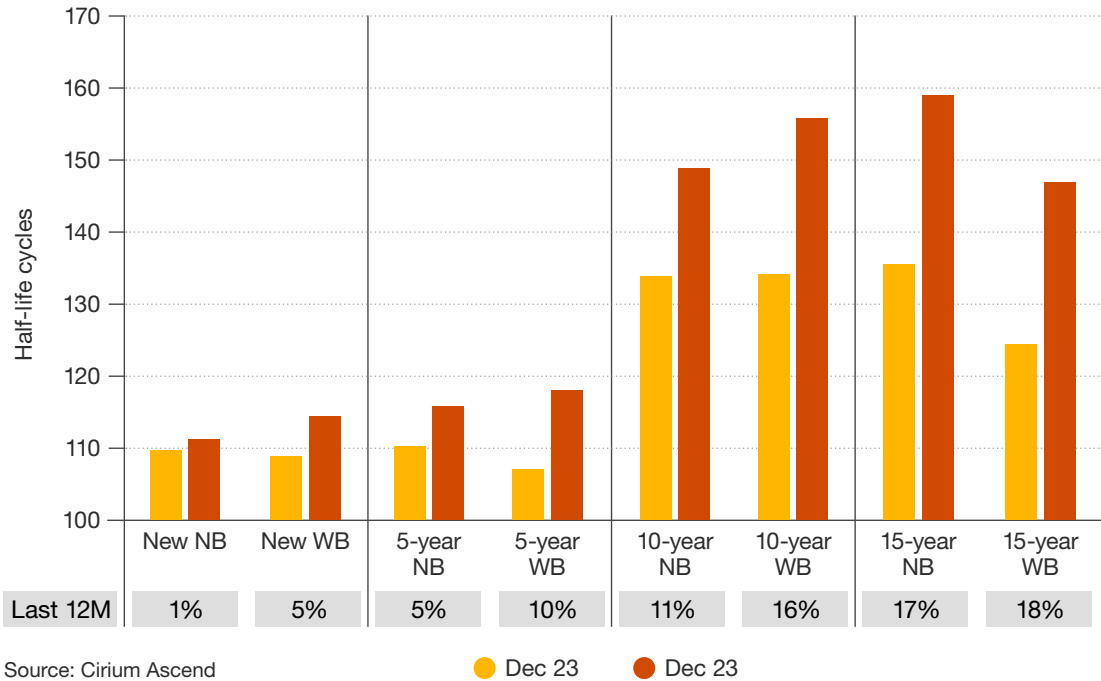
Young narrowbody values are now on average 10-15% above mid-COVID levels for new and 5-year-old examples respectively³. Considerably larger increases are evident at 10 years old and above, averaging between 50% and 60% relative to mid-COVID. Widebodies up to 10 years of age have recovered further but off a slower start. However, by 15 years, unlike narrowbodies, recovery has been slower.

Percentage gains over the past 12 months have been in double digits for all but the newest build aircraft, which also took the smallest reductions during COVID, when they represented the majority of aircraft still operating.

Engine lessors have also experienced substantial increases in engine values and lease rates, fuelled by a combination of the general shortage of engine shop capacity and extended turnaround times plus the specific pressures arising from the P&W GTF problems.



Chart 5: Generic Half-Life CMV indices (Dec 2021 = 100)



² A320ceo & neo, A321ceo & neo, 737-800, 737-8 MAX, E195-E1 & E2, 767-300ER, 777-300ER, 787-9, A330-300, A330-900, A350-900

³ All value comparisons are based on Cirium Ascend generic half-life CMVs

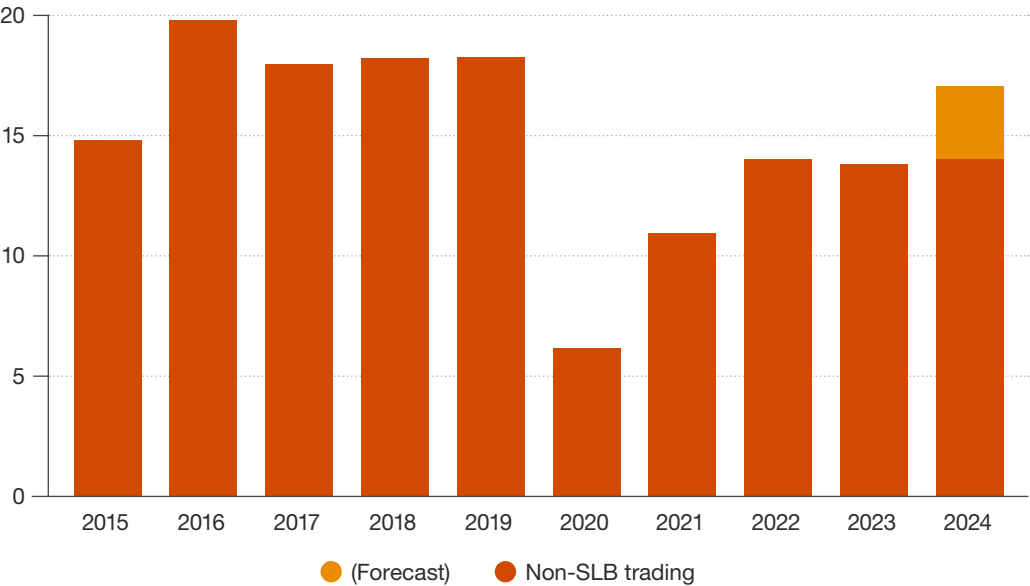


Trading

The trading of aircraft between lessors or investors is an important piece of the leasing business model. Activity had been muted since the onset of the COVID-19 pandemic but accelerated during 2024 to end the year much closer to pre-COVID levels (Chart 6).

The value of active aircraft traded between financial owners is estimated to have reached \$17.5 billion in 2024, 25% higher than in 2023 and moving closer to the \$18-20 billion levels seen at the peak of the previous cycle.

Chart 6: Non-Sale & Leaseback aircraft trading



The investment thesis

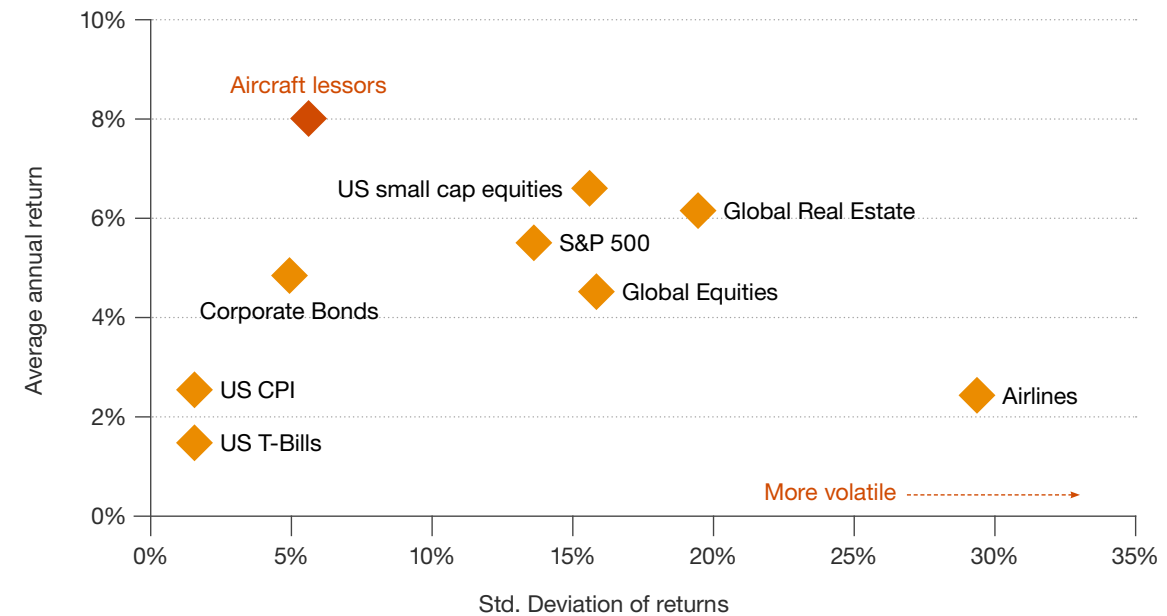
The long-term stability, profitability and resilience of the leasing sector underpins its attractiveness to investors. Lessors benefit from a simple business model and long-dated contracts, overlaid with strong risk management and fiscal discipline. Lessors have continued to generate attractive risk-adjusted returns for more than 25 years, through multiple industry cycles during which many of their airline customers and airline investors have made material losses.

