January/February 2023

AIRFINANCE JOURNAL

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Financing the recovery

High Ridge Aviation aims to become a $10 billion leasing and lending platform tailored for a new era of financing

Decade of technology defines future of flying

The 2020s will be crucial for developing aviation technology, with net zero the main target. New aircraft will have to take a back seat.

Sustainable aviation fuel, battery- and hydrogen-powered aircraft may be the future of flying – depending on the mission – but the consensus is that technology has to be defined this decade in order to achieve medium- to longer-term goals.

Airbus and Boeing have no immediate plans to launch a new aircraft – or family product – over the next 15 years and will rather focus on the technology propulsion to meet the 2050 zero emission target.

During an investor conference in November, Dave Calhoun, chief executive officer of Boeing, dismissed talk of any near-term development of aircraft.

"We won't contemplate a new airplane; we won't even put it on the drawing board until we know we're capable of doing that," he said. "So, this is strategy for us. Capabilities. And then there'll be a moment in time where we'll pull the rabbit out of the hat and introduce a new airplane sometime in the middle of next decade."

Aercap's chief executive officer, Aengus Kelly, said in the final quarter of last year that not building a new narrowbody aircraft was the right decision for Boeing.

Antoine Bouvier, Airbus head of strategy, mergers and acquisitions, public affairs, says Boeing's message essentially recognises Airbus's strategy to invest in new-technology to prepare for the next generation of aircraft.

He adds that Calhoun's comments do not change anything. "This is what we anticipated as there is no reason for any manufacturer to launch a new aircraft programme. There is no significant gap going forward," he says.

The year 2035 is 12 years ahead (only) and past experience shows that new aircraft introduction can easily exceed a 10-year timeframe.

Moreover, manufacturers still have large orderbooks (the Airbus A320neo family is believed to be 7,000 units while the Boeing Max is more in the 3,000 units range), with production backlogs running up to seven to eight years.

Today, the aviation sector needs solutions for commercially viable zero-carbon alternative flying.

There are challenges, especially as to procurement of the new technology as well as storage.

Besides, technical ability does not automatically mean the concept will be scalable and feasible to replace current commercial aircraft operations in the short run.

The energy density of batteries and hydrogen, possible lower expected speed, required spare capacity and, not least, extremely high-specific safety standards pose a real challenge.

New engine OEM born?

Airbus venturing into the engine original equipment manufacturer (OEM) world, at least into engine technology development, could be the news of 2022.

The European OEM is exploring direct hydrogen propulsion, among other technologies, to reach its "zero emission" target by 2050 and announced plans, early in December, to bring an aircraft concept for commercial purposes to the market in 2035.

Airbus will probably seek partners as the project progresses.

"It doesn't mean Airbus will do it on its own," said its vice-president zero-emission aircraft, Glenn Llewellyn, at the Airbus summit 2022. "In a subsequent step, if we decide to commercialise that technology, we might decide that's the best approach, but we could equally to partner."

The European OEM plans to start ground and flight testing of the fuel cell engine architecture onboard its ZEROe demonstrator aircraft towards the middle of this decade.

"At scale, and if the technology targets were achieved, fuel cell engines may be able to power a 100-passenger aircraft with a range of approximately 1,000 nautical miles. By continuing to invest in this technology, we are giving ourselves additional options that will inform our decisions on the architecture of our future ZEROe aircraft, the development of which we intend to launch in the 2027-28 timeframe," he says.

The manufacturer has identified hydrogen as one of the most promising alternatives to power a zero-emission aircraft, because it emits no carbon dioxide when generated from renewable energy, with water being its most significant by-product.

But asked if net zero 2050 can be achieved through a combination of more efficient engines, hybridisation systems and 100% sustainable aviation fuel compliance, Airbus chief technical officer, Sabine Klauke, says: "All are necessary, but the most powerful for us is hydrogen."

Return of capital market funding in 2023

The International Air Transport Association expects airlines returning to profitability in 2023, albeit with "razor thin" margins as carriers continue to cut losses stemming from the effects of the Covid-19 pandemic as well as rising fuel costs, labour shortages and ongoing China lockdowns.

The organisation is forecasting industry-wide net profit of $4.6 billion for 2023 and an earnings before interest and tax margin of 0.4%, reversing a net $6.9 billion loss in 2022 and $42 billion loss in 2021.

These figures compare with the $138 billion loss recorded in 2020, during the height of the pandemic, as well as nearly $30 billion of net losses recorded during the 2008 financial crisis.

In aircraft finance, the immediate term is the potential return of the capital markets to fund the industry.

"The markets need more stability to allow the aircraft ABS [asset-backed securities] market to return. But, on the other side, there has not been many bond issuances from the leasing companies, including the investment-grade lessors," observes one banker.

"They have financed themselves internally, but some leasing entities – admittedly the large lessors – have also used the secured market recently to address their refinancing needs."

Last year was poor in the number of issuances from the leasing companies.

"Not many deals have been issued by lessors, including investment-grade lessors," says another banker.

In 2022, only two aviation asset-backed securities hit the market, one in January and one in November. There is a wide expectation that aviation ABS transactions will resume in the first quarter of 2023.

He says: "The period after Thanksgiving is short through the year-end. Budgets are committed for next year and, as a borrower, it is better to tap the market in the New Year when investor appetite is there."

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Printed in the UK by Buxton Press, Buxton, Derbyshire.

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Airfinance Journal (USPS No: 022-554) is a full service business website and e-news facility with printed supplements by Delinian Limited.

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Citi's Noorani to step down

Citi's global co-head of Aviation Corporate Banking, Munawar Noorani, is retiring from the Wall Street bank after a 24-year career with more than two decades spent covering the aviation sector.

Noorani announced his decision on 19 December to *Airfinance Journal*. However, he will remain in his position until 31 January and continue to represent the bank at events such as *Airfinance Journal* Dublin.

Fellow co-head Joseph Shanahan will become the sole aviation lead for the bank's corporate banking activities,

"Covid was tough. Not only for our clients, but it was also tough for us, and other financial institutions, and very tough for me personally. So I just felt it was time," Noorani tells *Airfinance Journal*.

During Covid, Citi was able to raise debt, equity and M&A of more than $300 billion for airlines, lessors, and manufacturers.

He asserts Citi has prospered in the aviation sector due to innovation and longevity. "So John [Grier], Joe [Shanahan] and Thomas [Bliemel]. We have all been around Citi and worked together for almost 20 years. And I think that has been what our clients have loved, the congeniality and bench-strength we have provide, and why we've been so successful in the sector."

Noorani is described as "a mentor and friend to many, not just at Citi, but also within the industry," according to Shanahan.

"We became aviation corporate banking co-heads in January 2020, and I would highlight two things from an industry standpoint: I think the amount of capital that we raised with our clients, in partnership with other banks, during this period of distress, helped the industry survive and perform as well as it did through the crisis."

"But also from a risk management standpoint, protecting the bank's balance sheet, Munawar was a fantastic partner and really a fantastic leader, when it came to both protecting the bank but also working with our clients through what truly was a distressing period to try to find the best win-win for our clients and the bank. When I look back on certainly the last three years, but also the last 20, my first comment is Munawar's mark on this franchise has been indelible and, really, has continued to transition."

Citi's chairman of transportation and services, John Grier adds: "Citi has had a long-standing commitment to aviation excellence, dating back to the days of Fred Bradley and continued by Thomas Hollahan. Munawar has not only continued that legacy, but he's updated and modernised it."

Noorani has had a 30-year international career working for major global financial institutions in the USA, Europe, and the Middle East. He has previously worked for American Express Bank and Equitable Financial Companies.

He has been instrumental in building Citi's decarbonisation focus and developing a framework to disclose portfolio emissions. He also has been leading Citi's participation in the Rocky Mountain Institute's Aviation Climate-Aligned Finance Working Group to create such a framework.


Munawar Noorani

"It has also been a privilege to lead Citi's efforts in the Aviation Climate-Aligned Finance Working Group to create the framework for annual disclosure of our lending portfolio emissions under the NZBA guidelines along a science-based recognised pathway to achieve the 1.5c emissions goals by 2050," he says.

"I am proud of the early attention Citi, and our team have given to the decarbonisation needs, discussions, initiatives, and actual efforts of this hard-to-abate sector."

He hopes later to return to London from Dubai, and continue his work on decarbonisation. But first, Noorani looks forward to "taking some time".

Noorani holds a master of science in foreign service from Georgetown University, and a bachelor of arts in economics and international relations from Claremont Mckenna College, Los Angeles.

Hartley leaves **Boeing Capital**

Aircraft finance and leasing specialist Victoria Hartley has retired from Boeing after almost nine years.

She joined in 2013 as a senior director, customer finance, for Boeing Capital, serving the manufacturer's Europe-based airline, financing and leasing customers.

Hartley had her own UK finance consultancy where clients included airlines, export credit agencies and several major banks operating in aircraft finance. She has advised UK Export Finance, Sumitomo Mitsui Banking Corporation (SMBC), Tui Group and Lloyds Banking Group on aviation financing.

Hartley spent more than 11 years working in the London offices of Bankgesellschaft Berlin Aircraft Finance as an origination director for loans to airlines and lessors.

In 2004, she joined West LB to cover origination of aircraft finance loans to the global airline market.

CA-CIB Asian head relocates to Europe

Credit Agricole Corporate and Investment Bank (CA-CIB) has named Laurent Delvart as managing director global aviation sector coverage coordinator, based in Paris.

Delvart previously headed the Asian Aviation Group in Hong Kong SAR for more than 16 years.

He started his career at BNP Paribas in 1998 as vice-president, head of aircraft finance Asia, in Tokyo and joined CA-CIB in 2003 as vice-president, head of the Asian aerospace group.

CA-CIB promoted Bertrand Rovetto to head the Asian Aviation Group in November 2022.

Rovetto has worked at Credit Agricole for nearly 15 years and most recently served as director of aviation finance.

He joined the bank as an associate in 2008, first working in the rail finance team before moving across to aviation finance.

United promotes Garcia as director of fleet asset trading

United Airlines has promoted Jim Garcia to director of fleet asset trading.

Under his new role, Garcia will lead the asset trading team in developing and executing long-term strategies for United's airframe, engines and component sales.

He previously worked, since 2013, as a fleet transactions senior manager at the airline.

Garcia has worked within the United fleet team since 2010 and prior to that was a fleets project manager at Continental Airlines, whose integration into United was concluded in 2012.

Garcia began his career at AIG as an investment analyst and holds an MBA from the University of St Thomas in Houston, Texas.

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CDB Aviation confirms Chen as new CEO

CDB Aviation's board of directors announced Jie Chen as the company's new chief executive officer (CEO) in late November, confirming *Airfinance Journal*'s exclusive story the previous month.

Chen takes the helm in early January 2023, replacing Patrick Hannigan whose retirement was confirmed by the lessor in May.

Jie Chen

The announcement is the culmination of a planned transition that will ensure a smooth leadership changeover and lay a re-energised foundation for the lessor's next phase of growth, states CDB Aviation in a statement.

"The board and I are thrilled that Mr Chen has elected to take on the important role of leading the exciting next stage of the platform's development. This is an opportune moment for CDB Aviation to drive its growth momentum with the industry recovery in full swing," says Hong Ma, chairperson of CDB Leasing, the lessor's shareholder.

"We are highly confident that Mr Chen will steer the organisation successfully into the future, and we look forward to providing the support and resources that the talented leaders and colleagues of CDB Aviation will require to continue their efforts."

Chen's immediate focus will be on advancing collaboration with the lessor's airline customers, shareholder and other stakeholders to support the industry recovery while building on the team's strong relationships and the strength of its full-service, global platform to capitalise on emergent market opportunities.

"With the industry's rapidly evolving requirements, especially in the area of sustainability, our path forward will focus on delivering innovativeness and stewardship that meet the changing needs of the global airline sector and generate industry-leading shareholder value," says Chen.

Chen joins CDB Aviation from Air Lease Corporation (ALC), where he served as executive vice-president, managing director of Asia and president of ALC Hong Kong, leading commercial and sales efforts in Asia, which included the execution of the company's long-term strategy and the development of new and existing markets in the region.

Before ALC, he worked at International Lease Finance Corporation, serving most recently as senior vice-president and managing director, leading its sales and marketing activities across the Asia-Pacific. Chen started his aviation career as a project manager in the leasing division of China International Trust & Investment Corporation.

Hannigan assumed the helm in January 2020 and succeeded Peter Chang. He was promoted to CEO from the position of president and chief commercial officer.

"It has been a great pleasure to have worked with the industry's best-in-class team in establishing CDB Aviation as a leading global lessor with an increasingly influential role in the marketplace," he says. "I am thankful for the opportunity and confidently leave the company in the capable hands of Mr Chen and the execution-driven team to lead CDB Aviation into the future."

May promoted to **American** CFO role

American Airlines has named Devon May as the company's new chief financial officer (CFO) after a long-planned succession process.

May, who was the airline's senior vice-president of finance and investor relations, assumed the role on 1 January 2023.

He replaced Derek Kerr, who will remain at the airline as vice-chair, president of American Eagle and strategic adviser. He will continue to lead American's regional and cargo teams and serve as a strategic adviser to the company.

May, who joined America West in 2002, has more than 20 years' airline industry experience across finance, operations, network planning and alliances.

In his current role, he leads the airline's financial planning and analysis, corporate development and investor relations work.

"He previously served as senior vice-president of finance and American Eagle and senior vice-president of network strategy, where he led American's regional operations as well as its network planning and alliances work," stated the carrier.

"Devon is the perfect person to lead our finance organisation going forward as we continue to focus on achieving sustained profitability and reducing debt," says Robert Isom, American's chief executive officer.

"He is a world-class executive who has built a great team around him, and he has played a critical leadership role inside American for many years. This move follows a long-planned succession process, and the entire senior leadership team is looking forward to working alongside Devon even more closely in his new role."

S&P veteran Baggaley retires

Standard & Poor's Ratings Services veteran Philip Baggaley has retired after 37 years of following US transportation, aerospace and defence credits and acting as global coordinator for transportation industry coverage.

He joined Standard & Poor's Ratings Services in July 1985 as a transportation bond analyst, took over direction of the transportation team in 1990, and had management responsibility for aerospace and defence ratings from 1993 to 2014, before becoming managing director, corporates.

Baggaley has testified as an industry expert on airlines before committees of the US House of Representatives and Senate on multiple occasions. He developed initial and updated criteria for rating enhanced equipment trust certificates and even suggested the name that became the standard industry term for those structures.

He also provided aircraft and airline evaluations for credit analysis of aircraft-backed securities by the structured finance department.

Before moving to Standard & Poor's, Baggaley was a commercial loan officer at First National Bank of Chicago between 1982 and 1985, and a lecturer in the Yale University history department. He holds a BA in history and international relations from the University of Pennsylvania, and a PhD in history from Yale University. He is a chartered financial analyst.

Menze leaves FPG Amentum for **Nord LB**

German lender Nord LB has appointed Ulf Menze as a director of aviation finance.

He joined the bank's aviation finance and investment solutions team in Hanover, Germany, in the final quarter of 2022 after eight years at FPG Amentum, most recently as senior vice-president structured finance and risk, based in Hong Kong SAR.

Before FPG Amentum, Menze was a vice-president at HSH Nordbank.

Nord LB has offices in Hanover, New York and Singapore. Its aviation products range from secured direct loans, finance and operating leases, to predelivery payment financing, as well as large portfolio and warehouse facilities.


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The lifting of strict Covid-19 restrictions in mainland China and Hong Kong SAR give rise to newfound confidence in aviation recovery, reports **Elsie Guan**.

In December, China announced a nationwide loosening of its Covid-19 policy to shift from zero-Covid to living with the virus.

This includes a 10-point guideline to relax pandemic curbs, including dropping mass testing and centralising quarantine requirements for most cases. Furthermore, the Chinese government deactivated a digital itinerary card that has tracked people's movements for three years during the pandemic, largely alleviating the population from strict travel limitations.

Following China's opening up, the Hong Kong SAR government is scrapping some of its last remaining Covid restrictions, too, including stopping requiring people to scan a QR code on their phones to enter most venues.

Experts believe these measures will prompt more people to resume international travel and reignite Hong Kong SAR's global aviation hub status.

Hong Kong SAR's structural and financing advantages will help the region's aviation sector recover from the pandemic faster than some may think, experts at PwC have told *Airfinance Journal*.

"The third runway at Hong Kong airport has just been inaugurated, tax reforms to sustain Hong Kong's attractiveness and to encourage more capital inflow have been initiated, and measured relaxation of control measures has helped curtail the effects of the pandemic," says Johnny Lau, chief consultant, aviation business services, PwC Hong Kong SAR.

Late last year, Hong Kong SAR's Transport and Logistics Bureau launched a trade consultation on proposals to enhance the aircraft leasing preferential tax regime.

The proposals put forth are categorised as: provision of tax deduction in respect of the acquisition cost of an aircraft; expansion of the scope and coverage of lease and aircraft leasing activities; deduction of interest payable on money raised to finance the acquisition of aircraft; introduction of a threshold requirement to comply with Organisation for Economic Co-operation and Development (OECD) requirements and specification of the leasing model involving the use of a bare trust.

The regime was introduced in 2017 to provide global industry players with competitive profits tax concessions in Hong Kong SAR compared with other jurisdictions.

"Through the trade consultation, we hope to listen to the opinions of the industry to formulate effective and appropriate measures to attract more aircraft lessors to settle in Hong Kong and inject more momentum into Hong Kong's role as an international aviation hub," the government said in a filing.

PwC also pointed to Hong Kong SAR's importance as a cargo hub, noting that free port status and the quality of bilateral treaties are two significant reasons for its prominence as a cargo hub.

"Being an important aviation hub for many decades, Hong Kong enjoys the benefits of a high volume of passenger, cargo and capital flows brought by airlines and financial institutions from around the world. During the Covid crisis, businesses and people have put in incredible efforts to sustain this success story," says Lau.

Several industry experts believe that investors have confidence in investing in Hong Kong SAR's aircraft leasing market.

Kaixiang Mo, co-founder and chief executive officer of Tayon Holding, parent of Tayon Aviation Investment, thinks that Chinese capital is interested in increasing investment in Hong Kong SAR's aviation financing market.

"Hong Kong is close to the China market, and it faces South-East Asia. E-commerce development will also trigger demand in the region," says Mo, who points out one challenge is to educate investors about the aviation financing sector.

Julia Chen, APAC partnerships of Avolon-e, believes that Hong Kong SAR is a potential market for the electric vertical take off and landing (eVTOL) market, although there are lots of challenges to commercialise eVTOL.

"There are lots of challenges to adjust. But we are confident in that because we have already worked very collaboratively with people in the industry, including air authorities who are not only going to certify the aircraft but to adjust air space issues," says Chen.

It may take the mainland Chinese market another 12 months to recover to pre-pandemic levels, according to PwC's Lau.

Meanwhile, Chinese aviation in 2023 will for the first time see the Made in China COMAC C919 enter revenue service with local carriers. The C919 is the closest competitor to the Airbus A320 and Boeing 737 aircraft China's engineers have been able to produce.

The first C919 aircraft will enter service with launch operator China Eastern Airlines in the first quarter of 2023.

A Shanghai-based lessor says it would consider increasing its C919 commitments now that the aircraft has its type certificate and product certificate.

Several Chinese lessors announced firm orders at the Zhuhai air show in November, including 300 C919s and 30 ARJ21s.

Bocomm Financial Leasing's Irish platform, Bocomm Aviation Ireland, signed a firm order for 50 C919s, representing the first time COMAC has placed C919 commitments with an overseas leasing platform.

CCB Financial Leasing, CMB Financial Leasing, ICBC Financial Leasing and CDB Aviation each placed a firm order for 50 C919s at the air show. SPDB Financial Leasing ordered 30 C919s, while Suyin Financial Leasing placed a firm order for 20.

Airfinance Journal understands the Chinese lessors' involvement in the C919 programme includes ICBC Leasing (100 units), Bocomm Leasing (50), CCB Leasing (50), CMB Leasing (50), Everbright Leasing (30), ABC Leasing (75), AVIC Leasing (30), SPDB Leasing (30), Suyin Leasing (20) and Huaxia Financial Leasing (20).

Cautious ramp-up

Norwegian chief financial officer, Hans-Jorgen Wibstad, talks cash management, low-cost carrier competition and fleet financing with **Hugh Davies**.

Norwegian Air Shuttle's management is keenly focused on preserving cash to ensure that the company does not find itself in the same vulnerable situation it did in 2020, the carrier's chief financial officer, Hans-Jorgen Wibstad, tells *Airfinance Journal* in an interview.

"Cash is key for an airline at any time, especially in times of uncertainty," he says.

The Covid-19 pandemic and corresponding fall in ticket revenue left Norwegian in a precarious position with liquidity only to cover a few months of operation.

Norwegian exited a six-month restructuring process in the middle of 2021 with Nkr6 billion ($610 million) in new equity, resulting in a cash balance of Nkr7 billion.

The company has subsequently grown its cash position by more than Nkr1 billion despite the ramp up in operations and challenges arising from both high fuel costs and a strong US dollar in 2022.

Norwegian's liquidity level at the end of September 2022 was Nkr8.2 billion, putting it in an advantageous position heading into the winter, adds Wibstad.

"By exiting the restructuring process in May of 2021 with a strengthened balance sheet and liquidity position, Norwegian is placed better than ever before to tackle macroeconomic headwinds," he says.

"Having a good plan for and being able to deal with large capital expenditure obligations, as well as effectively deploy aircraft, in relation to aircraft orders, is of critical importance to an airline.

"Since the restructuring, Norwegian has maintained a disciplined approach to growth, balancing growth to achieve economies of scale needed to reduce unit cost while, at the same time, focusing solely on markets and routes with historically proven profitability," he adds.

As legacy competitors starting to adjust pricing to better compete with low-cost carriers, Wibstad argues it is questionable whether this can be sustained because of their naturally higher cost base.

"We are very confident that the strength of our brand, plus our focus on reliability and strong on-time performance, will keep passenger retention high, as well as attract new customers, both among leisure travellers, but also from corporates where we have experienced strong tailwinds this year," says Wibstad.

Lease negotiations

Norwegian says it has continued to work with lessors to alleviate cost pressures brought on by the current high interest rate environment.

For the summer of 2023, Norwegian plans for a fleet increasing to 85 aircraft with 15 new Boeing 737 Max aircraft. "We would like to get up to 90-95 aircraft because that is when we can get a good scale effect," Geir Karlsen, chief executive officer, indicated during an earnings call in November.

The carrier then has lease agreements signed for an additional 11 units to deliver in 2024.

"These leases include provisions mitigating interest and inflationary risks at levels satisfactory to both Norwegian and to the lessors," adds Wibstad.

Quizzed on lessor support in the current high interest rate environment, Wibstad says seasonal usage-based terms for new-technology aircraft are becoming difficult to attain.

"However, we are exploring several alternative paths to offset parts of the seasonality the airline is facing," he adds.

Wibstad explains that the company will look to finance about one-third of its 50 737 Max 8 order through sale and leasebacks, with the remainder being owned.

"We anticipate financing the owned aircraft using a combination of structures available to us. This would likely be debt financing or finance leases to begin with; however, in time we would not rule out a return to the capital markets or use of credit-wrap products," he adds.

The carrier added two Max 8 aircraft back to the fleet in late 2021, on a lease financing agreement with CCB Financial Leasing, *Airfinance Journal* data shows.

Wibstad also notes that sustainability-linked financing will also be considered in the carrier's financing structures, given that its 737 Max 8 order will replace 737-800s coming off lease and leaving net fleet growth neutral.

"We are keeping our options open," says Wibstad.

He notes that the carrier could potentially look to switch some Max 8 orders to the Max 10, although Boeing recertification headaches in the USA have to be resolved first.

"Since the restructuring, Norwegian has maintained a disciplined approach to growth, balancing growth to achieve economies of scale needed to reduce unit cost while, at the same time, focusing solely on markets and routes with historically proven profitability."

