The 2022 Cirium Fleet Forecast (CFF) predicts the delivery of some 44,500 new passenger and freighter jet and turboprop aircraft over the 20 years between 2022 and 2041, worth an estimated $2.9 trillion (2022$). It covers aircraft sized from 30-seats upwards and their freighter equivalents.

The forecast is produced amid the recovery from the Covid-19 crisis for the aviation industry, which from early 2020 caused a sudden and dramatic reduction in global traffic (by almost two-thirds) and record industry losses.

As storage volumes spiralled upwards during the first half of 2020, production rates of new aircraft were rapidly reduced. The subsequent recovery that has been playing out through 2020-2022 has been uneven across the regions. From early 2021, highly successful vaccine programmes saw much of the world’s population receive doses which helped spur gradual relaxation of travel restrictions. But while most major markets had re-opened to international travel by late 2022, crucially, China remained effectively closed. This isolated a huge aviation market and has restrained a full global aviation recovery.

For our third forecast in succession, the Ascend by Cirium forecast team has therefore chosen to again adopt a scenario approach, specifically for the 2022-2024 period. We have again suspended the usual deterministic methodology in favour of one that includes as much updated information as available, combining that with an expert hypothesis on the near-term recovery trajectory. This year’s forecast is based on our latest recovery outlook called Scenario 7, which is detailed in the report.

We track monthly progress for each airline domicile region and at a global level, traffic evolution in terms of revenue passenger kilometres (RPKs) have been close to our predicted levels. However, some regions have continued to experience faster and some slower recovery. By early 2022, the recovery from Covid was well established aside from the crucial Chinese market where its ongoing zero-Covid policy continued to lead to volatility in levels of economic activity. But a new factor emerged during early 2022, with Russia’s invasion of Ukraine in February. International sanctions and reciprocal air-space closures have impacted Russian airlines’ ability to fully operate and created operational issues for international carriers that were banned from Russian airspace. The ensuing economic turmoil created by rising energy costs resulting from the conflict have given many airlines cause for concern over potential declines in near-term demand for air travel.

Outside of China, and Russia and the CIS, most markets have seen a steady recovery of passenger traffic, as Covid travel restrictions continued to be relaxed. The pace of “opening-up” has informed
our revised assumptions for the 2022 forecast, known as Scenario 7, for the progression of demand (RPKs), load factor, aircraft productivity and hence in-service fleet changes from now until 2024.

The key differences in Scenario 7 are that recovery of certain regions has been delayed by some months (eg China, Asia-Pacific and Europe) while Russia/CIS has been set beyond 2025. For other regions, recovery to 2019 activity levels has been brought forward slightly (North America, Latin America and Africa). As a result, at the global level, we now expect activity to return to 2019 levels by October 2023, two months later than previously forecast. Scenario 7 also has slightly reduced expectations for the size of the in-service fleet at the end of 2022, compared with the 2021 forecast (down by 700 aircraft).

Two major uncertainties in the current near-term outlook are around the global economic situation given the Ukraine conflict etc, and the timing of the Chinese market’s re-opening. We have assumed the latter happens by mid-2023.

We continue to forecast the single-aisle passenger fleet will recover faster than the twin-aisle fleet. At the end of November 2022, the former was within 2% of 2019 levels, but the latter was still down by 20%, and daily utilisation of twin-aisles is also lower than before Covid.

The baseline scenario envisages most of the remaining stored fleet of modern types returning to service in 2023, thus eliminating the majority of the surplus fleet. This is consistent with moves to raise new aircraft production in 2023-2025 as demand recovers.

In the 2022 forecast, Russian capacity and traffic are assumed to decline in the near term. Combined with the complete cessation of Ukrainian civil aviation activity, Russia/CIS traffic is then forecast to stabilise at 70% of 2019 levels in 2024.

During the recovery from Covid-19, the over-supply of aircraft has gradually diminished and the OEMs have confirmed or are planning production rate increases – in Airbus’s case to unprecedented volumes for single-aisles. However, with widespread concerns about near-term economic turmoil and a retraction in demand, there remains the risk of more airline failures.

While delivery volumes were already down in 2019 due to the 737 Max grounding, the Covid-19 crisis caused a 43% decline in shipments during 2020, with 560 fewer passenger and freighters jets being handed over. There was some recovery in 2021, although volumes were still 27% (350 aircraft) below 2019. A further improvement is forecast in 2022, but the number is still expected to be around 170 deliveries behind 2019. However, the Covid-19 crisis is not entirely the cause of lower volumes. Deliveries in 2021-2022 have been impacted by a hiatus in 787 deliveries for many months due to quality issues, while the rate of 737 Max shipments has been lower than expected (partly due to the
ongoing situation in China). Supply-chain issues coming out of the Covid-crisis have also caused some interruptions in 2022 shipments.

