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The **numbers game**

Aircraft manufacturers' hopes of increasing production could be thwarted by problems with the supply chain, writes Laura Mueller. But if there is only one winner, the early money is on Airbus.

It has been an eventful few years for aviation, encompassing movements that normally take decades to play out in such a large, maturing industry.

This was particularly true for aircraft leasing in 2021. In March, two lessors – the industry's largest portfolio by units, GECAS, and Fly Leasing – announced their sales to competitors.

In the final week of the year, Nordic Aviation Capital filed for Chapter 11 bankruptcy protection. Days later, Carlyle Aviation Partners finally confirmed the purchase of AMCK.

The year ended with a fifth portfolio, Goshawk, subject to due diligence as part of a sale process to SMBC Aviation Capital. The ACMK and Goshawk sales, which *Airfinance Journal* exclusively revealed, were, like the shifting of the GECAS book, initiated on the quiet.

The sales underscore the importance of reinventing businesses in a post-Covid leasing market with a mega-lessor dominating the space by rapidly achieving scale, stripping overheads cost and lowering the cost of funds.

Aercap's $25 billion takeover of GECAS, which closed on 1 November, represents 2,196 commercial aircraft or 37.5% of the top 10 lessors.

Now another seismic shift is anticipated, but this time on the manufacturing side. Airbus plans to increase A320-family production to 65 aircraft a month from 45 a month in the fourth quarter of 2021, and is contemplating monthly rates as high as 75.

An Airbus statement last May said it was preparing for a rate of 70 a month by the first quarter of 2024. As *Airfinance Journal* went to press, preliminary data indicated Airbus delivered more than 600 commercial aircraft in 2021.

While the official figures are due to be released by the end of January 2022 following an audit, several sources managed to get hold of information confirming year-end figures for Airbus.

Is such a bullish outlook justified for a post-pandemic recovery of the narrowbody sector, especially given the wide variance in airline recovery by region and with increases in output that are well above pre-Covid rates?

Demand aside, it makes perfect business sense for Airbus to increase production and tilt market share in its favour for years to come. A steady increase in production will see Airbus "take away the oxygen from Boeing deliveries", observes a top 10 lessor.

But it is too soon to celebrate. In November, a delegate asked an anonymous question at the ISTAT Americas about the optimism apparent at the event over Airbus's rate of 70 a month.

The delegate noted the juxtaposition after lessor panellists at the ISTAT European event in October had unanimously agreed that there was "not enough demand in the market for the planned Airbus increase". However, a month later, lessor panellists at the ISTAT Austin, Texas, event agreed that "there will be a shortage of new narrowbody aircraft in 2024".

This shift was best articulated by Tom Baker, the president and chief executive officer (CEO) of Aviation Capital Group.

"Regardless of what we think," he says, "my guess is Airbus comes out of Dubai more convinced than ever that they're right. And so I think, we as a panel of lessors, and we as an industry, need to start to manage the fact that they are grinding their way toward rate 75, and we need to plan and manage accordingly."

Baker adds: "There seems to be incredible demand, and Airbus will say they're now sold out on A320-family aircraft through 2028."

SMBC Aviation Capital's Peter Barrett was more cautious.

"I think the demand for aircraft, I mean the 75 – when that will happen and how it will happen. They talked about it, but they haven't said they're going to do it," he says.

"I think the supply and demand will be there. If you throw in the extra 75 or whatever it's going to be, the rate was 25 or 15 to 25 aeroplanes a month, then I think you revisit it and see what your judgment is then, but it hasn't happened yet," adds Barrett.

The shift in support for the rate increase is a testament to how quickly sentiment can change, says Air Lease's CEO and president, John Plueger.

"I think it shows the incredible speed and rapidity, and in a very short amount of time. [ISTAT] Edinburgh was around the time as IATA [International Air Transport Association] in Boston, which was an amazingly well attended event by the airlines... and the airlines we met... not one did not ask about new aircraft. We have opened the US to the EU, and now we're opening up between the US and Canada and Mexico, so you just cannot put a pin in... and say this is it – things just change so fast."

But global supply chains are in a knot, and a significant challenge for Airbus and Boeing is the support of their suppliers during a production surge.

As *Airfinance Journal* went to press, Alcoa announced a halt in primary aluminium production at its plant in Spain for two years, the latest casualty of soaring energy prices in Europe. The curbs at Europe's second-largest aluminium plant come after energy costs spiked to new records in the final month of the year, putting heavy industries under increasing financial strain.

Barrett also emphasised supply chain pressures.

"I still think that the challenges that Airbus is going to face, both in terms of demand and the supplies team there, is their ability to build at that scale, and indeed there is the reaction of the engine manufacturers. I think those things still have to be played out," he says.

A C-suite lessor, speaking on anonymity, told *Airfinance Journal* that there is room for only one manufacturer to increase output.

"If Airbus wants to go to 70 and Boeing to 50, well, there is only capacity in my opinion given the current supply chain for one of the moves to happen. Who wins? Well, you only have to look at recent issues and who has a better relationship with its supply chain, and which OEM [original equipment manufacturer] hasn't severely squeezed its suppliers. Airbus is the winner."

So, while lessors tend to agree that demand is there to support the ramp up, concerns remain about severe snags in the supply chain and the ability to deliver at higher rates without severe disruption.

There is a further problem: how will Boeing grapple with the need to maintain market share, generate sufficient cash, pay down debt and support research and development projects when faced with a competitor that appears to have the support of its global supply chain?

LAURA MUELLER
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MUFG names co-global heads aviation

Mitsubishi UFJ Financial has promoted Olivier Trauchessec and Vicente Alava Pons as co-heads of global aviation.

Trauchessec has been at the bank since 2016 as managing director, head of transportation leasing and asset finance for the Americas, a unit of MUFG's investment banking and markets group.

He previously worked for BNP Paribas as head of aviation finance in the Americas. He had led the aviation desk in the Americas for the French bank since 2000. From 1996 to 2000, he served as vice-president of aircraft finance in the bank's Paris office.

Vicente Alava Pons

Olivier Trauchessec

In October 2016, *Airfinance Journal* reported that Mitsubishi UFJ Financial had established an aviation finance office in New York.

Alava Pons was managing director, head of origination aviation EMEA, since November 2019. He joined MUFG through the DVB Bank aviation lending acquisition that year. He previously held managing director and regional head roles at DVB in Europe, the Middle East and Africa (2017 to 2019) and Asia-Pacific (2003 to 2017).

Jebely joins **Withers**

Managing partner Paul Jebely left Pillsbury Winthrop Shaw Pittman in December to join Withers as a senior partner based in its Hong Kong office and head of its newly launched global asset finance practice, effective 1 January 2022.

Paul Jebely

Jebely joined the law firm in March 2016 with the opening of the Hong Kong office. Previously, he was at Clyde & Co, where he was a partner and head of the firm's aviation finance practice.

During his time at Pillsbury, Jebely advised clients such as Credit Suisse and Aviation Capital Group and ultra-high-networth individuals on the purchase and sale of business aircraft. Before Clyde & Co, he headed Ashurst's Asia, Middle East and Africa aviation group.

Well-known in commercial aviation globally, Jebely confirms that he will remain active in sector, though his main focus in it will shift from financiers and lessors to private investors.

"I followed the money," Jebely tells *Airfinance Journal*.

"Withers is a large global law firm that, although not known in the aviation industry, has represented ultra-wealthy individuals since 1896 and is today the top global law firm dedicated to serving them," he explains. "Private capital investment from ultra-high-net-worth individual and family offices is now integral to the future of aviation. Most often, these players first look for deep industry expertise from their most trusted personal advisors, like Withers, when considering such investments - be they in traditional airlines/leasing, advanced air mobility or anything in between. And now they have it."

Cape becomes VP of trading **Vmo Aircraft Leasing**

Vmo Aircraft Leasing named Jeremy Cape as senior vice-president head of trading and business analysis in November.

He joined from JP Morgan Asset Management.

Cape previously spent more than four years at Aercap as vice-president and another three years with ILFC, prior to the May 2014 acquisition.

His leasing experience also includes four years as head of risk at Aircastle. Previously, he worked at JP Morgan and Seabury in analyst roles.

New York-listed alternative asset firm Ares Management and aircraft leasing veterans Bob Brown, Sean Sullivan and Will Hudson teamed up in early 2021 to acquire and lease commercial aircraft.

Funds managed by Ares Private Equity and the Vmo management committed about $500 million in initial equity capital to support the new leasing platform.

In November, the San Francisco-based lessor signed a long-term lease agreement with Delta Air Lines for two used Airbus A350-900s. *Airfinance Journal*'s Fleet Tracker identifies both aircraft as 2015/16-vintage A350-900s previously leased to LATAM.

New CFO for **SMBC AC**

SMBC Aviation Capital (SMBC AC) has promoted Aisling Kenny to chief financial officer (CFO). Kenny served as SMBC AC's senior vice-president finance and entered her new role in January.

She joined SMBC AC in 2012 and has previously held positions in restructuring, as head of funding and corporate tax and as head of its global finance function. Aisling completed her training as a chartered accountant with Ernst & Young and held a management position in the firm's banking and leasing audit department before joining SMBC AC.

The move follows the appointment of Barry Flannery to the recently created position of chief commercial officer.

Flannery previously held the role of CFO before Eithne Manning, who joined the company in 2005, and was previously head of funding, tax and global finance, took over as its interim CFO.

"We are delighted to announce Aisling's appointment as chief financial officer," said Peter Barrett, chief executive officer.

"After an extensive internal and external search process, Aisling demonstrated impressive insights into the business and a clear strategic vision, which will be great additions to our senior management team as we continue to navigate short-term challenges in the sector and take advantage of commercial opportunities as the industry recovers. I know Aisling will be an excellent leader in the business and I look forward to working closely with her when she takes up her role in January 2022."

Isom to replace Parker as **American** CEO

American Airlines chief executive officer (CEO), Doug Parker, will retire on 31 March and be succeeded by Robert Isom, the carrier's president.

Isom will also join the airline's board of directors on that date, and Parker will continue to serve as chairman of American's board.

"I have worked with Robert for two decades, and I am incredibly pleased that he will be the next CEO of American Airlines, which is truly the best job in our industry," said Parker.

"Robert is a collaborative leader with deep operational expertise and global industry experience. His efforts to guide and support our team throughout the pandemic have been nothing short of phenomenal. We are well positioned to take full advantage of our industry's recovery, and now is the right time for a handoff we have planned and prepared for. I feel extremely fortunate to hand the reins to this clear and capable leader."

Lead independent director, John Cahill, said: "Over the span of his 35-year career, Doug has been an architect and advocate for a more vibrant, resilient and secure aviation industry. At American, Doug has overseen unprecedented investment in our team and our product and set the standard for servant leadership, tirelessly championing our people and establishing an accessible and inclusive culture. We look forward to continuing to benefit from Doug's sound judgment, deep industry knowledge, persistence and optimism as chairman of our board."

Isom, who was named president in 2016, brings more than 30 years' global industry and leadership experience across finance, operations, planning, marketing, sales, alliances, pricing and revenue management.

He previously served as executive vice-president and chief operating officer at American after holding the same positions at US Airways.

Before joining US Airways, he held senior executive operations, finance and commercial roles, at GMAC, Northwest Airlines and America West Airlines. He started his career at The Procter & Gamble Company.

Nord LB expands London team

German bank Nord LB has expanded its aviation finance team in London with the appointment of Sylvain Gloux.

Gloux has started as senior director origination, aviation finance and investment solutions at the bank, six months after being released by Erste Bank.

He joined Erste Bank in 2019, following the departure of key members of the Aerospace finance team.

Prior to that he was with Cargo Logic Management and Flybe as head of fleet trading and financing for almost four years.

Between 2011 and 2015, Gloux was at DVB Bank as assistant vice president-aircraft finance. Prior to that he held different aviation finance roles at Coface, BNP Paribas and ABN Amro Bank.

Veteran trader Whitty joins **AJW Group**

AJW Group appointed Tony Whitty as director of aircraft and engine procurement in December.

Whitty is responsible for aircraft and engine acquisitions across the AJW Group. He will use his extensive and diverse experience in aircraft remarketing for airlines, banks and other aircraft owners to assist AJW Group in its aircraft and engine trading business.

Whitty started his career in aircraft remarketing in 1990 with Fortis Aviation. He has been based both in Europe and the USA, and has achieved considerable success in aircraft remarketing on behalf of a variety of airline and financial sector clients.

He was one of the founders of Cabot Aviation in 1998 and subsequently worked for Air Partner since 2015.

ELFC names CCO

Engine Lease Finance Corporation (ELFC) has promoted Richard Hough to the position of chief operating officer.

Hough is the company's chief technical officer.

He joined the company in 1997 and he has held several positions of increasing responsibility within the technical department. In 2011 he was promoted to the position of executive vice president technical and in 2013 also assumed responsibility for the Company's IT function.

Before joining ELFC in 1997 Richard spent seven years with Shannon Aerospace where he trained as an aircraft engineer.

Aoife Fennell succeeds Hough as executive vice president and chief technical officer.

She joined ELFC in 2001 as an engineering manager and for the last 20 years she has undertaken increasing levels of responsibility within the technical function of the company as vice president and most recently as senior vice president with responsibility for the EMEA region.

Allman returns to **Loomis, Sayles**

Keith Allman has rejoined Loomis, Sayles & Company, an affiliate of Natixis Investment Managers, as head of research and private credit for the mortgage and structured finance team.

The Loomis Sayles Mortgage and Structured Finance (MSF) platform continues to enjoy meaningful growth under the leadership of Alessandro Pagani, portfolio manager and head of the MSF team.

The addition of Allman's newly established role will further strengthen the team's research function and enable dedicated focus on asset-based private credit and esoteric asset-backed securities (ABS), both asset types that are experiencing increased demand among investors.

In his new role as head of mortgage and structured finance research and private credit, Allman will oversee a team of seven analysts. He will also lead the effort to originate private credit opportunities alongside Michael Meyer, securitised strategist for illiquid and real assets.

Based in New York, Allman reports to Alessandro Pagani, portfolio manager and head of the Mortgage and Structured Finance (MSF) team.

He formerly was a senior analyst on the MSF team from 2016 to 2019. He specialised in commercial and esoteric ABS, with an emphasis on transportation assets, including aircraft, shipping containers and railcars.

Most recently, Allman was head of Non-Flow ABS at MUFG, where he led the development of multiple esoteric structured products such as the post-pandemic aircraft lessor enhanced equipment trust certificate. He positioned MUFG for left-lead roles in aviation, container and venture debt, as well as lead roles in a number of other asset classes, including whole business securitisation, data centres and solar loans and leases, among others. He was responsible for the group's strategy, client coverage, transaction pitching, deal execution and overall training and team development.

Previously, Allman was a director in banking and origination at Deutsche Bank, where he covered transportation ABS as well as timeshare, rental fleet and other esoteric ABS.

Surplus to requirements

The Covid-19 pandemic is exasperating an already difficult situation for used widebody aircraft, writes **Hugh Davies**.

There is still significant pressure on used Boeing 777 and Airbus A330 widebody aircraft with a significant surplus of both aircraft types putting pressure on lease rates and placement prospects.

Airfinance Journal's Fleet Tracker shows that about one in five A330 and 777 aircraft remain in storage, with inactive aircraft skewing towards older aircraft.

The Covid-19 crisis and the expectation that airlines transition out of current-technology widebodies and into new-technology aircraft such as the 787 and A350, further exasperate the 777-300ER/A330-300 surplus.

"We're well into the replacement wave with the newer-generation A350s and 787s, which is mainly where you see the demand from the higher-tier carriers," Mike Yeomans, IBA Aero's director of valuations, tells *Airfinance Journal*. "You're not seeing many placement opportunities for A330s, this is mainly moving down into the low-tier carriers."

"While you can put the aircraft to work, it's still a challenging environment for the A330. There are still aircraft to come out through lease returns in the coming years, so it may take time for there to be a meaningful recovery," adds Yeomans.

He points out that for the 777, there were signs that the market was softening even before the pandemic. "You have to bear in mind what level of reconfiguration and investment is required in the aircraft and how that is priced into the lease rates.

"There's a limit to what segments of the secondary market you can make a used 777 work in. It's still a large-capacity aircraft, so it does limit the addressable market from a secondary market perspective," adds Yeomans.

Olga Razzhivina, senior ISTAT appraiser at Oriel, tells *Airfinance Journal* that the used widebody market was under pressure before the onset of the Covid-19 crisis.

Record production levels for new aircraft in the 10 years preceding the pandemic, coupled with a wave of widebodies, particularly A330s, coming off lease in 2019, exasperated the situation for the aircraft types.

"Every lessor's hope was that operators would extend, and the way the world looked in 2019, even though widebody traffic growth rates weren't the same as for narrowbodies, they were still substantial, so the hope was somewhat justified," adds Razzhivina.

As the pandemic hit and airlines grounded their fleets, it became obvious that lease return prospects had diminished further, with future recovery prospects slow to pick up because a significant part of the fleet is still grounded and at low utilisation.