Hans-Jorgen Wibstad, chief financial officer, Norwegian

"This is dependent on several factors, commercially how the larger aircraft would fit into our network, unit costs and, of course, the ongoing certification process."

All eyes on China

Asia-Pacific airlines are encouraged by the reopening of borders despite a slowing global economy, Subhas Menon, director-general of the Association of Asia Pacific Airlines, tells **Dominic Lalk**. China will add a further boost when it reopens for business.

Asia-Pacific airline leaders gathering at the Association of Asia Pacific Airlines' (AAPA) 66th Assembly of Presidents in Bangkok, Thailand, in November welcomed the resumption of international air travel, which has surged as the region's governments gradually removed border restrictions brought in because of the Covid-19 pandemic.

As cross-border travel was progressively restored, regional carriers have raced to put on flights to meet runaway demand, stimulated by the pent-up desire to travel and savings accumulated in the two years of isolation, the AAPA's director-general, Subhas Menon, tells *Airfinance Journal*.

"During the first nine months of 2022, Asia-Pacific airlines recorded a robust increase in the number of international passengers carried by more than five-fold to 62 million compared to the same period in 2021. Consequently, with capacity expanding by 125% over the same period, the international passenger load factor jumped by 40 percentage points to average 70%," he says.

By contrast, air cargo markets, often an indicator of the state of the global economy, saw demand as measured in international freight tonne kilometres (FTK) fall by 4.4% during the first nine months of 2022 as export orders waned and supply chain problems mounted.

The macro-economic outlook has weakened, with rising inflation rates in many countries, stubbornly high energy prices and a strengthening US dollar.

Nevertheless, prospects for the region's airlines remain promising as long as pent-up demand continues to hold up and cargo yields remain healthy despite the easing of demand, says Menon.

"The region's recovery still lags behind the rest of the world and is expected to reach only 75% of 2019 levels by year-end. Except for mainland China, the gradual reopening of borders in many economies in Asia and strong recovery in air services only serve to underscore the magnitude of pent-up travel demand," he adds.

Apart from consolidating the lessons learned from managing the pandemic, the industry is also bracing to navigate the multiple headwinds that appear ahead as a result of a moderation in the outlook for the global economy. Overall, airline margins remain under pressure, states the AAPA.

Menon believes there is a "disconnect" between the Asia-Pacific's buoyant air travel recovery and the prevailing economic gloom facing the world.

"Very interesting is the disconnect between the global macroeconomic and the picture of air travel. Every month air travel is growing in traffic numbers, compared to 2021, but the global economic picture is getting bleaker by the day. Inflation is rising, the possibility of a recession, probably a deep recession in western economies and probably a milder recession in other parts of the world, especially developing economies. Also, fuel prices are at an all-time high and so is the US dollar," says Menon.

He adds: "Yet, the airlines are facing a lot of pent-up demand, the extent of which has taken them by surprise. We were trying to understand that disconnect and the conclusion is that people have got a lot of accumulated savings from being stuck at home for more than two years. VFR [visiting friends and relatives] is driving this revenge travel. Forward bookings are looking very strong. Once China opens up as well, the demand will be very high."

China accounts for about 40% of Asia-Pacific air travel, notes Menon. "That is obviously a huge contribution and so for Asia-Pacific to recover to 2019 levels, the recovery of China is fundamental. But, of course, that also includes the recovery of the Chinese economy, which has been hit hard by the anti-virus campaigns. Many businesses have been affected; the property market has crashed. At the moment, we optimistically expect a full Asia-Pacific recovery by the beginning of 2024 to 2019 levels. India is definitely helping in this equation, as we see steady 6-7% GDP growth," Menon tells *Airfinance Journal*.

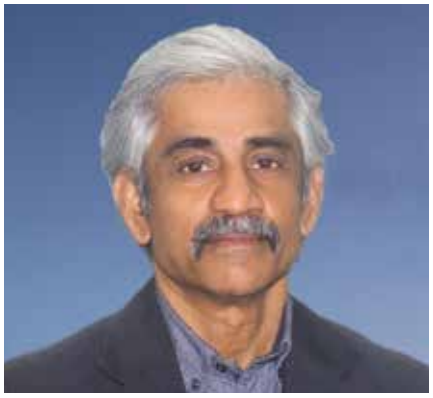
Noting that the pandemic brought regional air transport to a complete standstill for two years, Menon warns of challenges persisting in 2023.

"Airlines are struggling to ramp up their flights – there is an overall manpower constraint. This will show even more and become more obvious in the coming months," says the former Silkair chief executive officer and SIA Group veteran.

He adds: "As far as finances are concerned, some airlines are making record-breaking profits but, by and large, the industry is still trying to cope with the operating losses that have been incurred during the years of the pandemic. What is even more burdensome is the debt situation. There is an overhang of debt and the debt that has been accumulated is five or six times the losses incurred during the pandemic years. All this debt has to be paid back, so debt servicing is draining airlines.

"And then, of course, there are the high fuel prices. The picture is not pretty on the cost side for many of our airlines but at least on the demand and revenue side the airlines are heaving a huge sigh of relief."

At the same time, he says, airlines remain firmly committed to their sustainability goals, particularly in relation to the adoption of a long-term aspirational goal of net zero carbon emissions by 2050 and the commitment to the Carbon Offsetting and Reduction Scheme in Aviation as the only market-based offsetting scheme for international aviation.



> *"During the first nine months of 2022, Asia-Pacific airlines recorded a robust increase in the number of international passengers carried by more than five-fold to 62 million."*
>
> **Subhas Menon**, director-general of the Association, Asia Pacific Airlines

Interest rate hikes worry Chinese lessors

Rumours of lease factors falling below 0.5% for operating leases and lease interest falling below 2% a year for renminbi finance leases has made decision makers take note, industry experts tell **Elsie Guan**.

Unsustainable pricing is going to hit Chinese lessors severely as interest rates continue to rise, several industry experts tell *Airfinance Journal*.

Chinese lessors are increasingly concerned about financing rates and lease pricing, says Johnny Lau, chief consultant of aviation business services at PwC Hong Kong. Confidence has been hit by ongoing default cases at certain airlines and by secured aircraft financings becoming more expensive and harder to access.

Lau also warned that a lack of new deals is driving unsustainable pricing. "Rumours of lease factors falling below 0.5% for operating leases and lease interest rate falling below 2% per annum for RMB [renminbi] finance leases are ringing in the ears of decision makers," says Lau.

In November, the Federal Reserve raised its short-term borrowing rate by 0.75 percentage points to a target range of 3.75% to 4%. The Bank of England has raised UK interest rates to 3%, and the Hong Kong Monetary Authority has raised its base rate by 75 basis points to 4.25%.

In an interview with Joe O'Mara, head of aviation finance, KPMG Ireland, Robert Martin, BOC Aviation's managing director and chief executive officer, said that long-term funding will give lessors a competitive advantage in the high interest rate environment.

Martin notes widening spreads between the financing costs of lessors.

"Those lessors like ourselves who have basically funded themselves long term are in a better position because obviously that fixed-rate funding you raised during the low period of the market stays on your books for a long time," says Martin.

"The risk is much greater if you have been relying on short-term funding, which we just fundamentally would not do," he adds.

Martin says that cost control is vital for a lessor.

"When you think about the leasing industry, there are two costs which drive 80-85% of the cost: the price you pay for your aircraft and the price you pay for your funding," he adds.

"We've seen rates go up this year but obviously, we've had a very steep increase in the yield curve. I don't think all of that yield curve has been passed through. That's going to take time. But as we move to 2023, we believe that will happen," says Martin.

> *"Rumours of lease factors falling below 0.5% for operating leases and lease interest rate falling below 2% per annum for RMB finance leases are ringing in the ears of decision makers."*
>
> **Johnny Lau**, chief aviation consultant of PwC Aviation Services

It is also vital for lessors to control purchase costs and ensure escalations are capped, he adds.

Analysts from AVIC International Leasing think that interest rate hikes have significantly different impacts on different lessors.

"Top-tier lessors have enjoyed high rating, low interest rates and high leverage for a long time. In the long run, the recent interest rate hikes will not have a disruptive impact on their long-term earnings," says AVIC Leasing's analysts.

"In contrast, small- and medium-sized lessors usually get financing from the market on a single transaction basis. The loan cost rises rapidly, making it difficult for them to achieve their expected yields," add the analysts.

One source notes a weaker aircraft trading market because of the knock-on effects of US interest rate rises.

"The price of aircraft assets attached with lease agreements under the higher rates environment is lower than the pre-rates hike period," a lessor source tells *Airfinance Journal*.

The source explains that most aircraft attached with lease agreements have fixed rentals, so when interest rates rise, buyers offer a lower purchase price to compensate for the higher financing cost of the asset.

However, another lessor notes that asset prices could be falling for different reasons.

"The decrease of the aircraft asset could be caused by an aircraft valuation decline. Rising interest rates have some impacts on it, but they are not the only reason," says the source.

A third lessor also highlights the growing gap between rental income and lessors' financing costs: "Rate hikes increase lessors' borrowing costs, resulting in a mismatch between aircraft financing and rental income."

Lessors usually try to match their financing end and income end via proceeding interest rate swaps, but there are no resolutions when a mismatch happens. "Lessors can only suffer if losses are caused by the mismatch," according to the third lessor.

All lessors quizzed by *Airfinance Journal* agree that access to financing at the right rates has become the most significant competitive differentiator in the current interest rate environment.

"Lessors need to secure their liquidity in the first place," notes one lessor. The rate hikes will not affect new aircraft delivery volumes very much because these are based on market demand, says the first lessor source, noting that airlines also bear burdens as rental payments rise when rates increase.

The source adds: "Airlines which mostly rely on revenues in local currencies will suffer too due to weaker exchange rates against US dollars."

The case for the A220-500

Olivier Bonnassies looks at the questions Airbus has to answer for the launch of its new aircraft type.

Could 2025 be the year that Airbus commercially launches the Airbus A220-500 model, a fuselage stretched version of the A220-300 aircraft? The original equipment manufacturer faces several questions on its commercial strategy, resources as well as supply chain to support its claim.

In September, Airbus reiterated that the A220-500 is a viable option through which the European manufacturer could expand its offering in the 160- to 170-seat market with a stretched version of the A220-300.

"The A220-500 makes sense for us at a point in time," the manufacturer's chief executive officer, Guillaume Faury, told investors at the Airbus capital markets day 2022.

Faury said Airbus still has work to do on the A220 family and the "end game" depends on the horizon.

"We think the A220 family needs the A220-500 model to be a powerful product range. This is also what we need from airlines. The A220-300 is a good product but we think the potential of the -500 is probably stronger.

"Are we in a position to say today what it deserves and what we could expect, it is too early to say. But we have lots of expectations and are working to deliver strong returns because we think it has the potential to be in that place."

According to Airbus's chief financial officer, Dominik Asam, the manufacturer has yet to achieve break-even on the A220 programme. "Our volume is increasing compared with the 2019 levels," he says.

Airbus expects the A220 programme to break even in 2025.

It says the A220 production rate is six aircraft a month this year but it is aiming for a rate of 14 by the middle of the decade.

Christian Scherer, Airbus's chief commercial officer, recently reiterated the decision on whether to launch the A220-500 version is not "if but when".

He said: "The A220 stretch is a question of when not if. There is no definitive date set at Airbus today for the stretch. We are very much encouraged by the stretch and, in all likelihood, there should be a stretch one day."

The market feedback on the A220 family is "very positive" and the A220 acceptance is growing, he added.

Over the past year, some airlines, such as Air France and LOT Polish Airlines, have expressed an interest in the model, but Airbus will need large commitments for a launch. Could the next few months be decisive in convincing further airlines and get commitments by June, when further announcements will be made at the 2023 Paris air show?

> *"We think the A220 family needs the A220-500 model to be a powerful product range. This is also what we need from airlines. The A220-300 is a good product but we think the potential of the -500 is probably stronger."*
>
> **Guillaume Faury**, chief executive officer, Airbus

Nordic Aviation Capital has an orderbook for 20 A220s and, at the *Airfinance Journal* 2022 Dublin conference, its president, Norman Liu, said the lessor could expand its portfolio with purchase and leaseback transactions.

"If they stretch that, that will be a killer product as well," he commented.

MUFG's head of aviation research, Simon Finn, assumes that existing A220 customers will have a big say in the final definition of the A220-500.

He reckons the A220-500 could offer about 170 seats in a two-class layout or up to around 185 seats in an all-economy layout.

"What happens to range depends on whether the weight schedule has room to grow further, but it ought to offer not less than 3,000 nautical miles. The extra seats in a five-abreast layout will make for quite a long fuselage, but the revenue-generation of such an aircraft, in combination with the lower fuel-burn of the A220, ought to produce some pretty compelling operating economics. It's far from simple.

"There is the question of whether higher maximum take-off weight may require more powerful engines, or whether this may be a constraint to the payload/range of the -500 but, even trading the range of the -300 directly for the payload of the larger -500, ought to stimulate market interest," he tells *Airfinance Journal* in an interview.

"Now that we have a feel for what the technical capability might be, it's possible to imagine that Airbus certainly could produce an A220-500. The next question is much more difficult, as the company has to decide whether it should produce the new aircraft. The slightly uncomfortable truth about the A220-500 is that it comes out at similar seating capacity to that of the A320neo.

"The A320 is rightly viewed as one of the most successful commercial airliners of all time. Sales of the A320 family may be trending toward the larger A321neo but, at the time of writing, Airbus still has almost 2,400 A320neos on firm order backlog. It will be very wary of undermining the appeal of the A320neo with the A220-500 and just as mindful that if all the demand for a family becomes concentrated on just one model, then it isn't really a family anymore," says Finn.

He echoes Scherer's view, saying it is unrealistic to think that airlines with large A320neo-family fleets would suddenly cancel orders for the A320neo, just because the A220-500 has come to the market. "Such airlines are already massively invested in the A320neo family and are, to some extent, dependent on the

commonality benefits that this investment delivers," adds Finn.

Faury believes the A220 family will take a significant share of the marketplace and, consequently, Airbus will depend less on the A320 family.

"This will be more balanced," he says, adding that the A321 will be the focus of the A320 family.

Current figures show that the A321 model represents 60% of Airbus's combined A220 and A320 orderbook.

"From a product perspective, the A220 family has an important role to play and, from a profitability perspective, it has the potential to be a strong contributor.

"We are working on different scenarios but the second half of the decade is a good target for significant returns."

At the end of November, Airbus had delivered 56 out of 96 A220-100s on order. The European manufacturer's A220-300 programme stood at 182 deliveries out of a 698-unit orderbook.

There is the question of whether offering the A220-500 might hurt sales of the current A220-300, points out Finn.

"If airlines with the A220-300 are focused on greater revenues and lower seat-mile costs (highly likely), then offering the A220-500 could choke demand for the existing best-selling model of the family. Possibly, this is part of the messaging from Airbus that they will indeed build an A220-500 but, the question of when, has been left somewhat open, to allow the market to exhaust its appetite for the A220-300 before bringing out the A220-500 as a tasty dessert course," he says.

Finn adds that this Airbus approach dovetails nicely with the requirement to let the programme mature and reach a break-even, before deciding to invest further in another major A220 version.

"It also gives a bit more time to work away at the A320neo deliveries, as well as to consider how to position the A220-500 within the wider context of Airbus's overall single-aisle product offering," he says.

Finn asks if it makes sense to implement further adjustments either to the A320neo or to the A220-500, to reduce the "overlap" between the two aircraft types?

"Potentially, adding some frames to the A320neo could produce a new single-aisle aircraft 'sweet-spot' focused on 200 seats and leaving room for the A220-500 to form the upper end of the offering for the A220 family. This has a certain appeal from the perspective of an aircraft manufacturer, but might possibly have pretty severe consequences for the residual values of any incumbent aircraft type that finds itself 'orphaned' by the new product line-up," he says.

There are one or two other factors that lend weight to the idea that the A220-500 concept is a sound one, according to Finn. The volume of single-aisle production is going to grow strongly as the supply chains recover from their post-Covid-19 difficulties. However, the backlogs at the moment are not equally distributed between Airbus and Boeing.

"This may well change as full-throated competition returns but, for now, Airbus has the greater challenge to meet demand for its single-aisle products. If it could divert some of that demand into its 'second' family, it might free some capacity for additional production of the larger, more profitable (for Airbus) A321neo. It may be easier to serve the single-aisle market segments more effectively with two families rather than with just one," he opines.

Looking ahead, there is the question of where Airbus's engineering resources are to be directed.

Finn says Airbus completed its A350 design and offering quite some time ago, while the re-engining of the A320 and A330 families is also complete.

"Engineering needs a new project to get stuck into, to keep the skillset alive and to maintain that most important attribute for any aircraft manufacturer – to design, build, certify and sell new aircraft types," he comments.

"The concept of an A220-500 is quite an attractive prospect then – both for Airbus and for many of its customers. For that very reason (and also because Airbus's Scherer, has said as much), the Airbus A220-500 is very, very likely a question of when, not a question of if, and all the current indications point to further announcements in or around 2025," he concludes.

Asked whether the original equipment manufacturer will launch the unit and with CFM engines, Aercap's Bashir Hajjar. senior vice-president, head of America's leasing, says Airbus would first have to decide if the A220-500 "encroaches" on the A320 family.

"Obviously, and that's the biggest issue, and that's why they haven't launched that airplane. I think, at some point, they probably will, but I don't know if CFM would want to invest the money to be part of that platform," he commented at *Airfinance Journal*'s LATAM conference in Mexico City.

ELFC's Julian Jordan, executive vice-president and head of new business, agrees the aircraft will be launched. "I just don't think it will happen soon," he adds. "They'll launch it in the 2024 to 2025 timeframe."

He believes Airbus will stick with Pratt & Whitney for its powerplants. "Ultimately, the GTF dominates the A220 and it's very easy to adapt the GTF because it works with the pylons. It seems to me that Airbus would go with a single choice of GTF."

Speaking on a separate panel, Aviation Capital Group's senior vice-president head of airline marketing, Jorge Castillo, questions whether it made sense to launch the A220-500.

"The main problem I feel in the end is, because of the Bombardier origins, it is not an Airbus product. It is a different fleet. Do you sell A320 operators into changing your fleet for the A220-500?" he asks. "I understand that Airbus believes that this aircraft could grow into something that could replace the A320 and is out there trying to feel the market for this."

From a lessor's perspective, he prefers a single engine type. "The more engine options, window options and galley options there are, the worse it is" for the value of the aircraft, he says.

Jackson Square Aviation's senior vice-president of marketing LATAM, Alfredo Sarria, says product support from the manufacturer could influence the outcome.

He adds: "If you put CFM and P&W on the balance, they have not performed the same. One is better than the other from a customer's point of view, and that is a decisive factor going forward."

CS500 legacy

Bombardier was rumoured to be considering a stretch of the CS300 (now A220-300) fuselage six years ago. And at the 19th Annual Global Airfinance conference in Dublin in January 2017, a panel of appraisers were divided on the CS500.

Speaking on that panel, Stuart Rubin, principal, ICF International, said: "I certainly would say that Bombardier are looking closely at making a CS500. They see the family concept as a key success factor and we've seen that in the market, having a family is the key to success. I would not be surprised if they tried to stretch the aircraft in the next three to four years."

Lindsay Webster, director, asset valuations, at Morton Beyer & Agnew, added: "Bombardier is pretty adamant that there's not going to be. But I think that if they want to be in the industry for long, that's the next option they've got to go to."

However, Rikard de Jounge, vice-president, asset valuation at Avitas, disagreed with Webster and Rubin. "It would be tempting to stretch, but they have enough to do in the sub-150 market. In the bigger market, Airbus and Boeing would likely stomp you out."

Olga Razzhivina, director at Oriel, agreed, saying that Bombardier needs "a family concept" to be successful but going straight in a new class against Boeing and Airbus "will be difficult".

She added: "Looking at the history of Bombardier, we know there has been a bid from China to have ownership in the company. The Canadian government may look at that again. The influx of money from that side of the Pacific means that Bombardier may not have to look over their shoulder in financial terms when looking to funding a new programme."

Bucking the **trend**

Air Astana Group will post record results this year and is considering the addition of further Boeing 787-9s as it grows in all markets, its chief executive officer, Peter Foster, tells **Dominic Lalk**.

Modern-technology aircraft leases are driving profitability. Kazakh flag carrier Air Astana Group is poised to post record profits when most of the world is looking at recession.

"We stopped flying to Russia and over Russia in March. We far more than made up for that lost capacity to Russia and Ukraine by increased flights to pretty much everywhere. We increased capacity to Europe, we increased capacity to Turkey – a lot of extra capacity into Turkey. We resumed daily flights to India, we've increased our flights to Korea, to Bangkok, we've done a lot of flying around the region, to places like Georgia and the Caucasus," the carrier's chief executive officer, Peter Foster, tells *Airfinance Journal*.

"We completely and quite quickly absorbed that capacity onto other routes, all of which are performing very well. We do not have a single route this year that's not performed at a high level. We are very encouraged by that. The summer was very good for us, September was extremely strong, October was much stronger than we'd normally expect and even November was good. It's just been a good long solid run, a very powerful year for us indeed," says Foster.

Doubling profit

Foster says 2022 "is going to be our best-ever year really by virtually most if not all metrics". He forecasts that the group will carry more than seven million passengers and "produce probably over $1 billion of revenue for the first time ever in our history".

Air Astana's earnings before interest, taxes, depreciation, amortisation and restructuring or rent costs performance is "going to be very strong, up to $276 million". Net profit in 2021 was about $36 million and Foster says that the group will "double that this year".

The carrier is less affected by fuel price hikes than some of its peers. "The local fuel price is very stable. As far as non-local uplift is concerned, we were very lucky. We hedged all of our non-local fuel, which is about 40% of total uplift, at the beginning of 2021 for the whole of 2022 so when there was that huge spike after the war in Ukraine broke out we were protected from that.

Peter Foster

"The last three weeks or so the prices have come down to about 75 [dollars a barrel] right now. We are partially hedged for the first half of next year and we think those price reductions will hold, so we've only hedged for about half the year for now. We've done this under budget," says Foster.

Living in close proximity to Russia means Air Astana is heavily impacted by the war against Ukraine.

"We've had a steady flow of Russian people coming down to Kazakhstan since February, March but that flow became a flood in September when Russian declared that mobilisation. We had a huge number of people coming in. Many have since moved on, but many are rebuilding their lives and their businesses here," he says.

"At the moment, over 70% of our business is generated in Kazakhstan, which is probably a bit too high. In 2018, it was about 50% Kazakhstan, 50% the rest. We're keen to see our foreign markets grow their revenue contributions again as pandemic restrictions are easing in all parts of the world," adds Foster.

He reiterates the success of the Fly Arystan low-cost subsidiary, noting that when Air Astana launched the airline in 2018 its domestic market share had slipped to about 42% but, since then, "we've come roaring back and this year we'll have give or take 75% domestic market share".

Fly Arystan was set to take delivery of its latest Airbus A320neo in late December, after receiving another just before that. They are all configured with 188 seats, says Foster, noting that a low-cost airline needs that volume.

Earlier in 2022, Foster disclosed exclusively to *Airfinance Journal* that Air Astana had awarded A320neo operating lease mandates to California-based Aviation Capital Group (ACG) and Chinese bank-backed CDB Aviation – both new lessors to the group – covering seven deliveries in 2022-23.

The group fleet is set to grow to 59 aircraft through 2025 but there will be no more regional aircraft. "They did a good job for us for many years but now that we have a low-cost airline, they don't really work for us anymore. You need to have as many seats as you can," says Foster.

Deal with ALC and Boeing

In November, Air Astana and Air Lease (ALC) announced a lease deal covering three widebody Boeing 787-9 aircraft from 2025. When the deal was announced it was stated that the 787s would come from ALC's orderbook with Boeing. Air Astana's direct order with the US manufacturer for three 787-8s was not mentioned at the time.