Comparing the 2022 delivery forecast to the 2021 CFF, there are around 7% fewer deliveries in the next five years, reflecting the slower single-aisle ramp-up in 2022-2024 and lower twin-aisle rates.

**The long-term forecast**

The aviation industry has managed to survive many downturns and external shocks, although none as severe as the crisis created by Covid-19. Transportation of people and goods by air is a key element of economic development. Beyond 2024, we therefore expect to return to more traditional growth paths, but with that modelling starting from the perhaps structurally different industry we may find at the end of 2024. Russia/CIS traffic is assumed to resume long-term growth at around 2% per annum, based on the forward GDP annual forecast of 1%.

Passenger capacity (ASKs) is forecast to grow at 3.6% per year (compared to pre-pandemic levels in 2019), but in our view the industry has essentially lost about four years of capacity growth and so the level of ASKs in 2041 will be similar to those we had predicted for 2037 in the last pre-Covid forecast produced in 2019. Passenger traffic (RPKs) is forecast to grow annually by 3.6%, with a load factor of around 84% by the end of the period.

The 2022 CFF shows 43,390 new passenger aircraft deliveries between 2022-2041, worth an estimated $2.8 trillion. This is estimated using Ascend by Cirium’s 2022 Full-Life Base Values, since in our view, they are a more pragmatic estimation of actual business values than the manufacturer list prices often used in other forecasts. The annual delivery value will not recover to over $100 billion until 2024 and then rise to $185 billion by the end of the forecast. By then, annual passenger aircraft deliveries are forecast to average some 2,700 annually.

Freight capacity (available tonne kilometres or ATKs) is forecast to grow at 3.0% and traffic (FTKs) at 3.7%, relative to 2019.

The forecast predicts the supply of some 3,560 freighter aircraft over the next 20-year period, including 1,060 new builds (30%) and 2,480 conversions from passenger aircraft (70%). This is a similar volume compared with the 2021 forecast, which already reflected the near-term boom in conversions due to air-cargo market dynamics of the Covid-19 pandemic including e-commerce growth and rising feedstock availability.

Airbus and Boeing will remain the two largest commercial aircraft OEMs, between them delivering an estimated 80% of aircraft and 88% by value through 2041. However, there is $360 billion of demand for other OEMs or new programmes. There are new programmes in development by Comac, CRAIC and Irkut and other programme launches are expected during the forecast period.
In the passenger market, single-aisle jets will account for 70% of deliveries and 56% of delivery value, with the core of this $1.6 trillion market continuing to be the 150-seat size, typified by the Airbus A320neo and Boeing 737 Max 8. They will have 48% of deliveries, but the 180+ seaters including the A321neo and 737 Max 10 will take an increasing annual share, with just over 40% of deliveries through to 2041. New programmes from both OEMs are forecast to be in development by the mid to late 2030s.

The 787 and A350 will remain central to the $1.1 trillion twin-aisle market, with the mid-sized 250-300 seaters accounting for almost 70% of delivery value in the sector. The Airbus A350-1000 and Boeing 777-9 will compete in the highest capacity markets.

Until at least the turn of the decade, twin-aisle supply will remain the last duopoly in the commercial sector. However, the 300-seat CR929 project is being developed by China and Russia and the forecast has around 940 deliveries for the type or unspecified twin-aisles from existing, upgraded and new OEM programmes, from the beginning of the 2030s.

In the regional markets, deliveries are forecast to be worth $145 billion, around a third of which will be for turboprops. The 70-seaters will lead in the propeller-powered market sector with a larger 90-seat size from the 2030s. This sector is experiencing change, albeit Embraer has postponed a launch decision for its proposed large turboprop. China is also developing its MA700 at the larger end of the market. There are no hybrid or hybrid-electric airliners specifically included in this forecast, but these will likely be the next powerplant directions for this market, albeit at the smaller end of the sector.
The $95 billion regional jet market has been undergoing significant changes in the past few years, with production ceasing of the CRJ and the Mitsubishi SpaceJet being suspended. The forecast demand is split evenly by aircraft of over 90-100-seats and those typically in 70- to 76-seat configuration serving the North American market, which are currently scope-clause constrained. Demand in China supports the local ARJ21. While production of Russia’s Superjet is expected to continue, disruption has been caused by international sanctions prompting revisions to locally sourced powerplants and systems.