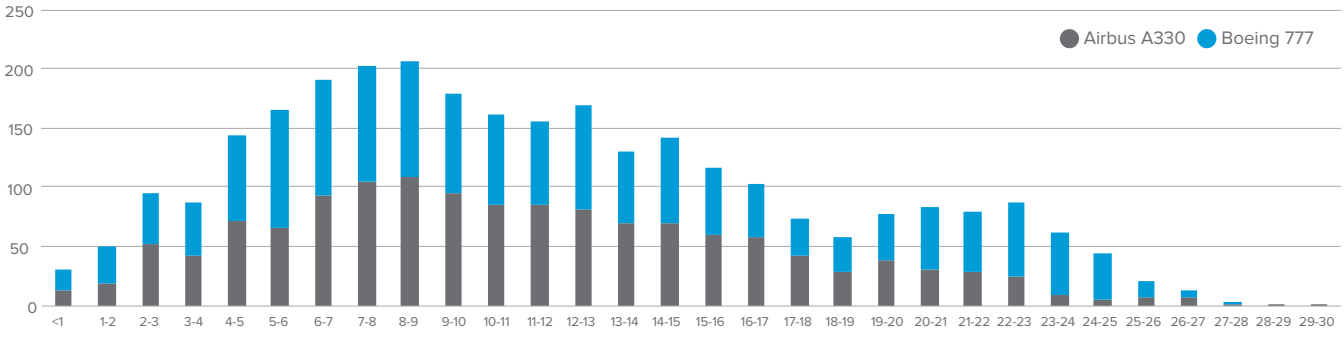
The key to the widebody recovery lies in a recovery in the Asia-Pacific region, with a return in lease rates being a leading indicator of recovery.

"Most widebodies are either based there or serve that region, so until we see a meaningful recovery in the Asia-Pacific region it is difficult to talk about a recovery in the widebody lease rates and values," comments Razzhivina.

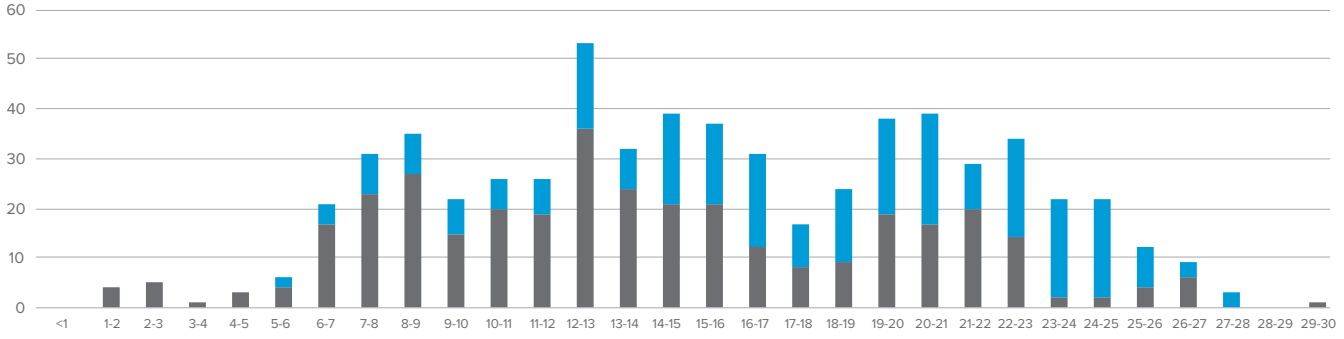
"Lease values typically recover before aircraft values because aircraft are

Age profile total fleet versus stored fleet

Age profile total aircraft



Age profile stored aircraft



Source: Airfinance Journal's Fleet Tracker, December 2021

expensive to buy and leasing is cheaper. While there are some discussions between lessors and operators around fixed rates coming back next year, the bulk of placements revolve around power-by-the-hour rates, especially over the winter season," she adds.

Razzhivina points out that the number of reactivated aircraft does not necessarily reflect recovery in demand.

"The number of active aircraft now compared to April 2020 has definitely increased, but it doesn't necessarily mean that the demand for them has increased. It may also mean airlines are making operational decisions to put the aircraft on low-utilisation operations or as auxiliary freighter services to minimise costs," she adds.

Fleet Tracker shows lessors account for more than 1,100 units in the global A330/777 fleet, with about 26% of these in storage or transitioning between customers. Of these, around 500 are 11 years or older, with the lessors having the largest exposure in this age range including Aercap, Carlyle Aviation Partners, KKR and DAE Capital.

Outlet challenges

Operators, lessors and investors have jumped on the opportunities presented by the freighter conversion market, taking advantage of structural changes in supply chains.

Avolon signed an agreement with Israel Aerospace Industries (IAI) to convert A330-300 aircraft in October, becoming the launch customer for IAI's A330-300 freighter conversion programme.

Earlier in the year, GECAS exercised options with IAI to undergo passenger-to-freighter (P2F) conversion for an additional three 777-300ER aircraft, bringing GECAS's total commitment to 18 firm conversions under its 'Big Twin' programme.

In August, ATSG announced plans to acquire and convert 20 A330s for lease to express delivery operators, with plans to finance conversion capital expenditures using its senior credit agreement along with current cash balances and future operating cash flows.

While there is strong demand for P2F conversions, slot constraints and cost issues combined with the uncertainty over how long demand will last make this outlet challenging to analyse.

"There is more supply to come. The freight conversion programme will absorb some of that supply and create demand, but I don't know if it will be enough to absorb all of it," comments Yeomans.

"Not every owner wants to invest $17-18 million on an asset that may not be performing or may not be aligned with their strategy. Some of the larger lessors have gone down that route and there are some good returns to be had if you picked up a distressed A330 in the low-to-mid teens. Overtime, that will ease as more belly capacity comes back into the market," he adds.

Air cargo became more popular because of its increased cost effectiveness during the pandemic due to supply chain constraints in other sectors. The pandemic saw a boom in e-commerce and express cargo demand, particularly in the USA, with yet untapped market potential in Asia-Pacific.

However, this short-term spike in demand and the improved economics of airfreight may not last.

"When this normalises, the cost difference will go back to being too steep for businesses to consider air cargo on a regular basis," says Razzhivina.

"We may have a healthier air cargo industry than we did before the pandemic," she adds, "but not growing at the same rate we're seeing today for any considerable period of time."

Mammoth conversions

For its part, prospective US cargo conversion company Mammoth Freighters is seeing strong demand for widebody cargo conversions from the leasing and investor community as well as from operators.

The company acquired 10 Delta Air Lines 777-200LRs in late 2020 with plans to launch P2F conversions this year and is currently reviewing other 777-300ER platforms.

"We've had a lot of interest from almost everyone because of the general lift shortage for long-haul cargo lift," Mammoth's vice-president marketing and sales, Brian McCarthy told *Airfinance Journal*.

The majority of interest in Mammoth's new programme has initially been from cargo operators, which McCarthy says is unusual for new platforms.

"Normally when you start a new conversion programme, most of the attraction initially comes from leasing companies and hedge funds with book value problems and too many aircraft in their garage."

McCarthy says lease return widebodies of particular interest for the company, which is looking to begin conversions from spring this year. "Plenty of the lift that has been parked and not sold will go back in service because they can go right back into the same airline they came from, but lease returns are much more problematic.

"When an airplane is hard lease returned and is longer at the airline or being replaced in some way, those airplanes are very unlikely to find a long-term home because it's so expensive to reconfigure these aircraft.

"They're the ones we're going to be focused on and those are going to be readily available," McCarthy continues.

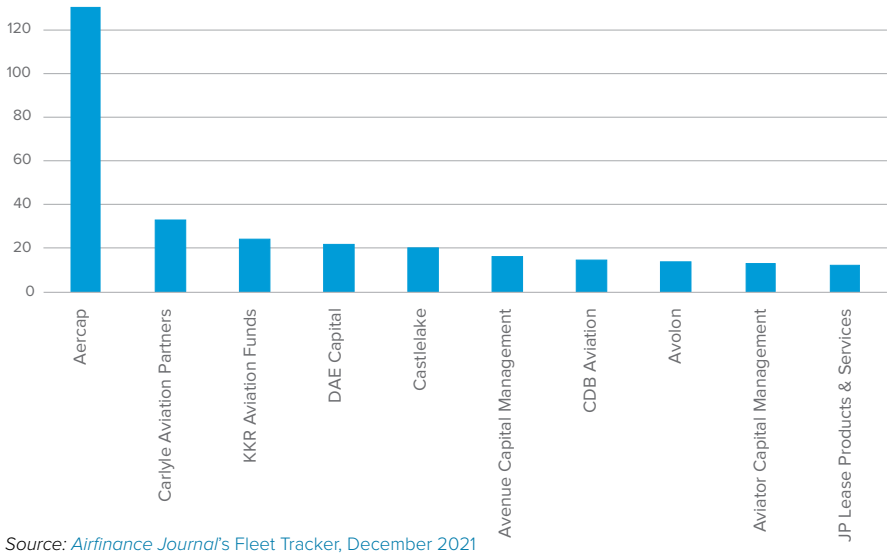
The company is targeting around six conversion lines at four conversions per line per year once the programme fully matures.

"If the market demands more or less we'll try to respond accordingly. The amount of aircraft that are being offered gives us reasonable view that were going to be able to feed this programme with enough feedstock for the next four to six years," adds McCarthy.

He explains that the capital-intensive nature of widebody conversions is narrowing down the playing field in terms of leasing companies looking to undertake P2F conversions for widebodies.

"We're seeing a much smaller but determined group of leasing entities that are contemplating the widebody conversion space," McCarthy notes.

Lessor A330/777 fleet 11+ years



Source: Airfinance Journal's Fleet Tracker, December 2021

Asia-Pacific's **long road to recovery**

The Asia-Pacific region is lagging far behind in pandemic recovery. Its airlines and lessors are struggling, industry experts tell **Elsie Guan**.

Aercap completed its acquisition of GECAS from General Electric (GE) in November. Under the agreement, GE received 111.5 million newly issued Aercap shares, about $23 billion of cash and $1 billion of Aercap notes. At closing, GE owned about 46% of Aercap's outstanding shares.

Shortly after, *Airfinance Journal* broke the news that Goshawk Aviation is to be purchased by SMBC Aviation Capital (SMBC AC) after nearly two years in the market. The deal will marry the businesses of the world's fifth-largest lessor, SMBC AC, and smaller, ranked 20th Goshawk, according to *Airfinance Journal*'s Leasing Top 50.

SMBC AC is backed by Japan's SMBC super conglomerate; Goshawk has the backing of Hong Kong's NWS Holdings and Chow Tai Fook Enterprises.

Mergers and acquisitions (M&A) in the aircraft leasing industry will continue in 2022, says David Yu, professor at New York University Shanghai.

"Asian capital-backed lessors are staying in a growth market. Since the start of the Covid-19 pandemic, I have seen a natural growth among Asian lessors instead of a dramatic expansion in their aircraft leasing businesses," says Yu.

"It depends on whether lessors have had mature conditions to proceed M&A transactions. In China, we seldom see big acquisitions between bank-backed lessors. Japan has the same situation. I did not see many lessor M&A transactions happening in Japan," comments Johnny Lau, chief consultant of PwC Aviation Business Services.

On the airline front, at the *Airfinance Journal* 2021 Asia-Pacific conference in November, Yong Ren Ng, vice-president marketing, Asia-Pacific at Aviation Capital Group (ACG), pointed out that the ability for northeast Asian airlines to raise capital is far stronger than what has been observed across South-East Asia.

Lau agrees that Northeast Asia has a stronger cargo business as well as more dedicated freighters and hence helping the survival of carriers.

Philippine Airlines emerged from voluntary Chapter 11 bankruptcy protection on 31 December after four months of restructuring proceedings. Many other carriers in the region are expected to continue to restructure throughout most of 2022, including Lion Group and Garuda in Indonesia, as well as Air Asia in Malaysia.

> *"Since the start of the Covid-19 pandemic, I have seen a natural growth among Asian lessors instead of a dramatic expansion in their aircraft leasing businesses."*
>
> **David Yu**, professor at New York University Shanghai

"In terms of aircraft leasing, the bargaining ability of Chinese carriers and northeast Asian carriers is stronger than southeast Asian carriers," says Lau, adding that uncertainties in South-East Asia led to higher risk premiums being exercised.

"We can see that aircraft lease rates and interest margins of bank loans have recovered to the pre-pandemic level in 2019 in North America and Europe. Due to the uncertainties in South-East Asia, Chinese lessors are bearing more risks in dealing with aircraft rental deferrals and aircraft repossessions," says Lau.

"Sale and leaseback transactions occupied a large portion of transactions completed by lessors and airlines in Asia in the past year compared with lessors' new aircraft orders and deliveries," says Yu.

Airlines seeking sale and leaseback deals to add cash back to their balance sheets, however, have led to breakneck competition in sale and leaseback transactions, quashing already fickle lease rate factors, note experts.

Some in the industry argue that aircraft leasing companies are well positioned to fill capacity gaps as markets recover from the pandemic, particularly in Asia-Pacific, where hundreds of widebodies have been sent for early retirement.

"The airlines have been doing a lot of revision over the past 18 months. That is going to make them more cost effective on a going-forward basis. On the aircraft-specific side, we are seeing a lot of older aircraft being retired," Deutsche Bank's managing director and head of transportation, infrastructure and energy financing for Asia, Richard Finlayson, told the *Airfinance Journal* Asia-Pacific conference in November.

"Perhaps it's wishful thinking, but I actually think we could get caught short on the airline capacity side, particularly one to two years out when international traffic comes back," adds Finlayson, who has run the transportation finance business of Deutsche Bank in Asia-Pacific for the past 13 years.

The aircraft financier notes that the widebody segment has suffered many retirements and lessor returns as those airlines that needed capacity upgauged almost exclusively on the narrowbody side, in the 200-seat capacity level.

"I think there is quite a possibility that there are airlines that need near-term capacity quite quickly, so they could either take widebodies back out of storage or lease to fill the gaps," says Finlayson, adding that these would likely be short-term leases of two to four years only.

If airlines do decide to reclaim older aircraft from storage facilities, he adds, this would require "quite a level of financing to get them back into service and reactivated".

Vistara expands via leasing route

Strong shareholder support and more than 30 new aircraft on the way will continue to fuel Vistara's expansion, airline chief executive officer, Vinod Kannan, tells **Dominic Lalk**.

On 1 January 2022, Vinod Kannan officially became the chief executive officer (CEO) of Indian full-service carrier Vistara, the Tata Sons and Singapore Airlines protégé.

Kannan, Vistara's former chief commercial officer, undoubtedly took the top job at the airline at a time of distress and uncertainty, although, unlike many of its peers, Vistara continued to grow throughout the Covid-19 pandemic, he tells *Airfinance Journal*.

In 2022, that growth trajectory is only set to increase, says Kannan, because Vistara will continue taking delivery of more than 30 Airbus A320neo-family aircraft on order, as well as four additional Boeing 787-9 widebody units.

Since its first commercial flight in January 2015, Vistara's fleet had grown to 48 aircraft at the end of 2021. The majority of these are on lease to the airline, including a 15-aircraft A320neo deal with Avolon and other A320neo-family lease deals with industry majors Aercap, BOC Aviation and Air Lease.

In 2021, however, Vistara also added its first owned A320neo to its portfolio. HSBC provided the financing to the airline to complete the purchase.

Through the end of 2023, the Vistara fleet is expected to reach 70 aircraft, Kannan confirms, and the focus will remain on leasing rather than owning.

"We hope to have 70 aircraft in 2023. Beyond that, we still have to see. Our previous plans have all come crashing down in 2020, just like everyone else's. We are still in recalibration mode as the industry reopens and recovers.

"Very honestly, during the crisis we have to work on a day-to-day basis. That is what has been keeping us occupied, dealing with the new realities," says Kannan.

Against these odds, Vistara still managed to grow its market share throughout the crisis.

"If you look at the market share up to September, we used to operate at about 5-6%. That has significantly increased. We are now at 8.7%, which is a function of capacity deployed but, more importantly, the gravitation of customers towards the brand, which is something that we are very thankful for," says Kannan.

"Compared to 2019 levels, no other airline in India has grown at the rate we have."

Vinod Kannan, chief executive officer, Vistara

"Compared to 2019 levels, no other airline in India has grown at the rate we have. We have continued to expand and take delivery of new aircraft through the pandemic. Why did we do it? We can see that there is pent-up demand for travel. The vaccination programme was rolled out quite successfully here in India after the massive second wave, which helped to build herd immunity.

"In terms of Covid preparedness, I think we have reason to be optimistic about the market recovering, cautiously optimistic," he adds.

For more than a year, airlines in India had capacity caps imposed on them by authorities as part of Covid-19 prevention measures. These are no longer, says Kannan.

"Government restrictions have just recently come off. We do not have any capacity caps imposed on us at the moment. We are free to deploy our resources, as are all other airlines in India, at least on the domestic front. Internationally, of course, we are guided and reliant on the so-called travel bubble arrangements," he adds.