"The 787-9s will come in starting 2025. We did a tripartite agreement with Boeing, ALC and ourselves whereby Boeing effectively agreed to cancel the -8 order on the point that every one of the -9s gets delivered. So, the first -9 comes, the first -8 drops away and so on," says Foster.

He notes, however, that three 787-9s may not be enough.

"Our markets are growing pretty strongly, so we probably expect to add to these aircraft in due course, probably next year," he says.

He adds: "The -9s could well mark our foray into North American flying, but you see the problem with that is that the 787s could only do it with no problem whatsoever as long as we're flying over Russia. At this moment in time we're not flying over Russia, and who knows where we're all going to be in 2025.

"As it stands," adds Foster, "we would have to stop on the Caspian to reach North America, even with the -9s. You see, our London flights that are operated with the A321neo LRs are also stopping on the Caspian these days. This is just the times we're living in."

Aircastle returns to **secured market**

Aircastle's chief financial officer, Roy Chandran, talks to **Olivier Bonnassies** about the return to secured financing and the new pricing environment.

US operating lessor Aircastle issued new secured debt on 30 November for general corporate purposes, including aircraft acquisition.

The new seven-year $450 million secured aircraft financing facility was the first time the leasing company tapped the secured market in more than six years.

BNP Paribas, Credit Agricole Corporate & Investment Bank (CA-CIB) and MUFG Bank acted as joint lead arrangers and co-syndication agents. BNP Paribas acted as the structuring agent and global coordinator for the facility.

The last time it raised secured funding in June 2016, Aircastle entered into a $400.5 million term facility initially secured by 17 aircraft.

The facility has a maturity of seven years and includes an accordion feature allowing for $67.5 million in additional future funding. According to *Airfinance Journal*'s Deal Tracker, the 2016 facility was increased to $435 million and was secured by 17 narrowbody and one widebody aircraft: 12 Airbus A320s, one A321, three Boeing 737-800s, one 737-700 and a 777-200ER aircraft.

The facility's funding had several drawdowns, with the first one, totalling $167.3 million, completed in June 2016. On that transaction, the financing was led by BNP Paribas, CA-CIB and The Bank of Tokyo-Mitsubishi UFJ, London Branch, as joint lead arrangers and SGBT Asset Based Funding as arranger, and ING Bank and Columbia State Bank as lenders. BNP Paribas also acted as agent and security trustee.

Secured versus unsecured

The Aircastle chief financial officer, Roy Chandran, says the lessor migrated to a predominantly unsecured market from mainly secured over the years.

"For us, secured versus unsecured is somewhat 'agnostic'. We realise that primary sources of financing are on an unsecured basis. Still, the key for us is maintaining some access to the secured market," he tells *Airfinance Journal* in an exclusive interview.

"The rating agencies do want you to have a predominant amount of your debt stack in the unsecured market. There is an actual limitation of secured funding we will do because we don't want to compromise the investment-grade rating," he adds.

He reveals that Aircastle has privately done transactions in the secured market between the two portfolio funding deals, including some in the joint venture with IBJ leasing.

"The year 2016 was the last large transaction involving portfolio financing, but since Aircastle has done smaller pools of aircraft and not with large syndications to maintain access to the secured market. The banking market is very relationship driven. Aircastle's core banking pool includes 10 banks, and we have roughly $600 million of bank financings," explains Chandran.

He adds: "We try to limit syndications because our deals, as opposed to lots of our peers, are recourse. Some entities opt for non-recourse to get off the balance sheet treatment. Our view is we already have $3.9 billion-worth of unsecured debt, which is all recourse. Adding anything else on a secured basis recourse will not move the needle."

Chandran says the lessor benefits from more flexibility on asset sales and releasing assets with no consent required. "From our perspective, recourse financing gives us those operational flexibilities, which you traditionally don't get in a pure non-recourse transaction.

"Our transactions are not ringfenced in specialist SPVs [special purpose vehicles] because they are recourse to the business."

He says being investment-grade is an attraction to all of its lenders. "Aircraft leasing still is a small portion of the investment-grade market, and as the broader market widens, aircraft leasing-related debt widens."

On the November issuance, Aircastle tracked the secured and unsecured markets.

"We thought we could pull an unsecured deal in seven to 10 days, but we talked to a couple of relationship banks to go secured with an asset pool with the view to preserve all the flexibilities we had in our existing deals, and it has to be underwritten.

"It [unsecured market] was way too wide for us. Since we have smaller issuance volumes than some investment-grade competitors, our financing requirements are between $800 million and $1 billion a year."

Chandran explains that from a company's perspective, it is all "about execution risk and addressing the delta between both markets".

He adds: "For us, it must be somewhere in the range of 100-150 basis points difference between both markets. There is no science to it, but we won't do a secured transaction otherwise."

Chandran believes more secured transactions are in the pipeline with other parties.

"When we started conversations with the banks, there were three or four transactions behind us," he says.

Lenders are more comfortable with a secured transaction as the lessor gradually moves to a new-technology aircraft portfolio.

"We got a very good reception with the transaction because we don't raise funding on a secured basis very often, and the banks also want to see some exposure from the lessors," he says.

Today, the secured market represents "no more than 20%" of Aircastle's total $2 billion funding. As of its last quarterly filing, the lessor's unsecured portion of the debt was at 86%.

"We will stay inside the 15% level if we can but definitely no more than 20%. The rating agencies are not too concerned because we have always adhered to the rating agency guidelines," he says.

Chandran is comfortable with the current core banking group.

"When we started conversations with the bank, there were three or four transactions behind us."

Roy Chandran, chief financial officer, Aircastle

"From an operational point of view, I don't want to be dealing with too many counterparties because, as we all have been in this industry, there will be some instances where I will have to go back to the banks and ask for something. It can be tough to deal with a huge and fragmented banking group. This is why we are very explicit about how much banks can syndicate and ensure the core banks have the whole minimum amount of a transaction," he says.

The seven-year secured transaction also pushes out weighted average maturity.

"For us, longer is always better. We always look at the curve for five-, seven- to 10-year maturity and the preference is to push further. Frankly, the sweet spot for the banking market is seven years. You can go for longer maturity, but the price does not make sense."

But Chandran does not expect the lessor to return to secured debt every year.

In April 2023, Aircastle has two unsecured transactions reaching maturity: a 5% $500 million notes deal and a 4.4% $650 million transaction.

He says some cash will be available from refinancings due in April. "We are well positioned for that, but we will return to the market at some point."

Chandran says the industry has to be realistic about pricing.

"At some point, there will be a new normal. ALC has just done unsecured funding at a yield of around 6%. We must be realistic about financings and cannot survive just utilising the secured market."

He adds: "If we look at investment-grade, it is a function of where the market is. I don't believe there will be getting back to 2% money."

The lessor recently acquired a pair of 737 Max 8s from another lessor with leases attached to Canadian carrier Westjet.

"We are funding those aircraft with cash, but we can use our revolver facilities for acquisitions. The $450 million with cash on hand will primarily cover our acquisitions," he says.

Aircastle does not have an orderbook, apart from some Embraer E2s.

"Generally, our acquisitions range from $800 million to $1 billion a year. And that number depends on the capacity to finance the acquisition, finding the right deals," says Chandran.

Ratings

Fitch Ratings affirmed the long-term issuer default rating (IDR) and senior unsecured debt rating of Aircastle at BBB in the summer.

In its note, the rating agency said Aircastle's unsecured debt accounted for about 85% of total debt at the fiscal year-end 2022. Aircastle held $200 million of unrestricted cash at the fiscal year-end 2022 and had $1.4 billion of undrawn credit facilities, including a $50 million unsecured revolving credit facility with Mizuho Bank.

"Aircastle has the strongest liquidity coverage ratio among peers with available funds over expected obligations over 12 months at 3.5x at FYE 2022," it commented.

The rating agency says the senior secured debt ratings are one notch above Aircastle's long-term IDR, at BBB+, reflecting the modest amount of secured debt with aircraft collateral and good recovery prospects in a stress scenario.

Aircastle had total liquidity of $2.1 billion on 1 October. It included $1.4 billion of undrawn revolving credit, unrestricted cash of $300 million and projected 12-month adjusted operating cash flows of $400 million.

The lessor took steps to boost its funding position during the second quarter, including a $100 million commitment from BMO Harris Bank. This agreement increased its unsecured revolving credit facilities to $1 billion.

Aircastle's net debt-to-equity leverage is 2.8x, consistent with its fiscal year-end.

Debt totalled $4.6 billion, of which 86% was unsecured on 30 September. The weighted average rate on the debt was 4.16%, a slight increase from the last quarter, reflecting the high-interest rate environment.

Aircastle ended the quarter with 243 aircraft and other flight equipment. It also managed nine aircraft with a net book value of $292 million on behalf of its joint venture with Mizuho Leasing.

Financing the **recovery**

High Ridge Aviation aims to become a $10 billion leasing and lending platform tailored for a new era of aviation financing.

Among the many nasty side effects of the Covid-19 pandemic, airline debt may be the least talked about.

Yet, it weighs heavily on balance sheets and could be cataclysmic.

Total balance sheet debt, including operating leases per IFRS 16 and ASC 842, jumped to $665 billion as of mid-last year from $478 billion in the 2019/2020 timeframe, according to *Airfinance Journal*'s The Airline Analyst in its review of 186 airlines whose most recent last-12-month (LTM) financials range from 31 March 2021 to 30 June 2022.

Moreover, the debt-to-equity ratio was 5.0x, compared with the pre-Covid level of 2.0x.

Fixed charge cover, which best illustrates the affordability of the increased debt service, was only 0.3x compared with the pre-Covid figure of 2.3x.

Unfortunately, there is no magic wand to wave to return to pre-pandemic days and defuse debt burdens as the industry butts up against a climate crisis and a worsening economic outlook.

The head of the International Monetary Fund, Kristalina Georgieva, said on 1 January that "one-third of the world economy" will be hit by recession this year, and the world faces a "tougher" year in 2023 than the previous 12 months.

But, as the sector hurtles toward what could become the next financial shock to hit balance sheets, some relief might be found in an experienced management team backed by a $2 trillion investor and a Rolodex of aviation elite.

Start-up lessor High Ridge Aviation may be only weeks into business, but its ambitions to become a $10 billion business appear eminently feasible given its management pedigree and financial backing.

Safe at home

Greg Conlon, the industry veteran and former GECAS chief executive officer (CEO), launched High Ridge to rekindle the industrious spirit of 12 ex-GECAS and PK Airfinance colleagues with help from the financing bellows of US investment firm PIMCO.

The asset management platform also incorporates a lending arm, LR Airfinance, restoring the GECAS and PK Airfinance business duo of originating and managing loans for airlines, lessors and manufacturers.

While High Ridge is built with a nod to the past, its focus is set on a post-pandemic aviation sector needing to deleverage from the billions of dollars of debt amassed during the pandemic while engaging in a delicate balancing act of achieving net zero agendas and maintaining growth targets.

The sector's challenges are not insuperable, but addressing them – while lessening debt levels – will take years.

"It's a very long path out, and we haven't even started that yet," says Conlon, who spent 20 years with GECAS and two years at its helm.

"It's a very long path out, and we haven't even started that yet."

Greg Conlon, High Ridge Aviation

"Covid-19 meant over a quarter of a trillion dollars in debt came into the airlines, and that's not including the lessors that financed receivables, so another couple billion-plus from there, and that was just to get to the other side of the pandemic.

"Now compare that with just under $30 billion, and $50 billion free cash in the best year since the Wright brothers. It will take five years, at least, of the best year to delever back to where we were."

But the simple answer is that it could be longer because financing is quickly becoming more expensive. Air Lease, which has historically accessed some of the cheapest cost of funds available, came to market in December with a 5.9% financing, highlighting the new funding environment for operating lessors. It issued $700 million of medium-term notes due 15 December 2027 with a 5.85% coupon at 98.96.

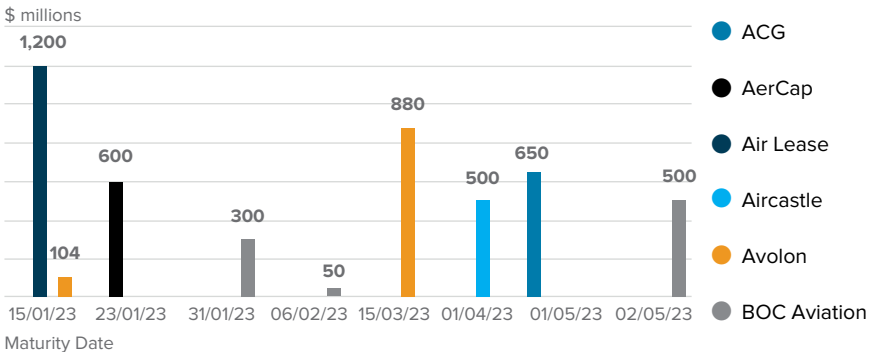
Days later, Marathon Asset Management revealed an inaugural offering of secured notes collateralised by 15 narrowbody aircraft. The $303.7 million offering priced at 6.995% with a 61.1% loan-to-value ratio.

While such levels are hardly a surprise and reflect other transactions – Spirit Aero Systems issued a $900 million private offering at 9.375% in November – they are in stark contrast to those achieved in 2021.

ALC issued its lowest coupon "ever and by far" attached to a $750 million unsecured note offering in January 2021, the lessor told *Airfinance Journal* at the time. The three-year deal priced at 0.70%.

A week earlier, Avolon issued a $1.5 billion unsecured bond. The $750 million five-year tranche priced at 2.125% with a 2.377% yield. The $750 million seven-year tranche priced at 2.75%. The yield was 2.946%.

Investment grade lessors - bond maturities - H1 2023



Source: *Airfinance Journal*'s The Lessor Analyst.

Long Covid

The most recent update from *Airfinance Journal*'s The Lessor Analyst shows investment-grade lessors have $87 billion of unsecured bonds outstanding, of which $13 billion is scheduled for repayment in 2023. Non-investment-grade lessors will need to roll over a further $2 billion.

These refinancings will occur during a time of tighter capacity and with the US benchmark interest rate the highest it has been in 15 years. Also, markets expect the Federal Reserve to continue to raise rates in 2023, with the first hike set for February.

Airfinance Journal's data indicates the average coupon per issuer of this maturing debt for investment grade lessors is between 2.50% and 5.00%. The overall average is 3.9%.

If the entire amount is refinanced at the same cost as ALC's recent $700 million five-year bond, the additional interest cost per annum will be approximately $260 million. However, given the range of credit quality among the lessors, this cost would likely be higher.

This is important to note as most aircraft with lease agreements have fixed rentals, so lessors' profitability and cash flow generation could be severely squeezed. Furthermore, long average lease terms are normally considered a positive but, in this context, are a negative as it delays the ability to increase rentals.

Conlon anticipates these bond maturities will result in higher spreads but from few sources. As such, opportunities are ripe for the LR Airfinance business.

"There is a need for someone to step into that gap where the structured finance markets and ABS [asset-backed securitisation] deals have backed away. Also, we've seen commercial banks back away from the space given the reserve requirements they have to hold, and this compresses the returns they have," says Conlon.

On the trading side, activity has stepped up, he notes. "We're seeing many portfolios come to market," he says. "And less now for a regular rebalancing of the portfolio. There was a component of harvesting for gains, some exposure resetting and then recycling the capital for capital expenditure.

I think those priorities have flipped. It's primarily a recycling of capital and less about exposure management and gain on sale. That's just great if you can get it."

High Ridge has no exposure issues as a start-up, allowing it to look "aggressively" at the "many opportunities" coming down the pipeline.

Sources tell *Airfinance Journal* that the dearth of funding sources – stemming from dislocations in the ABS to fewer and more selective bank financings, some because of tighter ESG requirements – has not been seen since the financial crisis of 2007-08.

Given this retreat, will the lending side be the dominant business?

"I don't think we have a predisposed recipe. We can do both. It's more about where the opportunities are," says Conlon. "But I agree that debt opportunities are larger now than they used to be, although we surprisingly see a fair amount of lease opportunities."

High Ridge's LR Airfinance business enters the market as established entities, such as Castlelake, which recently partnered with insurance-backed platform ITASCA, step up their lending efforts.

"It is certainly a space where we see attention coming in. We like our positioning and can go from investment grade to high yield. I think that's a differentiator," says Conlon. "We're not trying to take yield capital and find investment-grade deals and then wedge it in there. The LR platform is a good mix of airline and investor clients."

Following Russia's invasion of Ukraine, certain lessors and banks, particularly those involved in ABS deals, noted a hesitation to take on additional Chinese exposure because of a similar situation potentially occurring in Taiwan.

Even though China ended its stringent zero-Covid policy, the current rapid spread of Covid-19 in the country means it faces economic headwinds.

The IMF indicates that China's annual growth will likely be at or below global growth for the first time in 40 years.

Still, High Ridge is open to business in the region.

"People are a little gun-shy after Russia. Most didn't see that coming, so people are now underwriting downside scenarios they probably wouldn't have underwritten before. And then there is some decoupling with the West that's certainly driving some attention," he says. "There may be limited interest in the near term, but I'm an optimist. We're thoughtful about the region, not necessarily cautious, and we're looking at some opportunities now."

He would not be drawn on details but says "bespoke opportunities" are under review as opposed to large portfolios.

Take the loan

Lessors financed more than 60% of all new aircraft deliveries since the beginning of 2020, based on *Airfinance Journal*'s data, and Conlon expects lessors to continue taking on a more significant financing role. He says this is "evolving" how aviation exposure is managed.

"It's increasingly complex for a single balance sheet to own multiple billions of dollars of aviation exposure efficiently. It's possible, and we've seen it in the past, but it is pretty unique," he says.

"It works best if you are a big industrial that generates a lot of cash, like GE, or an insurance company that generates a lot of investable cash, like AIG," adds Conlon.

> *"I think there are quite a few orderbooks out there if you want one. We have already looked at opportunities."*
>
> **Greg Conlon**, High Ridge Aviation

A managed money model makes better sense. "It is efficient for an experienced team to focus on originating and managing assets and team with someone who is very efficient at raising capital. That's the natural progression of our space, and the market has been heading in this direction for some time," he says.

Understanding this shift in management direction made PIMCO the right business partner, adds Conlon.

"The difference between High Ridge and the others is that we are the platform owners. This is the first time PIMCO has invested in a platform. They have deals with GECAS, Gilead and Navigator, but this is truly a platform, and we can do multiple product strategies on both the lease and the debt sides."

No doubt, scale has always been important for lessors, especially for raising capital efficiently. It has arguably become more so following the sale of the world's largest leasing company to Aercap.

However, certain lessor leaders disagree.

In an interview with *Airfinance Journal* following Aercap's takeover of GECAS, Firoz Tarapore, the DAE CEO, clarified that, while he thought the largest aviation merger was a "fantastic deal" for both parties, diseconomies of scale remained a worry.

"There are some legitimate questions about whether our business has real diseconomies of scale. Only time will tell if 2,000-plus aircraft is too big to create the right economic returns for the capital they deploy or the risk they take by deploying capital," he said.

Meanwhile, SMBC Aviation Capital's CEO, Peter Barrett, said scale is essential "to get to investment-grade ratings" and the right cost of capital. "But do you need to be $50 billion or $30 billion? I think that brings some challenges before it brings some opportunity," he added.

According to Conlon, High Ridge will aim for the double-digit mark.

"Eventually, we need to be close to $10 [billion] to have some scale on a long-term basis, and I'm talking between debt and leases. That feels like the right neighbourhood," he says. "But we don't have to be there in 18 months. We have time."

However, High Ridge could end up bigger. "I think it is fine to do so, but it is not necessary to reach $35 [billion] to be relevant," he says.

"And any company that is that size, it was a long road to get there."

But High Ridge will not achieve scale through speculative orders.

"To make that work [speculative purchase], you need three things: a price that you're comfortable with to compensate for committing the capital on the forward risk; some view of scarcity and asset availability; and, finally, you need to have the product people want with the ability to adjust.

"Looking at that model now, our view is that we don't see those three things lining up right now to justify the deployment of capital. We can certainly do a new orderbook, but I don't see it as an investable thesis in today's market," says Conlon.

Airfinance Journal is aware of three lessors which are in discussion with manufacturers about their orderbooks. The portfolios all include Airbus A320neos, with one belonging to ALAFCO after selling 73 assets to Macquarie Airfinance.

Would High Ridge assume any of those positions?

"I think there are quite a few orderbooks out there if you want one. We have already looked at opportunities. The team has bought tens of billions of dollars of aircraft, so we know orderbooks very well. And we know how to underwrite that model and how to price it. We would certainly not shy away from an opportunity to look at orderbooks or portfolios of scale," he says.

However, there are drawbacks. "Orderbooks are challenging in a yield market. You know the PDPs [predelivery payments] are a drag on a yield business when you're just looking for an IRR [internal rate of return]. Also, you have to consider whether there is scarcity out there," he says.

"It takes a fair amount of underwriting on an orderbook to know precisely what you're buying. But we are just in our sixth week and haven't seen the right one yet. We will continue to review opportunistic trades with OEM [original equipment manufacturer] partners. I think the opportunities will come in the next six, 12 to 18 months, so we're excited about the prospects," adds Conlon.

Narrowbody assets are the "most logical" purchase for High Ridge.

"It is the largest part of the market, and it's got return requirements that we understand, but we will look at widebodies.

Transition costs are a considerable challenge associated with widebody aircraft. "It can be punitive, so you need to understand that you are working with good investable assets and have your eyes wide open. But our team has done all kinds of stuff. We've done freighters, we've done midlife."

High Ridge and Voyager Aviation Holdings (VAH), a privately owned aircraft investment firm with about $2 billion in assets, share backing from PIMCO.

VAH has been in the market recently with various aircraft portfolios. Are synergies or an outright sale likely because of the shared financial backing?

"It's certainly something we would look at, just like any other opportunity. PIMCO is one of the world's largest money managers, and they're into a little bit of everything," he says.

"We are not in discussions over the Aercap shares," he says.

> *"Eventually, we need to be close to $10 [billion] to have some scale on a long-term basis, and I'm talking between debt and leases. That feels like the right neighbourhood, but we don't have to be there in 18 months. We have time."*
>
> **Greg Conlon**, High Ridge

However, Conlon denies any interest in General Electric's equity stake in Aercap as a lock-up period ends.

"We are not in discussions over the Aercap shares," he says. GE's shares are subject to a lock-up period, which expires in stages from nine to 15 months following the sale of GECAS, which closed on 1 November 2021.

As part of the sale, GE received 111.5 million newly issued Aercap shares, about $23 billion of cash and $1 billion of Aercap senior notes.

Climate action

High Ridge has entered the market as the aviation sector is inexorably moving into another financial headwind as the convenient marriage of cheap finance and energy ends.

Global airlines have committed to reaching net zero carbon emissions by 2050. Yet there is no decisive action plan, perhaps because there has yet to be a technological fix.

Furthermore, transparency is lacking, with only 15% of the world's airlines reporting carbon emissions, according to aviation climate group, Impact. To achieve net zero, the International Air Transport Association estimates that $2 trillion is needed to support an industry-wide resolution. Not only will the sector have to invest billions of dollars in sustainable aviation fuel (SAF), air traffic control and infrastructure, but also manufacturers will have to develop newer, more efficient aircraft and engines.

But airlines first need to recover from the debt swell caused by Covid-19 and a costlier operating cost environment.

This tightrope act of building a more sustainable aviation market while emerging from the worst crisis in history is not lost on Conlon.

"There is no doubt that there is a lot of pressure to improve balance sheets," he says. "But, at the same time, you must grow and take more aircraft to heal. The market environment for the next three, four, or even five years will be very interesting. Interest rates will remain elevated."

The consequences of failing to deliver innovative financing solutions to an industry still reeling from the shocks of the pandemic but also tasked with climate action could be profound.

