

AVIATION WEEK
Fleet&MRO
FORECASTS

2024 MARKET SUMMARY REPORT

BUSINESS

AVIATION WEEK NETWORK

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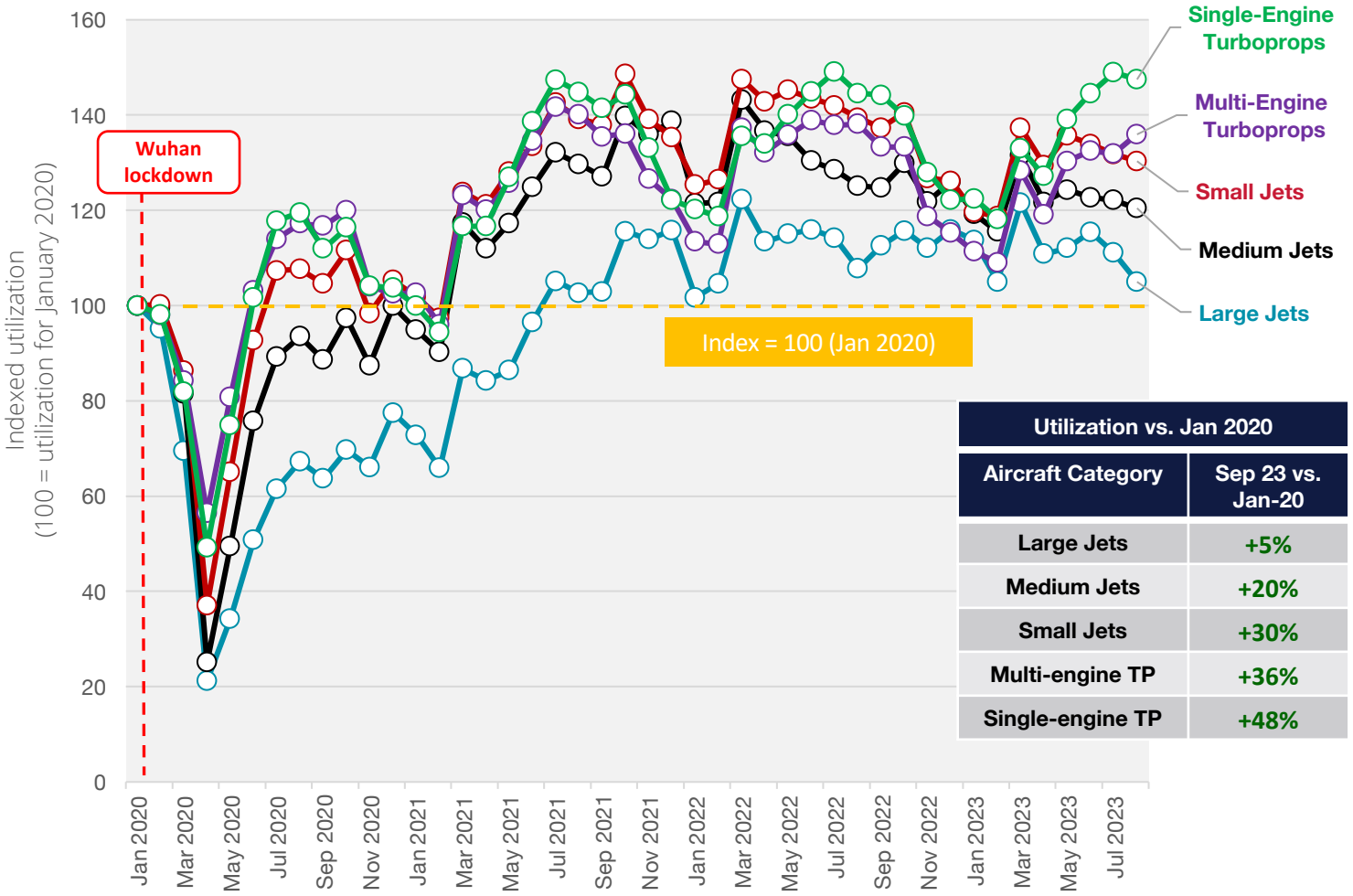
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Foreword: Business Aviation Climbing

Brian Kough, Senior Director, Forecasts & Aerospace Insights | Intelligence & Data, Aviation Week Network

Utilization change since January 2020



Utilization vs. Jan 2020	
Aircraft Category	**Sep 23 vs. Jan-20**
Large Jets	+5%
Medium Jets	+20%
Small Jets	+30%
Multi-engine TP	+36%
Single-engine TP	+48%

The recent trend history of business aircraft utilization speaks for itself. All categories of aircraft post-pandemic have seen strong, global, and more importantly, persistent recovery. Despite some recent retrenchment in the 3rd quarter, business utilization is up to 48% higher in the case of single-engine turboprops and 5% for large jets based on aggregate hours flown.

With nearly all international borders now open for business after the last parts of the Asia Pacific now take part in the freedom of movement, the new normal seems firmly in place. The “stickiness” of private aviation for new users appears on solid foundations as we look ahead toward our future.

New aircraft deliveries have accelerated meeting the requirements of individual, charter, and fractional operators. For the Jan-Sept period, unit deliveries are up over 180 aircraft compared to 2020. Primarily driven by small jet and single-engine turboprop category aircraft recently, the expectations for 4th quarter are high. We feel the delivery market will stabilize on the high side of recent “normal” activity seen over the previous decade at ~900 jets and ~230 turboprops per year on average. Last year’s signs of unsustainable exuberance in the new and used markets appear on track to stabilize with sales transactions taking on what we would call more normal activity and transaction precautions.

Source: Tracked Aircraft Utilization (TAU), Aviation Week Intelligence Network, Copyright 2023.

Foreword: Business Aviation Climbing

Brian Kough, Senior Director, Forecasts & Aerospace Insights | Intelligence & Data, Aviation Week Network

Aircraft Bluebook reports used aircraft valuations have ceased their stellar climbs from 2022, and except for turboprops, have seen slight price decreases as of the 3rd quarter amounting to -3% decrease overall.

GDP estimates for the major world regions remain positive according to economic prognosticators with Asia Pacific seeing the highest forecasted growth and Europe seeing the lowest. Jet fuel prices are a concern as supply constraints are pushing prices higher – on an inflation adjusted basis, we are near November 2014 prices. While higher prices are good for the oil & gas operators, higher fuel prices are generally a detractor.

Concerning factors remain this year. Interest rates have risen, and fuel prices have been susceptible to shocks as the world's supply chain remains vulnerable. War in the Ukraine persists, a new outbreak occurred in Israel-Gaza, and flash points in Asia Pacific have not subsided. Labor pressures are manifesting at OEMs, suppliers, and with MROs servicing aircraft as well as the security of supply chains themselves - all reasons for caution and monitoring the market dynamics. However, the market's strong signals cannot be mistaken, our predictions are favorable for continued fleet and MRO growth.



Credit: Brian Kough, Aviation Week Network


Credit: Brian Kough, Aviation Week Network



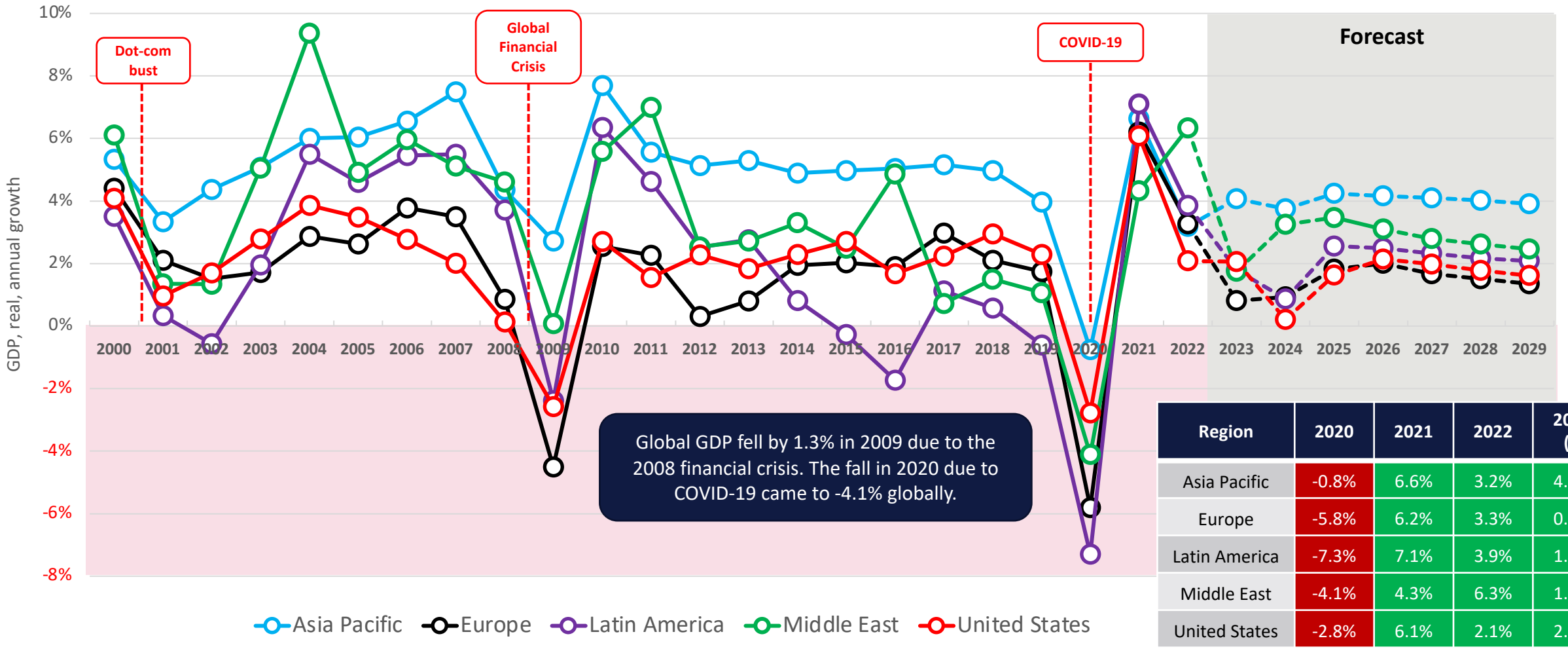
Credit: Nigel Prevett, Aviation Week Network


Credit: Brian Kough, Aviation Week Network



Credit: Brian Kough, Aviation Week Network

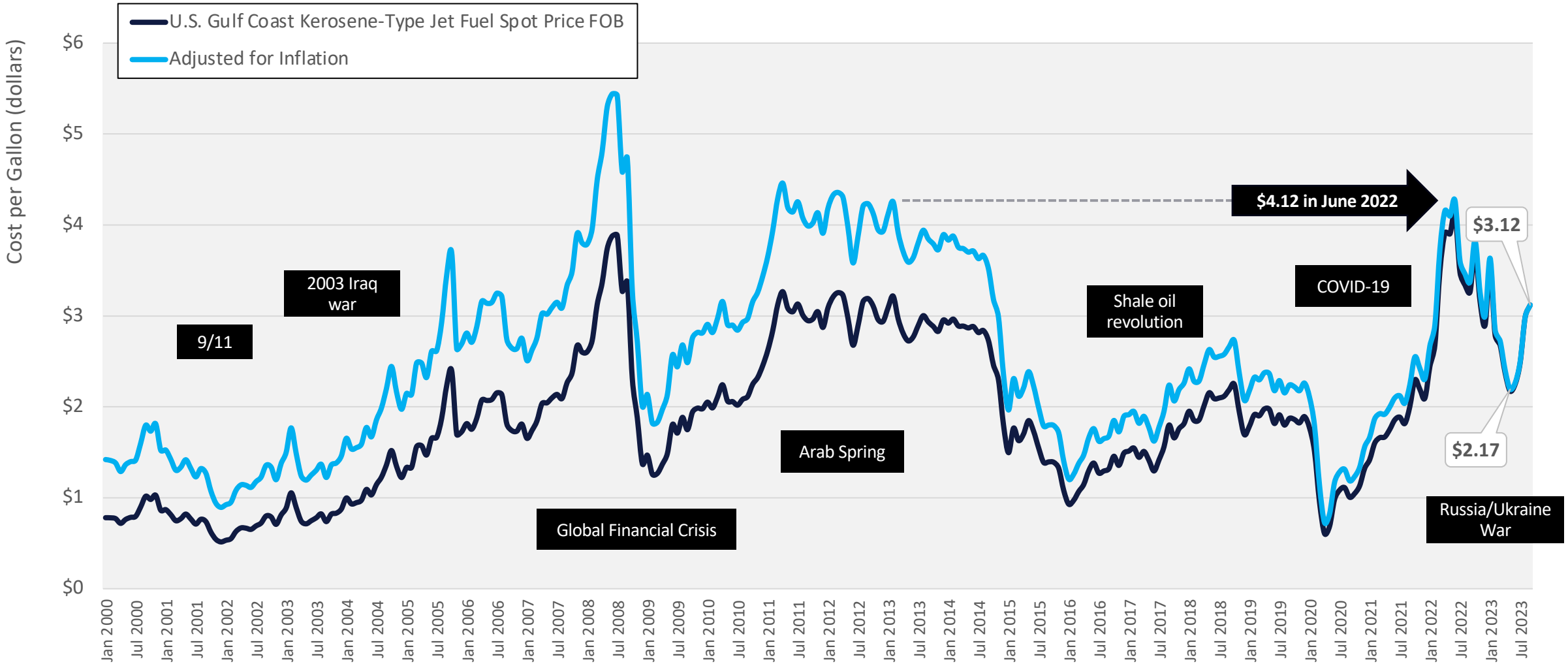
Foreword: GDP, Recent Economic Shocks & Forecast



Region	2020	2021	2022	2023 (f)
Asia Pacific	-0.8%	6.6%	3.2%	4.1%
Europe	-5.8%	6.2%	3.3%	0.8%
Latin America	-7.3%	7.1%	3.9%	1.8%
Middle East	-4.1%	4.3%	6.3%	1.8%
United States	-2.8%	6.1%	2.1%	2.1%

Source: Oxford Economics Ltd (20 September 2023 update)

Recent Historical Economic Shocks & Jet Fuel Prices

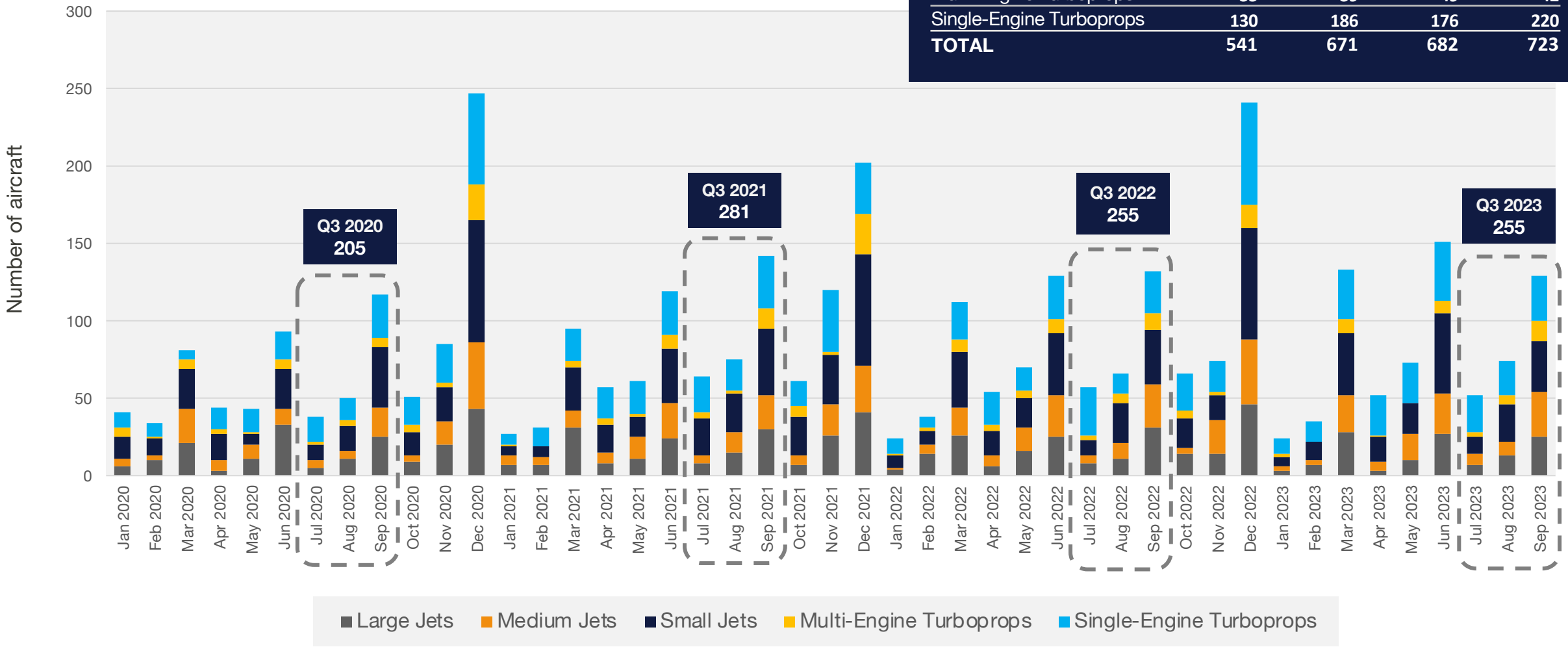


Source: US EIA, U.S. Gulf Coast Kerosene-Type Jet Fuel Spot Price FOB and U.S. Bureau of Labor Statistics CPI Index.
Note: Prices adjusted for inflation. Today's dollar value – all monthly prices are monthly averages adjusted for inflation using U.S. CPI data.

Foreword: Recent Aircraft Deliveries

Monthly business aircraft deliveries by category

Q1-Q3 Delivery Totals by Aircraft Category	2020	2021	2022	2023
Large Jets	125	141	141	123
Medium Jets	85	106	117	124
Small Jets	166	199	199	214
Multi-Engine Turboprops	35	39	49	42
Single-Engine Turboprops	130	186	176	220
TOTAL	**541**	**671**	**682**	**723**



Source: Fleet Discovery, Aviation Week Network, Copyright 2023.

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What's New?

What's New This Year?

Engine Type Certificate Holder (TCH) – See slide #38.

- The engine TCH is the current owner of the relevant certification authority's Type Certificate or loosely speaking the brand. Similar to an aircraft Type Certificate, the owner holds the legal rights to the design and is held responsible for its upkeep.
- A type certificate is issued by the authorities of a nation state mandating the airworthiness standard for the aircraft type, model, engine or propeller. Thus, the technology, engineering designs, intellectual property is held by this entity.
- The impact is that the TCH may license the technical manuals, technical software, as well as procedures to establish airworthiness standards for maintenance, i.e. maintenance intervals, tooling, technics, etc.