Tata is 51%-owned by Indian conglomerate Tata Sons, while Singapore Airlines holds the remainder. Kannan says both shareholders have been very supportive, "not just for survival but also for growth".

Kannan says he currently has limited visibility over how Tata's late-2021 acquisition of ailing Indian flag carrier Air India may impact his airline's fortunes. He does note, however, that India's market size is "significant" and that there is room for additional growth.

Tata Group will take control of Air India after bidding $2.4 billion, including equity and debt.

The deal puts Air India back in the hands of the group which founded it as Tata Airlines in 1932, before nationalisation in 1953. It includes Tata taking on $2 billion of Air India's $8.2 billion legacy debt, resulting in an equity value for the government of about $400 million.

The Tatas will now own a 100% stake in Air India, and also 100% of subsidiary Air India Express. Also part of the agreement is a 50% stake in the Air India SATS joint venture, a ground services and cargo-handling company.

Air India has a fleet of 117 widebody and narrowbody aircraft – Air India Express has 24 narrowbodies. A significant number of these aircraft are owned by the carrier.

The acquisition of Air India will give Tata an additional 4,400 domestic and 1,800 international slots at Indian airports annually, as well as 900 slots at airports overseas, the most lucrative of which are at London's Heathrow airport. Vistara commenced 787 service to Heathrow, Frankfurt and Paris in 2021.

The conglomerate also holds a majority stake in Air Asia India, a low-cost carrier operating more than 30 Airbus aircraft.

The three Tata-controlled airlines – Air India, Air Asia India and Vistara – will account for about one-third of India's commercial aviation market in 2022.

Rosy outlook for LCCs

Low-cost carriers will continue to drive the Covid-19 recovery, particularly in domestic markets with historically less competition, 777 Partners managing partner, Josh Wander, tells **Hugh Davies**.

US-based investment firm 777 Partners says it has been "overwhelmed" by interest from the market, following various offers to finance the company's growing fleet of Boeing 737 Max aircraft.

"We are evaluating several firm, interesting offers that we have on the table but have not ruled anything in or out at present," 777 Partners' co-founder and managing partner, Josh Wander, tells *Airfinance Journal* in an interview.

The company expects 29 737 Max aircraft from its orderbook with Boeing to be delivered to customers in 2022.

The firm also recently announced an order for another 30 737 Max aircraft, including both 737 Max 8s and extended Max 8-200s, expanding its commercial aircraft portfolio to 68 aircraft.

Wander says 777 Partners is seeing a "sharp return" in market value for the 737 Max 8, with demand recovering faster than anticipated.

"Our own view of the value of the aircraft is that it will continue to return to its position as a highly desirable aviation asset," he says, adding: "There are no better assets to enable that than the most efficient and cost-effective narrowbody aircraft in the market, the 737 Max."

Airfinance Journal's Fleet Tracker shows that nine aircraft have been delivered to 777 Partners to date, in operation with Canadian ultra-low-cost carrier (ULCC) Flair Airlines. The carrier's fleet will grow to 30 aircraft by mid-2023.

"Flair has a baseline plan for 2022 which will see it adding quite significantly to its existing fleet, although it too retains some flexibility to accommodate market conditions," adds Wander.

He explains that 777 Partners' investment approach is insight-driven rather than opportunistic.

"Our strategy was conceptualised and crystallised before the pandemic from empirical observations of an industry encumbered by legacy technology and lack of commerciality," he says. "We're pleased to be the holder of capital assets to allow our affiliate airlines to benefit from our expertise and scale in acquisitions and capital management. It's a model that has been used very successfully by some other smart aviation investors."

Low-cost carriers will continue to drive the recovery, believes 777 Partners, particularly in domestic markets with historically less competition.

"Our conviction about the cause and commercial viability of democratising duopolistic markets has deepened, particularly as the demand for domestic air travel returns with a vengeance following the pandemic-induced hiatus.

"Low-cost operators are driving the return of demand, and increased industry-wide interest in utilising software to restore route networks and evolve revenue models have validated our thesis," adds Wander.

Bonza

Wander's firm has announced plans to back Bonza, a new independent Australian budget carrier, which aims to launch operations in early 2022, taking eight 737 Max 8s this year.

Bonza's market entry is expected to bring increased competition and drive down the cost of domestic travel in Australia, one of the world's largest domestic aviation markets without an independent low-cost airline.

"We're pleased to have two operators in markets which are geographically and seasonally quite different. Our intent is to allocate our aircraft strategically, to where they add most value. Bonza has publicly announced that it is intending to introduce up to eight aircraft in its first 12 months of operation.

Tim Jordan, Bonza's chief executive officer, has also commented on the great advantage afforded it by being able to flex its fleet deliveries up or down depending on market conditions.

"The stark reality of an anti-competitive commercial airline sector in Australia is that the cost of domestic travel is amongst the highest in the world, and many secondary and tertiary destinations have been neglected to concentrate capacity on higher-yield trunk routes," says Wander.

"When most Australians are priced out of domestic air travel, it's bad for the country economically and socioculturally. Making all of Australia, not just major markets, accessible and affordable to visit is not just a mission for Bonza but a business model," he adds.

While Wander did not rule out the potential for longer-range international routes long term, he says the focus will be on building domestic connectivity in underserved regions.

"There are enough neglected cities and towns around the country to restore and establish service to keep the focus domestic in the near and mid term," says Wander. "Longer term, if it is good for Australians and good for the airline to explore international destinations, Bonza will do so."

"Low-cost operators are driving the return of demand, and increased industry-wide interest in utilising software to restore route networks and evolve revenue models have validated our thesis."

Josh Wander, managing partner, 777 Partners

Lease factors plumb nonsensical depths

The sale and leaseback market for new-technology aircraft continues to boom, with lease rate factors down to levels that have confounded industry leaders. By **Dominic Lalk**.

Panellists at the *Airfinance Journal* Asia-Pacific 2021 conference have confirmed that the sale and leaseback (SLB) market, especially on new-technology aircraft, is still red hot, with lease rate factors down to levels that "just don't make sense".

"For us financiers, it's the same as lessors. Through this crisis we've seen so much liquidity that lease rate factors, on a sale and leaseback, are now down to a level that doesn't make any sense. Everyone is chasing the same assets. It is super competitive," says Natixis global head of aviation finance, Singapore-based Jean Chedeville.

In their market review and assessment, the aviation finance top executives also agree that global aviation is on the mend, with recovery markers observed in all key markets, except Asia-Pacific.

"There is only one region that is lagging behind and that is South-East Asia, and Asia in general," says Chedeville. "But everywhere else, in all other parts of the world, we are seeing markets recovering."

Orix Aviation chief executive officer, James Meyler, observes there is no demand-side issue and that there has not been one throughout the pandemic.

"I'd say I'm very optimistic, but I'd caveat it in the sense that what we've seen hasn't been a demand-side crisis, or recession, or anything else. It's been a supply side issue," he says.

"Governments have stopped travel. People did not want to stop travelling. The US case clearly shows this. When they opened again, the market came back very strongly and when people couldn't fly transatlantic, they flew to South America or Mexico. Then we saw the same happening in Europe. Once we saw the vaccination passport rolled out, numbers rebounded very quickly. People are flying. Demand is there," adds Meyler.

Development Bank of Japan vice-president, Tomoki Fujisaki, agrees, noting there "definitely is pent up demand for travel", adding that "a lot of it comes from huge accumulated household savings".

Despite the hardships faced by airlines, lessors and passengers in Asia, the long-term outlook for the region is not changing, agree the experts.

"The long-term outlook for Asia hasn't changed. It will be the largest aviation market. That said, where we hope to see improvement is in the capital markets," says Paul Ng, a Singapore-based Milbank partner.

"On the finance front, what we have not seen here in Asia is large-scale capital markets funding to the lessors and airlines. A few Chinese lessors have issued bonds, the likes of BOC Aviation, but we would like to see more capital markets involvement and perhaps more structured capital markets involvement," says Ng. "I think the banks will get more engaged again once the airlines can show positive or close to positive cash flow."

Session moderator Joe O'Mara, KPMG Ireland's head of aviation finance, quizzed the panellists on potential airline bankruptcies in 2021 and into next year.

"It's a very strange crisis we're in, very different from previous crises. There is no liquidity shortage this time, in the sense that there's government monies, there's money from the markets or from new investors chasing any assets available," says Natixis's Chedeville.

"If this crisis has shown one thing it's that you need to do business with trusted partners: lessors that you know, airlines that you know. If you work with people like that and you deploy your capital in a structured manner you limit your risk and potential for losses," the Natixis aviation banker says, noting he is most concerned about the low-cost carriers in Asia because they are very rarely getting government support.

"On the lessor side, we've given huge forbearance to airlines that haven't filed for bankruptcies. A lot of that has helped their survival," says Orix's Meyler.

"As soon as we see markets opening up again and airlines get back to flying cash-flow positive, it's not going to be the time that the lessor banks then turn on the customers having waited so long for their recovery, so I don't think that will automatically trigger a wave of bankruptcies. It wouldn't be in anybody's interest for that to happen," adds Meyler.

"History will later show that it was the lessors and the banks that kept this industry going here in Asia, except for a few notable exceptions like SIA, which has seen strong government support. They've given so many deferrals and other concessions," says Milbank's Ng.

"I feel that for airlines to get out of this malaise they would need cash flow, which could come from banks or with assistance from lessors. In the case of lessors, what we are seeing is their amenability to possibly take some form of convertible debt or possibly even equity in the airlines. Banks and bondholders would obviously be less amenable to that because their business has nothing to do with running an airline. To get cash flow back to the airlines, we're seeing some of those conversations happening," he adds.

O'Mara observes "a building consensus of the positive long-term impact the crisis may give to lessors in that they have managed this crisis very well, with regards to the support and flexibility shown to airlines, the liquidity buffers they provided".

He then asked the panel if this could fuel a "meaningful" and long-term shift to leasing.

"It has been shown that lessors are able to access pools of funds at low rates partly because of their ability to pool assets. Their risk profiles are quite different from airlines; they could access cheaper funds. In a crisis they are definitely more resilient," says Milbank partner Ng.

"If you look at Asian lessors, there's a strong concentration in China, some in Japan. They are very different markets. Japan is very developed, savvy, and able to access very complex financings. China, on the other hand, is gorging on very basic bank debt and parent support. They do want to open up and access more complex financing structures in the future but, for now, amid the industry distress, they will just continue doing what they know and are used to," says Ng.

The most financing demand in the current market is for new-technology narrowbody aircraft, agree the panellists. However, certain mid-life aircraft remain in high demand, too.

"I think the focus has shifted a bit with the crisis, at least from a banking perspective," says Natixis's Chedeville. "Modern-technology aircraft are obviously better assets, but we are back to placing more emphasis on the lessee credit. Before, as a bank we used to focus about 50% on the asset and 50% on the credit. Today, the mix is different. What's important nowadays is, 'How much funding commitments do they have, how much have they been able to get throughout the crisis?' After that you look at the asset."

Good signs for **Chinese air cargo**

With less than 200 dedicated freighters in service, there is plenty of room for growth in China for air cargo operators, **Elsie Guan** reports.

In late December, SF Express-affiliated cargo carrier SF Airlines added its latest Boeing 767-300 freighter, growing the fleet to 68 freighter aircraft.

SF Airlines is China's largest cargo carrier. Its affiliates include China Postal Airlines, Tianjin Air Cargo and Central Longhao Airlines.

There are fewer than 200 dedicated freighters in service in China, less than 4.5% of all commercial aircraft registered on the mainland, compared with more than 600 freighters in the USA, according to statistics provided by the Chinese government.

Hongmei Liu, chief executive officer (CEO) of Ningxia Cargo Airlines, tells *Airfinance Journal* that a lack of freighter pilots limits China's air cargo development.

"China has a big appetite for freighter aircraft, but training of pilots cannot keep up," Liu comments.

She also notes that some Chinese cargo carriers have strict requirements on the age of freighters, limiting options.

"Freighters are in increasingly high demand worldwide since the beginning of the Covid-19 pandemic. I feel that foreign cargo operators are faster than us when they procure and lease freighters," says Liu.

Formerly known as Shaanxi International Freight – a Shaanxi state-owned logistics enterprise – Ningxia Cargo was created in 2013 by the commerce department of Shaanxi province with investment from Shaanxi Xixian Aviation Industry Development.

Earlier this year, Ningxia Cargo talked to several aircraft lessors about leasing 737-800 freighters.

"The biggest challenge for us is to combine supply chain with cargo transportation. There is huge logistics demand in China. Many logistics companies, however, are not experienced and professional in freighter leasing and operations," says Liu.

She thinks air cargo operators should continue to capture "golden opportunities" during the pandemic, especially when bellyhold capacity has not been restored.

At the *Airfinance Journal* 2021 Asia-Pacific conference, Shoro Ryu, senior vice-president business development and aircraft trading at Arena Aviation Capital, said that dedicated freighter capacity would remain in demand even as bellyhold freight returns in the post-pandemic era.

Hongmei Liu, chief executive officer, Ningxia Cargo Airlines

Ryu pointed out that the network for passenger airlines will shape the belly freight market when it returns.

"The passenger network is going to change after the pandemic. People will avoid travel to the major hubs and it will evolve more into the point-to-point way and that may have an impact on belly capacity. Therefore, the belly freight that was supposed to go to the hubs will be shifted and dedicated freight capacity will be required," said Ryu.

The cargo market has undergone a large transformation over the past 18 months and is 60% to 70% above normal levels, according to Ryu.

"I do not think the current high freighter market will last forever and obviously some extremes are going to moderate, but I believe the dedicated freight demand is going to continue," she added.

The Chinese government says it is encouraging competition among logistics providers, including dedicated air freight providers.

In that vein, JD Express, formerly known as Jiangsu JD Cargo, is expected to introduce its first aircraft – a 737-800 Boeing Converted Freighter – into its fleet in early 2022.

JD Logistics is a wholly-owned subsidiary of JD, a Chinese B2C online retailer. JD Logistics is planning to use Nantong Xingdong airport as JD Express's main hub.

JD Express won preliminary approval from the Civil Aviation Administration of China in 2021.

"Without long-term supply chain commitments, it is risky to introduce new freighters. Whether cargo airlines, especially medium and small cargo airlines, should expand their cargo fleets following supportive policies needs to be considered cautiously," a source from JD Logistics tells *Airfinance Journal*.

In terms of new freighters versus converted freighters, Stuart Rubin, vice-president, managing director, aviation, at ICF, thinks there will always be a place for new freighters. He notes that demand for new Boeing freighters is at record levels.

"From my perspective, there are relative considerations around sustainability, whether it should be a new freighter or a converted freighter," says Jeffrey Lam, president, commercial aerospace, at ST Engineering.

"What I expect in the coming months is that all aircraft lessors and owners will be actively looking at fleet options," adds Lam.

In November, Danish shipping company AP Moller Maersk ordered two 777 freighters as part of plans to grow its air freight capacity.

The 777Fs will be operated by Star Air, Maersk's in-house aircraft operator, and are the company's first 777 orders.

Airbus, in late 2021, launched the A350 dedicated freighter programme, with initial commitments from Air Lease, Air France and Singapore Airlines. French logistic company CMA CCM Group placed the first order for type with four A350F units in December.

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Door opens for more lessor deals

Expect more mergers, acquisitions and lessor consolidations in the leasing industry in 2022, but also watch out for newcomers trading in the market. **Laura Mueller** reports.

What a difference a year can make. In 2020, operating lessors were fretting over deferral requests and battling power-by-the-hour contracts as the pandemic forced carriers to axe routes and park hundreds of aircraft.

Few industries were hit as hard. Passenger traffic in April 2020 was 96% lower than April 2019 and stayed 60% below 2019 levels throughout the year.

Net 2020 losses totalled $137.7 billion (revised up from previous estimates of $126.4 billion) for the global airline industry, according to the International Air Transport Association.

All talk about lessor consolidation was firmly placed on the backburner.

A year later, and finally some relief came into view with airline industry losses falling to $52 billion.

At the same time, lessors began to review the collateral damage of Covid-19 as lease rate factors of 0.4 and 0.5 took hold of the tribal industry vocabulary and a highly leveraged airline industry emerged.

The time to sell for those that had already been looking to do so became increasingly clear.

This moment of refocusing resulted in three lessor sales, with one creating the largest merger in aviation history.

Is the price right?

After years of sales talks and denials, General Electric finally secured an exit from aviation leasing on 9 March 2021.

A few weeks later, on 29 March, Fly Leasing, including 84 aircraft and seven engines, was sold to Carlyle Aviation Partners.

As 2021 came to a close, another lessor sale was confirmed and another portfolio remained subject to due diligence.

Still, like many New Year resolutions, predictions about the future direction of consolidation and M&A activity in the leasing market often change and usually are aspirational.

However, in a new operating environment dominated by "Aercas", the mega lessor, will 2022 bring more M&A activity and consolidation as lessors look to stay competitive?