Increasingly, insurers and banks are sharpening their scrutiny of carbon-intensive portfolios with frameworks and structures to support the transition to net zero and re-price such risk. In other words, businesses must manage climate change or expect higher costs.

JP Morgan added the aviation sector to a list of carbon-intensive businesses that it seeks to help decarbonise by 2050, according to a 2022 climate report issued on 20 December.

The Wall Street bank plans to reduce the carbon intensity of its aviation financing portfolio by 36% by 2030 from a 2021 baseline, it stated.

However, Conlon stops short of supporting the idea that financiers or lessors should take on a different role in the path toward decarbonisation, such as being directly involved in SAF production.

"It is an interesting question, and we have had a lot of discussions about who is best to bring that to market. I think there is a strong argument for the petroleum industry, which has gazillions of dollars to invest in refinery techniques, and others will logically take the lead on that.

"It would be challenging for a leasing company to try to take the lead on developing SAF. I could be wrong. At High Ridge, our aspirations are matching the right capital with the return space," adds Conlon.

When will that happen? "We are pleased with our response and are involved in various discussions," he says. "I hope we have something for the *Airfinance Journal* Dublin event in January."

BayernLB grows profile

Olivier Bonnassies meets BayernLB's Oliver Geldner to discuss the bank's plans.

Germany's Bayerische Landesbank (BayernLB) is looking to grow its exposure to the commercial aircraft market this year.

The bank first entered the insurance market for commercial loans last year through a secondary Aircraft Financing Insurance Consortium (AFIC) transaction.

Now it is looking to take on a larger role, Oliver Geldner, sector head of aviation and space, tells *Airfinance Journal* in an exclusive interview.

"We are not targeting more secondary deals but primary business," he explains. "Our AFIC secondary trading deal enabled us to fully understand the product and proved that we can book transactions."

On Balthazar, BayernLB is an approved primary bank. "We went through that process in the summer of 2022 and we are assessing some deals," he adds.

BayernLB invested in the aviation insurance-guaranteed business in 2022 to lay the foundation. The plan is to close and develop that part of the bank's offering in 2023.

"We are looking at a few IFLI and Balthazar deals, and hope that we can close some in 2023," he comments.

He explains that one of the most significant pillars is limited recourse operating lease financing, and most of its clients in asset finance are lessors.

However, he says the bank also aims to increase its visibility with airlines in 2023.

"In general lending into a leasing company provides an extra layer of equity in a financing. Lessors as owners naturally have a strong interest in maintaining and protecting their investment, the asset, and during Covid-19, we had positive experiences with lessors," he comments.

Geldner points out that many airlines struggled to meet their payment obligations during Covid-19 whereas in particular the bigger lessors had no such issues. "With lessors, we are in a much better position regarding our investment," he says.

"We view the risk in lessor deals better than direct lending to airlines. And from a coverage perspective, it is also easier than establishing a relationship directly with airlines, as lessors on average are more active in trading and hence financing aircraft."

"When the bank restarted its lending business five years ago in 2017, most of the financings were concluded on a syndicated basis."

Geldner says BayernLB will continue club deals with its relationship bank partners, but it aims further to develop its aviation franchise to an arranging role.

"We want to grow our market presence by becoming a primary market participant. The challenge for an asset finance lender like us is to be relevant to investment-grade lessors. We have occasional secured portfolio transactions that we participate in, and lessors, in general, want to keep their secured lenders in their banking relationships."

In the lessor's space, BayernLB can selectively lend on an unsecured basis, provide portfolio financing, limited recourse asset financing, export credit, insurance-guaranteed and bank debt financings, including pre-delivery payments (PDPs).

As a next step, the bank is also analysing engine financings for lessors and is looking to participate in warehouse financings.

"Currently we see demand for refinancings of warehouses/portfolios, which were earmarked for the ABS market. While we believe that the ABS market will come back at some stage, we assume that bank debt might play a slightly bigger role going forward again," he says.

BayernLB will also look to provide secured liquidity facilities for ABS transactions as part of its capital markets offerings once that market is returning.

The bank provides revolving credit facilities mainly to corporate finance customers, he says, as an "entry ticket" that might benefit other transactions.

"Our DCM function is very Euro-focused, but the commercial aviation lending market is US-dollar denominated. Whenever we have lessors that would think about diversifying away from traditional USD financings into another currency like euros, this is where we aim to play a role in the capital markets."

Bank's restart in lending

When Geldner joined BayernLB in 2019, the aviation finance team was a product unit part of the asset finance securitisation and leasing group.

Since the 1990s, BayernLB has had several branches including e.g. Tokyo. Still, the bank officially moved out of commercial aircraft finance after receiving state aid in 2009, although it continuously remained active in ECA covered aircraft financings after the Lehman crisis.

> *"Although it will not become the majority of our aviation loan book, we are open for PDP transactions."*
>
> **Oliver Geldner**, sector head of aviation and space, Bayerische Landesbank

Back then, the bank's strategy focused on export credit guaranteed loans.

"BayernLB repaid its state aid in 2017 and restarted its lending policy into the commercial aviation space end of 2017," says Geldner, who adds that BayernLB is 75% owned by the Free State of Bavaria (Bavarian government) and 25% owned by Sparkassenverband Bayern, the umbrella organisation of Bavarian Sparkassen (Saving banks).

In 2020 the bank decided to streamline its corporates and markets business and identified the headline sectors energy, mobility, technology and infrastructure as focus of the bank. He explains that the sector aviation and space is part of the bank's division mobility and energy and the sector went live in January 2021.

"After the Lehman crisis, the bank kept its aviation loan portfolio and the employees, and with the existing experience in-house, it gave us a solid base to restart the commercial aircraft financing business at the end of 2017," he comments.

"We believe that setting up a sector focusing on aviation and space in early 2021 is probably counter-cyclical and underlines the bank's commitment to this industry, which was pretty much at its lowest point by then."

The sector approach pools all of the banks 'activities in aviation and space under one roof, which includes coverage of airlines, lessors, OEMs, MROs, and airports, whereas, on the product side, the sector includes experts from aircraft finance, corporate finance, trade and export finance, debt capital market and treasury products. Also the corresponding credit risk and research colleagues are allocated to the aviation sector.

"The idea is to build up deep industry understanding across all product areas through the commercial aviation sector coverage," he says. The growth case for the bank is in asset finance and to finance the transition to a climate neutral industry summarized in the slogan #Financing Progress."

BayernLB is also a member of Impact, and in the future, the bank's target is to increase the share of ESG-compliant financings in the loan book.

"There will be a lot of capital required to finance that decarbonisation transition in the industry, and this is where BayernLB wants to play a role," he says.

Geldner says the aircraft finance loan book represents around half of the total sector loan book.

BayernLB added capacity in London in October to support its global lending activity from its headquarters in Munich.

"We really grew our profile in 2022 and our product offering," he says.

The bank's aircraft loan portfolio is estimated at $1.5 billion, and the plan is - depending on the market - to add around $500 million of new underwriting business in 2023.

Geldner would expect the majority of this year's budget to be contracted with lessors again, but there is no allocation by client group and BayernLB is welcoming all new clients.

Aside from the new lending capability on the insurance-guaranteed product market, BayernLB executed a PDP financing for lessor Azorra Aviation in the final quarter of last year, marking the first time in years the bank lent on a PDP facility.

"It was probably our biggest step forward regarding our conservative risk appetite," recalls Geldner.

"Although it will not become the majority of our aviation loan book, we are open for PDP transactions."

The bank also took asset risk on pure commercial loan deals with lessor Dynam Aviation for three Airbus A321neo Wizz Air aircraft while directly lending on an Ex-Im covered Boeing 777-300ER aircraft for KLM Royal Dutch Airlines.

Geldner explains that most of the loan book portfolio will be conservative, low-risk business, but it does not prevent BayernLB from adding higher risk-return "bits and pieces".

He adds that BayernLB will finance current technology assets on a very selective basis, but the emphasis is on latest technology assets.

"Our portfolio will be overweight with the latest liquid in-production assets. Narrowbodies are banks' favourite assets, but we are certainly also open to all other assets such as widebodies, regional jets and turboprops."

Credit

"Depending on the financing structure, the bank can be more flexible on credit," he explains.

Most airlines have financing requirements when they have an outstanding orderbook. "The weaker the credit, the more structural enhancements are required, such as export credit or insurance coverage."

He observes that LCCs are the part of the market that has grabbed most of the market share since the start of the pandemic.

The European market includes some relatively smaller flag carriers that suffered substantially through the Covid-19 pandemic. It remains to be seen whether this is triggering more consolidation in the near-term future.

Financing **net zero**

Aviation financiers are taking a voluntary approach to sustainability-linked financing but are keen to mitigate the risk of greenwashing by airlines. **Hugh Davies** reports.

As the aviation industry awaits clearer frameworks and mechanisms for determining climate-aligned investments, capital providers and borrowers are increasingly taking a voluntary approach to sustainability-linked financing (SLF) as part of their environmental, social and governance (ESG) strategies.

Unlike green loans or bonds, which are raised to fund specific projects in other industries, SLFs have borrowers and lenders agreeing on independently assessed key performance indicators (KPIs) on reducing carbon emissions or other ESG-related goals.

They are structured to incentivise companies to lower their emissions with a lower interest payment and incur penalties if those targets are missed. For airlines, this is commonly linked to metrics such as CO_2 per available seat kilometre (ASK) or setting a younger fleet age target.

"At Natixis, our approach promotes bidirectional pricing adjustment for sustainability-linked loans," Cecilia Peteuil, director of aviation finance at Natixis CIB Americas, tells *Airfinance Journal* in an interview.

"There can be some buffer in between but it is what we have been pushing for," she explains.

Progress has been slower in aviation than other sectors because of the hard to abate nature of the industry, but financiers are catching up, particularly as aircraft technology improves and other decarbonisation solutions such as sustainable aviation fuel (SAF) scale up and provide new ways of integrating emissions-reduction metrics into lending.

"I wouldn't be surprised if, in a few years' time, most bank financings in aviation had to have some kind of independent certification from an environmental agency," Mark Bisset, global head of aviation finance, Clyde & Co, tells *Airfinance Journal*.

"Banks have their own ESG compliance targets, so if they get a borrower to use SAF, for example, then the bank can put that towards its own internal regulatory targets."

One source notes that banks' sustainability teams are focused on deploying capital in other competing sectors where banks can make a difference on sustainability immediately.

> *"Progress has been slower in aviation than other sectors because of the hard to abate nature of the industry."*
>
> **Cecilia Peteuil**, director of aviation finance at Natixis CIB Americas

Another source says that other banks are looking to replicate similar financings from other industries.

"We've spoken to a number of banks who haven't done this yet but who are under pressure to do more in certain areas that are harder to decarbonise, like aviation," adds the source.

He notes that developing markets such as India are promising areas for sustainability-linked loans and financing because of the emphasis on new-generation assets. "That's a market where they have large next-generation orderbooks. It's a jurisdiction where this type of financing hasn't had much penetration but where it is ripe for this kind of financing."

Barriers

While demand is growing, SLF in aviation is still in the early stages. One of the main barriers is the lack of transparency in emissions reporting by airlines and KPIs that are aggressive enough to sway airlines to reduce their CO_2.

"Although more and more airlines are reporting CO_2 emissions data in their ESG reports each year, not all airlines are in a position to define their future emissions targets and communicate them publicly," says Peteuil.

"This is one of the main challenges, since emissions intensity is one of the most important KPIs for airlines to issue sustainability-linked bonds or loans," she adds.

With only a small minority of airlines publishing emissions data, transparency is key to building trust and promoting ESG activities that airlines and lenders are pursuing. "The more an airline discloses, the more they can be trusted. It's that simple," says Michael Halaby, head of aviation advisory at MUFG.

"It is also potentially self-policing: prospective buyers of tickets – persons and corporations – may base their buying decisions on how transparent an airline is," he adds.

The other significant challenge, in part linked to transparency, is that some airlines are afraid of being accused of greenwashing and believe more proactive actions can be taken to reduce their carbon footprint, says Peteuil.

"We encourage pricing adjustment in both directions in other industry sectors as well. It makes sense to include a pricing penalty and that can also mitigate the risk of greenwashing."

Yevgeniya Levitin, managing director and head of aviation, Natixis CIB Americas, points out that airlines' treasury teams sometimes have priorities that are distinct from those of their sustainability and ESG teams.

"Treasury's focus is on minimising cost of financing and achieving the best possible terms, structures and maximum flexibility. We are starting to see increased coordination between finance and sustainability, indicating the paradigm is certainly changing but it is a process," she says.

Carrot versus stick

Industry sources argue that the issue is not deciding on carrot versus stick, but making sure both carrot and stick are big enough to avoid the greenwashing label and, at the same time, better motivate carriers to meet their targets.

"The obvious questions are whether they are aggressive enough and is the step up/down amount significant enough and are milestones achievable," says MUFG's Halaby.

He notes the importance of distinguishing between efficiencies of state-of-the-art aircraft and absolute emissions, which may still increase if fleet renewal is used as a licence to invest in more growth.

"An airline that is growing with new, high-density aircraft might see a decline in gCO_2/ASK but their footprint – their overall emissions – might still be increasing," he adds.

The decision between aiming for a target that is too low, which could lead to greenwashing labels, versus increased costs if targets are missed, can lead to airlines being discouraged from pursuing SLF.

"There has been a perception of risk-reward asymmetry among some airlines who expressed concern to us that failure to achieve sustainability KPIs would result in margin (and, therefore, financing cost) increases without a corresponding reward for achieving the KPIs," adds Levitin.

"This is not the only driving force, of course, and it is changing gradually as the ESG investor space matures and the market adopts a more balanced approach that incorporates both carrots and sticks, making this type of financing potentially more attractive to airline borrowers."

Adam Longney, a Reed Smith transportation lawyer, argues that one of the key challenges for establishing economically viable SLF transactions is how to ensure that sustainability performance targets (SPTs) ultimately drive progress towards the industry's net zero and sustainability goals, regardless of carrot or stick approach.

"Without being able to demonstrate that progress – especially where there is an economic upside to one party or the other, depending on whether or not the KPIs or SPTs are met – then customers may be wary of being accused of greenwashing," he adds.

"ESG-conscious investors and the general public want to understand, and see objectively measured evidence, of how stick versus carrot in this situation ultimately gets used to further ESG objectives, rather than merely improving one party's or the other's bottom line," says Longney.

"The key here will be to develop KPIs and sustainability performance targets that are measurable, easily reportable and applicable across the industry on a consistent basis, while recognising the differences inherent in airline operating models and across other industry participants."

He points out the distinction in business models between ultra-low-cost short-haul carriers and legacy long-haul, noting that in this context, a one-size-fits-all approach to standards and targets will not work on a like-for-like basis.

"Lessors are one of the major capital providers to airlines, and SAF is the primary lever that airlines have to reduce their greenhouse gas emissions, so it stands to reason that lessors should be actively exploring this space."

Yevgeniya Levitin, managing director and head of aviation, Natixis CIB Americas

"Once a consistent and standardised approach to measuring and reporting against KPIs and SPTs is achieved, then more regular and transparent ESG reporting is likely to result. This will make it easier for companies to demonstrate and promote what they are doing in terms that can be reliably and objectively measured and benchmarked against their peers," adds Longney.

Halaby notes that SLFs, to date, have been pro-actively pursued by borrowers and lenders without the benefit, or detriment, of laws, rules and regulations.

"These should be applauded as there is an absence of any guidelines. The next step, once these are accepted widely in terms and conditions, is to really focus on how KPIs are leading to net zero by 2050."

One mechanism that has made progress in defining a science-based classification system for sustainable investments is the European Union (EU) taxonomy on aviation, which aims to prevent greenwashing and help investors assess whether investments are consistent with policy commitments under the European Green Deal.

However, rules are still being drafted for the aviation sector, which has questioned certain aspects such as the scrapping rule and unrealistically high SAF mandates.

The taxonomy has also come under criticism in recent months over the EU Commission disregarding certain expert group recommendations and science-based targets.

The gradual phasing out of free CO_2 allowances in the EU this decade, as announced by the EU Commission in December, also sends a strong signal to the market and is expected to have implications for aircraft lessors whose lessees will have a greater responsibility to pay for their carbon footprint.

Sustainability-linked leases?

As owners of about half of the world's operating aircraft, half of the global aircraft CO_2 emissions fall within the aircraft leasing community's scope 3 emissions.

In the same way financiers are focusing on sustainability-linked financing, are lessors also working on ways to incentivise (or penalise) airlines for meeting pre-agreed emissions reduction targets?

"In theory, the potential is there," says Longney, who notes that while there have been reports of sustainability-linked leases being offered, there is limited information around deals.

"The lessor and the airline would need to take care to avoid a structure that is potentially viewed as merely "double-counting" the sustainability benefit, as this would then risk diluting the overall impact it has in terms of meeting sustainability goals," he adds.

Longney also notes that the current financial and technical barriers may hinder these sustainability-linked lease products.

"Lessors could offer airlines advantageous lease terms based on the airline's adoption of SAF. However, the current high cost and limited availability of SAF means that this is unlikely to be a widely adopted proposition until those cost and availability issues are addressed."

Levitin agrees that SAF will play a pivotal role in the future as supply ramps up. "We're getting a lot of questions from our lessor clients around SAF and how they can play a role in the SAF space," she tells *Airfinance Journal*.

"Lessors are one of the major capital providers to airlines, and SAF is the primary lever that airlines have to reduce their greenhouse gas emissions, so it stands to reason that lessors should be actively exploring this space."

In the same way lessors have historically enhanced sale and leaseback bids by providing predelivery payment financing to airlines, she envisions that lessors could

potentially combine bids with offers of SAF access to airlines that might not have their own SAF offtake contracts.

"That would, of course, require lessors to secure SAF supply of their own by entering into offtake agreements which may or may not be feasible for lessors and their shareholders, but it's a potentially interesting angle to consider for the industry," she adds.

One source agrees that, while operating lessors have not offered these types of discounts in recent years, mainly because of historically low lease rate factors, this could soon change.

"There is quite a big focus from leasing companies on ESG, so that might be a way for them to improve their credentials by offering lower rents if airlines meet their ESG targets," he adds.

"We see real potential in the form of a sustainability-linked lease," SMBC Aviation Capital's chief executive officer, Peter Barrett, tells *Airfinance Journal*.

"For example, on the financing side, KPIs are a valuable mechanism through which we can tie capital to our ESG objectives and be held accountable to these through tangible pricing adjustments or other outcomes.

"There is no reason not to make these mechanisms available to our airline customers, thus acknowledging their commitment to their own sustainability journeys and motivating them to set even more ambitious targets going forward," adds Barrett.

"KPIs are a valuable mechanism through which we can tie capital to our ESG objectives and be held accountable to these through tangible pricing adjustments or other outcomes."

Peter Barrett, chief executive officer, SMBC Aviation Capital

He agrees that it also makes sense to link SAF to a lease, although significant capital has to be mobilised towards production and development of those fuels.

"This is why we are also advocating for the inclusion of SAF in the lessor portion of the EU taxonomy on aviation. This is an area where there is significant potential with lots of options that need to be reviewed and considered," he adds.

SMBC Aviation Capital recently became the first aircraft lessor to launch a carbon credit programme to help airlines execute on their carbon offsetting as part of its wider commitment to supporting customers' net zero goals.

"Overall, we are very encouraged by the response we have seen to date," comments Barrett.

"There has been a very positive response to our programme because of the real, tangible benefits our carbon credits will deliver," he adds. "Aside from the environmental impact, there has also been acknowledgement of the social impact of our initiatives."

Diversification is key

The Truenoord chief executive tells **Hugh Davies** the lessor will continue to target regional jets and turboprops.

Regional leasing specialist Truenoord says portfolio diversification will be a key factor in determining capital allocation and mitigating macroeconomic challenges that impact supply and demand of aircraft.

"The most important element for us is that the portfolio has a good diversification in both make and model," Truenoord's chief executive officer, Anne-Bart Tieleman, tells *Airfinance Journal* in an interview.

"We try to avoid too much concentration risk, and we will be active in both the regional jet and turboprop market over the next year," he says.

Tieleman notes that in most of the deals the company participates in, it is seeing upward pressure on lease rates as demand creeps up and the supply of aircraft struggles to keep pace.

"A lot of aircraft that were available have been remarketed by other lessors, and the manufacturers are producing more slowly than they originally planned so there is less supply of new aircraft as well."

"The next 12 months will see that supply and demand equation move more positively for suppliers and aircraft lessors," he adds.

Tieleman believes it is inevitable that lease rates will rise as rate hikes make capital goods become more expensive.

"Airlines might not like it, but even if they go to a bank instead of leasing to finance an aircraft, they will find the same situation and perhaps even be charged more," he says.

"The strengthening of the US dollar over the last few months, as a result of US dollar interest rates going up, will mean non-US airlines will be confronted with higher costs because those costs are translated negatively into their local currencies."

The US Federal Reserve increased interest rates by 50 basis points in mid-December. Though it indicated more would follow, the recent increase is a smaller hike than in previous meetings because inflation shows signs of easing.

"All eyes are on the Fed and whether there is a plateau in rate increases ultimately, if that has an effect on the US dollar exchange rate," says Tieleman.

Quizzed on new-technology regional jet growth, Tieleman says it is hopeful deals can be signed in 2023. Truenoord has already added its first Embraer E195-E2s to its portfolio through a purchase and leaseback deal with Canadian regional carrier Porter Airlines for six new aircraft.

All six aircraft are to be delivered in 2023 and are part of Porter's first firm E2 order for 30 E195-E2s, confirmed in 2021.

"It [the Airbus A220] is a good aircraft, and both it and the E2s are performing better than the manufacturers stated in their marketing.

"We still need to find a deal that works for us. We're working on it and hope to incorporate these assets in the next 12 months," he adds.

Tieleman expects competition for regional jet request for proposals to ease slightly in the near term, recalling the competitive pricing of Air France A220 sale and leasebacks and how that has changed since the end of 2020.

"I expect that it will turn more in favour of lessors, and airlines like Air France will be confronted with less interest, fewer parties offering proposals and those proposals being more expensive," he says.

"Especially with sales and leasebacks of new assets, it is likely that aircraft will become more expensive because of labour costs, raw material costs or suppliers becoming more expensive. Clearly, transactions are still being done but perhaps not as aggressively as before," adds Tieleman.

Although ATR marked its re-entry into the Chinese market after validation of the ATR42-600 type certificate by the Civil Aviation Administration of China (CAAC), Truenoord will not be rushing to the Chinese market anytime soon.

Tieleman also points out that the CAAC certification is for up to 30 seats only, restricting denser configurations that want to make use of the full 50-seat capacity of the ATR42.

"It's good for ATR and a step in the right direction but for us, there is so much to cover elsewhere that we're not rushing to China any time soon," he comments.

"Certainly, that market will be very well serviced by Chinese leasing companies, and it will be interesting to see if Chinese lessors step into that market and start providing ATR leases," says Tieleman.

Having extended its relationships with banks through a $500 million financing facility and a recent $400 million revolving warehouse finance facility, the lessor remains very interested in the US debt capital markets and eventually seeking investment grade (IG).

"The ABS [asset-backed securities] market is still closed but it will be interesting to see when capital markets start to show interest in secured and unsecured products for investment-grade aircraft leasing issuers," says Tieleman.

"IG is definitely something we are aiming for in the next three or so years if the market allows," he adds.

"It may require a balance sheet of $2.5-3 billion with around 150-200 regional assets providing diversity within the portfolio. Aircraft lessors of commercial aircraft would need a larger balance sheet to match that portfolio diversity."

Korean Air's masterplan to integrate with Asiana

The South Korean flag carrier has an ambitious plan to absorb Asiana Airlines and set up a low-cost group of airlines. **Olivier Bonnassies** meets Korean Air CEO.