Engine Taxonomy

- The engine naming and hierarchy has been revised to follow common usage/recognition patterns more closely. Engines powering the aircraft in the forecast and historical entries will have an entry at the highest level, called family, and the next lower level of detail called model. Each has had revisions so use caution when matching up to previous forecasts.
- Example of hierarchy - the FJ44 *family* of engines which powers multiple aircraft like Citations, PC-24 and the new HondaJet Echelon (2600) have multiple engine *models* such as: FJ44-1A, FJ44-4A-QPM, and FJ44-4.



Market Outlook

Market Outlook

Molly McMillin, Editor-in-Chief | The Weekly of Business Aviation, Aviation Week Network



First-time buyers who entered business aviation during the coronavirus pandemic are staying, although the rate of new entrants has returned to normal.

Some new entrants purchased small business aircraft, while others jumped headfirst into a larger jet.

“Wealth did that; COVID didn’t do that,” Michael Amalfitano, Embraer Executive Jets president and CEO, based in Melbourne, Florida, said during a panel discussion at a recent Summit. “You have to focus on why they bought the aircraft—because they had the money to do so. And they always had the interest to do so. And now COVID gave them the reason to do so.”

The reason the customers are sticking is because they can afford to, Amalfitano says. The big question today, however, is whether they bought the right aircraft for their needs.

“That is a different question,” he says.

The number of first-time buyers spiked from the typical rate of 10-12% of buyers to 30%, Amalfitano says.

Today, “we’re back to normal growth of first-time buyers,” he says. When they change or exit an aircraft, it’s because they made the wrong buy and not because they do not want to fly private aircraft. They also are realizing that business aviation is more than the initial cost of an aircraft, including maintenance and the cost of pilots.

The corporate market, which had been in a wait-and-see mode, has returned. They are now in a replacement cycle process for aircraft and planning their fleets.

The charter and fractional ownership market received a boost as well.

Demand for NetJets’ fractional ownership services hit record levels during the pandemic, and while it has moderated, demand continues to remain higher than pre-pandemic levels, says Patrick Gallagher, NetJets president of sales, marketing and service. In September, NetJets entered a record-breaking deal with Textron Aviation for options to buy up to 1,500 Citation Latitude, Longitude and Ascend business jets over the next 15 years.

“We see an insatiable appetite for growth from customers and to be able to tee up these long-range supply agreements with our OEM partners is just really, really important to us,” Gallagher says.

Manufacturers’ backlogs for new aircraft are high. The big five business jet manufacturers—Gulfstream, Textron Aviation, Dassault, Embraer and Bombardier, have $50.3 billion in order backlogs on the books – representing about 18-24 months of backlog, according to JetNet data. Book-to-bill, the number of orders compared to deliveries, have declined from 2-to-1 in 2022 to about 1-to-1 in 2023.

Bombardier, for example, has built a two-year backlog with plans to increase production. Today, “the market supports a book-to-bill of 1,” says Eric Martel, Bombardier president and CEO. “If we’re selling 138 and more airplanes (a year), it means we’re maintaining that two years of backlog. It gives us predictability for the next two years, which is amazing.”

For Bombardier, North America remains a strong market, while the company sees “good momentum” in the Asia-Pacific and Middle East markets. The market in Europe, however, is more neutral, Martel says.

Market Outlook

Molly McMillin, Editor-in-Chief | The Weekly of Business Aviation, Aviation Week Network



The used business aircraft markets, meanwhile, are stabilizing, with analysts noting a decline in transactions in 2022 compared to the robustness of 2021 and inventory for sale increasing, although not dramatically. Deals are taking a little longer, brokers say.

Aviation Week's Business Aviation Fleet & MRO 10-year forecast predicts deliveries of 11,836 business aircraft from 2024 through 2033. That includes 9,047 business jets, including the Cirrus Vision light jet, and 2,789 turboprops valued at $299 billion over the decade.

Of the total breakdown, light jets are projected to reflect 21% of the total, followed by ultra-long-range jets at 19%, super midsize jets at 13% with very large jets, large jets and midsize jets each representing less than 10%. Single-engine turboprops are expected to take 19% of the share with multi-engine turboprops at 4%.

"While new aircraft deliveries and used aircraft sales are seeing unusually high demand and price increases lately, we feel that the delivery market will stabilize on the high side of normal activity we've seen over the previous decade," says Brian Kough, Aviation Week senior director of forecasts and aerospace insights. "Business jets will see the biggest gains, while business turboprops will see more of the same, but with single-engine turbos replacing multi-engines at a quicker pace."

Supply chain issues continue to pressure production and the industry, although the situation is improving, manufacturers say.

There's always things that we're working through," says Ron Draper, Textron Aviation president and CEO. "The capacity of the aerospace supply chain needs to grow—raw materials on up. We're working through that with our suppliers."

At the same time, the industry is facing a shortage of skilled labor.

To adjust, manufacturers are taking a number of steps to attract and retain employees, including increasing pay, benefits and adding additional perks.

"That's good for workers," Draper says. "That will push wages up, and we will go out and compete. We've got great people. We have great processes, but we're going to have to keep hiring."

Textron Aviation's goal is to hire 2,000 employees in 2023. "We'll be doing that every year and training lots of folks."

Piper Aircraft, for example, opened a health care center at its Vero Beach, Florida, headquarters in July, offering employees and their families no-cost preventative care, sick care, chronic condition management, health coaching and lab services.

Textron Aviation opened similar on-site clinics along with on-site cafes and learning centers for skill development and training.

While supply chain and workforce shortages are challenges, they also present advantages.

Market Outlook

Molly McMillin, Editor-in-Chief | The Weekly of Business Aviation, Aviation Week Network



“Those constraints are both a curse and a blessing,” says Ron Gunnarson, Piper Aircraft president of sales, marketing and customer support. “We are an industry that follows the market like no other industry with the ups and downs,”

When times are good, the industry has a tendency to overproduce aircraft.

“You are going full tilt, full throttle all the time, and you get yourself out onto a ledge,” Gunnarson says. “No one can overbuild like general aviation OEMs.”

That overbuilding presents difficulties in times of a downturn.

Today’s supply chain and workforce difficulties, however, are “keeping us in the real world,” he says, with a healthy backlog of aircraft orders.

“It’s a very good and special place to be,” Gunnarson says.



Credit: Nigel Howarth, Aviation Week Network

Embraer Praetor 600



Credit: Nigel Howarth, Aviation Week Network

Bombardier Global 7500

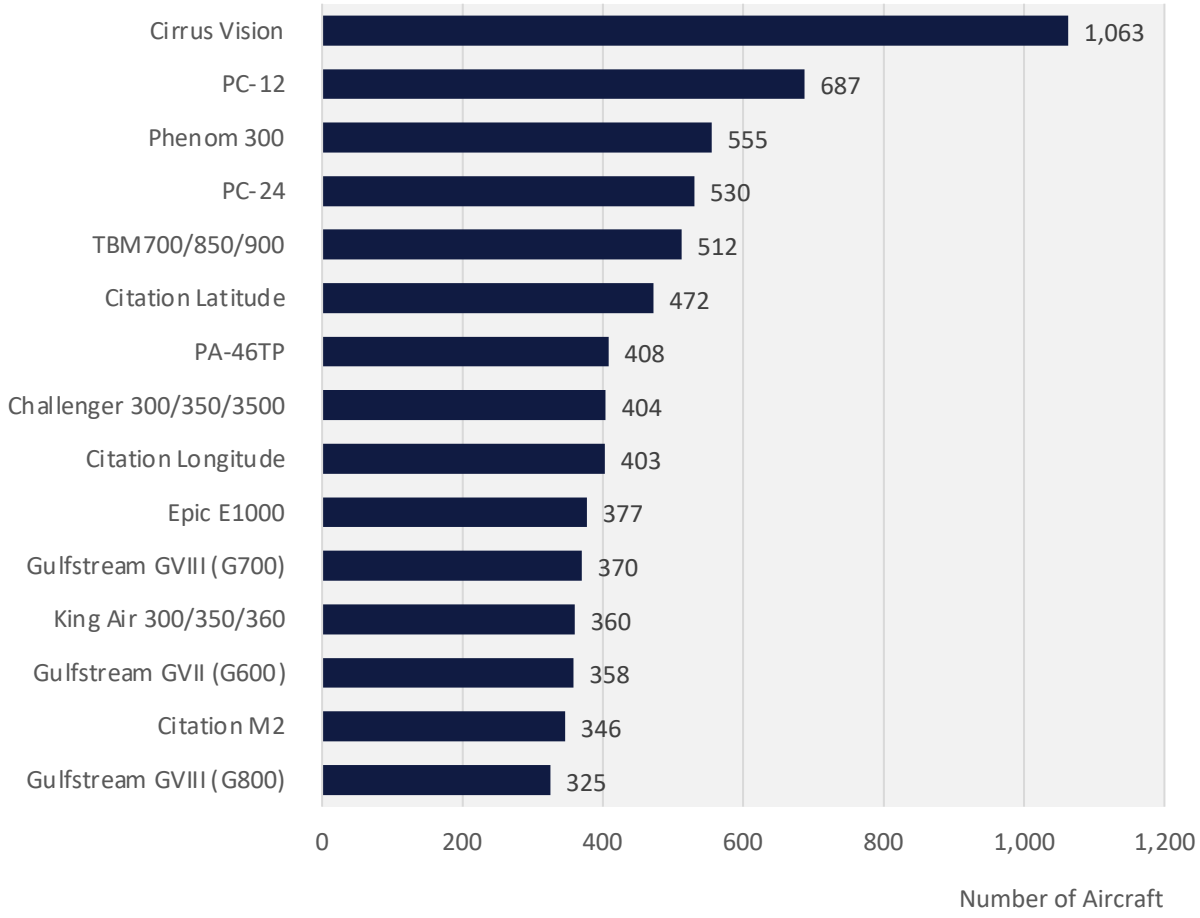
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Fleet Forecast & Trends

Forecast Aircraft Deliveries

By Aircraft Group



Highlights

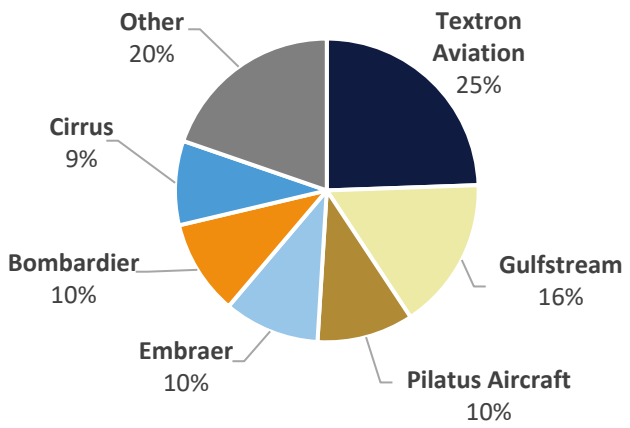
- 11,836 total deliveries over 10 years; 9,047 business jets / 2,789 turboprops.
- $299 billion retail delivery value over 10 years.

The Cirrus Vision Jet, Pilatus PC-12 and Phenom 300 are expected to see the highest number of unit deliveries of new build aircraft in the forecast period. The Citation product line alone will account for 2,106, or 18% of the total. All models of Gulfstream's line up will account for 1,729 (15%), while Cirrus' lone, single-engine turbofan type, the Vision SF50, will account for 1,063 (9%). The vast majority of both unit-counts and delivery values will occur in North America, with Western Europe trailing in a distant second place, $180 billion vs. $57 billion, respectively.

By manufacturer, Textron continues its leading product line-up position and is expected to deliver the most aircraft over the period at 2,893 aircraft, or 24% of total deliveries with leading programs of the Citation Latitude/Longitude/Ascend as well as the King Airs.

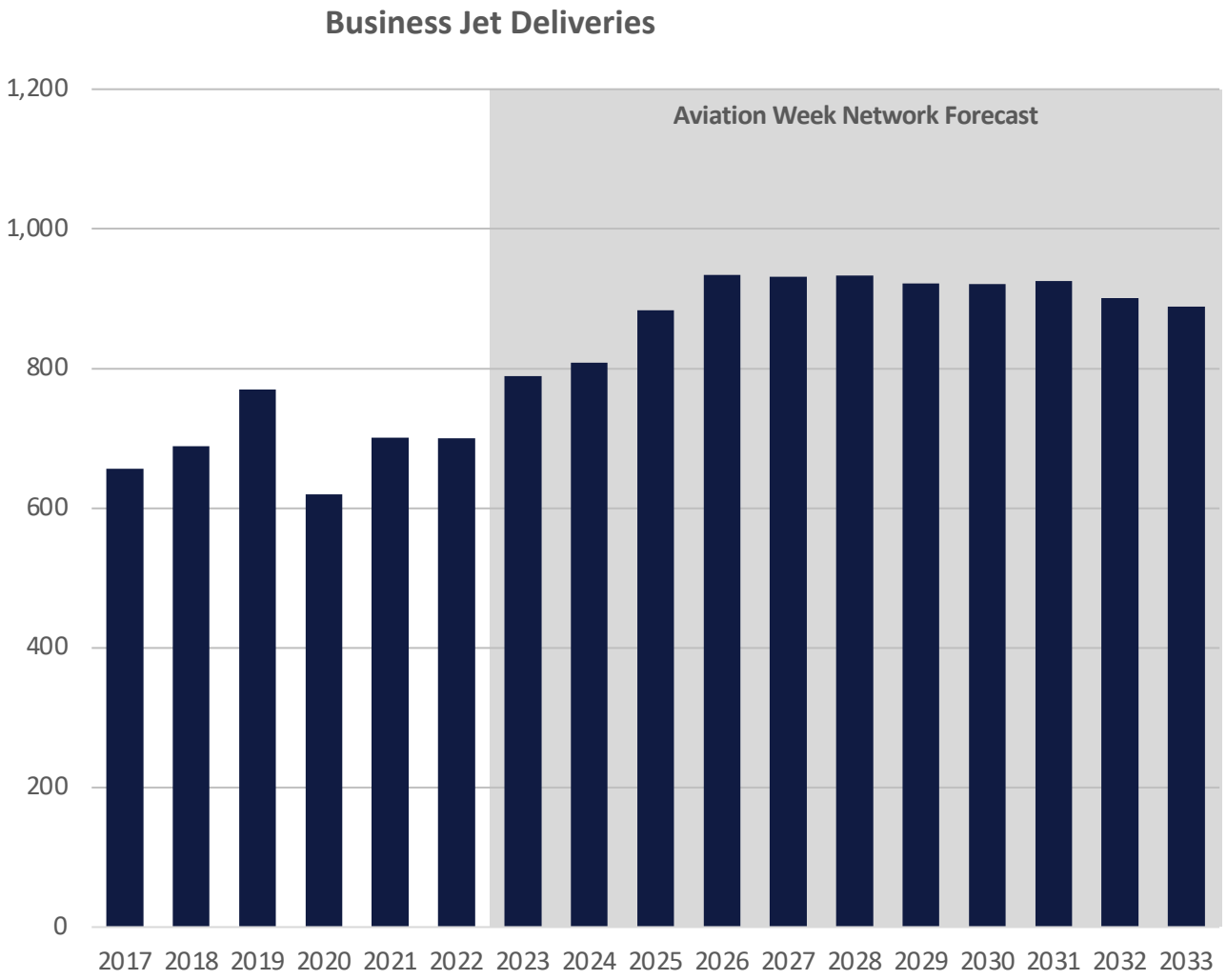
Gulfstream (1,924), Pilatus (1,217), Embraer (1,208), Bombardier (1,198), and Cirrus (1,063) are the other leading manufactures with a share of 9% or greater of overall deliveries.

Deliveries By Manufacturer



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

Historical & Forecast Aircraft Deliveries – Jets



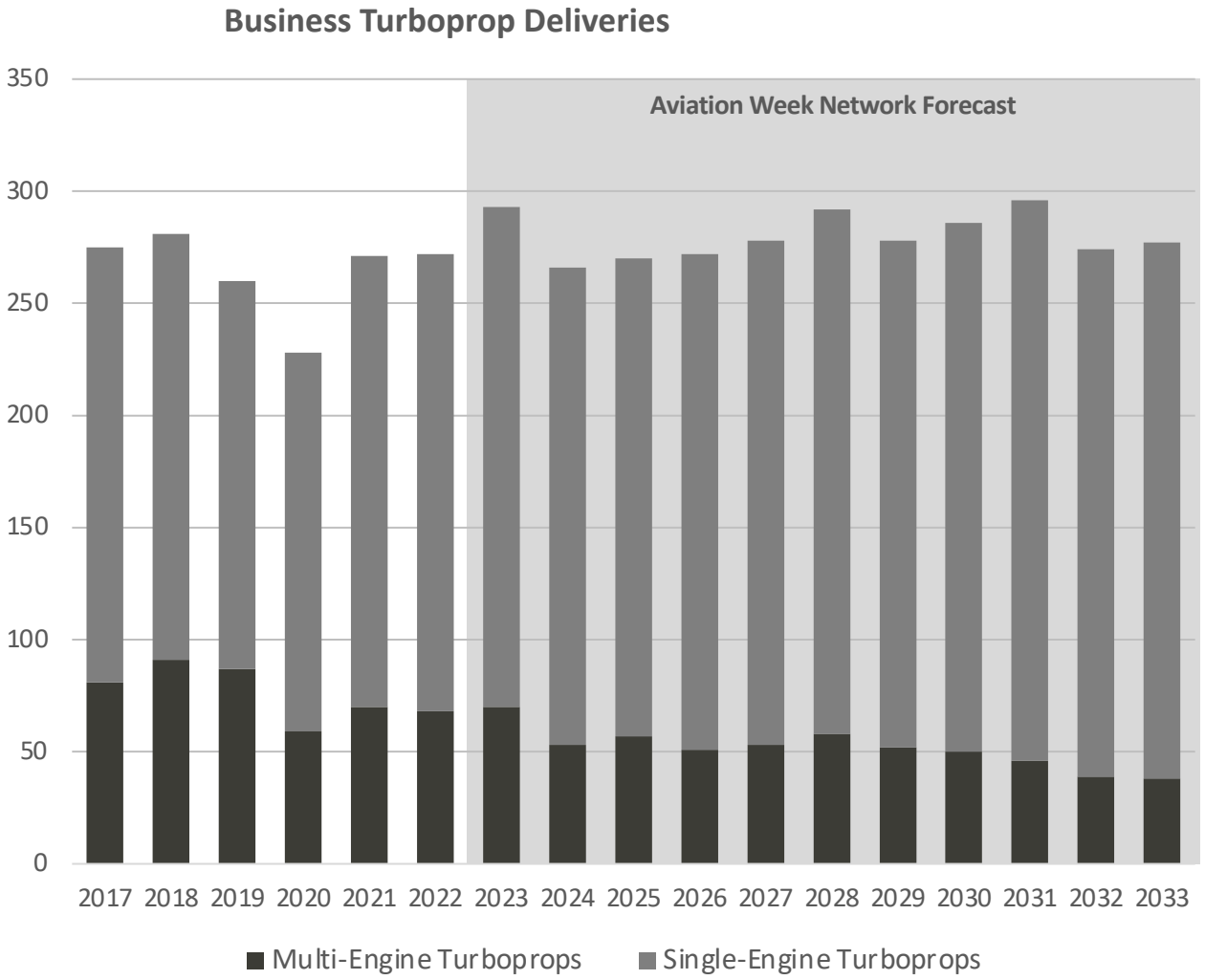
Highlights

- 9,047 business jet (turbofan) deliveries over the 2024-33 period.
- 76% of all business aircraft deliveries will be turbofan powered during the 10-year period, with small jets accounting for most units delivered.
- 900-unit annual average for business jet deliveries for next 10 years predicted to come to just over.