These strong and stable return characteristics compare favourably with other asset classes in which investors are active. Chart 7 compares the historical returns between 2000 and 2023 generated by aircraft lessors relative to other investment opportunities, including airlines, set against the lower volatility of lessor financial performance.

Scale remains a significant factor in determining lessor profitability, driving down financing costs and increasing the capacity to transact in scale and interact with OEMs in a meaningful way. The trend towards consolidation of lessor platforms will continue, with more M&A activity within the middle tier of lessor ranks and some selective acquisitions of smaller platforms on the part of the largest players as a way to maintain portfolio growth where access to additional direct orders is limited by lack of timely delivery slots.



Chart 7: Returns on aircraft and other asset classes 2000–2023



Sources: PwC, Bloomberg, OECD, US Fed., company financial statements

4.

The OEMs



The OEMs

A shortfall of more than 4,500 commercial aircraft now exists compared to the stated intentions of the airframers in 2019. These aircraft will never be built and delivered, not only leaving airlines short of capacity for many years to come but also denying the OEMs sales valued at an estimated \$350 billion, with obvious implications for the scale and timing of future investment and product development.

In 2024 alone, the OEMs missed their delivery commitments by an estimated 560 aircraft⁴, of which Boeing accounted for 70% (Chart 8). Approximately 1,200 aircraft were delivered during the year, which was a 12% reduction compared to 2023 and 32% below plan. Expressed in delivery dollars, 2024's total of approximately \$74 billion is around \$9 billion lower than 2023.

The number of firm orders booked also fell sharply from 2023's record-breaking total. An estimated 1426 orders were announced by Western OEMs (Chart 9), with an estimated market value of \$104 billion, of which over three-quarters were narrowbody types. The backlog has extended to almost 17,000, with delivery dates as far out as 2038.

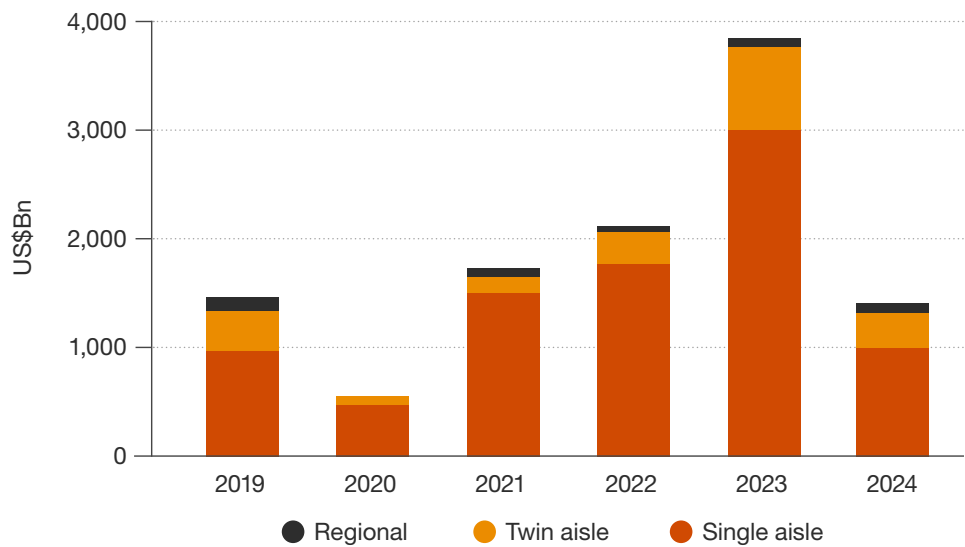


Chart 8: 2024 deliveries vs planned

	31/12/2023 Planned ¹	31/12/2024 Actual	Shortfall	
Airbus	874	757	117	-13%
Boeing	726	333	393	-54%
ATR	50	33	17	-34%
Embraer	105	70	35	-33%
All Western Aircraft	1,755	1,193	562	-32%
COMAC	60	47	13	-22%

¹ According to Cirium Ascend Fleets Analyzer 31 December 2023

Chart 9: Western airliner firm orders



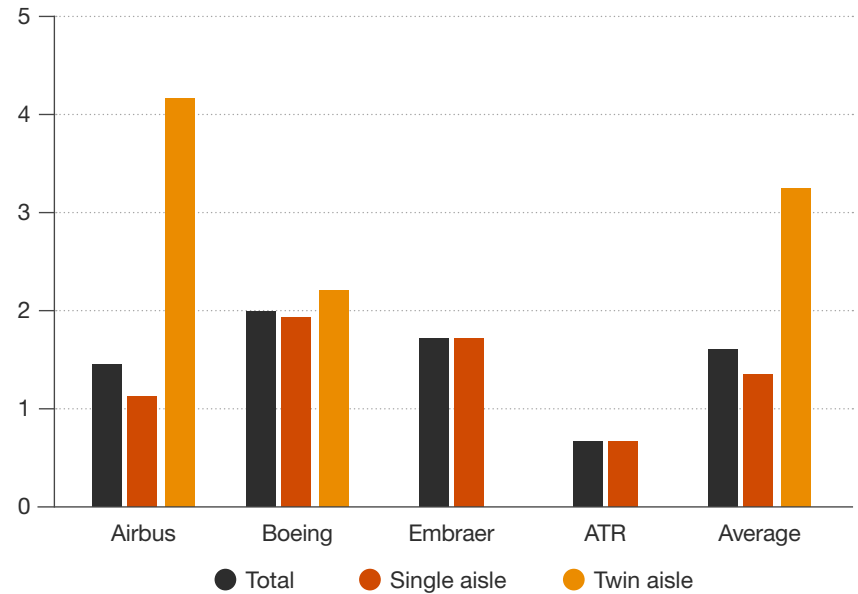
⁴ Based on scheduled deliveries listed in Cirium Ascend's Fleets Analyzer database on 31st December 2023



The overall book-to-bill ratio (“BTB”) for 2024 fell by 45% compared to the previous year, with an average of 1.6 orders per delivery (Chart 10). This still good performance was boosted by a 4.2:1 BTB for the A350 whilst ATR was the only manufacturer that recorded a BTB below 1, reducing its backlog versus 2023. The fact that Airbus achieved a BTB of barely 1:1 for the A320 family is likely explained by the sheer size of the backlog (7,700 aircraft) and the lack of availability until the 2030s.

It is instructive to note that, for the second year running, China did not order any Western commercial aircraft. To underscore the not very hidden message being sent, they did order 270 COMAC aircraft, however, adding to the 200 ordered in 2023.

Chart 10: 2024 OEM book to bill ratios



Boeing

Whilst it is fair to say that no OEM had a good 2024, the prize for the worst *annus horribilis* once again goes to Boeing. On the plus side, a new CEO arrived in August and chose to relocate to Seattle, rather than corporate HQ, to rebuild the lost connectivity between leadership and engineers.

In addition to addressing the underlying issues of quality, efficiency and loss of trust at the FAA, two key events will define how Boeing’s recovery trajectory moves over the next two years. During 2024, Boeing agreed to re-acquire Spirit AeroSystems, a major supplier of 737 fuselages and sub-assemblies, and the process of integrating the Spirit production facilities into the company will take up much of 2025. Resolving the machinists strike is the first step on the journey of restoring employee-management trust and respect – a journey that must be travelled in both directions.