Walter Cho, the Korean Air chief executive officer, is optimistic that the flag carrier will achieve its integration plan by 2024, but recognises the task of absorbing its former rival carrier Asiana Airlines as well as consolidating the low-cost carriers into one single unit will be challenging.

Talking to *Airfinance Journal* in an exclusive interview, Cho confirms the Asiana Airlines takeover completion and the low-cost carrier (LCC) consolidation is expected by 2024.

"The LCC project is easier than the acquisition of Asiana but the two projects will be difficult. We have been fierce competitors with Asiana for a number of years and changing the mentality is going to be a challenge," he says.

"Mergers are very rare in South Korea, especially with large companies. Acquisitions happen all the time in Europe or the USA but in South Korea the large conglomerates like LG or Samsung tend to split up but hardly acquire other companies," he says.

"It is our first acquisition of an airline since 1969, and I don't know what to expect. And this is the largest one in our group's history."

Incentive

In 2020, just a few months after Cho took over the reigns of Korean Air, the Asiana Airlines creditors contacted him about a potential takeover.

"At the time, we were not in a situation to take Asiana but we negotiated hard for two months and committed to save them. Asiana was in such a situation that by December 2020, they would have had no choice but file for bankruptcy," he says.

Cho says Asiana Airlines is a very large Korean company and a takeover was the best option for their employees and the economy.

"Asiana has $10 billion of debt and their debt ratio is 65-45% currently. Economically, they were in a bad shape. We are in the same business and I felt for the employees," he says.

He adds that another option was to join a low-cost airline, but no low-cost carrier was in the situation to hire in South Korea.

"It is our first acquisition of an airline since 1969, and I don't know what to expect. And this is the largest one in our group's history."

Walter Cho, chief executive officer, Korean Air

According to Cho, the low-cost carrier industry is very competitive with eight low-cost carriers currently operating in South Korea.

LCC group plan

Korean Air made inroads into the low-cost carrier market in June 2022 with the acquisition of Jin Air. Cho concedes that the low-cost market is a new area for Korean Air.

"We had no direct ownership in the low-cost carrier," he says. "Hanjin KAL is the parent company that used to own Korean Air and Jin Air."

The acquisition move was engineered to facilitate pilot dispatches and training, and aircraft transfers. "For us, dispatching pilots to Jin Air and training Jin Air pilots was challenging before the acquisition. It becomes easier with Jin Air as a subsidiary," he says.

Cho adds that the move also allows Jin Air, which was impacted by the Covid-19 pandemic, to increase revenues.

Jin Air was created in 2008 and it was Hanjin's attempt to protect Korean Air from the low-cost carrier threat.

"We tried to keep it conservative and our main goal was to grow moderately but in a profitable way," he says.

Established in 2013, Hanjin KAL is the holding company of both Korean Air and Jin Air, and Jin Air went public in December 2017.

"Most of the fleet is 737 aircraft to south-east Asia, Japan and China flying leisure markets, and Jin Air will typically fill in the market that Korean Air does not operate. There are some overlaps," he explains.

Korean Air's schedules are more focused on the transit market while Jin Air's schedule reflects more direct flights.

"For example, Vietnam is the largest market for the low-cost carriers in Korea and this is mainly leisure travel. "Bangkok, on the other hand, is 50% business and 50% leisure. Korean Air flights mainly feed traffic from the USA and Europe to Thailand, while Jin Air ultimately provides flights for leisure travel to Thailand," he adds.

Jin Air's 26-aircraft fleet includes some Boeing 777-200ERs leased by Korean Air, but the carrier has abandoned plans to develop long-haul operations.

The low-cost carrier launched its first long-haul route, between Incheon and US destination Honolulu, in December 2015.

"Honolulu was a very competitive market. When the Covid-19 pandemic hit, Jin Air redeployed widebody capacity for cargo operations but the P&W [Pratt & Whitney] issues hit their operations for most of the pandemic," he says.

Jin Air's 777-200ER fleet will be replaced and the carrier may look at medium-size widebodies.

"Jin Air would preferably go for a type that is smaller than the 777 size for south-east Asia operations."

He adds that those aircraft, which can be 787-9s or Airbus A330s, will be transferred from Korean Air.

Another big part of the Asiana Airlines' takeover is low-cost carriers.

"Asiana has two low-cost carriers [Air Busan and Air Seoul] and ultimately those airlines will be combined into Jin Air," he reveals.

Through the acquisition of Asiana Airlines, Air Busan and Air Seoul will transfer into Jin Air.

The optimum size for the low-cost carrier group will be about 60 aircraft. "This would include around 50 narrowbodies and 10 widebodies. Ultimately, we are picturing the consolidated Jin Air to operate a 100% Airbus fleet, but it will be a long process," he predicts.

Cho assures that it makes "more sense" to switch to an Airbus fleet because Asiana and Korean Air already operate those types. "We have more A320/A321neos on order than Max 8s, and the plan is to transfer them to the new Jin Air, while Korean Air will keep the Max fleet."

"Once the approval process is completed, it will probably take two years to integrate into one brand," adds Cho.

Fleet integration

Cho sums up the difficulties in integrating both Asiana and Korean Air through the fleets.

"If you look at Asiana and Korean Air fleets, they are totally the opposite. On the widebody side, Korean Air has 787s, Asiana has A350s. Both Airlines have the A380s but with different engine manufacturers. Asiana has the A320 family while Korean Air has the 737 fleet. Everything is different between the two companies, not only the fleet. The systems between the companies are different and so is the mindset, the culture," he says.

Korean Air's orderbook includes 30 A321neo aircraft, 24 Max 8s and 30 787-9/-10s, while Asiana Airlines has 20 A321neos to take delivery of, along with eight A350-900s and nine A350-1000s.

The complexity of the Korean Air and Asiana Airlines fleets does not call for another type of aircraft right now.

"The A220-300 is an excellent aircraft. It is a very reliable and efficient aircraft but it has its limits: stretching it does not necessarily make it better. I have to see what Airbus comes out with before making a decision."

The Korean Air A220-300 has 140 seats in a two-three-passenger configuration.

"Right now, the A220-300 is too small for Korean Air. We use the fleet for domestic flights but the 737-800 is better suited for that market," he says.

"The A220-500 will be similar to the A320neo and I don't see them using the same engine as the A220-300, the PW1100G. How likely will they do it? Because I don't think that the PW110G will fit under the wing of the A220-500 as it is too big. We saw that with the Max because of the complexity of the structure," adds Cho.

Fleet financing approach

Cho says Korean Air will keep a balance between finance leases and operating leases in the future.

> *"My view is that narrowbody assets are easier to remarket and trade at the end of their finance lease, so we will opt for that product. Widebodies are more difficult, and it makes sense to use the operating lease and sale and leaseback market for them."*
>
> **Walter Cho**, chief executive officer, Korean Air

"The Asiana Airlines fleet is financed mostly via the operating lease market, while Korean Air has a different approach. We mostly own our newer narrowbody and widebodies. Ultimately, the operating lease versus finance lease will be a better ratio," he says.

"My view is that narrowbody assets are easier to remarket and trade at the end of their finance lease, so we will opt for that product. Widebodies are more difficult, and it makes sense to use the operating lease and sale and leaseback market for them.

"The first 10 787-9s were purchased and an additional 10 purchased directly from Boeing are coming. Then a batch of 10 787-10s is on the orderbook while another 10 will be leased from Air Lease," he says.

The non-leased 787s will be acquired under finance lease structures.

"Korean Air's financing partners include the Korean Development Bank, as well as the export credit agencies on both the Airbus and Boeing sides," he says.

Cargo lifesaver

Cho says Asiana Airlines is looking at widebody freighters including the A350F.

"Their fleet is ageing and they look at a replacement," he says.

On the freighter side, Korean Air is not looking at expanding its freighter fleet.

"We have 12 777Fs, four 747-400ERFs and seven 747-8Fs. Demand for cargo is falling this year. I believe the peak in cargo demand was last year and it is less this year. We are comfortable with the size of our fleet, and our fleet is relatively young: our 777F and 747-8F are less than 10 years of age on average while the 747-400ERF fleet is 15 years," he says.

"The cargo market saved Korean Air from the pandemic," says Cho, adding that the cargo market probably reached its peak last year.

Korean Air is banking on passenger demand recovery in 2022.

"Right now, a lot of our fleet remains grounded as we operate at 60% capacity compared with the pre-pandemic period. We are slowly bringing aircraft back, including the A380 and the 747-8I models. The A330s are also coming back into operations," he says.

"Demand for long-haul flights remains strong. US operations are running at 80% capacity now while Europe is at 60% but demand in south-east Asia is still weak. China is close to zero."

Korean Air operates three flights a week to China, Shenyang, Guangzhou and Tianjin, versus 230 flights a week pre-Covid-19.

"Once China opens up, this will be very critical for our operations," he adds.

In September, Japan announced the lifting of Covid restrictions, and Cho says demand has been very strong since the announcement.

He says Korean Air covers more destinations than Asiana Airlines, but the network is similar.

"There is an 80% overlap. For instance in Europe, Asiana flies to 10 destinations, while we cover 19 cities."

The networks are not complementary. "We will keep the destinations and we will probably strengthen our presence by increasing frequencies," adds Cho.

The Korean domestic market is "tiny", says Cho, although he adds that Seoul Gimpo to Jeju is the world's busiest domestic route. "The island has 15 million tourists a year and Korean Air has 96 round-trip flights a day."

He says the anti-competition regulators are taking longer than "we anticipated" to approve the takeover of Asiana.

"The Asiana takeover is on the right track. We are actively engaged with both sides and there are still five big jurisdictions left: the EU, the USA, the UK, Japan and China."

Cho says Korean Air will have to take over some of the Asiana bond obligations.

"Korean Air was the only airline profitable in the second quarter of 2020. Since then, we have been profitable. This has allowed us to strengthen our cash and liquidity position and we will use them to finance the Asiana takeover."

He estimates the acquisition of Asiana Airlines will cost KRW1.8 trillion ($1.1 billion). Korean Air does not plan to tap the capital markets with bond issuances to finance the acquisition.

Execution

The road to execute the four-year plan will be bumpy, particularly with the unpredictability of the aviation industry along with macro-economic factors.

But Cho remains confident that the Korean Air of the future will be better.

"Growing is not my goal. Our fleet is 155 aircraft, Asiana about 80 units and with the low-cost carriers we will remain around 300 aircraft," he says.

Lease rents **on the rise**

Avation notes interest from lenders for new-technology purchases but needs to charge airlines higher lease rents to cover its cost, the lessor's founder and executive chairman, Jeff Chatfield, tells **Dominic Lalk**.

Airlines need to face reality and accept that lessors can no longer charge the kind of low lease rents they were able to three years ago. Times have changed but many industry players have yet to wake up, Jeff Chatfield, executive chairman of Singapore-based, London-listed aircraft lessor Avation, tells *Airfinance Journal*.

"The market has very clearly improved as far as demand for aircraft goes. However, lessors need to charge more money in lease rent for their aircraft because clearly interest rates have gone up, the cost of funds has gone up. Investors looking for higher returns need higher rent," says Chatfield.

Airlines have a tough time waking up to this new reality, he observes.

"Governments have helped airlines get through Covid. There has been a lot of community goodwill. Passengers have even lent money to the airline industry. But now that the airlines have survived, I think it is time they recognise their dues.

"Airlines cannot say they want the same lease rates that they were getting when interest rates were effectively 3% lower than they are now. I do not think it works like that," says Chatfield.

He adds: "They're going to have to realise that the fundamentals of the market have changed, therefore they need to pay the money."

Lessors have lent a lot of money to airlines during the pandemic. "Since Covid, we've sort of become the banks for some airlines," says Chatfield, and he quickly reiterates that the cost of funding for lessors has gone up too and now there is more competition for money.

Not everyone, however, is prepared to pay more.

"We had one recent case at our shop where I told the airline that wanted to lease the aircraft that they would have to pay $3,000 more a month and they didn't want to do that, so I said OK I'll put my lease somewhere else," he recalls.

Chatfield believes that airlines need to increase ticket prices to balance the higher costs they face in a post-Covid world reeling from Russia's war in Ukraine and high energy costs. Also, they need to provide better services to customers or face passenger resentment.

"Obviously, the airlines will need to charge passengers more so they can repay all the money that they borrowed and rebuild their balance sheets. That said, I think some of them, the ones with a lot of economic power and, if you like, the wide networks are just abusing their market position," he says.

"It's incredibly expensive to travel now in some markets and some of the behaviours aren't very friendly to their customers. As a customer, you are ultimately the revenue in this industry. What drives this industry is passengers buying tickets but if all these operational failures and customer unfriendly behaviours persist, then people will at some point stop buying tickets. During Covid they had to travel so they'd pay any fare, now this is changing.

"The airlines can no longer take people's money and provide inadequate service, at the airport, in the lounges and on board. In the short term, it's looking to be a pretty terrible experience – there's a shortage of airplanes, staff, everything," adds Chatfield.

Avation has been responding to recent requests for proposals to finance new aircraft and has also reinitiated the search for opportunistic aircraft acquisitions from airlines and other lessors. That said, the lessor has some concerns about more nascent aviation finance players coming into the market offering rates that "make no sense".

Chatfield says: "I don't really understand why newbies to the business offer aggressively low rent to airlines and then they take their share and they quickly disappear. Why would you do a stupid lease rent with an airline, effectively giving money away to an airline for nothing or very low returns. The only reason why this would happen is when you have been incentivised wrong and are extremely short term.

"I think it's sort of a bit like that with the ABS [asset-backed securities] market. I think some lessors use the ABS market as a dumping ground for really crappy leases. They just buy a bunch of aircraft, shove them into an ABS and exit really quickly. And this always causes issues with investors who probably do not understand the risk."

In mid-December, Avation again extended the purchase of its $60 million tender offer, this time through January 26, unless further extended or earlier terminated. Citigroup Global Markets is acting as the sole dealer manager for the tender offer, while Global Bondholder Services Corporation serves as the information and tender agent. The offer is for 9/8.25% senior toggle notes maturing 31 October 2026 under its global note programme and guaranteed by Avation.

"The airlines can no longer take people's money and provide inadequate service, at the airport, in the lounges and on board."

Jeff Chatfield, founder and executive chairman, Avation PLC

Avation will focus solely on new-technology aircraft going forward. It noted increased interest from secured lenders to finance the type of young popular aircraft that Avation's strategy focuses on, as evidenced by the refinancing of two Airbus A220-300 aircraft in November when it closed a senior secured term loan facility of $44 million and a nine-year term with MUFG. The aircraft were previously financed in Avation's floating rate warehouse finance facility.

As at 1 December, Avation's fleet totalled 39 aircraft. The average age of the fleet is six years and the average remaining lease term is 5.3 years. It consists of 17% widebody, 52% narrowbody and 31% turboprop aircraft by value.

Avation's customers comprise 16 airlines in 13 countries, including Easyjet, Eva Air, Philippine Airlines, Alliance Air India, Vietjet Air, Fiji Airways, Mandarin Airlines, Cebu Pacific, Air Baltic and US Bangla Airlines.

The Singapore-based lessor has continued to lease and transition aircraft impacted by the pandemic. Avation is finalising the sale of two ATR72-600 aircraft previously on lease to Loganair and a former Garuda Indonesia Boeing 737-800. The firm is also remarketing an ATR72-600 formerly on lease to Golden Myanmar Airlines. The next aircraft scheduled to come off lease is not until September 2023 and, after this, the next aircraft to come off lease is not until October 2025.

The only other unutilised aircraft in the fleet are two former Virgin Australia ATR72 aircraft that may be leased or sold.

Avation said its major airline customers have increased utilisation of aircraft, with many flying at or close to pre-Covid levels.

To facilitate future fleet growth, Avation has two ATR72-600 aircraft on order for delivery in April and May 2024. These positions could potentially be brought forward should customer requirements necessitate it. Chatfield says that Avation retains purchase rights for an additional 28 ATR72-600s, all with the new PW127XT engine.

On the operational side, Avation notes that, while the return to flying has been embraced by passengers and airlines, there is still significant disruption in respect of aircraft servicing and repair as workshops continue to be impacted by reduced personnel levels and the rebuilding of workforces.

"This has resulted in delays to the service, repair and movement of aircraft being sold or transitioned by Avation. We expect that these services will gradually improve to pre-Covid levels during 2023," says Chatfield.

The lessor chief says that debt collection remains a key focus and Avation works closely with airlines to ensure operational cash flow is maintained. Avation hopes that cash flow from operations will improve as the return to normal trading conditions continues as airlines return to full service.

The company received an initial distribution of A$5.5 million ($3.7 million) from the insolvency of Virgin Australia in September 2022.

"During the remainder of the financial year, aircraft sales, collections of receivables from customers and the insolvency proceedings of Virgin Australia, in addition to cash flow from operations, should support opportunities for a return to fleet growth," says Chatfield.

Cash inflows for the remainder of the financial year are expected to be boosted through the settlement of aircraft sales, further collections from the insolvency proceedings of Virgin Australia and collections of outstanding amounts related to rent deferral arrangements put in place during the Covid-19 pandemic.

This includes the scheduled repayment of a $25.9 million interest-bearing loan to a major customer from January 2023 in equal instalments over 24 months.

Avation confirms that it is current with all payments to secured lenders and is in compliance with all financial covenants in place with secured lenders.

Boeing 737-800 enters period of transition

The 737 Max 8 is finally being delivered in significant numbers. **Geoff Hearn** looks at how this is impacting the fortunes of its predecessor.

Demand for the 737-800 continues

The Boeing 737-800 is the biggest selling member of the successful, so-called, next-generation (NG) family. The other members are the 737-600, the -700 and the -900/-900ER models. Close to 5,000 of the most popular variant were delivered. Boeing stopped assembling commercial 737NGs in 2019 and made the final deliveries in January 2020.

The 737-800 was the second member of the family and entered service in 1998, succeeding the 737-400. It incorporated a new, larger wing with increased fuel capacity and optional winglets, an enhanced electronic flight instrument system and upgraded systems.

The aircraft was equipped with CFM56-7B engines, which provided a step change in fuel efficiency compared with the older technology engines that powered the classic generation of 737s. The 737-800's most direct competitor is the slightly smaller Airbus A320.

Recent market activity

Demand for the 737-800 continues as operators seek interim and medium-term capacity to offset the lower-than-expected numbers of deliveries of the new-generation 737 Max 8 and, to some extent, A320neo models.

Start-up carriers are also looking to the aircraft as a means of getting operations underway.

Norway's Flyr started operations last year with the aircraft type. Earlier this year, Aeroitalia sourced a 737-800 from Macquarie Airfinance as it awaits delivery of 737 Max aircraft in 2023 and 2024.

Despite the sustained demand for passenger aircraft, much of the focus of 737-800 trading is on the converted freighter role of the aircraft. As the delivery numbers of the new-generation models are ramped up, albeit with difficulty, the freighter conversion may become increasingly attractive to lessors and financiers seeking to bolster residual values (see Owners look to conversions to maintain 737-800 values).

Jackson Square Aviation is among the latest lessors to go down the freighter conversion route. In October, the company placed an order for six freighter conversions with Aeronautical Engineers.

Future development

Although the 737-800 is out of production, upgrades are available for the large in-service fleet. Ryanair recently announced it would retrofit the scimitar winglets offered by Aviation Partners Boeing across its 737-800 fleet. United Airlines is already a major customer for the programme. The Irish carrier says its agreement covers 409 aircraft and represents an investment of more than $200 million. The winglets are projected to cut fuel burn by 1.5%.

AIRCRAFT CHARACTERISTICS

Seating/range

Max seating	189 at 30-inch pitch
Typical seating	162 at 32-/34-inch pitch
Maximum range (winglets)	3,115nm (5,760km)

Technical characteristics

MTOW	79 tonnes
OEW	41.1 tonnes
MZFW	61.7 tonnes
Fuel capacity	26,020 litres
Engines	CFM56-7B
Thrust	27,300lbf (121kn)

Fuels and times

Block fuel 200 nautical miles (nm)	2,000kg
Block fuel 500nm	3,530kg
Block time 200nm	54 minutes
Block time 500nm	94 minutes

Fleet data

Entry into service	1998
In service	4,073
Operators (current)	263
In storage	40
Built peak year (2016)	408
Average age	9.5 years

Source: *Airfinance Journal* Fleet Tracker 1 December 2022.

Indicative maintenance reserves

C-check reserve	$70-$75 per flight hour
Higher checks reserve	$55-$60 per flight hour
Engine overhaul	$120-$130/ engine flight hour
Engine LLP	$130-$135 per engine cycle
Landing gear refurbishment	$50-$55 per cycle
Wheels, brakes and tyres	$75-$80 per cycle
APU	$85-$90 per APU hour
Component overhaul	$220-$230 per flight hour

Source: *Airfinance Journal* estimates.

An Appraiser's view

Olga Razzhivina, senior Istat appraiser, Oriel

By far the most successful member of the Boeing 737NG family, the -800 accounts for close to three-quarters of the 737NG total fleet. The grounding of the 737 Max 8 has supported demand, but its predecessor has remained extremely popular in its own right, a testament to its outstanding reliability.

The aircraft is to be found in a full range of business models, including: flag-carriers, low-cost airlines and charter operators. The largest fleet is with Ryanair Group – nearly 410 aircraft. About 50% of the worldwide fleet is in the hands of lessors, which, despite it being superseded, still cherish the liquidity and relatively strong residual value performance of the variant.

The 737-800 values and lease rate have mostly outperformed those of its main competitor, the Airbus A320. While it is difficult to point out the single cause, several factors could have contributed to the stronger performance:

- for a long time, the 737-800 allowed six more passengers in its maximum density configuration than the equivalent A320 layout;
- the Boeing aircraft benefitted from an earlier introduction of winglets;
- the single engine choice on the 737NG has led to a larger remarketing base than the dual-source A320;
- as the company's first single-aisle product, Airbus had to win market share with the A320, possibly taking on less-established customers with larger orders resulting in more bankruptcies than for 737NG operators;
- for a long period, non-airline ownership of the 737-800 was concentrated with relatively few and larger organisations – leading to less fierce competition when placing aircraft. The A320 is dispersed over a larger number of smaller lessors, fuelling more extensive competition;
- the grounding of the 737 Max has forced airlines to hold onto their 737NGs for longer, with lessors being able to command longer extension terms in 2019;
- the 737NG freighter-conversion programmes benefit from their successful 737 classic-generation predecessors and offer better payload and range capabilities; and
- following the disruption from Covid-19, 737 Max production delays continued, while the A320neo replaced the A320 at a higher rate.

Lease rates of 737NG models were among the first to show an upward trajectory after Covid with values following suit. Younger aircraft, under 10 years of age, are benefitting the most, while older examples see most demand as feedstock for freighter conversion.

Being lessor-led, the conversion market is characterised by large orders, which cannot always be filled with the lessor's own aircraft, creating an active market for the older aircraft. With fuel prices significantly increased since the Covid lows, airlines are more inclined to replace older aircraft, even though the latest generation models are still experiencing early-programme technical issues.

In the short term, values and lease rates will depend on the depth of the cost-of-living crisis and its effect on passenger demand.

In this uncertain environment, airlines, especially in Europe, are postponing their fleet and maintenance decisions. On the other hand, MRO bottlenecks create an artificial scarcity of operational aircraft – providing a boost to the values of aircraft available immediately, particularly those in a single-class configuration.

Long term, values and lease rates behaviour will depend on the delivery rates of the Max models.

While the 737-800 is likely to remain in operation throughout this decade, progressively younger vintages will see all of their value in their maintenance condition.

Oriel view of 737-800 values and lease rates

Build year	1998	2003	2008	2013	2018
Current market values ($m)	7.5	7.6	10.6	18.6	28.0
Lease rates ($'000s/month)	85	95	135	185	230

Aircraft specifications: MTOW 174,200lb, CFMI CFM56-7B26/3 engines, winglets. Maintenance status assumes half-life.