"Although the question is a natural one, especially given the recent merger, I don't think you can dismiss the formation of new entities and trading platforms," said Air Lease's chief executive officer (CEO), John Plueger, speaking on lessor panel at ISTAT Americas last November.

"It's not binary... there's a lot of capital here, so while there may be some consolidation...we will also have additional capital that will start trading platforms in this space," he says.

Consolidation is in the eye of the beholder, according to Aircastle's CEO, Michael Inglese. He believes lessors will react if they "start to feel like the new 1600-pound gorilla is doing things that they couldn't do before, and if they feel like they need to respond in a sort of relative size game."

However, he does not believe consolidation is a "giant imperative".

He says: "It'll probably happen after we see more of a recovery ...but I don't think it's imminent. In time, you'll see some more consolidation as different players in different platforms realise there may be benefits to leveraging your operating infrastructure."

Consolidation is not anything new, stressed Peter Barrett, SMBC Aviation Capital (SMBC AC) CEO.

"There's always been consolidation. All the businesses on this panel, except for ALC, have been traded at some point in the last 10 to 15 years, and a couple of times. It's just the natural cycle of things. I think the market tends to talk about it a lot when a big trade like the one that's just happened happens.

"But that's part of the cycle, so I don't like trying to say 'we'll draw a line from that deal', then say that that's what everybody else has to do. It is a little bit over-simplistic. If opportunities come along and sellers see good value, they'll do deals, and if they don't, they won't."

Barrett's comments came just days after the ISTAT Americas event when *Airfinance Journal* exclusively revealed that SMBC AC was in the process of acquiring Goshawk Aviation.

The portfolio first came to market in December 2019, with interest from BOC Aviation, Blackstone, Bain Capital/Griffin, Castlelake, CDB Aviation, DAE and SMBC AC.

At that time, SMBC AC was seen as the likely buyer for the portfolio.

Goshawk then pulled the sale process after bidding levels did not meet its pricing requirement of book value, say sources.

Then, in March 2021, renewed interest emerged from lessors, including Apollo/Merx, Castlelake and Macquarie Airfinance.

Sources indicate that the sale has been agreed on but is subject to due diligence.

According to *Airfinance Journal*'s Lessor Top 50 2021, the deal would bring together the market's number five, ranked by units, and number 20.

Goshawk was launched in November 2012 by Investec and two initial co-shareholders, Chow Tai Fook Enterprises and the Cheung Kong Group. Cheung Kong later sold its stake to NWS and then set up leasing firm Accipiter.

Investec offloaded its stake in Goshawk in 2017 to the two existing shareholders, leaving them each with a 50% stake.

It is this shift in ownership that has been happening across various platforms, according to Plueger.

"So, here's what's different now, versus maybe three or four years ago... I'm surrounded by Japanese money. It's not just consolidation that has happened in the industry, but a change in ownership," he says.

Speaking directly to the panel, Plueger adds: "There's a lot of change. I don't think you all would have known three or four years ago that you'd be sitting where you are now with your shareholders."

The changing landscape "adds to the nature of the business and the robustness of the platforms", he insists, "and I think that will just continue".

Smaller is beautiful

While scale has always been important for lessors, especially for raising capital efficiently, has it become more so following the sale of the world's largest leasing company by number of aircraft?

ISTAT lessor moderator, Dana Barta, an executive director of airline debt capital markets at JP Morgan, asked panellists whether it matters that Aercap now has 2,000-plus aircraft? Can lessors achieve scale benefits by being smaller?

"I think scale does matter, but I think at some point there's a place where it becomes potentially a dis-synergy. I don't think it's linear or exponential. There could be the second derivative of the curve that certainly turns negative somewhere in terms of size, and the first derivative of the curve probably also turns negative at some size," said Aviation Capital Group's CEO and president, Tom Baker.

He adds: "So, it used to be five [$ billion], and then that became 10, and 10 is maybe now 12 to 15, or 18 to 20, but you don't need to be 50 [$ billion]. And at some point 50 might become too

unwieldy. I do think that at some point, there's certain escape velocity that comes with it."

In an interview with *Airfinance Journal* following Aercap's takeover of Gecas, DAE CEO, Firoz Tarapore, 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 there are real diseconomies of scale in our business. 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.

BOC Aviation also told *Airfinance Journal* the combination is "generally good for the major players in the industry", because it removes an overhang. However, the lessor noted there is nothing that it has seen that suggests "being a behemoth confers any benefits relative to an adequately scaled business [generally more than $10 billion in aircraft assets]." As a result, it did not see the merger as anticompetitive.

According to Baker, diminishing returns of scale are evident once lessors have greater funding options.

"Once you can finance yourself in the senior secured capital markets, your cost of capital improves, you're able to do big deals and you're more relevant across the entire RFP [request for proposals] – that stuff's important," he says. "But, after a certain point, I don't. I don't think there's a scale benefit."

Barrett agrees. "I think you hit the nail on the head there. I think you need scale to get investment-grade ratings... and having the right cost of capital is critically important, and you need a certain scale to do that. But do you need to be $50 billion or $30 billion, I don't think so, and I think it brings some challenges before it brings some opportunity.

"Ultimately, Gus [Aengus Kelly, CEO of Aercap] will have to deal with the 2,000 aeroplanes and $50 billion balance sheet, and I'm sure they will make a good fist of it and do well. But I think it's going to bring different opportunities and challenges that'll play out over the next few years. Certainly, a level of scale is important, but I don't think it's the be all end all."

Scan the leasing sector, and it is clear capital is chasing a growing industry. Operating lessors now account for more than 50% of the global aircraft market in terms of units, up from just 43% in December 2019, based on *Airfinance Journal*'s data.

Lessors have also financed more than 60% of all new aircraft deliveries since the beginning of 2020.

This growth has led market observers to question whether there is too much liquidity in the leasing market. The assumption is that certain lessors will potentially be put on self-destructive autopilot, ignoring sensible investment criteria because of an abundance of liquidity on offer.

That's a very narrow reading of the market, according to Plueger.

"Who would rather work in a broke industry, one that had no money anywhere; versus, a well-funded and a well-capitalised industry?" he asks. "This is an industry fundamentally needed by the world. If that were not the case, we wouldn't have liquidity all over the place, so the bottom line is liquidity is great.

"And to all these airlines that have gone through a tremendously difficult time, they still have capital being put to them. I think we need to all recognise that and feel good about it. It is a great time to be working in our space because we have capital available. I would not want to be on the other side," adds Plueger.

This is partly, or even mostly, about aviation leasing "performing well" through all the challenges of the past 30 years, says Barrett. "So, I am not surprised about the amount of capital. Ultimately, yes, it brings challenges such as in the sale and leasebacks, but I think it's good. I think a liquid industry is much better than an illiquid one for all of us."

Aircastle's CEO reckons liquidity is "a little bit of a double-edged sword" because of the increased competition and the resulting pricing levels seen in sale and leaseback transactions.

Yet aviation has continued to attract capital because "it provides pretty nice returns with pretty low volatility compared to a lot of other things that people can do with their money", he adds.

Tourist attractions

In conversations with financiers, the subject of private equity comes up again and again.

Market observers agree the interest in acquiring leasing companies is increasing from private equity money driven by asset under management growth targets.

While private equity was surprisingly absent in the Aercap merger, it has materialised in two other lessor sales.

On the heels of news that SMBC AC is to acquire Goshawk, *Airfinance Journal* also revealed advanced talks between Carlyle Aviation Partners and AMCK regarding the purchase of the Hong Kong SAR-based lessor's portfolio.

The move came just three months after Carlyle completed the purchase of Fly Leasing.

According to *Airfinance Journal*'s Lessor Top 50 2021, the deal would bring together the market's number 14, ranked by units, and number 21.

Another version of the private equity narrative is that the investment is merely tourist capital that will eventually disappear.

"I think some of them will, some of them won't. I mean, in the last 30 years, we were all tourists once," says Barrett. "But I have no doubt that some leasing companies that are starting today backed by private equity or something else, some of them will thrive and do well. They won't all become an SMBC AC, ACG or Aircastle, but some will, and that's a good thing."

Speaking at *Airfinance Journal*'s Miami event in August 2021, Hudson Structured Capital Management's founder and managing partner, David Andrews, explained the change in appetite from private equity firms.

He noted that private equity historically has looked at higher return levels than what aviation can offer; however, more recently, funds are on the hunt for investments with lower returns, which has played into the sector.

As the capital base continues to develop and mature in the leasing sector, that money is becoming pickier, says Baker.

"You have pockets of capital that have a very specific investment thesis and very specific set of assets, or a tranche within an asset class, or a certain age. You know, some people have a thesis that they're drilling down into, getting to work on, and I think that's different. That's the goal."

According to Baker, investors are starting to "take the scalpel to ways to make money" in the leasing sector, "and that's good because it makes the deployment of capital more efficient, and it should make the pricing of capital for consumers of that capital more efficient. Probably not enough room for everybody to make the returns that they're hoping to make in this space, but there's definitely a lot of room for people to continue to put capital work in very smart, very specific, very targeted ways."

But not all lessors are looking for scale through M&A activity.

Nordic Aviation Capital, which filed for Chapter 11 bankruptcy protection on 17 December, plans to build scale by shifting its focus from regional aircraft to narrowbody units.

The lessor is looking to add 100 narrowbodies during the next five years primarily through purchase and leaseback deals and new aircraft orders (it currently has an order with Airbus for 20 A220-family aircraft).

So, with plenty of liquidity still sloshing around the global markets, and investors equipped with lower return expectations, forecasting further M&A activity and consolidation in 2022 seems less aspirational and more like an easy prediction to make.

Big, and getting **bigger**

Not many chief executive officers can claim two mega-acquisitions in the aircraft leasing industry, especially in less than eight years. Aercap's Aengus Kelly has. *Airfinance Journal* sits down with him in Dublin to reflect on the two acquisitions, the integration process and the lessor's next priorities.

Every lessor's ambition is to be the number one aircraft leasing firm in the world, however, that got shot out of the skies in March when Aercap announced plans to acquire the GECAS leasing business, as well as the engine, helicopter and materials businesses from General Electric.

The 1 November completion of the acquisition marked the second major M&A transaction for Aercap in less than eight years.

In between, the airline and aircraft leasing market environments have been different. And so were the interest rates and liquidity in the marketplace.

Aercap's chief executive officer (CEO) and executive director, Aengus Kelly, tells *Airfinance Journal* in an interview that there are similarities and very big differences between the two deals.

"We announced that deal [with ILFC] in 2013, and at that point we were coming out of the financial crisis. AerCap was a much smaller company than ILFC. At the time ILFC was almost four times our size. That made for a very different type of transaction with significant uncertainty around how we would manage a much bigger business," he says.

Kelly adds that Aercap did not wake up one day thinking GECAS would be attractive.

"With the Board, we would always look at the competitive landscape and assess which businesses would be attractive, would we be able to execute on it, and whether there is a party willing to sell at a price that makes sense to us and to them."

Kelly recalls that, in 2019, price expectations were extremely high.

"The Covid-19 pandemic followed, and much like the ILFC transaction, AerCap had looked at the business two to three years before the acquisition. We knew what we liked; what we were not so keen on and when GE decided to go back to its industrial roots, and we saw that there was an opportunity."

Kelly says that when negotiations were in full swing by the end of 2020, Aercap felt it had dealt with the worst effects of the pandemic.

"AerCap was in good shape with plenty of capital and a strong balance sheet. We'd shown we could access the bond market and we were confident that we could complete this transaction," he says.

But he recalls that what Aercap agreed with AIG and Bob Benmosche, its president and CEO, was very instructive for GE and its chairman and CEO, Larry Culp.

"Bob knew that the aviation market was going to recover. He knew that on the day of agreeing the sale to AerCap there would be a significant loss on his books, but he also knew that by taking stock in the combined business, he would ride the upcycle," he says.

"GE is the largest engine manufacturer in the world and so had a wide lens into the aviation industry and they felt the same way. Having a shareholding in AerCap is effectively reverse engineering an IPO of GECAS making it a much quicker and more efficient way to monetise their stake in GECAS," he adds.

Kelly says that the banks' underwriting of the transaction (see box, Financing the GECAS transaction) was "crucial" because without this, GE was not going to do a transaction subject to a financing risk.

M&A trend

Other platforms have been up for sale over the past two years, but Kelly points out that the GECAS strategy was similar to Aercap's on the portfolio side.

"Other targets were out there, but if they were growing by acquiring others at let's say 1.2-1.3 times the book value equity of the target leasing company, then to get back to the right book value they would need to take a significant hit to get it back to anywhere near where it would be attractive, because their starting price is so much higher. As a result, it is harder for the equity to sell when they have been buying off other lessors to create the portfolio or through overpriced M&As. Those targets are not attractive," he says.

He adds: "We saw a lot of new entrants in the sector during that six-year stretch following the end of the financial crisis. Investors were attracted by the yields, and by assets that provide good risk-adjusted returns. At the time, we had extraordinarily low global bond yields and interest rates were close to zero. So, anything looked attractive. But what the pandemic has shown is that if you don't have a global platform and an infrastructure, you are not able to deal with the problems that come at you or move aircraft quickly."

"I don't see competition from China going away, but it will be more focused and that is a good thing because the industry is too fragmented."

Aengus Kelly, chief executive officer, Aercap

Kelly sees more consolidation in the marketplace, especially around new entrants.

"I think those platforms where the owners don't have the infrastructure and who have overpaid for assets are realising that it is a tougher business than initially anticipated. It is not a spread business where if you borrow at two and lend at five, you make money. We will see a number of those entrants leave the space and look to be part of some form of consolidation," Kelly says.

He sees a couple of champions emerging out of China. "I don't see competition from China going away, but it will be more focused and that is a good thing because the industry is too fragmented."

Integration process

Kelly says the principal integration tasks will occur during 2022.

"The integration is all about the processes, the IT systems, the structure and the people," adds Kelly.

He says that the IT systems will be a "huge focus" over the next 12 months.

"We have selected the systems we want and now we need to implement those to support the increased level of activity. This is a very significant task but is something we have done before."

Kelly says that the vast majority of the decisions on the personnel side have been made.

"A lot of decisions have been taken because we had six months to prepare before the transaction closed. What we need now is people to work together. There are a lot of similarities between the two businesses but there are differences too, because of the ownership structures. We never had a parent to call on. It is just us. So that brings a type of culture that is extremely focused on execution every day," he says.

These are the key parameters that are very important for the long-term success of Aercap, according to Kelly.

"If we do those well, the rest will look after itself. The valuation of aircraft, the demand trends or the funding aspects, all come from the building blocks of the business. The commercial and trading aspects will take care of themselves if the underlying fundamentals of the business and how we operate work correctly," he adds.

The integration of the ILFC business was initially about the same timeline. Kelly recalls the relocation of the business to Dublin was three years after the announcement. It took a couple of years to build that up when Aercap replaced Amsterdam and Los Angeles with the head office in Dublin.

He sees no difference this time around. "Some parts have a longer tail, so there will be different parts of the integration that will drag on a bit longer. The ILFC integration was more challenging because it was

multiple times our size. This [GECAS] will be difficult too, and there will be parts that take time, 24 months at least. However, the key decisions have been made."

Aercap plans to keep Dublin as its head office but will continue to have a very large presence in Shannon, which will be a key office, like Singapore in Asia, according to him.

Non-core business

Kelly sees an improving performance in the helicopter business, backed by the utilisation of the fleet.

"What we saw was an industry that has had many difficulties since 2014. It still has some challenges, but it has turned the corner because of the oil and gas recovery. It is still a tough asset, but we definitely see improving trends," he says.

Kelly says the Aercap balance sheet is about $76 billion, and the helicopter business represents about 6%.

"Milestone Aviation is the biggest player in the helicopter market. You can put the number two, three, four players together and they don't reach the size of Milestone. We have the right team managing the business. The business is turning, and we are confident in its future." he says.

Asset sales

Like in 2014, the market expects some asset sale activity from the GECAS portfolio. Post the ILFC transaction, Aercap sold $2 billion-worth of assets versus $1 billion initially anticipated.

"You will definitely see sales as this is part of our business of recycling capital," he says. "Whatever we sell has to be attractive to the buyer. If we sell a portfolio of assets, we want to be paid a fair price. There are certain assets we want to dispose of, then the buyer should get a price that works for them too. We will employ the same asset disposal strategy we had post the ILFC acquisition and shape the portfolio accordingly."

Kelly points out the main difference between now and eight years ago, when Aercap had to sell assets rapidly because of the leverage point the company was then at. "We had to get the ratings back to investment-grade. This transaction is different because the company was coming into it with low leverage and we were buying a business that was slightly smaller than ourselves. The leverage ratio was already investment-grade and we are already lower than the anticipated debt-equity ratio."

He adds: "Post-ILFC, we had a non-investment-grade balance sheet so there was pressure to dispose of assets then but that is not the case this time round. The leverage was more than four to one, whereas today we are starting at 2.8 times. Of course, we will sell assets but that will not be out of necessity."