The strike that shut down 737, 767 and 777 production was called on 13th September as a means to secure improved compensation and conditions for 33,000 Seattle-based machinists. The 2024 contract renegotiation was expected to be tough and had been anticipated since the expiring 10-year contract was acrimoniously introduced in 2014, limiting pay increases and winding down a generous defined benefits pension scheme.



During the 53 strike days that it took to reach agreement, Boeing's negotiating team made several missteps, having badly mis-read the room. The company ended up giving virtually all of the 40% wage increase sought, but no return to the defined benefits pension scheme, which was never realistically going to be conceded. At the heart of the grievances was not just the erosion of earning power through inflation since 2014 but also a perceived lack of respect for, and involvement of, workers in the way the company has been run, arguably dating back to the 1997 acquisition of McDonnell Douglas.

Going forward, it will be essential for Boeing's leadership to bring the workforce back on side and increase the level of employee engagement in improving and then maintaining quality and efficiency across the production process. An early positive sign that the company wants to change the dynamic is that, during the month following the end of the strike, no aircraft were built in the Seattle area, instead using the production facilities for a series of training activities to bring the mechanics back up to speed and prepare for the restart.

It is noteworthy that prior to the pandemic the average experience of a Boeing machinist was around 25 years, but today 50% of that employee group has less than 2 years' experience. In order to resolve the quality issues in production, therefore, Boeing needed to add a significant number of skilled engineers to the payroll. Prior to the strike, Boeing had been on course to hire thousands of new workers to make up for the numbers (but not immediately the experience) lost during the pandemic.



However, a hiring freeze is now in place, one of the measures announced at the start of the strike to conserve cash, along with a decision to reduce the wider Boeing workforce in Washington State by 17,000 or around 10%. Consequently, Boeing will need to leverage the skillset that exists within Spirit AeroSystems to cross-fertilise their other production lines and, over the longer term, invest extensively in robotics to automate high labour content production processes.

One of the downsizing decisions made by Boeing has been to shut down AerData, one of the leading providers of asset, maintenance and records management solutions to lessors and other industry stakeholders. Existing clients have been advised and are in the process of sourcing alternative products. AerData was founded as an independent company in 2007, but since then the relative complexity and cost of a legacy platform has become increasingly uncompetitive against a new generation of cloud-based solutions. The shut-off date for AerData's products has not been announced, but it is likely that transitioning all of the clients will take at least 12 months.

Airbus

Airbus has by no means escaped the challenges presented by disrupted supply chains and shortages of skilled workers. Along with other airframers, they have again missed their planned production targets, with delays in the supply of engines, cabin equipment, aero structures and premium seats cited as recurring problems. They delivered approximately 760 aircraft in 2024, short of their already reduced target of 770.

For the 3rd year running, more A321s were delivered than A320s, accounting for 60% of family deliveries in 2024. Airbus also delivered the first A321XLR in October, and both engine variants have now been certified by the FAA after some delays. A350 production will remain below target for some further time as Airbus needs to bring in-house the work previously out-sourced to Spirit AeroSystems following the latter's acquisition by Boeing which required non-Boeing related activity to be spun out. Airbus received \$559 million from Spirit in compensation which will go a good way towards covering the transition costs.

Airbus, along with other OEMs, will indirectly benefit from the Boeing machinists pay award, since it will impact the aerospace labour cost indices that virtually all OEMs incorporate in their delivery price escalation formulae. Boeing last settled a strike by its unionised production workers in 2008, when Boeing escalation averaged 3.2% over the year, but saw that number almost double to 5.7% in 2009, with several months running at over 8%.

Embraer

Embraer had its strongest year for new orders since 2019, securing 120 additions to the backlog, which now stands at 360 aircraft, the majority split evenly between E175s and E195-E2. It missed its revised 2024 delivery target by around 10%, for the same supply chain reasons as the other OEMs and, with a single source engine, all of the operator base is exposed to Pratt & Whitney's powdered metal issues.

The inability of the historical airframer duopoly to meet contractual deliveries leaves an opening for a third "Western" supplier in the 180-240 seat single aisle space – this could be Embraer's next big moment in history, but they will need significant investor support to make it happen.



COMAC

During 2024, COMAC delivered 34 C909s (the recently rebranded ARJ21) and 13 C919s. This takes the number of C919s in service to 16, all operated by China's "Big 3" – Air China, China Eastern & China Southern. Fleet utilisation remains low, but has been increasing, and cross-border flights outside mainland China have just commenced with a new route between Shanghai and Hong Kong.

COMAC undertook a number of promotional sales tours with the C919 during the year, focussing on building the customer base in Asia. To date, COMAC has sold 1,000 C919s and over 500 C909s and has a backlog of more than 1350 aircraft (987 C919s and 377 C909s). However, their 7 airline customers for the C919 are all Chinese and over 50% of the backlog is held by Chinese lessors, of which less than 10% has been placed. Indonesia, as the only country outside China with airlines (TransNusa & LinkAsia) operating C909s, must surely be a key target for C919 sales.

COMAC has also been progressing its widebody project, the C929, which latest design updates suggest will be a 280-440 seat widebody offered in three variants. The -500 will have 250 seats and a range of 7,500 nautical miles; the -600 will have high-density capability for up to 440 passengers in a single class configuration; the -700 with 320 seats will have a range of 5,400 NM. The current design, which includes flight deck commonality with the C919, is currently reliant on western

suppliers for engines and presumably other key components such as avionics. A launch order from Air China was announced in November 2024, although the number of aircraft and the delivery dates were not disclosed.

The challenges facing Boeing and, to a lesser extent, Airbus have been flagged as providing COMAC with an opportunity to turbocharge their global market penetration. Undoubtedly, many customers would welcome additional competition to reduce their dependency on the large airliner duopoly but remain sceptical about committing to an OEM with no track record or established customer support infrastructure outside China. This is recognised as a critical step in establishing customer confidence and the experience of Russia's Superjet operators will not have been lost on the Chinese. The pathway to EASA and FAA certification is also not straightforward, particularly given the uncertain nature of US-Chinese diplomatic and trade relations over the next four years. The world is therefore unlikely to see the Airbus/Boeing dominance of airliner sales significantly challenged by COMAC over the next decade.