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

Historical & Forecast Aircraft Deliveries – Turboprops



Highlights

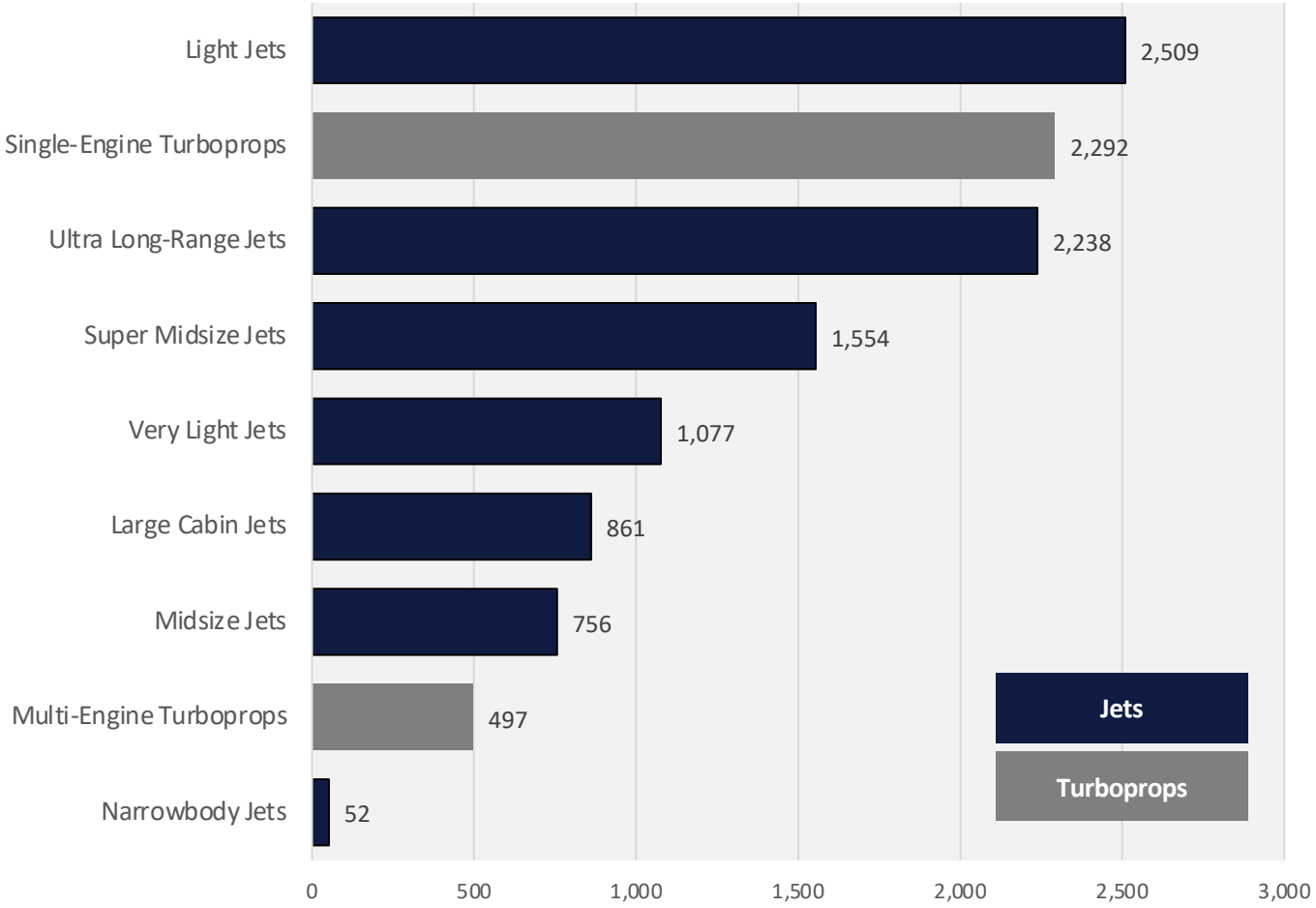
- 2,783 turboprop deliveries over period .
- 2,292 single-engine (SE) turboprop deliveries over 2024-33 period.
- 24% - Turboprops share of all business aircraft deliveries.
- ~230 yearly average units for SE business turboprop deliveries for next 10 years.
- Single-engine in-service fleet grows at above average 4.3% CAGR replacing multi-engine configured aircraft shares.



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

Forecast Deliveries – Size Category & Propulsion

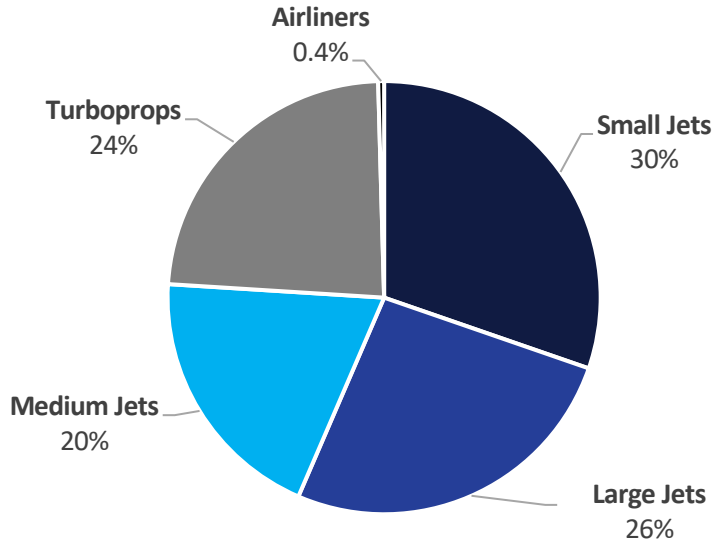
2024-33 Unit Deliveries by Size Category



In terms of business aircraft size, light jets and single-engine turboprops are expected to see the largest number of deliveries between 2024 and 2033 with these two categories alone accounting for 4,801 deliveries, equivalent to 41% of the total over the forecast.

At the next higher, market segment level, small jets account for one-in-three of all business aircraft deliveries over the period, with Large Jets accounting for a further 26%. This means that these two categories account for 56% of deliveries in the forecast, despite accounting for just 46% of the 2024 in service fleet.

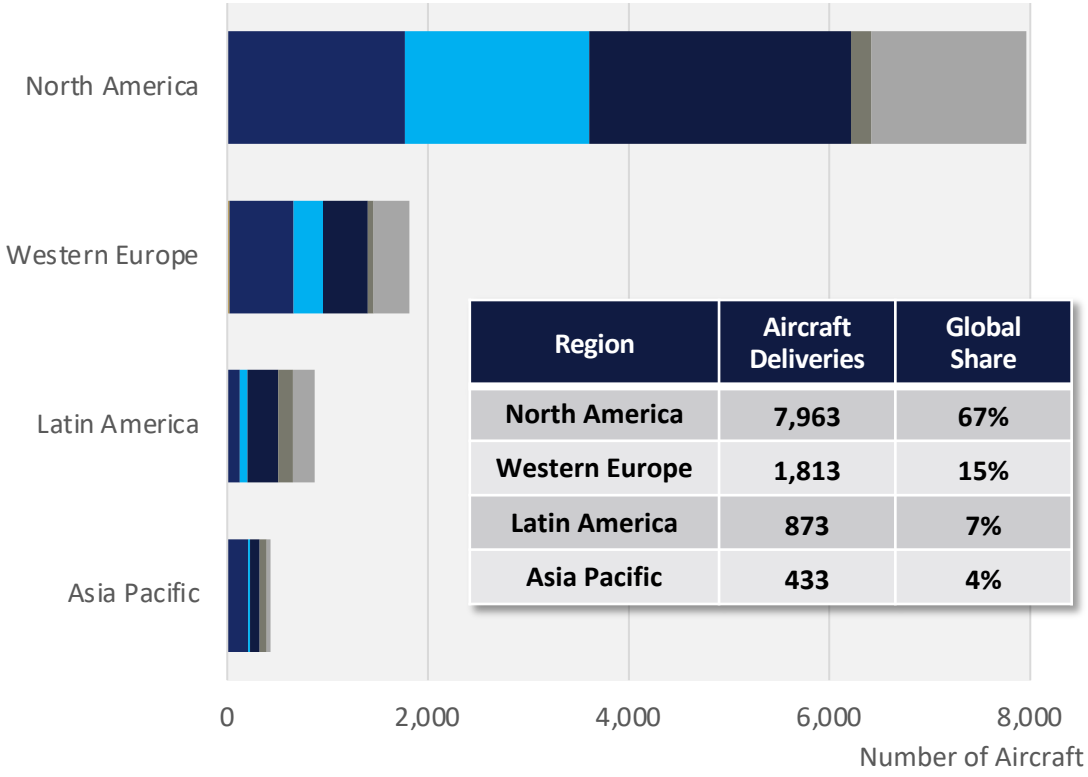
Deliveries By Market Segment



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

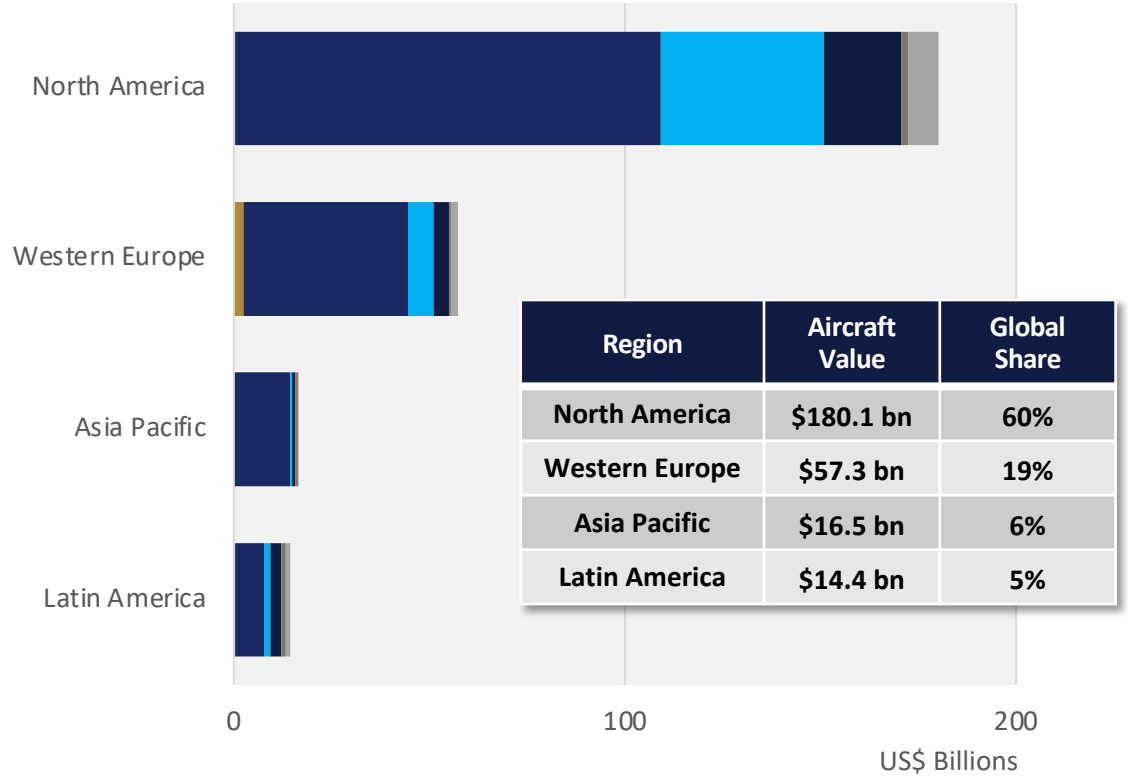
Aircraft Deliveries and Value by Region

Aircraft Units



Region	Aircraft Deliveries	Global Share
North America	7,963	67%
Western Europe	1,813	15%
Latin America	873	7%
Asia Pacific	433	4%

$ Value of Aircraft

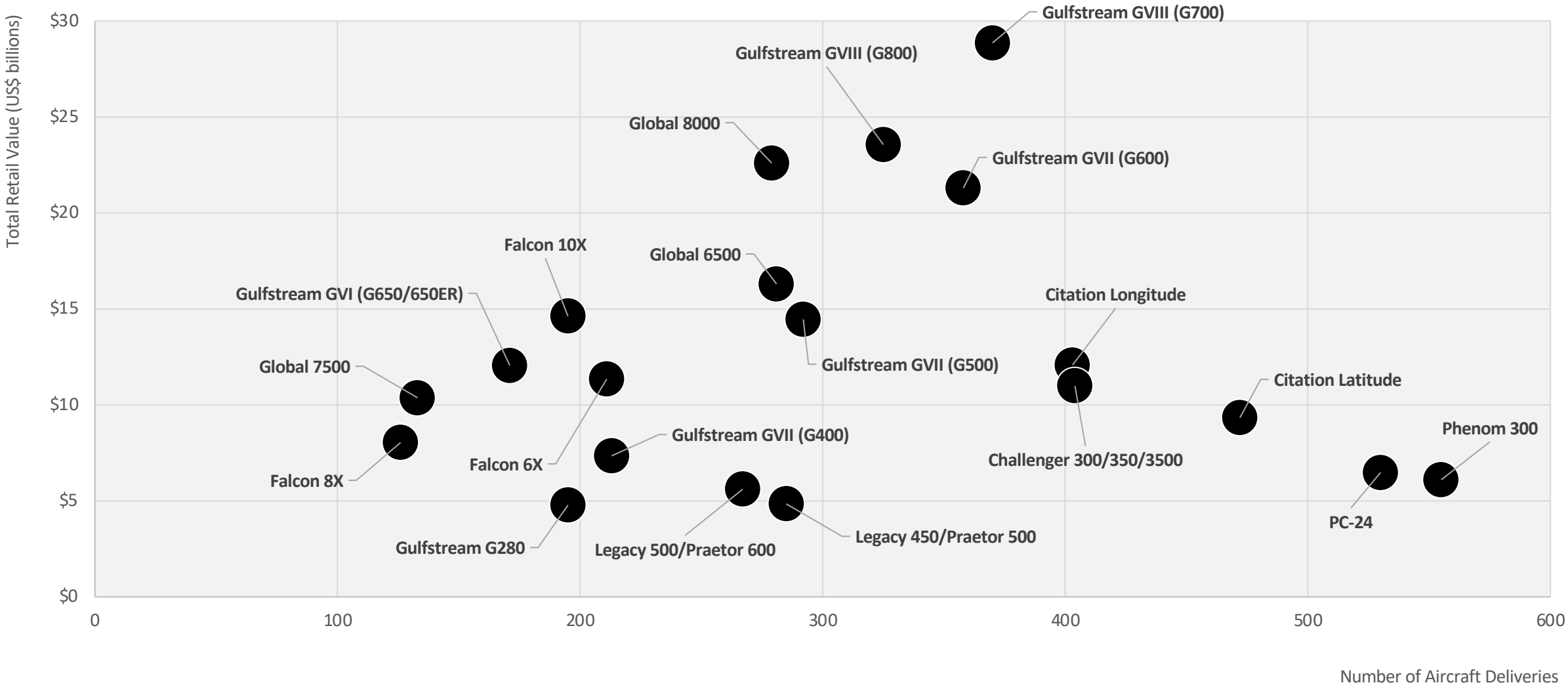


Region	Aircraft Value	Global Share
North America	$180.1 bn	60%
Western Europe	$57.3 bn	19%
Asia Pacific	$16.5 bn	6%
Latin America	$14.4 bn	5%

Airliners | Large Jets | Medium Jets | Small Jets | Multi-Engine Turboprops | Single-Engine Turboprops

Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

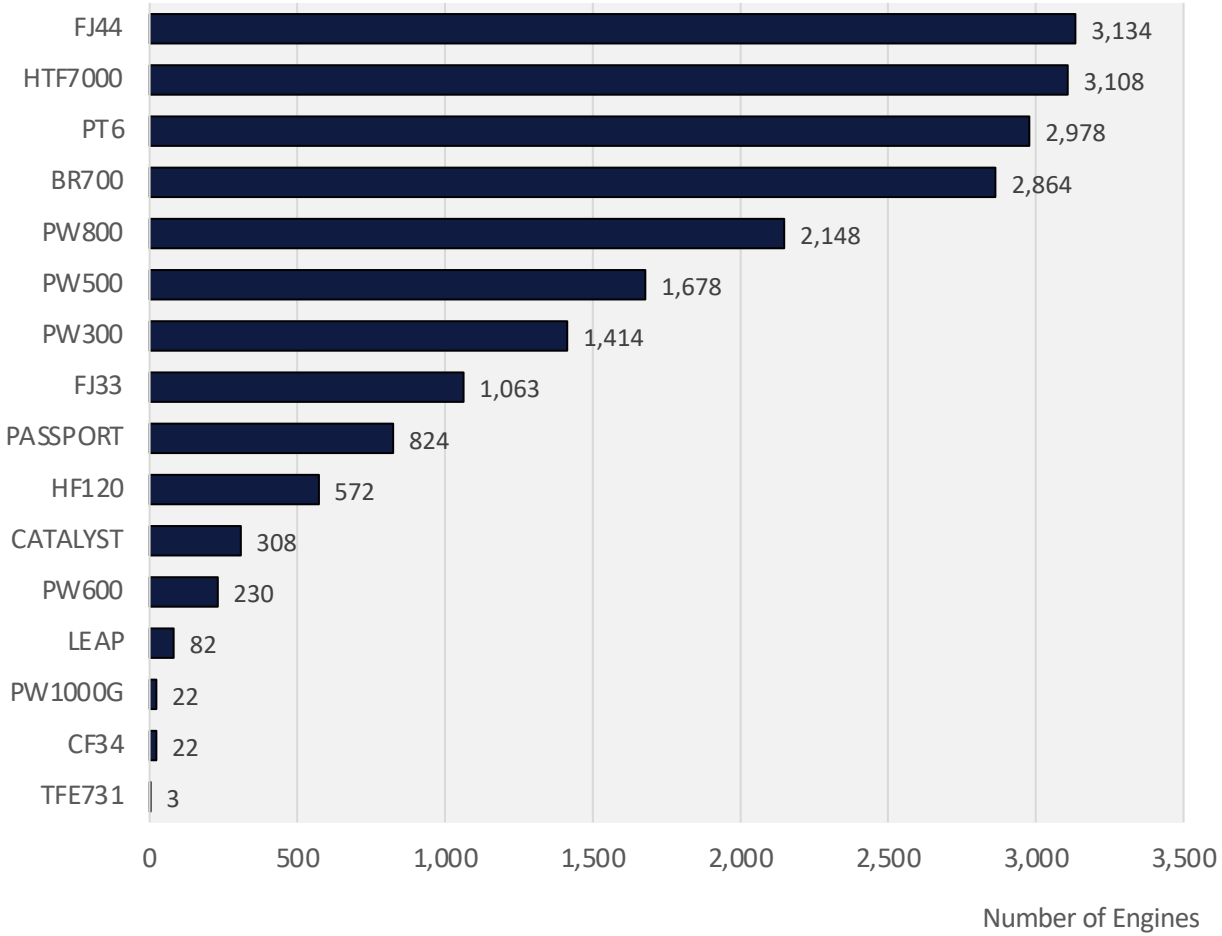
Aircraft Deliveries – 20 Highest Program Values



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

Forecast Engine Deliveries

By Engine Family

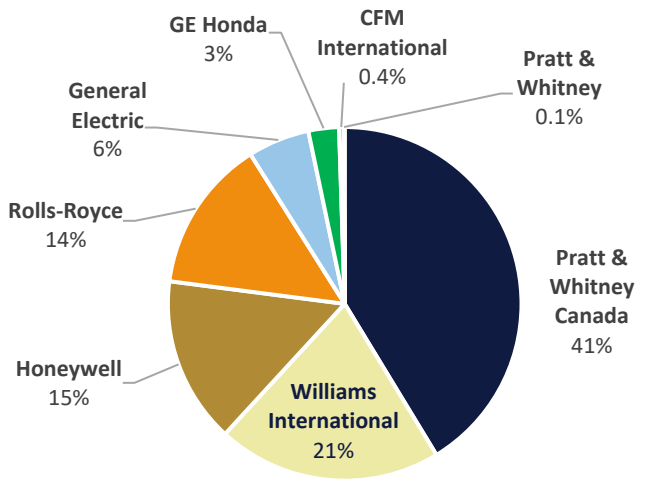


The Williams International FJ44, Honeywell HTF7000 and Pratt & Whitney Canada PT6 series of engines are expected to lead deliveries over the forecast period, with these three engine families each taking an equal 15% share, accounting for 45% of all business engine deliveries between 2024 and 2033. Deliveries of the Rolls-Royce BR700 series are expected to account for a further 14%.