> *"There are supply-chain constraints and that is not going to change. I don't see narrowbody production going to 75 rate a month."*
>
> **Aengus Kelly**, CEO, Aercap says of the A320neo family production rates

Aercap and GECAS have traded assets over the past four years through joint-venture platforms while retaining management/servicer fees.

"There is certainly an appetite for capital to come into this sector. This capital will discriminate. It will not want to be associated with sub-scale businesses. The pandemic has shown the importance of having a global platform with the right infrastructure," he adds.

Kelly says the industry has matured tremendously over the past 20 years and it is far more professional. "Everybody understands the business far more, and that is evidenced by the amount of capital the leasing industry is able to raise."

How will Aercap work on evaluating the aircraft acquired from GECAS? For Kelly the age of the portfolio is not an indicator of risk.

"The quality of the portfolio is the main indicator of risk. If you buy an A320ceo or 737NG you do not want to be buying the younger versions of those assets. These aircraft will be in demand for the next decade. So why would you buy one that was manufactured in 2018? The financiers will see this happen long before that and this will be reflected in the pricing." he says.

Kelly adds that older assets are "fine" from an investment point of view.

"What would you prefer: a three-year-old 777 or a 15-year-old one? he asks.

"You'll lose a fortune on a three-year-old aircraft, because that aircraft will not be in service in 15 years' time and you'll probably have paid $165 million for it. "

He adds: "In comparison, a 15-year-old aircraft won't have that problem as you will lease it out for the next ten years and therefore, you'll have consumed its remaining economic value in that timeframe."

Production rates

Kelly does not believe new aircraft production rates will reach 75 units a month.

"Airbus has delays, albeit not as big as Boeings. But there are supply-chain constraints, and that is not going to change in the near term. I don't see narrowbody production going to a rate of 75 a month," he states.

He explains that engine manufacturers have no interest in doing this because their business model is based on overhauling engines over a 25-year period.

According to Kelly, there is also plenty of capacity in the market, with no shortage of Neos.

Kelly says there are several hundred slots in the Neo production line available to leasing companies between 2023 and 2025.

"We have slots, and we know there are lots of airlines that want to operate Neos.

"Airbus tells airlines they cannot sell any slots, but I am telling you that the airlines can get the slots they want from the leasing companies."

The GECAS portfolio is opening or consolidating some markets for Aercap. The combined businesses will add 100 customers, a portfolio of more than 2,000 aircraft, more than 900 engines and over 300 helicopters, as well as an orderbook of about 450 aircraft.

In May 2014, the combined Aercap-ILFC entity owned and managed 1,300 aircraft, serving more than 200 customers. The orderbook was about 350 units.

"I cannot think of any customers of more than 20 aircraft that we don't do business with," says Kelly.

Aercap's biggest customers now include American Airlines, United Airlines, China Southern Airlines and Southwest Airlines, and there could be an opportunity to grow a further presence in some markets.

Kelly admits that Aercap could do more business with Ryanair, Easyjet and Wizz Air, the top three low-cost carriers in Europe, only if that "makes sense".

He says: "I don't want to have some airlines represented on a pro-rata basis. Growing the business is not the number one task. The aircraft are leased and the orderbook is placed well into the future. The engine business gives us another arm when it comes to placing aircraft, but I don't think there will be a change in the aircraft placement strategy."

Kelly admits the end of 2020 was difficult for lessors regarding power-by-the-hour (PBH) requests.

"If you wanted to get your aircraft up and flying, you had to give PBH to the airlines. Your hope was that summer 2021 was strong on the narrowbody market, and that turned out to be the case," he says.

"If you were to lease an aircraft today, you want to get your aircraft in the air for summer 2022 and you'll probably have to give three or four months PBH during the winter," he adds.

"Despite the virus, I do think in the narrowbody market capacity will be close to 2019 levels in most parts of the world during 2022," he says, adding that Europe

and North America were at 80% of capacity in October, and China was at 100% of 2019 levels, but South-East Asia was still lagging behind.

"On the widebody segment, the North Atlantic market is huge. We'll have to see the impact of the Omicron variant and how other markets cope with this.

Kelly sees government intervention to help airlines financially should the winter prove very challenging again.

"I think they will. 18 months ago, governments were uncertain about traffic resuming but they needed it as part of the critical infrastructure of the country. Now it is clear to governments that this variant [virus] will pass, traffic will come back, and airlines don't need as much support as they needed before."

He adds: "I think the governments will be there for them because the world has moved on and is better prepared than in February 2020. It was a more difficult decision to take back then."

He also points out that airlines have used the capital markets to refinanced government aid.

"One thing for sure is that airlines want to delever their balance sheet and build resilience. That means they will not buy as many aircraft, but will lease more," he states.

"The vast majority of the deliveries by the OEMs [original equipment manufacturers] today are to leasing companies, either from the orderbook or the sale and leaseback market. I am sure that by 2024 we will see the leasing sector owning over 50% of the world fleet. I think we are close to this number by asset value already," he adds.

Sustainability

Aercap was one of the first lessors to publish annual environmental, social and governance (ESG) reports and set out clear targets.

"The 'E' is probably more prominent at the moment, but the 'G' has always been very important. We are a public company, and we talk regularly to our shareholders where this has been a growing issue. Many of the large investment funds have ESG departments which are growing in influence, so it is important for AerCap to lead the industry on the issue," says Kelly.

The lessor aims to own 75% new-technology aircraft by 2024. "This is increasing our target. If you buy older technology assets, in time you will come under pressure from the environmental lobby, as well as from shareholders. Given the size of the portfolio it would not be optimal to switch the existing technology to a whole new technology fleet this side of 2030, but it will happen in the next decade," he says.

Should lessors back sustainable aviation fuel (SAF) or new-technology aircraft?

Kelly is in the SAF camp, because it is the only viable technology.

"Boeing's CEO, David Calhoun, has said hydrogen is for 2050. Politicians can say whatever they want but that is not going to happen. We are not going to have hydrogen aircraft in large scale, carrying a large number of passengers, for a long time. For something that is going to be viable in 15 years, they need to be working on it now," he states.

However, Kelly firmly believes the market will have new technology between now and 2050 with open-rotors, or in some other forms of combination with electric power vehicles.

"In the course of the next 10 years, SAF is the answer," he says, adding that for SAF to work, costs will have to come down, because it is a multiple of Jet A1 prices.

"Unless governments are willing to get behind it to subsidise the cost, then I doubt the consumers will pay for it. It would be unreasonable to think that airlines in one part of the world are forced to fly using SAF and pay the premium to operate while others are not. They simply wouldn't be able to compete, so a global coordinated approach is needed. It will have to be done over time and will need significant government support. It is good it has been identified as a solution but there is a lot to be done," adds Kelly.

He sees new aircraft programmes coming to the market. "We will see something in the 2030s," says Kelly.

Financing the GECAS transaction

Aercap completed the acquisition of GECAS from General Electric (GE) on 1 November. Under the terms of the transaction agreement, GE received 111.5 million newly issued Aercap shares, about $23 billion of cash and $1 billion of Aercap notes. Post-completion, GE owned about 46% of Aercap's outstanding shares.

To finance the acquisition, Aercap co-issued $21 billion of senior unsecured notes in aggregate on 29 October. The GECAS acquisition notes consist of $1.75 billion aggregate principal amount of 1.15% senior notes due 2023; $3.25 billion aggregate principal amount of 1.65% senior notes due 2024; $1 billion aggregate principal amount of 1.75% senior notes due 2024; $3.75 billion aggregate principal amount of 2.45% senior notes due 2026; $3.75 billion aggregate principal amount of 3% senior notes 2028; $4 billion aggregate principal amount of 3.3% senior notes due 2032; $1.5 billion aggregate principal amount of 3.4% senior notes due 2033; $1.5 billion aggregate principal amount of 3.85% senior notes due 2041; and $500 million aggregate principal amount of floating-rate senior notes due 2023.

Aercap completed the acquisition of GECAS from General Electric (GE) on 1 November

The notes are fully and unconditionally guaranteed on a senior unsecured basis by Aercap and other Aercap subsidiaries.

In connection with the GECAS transaction, a $2 billion institutional secured term loan was entered into on 5 November. The proceeds from the loan were used to repay the amount borrowed under the term loan credit agreement. On 1 November, Aercap Trust and AICDC co-issued $1 billion of 1.899% senior unsecured notes due 2025 to a subsidiary of GE in connection with the closing of the GECAS transaction. The bridge credit facility and the term loan credit agreement were terminated in connection with the closing of the GECAS transaction.

A321neo – better times returning

No aircraft has been immune to the impact of Covid-19 on its sales, but Airbus's largest single-aisle looks to have suffered less than most. **Geoff Hearn** looks in more detail at the aircraft's prospects.

The Airbus A321 is becoming the most popular model in the A320 new engine option (Neo) family. The largest member of the range garnered close to 500 orders in 2019 compared with about 300 for the baseline A320neo model.

The situation in 2020 and 2021 is, of course, distorted, but the trend has continued with Airbus selling more than twice as many of the larger model than of the baseline variant.

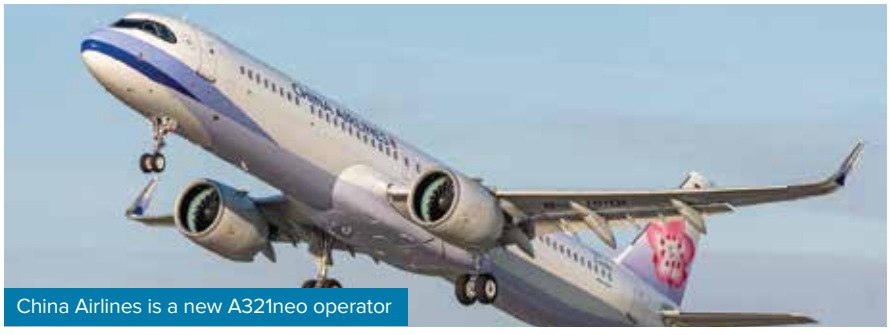
A321neo sales have been helped by the addition of longer-range variants – the A321LR and A321XLR. The manufacturer suggests the long-range variants can tap into new long-haul markets, which were not previously accessible with single-aisle aircraft. The models do appear to be having some success in replacing ageing Boeing 757s and 767s that have been the mainstay of low-density long-haul routes.

A321LR

The A321LR variant provides extended range for the A320neo family's longest fuselage version with the capability to operate sectors of up to 4,000 nautical miles (7,400 km) with 206 passengers. The additional range is achieved by increasing the maximum take-off weight (MTOW) to 97 tonnes and by augmenting the fuel capacity with three additional centre fuel tanks.

A321XLR

The A321XLR variant has a range of about 4,700 nautical miles. It features a further increased MTOW of 101 tonnes, and is fitted with a rear centre fuel tank and an optional forward additional centre tank. Other significant changes include structural reinforcements and a modified landing gear, enhanced braking capability, higher tyre speed, and additional flap and slat configurations. Airbus is targeting 2023 for the XLR's entry into service.



China Airlines is a new A321neo operator

Market outlook

There is no doubt that A321 sales have been hit by the Covid-19 pandemic – combined 2020/21 orders are below the number achieved in 2019. However, the manufacturer appears bullish about the future and expects the single-aisle segment to lead a recovery – with passenger traffic returning to pre-Covid levels between 2023 and 2025.

In May 2021, the company provided suppliers with an update of its production plans for the A320 family, which cited rates as high as 75 a month by 2025.

What proportion of these will be A321 models is unclear, but recent strategic steps suggest that the larger model will play an increasing role in production plans for Airbus's network of international production facilities. The European manufacturer announced in November 2021 that it will produce and deliver A321s in China by expanding its final assembly line in Tianjin. The new production is scheduled to begin in July 2022 and will add to the capabilities in Germany (Hamburg) and the US (Mobile, Alabama).

In a related development, Airbus is modernising its production in France by replacing the A380 line in Toulouse with a facility capable of producing A321neos.

Orders and deliveries picking up

Recent developments in the market suggest that momentum is returning to the commercial aircraft market. The Dubai air show in November 2021 saw large orders for the A321 models in particular. Indigo Partners portfolio airlines placed a firm order for 255 A321neos, including 29 XLR versions. Lessor Air Lease Corporation (ALC) signed a commitment for 111 aircraft that included 55 A321neos plus 20 XLRs (ALC firmed up its orders in late December and added four additional A321neos to the original letter of intent). Jazeera Airways committed to 28 of the type.

The US domestic air-travel market is recovering faster than many expected with some analysts forecasting that a return to pre-Covid demand will be registered by early 2022. Recent orders from US carriers suggest that airlines see a growing requirement for the Airbus model, with Delta Air Lines and United Airlines ordering an additional 100 A321neos between them in 2021.

A321neo orders and deliveries per year

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021 (to 1 December)
Orders	443	215	448	420	508	179	562	143	431	158	195
Deliveries	none	none	none	none	none	none	20	102	168	178	144

Source: *Airfinance Journal* Fleet Tracker, includes subsequently cancelled orders

The A321neo appears to be a good asset for lessors, as witnessed by the September 2021 deal between ALC and Spirit Airlines, which included long-term lease placements for 10 new A321neos. The aircraft are scheduled to be delivered to Spirit Airlines from ALC's orderbook with Airbus from 2023 through 2024.

ALC is also the lessor of the first A321neo delivered to China Airlines (CAL) at the end of November.

Altogether, CAL will acquire 25 A321neo aircraft, comprising 11 directly ordered from Airbus and 14 under lease agreements.

There is, however, room for caution on the A321neo's short-term future. The 167 cancellations announced by Airbus for the first 10 months of 2021 included 42 of the large single-aisle model.

Absent competitors

The A320neo family competes directly with the Boeing 737 Max range of models, which was grounded for most of 2019 and 2020. The worst of the Boeing aircraft's problems are perhaps behind it and the smaller members of the family will be able compete again with the A320. However, the main competitor to the A321neo is the Max 10, which has been considerably delayed. The first deliveries of the largest model in the Boeing family will not be before 2023.

Previous analysis by *Airfinance Journal* has shown the Max 10 to be competitive with the A321neo in terms of operating cost – offering a small advantage in trip and seat costs. However, the A321neo is a more capable aircraft and the late entry into service of the Boeing model may further handicap the US manufacturer's attempts to recapture market share.

Family background

The A321neo benefits from commonality with other Airbus products.

The second generation of the Airbus A320 family was launched in December 2010 and the new models were given the marketing designation Neo (new engine option) to distinguish them from the original A320-family members.

As in the original family there are three models: the baseline A320neo, the smaller A319neo and the stretched A321neo.

The new aircraft have between 15% and 20% lower fuel burn than the models they replace.

As the branding suggests, the most significant change between the two generations is the introduction of more advanced engines, which are responsible for the majority of the efficiency gains. The Neo family is offered with a choice of Pratt & Whitney's PW1100G-JM geared turbofan, or CFM International's LEAP-1A powerplant.

The A320neo models also incorporate as standard Airbus's sharklets, which

Sharklets can result in a 4% reduction in fuel burn

are large wingtip devices that the manufacturer says can result in a 4% reduction in fuel burn over longer sectors.

Commonality

The A320 shares the same fly-by-wire digital flight controls and cabin management systems with the other versions in Airbus's single-aisle aircraft family. Airbus says this commonality helps reduce the cost of pilot training and scheduling, while also lowering operations and maintenance costs. According to the manufacturer, the A320 family has a common pilot type rating, and transitioning to Airbus's widebody fly-by-wire A330 and A350 is facilitated by a so-called cross-crew qualification.

An Appraiser's view

Gueric Dechavanne, vice-president, commercial aviation services, Collateral Verifications (CV), assesses A321neo values

The current market demand for the Airbus A321neo has remained strong since its entry into service in 2017. Even as the Covid-19 pandemic hit, this aircraft type has continued to be the aircraft of choice for many airlines as markets have started to recover in certain parts of the world. This demand has kept values and lease rates fairly stable in the past 12 months, especially in comparison to other types.

Today, CV knows of only three aircraft listed as available for sale and/or lease. It is our belief that all of these will go back into service as the recovery continues.

Because of the pandemic, current market values have declined by between 5% and 7% for new and used aircraft. However, as certain regions started to recover, we have now seen this discount disappear because of the resurgence of demand for the type. This trend will most likely continue throughout 2022 as air traffic recovers and demand for aircraft returns.

In looking at the leasing market, new aircraft are now leasing for about $350,000 a month on average, which is about a $60,000 premium over the original A321. This is a slight decline of about 10% from 2019 but we expect the rates to start going back up as the recovery continues.

With the potential increase in production rates from Airbus, it may once again create some competition for lessors trying to place new aircraft, which may put pressure on lease rates. However, as fuel prices rise and airlines shift their focus to new-generation aircraft, such as the A321neo, we expect lease rates to remain stable and/or increase over time.