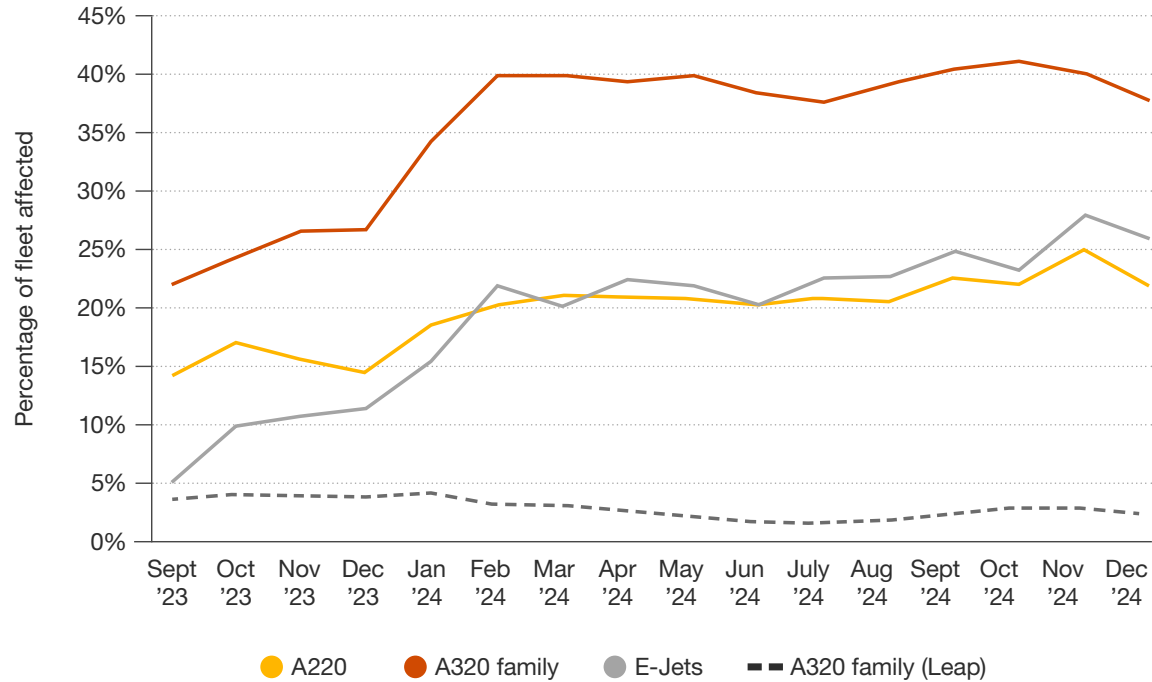


Pratt & Whitney

The level of GTF-powered aircraft groundings has maintained an average of more than 35% of the delivered fleets throughout 2024 and at year-end numbered over 700 aircraft. A320neos are most severely affected with almost 50% of the fleet unavailable, while A321s are at around 30%, presenting a stark comparison with the performance of Leap-powered Neos (Chart 11). E-jets and A220s are less severely impacted and, like the A320s, show a slight reduction at the close of the year.

The powdered metal contamination problem has been identified and remedied and so-called “full life engines” have been back in production again for 8 or 9 months. Nevertheless, the build rate is below what is required to keep the airframers at their planned levels of output and provide sufficient spares to service the flow of re-work engines through the engine shops. The end-to-end time for SVs remains close to all-time highs, adding to the fleet and network planning challenges faced by operators. Given the size of the backlog and the shortage of engine shop capacity, there is little doubt that the remedial work will not be fully completed before the latter end of 2026.

Chart 11: GTF storage status (percentage of delivered fleet)



5.

The Money

The Money

2024 was another strong year for aviation-related borrowing, with traditional aerospace lenders competing strongly for good quality business and spreads tracking downwards assisted by lower base interest rates.

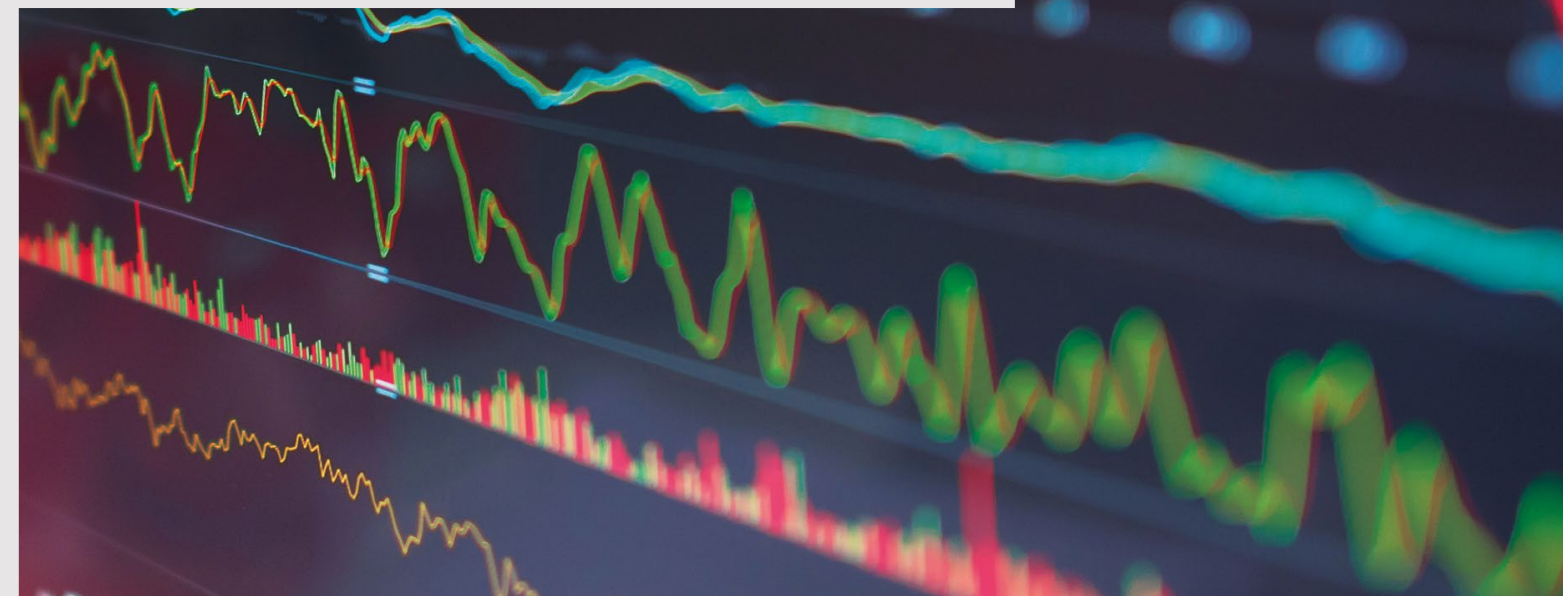
Behind the scenes, however, several aviation lenders exited the market, citing strategic and regulatory changes driven by Basel and ESG considerations. One long-standing marquee player departing the sector in 2024 was NordLB, which sold the majority (€1.67 billion) of its aviation loan book to Deutsche Bank and will run down the remaining €1.1 billion portion over time. This was described as a strategic measure facilitating the bank's transition to meet sustainability objectives and improve profitability.

Increasingly augmenting the established aviation banks are alternative lenders such as Volofin, Muzinich, PK (Apollo) and Ashland Place, KKR, AV Airfinance with transaction volume in the space increasing by an estimated 15-20% year on year and spreads typically in the 300-400 bps range. This segment of the market is likely to become even more relevant as more mid-life aircraft are retained and will require re-financing.

2024 also saw a strong uptick in ABS transactions, with 7 new commercial aircraft deals closing during the year. The transactions, which included both aircraft and loans, had a

combined value of \$4 billion – which is still just 40% of the 2019 market peak.

Sustained strong demand for capital markets products has been evident, with IG lessors in particular benefitting from tight yields as several COVID-era bond issuances approach maturity, a feature that will extend into 2025 and maintain the steady volume growth trend of the past two years. Spreads are tighter compared to a year earlier and in some cases are almost back to pre-COVID levels.



6.

The Environment



The Environment

The realities of the scale of the challenges presented by IATA's commitment to Net Zero (CO₂) by 2050 and the EU's targets for emissions reduction, stepped increases in usage of SAF, etc. have been sinking in as deadlines approached for mandatory ESG data collection and reporting.

Much of the industry is now in agreement that meeting the near-term targets will be extremely challenging and that NetZero by 2050 will only be achievable if SAF availability and affordability improves by many orders of magnitude – improvements that are heavily dependent on investment and commitment from outside the current orbit of airlines, lessors, OEMs and lenders.