Owners look to conversions to maintain 737-800 values

Boeing's most successful single-aisle aircraft makes an excellent freighter, but there could be too much of a good thing.

As Robert Convey, AEI senior vice-president sales and marketing, pointed out in *Airfinance Journal* in early 2022 that the air cargo market, unlike most aspects of commercial aviation, enjoyed significant growth during the Covid-19 pandemic. Convey said this development had provided conversion houses with new opportunities and had, in some ways, transformed the business.

However, he cautioned that there would be challenges and questioned how long the robust market conditions would last. Some of his concerns may be being borne out, particularly when it comes to the Boeing 737-800, which dominates the passenger-to-freighter (P2F) conversion market.

Boeing is bullish about demand for converted freighters in the 737-800 category, suggesting that, over the next 20 years, about 1,000 such aircraft will be required, with Chinese domestic airfreight carriers accounting for nearly one-third of the total.

However, some observers are warning of a potential oversupply against a backdrop of softening demand for airfreight.

In addition to Boeing's own conversion programme, which leads the market and has several third-party contractors, there are a number of other suppliers of 737-800 conversions, including IAI Bedek, AEI and Pemco.

As of 1 December 2022, *Airfinance Journal*'s Fleet Tracker showed just over 120 converted 737-800 freighters were in service. Industry sources suggest about 50 conversions are in the pipeline. A further 20 aircraft are listed as stored, but these are mostly aircraft in transition that will return to service.

Some analysts believe there is a risk of too many aircraft being converted. In a recent webinar, IBA warned that the oversupply could result in a softening of values and lease rates.

The 737-800 has long been regarded as an ideal candidate for passenger-to-freighter conversion. However, residual values of the passenger version have remained high and made conversion uneconomic. As 737 Max deliveries ramp up and the 737-800 fleet ages, values of passenger aircraft are dropping to levels that make conversion viable.

50-seater market is secondary affair

The days when the 50-seat market featured stiff competition between several manufacturers of regional aircraft are long gone. **Geoff Hearn** looks at the current landscape.

The ATR42 remains in production

Recent activity in the 50-seat category has been largely restricted to deals in the secondary market. For some time, ATR has been the only manufacturer of new aircraft in the category, albeit with deliveries at modest levels.

In addition to ATR models, there are still relatively large fleets of 50-seat regional aircraft. The Bombardier/Mitsubishi (MHI) CRJ200 has more than 400 aircraft in active service with nearly 300 more in storage. The Embraer ERJ145 fleet is about 20% smaller, with a similar split between in-service and stored aircraft.

The large fleets of 50-seat regional jets could act as a deterrent to the development of new models, including potential turboprops, but increasing environmental pressures may neutralise the threat.

New markets

ATR cites China as a potentially large market but has focused primarily on the larger ATR72. However, the company's recent announcements have boosted the prospects of the smaller member of the family in the country. The regional OEM received an order for three ATR42-600s, following validation of the aircraft's type certificate by the Civil Aviation Administration of China (CAAC).

The Franco-Italian manufacturer suggests the ATR42-600 is an ideal route opener for Chinese domestic routes. ATR makes some big claims about the impact of regional aviation in the country, suggesting that increasing regional flights by 10% generates a 5% rise in tourism, a 6% rise in regional GDP and an 8% increase in foreign direct investment.

Despite this promising development, it looks unlikely that there will be a big increase in demand for the smaller member of the ATR family. An average of about six aircraft a year are being delivered and, even with the introduction of the new short take-off and landing version, no major increase is anticipated.

New technologies

Although there are no firm proposals for new 50-seat aircraft from any manufacturers, new environmentally friendly technologies are likely to be available sooner for smaller aircraft, which may encourage investment. Embraer's 2022 market outlook alludes to this possibility, stating: "Regional aviation will have a key role in the path to a low-carbon industry. New programmes will tend to

Key data of 50-seat models

Model	ATR42-600	CRJ200	ERJ145
Maximum seats	50	52	50
Typical seats	48	50	50
Typical range (nautical miles)	720	1,650	1,600/2,000
Entry into service/production ended	2012/continues	1992/2006	1996/2013
In-service	58*	435	365
Stored	5*	299	247
Order backlog	24*	0	0

*Excludes earlier ATR42 variants.
Source: Air Investor/Airfinance Journal and Fleet Tracker, 30 November 2022.

Indicative relative cash operating costs in current fuel-price environment ($3.7 per US gallon)

Sector length	ATR42-600	CRJ200	ERJ145
200 nautical miles	Base	+39%	+42%
500 nautical miles	Base	+23%	+30%

Assumptions: Figures are based on *Airfinance Journal*'s interpretation of manufacturer claims and published data.

focus on smaller capacity aircraft to refine applications for new technologies."

There is a view in the industry that electric, or at least hybrid, aircraft might soon be viable in the 50-seat category. Whether there is sufficient demand to justify the necessary investment in such programmes is another question.

Secondary market

With no new regional aircraft being built, activity is restricted to the secondary market, which has seen relatively few recent deals.

Figures from *Airfinance Journal*'s Fleet Tracker suggest that a large proportion of the 50-seat regional aircraft fleet is in storage. However, Chris Beer, managing director, Skyworld Aviation, believes the figures may give an overly pessimistic impression, particularly in the case of the ERJ145, because a lot of aircraft are transitioning to new roles.

The ERJ145 storage figures are heavily skewed by the number of aircraft parked in the USA, where more than 30% of the fleet is inactive. The equivalent figures for all other global regions are much lower.

Beer says the emergence of carriers, particularly in the USA, specialising in point-to-point service has increased demand for 50-seat aircraft. Carriers such as JSX are acquiring aircraft and converting the cabins to offer corporate-jet levels of comfort – typically reducing capacity to about 30 passengers.

The high yields they are able to obtain for such services allow them to operate the reduced capacity aircraft profitably, even in the current environment of high flight-crew cost. Operating under regulations for charter-type services (FAA Part 135 rules, rather than Part 121) eases the problem of pilot shortages, as the experience levels required are lower than for scheduled airline operations.

Analysis by Skyworld Aviation shows nearly 30 buying/selling transactions of the ERJ145 between June 2021 and November 2022 with about a further 15 leasing transactions during the same period. The analysis also shows a steady increase in the active fleet with about 30 more aircraft in service in November 2022 compared with February 2021.

The CRJ does not seem to be attracting the same level of interest, which may in part be caused by concerns in the market over the cost of engine overhauls for older models. Sources tell *Airfinance Journal* that shop visits can cost close to $2 million excluding life-limited parts (LLPs).

Overhauls that require a full replacement of LLPs can cost about $5 million. Given that scale of investment, it is difficult to operate the CRJ profitably, particularly with the reduced passenger capacity envisaged in the new-style point-to-point services.

There is, however, some activity in the secondary market for the MHI aircraft. *Airfinance Journal* reported in December that Proflight Zambia took delivery of the second of two CRJ200s under a lease agreement with Canadian regional lessor Avmax Aircraft Leasing. The 2003-vintage aircraft was last operated by Aruba Airlines, *Airfinance Journal*'s Fleet Tracker shows.

The delivery marks the third CRJ aircraft in the Zambian regional carrier's fleet. The Canadian company has had other successes in the African continent, having placed an ERJ145 and a De Havilland of Canada Dash 8-300 turboprop with Fly Angola. The De Haviland aircraft is among the 50-seat models that has ceased production and has left a once crowded field.

Freighter versions

As in the single-aisle market, operators and owners see potential in passenger-to-freighter conversions as a way to extend the life of their assets. Bombardier partnered with US conversion specialist AEI prior to the sale of the CRJ programmes to Mitsubishi. All the parties involved have said the programme, known as the CRJ200SF, is unaffected by the takeover.

AEI's CRJ conversion was launched in 2013 and was granted a supplemental type certificate from the FAA in October 2016. AEI subsequently received EASA approval in May 2018 and obtained Transport Canada approval at the end of 2018.

AEI has not announced any orders for the programme since 2021, but Robert Convey, senior vice-president, sales and marketing, told *Airfinance Journal* that orders were in the pipeline.

ATR also sees potential in freighter versions of its aircraft but believes the requirement will be largely for models with a size corresponding to 70-seat passenger aircraft. Its market forecast estimates that only 40 of the 550 regional freighters predicted to be in service by 2041 would be in the size bracket corresponding to 50-seat passenger aircraft.

Operating costs

The 50-seat sector has historically been divided between turboprops and regional jets, with much debate focused on the relative operating costs of the two technologies. There is no doubt that turboprops are more suited to shorter sectors, while regional jets come into their own on longer routes.

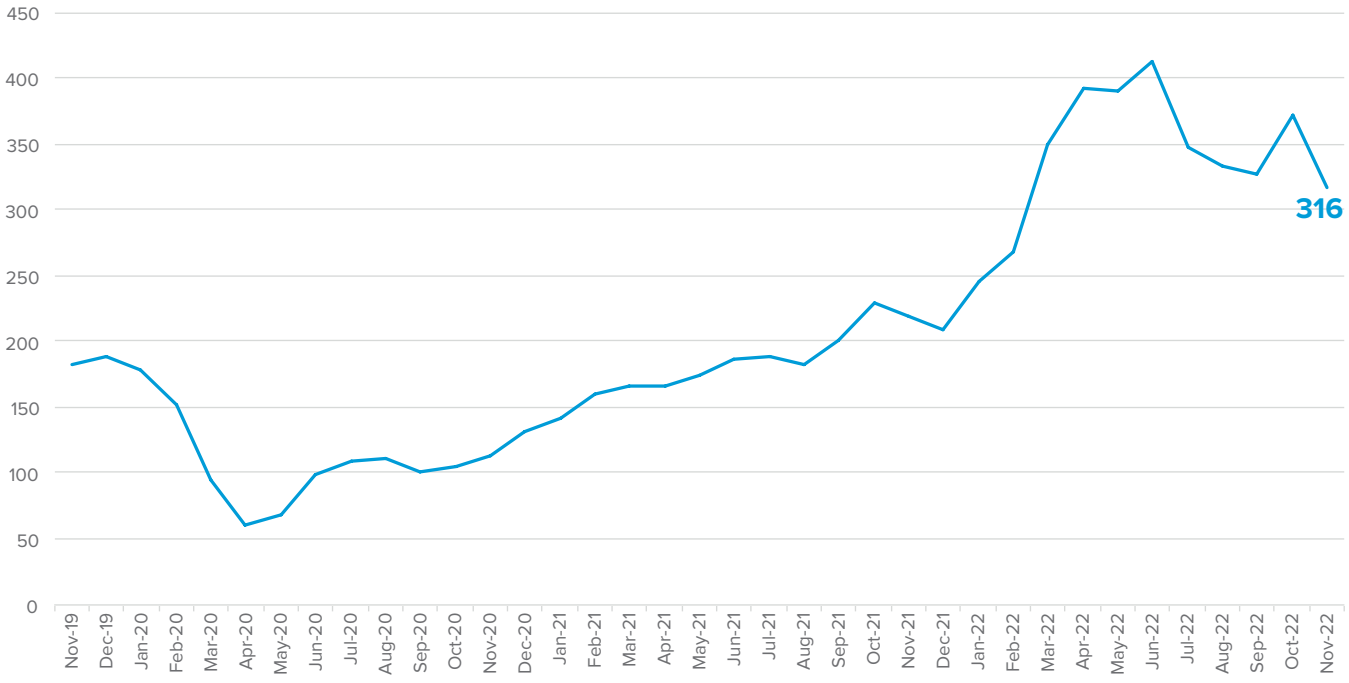
Where the boundary lies is a matter of debate, but regional jets are likely to be more economical once sector lengths of 500 nautical miles and above are considered. In addition, the two hours that a conventional turboprop requires for such sectors is considered by many to be at the upper end of what passengers will accept.

It is mostly the second of these two factors that is driving the demand from carriers such as JSX for regional jets in the secondary market. *Airfinance Journal* estimates that on a 500-nautical mile sector, cash-operating cost of a mid-life 50-seat jet is between 23% and 30% higher than for a new ATR42-600. Given that the new operators are reducing aircraft capacity, the cost per seat of the jets could be nearly double the cost of the turboprop. However, low capital costs offset this differential substantially.

A regional jet acquired for about $3 million starts to match the total direct operating costs of the new turboprop on longer sectors. Given that the new-style carriers are able to charge premium fares, the business case looks attractive. However, the availability of relatively low-cost aircraft in the secondary market is a key part of the equation.

With this background, the emergence of new-generation regional jets looks unlikely. This in turn begs the question as to whether environmental pressures might become a threat to the emerging carriers, if they are reliant on older technology equipment.

US Gulf Coast kerosene-type jet fuel (cents per US gallon)



Source: *US Energy Information Administration.*

Commercial aircraft orders by manufacturer

	Gross orders 2022	Cancellations 2022	Net orders 2022	Net orders 2021
Airbus (30 November)	1,062	237	825	507
Boeing (30 November)	685	109	576	535
Embraer	62	0	62	81
ATR	27	0	27	35

Based on *Airfinance Journal* research and manufacturer announcements until 30 December 2022.

Recent commercial aircraft orders (November-December 2022)

Customer	Country	Quantity/Type
Aer Lingus	Ireland	Two A320neo
Azul	Brazil	Three A330-900
BOC Aviation	Singapore	40 Boeing 737 Max 8
Binter Canarias	Spain	Five E195-E2
British Airways	UK	Four A320neo, two A321neo
Condor	Germany	Four A320neo, Six A321neo
Croatia Airlines	Croatia	Six A220-300
Emirates Airline	UAE	Five 777F
Federal Express	USA	One 767-300F
Hawaiian Airlines	USA	Two 787-9
Silk Way Airlines	Azerbaijan	Two Boeing 777-8F
United Airlines	USA	100 787, 100 737 Max
Undisclosed		18 737 Max
Undisclosed		10 787-9
Undisclosed		Three ATR42-600

Based on *Airfinance Journal* research November-December 2022.

Rating agency unsecured ratings

Airlines

	Fitch	Moody's	S&P
Aeroflot	WD	-	-
Air Canada	B+(neg)	Ba3(stable)	B+(stable)
Air New Zealand	-	Baa2(stable)	-
Alaska Air Group	BB+(neg)	WD	BB(stable)
Allegiant Travel Company	BB-(stable)	Ba3(stable)	B+(stable)
American Airlines Group	B-(stable)	B2(stable)	B-(Stable)
Avianca Holdings	WD	B3(stable)	B-(stable)
British Airways	BB(neg)	Ba2(neg)	BB(stable)
Delta Air Lines	BB+(neg)	Baa3(stable)	BB(Stable)
Easyjet	-	Baa3(stable)	BBB-(stable)
Etihad Airways	A(stable)	-	-
Grupo Aeromexico	-	B3(stable)	B-(stable)
GOL	B-(neg)	B3(stable)	CCC+(stable)
Hawaiian Holdings	B-(stable)	B1(stable)	B-(stable)
International Consolidated Airlines Group	-	Ba2(neg)	BB(stable)
Jetblue	BB-(neg)	Ba2(stable)	B+(neg)
LATAM Airlines Group	WD	-	-
Lufthansa Group	-	Ba2(stable)	BB(pos)
Pegasus Airlines (Pegasus Hava Tasımacılıgı Anonim Sirketi)	B+(neg)	-	B (stable)
Qantas Airways	-	Baa2(stable)	-
Ryanair	BBB(pos)	-	BBB(pos)
SAS	-	-	D(NM)
Southwest Airlines	BBB+(neg)	Baa1(stable)	BBB(pos)
Spirit Airlines	B+(stable)	B1(neg)	B(stable)
TAP Portugal (Transportes Aereos Portugueses, S.A.)	-	B3(stable)	B+(stable)
Turkish Airlines	B(neg)	B3(stable)	B(stable)
United Airlines Holdings	B+(neg)	Ba2(neg)	B+(stable)
Virgin Australia	WD	-	-
Westjet	B-(stable)	B3(stable)	B-(stable)
Wizz Air	BBB-(neg)	Ba1(stable)	-

Source: Ratings Agencies - 23/12/2022.

Lessors

	Fitch	Moody's	S&P	Kroll Bond Ratings
Aercap	BBB-(pos)	Baa3(pos)	BBB(stable)	-
Air Lease Corp	BBB(Stable)	-	BBB(stable)	A-(stable)
Aircastle	BBB(stable)	Baa3(Stable)	BBB-(stable)	-
Avation PLC	WD	-	B-(stable)	-
Aviation Capital Group	-	Baa2(stable)	BBB-(stable)	A-(stable)
Avolon Holdings Limited	BBB-(Stable)	Baa3(stable)	BBB-(stable)	BBB+(stable)
AWAS Aviation Capital Limited	-	Baa3(Stable)	-	-
BOC Aviation	A-(stable)	-	A-(stable)	-
CCB Leasing (International) Corporation	-	-	A (stable)	-
CDB Aviation Lease & Finance	A+(stable)	A2(stable)	A (stable)	-
Clover Aviation Capital	-	Baa3(stable)	-	-
Dubai Aerospace Enterprise	BBB-(Stable)	Baa3(stable)	-	BBB+(stable)
Fly Leasing	-	Caa1(stable)	CCC(developing)	BB-(neg)
Global Aircraft Leasing	-	B2(neg)	-	-
ICBC Financial Leasing	A(stable)	A1(stable)	A(stable)	-
ILFC (Part of Aercap)	BBB-(pos)	Ba2(hyb)(pos)	-	-
Macquarie Group Limited	A(Stable)	A3	BBB+(stable)	-
Marubeni Corporation	-	Baa2(pos)	BBB+(stable)	-
Mitsubishi UFJ Lease	-	A3(stable)	A-(stable)	-
Park Aerospace Holdings	BBB-(Stable)	Baa3(Stable)	-	BBB+(stable)
SMBC Aviation Capital	BBB+(stable)	-	A-(stable)	-
Voyager Aviation	WD	WD	-	WR

Source: Ratings Agencies - 23/12/2022.

Manufacturers

	Fitch	Moody's	S&P
Airbus Group	BBB+(stable)	A2(stable)	A(stable)
Boeing	BBB-(stable)	Baa2(neg)	BBB-(neg)
Bombardier	WD	B3(stable)	B-(stable)
Embraer	BB+(stable)	Ba2(stable)	BB(pos)
Rolls-Royce plc	BB-(pos)	Ba3(stable)	BB-(pos)
Raytheon Technologies Corp	-	Baa1(stable)	A-(neg)

Source: Ratings Agencies - 23/12/2022.

Putting theory into practice

Adam Pilarski, senior vice-president at Avitas, looks at two fundamental economic concepts that help to understand the current developments in aviation.

Anybody who took economics classes in college may remember some concepts introduced by lecturers which, at that time, seemed very theoretical and even far-fetched. It turns out that they actually have a deep meaning which is now relevant and influencing our lives profoundly.

The first basic concept relates to the general objectives of economic activities. For the record, we identify four objectives: efficiency, growth, stability and equality.

The popular idea in many people's minds is restricted to efficiency only. Hence, many people mistakenly believe that economics is about, say, maximising income. In reality, we know this is not the case. For example, maximising income today may affect our long-term welfare. So, efficiency today may hamper our long-term prospects. For individuals, realities change over time. Younger individuals may be more interested in future growth, while those closer to retirement value stability more.

The four basic and often contradictory economic objectives have been influencing worldwide economic realities. For the past few decades, the world emphasised efficiency at the expense of the other objectives, especially equality and stability. This caused the move to outsource production to the most efficient (read: cheapest) producers. That was the major factor causing low inflation rates around the world.

It also generated serious unhappiness among some workers. Higher efficiency led to higher rates of economic growth in the world. But it came at the expense of stability. Outsourcing was readily accepted by consumers, who got access to cheap products, but much less so by workers, who had to compete with others far away who were more efficient.

Since the emergence of Covid-19 and the war in Ukraine, business concerns focus on uncertainty and unexpected changes in the environment. In addition to big macro issues, we have faced supply chain problems often related to events far away (such as the Tohoku earthquake in 2011). Because of this, the term in vogue in business plans currently is "derisking". How can we plan strategies and conduct our business while minimising risks?

Most planners and strategists move away from efficiency towards stability. Hence, a change of strategies. JIT (just in time) is being replaced by JIC (just in case) leading to much higher cost (necessitating larger costly inventories) but also to more predictability. These changes have been in the making for quite a few years and are here to stay at least for the next few decades and will contribute to higher inflation rates around the world.

Our author at the *Airfinance Journal* Dublin 2022 conference

> *"For the past few decades, the world emphasised efficiency at the expense of the other objectives, especially equality and stability."*

Another economic concept that many students considered not very relevant is the kinked demand curve. It is a theory that attempts to explain why in oligopolistic markets prices seemed to be quite stable. The explanation taught to students was that oligopolists are very reluctant to increase prices, believing that doing so will lead to a loss of their competitive position and (since products are similar) to a loss of market share.

Were they to lower prices, their competitors would surely follow their lead not wanting to lose market share. The outcome in such a market of large producers having similar products is a situation of quite stable prices. Nobody wants to follow price declines but everybody is afraid of raising prices.

A number of analysts believe the airline industry has been a good representation of such a market described above. A number of fairly large airlines produce similar products resulting in commoditisation of seats where consumers only care about the price.

Over many decades, the airline industry evolved into one exclusively interested in lower prices. The low-cost model pioneered by Southwest Airlines spread across the world. Because of the rationale of the kinked demand curve, airlines did not change pricing too drastically up or down.

This resulted in stable and continuously declining prices with little product differentiation. The situation changes when the market experiences high inflation such as now. Prices cannot remain stable since this will necessarily lead to big losses. Historically, airlines did better when, for example, oil prices surged forcing the industry to move from the kink on the demand curve and raise prices without being afraid that their competitors will not match them.

In my opinion, we are now at a situation where airlines will realise that increasing fares are beneficial for them. A number of carriers worldwide ended up drastically raising prices with reduced capacity but increased profits. Airlines may continue such strategies and move towards permanently higher prices.

We may get to a situation where airline tickets may again become the biggest part of our holiday expense, the way it was many years ago. The recent pronouncement of the chief executive officer of United Airlines that ultra-low-cost carriers (ULCC) are doomed reinforces this view. The ULCCs will be seen as vehicles for transporting the most price elastic part of the demand curve, a role charter airlines provided for years.

Overall, fewer people will travel but at higher prices. This may end up good for airlines but not so good for equipment manufacturers.

AIRFINANCE JOURNAL

An ***Airfinance Journal***

special supplement

Air Investor 2023

Narrowbodies remain on top

Narrowbody aircraft continue to be investors' preferred assets when it comes to investing in the sector. However, the overall ratings of some aircraft have dropped. **Olivier Bonnassies** reports.

There is a sentiment of optimism for widebody assets as the market is tipped to return by 2024. Some leasing platforms and investors have recently approached the market looking to sell widebody exposure.

A growing capacity demand expected from next year onwards has translated into an improving outlook, mainly for new-technology widebodies.

This was recently emphasised by public lessors in their third-quarter earnings calls.

The focus has been on new-technology assets in the widebody market, with the Airbus A350-900 and the Boeing 787-9 models well ahead of their peers in *Airfinance Journal*'s investor poll's four criteria: residual value, value for money, operational success and remarketing potential.

Both models again came top but lost ground versus last year's poll.

The A350-900 has been hit by some airline bankruptcies and restructurings, unlike the 787 models. SAS is still talking to its leasing community about some aircraft, and should they be released, a new home, especially in Europe, is probable.

One leasing source says A350-900 appetite is here with four out of five airlines recently sounded out in need of additional capacity, albeit at some aggressive rents. In the meantime, those aircraft may involve reconfiguration costs for their owners.

"Finnair and SAS are making it more challenging to place in addition to the overhand in Qatar Airways, too," says another source, adding: "I believe future residual values are understated."

Despite a similar scoring, the A350-1000 remained fifth, behind the 767-300ER and the 787-10 in the investor poll. There is a consensus that the type needs more airline customers but the A350-1000 has also progressed in terms of financing acceptability and has a long-term potential.