Turbofans will dominate the market with 17,164 deliveries over the period, equivalent to 84% of the total. By comparison, a total of 3,286 turboprop engines will be delivered over the course of the forecast.

The strong performance of the PW800 and PT6 engine families mean that Pratt & Whitney Canada will account for the largest share of deliveries over the forecast, at 41% of the total. Williams International will account for a further 21%, Honeywell 15% and Rolls-Royce 14%.

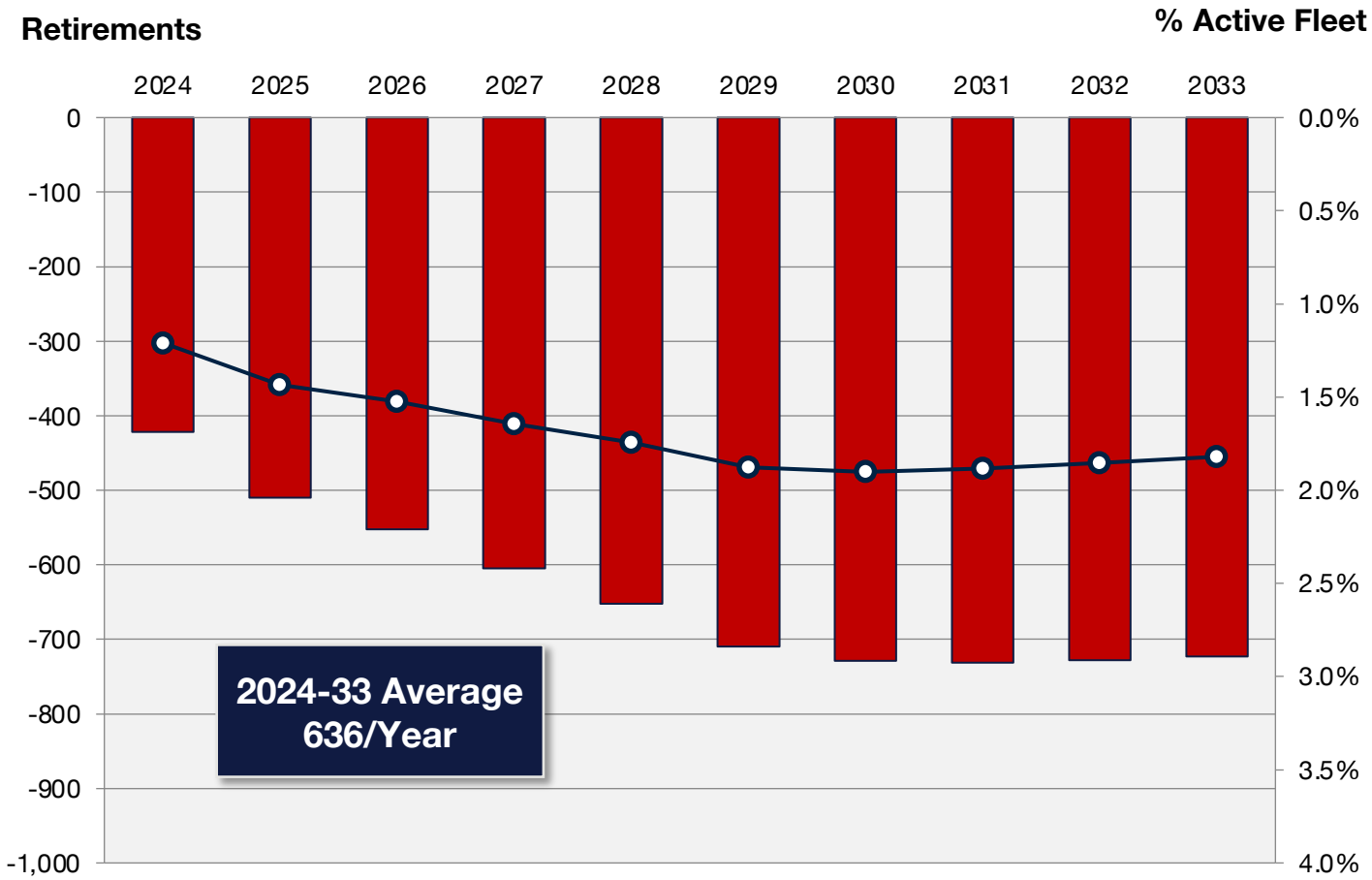
By Manufacturer



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Aircraft Retirements - Trends

Annual forecasted aircraft retirements and % of active fleet



Highlights

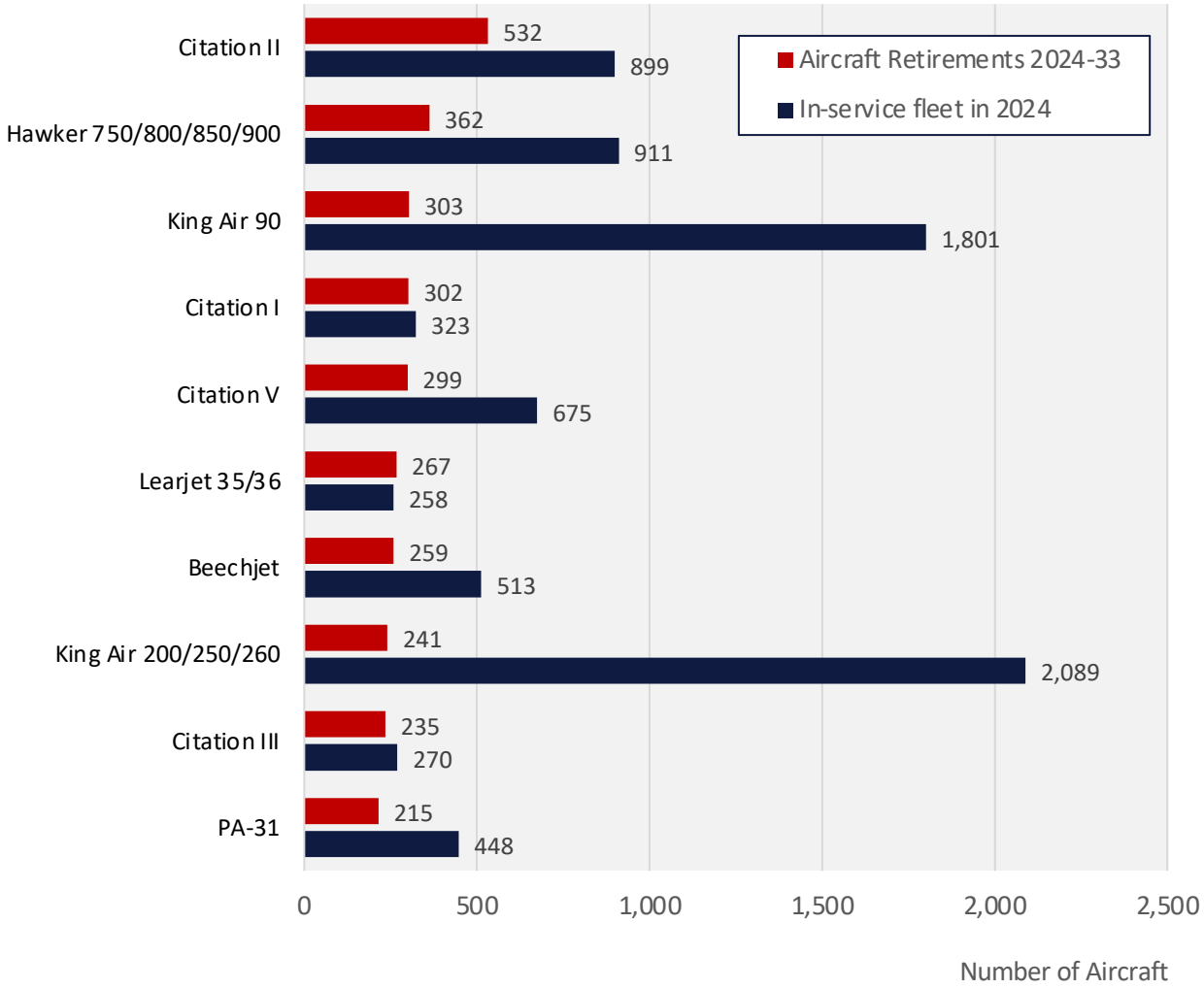
- Retirements peak in 2031 at 731.
- Historic rise of percentage of fleet rates dominate the decade.
- Top retirees include Cessna Citations, Learjet (31, 35, 60, etc.), King Air 90s.
- Age-based retirements.



~6,300 aircraft retirements over the 10-year forecast

Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

Aircraft Retirements – Analysis



At the group level, the Citation II is expected to see the highest number of retirements at 532, followed by the Hawker 750/800/850/900 at 362 aircraft. At the wider family level, Citation aircraft account for 1,730 units and 27% of total retirements in the forecast.

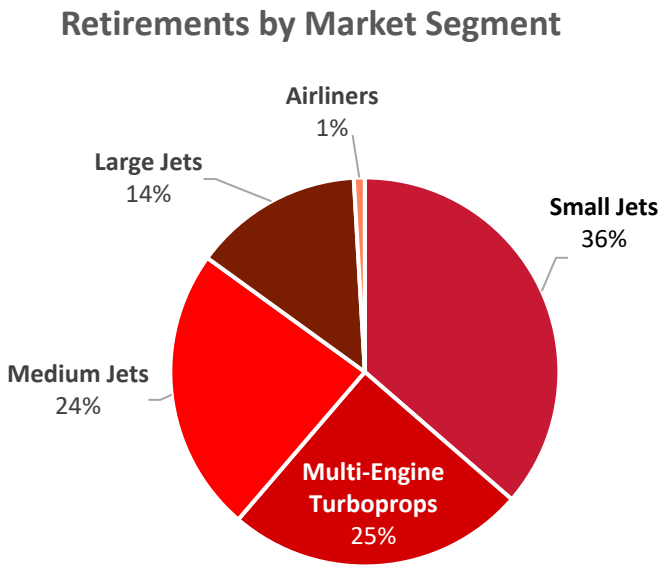
Nevertheless, despite the large number of aircraft leaving service, the number of retirements represents just 23% of the total Citation line in service in the year 2024.

Considerable numbers of King Air 90 (303), Citation I (302), Citation V (299) and Learjet 35/36 (267) aircraft will also be withdrawn from service.

Substantial fleets which are expected to see almost complete withdrawal from service over the decade include the Citation I and the Learjet 35/36.

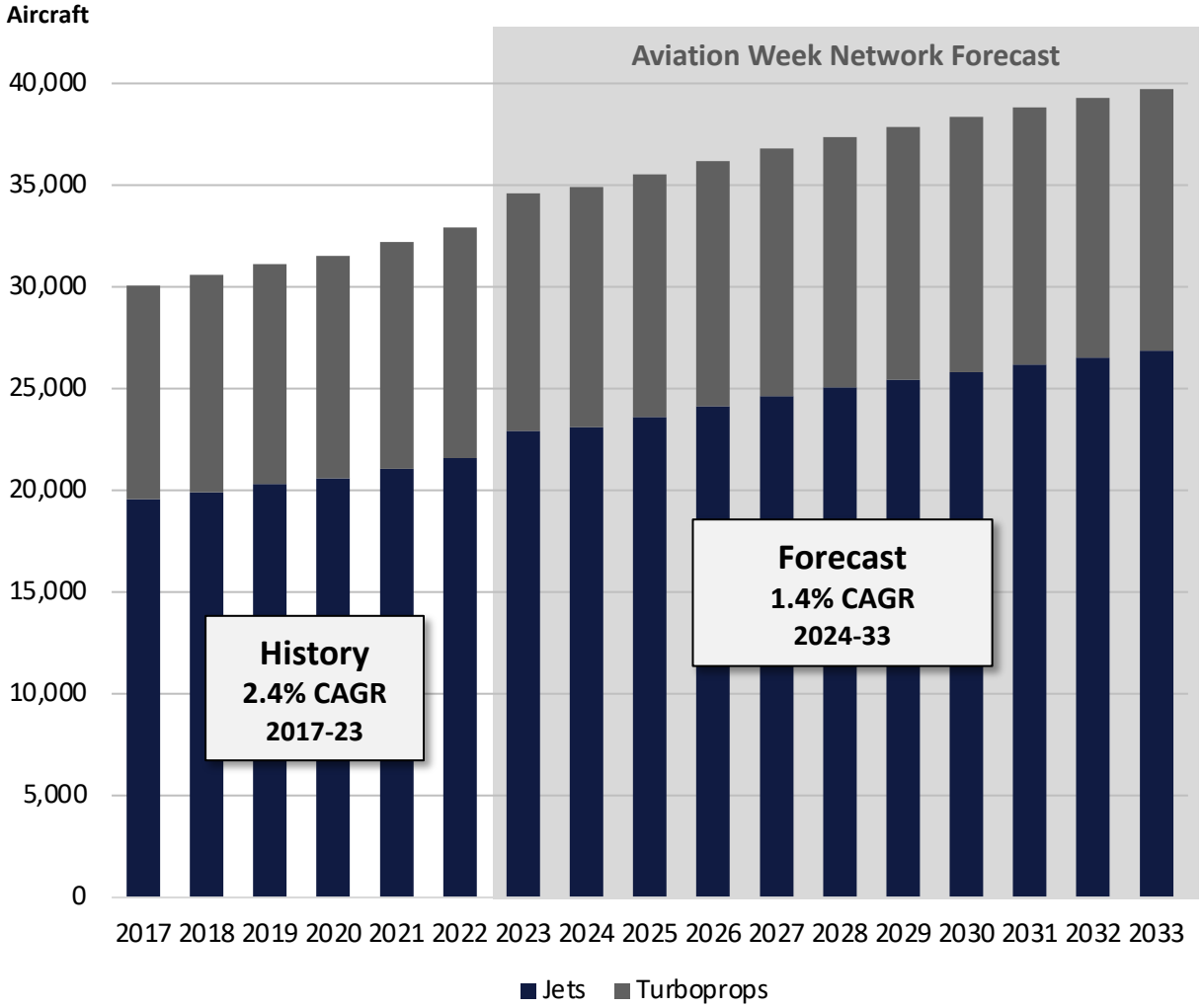
At the market segment level, retirements are dominated by Small Jets which account for 36% of all retirements in the period.

Multi-Engine Turboprops account for the next largest share at 25%, closely followed by Medium Jets at 24%.



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

In-Service Aircraft Fleet



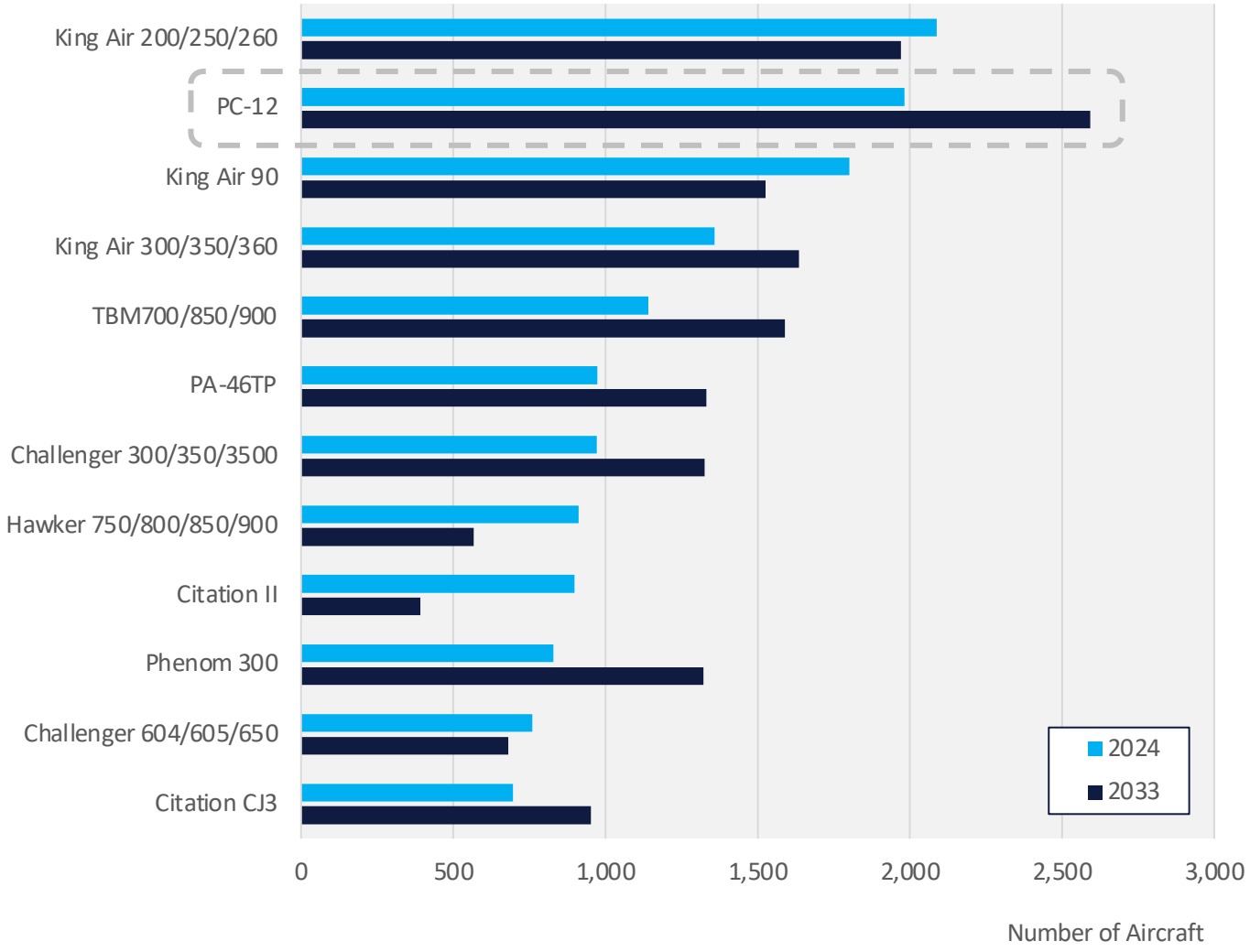
Highlights

- 1.4% future CAGR expected after 2.4% historical CAGR fleet growth.
- 39,719 global business aircraft fleet by the end of 2033.
- 1.7% CAGR for turbofan-powered aircraft;
- 1.0% CAGR for turboprop-powered aircraft.
- Large Jets gain the most share overall, while single-engine turboprops gain market share at the expense of multi-engine turboprops.