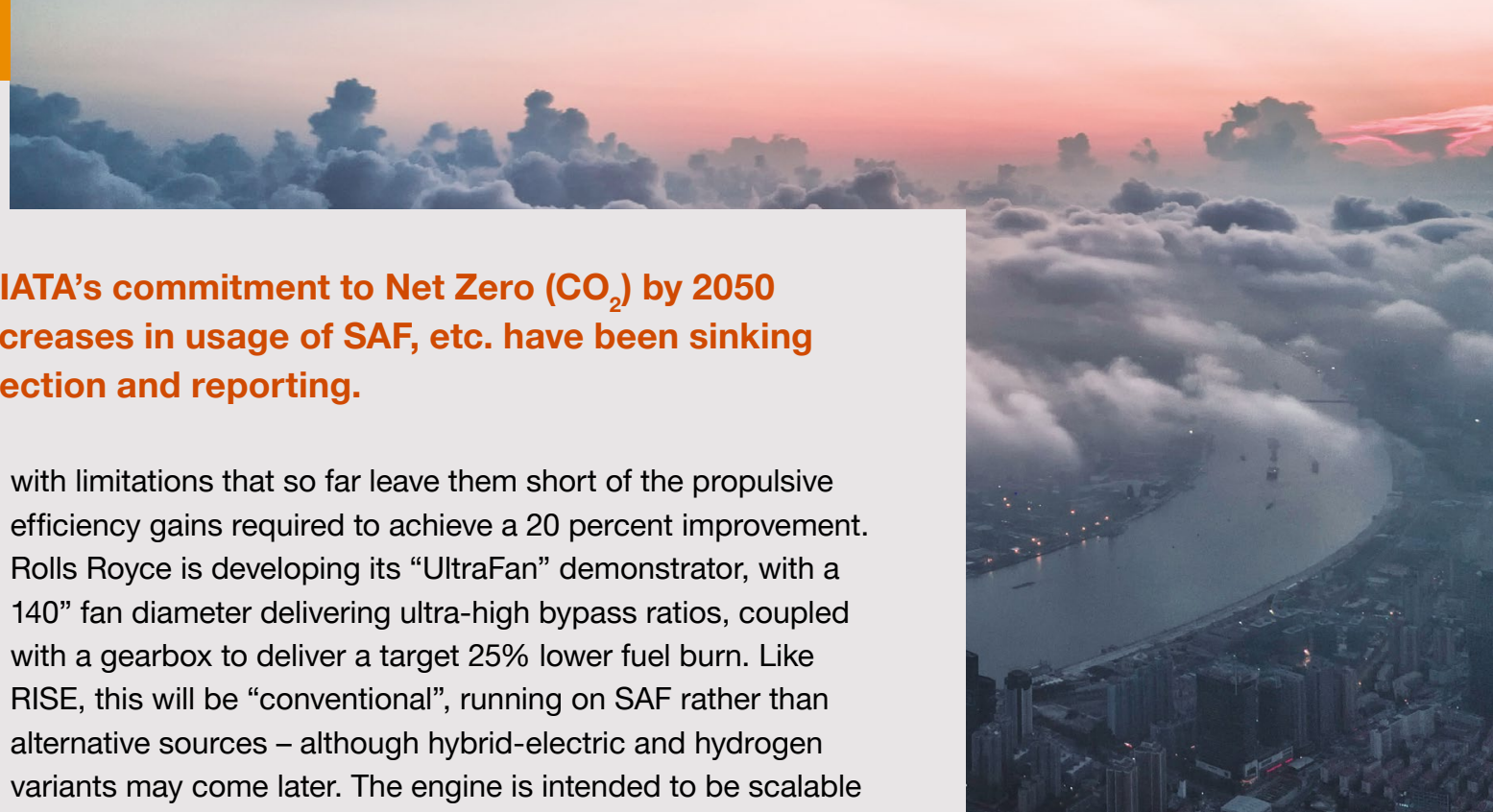
Neither the airframers nor the engine OEMs currently have the technology advancements market-ready to launch the next generation of alternatively powered commercial aircraft (electric, hydrogen or a hybrid), let alone to have achieved a meaningful share of the world's operating fleet by 2050. Even next generation conventionally powered engines remain in the R&D phase.

CFMI's RISE Program is testing key technologies that will determine future engine architecture. However, RISE is an open rotor design which historically has been unable to overcome operational, maintenance and noise issues. Many commentators believe that open rotor will not be the ultimate way forward. CFM is also exploring other architectures, each

with limitations that so far leave them short of the propulsive efficiency gains required to achieve a 20 percent improvement. Rolls Royce is developing its "UltraFan" demonstrator, with a 140" fan diameter delivering ultra-high bypass ratios, coupled with a gearbox to deliver a target 25% lower fuel burn. Like RISE, this will be "conventional", running on SAF rather than alternative sources – although hybrid-electric and hydrogen variants may come later. The engine is intended to be scalable from 25,000 to 110,000 lbs thrust, with the smaller variant suitable for single aisle applications.

GE is developing a hybrid electric demonstrator engine with NASA that will embed electric motor/generators in a conventional, fuel-burning high-bypass commercial turbofan to supplement power during different phases of operation. It is probable that there will be some level of next-gen market penetration for regional and small narrowbody aircraft by 2040. However, SAF plus carbon trading, capture and offsets will still contribute 80% of the CO₂ reductions required to hit the 2050 target, with the SAF component ranging from a meagre 5% to 31%, according to ATAG⁵.

⁵ The Air Transport Action Group



SAF production more than doubled in 2024 compared to 2023, but availability remains chronically low, accounting for less than 0.5% of airline consumption. Currently, SAF is produced from recycled vegetable oils and agricultural crops and waste, however even when production is ramped up there will be insufficient feedstock to provide more than a small part of the total requirement.

Alternative synthetic SAF products are therefore needed. However, cost is a major consideration for airlines. HEFA (recycled Hydrotreated Esters and Fatty Acids) costs 3x regular Jet A-1 while synthetic SAF is expected to be 6x to 10x more expensive.

The scale of investment required to develop the technologies and production facilities for synthetic SAF is currently far beyond what the market is capable of raising⁶ and the investment thesis is blurred by concurrent statements that alternative fuel sources will at some point supplant kerosene and SAF.

The Urban Mobility and eVTOL development space encountered some setbacks in 2024. Volocopter and Lilium both filed for bankruptcy in the closing weeks of 2024. The latter has already reportedly found a buyer for the business although the majority of employees have been let go. Earlier in the year Rolls Royce terminated its partnership with Vertical Aerospace ahead of closing its electric propulsion unit, RR Electrical, having failed to find a buyer for the business. Vertical itself

has undergone a change of ownership and control following a further capital injection, highlighting a core issue for these businesses in their development phase, namely a high funding burn rate and an increasingly cautious investor community. Turning concepts into commercial reality takes more than money, clearly, and the regulatory requirements, which are still at an early stage and evolving, will rightly be onerous. Ambitious timelines for service entry are unlikely to be met and global acceptance remains a long way off.

⁶ Estimated \$1.5 trillion investment over 30 years to ensure SAF supply sufficient to meet 2050 Net Zero



7.

The Outlook

The Outlook

In 2025, the industry poised to benefit from a robust global economy, low oil prices and crack spread, further modest reductions in interest rates and inflation and the completion of post-COVID traffic recovery in Asia.

Although it is unclear what economic and social measures the new Trump administration will implement, it is likely that their impact will be less seismic than many are predicting – at least as far as commercial aviation is concerned. It will, however, be important to ensure that the FAA is sufficiently funded and resourced to provide the oversight and approvals necessary to support aircraft production and delivery. This immediately requires the appointment of a replacement for the current Administrator, who leaves the top job on 20th January.

Boeing has announced an aggressive ramp-up plan for 737s and 777s with the former targeted to reach the current FAA-imposed limit of 38 a month by May 2025, with further step increases thereafter to get to rate 57 in mid-2027. Suppliers are cautious, however, having been exposed to over-reach by Boeing too often over the past several years. The supply chain is unlikely to fully embrace Boeing's new schedule, at least in the near term until a pattern of stability has been re-established. Until then, shortages of some assemblies and components are likely to slow the overall completion rate, with Leap engines arguably under the greatest pressure to deliver at the higher rates. A further impediment to an accelerated delivery rate is

likely to come from the direction of the FAA, which is expected to have a new administrator appointed early in 2025 and still needs to be satisfied that Boeing has implemented all of its mandated safety and quality initiatives.

Having failed to hit their own revised delivery targets in 2024, Airbus may also find it prudent to take a more measured approach to 2025 and provide customers with realistic and stable delivery schedules. Airlines should not have to face another peak season of frustrated expectations and late scheduling changes; and passengers should equally not have to bear the consequences.