The A330-900neo and the 787-8 had different fortunes: one marginally improving while the other marginally dropping.

One pollster observes that demand for the 787-8 has dwindled at the expense of

Twin-aisles (Rating for each category: 1 is worst, 5 is best)

Aircraft type	Residual value	Value for money	Operational success	Remarketing potential	Overall score	Last year's score	Difference
A350-900	3.77	3.98	4.36	3.64	**3.94**	**4.16**	-0.22
787-9	3.77	3.86	4.2	3.7	**3.89**	**4.06**	-0.17
767-300ER	3.08	3.29	3.84	3.13	**3.34**	**3.49**	-0.15
787-10	3.22	3.39	3.47	3.22	**3.33**	**3.51**	-0.18
A350-1000	3	3.29	3.71	2.97	**3.24**	**3.25**	-0.01
787-8	2.88	3.28	3.43	2.98	**3.14**	**3.16**	-0.02
777-300ER	2.48	3.41	4.09	2.45	**3.11**	**3.31**	-0.2
A330-300	2.48	3.6	3.76	2.52	**3.09**	**3.08**	0.01
A330-900neo	2.93	3.13	2.98	2.6	**2.91**	**2.89**	0.02
A330-200	2.15	3.2	3.53	2.15	**2.76**	**2.7**	0.06
777-9	2.69	2.81	2.59	2.42	**2.63**	**2.87**	-0.24
A330-800neo	2.35	2.53	2.13	2.03	**2.26**	**2.2**	0.06
777-200ER	1.74	2.63	3.24	1.37	**2.24**	**2.44**	-0.2
777-200LR	2.05	2.25	2.45	1.75	**2.13**	**2.23**	-0.11
777-8	2	2.23	2.05	1.65	**1.98**	**2.33**	-0.35
A350-800	1.81	2.12	2.13	1.65	**1.93**	**N/A**	N/A
747-8 pax	1.78	2.18	2.28	1.45	**1.92**	**2.1**	-0.18
A380	1.29	1.95	2.21	1.1	**1.64**	**1.68**	-0.04

Appetite for widebodies could grow with United Airlines ordering an additional 100 787s along with 100 options

its larger stablemates, which offer a better blend of passenger capacity, payload and range. There are some aircraft on offer in the marketplace and one respondent highlights the "strong tier-one operator base".

A lessor source expects a large portion of the 787 fleet to remain with current operators because there is very little prospect of a replacement widebody aircraft and production will be low for some time.

The 787-10 is perceived as "nichy" by one respondent but the type has "room for improvement and it is coming", says another pollster.

Appetite for widebodies could grow over the coming years, with Boeing selling more than 215 in 2022 after the United Airlines order for an additional 100 787s along with 100 options.

The United order is noteworthy for the leasing community. Its sheer size and the funding it will require could develop a sale and leaseback financing potential for those lessors willing to take widebody exposure as the market for that part of the sector gradually recovers.

The majority of widebodies are scoring less than in last year's poll with the exception of the A330-200. The type is viewed as a "very cheap" asset for airlines needing capacity. "It is still a work horse at the right price and I am bullish on the outlook for cheap widebodies," says a pollster.

The 787-9 is clearly Boeing's favourite asset in the widebody production line and is an attractive asset when offered for trading.

On the other side of the spectrum, the A330-800, A350-800, 777-8 and 777-9 products have yet to convince pollsters.

Despite the gradual return to service of some A380s, the type has limited appeal for investment. Likewise, the prospects of the 747-8 passenger version are non-existent for investors. The operator's base is limited to Air China, Korean Air and Lufthansa, and secondary market opportunities are likely to be slim.

"There is some salvation in the value of engines however, which are common with the popular Boeing 747-8F cargo model," points out one pollster.

The 777-300ER has lost ground because of remarketing cost and risk, but has benefitted from the 777X delays, with airlines extending their fleets. The model also benefits from a passenger-to-freighter programme. Trading opportunities are on the increase, according to one respondent, because the model is perceived as the sole exception to old-generation widebodies due to outstanding operational capacity (dense cabin seating and belly space).

The 777-300ER has lost ground because of remarketing cost and risk, but has benefitted from the 777X delays

Single-aisles (Rating for each category: 1 is worst, 5 is best)

Aircraft type	Residual value	Value for money	Operational success	Remarketing potential	Overall score	Last year's score	Difference
A321neo	4.71	4.38	4.71	4.88	**4.67**	**4.7**	-0.03
A320neo	4.54	4.15	4.42	4.69	**4.45**	**4.53**	-0.08
737-800	3.88	4.08	4.62	4.12	**4.18**	**4.33**	-0.16
737 Max 8	4.2	4.08	3.78	4.44	**4.13**	**4.08**	0.04
A321	3.79	4.08	4.54	4.04	**4.11**	**4.14**	-0.03
A320	3.46	3.92	4.45	3.75	**3.89**	**3.93**	-0.04
A220-300	3.75	3.7	3.7	3.61	**3.69**	**4.04**	-0.35
737 Max 10	3.16	3.18	2.91	3.26	**3.13**	**3.33**	-0.2
737-900ER	2.85	3.41	3.11	2.8	**3.04**	**2.99**	0.05
737 Max 9	2.92	3.07	2.9	3.14	**3.01**	**3.01**	0.00
737-700	2.52	3.09	3.04	2.43	**2.77**	**2.81**	-0.04
A319	2.33	2.88	3.29	2.38	**2.72**	**2.66**	0.06
737 Max 7	2.31	2.64	2.22	2.11	**2.32**	**2.46**	-0.14
A319neo	2.29	2.52	2.21	2.1	**2.28**	**2.47**	-0.19

"When international travel returns, this will be the best bang for the buck," says one pollster.

Narrowbodies

Overall scores on many narrowbody assets were lower than the previous year.

And in the context of trading or financing models, current macro conditions are having an affect. There is a realisation that high interest rates and the escalation of prices are hitting investment sentiment.

"This will be a factor I would say, and it will become even more so as access to previous cheaper capital dries up. This is one of the variables impacting on-lease assets for sale too, as you're basing your deal off higher returns to negate the impact of inflation on maintenance rates and also interest rates," says one pollster.

The Boeing Max families have made the headlines all year on certification for new products. The prospect of having the Max 7 and Max 10 certified were still in the balance as *Airfinance Journal* went to press.

The US House of Representatives was holding final votes on passing legislation to certify the models on 15 December before recessing until January. In early December, Congress declined to add an extension to the exemption deadline as part of an annual defence bill.

Boeing has said it is still working with Congress on passing legislation to certify the 737 Max 7 and Max 10, but indicated that this may be delayed to 2023.

"We're still working obviously and hope something happens this year," Boeing's chief executive officer, Stan Deal, was quoted as saying by *Reuters*. He added that the US manufacturer has "got another shot" in 2023.

"We're going to hope Congress does their part," says Deal.

The exemption deadline was due on 27 December, which will require all newly built aircraft to have modern cockpit alerting systems, requiring US FAA certification. Without an extension to the deadline, the 737 Max 7 and Max 10 will likely face further delivery delays.

Airlines appear sanguine about the chances of flying the Max 7 and Max 10 before the end of 2023.

Bob Jordan, the Southwest Airlines chief executive officer, says while he believes Boeing will likely get the extension, it will take them sometime into 2023 to get the certification. "So we're likely to not fly a 7 until late 2023 or into 2024," he noted during a recent earnings call.

United, which added 100 737 Max aircraft to its orderbook in December, indicated that Congress would not work on the extension until 2023.

"We're assuming it gets approved sometime next year," United's chief executive officer, Scott Kirby, was quoted as saying by *Reuters*.

Norwegian Air Shuttle has an order for 50 737 Max 8s but told *Airfinance Journal* it could look to switch some Max 8 orders to the Max 10, although Boeing recertification headaches in the USA have to be resolved first.

"This is dependent on several factors: commercially how the larger aircraft would

Norwegian Air Shuttle will look to finance about one-third of its 50 737 Max 8 order through sale and leasebacks

fit into our network, unit costs and, of course, the ongoing certification process," Norwegian's chief financial officer, Hans-Jorgen Wibstad, said in an interview.

The Max 10 version has more appeal to the financing and trading community than the smaller version. *Airfinance Journal*'s Fleet Tracker also shows more than 1,000 orders in total with a 75% to 25% ratio for the higher capacity variant.

The A321neo is again the top rated aircraft in the poll.

"The Airbus A321neo has proven popular with operators, investors and owners. The A320neo-family production is moving in favour of the A321neo, which is likely to be the narrowbody aircraft with the most deliveries in 2022, despite production rates being much lower than pre-pandemic," says one respondent.

Second was the A320neo, also with lower marks in all four categories versus 2021.

The 737-800 came third, once again, but lost ground on the top two Airbuses. A continuing very low 737 Max production and a healthy passenger-to-freighter conversion demand supports its remarketability in the near term at least, points one pollster.

One respondent says the market for freighter conversions is between 500 to 1,000 units. The buoyant conversion market supplement placements for used aircraft. Part of the SAS fleet has found a new home at Jet2, for instance.

One pollster points out a strong market for next-generation and current engine option (ceo) narrowbody aircraft.

"If we look at some narrowbodies' naked assets, values have been strong – A320 family and 737NG family. The A321ceo is strong, too. If you want a passenger model, you just cannot get one. The same can be said for the -900ER," he says.

The Max 8 recovered ground last year, and scored marginally higher in three of the four criteria. Activity on the financing side, especially through purchase and leasebacks, significantly increased.

"For the Max, there is an argument for it clawing some share back linked to available slots versus the competition. Perhaps programme delays or challenges getting certain variants out to market are a factor in people's thoughts," says one pollster.

Current market conditions for new narrowbody aircraft favour 737 Max types, sources told *Airfinance Journal* in the final quarter of 2022.

"We are seeing a compression of the delta between the Airbus A320neo family and the Max family," says a lessor.

The source confirms the recovery in the Max products is because of higher production rates than a year ago, as well as more market acceptance.

Another source agrees, adding that the Max 8 now "looks less expensive to acquire" from Boeing because some delivery slots have been renegotiated or traded.

"There are different dynamics between the two families: the Neo family has more availability but production rates are higher. The Max 8 has now started to redeliver for more than a year and Boeing's sales performance since 2021 reflects appetite for the product."

The year 2021 was one of resurgence for the 737 Max family. As the Max's return to service gained speed, so did orders, with Boeing recording 749 gross new orders across the 737 Max family. Consequently, pricing, in terms of sale and leaseback deals, began to converge. "Lease rates between A320neo family and 737 Max family have compressed. The Max 8 has come back and now looks more like a finance asset," says one banking source.

The leasing community has always had a high confidence in the Max 8 model and airlines continue to issue requests for proposals (RFPs) for financing new deliveries.

In the *Airfinance Journal* poll, the type still suffers from its operational success, scoring much lower than the A320neo-family products.

"This will be a good aircraft, but not much of a family anymore, as Airbus has won that race," says one respondent.

The year 2022 has seen a resurgence of RFPs, mainly on narrowbody aircraft, hitting the markets for assets with leases attached. Some have sold but other deals are taking time to materialise especially as trading conditions have changed throughout the year.

The Max 9 is one of the few aircraft, along with the Max 8 model, that has not lost ground compared with the year 2021. However, it is described as "consigned to be a 'tweener aircraft' since the Max 10 came along".

The A220-300 has a long way to make it to the top, although the model is enjoying growing demand from the investor community as the in-service fleet and operator base are becoming more established.

The A220-100 is becoming "somewhat marginalised", says one respondent, adding that the anchor operators are, however, of good credit quality.

The **numbers**

The following pages include key data for current production commercial aircraft. Aircraft that have not yet entered service are not included, because the information available has not been confirmed by in-service experience.

Technical characteristics
The maximum take-off weight (MTOW) shows the maximum option available for the type in question. There may be lower-weight versions available. The operating empty weight (OEW) is based on the manufacturers' figures. Airline weights are likely to be higher than those quoted.

Fuels and times
The figures shown for fuels and times are *Airfinance Journal*'s estimates based on a variety of sources. They are intended to reflect 60% passenger load factors, international standard atmosphere (ISA) conditions en-route, zero winds and optimum flight levels.

Indicative maintenance costs
The maintenance figures are intended as a guide to the order of magnitude of reserves associated with the various aircraft types. The figures are intended to reflect mature costs with no account taken of warranty effects and other reductions associated with new aircraft.

The C-check and heavy-check reserves are based on typical check costs and intervals. No allowance is made for cabin refurbishment. The cost quoted for component overhaul excludes inventory support.

Unless stated, the engine costs refer to the most common engine type for the aircraft model in question.

The information used to estimate the indicative maintenance reserves has been collected from a wide variety of sources. While *Airfinance Journal* has made every effort to normalise the data, direct comparisons between aircraft types may be misleading.

It should also be noted that maintenance costs of a particular type are highly dependent on the route structure, operating environment and maintenance philosophy of the airline with which the aircraft is in service. As such our estimates are difficult to reconcile with the numbers provided by manufacturers.

Seating/range
The numbers quoted for seating capacity are based on the manufacturers' selling standards. Large variations are possible, particularly for widebody aircraft. The operational ranges shown are for still-air conditions, optimum flight levels and are based on the typical seating figure and the operating empty weight quoted by the manufacturer. Ranges in airline operation are likely to be significantly less than the figures quoted.

Fleet data
The data is based on *Airfinance Journal*'s Fleet Tracker as of 1 December, 2022. The fleet information reflects the situation arising from the Covid-19 situation, in particular the high number of parked/stored aircraft. In acknowledgement of this situation, operator numbers and average age are based on the combined in-service and parked fleets.

Aircraft data index

Aircraft **data**

Airbus A220-100

SEATING/RANGE	
Max seating	133
Typical seating	100-120
Maximum range	3,500nm (6,350km)
TECHNICAL CHARACTERISTICS	
MTOW	63.1 tonnes (option 60.8)
OEW	35.2 tonnes
MZFW	52.2 tonnes
Fuel capacity	21,510 litres
Engines	PW1521G/1524G/1525G
Thrust	21,000lbs to 23,3000lbs
FUELS AND TIMES	
Block fuel 200nm	1,330kg
Block fuel 500nm	2,450kg
Block fuel 1,000nm	4,380kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2016
In service	56
Operators (current and planned)	12
In storage	7
On order	40
Build peak year (2019)	25
Estimated production 2023	15
Average age (years)	3.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$100-110 per engine flight hour
Engine LLP	$130-140 per engine cycle
Landing gear refurbishment	$40-50 per cycle
Wheels brakes and tyres	$130-140 per cycle
APU	$80-90 per APU hour
Component overhaul	$220-230 per flight hour

Airbus A220-300

SEATING/RANGE	
Max seating	160
Typical seating	120-150
Maximum range	3,400nm (6,300km)
TECHNICAL CHARACTERISTICS	
MTOW	69.9 tonnes
OEW	37.1 tonnes
MZFW	57.6 tonnes
Fuel capacity	21,510 litres
Engines	PW1521G/1524G/1525G
Thrust	21,000lbs to 23,3000lbs
FUELS AND TIMES	
Block fuel 200nm	1,370kg
Block fuel 500nm	2,510kg
Block fuel 1,000nm	4,490kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2016
In service	182
Operators (current and planned)	29
In storage	11
On order	516
Build peak year (2018)	30
Estimated production 2023	60
Average age (years)	2.7
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$110-120 per engine flight hour
Engine LLP	$130-140 per engine cycle
Landing gear refurbishment	$40-45 per cycle
Wheels brakes and tyres	$130-140 per cycle
APU	$80-85 per APU hour
Component overhaul	$220-230 per flight hour

Airbus A319neo

SEATING/RANGE	
Max seating	156
Typical seating	120-150
Typical range	3,400nm (6,300km)
TECHNICAL CHARACTERISTICS	
MTOW	75.5 tonnes
OEW	43 tonnes
MZFW	60.3 tonnes
Fuel capacity	26,730 litres
Engines	LEAP-1A/PW1100G
Thrust	24,100lbs (107kN)
FUELS AND TIMES	
Block fuel 200nm	1,450kg
Block fuel 500nm	2,670kg
Block fuel 1,000nm	4,780kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING CORPORATE JET VERSIONS)	
Entry into service (nominal)	2020
In service	9
Operators (current and planned)	5
In storage	3
On order	72
Built peak year	Not applicable
Estimated production 2023	Unknown
Average age (years)	0.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$67-75 per flight hour
Higher checks reserve	$60-70 per flight hour
Engine overhaul	$110-120 per engine flight hour
Engine LLP	$140-150 per engine cycle
Landing gear refurbishment	$40-50 per cycle
Wheels brakes and tyres	$130-140 per cycle
APU	$80-90 per APU hour
Component overhaul	$220-230 per flight hour

Airbus A320neo

SEATING/RANGE	
Max seating	194
Typical seating	150-180
Typical range	3,400nm (6,300km)
TECHNICAL CHARACTERISTICS	
MTOW	79 tonnes
OEW	44.5 tonnes
MZFW	64.3 tonnes
Fuel capacity	26,730 litres
Engines	LEAP-1A/PW1100G
Thrust	27,000lbs (120kN)
FUELS AND TIMES	
Block fuel 200nm	1,570kg
Block fuel 500nm	2,880kg
Block fuel 1,000nm	5,170kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2016
In service	1,539
Operators (current and planned)	131
In storage	67
On order	2,383
Built peak year (2019)	295
Estimated production 2023	250
Average age (years)	3.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$60-65 per flight hour
Engine overhaul	$110-115 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$40-45 per cycle
Wheels brakes and tyres	$130-140 per cycle
APU	$80-85 per APU hour
Component overhaul	$220-230 per flight hour

Airbus A321neo

SEATING/RANGE	
Max seating	244
Typical seating	180-220
Maximum range	3,995nm (7,400km)
TECHNICAL CHARACTERISTICS	
MTOW	97 tonnes
OEW	50.1 tonnes
MZFW	75.6 tonnes
Fuel capacity	30,030 litres
Engines	LEAP-1A/PW1100G
Thrust	32,000lbs (143kN)
FUELS AND TIMES	
Block fuel 200nm	1,960kg
Block fuel 500nm	3,600kg
Block fuel 1,000nm	6,450kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2017
In service	862
Operators (current and planned)	120
In storage	16
On order	3,618
Build peak year (2022)	251
Estimated production 2023	250
Average age (years)	2.3
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$60-65 per flight hour
Engine overhaul	$125-130 per engine flight hour
Engine LLP	$130-135 per engine cycle
Landing gear refurbishment	$40-45 per cycle
Wheels brakes and tyres	$130-140 per cycle
APU	$80-85 per APU hour
Component overhaul	$220-230 per flight hour

Airbus A330-800neo

SEATING/RANGE	
Max seating	406
Typical seating	220-260
Typical range	8,150nm (15,090km)
TECHNICAL CHARACTERISTICS	
MTOW	251 tonnes
OEW	110 tonnes
MZFW	176 tonnes
Fuel capacity	139,090 litres
Engines	Trent 7000
Thrust	68,000lbs (303kN)
FUELS AND TIMES	
Block fuel 1,000nm	10,940kg
Block fuel 2,000nm	20,390kg
Block fuel 4,000nm	39,290kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET	
Entry into service	2020
In service	6
Operators (current and planned)	4
In storage	none
On order	5
Built peak year (2022)	2
Estimated production 2023	2
Average age	0.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-120 per flight hour
Higher checks reserve	$100-110 per flight hour
Engine overhaul	$270-280 per engine flight hour
Engine LLP	$250-260 per engine cycle
Landing gear refurbishment	$155-165 per cycle
Wheels, brakes and tyres	$380-390 per cycle
APU	$110-120 per APU hour
Component overhaul	$430-440 per flight hour

Maintenance reserves are based on A330-300 model pending confirmation of manufacturer's claimed reductions for new engine model.

Airbus A330-900neo

SEATING/RANGE	
Max seating	440
Typical seating	260-300
Maximum range	7,200nm (13,330km)
TECHNICAL CHARACTERISTICS	
MTOW	251 tonnes
OEW	115 tonnes
MZFW	181 tonnes
Fuel capacity	139,090 litres
Engines	Trent 7000
Thrust	68,000lbs (303kN)
FUELS AND TIMES	
Block fuel 1,000nm	11,280 kg
Block fuel 2,000nm	21,040 kg
Block fuel 4,000nm	40,520 kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET	
Entry into service	2018
In service	79
Operators (current and planned)	32
In storage	6
On order	183
Build peak year (2019)	32
Estimated production 2023	24
Average age (years)	2.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-120 per flight hour
Higher checks reserve	$100-110 per flight hour
Engine overhaul	$270-280 per engine flight hour
Engine LLP	$250-260 per engine cycle
Landing gear refurbishment	$155-165 per cycle
Wheels brakes and tyres	$380-390 per cycle
APU	$120-130 per APU hour
Component overhaul	$430-440 per flight hour

Maintenance reserves are based on A330-300 model pending confirmation of manufacturer's claimed reductions for new engine model.

Airbus A350-900

SEATING/RANGE	
Max seating	440
Typical seating	300-350
Maximum range	8,100nm (15,000km)
TECHNICAL CHARACTERISTICS	
MTOW	280 tonnes
OEW	140 tonnes
MZFW	195 tonnes
Fuel capacity	141,000 litres
Engines	Trent XWB
Thrust	84,000lbs (374kN)
FUELS AND TIMES	
Block fuel 1,000nm	11,810kg
Block fuel 2,000nm	22,010kg
Block fuel 4,000nm	42,410kg
Bock time 1,000nm	179 minutes
Block time 2,000nm	291 minutes
Block time 4,000nm	512 minutes
FLEET	
Entry into service	2014
In service	397
Operators (current and planned)	51
In storage	51
On order	303
Build peak year (2019)	80
Estimated production 2023	48
Average age (years)	4.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-120 per flight hour
Higher checks reserve	$100-110 per flight hour
Engine overhaul	$300-310 per engine flight hour
Engine LLP	$275-285 per engine cycle
Landing gear refurbishment	$155-165 per cycle
Wheels brakes and tyres	$380-390 per cycle
APU	$110-120 per APU hour
Component overhaul	$425-430 per flight hour

Airbus A350-1000

SEATING/RANGE	
Max seating	440
Typical seating	350-410
Maximum range	8,700nm (16,100km)
TECHNICAL CHARACTERISTICS	
MTOW	316 tonnes
OEW	150 tonnes
MZFW	223 tonnes
Fuel capacity	159,000 litres
Engines	Trent XWB
Thrust	97,000lbs (432kN)
FUELS AND TIMES	
Block fuel 1,000nm	13,860kg
Block fuel 2,000nm	25,840kg
Block fuel 4,000nm	49,770kg
Bock time 1,000nm	179 minutes
Block time 2,000nm	291 minutes
Block time 4,000nm	512 minutes
FLEET	
Entry into service	2018
In service	62
Operators (current and planned)	15
In storage	6
On order	83
Build peak year (2019)	23
Estimated production 2023	24
Average age (years)	3.4
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-120 per flight hour
Higher checks reserve	$100-110 per flight hour
Engine overhaul	$320-330 per engine flight hour
Engine LLP	$295-305 per engine cycle
Landing gear refurbishment	$155-165 per cycle
Wheels brakes and tyres	$380-390 per cycle
APU	$110-120 per APU hour
Component overhaul	$430-440 per flight hour

Maintenance reserves are based on A350-900 model pending confirmation of manufacturer's claimed reductions for new engine model.