Across all size categories, just under half of all passenger deliveries will be for replacement during the 20 years.

Freighter markets will continue to see a 70% to 30% split between conversions and new deliveries, with total demand for over 3,500 aircraft, including $130 billion for some 1,060 new aircraft. Two new widebody factory freighters have now been launched by Airbus and Boeing, due to enter service in 2025 and 2027 respectively. Meanwhile, conversion demand is being driven by the rise of e-commerce which gained momentum during lockdowns as well as increasing volumes of feedstock in the wake of the Covid-19 crisis. Focus is increasingly on newer generation conversion programmes, including the A321CEO, 737-800, A330CEO and 777-300ER.

**Chart 2**

Forecast new deliveries 2022-2041 by airline region

Asia remains the key growth region, with China forecast to have the highest passenger traffic growth rate at over 6%. This will make it the largest single country in the region for deliveries, with a 19% share, ahead of all other Asia-Pacific countries with a combined share of 22%. North American airlines follow with 21% and Europe with 17%. Middle East airlines will take 7% of deliveries, but the share rises to 14% in value terms due to the rich mix of higher value twin-aisle deliveries.
Fleet Growth

The crisis that enveloped the airline industry in 2020 saw the active passenger jet fleet plummet as the number of aircraft temporary storage mushroomed to over 60% in April, compared with around 12% immediately prior to the pandemic. Levels subsequently began reducing through 2021 to around 23% by year-end. The emergence of new Covid-19 variants prompted further temporary restrictions in some markets through late 2021 into 2022, which briefly reversed the storage decline. However, through the summer of 2022, levels contracted to less than 20%.

The in-service passenger fleet is not forecast to return to 2019 levels until mid-2023, thus effectively losing up to four years of “normal” fleet growth.

Forecast traffic growth over the long term will require the global passenger fleet to increase by around 22,000 units, which equates to a 3.1% annual growth rate, taking the inventory to some 47,700 aircraft at the end of 2041.

The single-aisle fleet will grow faster at 3.7% annually, against 3.2% for twin-aisles, with long-haul traffic taking longer to recover. The regional aircraft fleet will rise more modestly at an overall rate of around 1.1% a year, and within the regional sector, the turboprop fleet will grow at a faster rate.

About 88% of the current passenger fleet is forecast to be retired from passenger service during the 20-year period (including aircraft being converted to freighters). Freighters have longer useful economic lives, and of the current fleet, around 70% will be retired. With increasing pressure to switch to more environmentally friendly aircraft, replacing older-generation less-efficient types will be an increasingly crucial element of fleet planning.

Overall, there will be some 19,000 retirements from the end-2021 passenger fleet, plus a further 2,500 aircraft that leave the passenger fleet via cargo conversion. The Covid-19 crisis has seen a number of relatively young aircraft being phased out, while other aircraft of older vintages may languish in storage until eventual scrapping. Survivor curve analysis is used for modelling retirements and forecasts an average economic life of 22 years for single-aisles and 20 years for twin-aisles.

Over the next 20 years, the forecast deliveries will drive the Chinese passenger fleet to grow at the highest annual rate, around 4.5%, enabling it to grow its share from 15% to 19%. Asia-Pacific will lead with a 22% global share, while the more mature North American and European markets follow with 20% and 18% respectively.

The freighter fleet will grow by 2.3% annually to reach over 4,100 aircraft. The freighter fleet benefitted during the Covid-19 crisis from the short-term reduction in passenger aircraft belly capacity and the rise of e-commerce will drive longer-term freighter fleet growth. This is especially true for conversions, where the market dynamics caused by Covid-19 have helped provide suitable feedstock. Although
the current conversion boom may not persist, it is enabling the replacement of older, less efficient aircraft as well as catering for e-commerce growth.

North America, home of the largest integrators and e-commerce providers, will maintain its leading share of the freighter fleet, albeit reduced from 47% to 38%, as the Chinese market grows its fleet by 11 points to a share of 18%. This will edge the country ahead of Europe as the second largest global cargo market. The Ukraine conflict makes long-term forecasting for the Russia and the CIS market uncertain but in our current scenario, the freighter market is forecast to contract through to 2041, reducing its global share from 7% to just over 3%.

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- Fleet delivery forecast
- Value of the future fleet
- Detailed market share analysis
- Breakdowns by region, type, and category
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