CV believes that the A321neo, with its quieter wide cabin, offering strong customer appeal, containerised cargo, commonality with other Airbus products, competitive choices of engines, fly-by-wire advantages and being a part of a family of single-aisle aircraft, will be in strong demand well through the next decade.

CV view of A321neo values and lease rates

Build year	2017	2018	2019	2020	New
Current market value* ($m)	42.7	44.3	46.7	49.4	59.3
Indicative lease rates ($'000s/month)	310	320	330	340	350

**Maintenance status is assumed to be half-life, except for new aircraft.*

Small widebodies struggle

The widebody market has been badly hit by the Covid-19 pandemic and is expected to be slower to recover than other sectors of commercial aviation. **Geoff Hearn** looks at how this might affect the smaller twin-aisle aircraft on offer from Boeing and Airbus.

Sales of small twin-aisle aircraft were at best sluggish before the Covid-19 outbreak and the pandemic ensured there was no upturn in 2020. There also was little improvement in 2021.

There are signs that a recovery in single-aisle sales and deliveries is underway and that at least the worst of Covid's impact on commercial aviation is over. However, the signs for widebodies are much less promising, with most forecasts suggesting that the twin-aisle market will be much slower to recover.

Neither the Airbus A330neo family nor the competing Boeing 787 models are showing much sign of an upturn in sales. The larger members of the families, the A330-900 and 787-9, are not faring much better, although the Dubai air show did see a commitment to four A330neos (which was later firmed as five A330-900s) by Air Lease Corporation (ALC) as part of an 111-aircraft deal for mainly single-aisle models.

There are some positive signs in the secondary market. In November, Monaco-based asset management company Stratos announced the delivery of the first of two A330-900's on long-term operating lease to French carrier Corsair. Commenting on the delivery, Brian Jeffery, chief commercial officer of Stratos, conceded that "placing widebodies in the Covid environment is a huge challenge".

Despite having its fair share of technical problems, the 787 programme has accumulated a healthy number of sales, but even the popular -9 model has struggled to regain any sales momentum and deliveries remain at depressed levels.

The story is similar for the A330-900. The situation for the smaller members of both the Boeing and Airbus families is worse. Orders for the A330-800 and the 787-8 were already in short supply before the pandemic and there are no signs of the situation changing, with just a single sale between them in 2021. The paucity of deliveries is also an indicator that the market is not picking up to any substantial degree.

A330-800 sales have not taken off

Deliveries and orders for the 787-8 have declined

Replacement market

Given the 787-8 has been delivered in substantial numbers, Boeing can perhaps afford to be relatively sanguine about the declining backlog for its smallest widebody. The same is not true for Airbus in the case of the A330-800. The European manufacturer continues to remain upbeat about the aircraft's future and it is true there appears to be a sizeable replacement market for which the A330-800 would seem well suited.

Candidates for replacement include the 767-300ER as well as the A330-200 and -300. According to *Airfinance Journal*'s Fleet Tracker, there are close to 1,000 of these types in service or stored, which are over 10 years of age.

Financing

The lack of deliveries has naturally led to a decline in financing activity, and the market's appetite for aircraft such as the 787 and A330 models has not been tested. However, as *Airfinance Journal* has reported over recent months, there is some increase in activity. For example, sources have indicated Turkish Airlines is in the market for bank debt, Japanese operating lease with call option (Jolco), sale and leaseback and guaranteed aircraft financing for a batch of narrowbody and widebody deliveries scheduled for next year. The deliveries are believed to include both the 787-9 and A350-900 models.

For Boeing, there are some worrying developments among the leasing community. Los Angeles-based ALC says it has cancelled orders for three 787-9 widebody aircraft amid "uncertainty" around the programme.

Deliveries per year

	Pre-2018	2018	2019	2020	2021 (to 1 December)
A330-800	none	none	none	3	1
A330-900	none	3	41	10	12
787-8	349	11	10	5	2
787-9	287	120	114	36	12

Source: Airfinance Journal Fleet Tracker

Orders per year

	Pre-2014	2014	2015	2016	2017	2018	2019	2020	2021 (to 1 December)
A330-800	none	10	none	none	none	8	6	1	none
A330-900	none	110	52	42	10	20	98	none	17
787-8	441	none	9	5	12	24	2	none	1
787-9	468	63	74	75	79	112	91	11	16

Source: Airfinance Journal Fleet Tracker. Includes subsequently cancelled orders

ALC's chief executive officer, John Plueger, says the lessor hoped to deliver as many as 16 787s in 2022, but this hinges on how quickly Boeing was able to resolve the production issues surrounding the type.

Operating cost

The claims by manufacturers regarding operating costs of their aircraft tend to focus on the gains compared with their respective previous-generation models. Airbus, for example, says the A330neos "bring a double-digit reduction in fuel burn". How the various latest models compare with each other is more difficult to ascertain.

Airfinance Journal regularly makes its own comparisons based on published data and prevailing economic conditions. Recent analyses have been carried out assuming fuel prices that have been driven down by reduced demand during the Covid-19 pandemic. However, a steady return to high fuel prices has been evident since about April 2020 and reached $2.30 at the turn of the year (2021/22). This relatively high price is closer to the assumption made by manufacturers when development decisions were being made on the latest-generation aircraft. In terms of cash operating cost comparisons, a higher fuel price favours the new-generation aircraft.

Indicative relative cash operating costs at recent fuel price

($2.3 per US gallon)

	787-8	A330-200	A330-800	787-9	A330-900
Relative trip cost	85%	Base	94%	89%	95%
Relative seat cost	79%	Base	90%	70%	77%

Assumptions: 4,000-nautical mile sector. Fuel consumption, speed, maintenance costs and typical seating layouts are as per Air Investor 2022.

The *Airfinance Journal* analysis indicates also that it increases the cash operating cost advantage of the 787 family over the A330neo models.

The analysis shows that all new-generation models offer double-digit savings in operating cost per seat compared with the A330-200 model. In some cases, the cost per seat is helped by the manufacturer introducing new cabin designs and augmented seating capacities in the latest models – even where there is no actual increase in cabin size from the corresponding previous-generation aircraft.

The 787 models have a significant advantage over their direct competitors. The cash operating cost per seat of the 787-8 is about 13% lower than that of the A330-800. The Airbus model does, however, have a greater range, which may sway the choice of some potential customers. The 787-9 versus A330-900 comparison is closer, but the Boeing aircraft still has a 10% lower unit cost, according to *Airfinance Journal*'s analysis.

Despite an earlier entry into service, the 787 models adopted more new technology than the A330neos, which rely largely on improved engine performance for their efficiency gains. The new technology contributed to a troubled development programme and entry into service of the 787-8 in particular, but in a high fuel-price environment the cost benefits of the new-technology increase.

The lower development costs incurred by Airbus on the A330neo may allow more competitive pricing to reduce or even negate any advantage of the Boeing models in total operating costs.

Small widebody leading characteristics

The smaller members of the Boeing and Airbus widebody families compete in the same market, but their development histories and technical capabilities differ significantly.

Airbus A330neos

Airbus formally launched re-engined versions of its A330-200 and A330-300 models in 2014. The replacement models were designated as the A330-800 and A330-900 respectively and, in line with the company's single-aisle family, were assigned the marketing designation Neo (new engine option). The aircraft are intended to complement the European manufacturer's A350 models and help compete against the smaller models in Boeing's 787 family.

The A330neos are the same size as the aircraft they replace, but incorporate an A350-style cabin, which allows an increase in capacity. The manufacturer says that compared with the original A330s, the new models can accommodate an additional 10 passengers, as well as offering range increases of about 1,000 nautical miles.

The Rolls-Royce Trent 7000 engine is the only powerplant available on the A330neo variants and contributes much of the fuel burn savings that new models offer over their respective predecessors. A new nacelle design adds to the improvements obtained by the installed engine. In addition to the new engine, the A330neos have an increased wingspan, resulting primarily from the adoption of wingtips based on the technology of the A350's sharklets.

In an apparent bid to increase sales, Airbus has introduced new variants of the A330neo models, which offer lower maximum take-off weights. This has some benefits in reducing operating costs, but sacrifices aircraft range. The variants could therefore be attractive for companies which intend to use the widebodies on routes that do not require the aircraft's full-range capability.

Boeing 787 family

The 787 family, which Boeing markets under the Dreamliner name, initially comprised three models, but the short-range 787-3 was dropped, leaving the 787-8 and larger 787-9. Boeing subsequently added the stretched 787-10 to its offering.

Boeing adopted a lot of new technology in the 787 design. Composites comprise about 50% of the primary structure (including wing spars and floor beams) and reduce weight by about 20% compared with earlier airframe designs. The 787 had a troubled development and the -8 model, which was the lead variant, entered service in 2011 – several years later than planned.

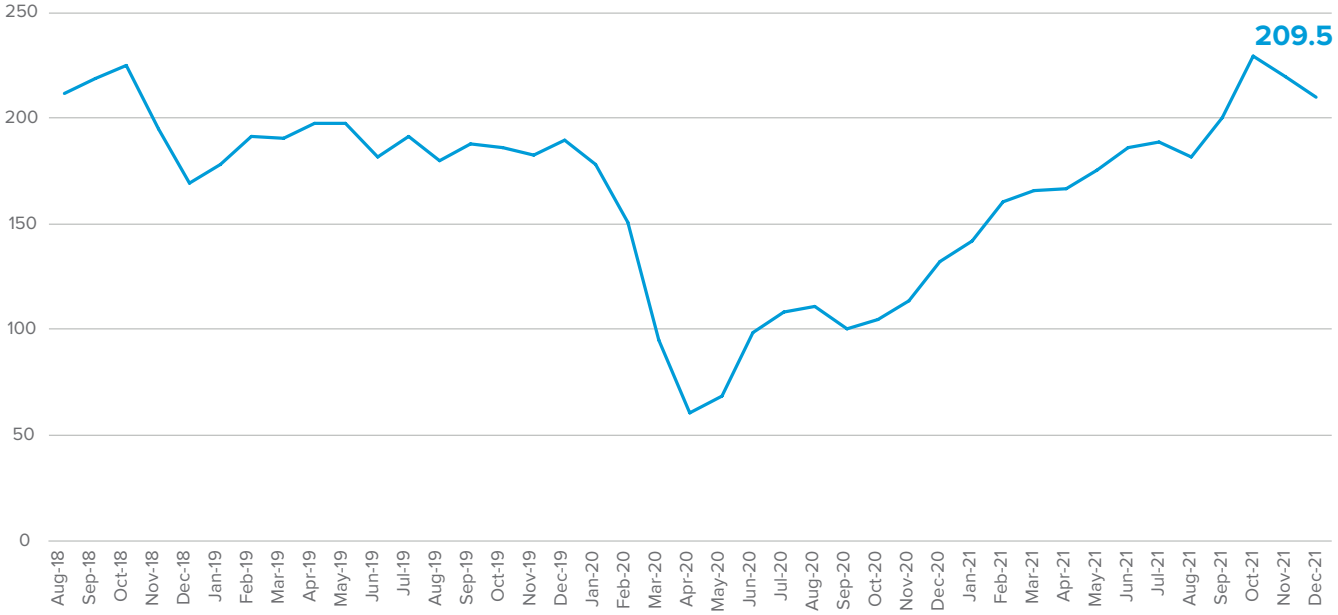
The 787 family offers a choice of two new-technology engines: the General Electric GEnx 1B and the Rolls-Royce Trent 1000 series, both delivering significantly improved fuel consumption and reduced noise and emissions compared with previous generation engines.

Competing small widebodies

Model	787-8	A330-800neo	787-9	A330-900neo
Maximum seats	359	406	408	440
Typical two-class seats	240-250	220-260	290-300	260-300
Typical range (nautical miles)	7,300	8,150	7,530	7,200
Entry into service	2011	2020	2014	2018

Source: Air Investor 2022

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



Source: *US Energy Information Administration*

Commercial aircraft orders by manufacturer

	Gross orders 2021	Cancellations 2021	Net orders 2021	Net orders 2020
Airbus (30 November)	167	134	33	268
Boeing (30 November)	630	360	270	-471
De Havilland of Canada	0	0	0	0
Embraer	98	0	98	20
ATR	29	0	29	5

Based on *Airfinance Journal* research and manufacturer announcements until 31/12/2021

Recent commercial aircraft orders (November-December 2021)

Customer	Country	Quantity/Type
Afrijet	Gabon	Three ATR72-600
Air Corsica	Spain	Five ATR72-600
Air France-KLM	France/Netherlands	100 A320neo family
Air Lease	USA	25 A220-300, 59 A321neo, 20 A321XLR, five A330-900, seven A350F
Akasa Air	India	72 Max 8/8-200
Atlas Air	USA	Four 777F
Binter	Canarias Spain	Four ATR72-600
CMA CGM Group	France	Four A350F
Easyjet	United Kingdom	19 A320neo family
Emirates	UAE	Two 777-200F
Frontier Airlines	USA	91 A321neo
Ibom	Air Nigeria	10 A220
ITA Airways	Italy	Seven A220, 11 A320neo, 10 A330neo
Jetsmart	Chile	21 A321neo, two A321XLR
Overland Airways	Nigeria	Three E175
TAROM	Romania	Three ATR72-600
UPS	USA	19 767F
Volaris	Mexico	39 A321neo
Wizz Air	Switzerland	75 A321neo, 27 A321XLR
777 Partners	USA	30 Max family

Based on *Airfinance Journal* research November-December 2021

Rating agency unsecured ratings

Airlines

	Fitch	Moody's	S&P
Aeroflot	BB(stable)	-	-
Air Canada	B+(stable)	Ba3(neg)	B+(neg)
Air New Zealand	-	Baa2(stable)	-
Alaska Air Group	BB+(neg)	-	BB(stable)
Allegiant Travel Company	-	Ba3(positive)	B+(stable)
American Airlines Group	B-(stable)	B2(stable)	B-(Stable)
Avianca Holdings	WD	-	D(NM)
British Airways	BB(neg)	Ba2(neg)	BB(neg)
Delta Air Lines	BB+(neg)	Baa3(stable)	BB(Stable)
Easyjet	-	Baa3(stable)	BBB-(neg)
Etihad Airways	A(stable)	-	-
Grupo Aeromexico	-	-	D(NM)
GOL	B-(stable)	B3(stable)	CCC+(positive)
Hawaiian Holdings	B-(stable)	B1(neg)	CCC+(positive)
International Consolidated Airlines Group	-	Ba2(neg)	BB(neg)
Jetblue	BB-(stable)	Ba2(Positive)	B+(Positive)
LATAM Airlines Group	WD	-	-
Lufthansa Group	-	Ba2(neg)	BB-(stable)
Pegasus Airlines (Pegasus Hava Tasımacılıgı Anonim Sirketi)	BB-(neg)	-	B (stable)
Qantas Airways	-	Baa2(neg)	-
Ryanair	BBB(Stable)	-	BBB(stable)
SAS	-	Caa1(neg)	CCC(neg)
Southwest Airlines	BBB+(neg)	Baa1(stable)	BBB(Positive)
Spirit Airlines	BB-(stable)	B1(positive)	B(positive)
TAP Portugal (Transportes Aereos Portugueses, S.A.)	-	Caa2(neg)	B-(watch neg)
Turkish Airlines	-	B3(neg)	B(stable)
United Airlines Holdings	B+(stable)	Ba2(neg)	B+(stable)
Virgin Australia	WD	-	-
Westjet	B(neg)	B3(positive)	B-(neg)
Wizz Air	BBB-(stable)	Baa3(neg)	-

Source: Ratings Agencies - 22/12/2021

Lessors

	Fitch	Moody's	S&P	Kroll Bond Ratings
Aercap	BBB-(stable)	(P)Baa3(stable)	BBB(stable)	-
Air Lease Corp	BBB(Stable)	-	BBB(stable)	A-(neg)
Aircastle	BBB(stable)	Baa3(Stable)	BBB-(stable)	-
Avation PLC	WD	-	CCC(Developing)	-
Aviation Capital Group	-	Baa2(stable)	BBB-(stable)	A-(neg)
Avolon Holdings Limited	BBB-(Stable)	Baa3(stable)	BBB-(stable)	BBB+(neg)
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)	-
Dubai Aerospace Enterprise	BBB-(Stable)	Baa3(stable)	-	BBB+(neg)
Fly Leasing	-	B1(Stable)	BB-(neg)	BBB-(neg)
Global Aircraft Leasing	-	B1(neg)	-	-
ICBC Financial Leasing	A(stable)	A1(stable)	A(stable)	-
ILFC (Part of Aercap)	BBB-(stable)	Baa3(stable)	-	-
Macquarie Group Limited	A-(Stable)	A3	BBB+(stable)	-
Marubeni Corporation	-	Baa2(stable)	BBB (positive)	-
Mitsubishi UFJ Lease	-	A3(stable)	A-(stable)	-
Park Aerospace Holdings	BBB-(Stable)	Baa3(Stable)	-	-
SMBC Aviation Capital	A-(neg)	-	A-(stable)	-
Voyager Aviation	B(Stable)	WD	-	WR

Source: Ratings Agencies - 22/12/2021

Manufacturers

	Fitch	Moody's	S&P
Airbus Group	BBB+(stable)	A2(neg)	A(neg)
Boeing	BBB-(stable)	Baa2(neg)	BBB-(neg)
Bombardier	WD	Caa1 (Stable)	CCC+(Stable)
Embraer	BB+(neg)	Ba2(neg)	BB(neg)
Rolls-Royce plc	BB-(stable)	Ba3(neg)	BB-(stable)
Raytheon Technologies Corp	-	Baa1(stable)	A-(neg)

Source: Ratings Agencies - 22/12/2021

How to become fabulously rich in uncertain times?