ATR42-600

SEATING/RANGE	
Max seating	50
Typical seating	48
Maximum range	720nm (1,330km)
TECHNICAL CHARACTERISTICS	
MTOW	18.6 tonnes
OEW	11.7 tonnes
MZFW	17 tonnes
Fuel capacity	5,700 litres
Engines	PW127M/PW127XT
Thrust	2,160 shp
FUELS AND TIMES	
Block fuel 100nm	340kg
Block fuel 200nm	560kg
Block fuel 500nm	1,210kg
Bock time 100nm	33 minutes
Block time 200nm	55 minutes
Block time 500nm	122 minutes
FLEET	
Entry into service	2012
In service	58
Operators (current and planned)	27
In storage	5
On order	24
Build peak year (2019)	10
Estimated production 2023	6
Average age (years)	6.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$40-50 per flight hour
Higher checks reserve	$30-40 per flight hour
Engine overhaul	$105-110 per engine flight hour
Engine LLP	$35-40 per engine cycle
Landing gear refurbishment	$25-30 per cycle
Wheels brakes and tyres	$40-45 per cycle
Propeller	$20-25 per propeller hour
Component overhaul	$120-130 per flight hour

ATR72-600

SEATING/RANGE	
Max seating	78
Typical seating	72
Maximum range	825nm (1,526km)
TECHNICAL CHARACTERISTICS	
MTOW	23 tonnes
OEW	14 tonnes
MZFW	21 tonnes
Fuel capacity	6,370 litres
Engines	PW127M/PW127XT
Thrust	2,475 shp
FUELS AND TIMES	
Block fuel 100nm	370kg
Block fuel 200nm	610kg
Block fuel 500nm	1,310kg
Bock time 100nm	36 minutes
Block time 200nm	58 minutes
Block time 500nm	125 minutes
FLEET	
Entry into service	2011
In service	490
Operators (current and planned)	105
In storage	92
On order	120
Build peak year (2015)	79
Estimated production 2023	24
Average age (years)	6.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$40-50 per flight hour
Higher checks reserve	$30-40 per flight hour
Engine overhaul	$105-115 per engine flight hour
Engine LLP	$35-40 per engine cycle
Landing gear refurbishment	$25-30 per cycle
Wheels brakes and tyres	$40-45 per cycle
Propeller	$20-25 per propeller hour
Component overhaul	$130-140 per flight hour

ATR72-600F

PAYLOAD/RANGE	
Max payload	102 tonnes
Maximum range	1,030 nm (1,905 km)
TECHNICAL CHARACTERISTICS	
MTOW	23 tonnes
OEW	11.8 tonnes
MZFW	21 tonnes
Fuel capacity	6,370 litres
Engines	PW127M/PW127XT
Thrust	2,475 shp
FUELS AND TIMES	
Block fuel 100nm	370kg
Block fuel 200nm	610kg
Block fuel 500nm	1,310kg
Bock time 100nm	36 minutes
Block time 200nm	58 minutes
Block time 500m	125 minutes
FLEET	
Entry into service	2021
In Service:	10
Operators (current and planed)	2
In Storage	none
On order	20
Built peak year	Not applicable
Estimated production 2023	12
Average age	0.8 years
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$40-45 per flight hour
Higher checks reserve	$30-35 per flight hour
Engine overhaul	$105-110 per engine flight hour
Engine LLP	$35-40 per engine cycle
Landing gear refurbishment	$20-25 per cycle
Wheels brakes and tyres	$40-45 per cycle
Propeller	$20-25 per propeller hour
Component overhaul	$130-140 per flight hour

Boeing 737 Max 8

SEATING/RANGE	
Max seating	200
Typical seating	162-172
Maximum range	3,515nm (6,510km)
TECHNICAL CHARACTERISTICS	
MTOW	82.2 tonnes
OEW	45.1 tonnes
MZFW	65.9 tonnes
Fuel capacity	25,810 litres
Engines	LEAP-1B
Thrust	26,780lbs (119kN)
FUELS AND TIMES	
Block fuel 200nm	1,720kg
Block fuel 500nm	3,040kg
Block fuel 1,000nm	5,320kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2017
In service	630
Operators (current and planned)	112
In storage	30
On order	2,871
Build peak year (2018)	194
Estimated production 2023	340
Average age (years)	3.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$70-80 per flight hour
Higher checks reserve	$55-65 per flight hour
Engine overhaul	$125-135 per engine flight hour
Engine LLP	$130-140 per engine cycle
Landing gear refurbishment	$50-60 per cycle
Wheels brakes and tyres	$75-85 per cycle
APU	$85-95 per APU hour
Component overhaul	$220-230 per flight hour

Maintenance reserves are estimates based on 737-800 model pending in-service feedback and confirmation of claimed savings.

Boeing 737 Max 9

SEATING/RANGE	
Max seating	220
Typical seating	178-193
Maximum range	3,215nm (5,960km)
TECHNICAL CHARACTERISTICS	
MTOW	88.3 tonnes
OEW	45.1 tonnes
MZFW	71 tonnes
Fuel capacity	25,810 litres
Engines	LEAP-1B
Thrust	27,300 (121kN)
FUELS AND TIMES	
Block fuel 200nm	1,790kg
Block fuel 500nm	3,150kg
Block fuel 1,000nm	5,520kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2018
In service	122
Operators (current and planned)	15
In storage	4
On order	196
Build peak year (2021)	60
Estimated production 2023	60
Average age (years)	3.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$75-80 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$125-135 per engine flight hour
Engine LLP	$130-140 per engine cycle
Landing gear refurbishment	$50-60 per cycle
Wheels brakes and tyres	$75-85 per cycle
APU	$85-90 per APU hour
Component overhaul	$220-230 per flight hour

Maintenance reserves are estimates based on 737-900 model pending in-service feedback and confirmation of claimed savings.

Boeing 767F

SEATING/RANGE	
Max Payload	52 tonnes
Maximum range	3,250nm (6,020km)
TECHNICAL CHARACTERISTICS	
MTOW	187 tonnes
OEW	81 tonnes
MZFW	133 tonnes
Fuel capacity	91,380 litres
Engines	CF6-80C
Thrust	63,300lbs (276kN)
FUELS AND TIMES	
Block fuel 1,000Nm	10,560kg
Block fuel 2,000nm	19,760kg
Block fuel 4,000 Nm	37,910kg
Bock time 1,000Nm	184 minutes
Block time 2,000Nm	301 minutes
Block time 4,000Nm	536 minutes
FLEET	
Entry into service	1995
In Service	224
Operators (current and planed)	19
In Storage	2
On order	57
Built peak year (2019)	18
Estimated production 2023	12
Average age	9.6 years
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$80-90 per flight hour
Engine overhaul	$170-180 per engine flight hour
Engine LLP	$260-270 per engine cycle
Landing gear refurbishment	$70-75 per cycle
Wheels brakes and tyres	$75-80 per cycle
APU	$110-120 per APU hour
Component overhaul	$260-270 per flight hour

Boeing 777F

SEATING/RANGE	
Max Payload	102 tonnes
Maximum range	4,970nm (9,200km)
TECHNICAL CHARACTERISTICS	
MTOW	348 tonnes
OEW	144 tonnes
MZFW	248 tonnes
Fuel capacity	181,280 litres
Engines	GE90-110/115
Thrust	110,000lbs (489 kN)
FUELS AND TIMES	
Block fuel 1,000Nm	14,140 kg
Block fuel 2,000nm	26,350 kg
Block fuel 4,000 Nm	50,780 kg
Bock time 1,000Nm	152 minutes
Block time 2,000Nm	277 minutes
Block time 4,000Nm	525 minutes
FLEET	
Entry into service	2009
In Service	23
Operators (current and planed)	36
In Storage	2
On order	86
Built peak year (2019)	25
Estimated production 2023	18
Average age (years)	7.4
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$130-140 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$295-305 per engine flight hour
Engine LLP	$460-470 per engine cycle
Landing gear refurbishment	$165-175 per cycle
Wheels brakes and tyres	$485-490 per cycle
APU	$110-120 per APU hour
Component overhaul	$410-420 per flight hour

Boeing 777-300ER

SEATING/RANGE	
Max seating	550
Typical seating	365 (three-class)
Maximum range	7,370nm (13,650km)
TECHNICAL CHARACTERISTICS	
MTOW	351.5 tonnes
OEW	168 tonnes
MZFW	238 tonnes
Fuel capacity	181,280 litres
Engines	GE90-115BL
Thrust	115,300lbs (504kN)
FUELS AND TIMES	
Block fuel 1,000nm	15,610kg
Block fuel 2,000nm	29,840kg
Block fuel 4,000nm	60,900kg
Bock time 1,000nm	152 minutes
Block time 2,000nm	277 minutes
Block time 4,000nm	525 minutes
FLEET	
Entry into service	2003
In service	731
Operators (current and planned)	61
In storage	86
On order	6
Build peak year (2016)	89
Estimated production 2023	12
Average age (years)	9.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$130-140 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$300-310 per engine flight hour
Engine LLP	$460-470 per engine cycle
Landing gear refurbishment	$160-170 per cycle
Wheels brakes and tyres	$480-490 per cycle
APU	$110-120 per APU hour
Component overhaul	$420-430 per flight hour

Boeing 787-8

SEATING/RANGE	
Max seating	359
Typical seating	248
Maximum range	7,300nm (13,530km)
TECHNICAL CHARACTERISTICS	
MTOW	227.9 tonnes
OEW	120 tonnes
MZFW	172 tonnes
Fuel capacity	126,920 litres
Engines	GEnx/Trent 1000
Thrust	64,000lbs (280kN)
FUELS AND TIMES	
Block fuel 1,000nm	10,170kg
Block fuel 2,000nm	18,970kg
Block fuel 4,000nm	36,540kg
Bock time 1,000nm	178 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	510 minutes
FLEET	
Entry into service	2011
In service	366
Operators (current and planned)	54
In storage	18
On order	38
Build peak year (2014)	104
Estimated production 2023	12
Average age (years)	7.0
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-120 per flight hour
Higher checks reserve	$90-100 per flight hour
Engine overhaul	$310-320 per engine flight hour
Engine LLP	$310-320 per engine cycle
Landing gear refurbishment	$80-90 per cycle
Wheels brakes and tyres	$110-120 per cycle
APU	$110-120 per APU hour
Component overhaul	$320-330 per flight hour

Boeing 787-9

SEATING/RANGE	
Max seating	406
Typical seating	296 (two-class)
Maximum range	7,530nm (13,950km)
TECHNICAL CHARACTERISTICS	
MTOW	252.7 tonnes
OEW	120 tonnes
MZFW	181 tonnes
Fuel capacity	138,700 litres
Engines	GEnx1B/Trent 1000
Thrust	71,000lbs (320kN)
FUELS AND TIMES	
Block fuel 1,000nm	10,480kg
Block fuel 2,000nm	19,500kg
Block fuel 4,000nm	37,630kg
Bock time 1,000nm	178 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	510 minutes
FLEET	
Entry into service	2014
In service	552
Operators (current and planned)	73
In storage	22
On order	332
Build peak year (2018)	120
Estimated production 2023	12
Average age (years)	5.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$115-125 per flight hour
Higher checks reserve	$90-100 per flight hour
Engine overhaul	$315-325 per engine flight hour
Engine LLP	$325-335 per engine cycle
Landing gear refurbishment	$80-90 per cycle
Wheels brakes and tyres	$100-110 per cycle
APU	$130-140 per APU hour
Component overhaul	$325-335 per flight hour

Boeing 787-10

SEATING/RANGE	
Max seating	440
Typical seating	336
Maximum range	6,345nm (11,750km)
TECHNICAL CHARACTERISTICS	
MTOW	254 tonnes
OEW	135 tonnes
MZFW	192.7 tonnes
Fuel capacity	126,370 litres
Engines	GEnx-1B/Trent 1000
Thrust	76,000 (340kN)
FUELS AND TIMES	
Block fuel 1,000nm	11,310kg
Block fuel 2,000nm	21,080kg
Block fuel 4,000nm	40,620kg
Bock time 1,000nm	146 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	501 minutes
FLEET	
Entry into service	2018
In service	66
Operators (current and planned)	14
In storage	1
On order	116
Build peak year (2019)	29
Estimated production 2023	12
Average age (years)	2.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$120-130 per flight hour
Higher checks reserve	$90-100 per flight hour
Engine overhaul	$320-330 per engine flight hour
Engine LLP	$335-340 per engine cycle
Landing gear refurbishment	$80-90 per cycle
Wheels brakes and tyres	$110-120 per cycle
APU	$130-140 per APU hour
Component overhaul	$340-350 per flight hour

Embraer E175

SEATING/RANGE	
Max seating	88
Typical seating	78
Maximum range	2,200nm (4,070km)
TECHNICAL CHARACTERISTICS	
MTOW	40.4 tonnes
OEW	22 tonnes
MZFW	32 tonnes
Fuel capacity	11,630 litres
Engines	CF34-8E
Thrust	13,800lbs (60kN)
FUELS AND TIMES	
Block fuel 200nm	1,180kg
Block fuel 500nm	2,390kg
Block time 200nm	51 minutes
Bock time 500nm	89 minutes
FLEET	
Entry into service	2005
In service	674
Operators (current and planned)	32
In storage	44
On order	123
Build peak year (2016)	88
Estimated production 2023	24
Average age (years)	7.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$50-60 per flight hour
Higher checks reserve	$40-50 per flight hour
Engine overhaul	$80-90 per engine flight hour
Engine LLP	$110-120 per engine cycle
Landing gear refurbishment	$30-40 per cycle
Wheels brakes and tyres	$50-60 per cycle
APU	$60-70 per APU hour
Component overhaul	$160-170 per flight hour

Embraer E190

SEATING/RANGE	
Max seating	114
Typical seating	98
Typical range	2,400nm (4,448km)
TECHNICAL CHARACTERISTICS	
MTOW	47.8 tonnes
OEW	27.7 tonnes
MZFW	40.8 tonnes
Fuel capacity	16,210litres
Engines	CF34-10E
Thrust	18,500 lbs (85 kN)
FUELS AND TIMES	
Block fuel 200Nm	1,340 kg
Block fuel 500 Nm	2,710 kg
Bock time 200Nm	46 minutes
Block time 500Nm	83 minutes
FLEET	
Entry into service (planned)	2005
In Service:	465
Operators (current and planed)	112
In Storage	112
On order	3
Built peak year (2011)	71
Estimated production 2023	unknown
Average age (years)	9.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	$70-75 per engine flight hour
Engine LLP	$90-95 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$55-60 per cycle
APU	$70-75 per APU hour
Component overhaul	$180-185 per flight hour

Embraer E190-E2

SEATING/RANGE	
Max seating	114
Typical seating	106
Maximum range	2,850nm (5,280km)
TECHNICAL CHARACTERISTICS	
MTOW	56.4 tonnes
OEW	33 tonnes
MZFW	46.7 tonnes
Fuel capacity	17,110 litres
Engines	PW1919
Thrust	19,000lbs (85kN)
FUELS AND TIMES	
Block fuel 200nm	1,140kg
Block fuel 500nm	2,300kg
Block time 200nm	51 minutes
Bock time 500nm	89 minutes
FLEET	
Entry into service	2018
In service	16
Operators (current and planned)	7
In storage	6
On order	13
Build peak year (2019)	7
Estimated production 2023	6
Average age (years)	3.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$50-60 per flight hour
Higher checks reserve	$40-50 per flight hour
Engine overhaul	No data
Engine LLP	No data
Landing gear refurbishment	$40-50 per cycle
Wheels brakes and tyres	$60-70 per cycle
APU	$80-90 per APU hour
Component overhaul	$180-190 per flight hour

Maintenance reserves are estimates based on E190 model pending in-service feedback and confirmation of claimed savings.

Embraer E195-E2

SEATING/RANGE	
Max seating	146
Typical seating	132
Typical range	2,600nm (4,800km)
TECHNICAL CHARACTERISTICS	
MTOW	61.5 tonnes
OEW	35.7 tonnes
MZFW	51.8 tonnes
Estimated fuel capacity	17,110 litres
Engines	Pratt & Whitney PW1919
Thrust	19,000lbs (85kN)
FUELS AND TIMES	
Block fuel 200nm	1,260kg
Block fuel 500nm	2,440kg
Bock time 200nm	51 minutes
Block time 500nm	89 minutes
FLEET	
Entry into service	2019
In service	38
Operators (current and planned)	14
In storage	5
On order	185
Built peak year (2021)	18
Estimated production 2023	30
Average age (years)	2.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	No data
Engine LLP	No data
Landing gear refurbishment	$40-50 per cycle
Wheels, brakes and tyres	$60-70 per cycle
APU	$80-90 per APU hour
Component overhaul	$180-185 per flight hour

Maintenance reserves are estimates based on E195 model pending in-service feedback and confirmation of claimed savings.

New aircraft market values ($ million)

Model	Avitas view	CV view	IBA view	ICF view	MBA view	Oriel view	Average
Airbus							
A220-100	33.8	34.7	32.8	34.5	32.0	34.2	**33.7**
A220-300	37.4	39.4	37.4	38.2	36.9	39.2	**38.1**
A319neo	39.4	40.0	39.0	39.5	33.2	44.9	**39.3**
A320neo	52.4	54.1	49.6	50.8	48.9	53.1	**51.5**
A321neo	59.4	62.3	57.4	58.8	56.8	62.7	**59.6**
A330-800 (neo)	90.0	95.0	91.6	88.9	85.2	89.0	**89.9**
A330-900 (neo)	104.5	107.9	101.6	103.1	100.8	105.0	**103.8**
A350-900	153.0	154.8	146.0	155.1	138.7	140.0	**147.9**
A350-1000	157.9	174.1	160.6	166.6	159.5	153.0	**161.9**
ATR							
ATR42-600	15.8	N/A	15.6	16.1	14.5	15.2	**15.4**
ATR72-600	19.0	N/A	21.2	19.1	18.0	19.0	**19.3**
Boeing							
737 Max 8	51.4	52.5	50.6	48.7	48.6	51.0	**50.5**
737 Max 9	52.5	53	53.1	50.4	48.6	54.0	**51.9**
767F	81.2	90	77.4	77.3	77.2	81.0	**80.7**
777-300ER	N/A	125	124.5	136.6	100.1	N/A	**121.6**
777F	168.9	181	160.0	164.1	157.9	168.0	**166.7**
787-8	116.1	114	95.5	102.9	108.8	95.0	**105.4**
787-9	146.1	151	140.3	143.7	131.9	138.0	**141.8**
787-10	150.3	161	156.5	153.2	146.6	147.0	**152.4**
Embraer							
E175	27.3	25	26.8	27.7	28.4	23.8	**26.5**
E190-E2	33.8	30	32.0	33.9	28.2	31.6	**31.6**
E195-E2	36.3	38	35.1	36.8	32.7	33.6	**35.4**

New aircraft lease rates ($'000s per month)

Model	Avitas view	CV view	IBA view	ICF view	MBA view	Oriel view	Average
Airbus							
A220-100	210-245	240	224	231	214-230	245	**210-245**
A220-300	235-270	280	240	270	245-263	290	**235-290**
A319neo	225-270	280	290	277	222-239	315	**222-315**
A320neo	285-340	350	324	350	311-334	375	**285-375**
A321neo	335-395	400	375	385	361-388	420	**335-420**
A330-800	620-700	750	651	644	557-598	690	**557-750**
A330-900	655-740	875	720	724	659-707	750	**655-875**
A350-900	925-1,045	1,100	953	1,054	897-963	905	**897-1,100**
A350-1000	960-1,170	1,125	1,130	1,126	1,086-1,166	950	**950-1,170**
ATR							
ATR42-600	105-120	N/A	132	135	114-123	130	**105-135**
ATR72-600	125-150	N/A	166	165	150-161	160	**125-166**
Boeing							
737 Max 8	280-325	350	317	328	306-328	340	**280-350**
737 Max 9	285-340	355	329	348	306-329	370	**285-370**
767F	450-555	750	579	490	564-606	645	**450-750**
777-300ER	N/A	800	949	861	N/A	N/A	**800-949**
777F	1,135-1,255	1,400	1,300	970	1,155-1,240	1,120	**970-1,400**
787-8	630-710	750	658	734	704-755	680	**630-755**
787-9	865-975	1,050	885	966	880-945	885	**865-1,050**
787-10	895-1,110	1,000	1,018	1,034	999-1,072	975	**895-1,110**
Embraer							
E175	170-195	225	170	171	213-229	185	**170-229**
E190-E2	190-225	225	231	226	189-202	235	**189-235**
E195-E2	220-260	270	251	248	219-235	240	**219-270**

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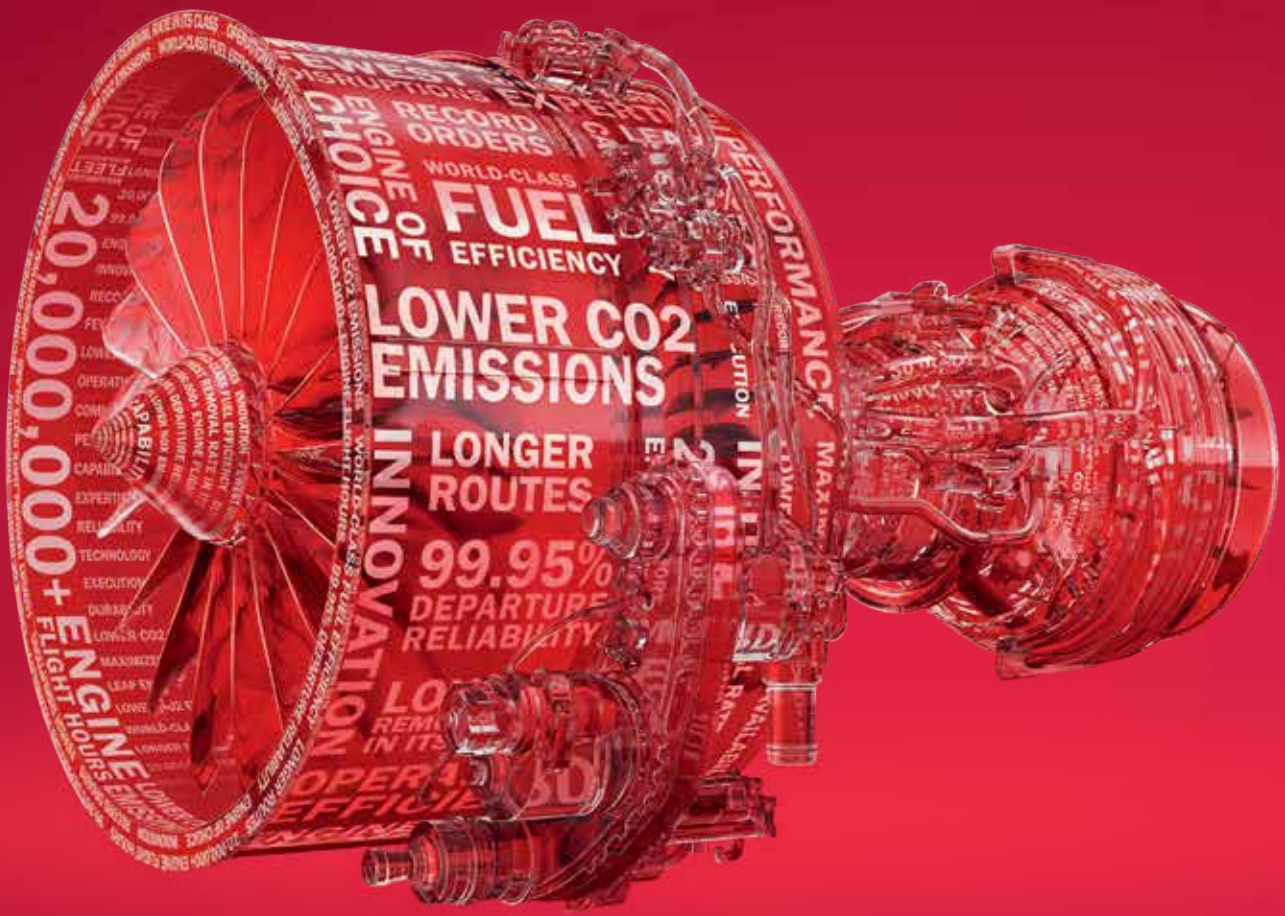

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