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

In-Service Fleet – Aircraft Share Over Time



The resultant shifts in the active, in-service fleet from new deliveries and retirements, plays out at various levels of analysis.

At the aircraft group level, depicted at left, the PC-12 fleet is expected to move from being the second largest in-service fleet in 2024 to the largest by 2033. The multi-engine turboprop King Air 200/250/260 group is expected to slip to the second largest fleet. The King Air 90 aircraft group declines as well, going from third place in 2024 to sixth on the last year of the forecast.

The Citation family, all Citation lines, retains its position as the largest in-service *family* over the decade with more than 7,000 aircraft expected to be in operation throughout the 10 years of the forecast. The reduction in the older Citation I (-84%) and II (-57%), will be offset by growth in the Citation Longitude (+251%), Latitude (+99%)and Ascend models.

At the category level, Ultra Long-Range Jets (+77%), Very Light Jets (+68%), and Single-Engine Turboprops (+46%) are expected to see the greatest growth of in-service fleets. The numbers of Multi-Engine Turboprops (-14%) and Midsize Jets (-11%) in service globally are projected to fall significantly over the course of the forecast.

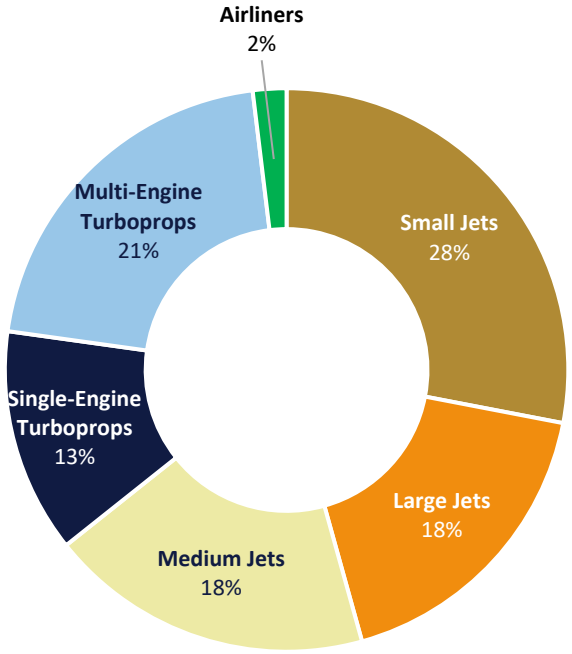
Aircraft fleets that are expected to see rapid growth over the course of the forecast include the Pilatus PC-24 (+173%), Cirrus Vision SF50 (+156%) and HondaJet (+93%).

Those expected to experience a significant decline in fleet strength include the Learjet 35/36 (-93%), King Air 100 (-74%) and Falcon 50 (-72%).

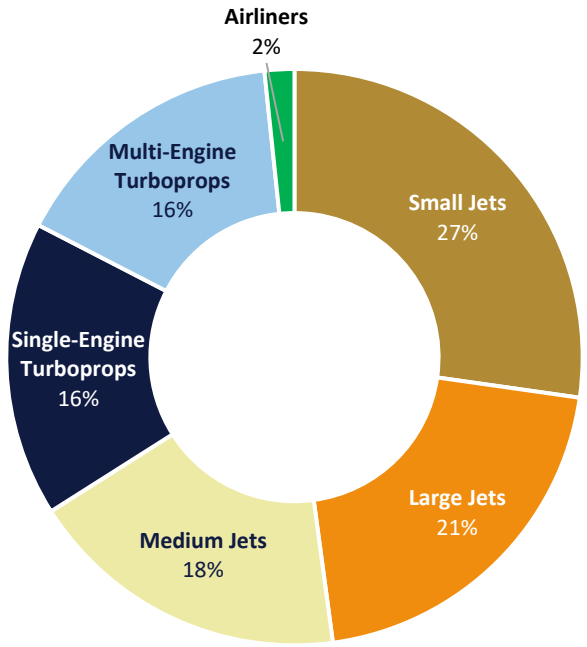
Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

In-Service Fleet Share

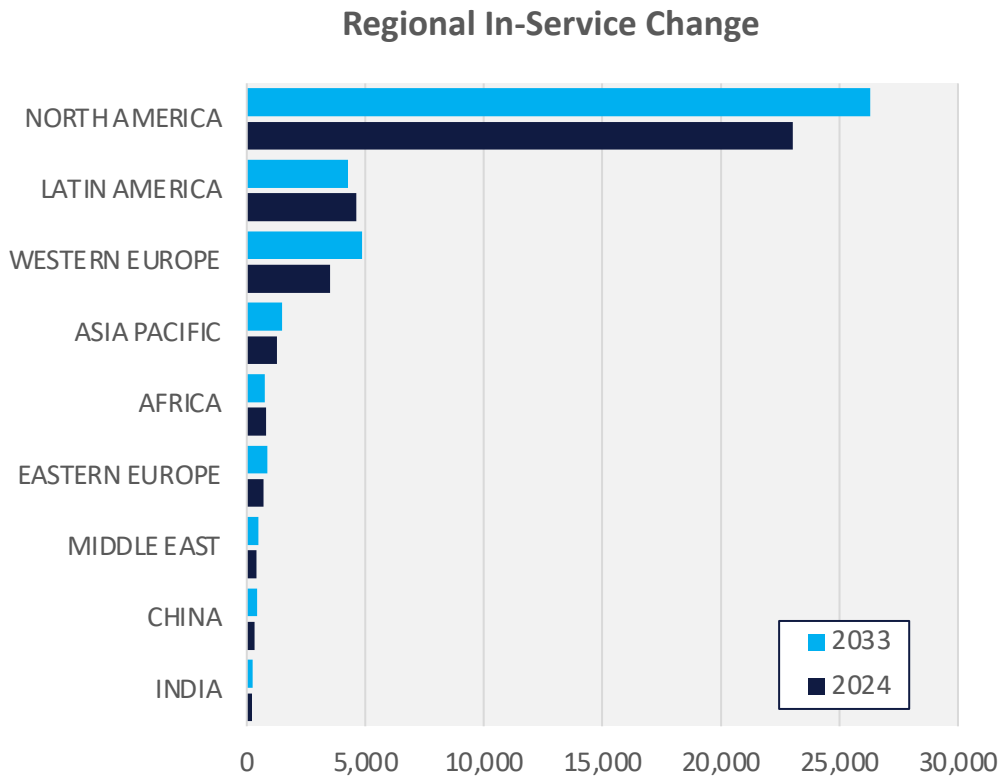
Fleet expands 14% 2024-33; grows at 1.4% CAGR over 10 years



2024 Fleet
34,897 Aircraft

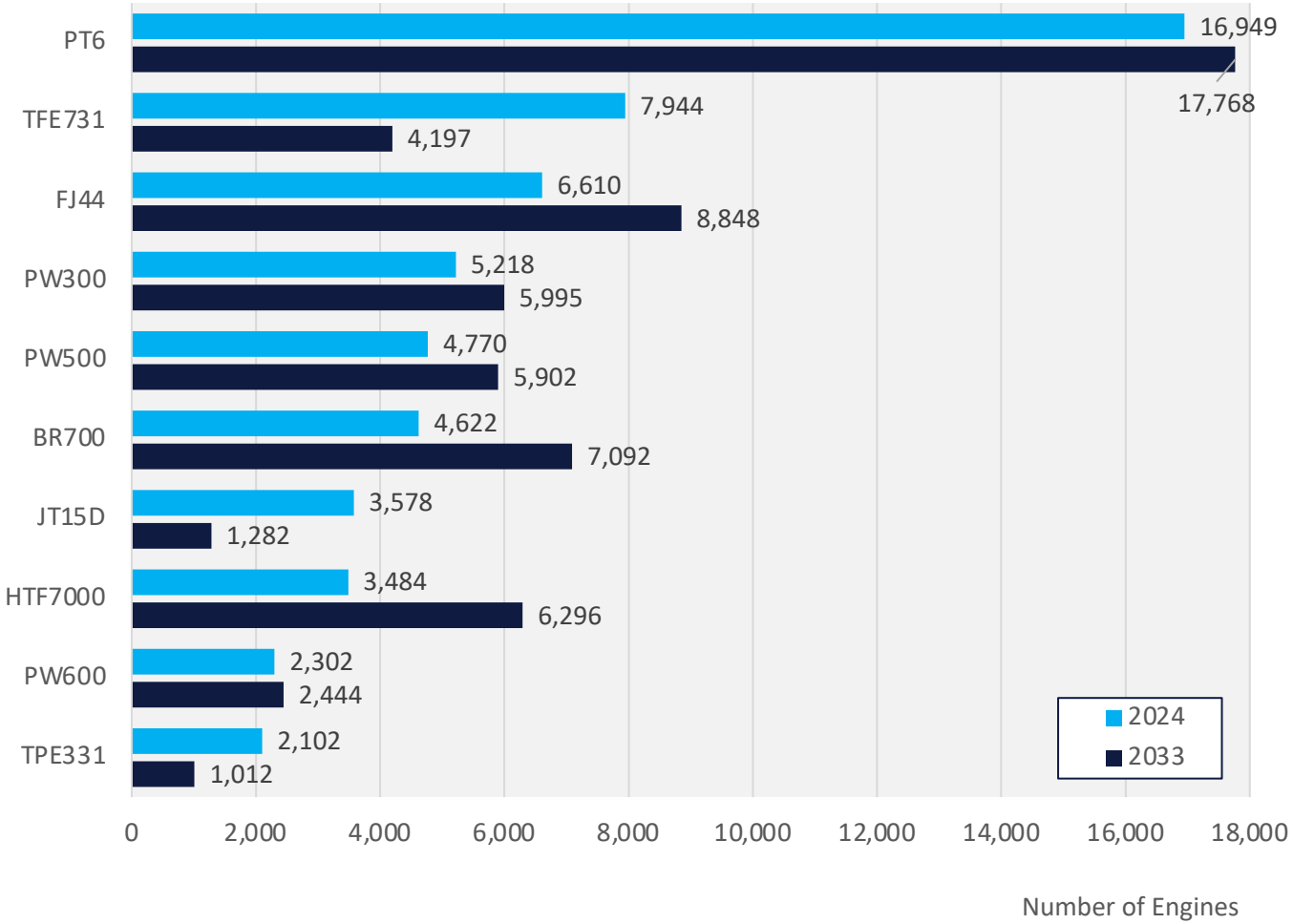


2033 Fleet
39,719 Aircraft



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

In-Service Fleet – Engine Family Share Over Time



The number of turbofan and turboprop engines in service globally is forecast to grow at 1.1% CAGR, from 65,660 units in 2024 to 72,263 by 2033. With 14 original engine manufacturers and 23 engine family types, the business engine fleet is a highly segmented market.

The Pratt & Whitney Canada PT6 engine family dominates the forecast in terms of the fleet. As of 2024, the number of PT6 engines in operation globally and powering single-engine and multi-engine turboprop aircraft comes to 16,949 units, the largest number of any powerplant representing 26% of the total. The PT6 family's end strength will grow but its fleet share will drop by a percentage point of the total engine count by 2033.

The current, second most popular engine family, the Honeywell TFE731 powering Hawkers, Learjets, and Falcon 900s will see a declining fleet as these aircraft and their engines are replaced with newer generation engines in the future. The TFE731 numbers projected to decline by 47% over the decade, falling from 7,944 engines in 2024 to 4,197 by 2033.

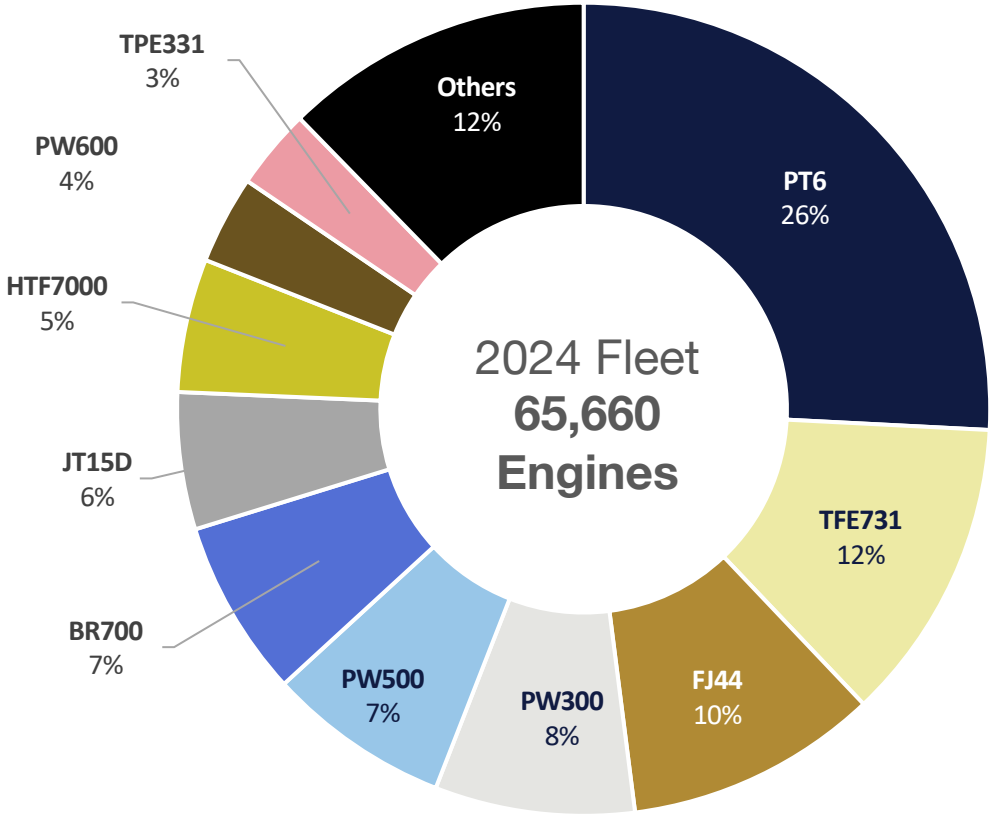
The FJ44 engine family, the third most popular engine with a long history of powering early Cessna Citations, will be given a breath of life by powering newer aircraft, namely the Pilatus PC-24 and the HondaJet Echelon (2600).

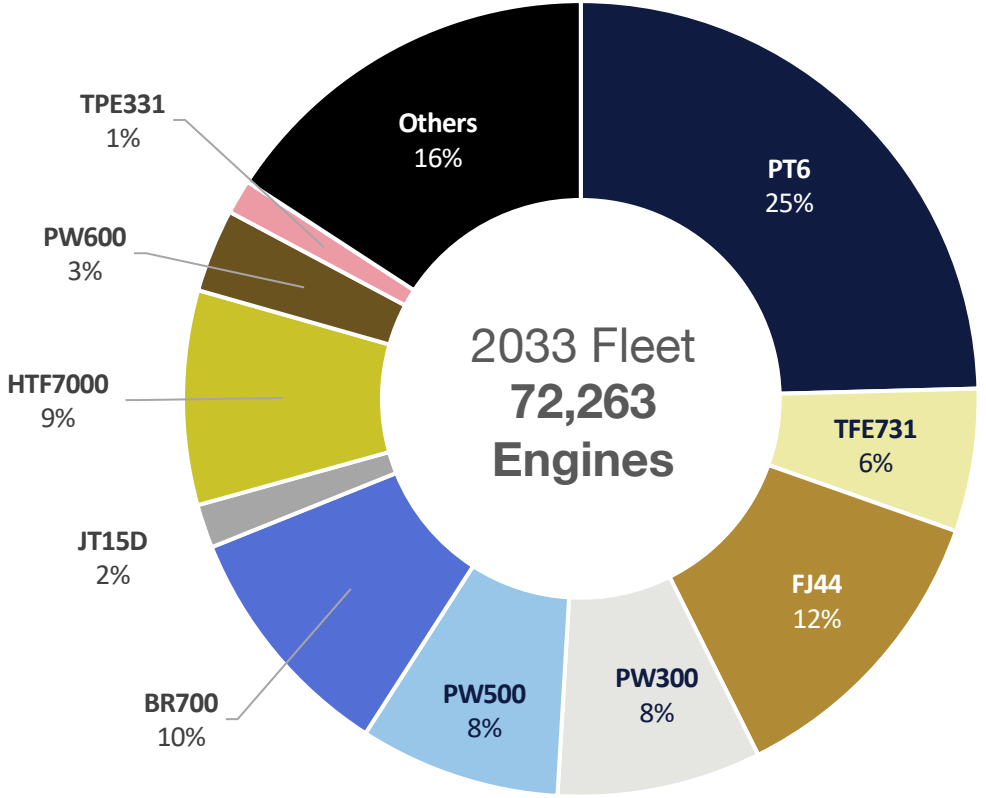
The fastest growing in service fleets of engines over the period will include the PW800 (+309%), Passport (+170%), FJ33 (+156%), HF120 (+93%) and the HTF7000 series (+81%).

Among the engine fleets that are expected to see the biggest decline over the forecast are the JT15D (-64%) and TPE331 (-52%).

Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

Engines – In-Service Fleet Trends





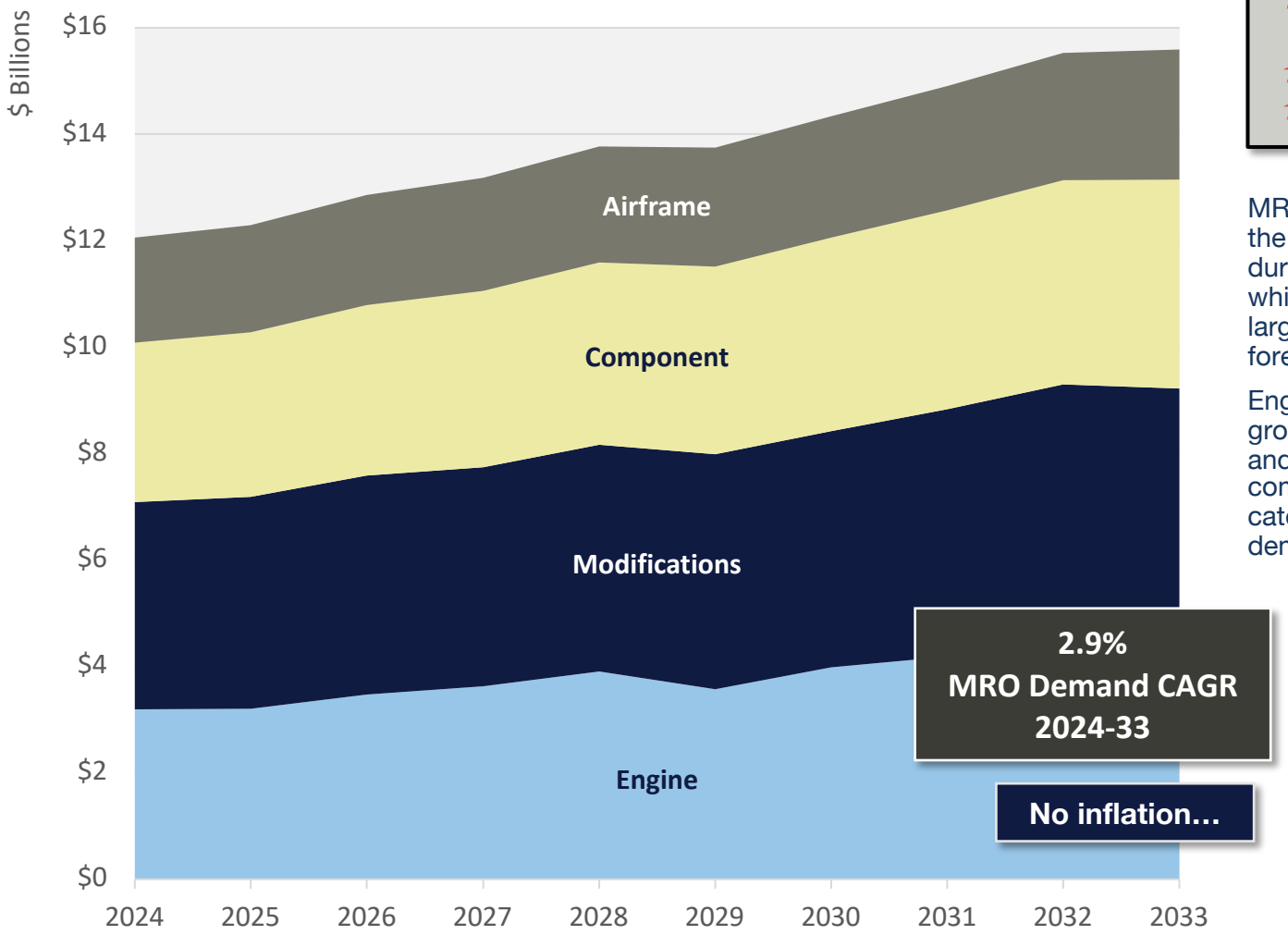
Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

BUSINESS

MARKET SUMMARY REPORT

MRO Demand Forecast & Trends

MRO Demand - Forecast

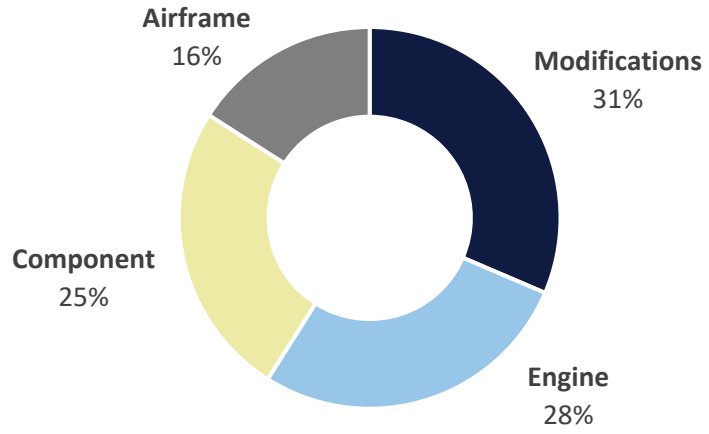


Highlights

- $138 billion in aftermarket requirements over the decade.
- $43.5 billion in modifications demand, the largest MRO category grows at 2.3% CAGR.
- $38 billion in engine MRO demand grows the fastest at 3.7% CAGR.
- + 53k major engine MRO events expected on 23 engine family types.

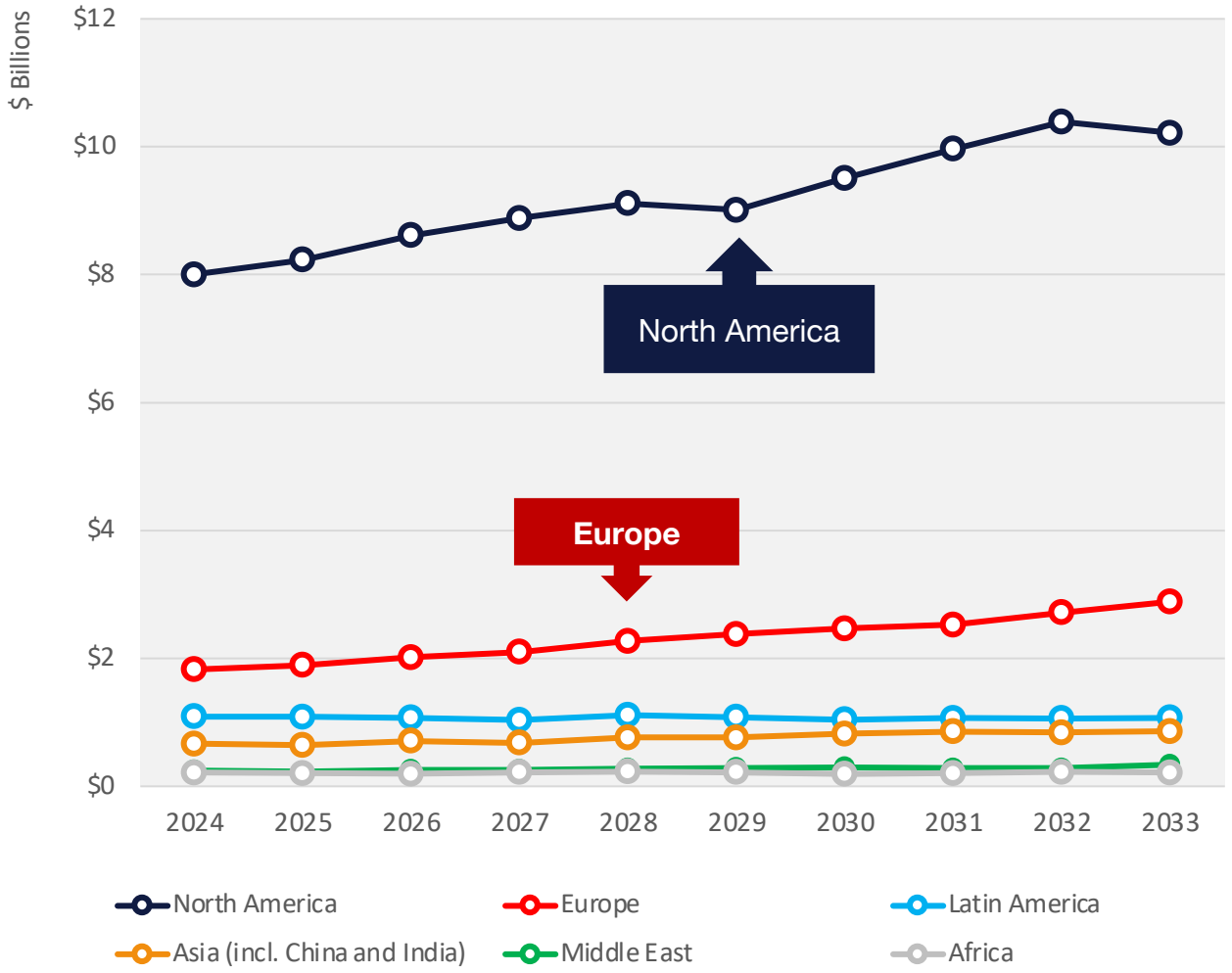
MRO Demand is expected to increase in line with both projected utilization and the size of the in-service fleet. Just over $138 billion in requirements is expected during the 10-year period, growing at a 2.9% CAGR. Modifications maintenance which includes paint, cabin upgrades and avionics, is expected to generate the largest amount of demand at $43.5 billion, or 31% of total MRO demand in the forecast.

Engine maintenance will account for a further $38.1B or 28% of demand and will grow the fastest. Components, which includes APUs, landing gear, and wheels and brakes, tallies to $34.7B or 25% of the total while airframe maintenance composes the remaining $22.1 billion or 16% over the decade. At the size category level, Large Cabin Jets will account for the biggest share of MRO demand at 20% share, despite their smaller unit values.



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

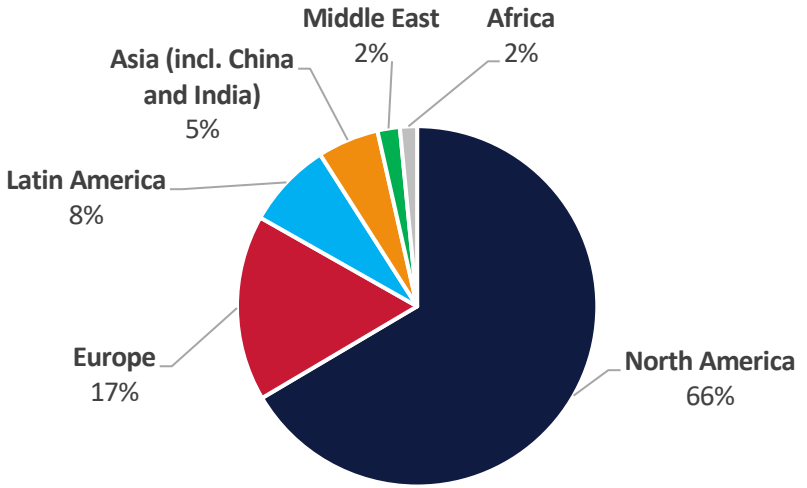
MRO Demand – Regions



Operators in North America continue to generate by far the largest amount of MRO demand throughout the forecast period given its fleet strength. Just over two thirds of all MRO expenses are generated here alone with demand continuing to increase at a healthy 2.7% CAGR over the decade.

Eastern and Western Europe combined generates $23.1 billion in demand over the period, accounting for 17% of total MRO. Combined European demand also increases at a robust 5.2% 10-year CAGR – the highest of any region.

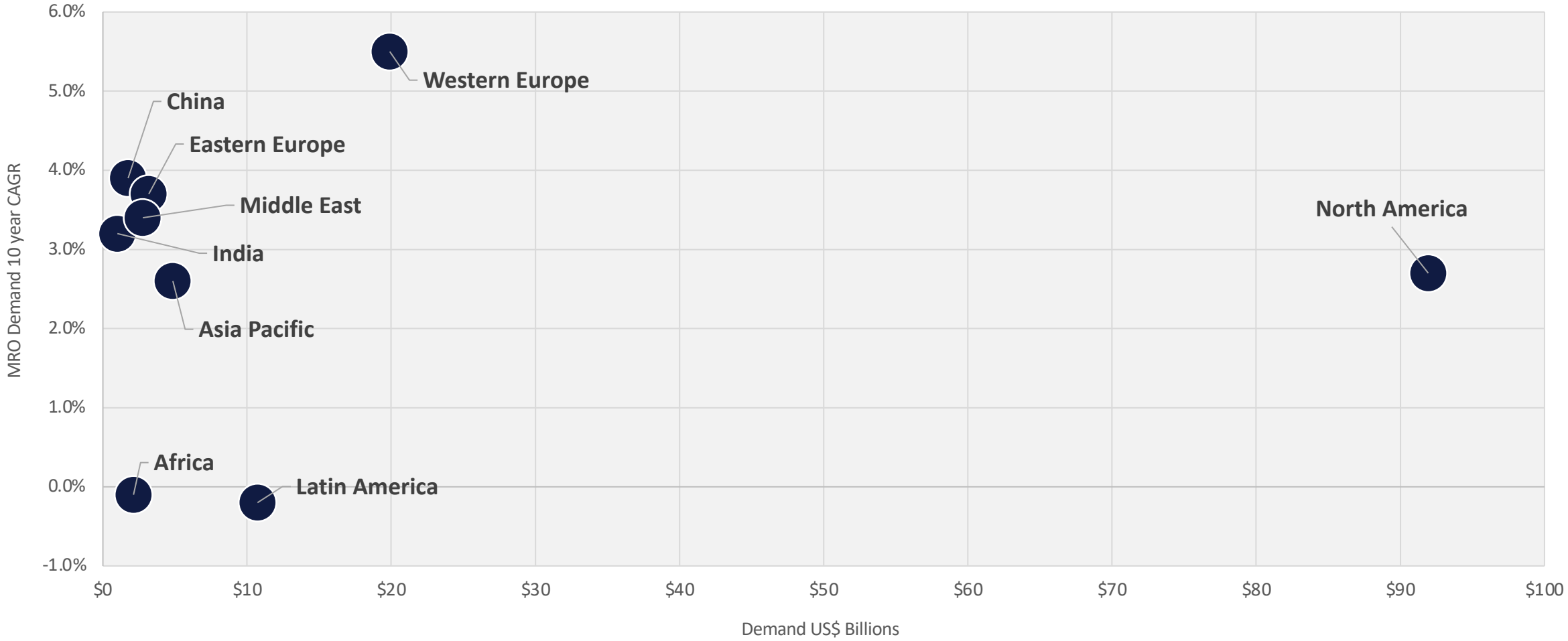
Demand in Asia (including Asia Pacific, China and India) will experience significant growth, albeit from a low base. In China alone, MRO spend increases by 42% over the decade. However, even with this growth, demand in China will remain limited to around $200 million in 2033. The Asia-Pacific region sees growth of 26% over the period, with demand reaching $500 million by 2033.



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

MRO Demand – Regional Trends

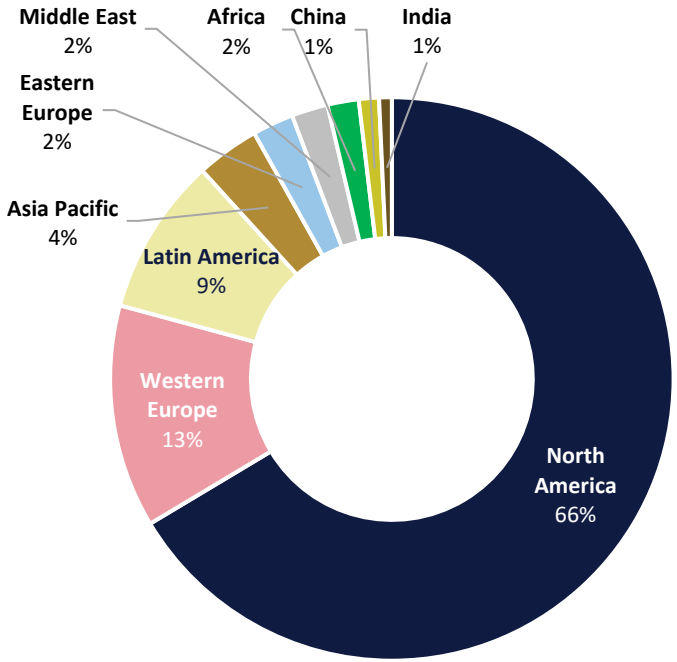
North America continues to dominate MRO demand accounting for 66% of global maintenance requirements



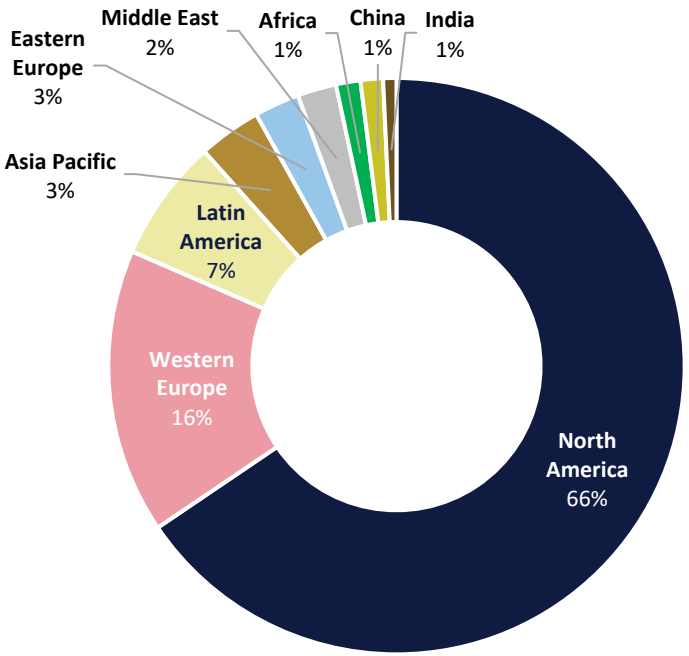
Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