Supply chain issues will gradually improve, but a key factor in restoring a fully functioning supply chain is re-building the depth of experience within the workforce. This can only come with the passage of time and this points to production rates remaining below OEM projections and market demand for much of the second half of the decade.



Finally, here are our predictions for 2025:

- » Deliveries will increase significantly with the largest rebound coming from Boeing, despite their challenges
- » Firm orders will be no higher than in 2024, constrained by a lack of delivery slots
- » Embraer will announce cooperation agreements in at least one emerging market
- » Trading activity will return to pre-COVID levels and ABS transactions will pass \$6bn
- » More airlines will reduce or reroute flights to avoid Russian airspace, putting passenger and crew safety before profit
- » COMAC will make its first C919 sale to a foreign airline in Asia
- » Boeing will spin off more services-related businesses
- » At least one more e-VTOL developer will enter restructuring or bankruptcy.

As we step into 2025, a time of great uncertainty, while time will reveal which predictions come true, one thing is certain: the future holds endless possibilities and opportunities.



8.

Revolutionising Aviation Finance with Generative AI

Unlocking the Future of Aviation Finance

Over the past two years, spurred by advances in technology but also in part by changes to work practices post-Covid, aircraft leasing companies have increasingly turned their attention to improving the technology they are using. This has coincided with the extraordinary rise of Artificial Intelligence and, in particular, Generative AI (“GenAI”).

Initially, it was easy to be sceptical about the sheer number of claims made for AI and products advertised with an AI sticker on them. In a short space of time however this has changed, and most companies now see that AI is being used in their business and that this needs to be done safely and securely with proper controls. Whether it is through systems they use or through employees using products on their phones, GenAI brings significant risks as well as opportunities and these need to be addressed as a priority. At PwC, we have been putting a lot of time into thinking about how to leverage GenAI to drive productivity and cost savings for lessors while also keeping the lessor and their proprietary information and systems safe and secure. This article explores how leasing companies can begin to explore GenAI and what it can do for them.

The power of GenAI in aviation finance

When considering where GenAI can fit into a business, it is important to start with its capabilities and then consider how

these can be used to enhance part of your workflow. We view AI as being good at four things that are relevant to lessors:

1. Automating high volume tasks
2. Analysing and arranging unstructured data
3. Identifying patterns in large data sets
4. Making predictions based on past data.



What this means is that, in aviation finance, GenAI can be used to optimise both customer facing deal processes and back-office operations. Specific use cases include:

- » **Deal Metric Analysis:** GenAI can analyse vast amounts of data to identify trends and insights, helping lessors make informed decisions.
- » **Lease Drafting:** AI can automate the drafting of leases to save time and reduce errors.
- » **Multi Lease Review and Analysis:** GenAI can review and analyse multiple leases simultaneously, improving accuracy and speed.
- » **Portfolio Monitoring:** GenAI can continuously monitor asset portfolios, allowing for proactive management and risk mitigation.
- » **Airline Invoicing:** GenAI can automate invoicing processes, reducing errors and speeding up transactions.
- » **Deal Creditworthiness Assessments:** GenAI can support in assessing the creditworthiness of counterparties, providing valuable insights for decision-making.

AI also supports back-office functions, including the generation of IT code and test documentation, the automation of meeting summaries, generation of policies and automation of various recruitment processes. In fact, it is possible to map a GenAI use case to almost every part of a typical lessor workflow.



The technology is not yet advanced enough to work in all areas, but if the recent past is anything to go by, the rapid advancements over the past year suggest this is only a matter of time.

Human-led, tech-powered transformation

While the technological benefits of GenAI are clear, the human element cannot be overlooked. To achieve the most from GenAI, it is essential to prepare your people and culture for this change journey. This transformation must be human-led and tech-powered, meaning that success hinges on the ability to integrate technology seamlessly with human expertise.

It is vital to equip your employees with the skills to work alongside GenAI through comprehensive training and robust change management strategies, ensuring clear communication and continuous support. Through this, you can foster collaboration between human and AI systems, viewing GenAI as a tool to enhance human capabilities. Adopting GenAI requires a cultural shift and without buy in from all employees, it simply won't deliver the benefits that are available. Cultivating a culture of innovation and continuous improvement is essential, as GenAI's full potential is realised through ongoing learning and adaptation.

Next steps

There can be no doubt that GenAI is going to change how leasing companies work. At PwC, with the learnings and expertise gained from our GenAI Business Centre, enabled by Microsoft, we are dedicated to helping lessors harness the power of GenAI to achieve remarkable productivity gains and cost savings. Given the scale of what is possible, it is sometimes hard to know where to start. We believe that the three key next steps that everyone should be considering in the near term are:

1. Set a GenAI policy for your company that takes IT security and data protection into account and ensure that you understand the risks involved in deploying GenAI.
2. Communicate your plans for using GenAI to the entire firm and seek volunteers from all departments.



3. Choose one or two items that are known to work today from the long list of possible use cases as a pilot project and start from there.

PwC's unique position in the AI landscape

PwC supports clients in deploying customised AI models and integrating AI capabilities into enterprise software. Strategic partnerships with AI pioneers like Microsoft, Harvey, and OpenAI enhance PwC's ability to deliver tailored AI solutions that drive innovation, efficiency, and ethical implementation. PwC's commitment to value creation and trusted partnerships positions it as a leader in the AI landscape, recognised globally for responsible AI deployment. By leveraging Generative AI, lessors can streamline operations, enhance decision-making, and optimise resource allocation, driving growth and innovation in the aviation leasing sector.

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Securing the Skies: Enhancing Cybersecurity in Aviation Finance



Enhancing Cybersecurity in Aviation Finance

In recent years, technology has evolved significantly, most notably with the introduction of Gen AI. This evolution has led to an increased cybersecurity threat landscape for all sectors, including aviation finance.