New opportunities are opening up in these uncertain times that could make some people fabulously rich, writes Adam Pilarski, senior vice-president at Avitas.

As mentioned in the past few columns, we have entered a period of much higher uncertainty than before. The upheaval caused by the worldwide pandemic leads everybody to examine their behaviour and products. The result will be a plethora of new firms and ways of doing business.

It seems obvious to me that this is the time for experimentation and for new ways of doing things that have remained routine for quite some time. That thought may frighten some people who appreciate the stagnant environment we have got used to for a few decades. The new realities, though, will enable some to make unbelievable fortunes and transform the world. We now live in a world of chances to take high-risk moves that can lead to unprecedented rewards. Historically, when bad things happen humans change directions. So, after the Dark Ages in Europe, a period of quite significant misery but also stability, we entered the Renaissance, which moved towards a period of highly positive changes in the human condition. The Second World War, which brought with it unspeakable suffering, was followed by tremendous improvements in our lives. In our industry, jets and radars were a direct result of the tragedies of that time.

It is my firm belief that the current hardships will eventually lead to a much better long-term environment for the human race. Following the German philosopher Friedrich Nietzsche, I believe in his statement: "What does not kill me makes me stronger." This goes together well with another pronouncement he made in 1883: "You still have to have chaos in you to be able to give birth to a dancing star."

When I express such sentiments to industry colleagues, I am always asked the following: "So, you say there are many new ideas to pursue which may in today's realities lead to riches and success. What should I do?" Below are some New Year ideas that may bring you personal happiness, fame and fortune.

One of the places where change is warranted is airline start-ups. We have not had many new airlines established in recent years. There are attempts now to start new ventures which will connect various localities. There are also many aircraft available to try new approaches. At the time of such periodic low as we have been experiencing, an innovative start-up may lead to a glorious future. Even greater opportunities exist in the manufacturing sector. Our industry experienced decades of stagnation – no real advances have been achieved for a long time. The frustration of the flying public with the same old realities is leading many entrepreneurs, visionaries and technocrats to try new revolutionary concepts.

Our author at the *Airfinance Journal* Dublin 2020 conference.

> *"It is my firm belief that the current hardships will eventually lead to a much better long-term environment for the human race."*

Airbus, of the traditional serious players, is talking about hydrogen aircraft by 2035. The strong movement towards carbon-free aviation spurs developments that incorporate electric vehicles starting with fairly small and short-range ones. It is my firm belief that once progress is achieved, more competitors will quickly join the race towards fully electric aircraft. Technological progress made with eVTOL units will eventually be transferred to other units.

Many of the radical advances will lead to a host of other accomplishments not just restricted to sources of fuel. I am still a firm believer that much higher speed aircraft will appear in the not too distant future, as will potentially new players in this competition.

If Jeff Bezos and Elon Musk could enter the space race, there is no reason not to expect them or other cash-rich and technology brilliant visionaries also to enter commercial aviation. Or other individuals we have not heard of, and not necessarily only in the USA.

A lot of quite exotic technologies are being discussed, including some by the serious players. These include wings moving to mimic the flight of birds or aircraft skin resembling that of sharks to reduce air resistance.

In addition to the tremendous progress being made in the field of technology, we should expect structural changes in our industry. Governments worldwide are more committed than before to help the air transport sector overcome the temporary setbacks brought about by the virus. More funds will be available for improvements in the field of basic research and air traffic control. This gives many ambitious and skilled individuals a chance to chart their glorious future. There are plenty of financial resources looking for a source of relatively safe and decent returns. I am positive some of you reading these words will find new ways of accessing these funds. The role of lessors will change in the coming years and some elements of decision-making (and taking risks but also getting rewards) will shift from airlines to lessors.

Overall, this is a time of more risk but definitely also of a greater chance of much higher returns. May you be skillful in selecting the right path and also please be lucky, which is an important part of success.

AIRFINANCE JOURNAL

An ***Airfinance Journal***

special supplement

Air Investor 2022

Narrowbodies **continue to lead**

Not surprisingly, narrowbodies remain the most popular types when it comes to remarketing potential, operational success, value for money and residual value – the four criteria in *Airfinance Journal*'s investor poll.

Since the start of the Covid pandemic, narrowbodies have increased their lead over the widebody aircraft, in the *Airfinance Journal*'s investor poll.

In 2021, the Boeing Max models benefitted from the gradual lift in bans from certain jurisdictions. The Boeing Max 8 was the star performer last year and recorded a 0.39-point improvement over the previous year to make the top five. The Max 10 was not far behind with a 0.30-point improvement.

Airbus's competitive products, the A321neo and the A320neo models, also recorded some improvements in 2021.

Once again, the A321neo was the clear winner in the single-aisle category and, for the first time, it led the way in all four criteria.

One pollster noted that the type has recorded four times more orders than the 737-10, adding: "The market has voted."

Second was the A320neo model with improved marks in all four categories.

The 737-800 came third, like in 2020, scoring better in three criteria than in the previous year. The model has benefitted from the Max crisis. Despite the ongoing replacement with the Max family, the 737-800 remains a key asset on the passenger side, while cargo conversion appetite continues to rise.

The lift in bans of the Max family gave investors confidence in the remarketing potential and residual values categories

Single-aisles

Aircraft type	Residual value	Value for money	Operational success	Remarketing potential	Overall score	Last year's score	Difference
A321neo	4.79	4.42	4.68	4.89	**4.70**	**4.54**	0.16
A320neo	4.60	4.30	4.55	4.68	**4.53**	**4.39**	0.14
737-800	4.05	4.32	4.79	4.17	**4.33**	**4.19**	0.14
A321	3.87	4.11	4.53	4.06	**4.14**	**4.05**	0.09
737 Max 8	4.24	4.00	3.74	4.33	**4.08**	**3.69**	0.39
A220-300	4.11	3.97	4.05	4.06	**4.04**	**3.88**	0.16
A320	3.43	3.95	4.63	3.74	**3.93**	**3.88**	0.05
737 Max 10	3.33	3.56	3.29	3.15	**3.33**	**3.03**	0.30
737 Max 9	3.11	2.95	2.78	3.19	**3.01**	**2.96**	0.05
737-900ER	2.79	3.47	3.11	2.61	**2.99**	**3.11**	-0.12
737-700	2.39	3.06	3.53	2.25	**2.81**	**2.74**	0.07
A319	1.90	3.10	3.65	2.00	**2.66**	**2.64**	0.02
A319neo	2.32	2.61	2.77	2.17	**2.47**	**2.29**	0.18
737 Max 7	2.50	2.56	2.50	2.29	**2.46**	**2.17**	0.29
C919	1.27	1.60	1.38	1.18	**1.36**	**1.38**	-0.02
ARJ21	1.19	1.25	1.25	1.08	**1.19**	**1.19**	0.00

The A321neo was the clear winner in the single-aisle category

last year and this is set to continue in 2022. However, Airbus continues to extend its lead with airlines by converting some 737 operators into A321neo customers. In December, it clinched the KLM Group (which also includes Transavia France) and Qantas Group (although this was announced as a memorandum of understanding) as new narrowbody Airbus customers.

As *Airfinance Journal* passed to press, Allegiant Air opted for the Max family to renew its Airbus fleet, but, Airbus could also clinch another Boeing operator in Europe: LOT Polish Airlines.

The proposed A220-500, a higher-capacity variant of the A220 family, could be a crucial part of negotiations between the European manufacturer and the Polish flag carrier.

The A220-300 enjoyed a successful year on the commercial side. The type has also benefitted from more diverse sources of financing from the investor community, as well as more leasing appetite. The A220-300 continues to attract many bids for sale and leaseback transactions at decent lease rate factors, when compared with other products. This was reflected in the investor poll with all four criteria.

Could it become the new darling of the industry?

"This aircraft type has proven to be successful so far and current operators seem to be satisfied with the aircraft. While Airbus has managed to attract interest for the type in North America and Europe among different carriers operating under various business models, it has yet to attract interest from Asian carriers," observes one financier.

The A220-100 market has yet to develop and it will be interesting if Airbus launches the larger A220-500 model.

Airbus current-technology narrowbody productions are almost completed. The A321 model continues to see strong marking in the four criteria, as some markets continue to upgauge. But there is an increasing distinction between younger and mid-life aircraft versus older assets. The type is being gradually replaced by the A321neo, which offers improved economics and better operational performance. The passenger-to-freighter conversion programme suggests that aircraft values will stabilise over time.

Widebody changes

The Covid pandemic has highlighted an acceleration to new-technology aircraft, and this was no more apparent than in the widebody market.

With capacity seriously hampered in international markets over the past two years, operators have used new-

The 737 Max 8 was the most improved aircraft in 2021

Twin-aisles

Aircraft type	Residual value	Value for money	Operational success	Remarketing potential	Overall score	Last year's score	Difference
A350-900	4.17	4.14	4.56	3.76	**4.16**	**3.81**	0.35
787-9	4.00	4.00	4.29	3.94	**4.06**	**3.95**	0.11
787-10	3.47	3.38	3.80	3.38	**3.51**	**3.4**	0.11
767-300ER	3.06	3.44	4.12	3.34	**3.49**	**3.5**	-0.01
777-300ER	2.72	3.67	4.22	2.65	**3.31**	**2.99**	0.32
A350-1000	3.29	3.24	3.53	2.94	**3.25**	**3.26**	-0.01
787-8	3.00	3.12	3.65	2.88	**3.16**	**3.08**	0.08
A330-300	2.39	3.61	3.89	2.41	**3.08**	**2.82**	0.26
A330-900neo	2.89	3.03	2.89	2.76	**2.89**	**2.99**	-0.10
777-9	2.93	3.08	2.78	2.69	**2.87**	**2.83**	0.04
A330-200	2.18	3.18	3.44	2.00	**2.70**	**2.4**	0.30
777-200ER	1.78	3.06	3.22	1.71	**2.44**	**2.14**	0.30
777-8	2.57	2.54	2.22	2.00	**2.33**	**2.26**	0.07
777-200LR	1.94	2.65	2.53	1.81	**2.23**	**1.86**	0.37
A330-800neo	2.15	2.41	2.11	2.13	**2.20**	**2.27**	-0.07
747-8 pax	1.88	2.38	2.50	1.63	**2.10**	**1.89**	0.21
A380	1.22	2.17	2.33	1.00	**1.68**	**1.44**	0.24

technology aircraft to resume or maintain services. A return to a more normal capacity will include more new-technology aircraft.

The A330 models and the 777-300ER entered the Covid-19 period against a landscape of oversupply and declining values and lease rates. But current-technology aircraft placements have happened since the onset of the pandemic and this was reflected in the A330/777-300ER performances in 2021, which showed year-on-year improvement.

One pollster believes that when international travel returns to normality, the 777-300ER will be the "best bang for the buck".

While the passenger life for those models may be limited as the years pass, the cargo conversion market could take some of the capacity next.

The 767-300ER has benefitted from a second life in the cargo conversion market over the past few years and, although Boeing continues to sell the 767F model, the market is moving to the 777 conversions.

The A350-900 and 787-9 continue to be the reference models in the widebody market. In fact, both have extended their lead over the past year, the investor poll shows.

In 2021, the A350-900 topped the charts after reporting a 0.35-point improvement over the previous year – the 787-9 improved by 0.11.

While the A350-900 enjoys large success from customers, it may also have benefitted from the technical issues around the 787-9 model, along with the ongoing restructurings of some 787 operators. Still, the A350-900 is not immune because it was impacted in the LATAM restructuring.

Beyond both successful models, the gap was further widened last year. Third came the 787-10 with a similar scoring than in 2019, and a slightly improved overall performance on 2020.

The 787-10 benefits from strong interest from full-service carriers – such as the A350-1000 – but as one pollster observes, its overall success could be impacted as the widebody market shifts to smaller widebody aircraft.

"We see the Boeing 787-10 aircraft as an asset with limited secondary market opportunities as operators tend to favour the smaller variant -9," says the financier.

The A350-1000 and the 787-8 remained fifth and sixth with no noticeable improvements over 2020.

The A330neo products have yet to convince pollsters. While interest for the A330-800 is limited, current backlog figures for the A330-900 suggest that operators are willing to shift from previous aircraft series to new aircraft programmes such as the A350 or the 787, notes one pollster.

Airbus sold the A330-900 model to Condor and ITA Airways in 2020, but the type has attracted non-tier one operators with the exception of Delta Air Lines, and this seems to penalise it.

Air Lease, Avolon and BOC Aviation are the main lessors on the programme (via direct orders) and total about 65 units, or about 20% of the orderbook.

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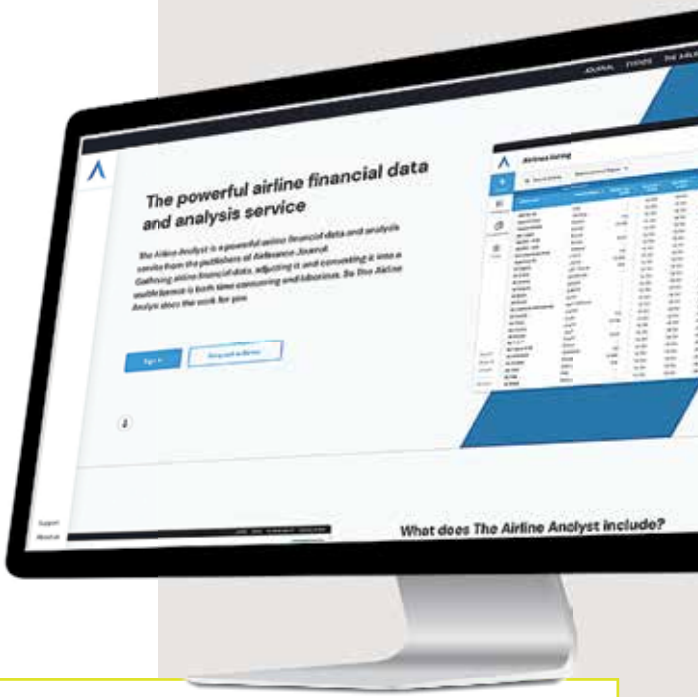

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The **numbers**

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, 2021. 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	50
Operators (current and planned)	10
In storage	5
On order	54
Build peak year (2019)	25
Estimated production 2022	15
Average age (years)	2.7
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$55-60 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$95-100 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per propeller hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are estimates based on similar aircraft types pending in-service confirmation of manufacturer claims.

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	128
Operators (current and planned)	28
In storage	7
On order	412
Build peak year (2018)	30
Estimated production 2022	60
Average age (years)	2.2
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$55-60 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$105-110 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per propeller hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are estimates based on similar aircraft types pending in-service confirmation of manufacturer claims.

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	none
Operators (current and planned)	5
In storage	none
On order	64
Built peak year	Not applicable
Estimated production 2022	Unknown
Average age (years)	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$100-105 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per APU hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are based on A319 current engine model pending confirmation of manufacturer's claimed reductions for new engine model.