MRO Share by Region

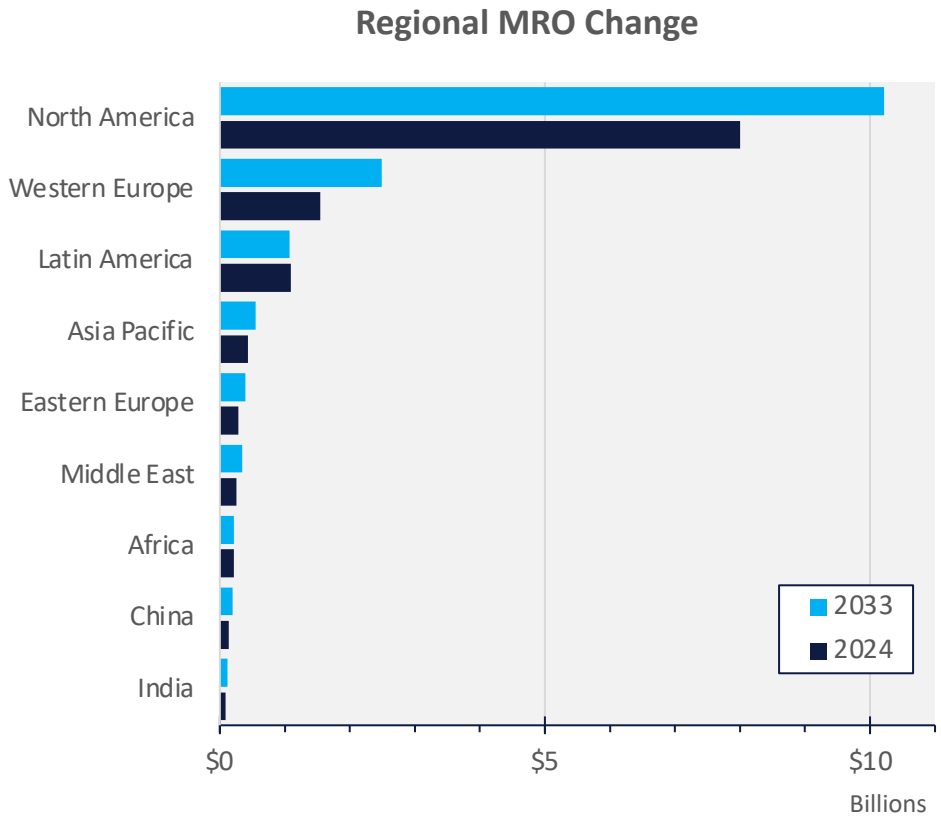
MRO increases 29% 2024-33; grows at 2.9% CAGR over 10 years



$12 Billion
2024 MRO Demand

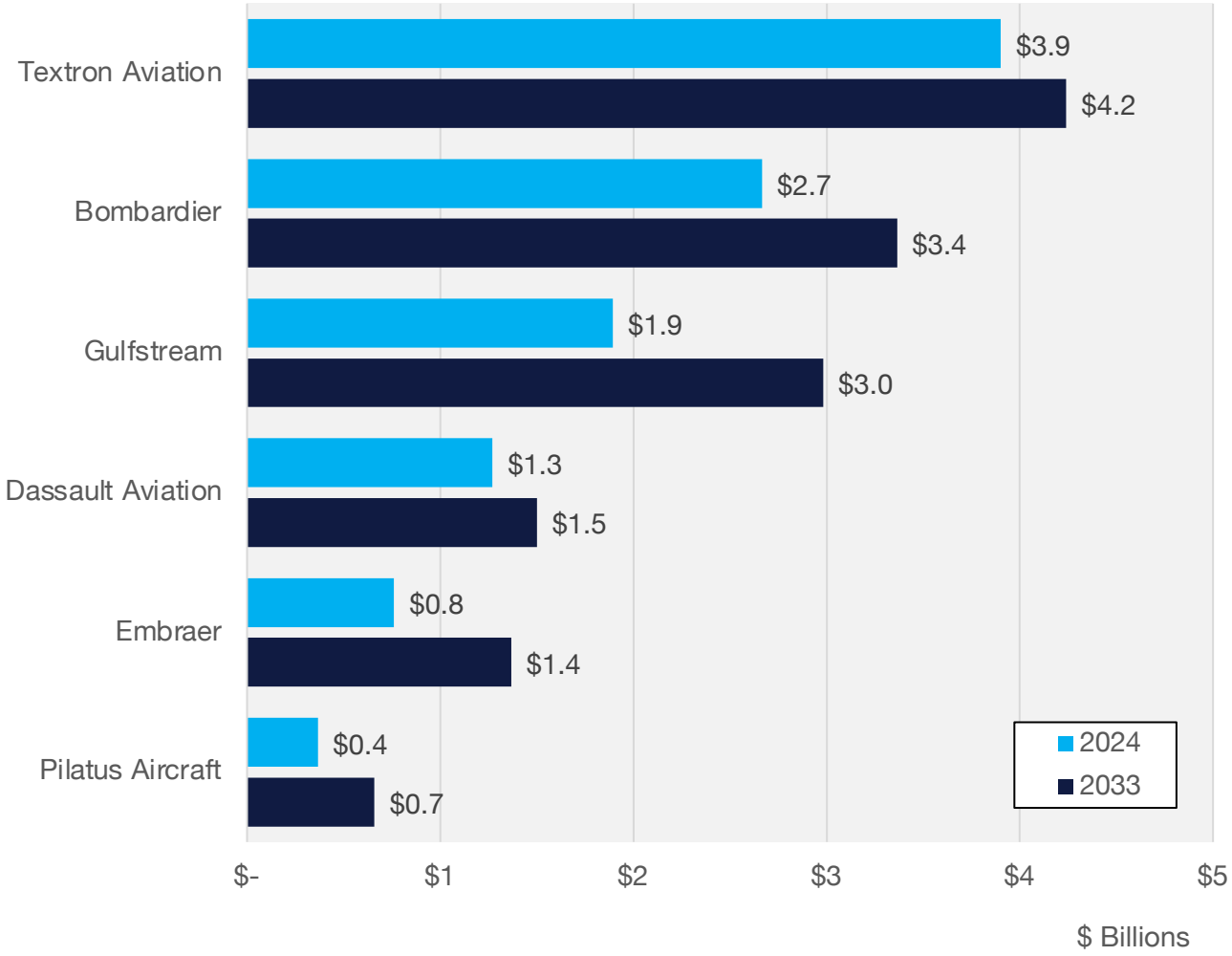


$15.6 Billion
2033 MRO Demand



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

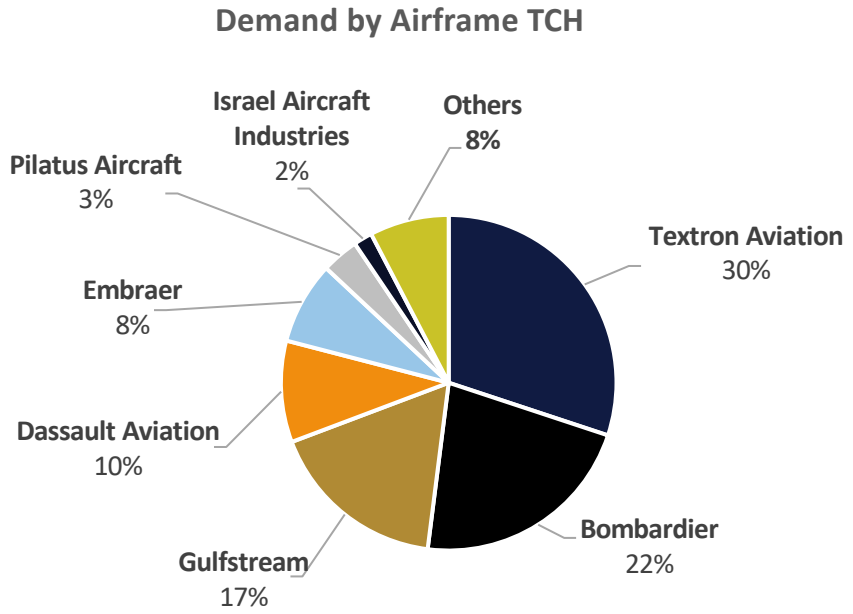
MRO Demand Change – Aircraft Type Certificate Holders



Textron aircraft account for the largest share of MRO Demand during the forecast period, with 30% or a value exceeding $40 billion over 10-years. The Citation family of aircraft will account for nearly 70% of Textron's MRO expenditures. Over the forecast period, Textron will show a .93% CAGR over the forecast period.

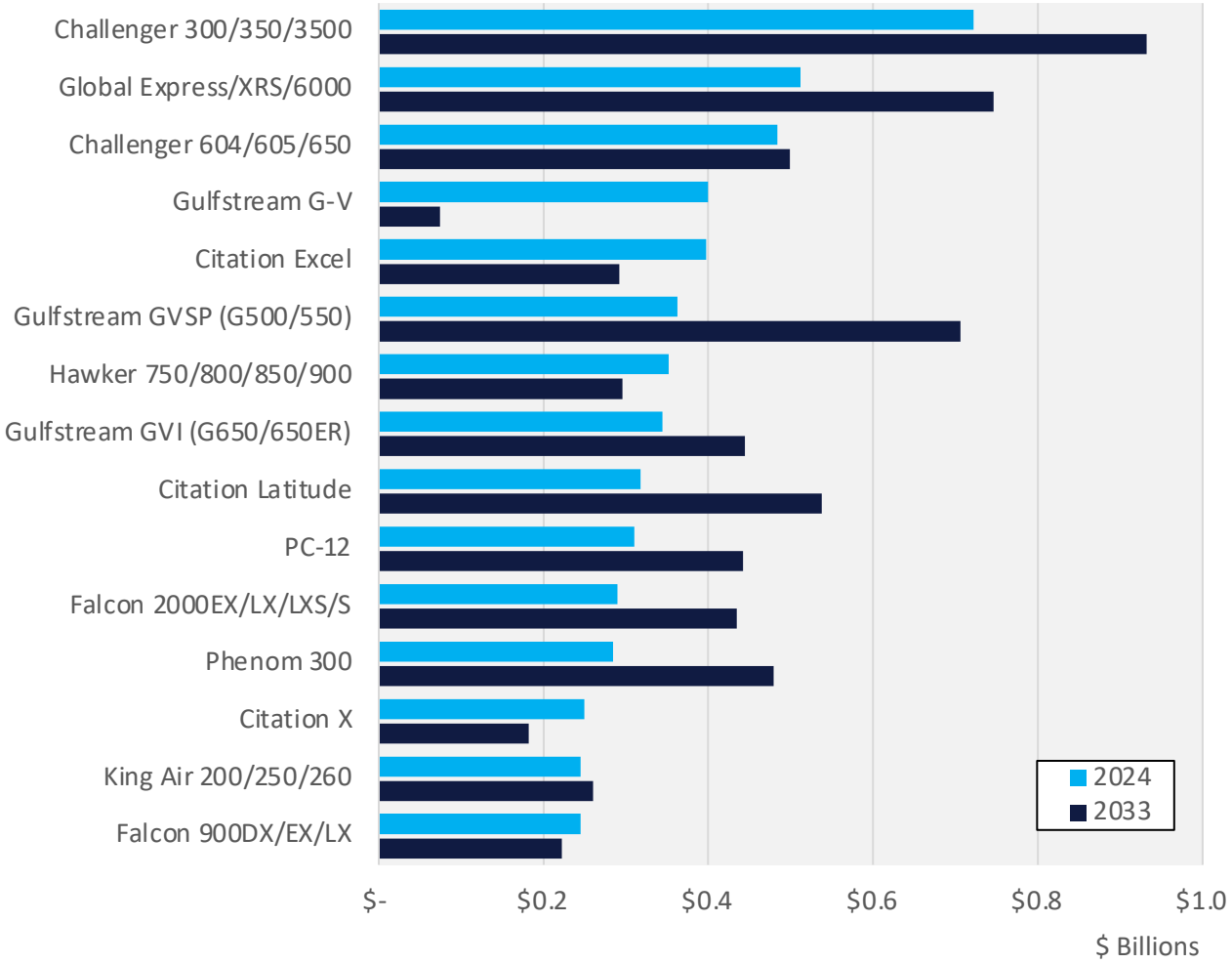
Bombardier and Gulfstream follow with shares of 22% and 17% respectively. In 2033 alone, MRO Demand for Bombardier will account for $3.4 billion while Gulfstream will account for over $3 billion.

Pilatus Aircraft and Embraer will both experience a growth of 80% and 6.7% CAGR – the largest increase for any of the leading aircraft type certificate holders.



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

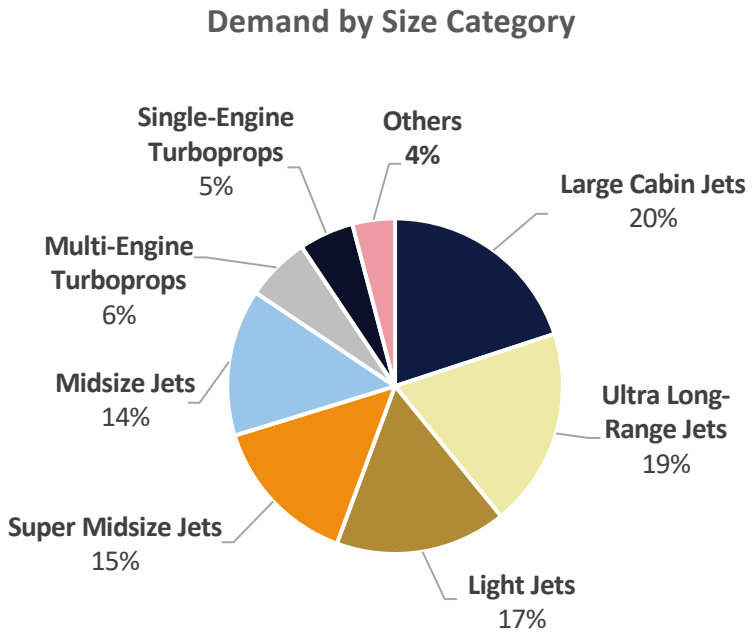
MRO Demand Change – Aircraft Programs



Bombardier aircraft lead all other manufacturers in generating MRO demand over the forecast with over $30 billion in dollar demand. Beginning in 2024, the Bombardier Challenger 300/350/3500 lineup and Global Express/XRS/6000 groups represent the two leading programs in terms of dollar demand generated at the aircraft group level. This share/position trend continues over the course of the decade. Ranking third initially, the Challenger 604/605/650 series [$484 million in 2024] loses its place to the Gulfstream GVSP (G500/550) [$707 million in 2033].

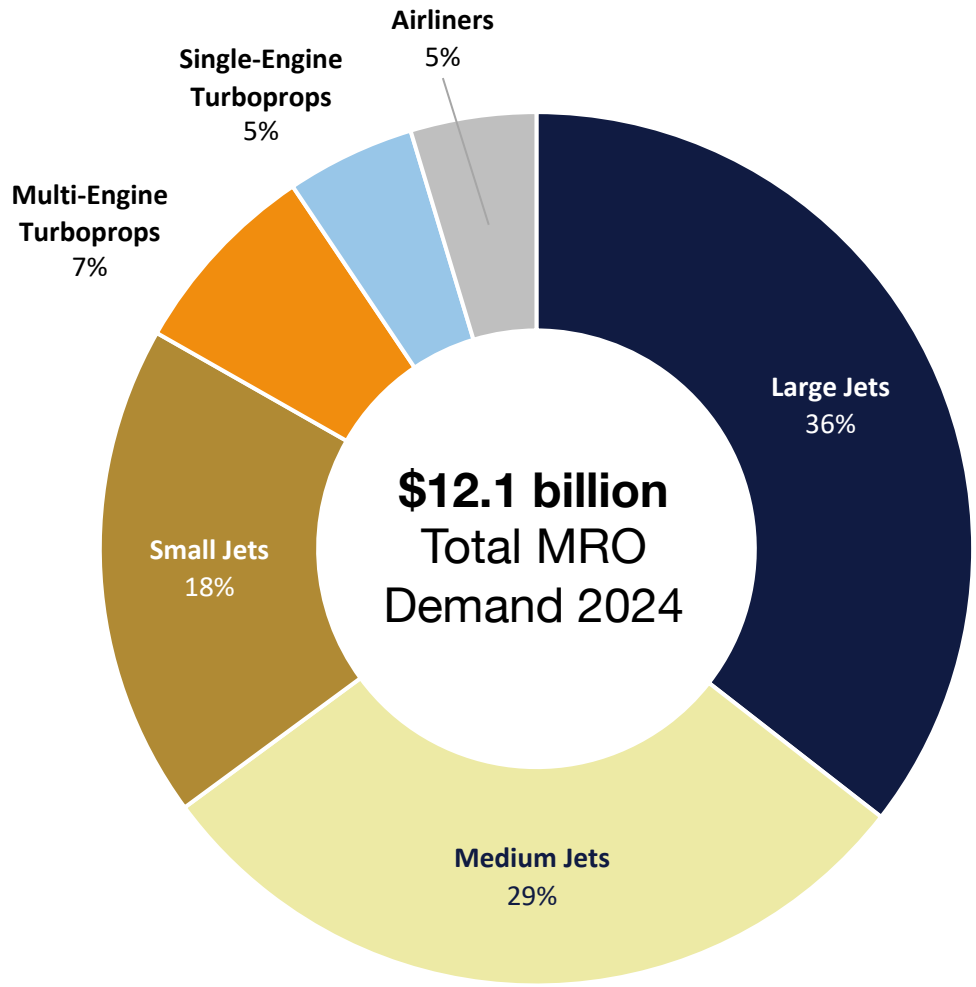
At the lowest size segmentation level, Large Cabin Jets account for the largest share of MRO demand at 20%. Along with the Ultra Long-Range, the two categories account for nearly 40% of all demand generated, while representing about 20% of the global in-service fleet.

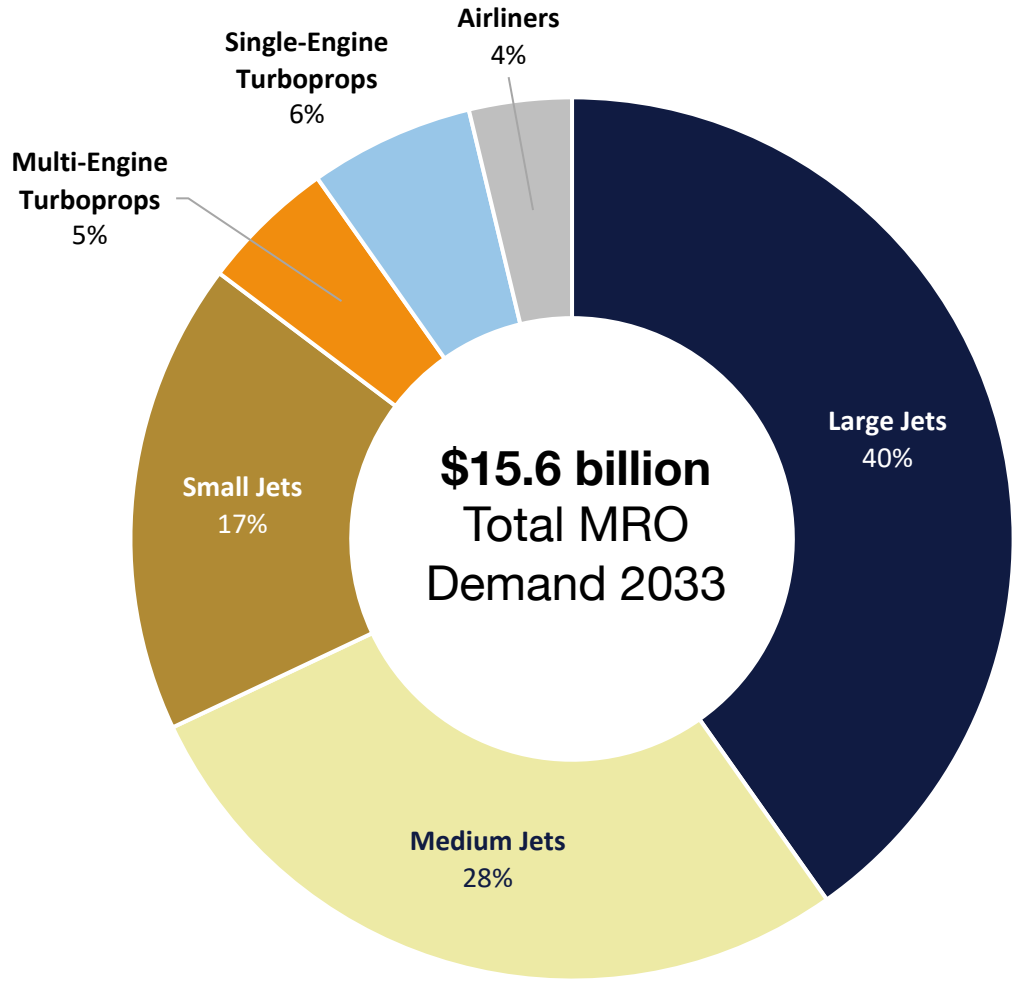
The vast Citation series is expected to generate $28.9 billion in demand, equivalent to 21% of all MRO activity over the decade. While the popular Gulfstream lineup is expected to generate $21.9 billion, representing a further 16% of the total.