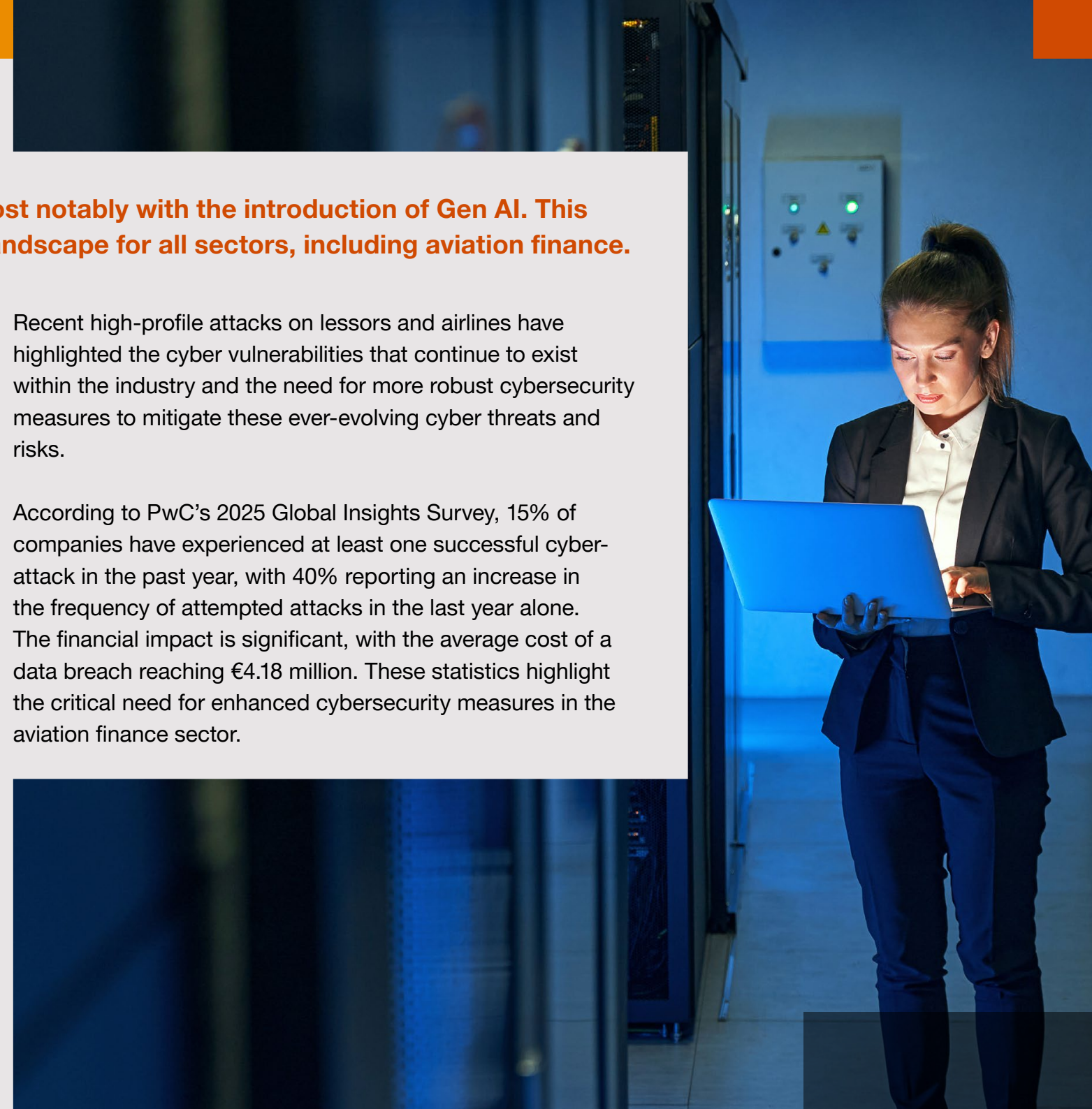
The growing sophistication and frequency of cyber threats make it essential for aircraft lessors to continue to prioritise and evolve their cybersecurity measures. By doing so, they can stay ahead of malicious actors and protect their assets, data, and reputation. This section explores the expanding cyber threat landscape, outlines steps lessors can take to enhance their cybersecurity and how PwC can assist lessors in navigating this complex environment.

The growing cyber threat landscape

The aviation finance sector is witnessing a surge in cyber-attacks, with ransomware being the most prevalent threat. According to PwC's 2024 Threat Intel Report, ransomware accounted for 22% of all malicious incidents in the aviation finance sector in 2024. Ransomware is a type of malicious software designed to block access to a computer system or data until a sum of money is paid. Attackers typically encrypt the lessor's data and demand a ransom for the decryption key.

Recent high-profile attacks on lessors and airlines have highlighted the cyber vulnerabilities that continue to exist within the industry and the need for more robust cybersecurity measures to mitigate these ever-evolving cyber threats and risks.

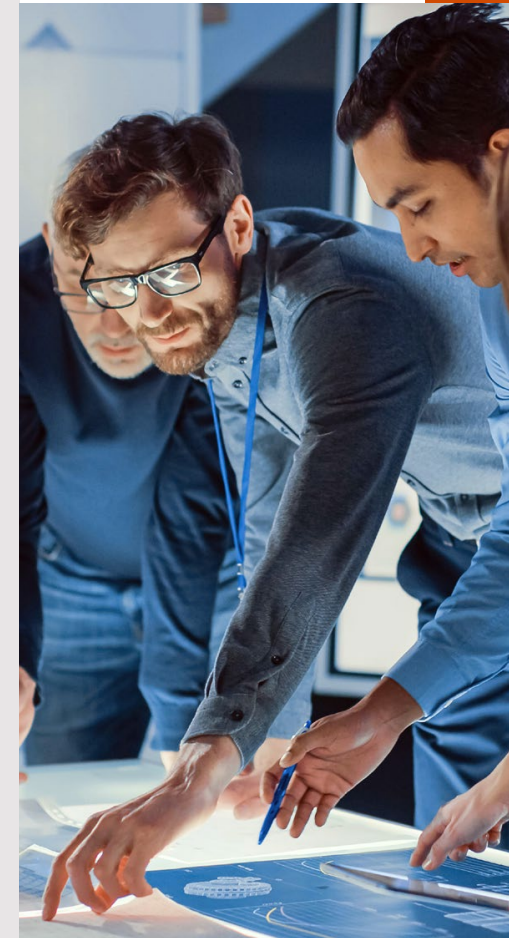
According to PwC's 2025 Global Insights Survey, 15% of companies have experienced at least one successful cyber-attack in the past year, with 40% reporting an increase in the frequency of attempted attacks in the last year alone. The financial impact is significant, with the average cost of a data breach reaching €4.18 million. These statistics highlight the critical need for enhanced cybersecurity measures in the aviation finance sector.



Strategic focus areas for lessors in 2025

To effectively protect against the ever-evolving cyber threat landscape, PwC recommends that lessors prioritise the following seven measures in 2025:

- 1. Identity and Access Management (IAM):** Traditionally, lessors have allowed broad employee access across various systems and data, regardless of necessity. This openness increases the risk of data breaches. Bad actors can exploit a single compromised user to access vast amounts of sensitive data and information. Implementing robust user access controls, through an IAM review, helps safeguard sensitive information and ensure operational security.
- 2. Third-Party Risk Management (TPRM):** The adage “you are only as strong as your weakest link” is particularly true in cybersecurity. Historically, airlines have underinvested in cybersecurity, leading to numerous attempted attacks, especially through invoice hacking. Strengthening supply chain security by robustly managing third-party vendor risks is essential to prevent fraud, ensure transparency, and maintain the integrity of operations.
- 3. Cyber Risk Management:** Compiling comprehensive and actionable cyber risk data is complex due to data silos, the dynamic threat landscape, reporting complexities, and resource constraints. Adopting a cyber risk management framework, like NIST, can help lessors manage cyber risks systematically, making it easier to present clear, actionable insights to senior stakeholders and board members.
- 4. Cyber Portfolio Rationalisation:** Over the years, most lessors have accumulated a diverse array of tools—from Multi factor Authentication and spam filtering tools to advanced AI solutions—without thorough evaluation, leading to redundancy and gaps. Robust rationalisation and consolidation of a lessor’s cybersecurity toolset strengthens resilience against emerging threats whilst optimizing the cyber tool portfolio.
- 5. AI Protect:** The rapid adoption of AI technologies has significantly expanded the attack surface. Lessors now face more complex and unpredictable cyber threats. Implementing cybersecurity measures to protect AI solutions from threats and vulnerabilities is crucial. Staying ahead of these threats requires continuous updates to cybersecurity strategies and the deployment of advanced protective technologies to safeguard both AI and traditional technologies.
- 6. Threat and Vulnerability Management:** There is a heightened focus on improving detection and response capabilities given the expanding and ever-evolving attack surface. Proactively identifying, assessing, and mitigating potential security risks through continuous monitoring, automated scans, and vulnerability assessments enables swift identification and mitigation of cyber incidents, minimizing potential damage.
- 7. Zero Trust Architecture:** The adoption of Zero Trust architecture is gaining traction outside the lessor industry. This approach, which verifies every access request and minimizes inherent trust, is yet to be widely adopted by lessors. Embracing Zero Trust principles can provide robust protection against sophisticated cyber threats, enhancing overall security posture.



PwC's commitment to cybersecurity excellence

PwC offers a comprehensive suite of cybersecurity services tailored for the aviation finance sector. Our approach combines deep industry expertise with cutting-edge technology to create customized strategies that address the cybersecurity challenges faced by lessors.

Our team of experienced professionals guides you through your cybersecurity maturity journey, ensuring your organization remains secure and compliant. By leveraging our expertise in identity and access management, third-party risk management, and cyber risk management, we provide solutions that enhance your security posture and protect your operations from emerging threats.