Airbus A320

SEATING/RANGE	
Max seating	180
Typical seating	150
Typical range (with sharklets)	3,500nm (6,500km)
TECHNICAL CHARACTERISTICS	
MTOW	73.5 tonnes/78 tonnes
OEW	42 tonnes
MZFW	61 tonnes/62.5 tonnes
Fuel capacity	24,210 litres/27,200 litres
Engines	CFM56-5B/V2500
Thrust	25,000lbs (120kN)
FUELS AND TIMES	
Block fuel 200nm	1,850kg
Block fuel 500nm	3,390kg
Block fuel 1,000nm	6,080kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING CORPORATE JET VERSIONS)	
Entry into service	1988
In service	3,438
Operators (current and planned)	413
In storage	781
On order	45
Built peak year (2013)	352
Estimated production 2022	Unknown
Average age (years)	11.2
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$105-110 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per APU hour
Component overhaul	$210-220 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	1,296
Operators (current and planned)	121
In storage	57
On order	2,454
Built peak year (2019)	295
Estimated production 2022	250
Average age (years)	2.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$105-110 per engine flight hour
Engine LLP	$120-125 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per APU hour
Component overhaul	$210-220 per flight hour

Airbus A321

SEATING/RANGE	
Max seating	220
Typical seating	185
Maximum range	3,200nm (5,950km)
TECHNICAL CHARACTERISTICS	
MTOW	93.5 tonnes
OEW	48 tonnes
MZFW	73.8 tonnes
Fuel capacity	30,030 litres
Engines	CFM56-5B/V2500-A5
Thrust	27,000-33,000lbs (120-148kN)
FUELS AND TIMES	
Block fuel 200nm	2,310kg
Block fuel 500nm	4,230kg
Block fuel 1,000nm	7,590kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING -100s)	
Entry into service	1996
In service	1,462
Operators (current and planned)	132
In storage	200
On order	10
Built peak year (2013)	215
Estimated production 2022	Unknown
Average age (years)	9.2
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$60-65 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per APU hour
Component overhaul	$210-220 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	603
Operators (current and planned)	108
In storage	24
On order	2,998
Build peak year (2019)	127
Estimated production 2022	250
Average age (years)	1.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per APU hour
Component overhaul	$210-220 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	4
Operators (current and planned)	4
In storage	none
On order	11
Built peak year	Not applicable
Estimated production 2022	1
Average age	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100/flight hour
Engine overhaul	$265-270/engine flight hour
Engine LLP	$245-250/engine cycle
Landing gear refurbishment	$150-155/cycle
Wheels, brakes and tyres	$375-380/cycle
APU	$105-110/APU hour
Component overhaul	$420-425/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	54
Operators (current and planned)	26
In storage	7
On order	264
Build peak year (2019)	32
Estimated production 2022	24
Average age (years)	2.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$265-270 per engine flight hour
Engine LLP	$245-250 per engine cycle
Landing gear refurbishment	$150-155 per cycle
Wheels brakes and tyres	$375-380 per cycle
APU	$105-110 per APU hour
Component overhaul	$420-425 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	337
Operators (current and planned)	51
In storage	55
On order	366
Build peak year (2019)	80
Estimated production 2022	36
Average age (years)	3.4
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$295-300 per engine flight hour
Engine LLP	$270-275 per engine cycle
Landing gear refurbishment	$150-155 per cycle
Wheels brakes and tyres	$375-380 per cycle
APU	$105-110 per APU hour
Component overhaul	$420-425 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	51
Operators (current and planned)	14
In storage	6
On order	111
Build peak year (2019)	23
Estimated production 2022	24
Average age (years)	2.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$315-320 per engine flight hour
Engine LLP	$290-295 per engine cycle
Landing gear refurbishment	$150-155 per cycle
Wheels brakes and tyres	$375-380 per cycle
APU	$105-110 per APU hour
Component overhaul	$420-425 per flight hour

Maintenance reserves are based on A350-900 model pending confirmation of manufacturer's claimed reductions for new engine model.

Airbus A380

SEATING/RANGE	
Max seating	853
Typical seating	544 (four-class)
Maximum range	8,700nm (15,200km)
TECHNICAL CHARACTERISTICS	
MTOW	575 tonnes
OEW	277 tonnes
MZFW	369 tonnes
Fuel capacity	320,000 litres
Engines	GP7200/Trent 900
Thrust	70,000lbs (311kN)
FUELS AND TIMES	
Block fuel 1,000nm	26,590kg
Block fuel 2,000nm	50,580kg
Block fuel 4,000nm	104,290kg
Bock time 1,000nm	146 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	501 minutes
FLEET	
Entry into service	2007
In service	89
Operators (current and planned)	16
In storage	152
On order	2
Build peak year (2012)	30
Estimated production 2022	8
Average age (years)	7.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$160-165 per flight hour
Higher checks reserve	$145-150 per flight hour
Engine overhaul	$195-200 per engine flight hour
Engine LLP	$200-205 per engine cycle
Landing gear refurbishment	$200-205 per cycle
Wheels brakes and tyres	$565-570 per cycle
APU	$155-160 per APU hour
Component overhaul	$575-580 per flight hour

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
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	52
Operators (current and planned)	23
In storage	6
On order	15
Build peak year (2019)	10
Estimated production 2022	6
Average age (years)	5.2
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$35-40 per flight hour
Higher checks reserve	$25-30 per flight hour
Engine overhaul	$100-105 per engine flight hour
Engine LLP	$30-35 per engine cycle
Landing gear refurbishment	$20-25 per cycle
Wheels brakes and tyres	$35-40 per cycle
Component overhaul	$115-120 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
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	461
Operators (current and planned)	105
In storage	103
On order	162
Build peak year (2015)	79
Estimated production 2022	24
Average age (years)	5.7
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$35-40 per flight hour
Higher checks reserve	$25-30 per flight hour
Engine overhaul	$100-105 per engine flight hour
Engine LLP	$30-35 per engine cycle
Landing gear refurbishment	$20-25 per cycle
Wheels brakes and tyres	$35-40 per cycle
Component overhaul	$125-130 per flight hour

Boeing 737-800

SEATING/RANGE	
Max seating	189
Typical seating	162
Maximum range (with winglets)	3,115nm (5,767km)
TECHNICAL CHARACTERISTICS	
MTOW	79 tonnes
OEW	41.1 tonnes
MZFW	61.7 tonnes
Fuel capacity	26,020 litres/40,580 litres
Engines	CFM56-7B
Thrust	27,300lbs (121kN)
FUELS AND TIMES	
Block fuel 200nm	2,000kg
Block fuel 500nm	3,530kg
Block fuel 1,000nm	6,190kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	1998
In service	4,414
Operators (current and planned)	268
In storage	409
On order (nominal)	33
Build peak year (2016)	408
Estimated production 2022	None
Average age (years)	8.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$45-50 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$80-85 per APU hour
Component overhaul	$210-220 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	334
Operators (current and planned)	104
In storage	38
On order	3,007
Build peak year (2018)	194
Estimated production 2022	240
Average age (years)	3.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$45-50 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$80-85 per APU hour
Component overhaul	$210-220 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	68
Operators (current and planned)	14
In storage	3
On order	224
Build peak year (2018)	20
Estimated production 2022	60
Average age (years)	3.0
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$70-75 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$45-50 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$80-85 per APU hour
Component overhaul	$210-220 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	210
Operators (current and planed)	19
In Storage	None
On order	45
Built peak year (2019)	18
Estimated production 2022	12
Average age	8.8 years
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$100-105 per flight hour
Higher checks reserve	$75-80 per flight hour
Engine overhaul	$165-170 per engine flight hour
Engine LLP	$255-260 per engine cycle
Landing gear refurbishment	$65-70 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$105-110 per APU hour
Component overhaul	$250-260 per flight hour

Boeing 777F

SEATING/RANGE	
Max Payload	102 tonnes
Maximum range	4,970 nm (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	214
Operators (current and planed)	29
In Storage	none
On order	66
Built peak year	25
Estimated production 2022	18
Average age (years)	6.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$125-130 per flight hour
Higher checks reserve	$90-95 per flight hour
Engine overhaul	$290-295 per engine flight hour
Engine LLP	$450-455 per engine cycle
Landing gear refurbishment	$160-165 per cycle
Wheels brakes and tyres	$480-485 per cycle
APU	$105-110 per APU hour
Component overhaul	$400-410 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	752
Operators (current and planned)	54
In storage	80
On order	9
Build peak year (2016)	89
Estimated production 2022	12
Average age (years)	9.0
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$125-130 per flight hour
Higher checks reserve	$90-95 per flight hour
Engine overhaul	$295-300 per engine flight hour
Engine LLP	$450-455 per engine cycle
Landing gear refurbishment	$160-165 per cycle
Wheels brakes and tyres	$480-485 per cycle
APU	$105-110 per APU hour
Component overhaul	$410-415 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	333
Operators (current and planned)	52
In storage	44
On order	43
Build peak year (2014)	104
Estimated production 2022	12
Average age (years)	6.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-115 per flight hour
Higher checks reserve	$80-85 per flight hour
Engine overhaul	$300-310 per engine flight hour
Engine LLP	$305-310 per engine cycle
Landing gear refurbishment	$75-80 per cycle
Wheels brakes and tyres	$100-105 per cycle
APU	$105-110 per APU hour
Component overhaul	$315-320 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	525
Operators (current and planned)	74
In storage	43
On order	322
Build peak year (2018)	120
Estimated production 2022	12
Average age (years)	4.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-115 per flight hour
Higher checks reserve	$85-90 per flight hour
Engine overhaul	$310-315 per engine flight hour
Engine LLP	$320-325 per engine cycle
Landing gear refurbishment	$75-80 per cycle
Wheels brakes and tyres	$100-105 per cycle
APU	$125-130 per APU hour
Component overhaul	$320-325 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	60
Operators (current and planned)	14
In storage	1
On order	124
Build peak year (2019)	29
Estimated production 2022	6
Average age (years)	2.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$120-125 per flight hour
Higher checks reserve	$90-95per flight hour
Engine overhaul	$315-320 per engine flight hour
Engine LLP	$320-325 per engine cycle
Landing gear refurbishment	$75-80 per cycle
Wheels brakes and tyres	$105-110 per cycle
APU	$125-130 per APU hour
Component overhaul	$330-335 per flight hour

De Havilland of Canada Dash 8 400

SEATING/RANGE	
Max seating	90
Typical seating	74
Maximum range	1,100nm (2,040km)
TECHNICAL CHARACTERISTICS	
MTOW	30.5 tonnes
OEW	17.8 tonnes
MZFW	29 tonnes
Fuel capacity	6,700 litres
Engines	PW150A
Thrust	5,070shp
FUELS AND TIMES (LR cruise)	
Block fuel 100nm	480kg
Block fuel 200nm	740kg
Block fuel 500nm	1,550kg
Bock time 100nm	44 minutes
Block time 200nm	65 minutes
Block time 500nm	126 minutes
FLEET	
Entry into service	1999
In service	416
Operators (current and planned)	80
In storage	149
On order	29
Build peak year (2010)	54
Estimated production 2022	TBD
Average age (years)	10.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$30-35 per flight hour
Engine overhaul	$150-155 per engine flight hour
Engine LLP	$45-50 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$45-50 per cycle
APU	$55-60 per APU hour
Propeller	$15-20 per flight hour
Component overhaul	$145-150 per propeller 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	659
Operators (current and planned)	29
In storage	28
On order	171
Build peak year (2016)	88
Estimated production 2022	30
Average age (years)	6.8
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	$75-80 per engine flight hour
Engine LLP	$105-110 per engine cycle
Landing gear refurbishment	$30-35 per cycle
Wheels brakes and tyres	$50-55 per cycle
APU	$55-60 per APU hour
Component overhaul	$150-160 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	17
Operators (current and planned)	7
In storage	5
On order	13
Build peak year (2019)	7
Estimated production 2022	6
Average age (years)	2.5
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	$35-40 per cycle
Wheels brakes and tyres	$55-60 per cycle
APU	$70-75 per APU hour
Component overhaul	$18-185 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	29
Operators (current and planned)	13
In storage	4
On order	142
Built peak year (2021)	18
Estimated production 2022	30
Average age (years)	1.8
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$35-40/flight hour
Engine overhaul	No data
Engine LLP	No data
Landing gear refurbishment	$35-40/cycle
Wheels, brakes and tyres	$55-60/cycle
APU	$70-75/APU hour
Component overhaul	$180-185/flight hour

Maintenance reserves are estimates based on E195 model pending in-service feedback and confirmation of claimed savings.

Sukhoi SSJ100

SEATING/RANGE	
Max seating	108
Typical seating	98
Maximum range (basic version)	1,645nm (3,048km)
Maximum range (LR version)	2,470nm (4,578km)
TECHNICAL CHARACTERISTICS	
MTOW (basic version)	45.8 tonnes
MTOW (LR version)	48.5 tonnes
OEW (basic version)	24.3 tonnes
OEW (LR version)	25.1 tonnes
MZFW (basic version)	36.6 tonnes
MZFW (LR version)	37.4 tonnes
Fuel capacity	13,135 litres
Engines	PowerJet SaM146-1S17/8
Thrust	17,800lbs with automatic power reserve
FUELS AND TIMES	
Block fuel 200nm	1,150kg
Block fuel 500nm	2,340kg
Block time 200nm	46 minutes
Bock time 500nm	83 minutes
FLEET	
Entry into service	2011
In service	130
Operators (current and planned)	36
In storage	59
On order	212
Build peak year (2018)	28
Estimated production 2022	12
Average age (years)	5.7
INDICATIVE MAINTENANCE RESERVES	
Insufficient data available	

New aircraft market values ($ million)

Model	Avitas view	CV view	IBA view	ICF view	MBA view	Oriel view	Average
Airbus							
A220-100	30.3	33.66	32.8	31.0	34.1	33.4	**32.6**
A220-300	35.2	38.26	37.4	36.5	38.5	38.2	**37.4**
A319neo	37.2	-	39.0	-	35.8	-	**37.4**
A320*	42.4	42.04	38.2	42.5	39.4	38.8	**40.6**
A320neo	50.0	50.63	49.6	51.2	50.3	50.9	**50.4**
A321*	47.8	46.4	48.7	48.5	48.3	46.3	**47.7**
A321neo	59.0	59.3	57.4	58.1	57.7	60.4	**58.6**
A330-800	89.3	-	91.6	-	92.1	77.0	**87.5**
A330 900 (neo)	99.8	105.27	101.6	105.6	107.4	95.0	**102.4**
A350-900	149.0	147	146.0	154.6	146.1	135.0	**146.3**
A350-1000	156.8	160.9	160.6	160.0	168.6	147.0	**159.0**
A380	171.0	110.6	176.3	-	105.0	-	**140.7**
ATR							
ATR42-600	15.7	14.56	15.6	16.2	15.5	14.5	**15.3**
ATR72-600	18.8	19.11	21.2	19.2	19.9	15.6	**19.0**
Boeing							
737-800*	37.1	32.6	33.3	43.5	38.7	17.6	**33.8**
737 Max 8	46.4	48.06	48.1	47.5	47.9	49.1	**47.8**
737 Max 9	48.3	48.6	49.6	48.9	48.7	52.2	**49.4**
767F	80.6	88.45	69.0	80.0	82.2	80.0	**80.0**
777-300ER	141.6	130.5	124.9	143.0	134.3	120.0	**132.4**
777F	165.6	166.3	141.9	165.0	166.4	163.0	**161.4**
787-8	114.2	104.8	94.7	115.6	117.5	98.0	**107.5**
787-9	139.2	129.9	138.9	145.3	141.0	134.0	**138.0**
787-10	146.3	144.3	153.8	148.0	154.4	142.0	**148.1**
De Haviland							
DHC 8-400*	19.5	21	20.2	20.3	20.0	16.8	**19.6**
Embraer							
E175	27.1	25.6	25.9	-	30.4	23.1	**26.4**
E190-E2	32.3	29.25	31.1	-	32.0	30.6	**31.1**
E195-E2	34.2	32	34.9	-	36.1	32.3	**33.9**
Sukhoi							
SSJ100	-	18.8	21.2	-	-	-	**20.0**

** values for last year of build*

New aircraft lease rates ($'000s per month)

Model	Avitas view	CV view	IBA view	ICF view	MBA view	Oriel view	Range
Airbus							
A220-100	210-245	235	215	210-230	221	230	**210-245**
A220-300	235-270	270	230	240-260	249	270	**230-270**
A319neo	240-290	-	264	-	227	-	**227-290**
A320*	265-310	260	210	275-300	250	275	**210-310**
A320neo	285-335	300	297	315-380	319	315	**285-380**
A321*	285-330	300	269	320-360	306	285	**269-360**
A321neo	325-380	350	338	350-430	366	400	**325-430**
A330-800	620-700	-	686	-	562	660	**562-700**
A330 900	655 - 740	700	716	660-750	655	740	**655-750**
A350-900	880 - 995	850	876	940-1,100	890	895	**850-1,100**
A350-1000	900 - 1,100	1025	1,074	1,050-1,250	1,028	975	**900-1,250**
A380	765 - 830	675	1,234	-	640	-	**640-1,234**
ATR							
ATR42-600	115-135	105	131	110-135	122	120	**105-135**
ATR72-600	115-140	135	160	130-165	157	145	**115-165**
Boeing							
737-800*	210 - 245	250	237	285-325	252	125	**125-325**
737 Max 8	265 - 310	300	288	275-340	303	295	**265-340**
737 Max 9	265 - 310	305	297	285-340	309	315	**265-340**
767F	450 - 555	700	280	400-430	633	635	**400-700**
777-300ER	920 - 1,015	850	935	790-970	819	855	**850-1,015**
777F	1,135 - 1,260	1250	1,092	950-1,200	1,000	1,085	**950-1,260**
787-8	630 - 710	700	634	700-875	716	705	**630-875**
787-9	805 - 910	850	832	900-1,100	860	810	**805-1,100**
787-10	835 - 945	900	952	950-1,150	941	910	**835-1,150**
De Haviland							
DHC 8-400*	125-150	150	141	165-180	150	150	**125-180**
Embraer							
E175	170 - 195	223	164	-	241	175	**170-241**
E190-E2	190 - 225	210	198	-	203	210	**190-225**
E195-E2	220 - 260	225	216	-	229	220	**216-260**
Sukhoi							
SSJ100	-	140	198	-	-	-	**140-198**

** values for last year of build*

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