As the aviation finance sector threat landscape continues to evolve, PwC is committed to helping lessors achieve resilience and security. Our strategic insights and methodologies are designed to strengthen your cybersecurity defences, ensuring you can confidently face the challenges of today and tomorrow.



Conclusion

In an era where cyber threats are increasingly sophisticated and pervasive, it is imperative for aircraft lessors to continue to prioritise cybersecurity. By focusing on key areas such as IAM, TPRM, cyber risk management, lessors can successfully navigate the complexities of the current cybersecurity landscape, ensuring a secure and resilient future for their operations.

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10.

CSRD Readiness: Action Plan for Leasing Industry's 2025 Priorities



Corporate Sustainability Reporting Directive

The second half of 2024 saw a rapidly growing awareness of and engagement with CSRD by leasing companies. With all in-scope lessors reporting in 2026 based off FY2025 data, this level of engagement is timely and will mean that the industry is in good shape to be ready for this enormous change to reporting obligations.

The focus so far has been on the scoping and double materiality assessments, and we have seen clear trends to date on what the principal reporting areas will be for leasing companies. A DMA is just the start however and as lessors complete their assessments and look ahead to 2025, there are some key additional areas that they will need to consider and prioritise.

Prepare data collection processes and systems

The output of the double materiality assessment gives the set of data that will need to be disclosed in a CSRD report. The starting point for this data collection is the beginning of the reporting company's financial year meaning that for any company reporting based off 2025 data there is no time to lose in preparing for the data collection.

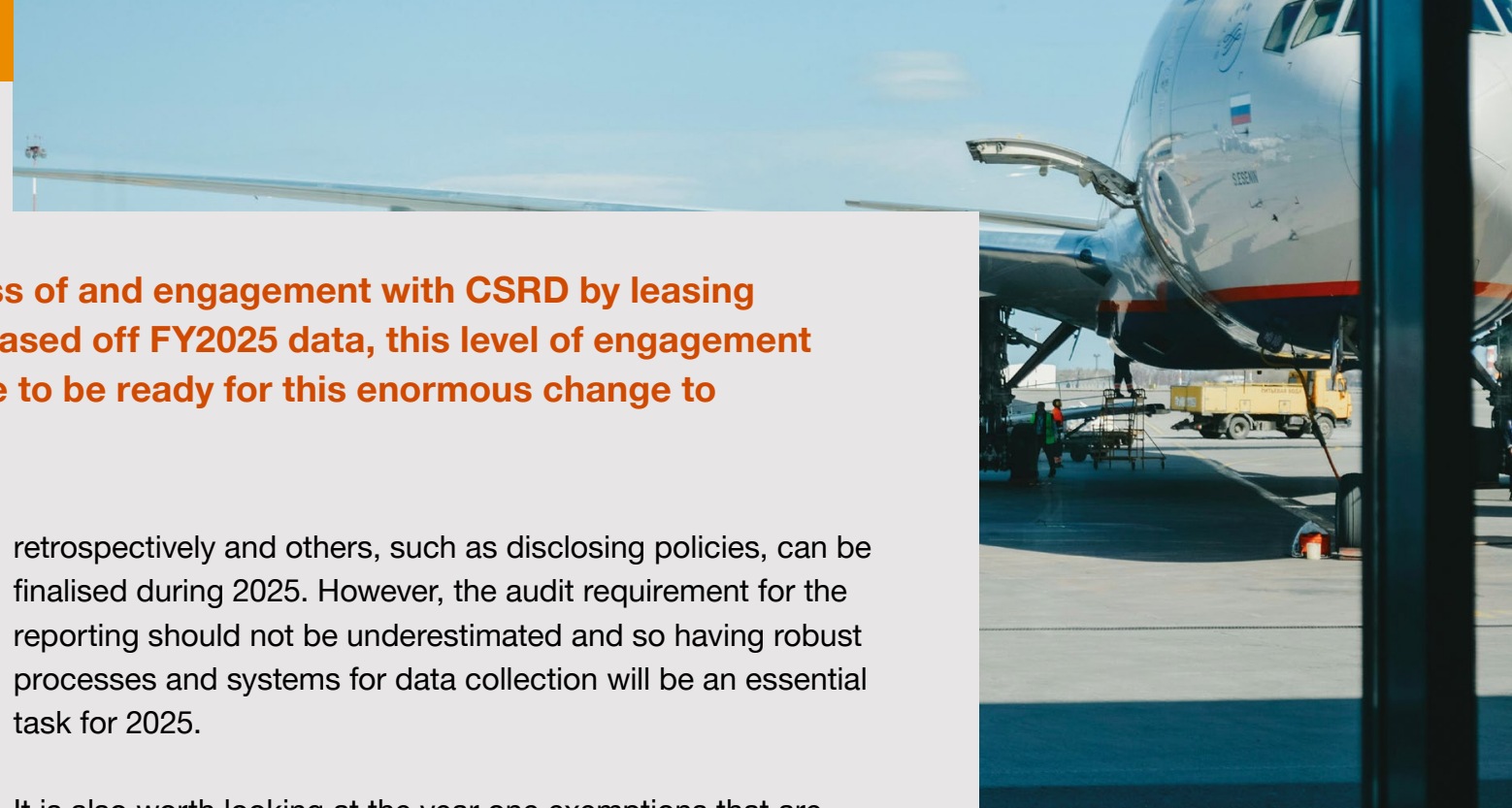
The required data comes in different forms, including metrics, policies and scenarios. Some of these can be calculated

retrospectively and others, such as disclosing policies, can be finalised during 2025. However, the audit requirement for the reporting should not be underestimated and so having robust processes and systems for data collection will be an essential task for 2025.

It is also worth looking at the year one exemptions that are available to companies with fewer than 500 employees on scope 3 disclosures and own workforce disclosures and then use 2025 as the preparation time for the collection of these data.

Decide on messaging

Many of the disclosures under the CSRD ask for the reporting company's policies and strategies relating to issues such as climate change and biodiversity loss. Additionally, there are scenarios requiring companies to model the impacts on their businesses of different global temperature rises. The nature of these disclosures is designed to prompt companies to consider



what they want to say about their approach to ESG. Preparing for CSRD is a time consuming process and treating it solely as a compliance exercise might be a wasted opportunity so it will be worth spending some of 2025 thinking about what you want to say with your reporting.

Look into the taxonomy and prepare for the minimum safeguard declarations

The CSRD always begins to look easier to follow when compared with the taxonomy. Any company in scope for CSRD reporting will also need to report on how their economic activities are classed as sustainable. For lessors this will centre around the aircraft they trade and lease but other smaller activities, e.g., provision of company cars, could also come into scope. There is still confusion over how aircraft will ultimately be treated under the taxonomy, but this should be clarified in the first half of the year.

As well as reporting on economic activities, in scope companies need to make a declaration on what are called the minimum safeguards. Specifically, this provides that organisations conducting economic activities must implement procedures to ensure alignment with the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights. This includes adherence to the principles and rights outlined in the eight fundamental conventions identified

in the Declaration of the International Labour Organisation on Fundamental Principles and Rights at Work, as well as those in the International Bill of Human Rights. It also provides that organisations must adhere to the principle of “do no significant harm” when implementing these procedures. Unlike with the CSRD, there is no materiality threshold for the minimum safeguards. This means that all in-scope companies will need to report on topics such as tax policy, anti-bribery and anti-corruption, human rights and fair competition and will need to ensure that they have documented policies in respect of these areas.

Read the reports from listed airlines and manufacturers

Any EU listed airlines and aircraft manufacturers will be reporting under the CSRD in 2025 based off financial year 2024 data. These reports will provide invaluable information on airline and OEM approaches to topics such as measuring and modelling emissions from aircraft manufacturing and aircraft operation. Any in-scope leasing company should plan to review these reports to help guide their own reporting in 2026.



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