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

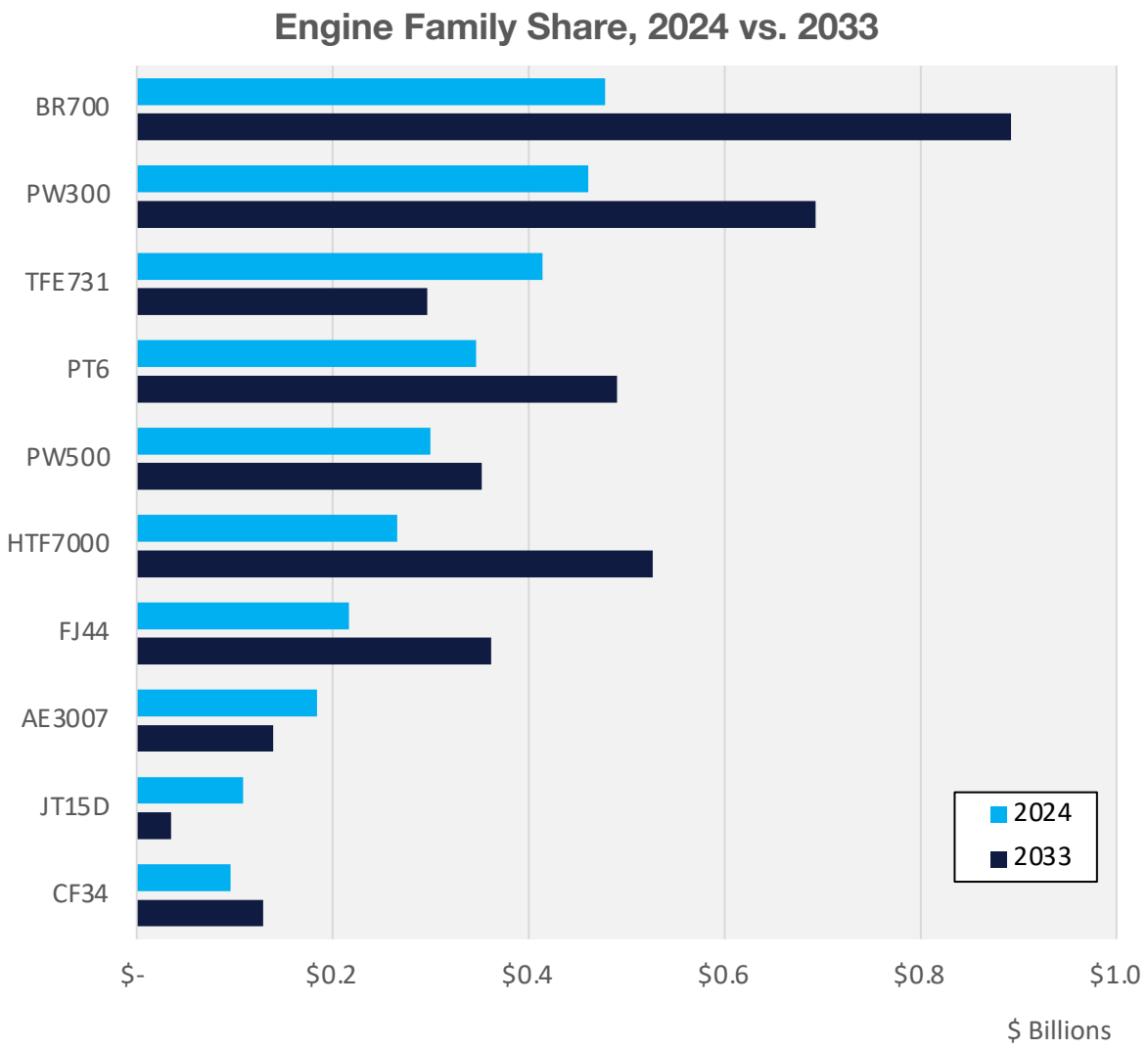
MRO Demand – Aircraft Size Segment Share 2024 vs. 2033





Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

MRO Demand Change – Engines



Engine maintenance generates $38.1B in MRO dollar demand over the decade, equivalent to 28% of overall maintenance. Growth in engine MRO demand outpaces other maintenance categories achieving a 3.7% CAGR over the decade.

Turbofans generate $33.6 billion in MRO spend accounting for 88% of the total after growing at a 4.0% CAGR over the decade. Turboprops generate $4.5 billion in engine maintenance requirements and after a 1.9% CAGR.

Rolls Royce BR700 engines accelerate their lead in the top position over the forecast. Powering Gulfstream, Bombardier, and Dassault aircraft, and with new entrants including the Pearl 15 and Pearl 700 models, they generate the largest annual MRO demand of any family. Projected growth in the forecast of 7.2% CAGR arrives at $890 million in 2033 alone. The Pratt & Whitney Canada PW300 series powering Dassault, Cessna, and Bombardier aircraft account for $693 million in demand in 2033, equivalent to 18% of the total global engine maintenance spend that year. Aside from the BR700 and PW300 rapid growth, the PT6's MRO demand is expected to increase at a 3.9% CAGR over the decade, reaching $490 million in 2033.

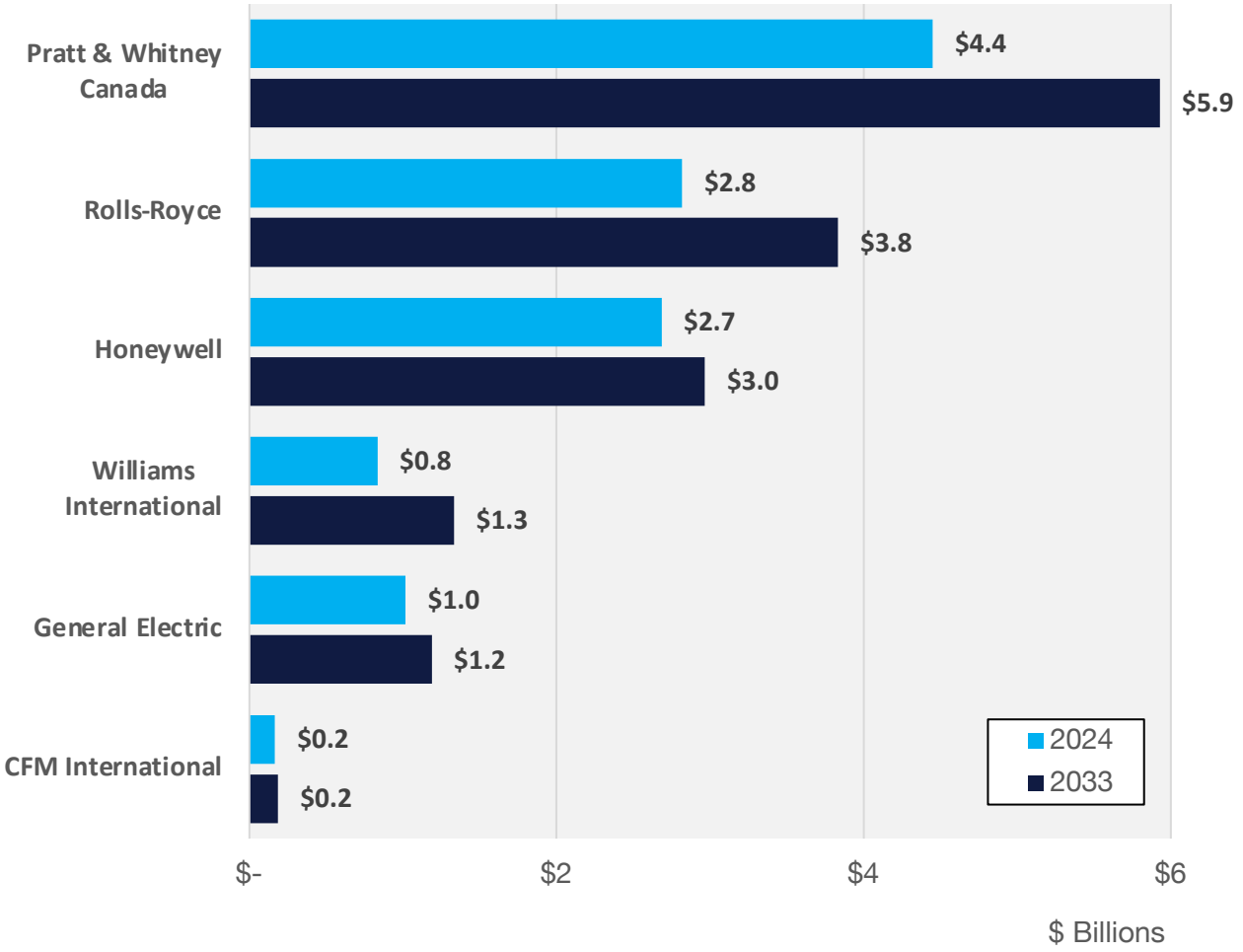
Meanwhile, the TFE731 is the only engine family in the top five to show a decrease in demand, with a -3.6% CAGR





Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

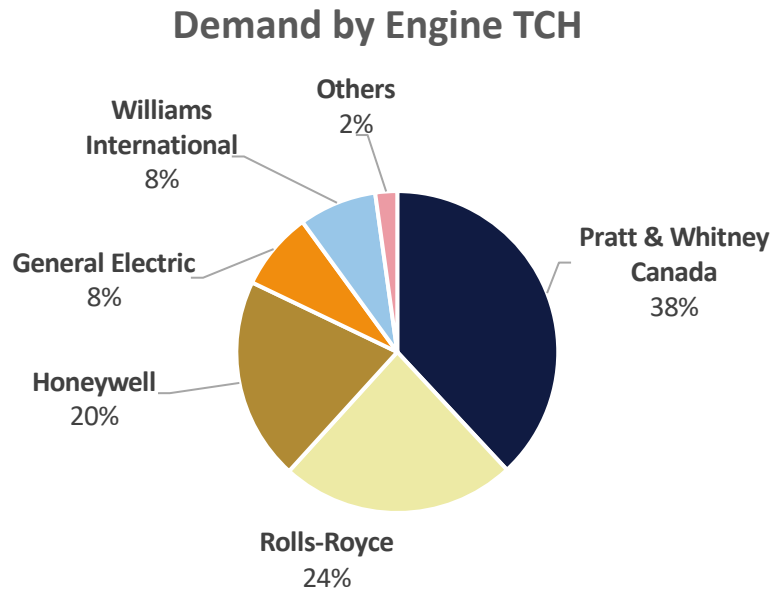
MRO Demand Change – Engine Type Certificate Holders



Pratt & Whitney Canada engines account for the largest share of MRO demand, at 38% during the 2024-33 period. Rolls-Royce at 24% and Honeywell at 20% follow.

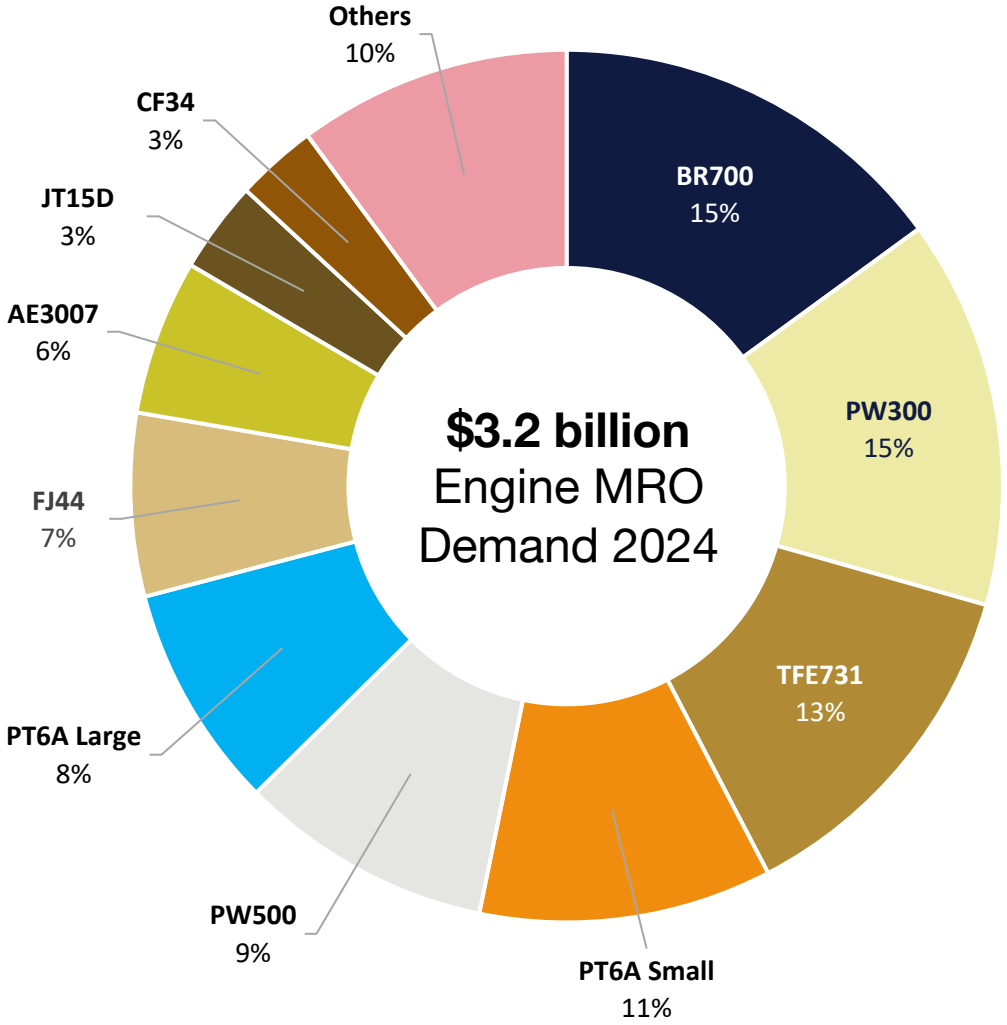
Rolls Royce engines on the Gulfstream family of aircraft make up the largest individual percentage of MRO expenditure. However, the number Pratt and Whitney Canada engines and associated MRO expenditures on the Citation, Phenom, Falcon and additional aircraft families place Pratt and Whitney Canada as the largest engine TCH by MRO expenditure.

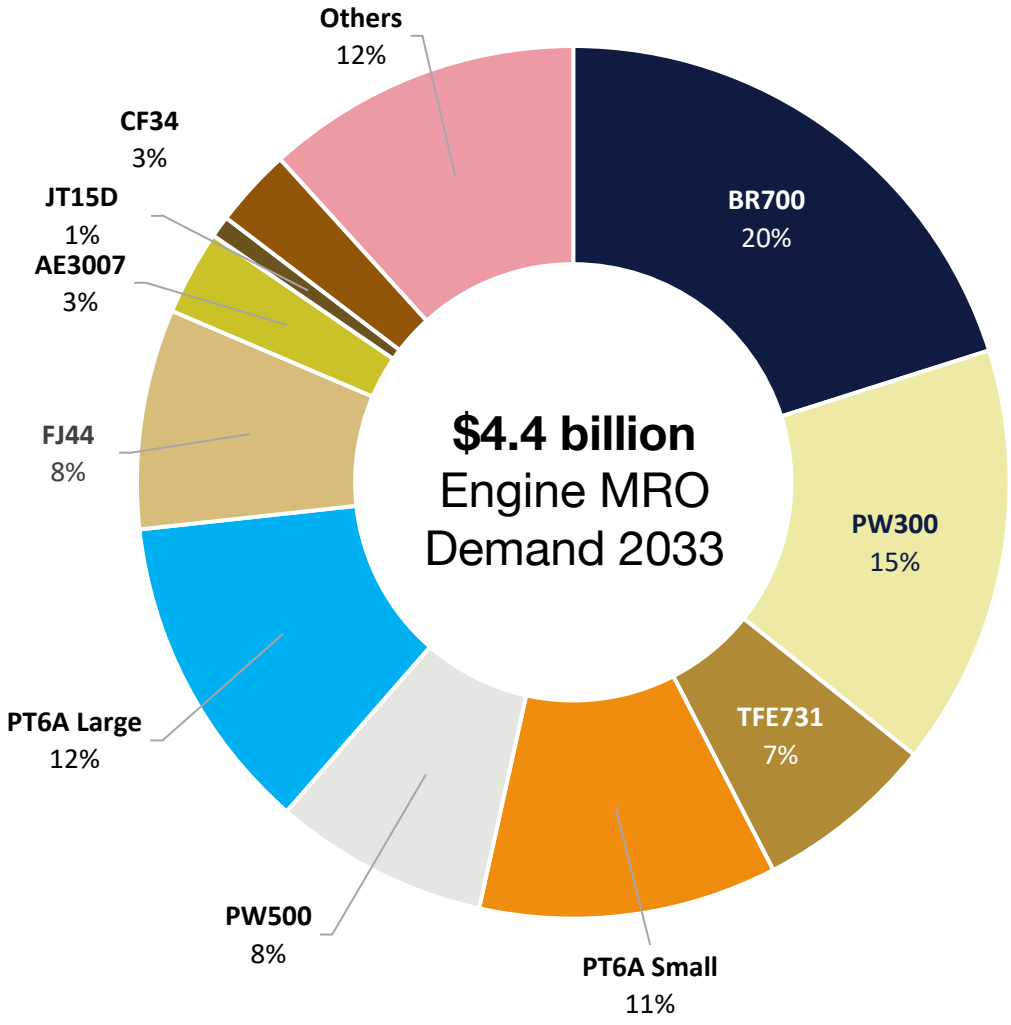
By 2033, the leading three type certificate holders generating the most demand will remain Pratt & Whitney Canada ($5.9bn), Rolls-Royce ($3.8bn) and Honeywell ($3.0bn).



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

MRO Demand Change – Engine Family Share 2024 vs. 2033

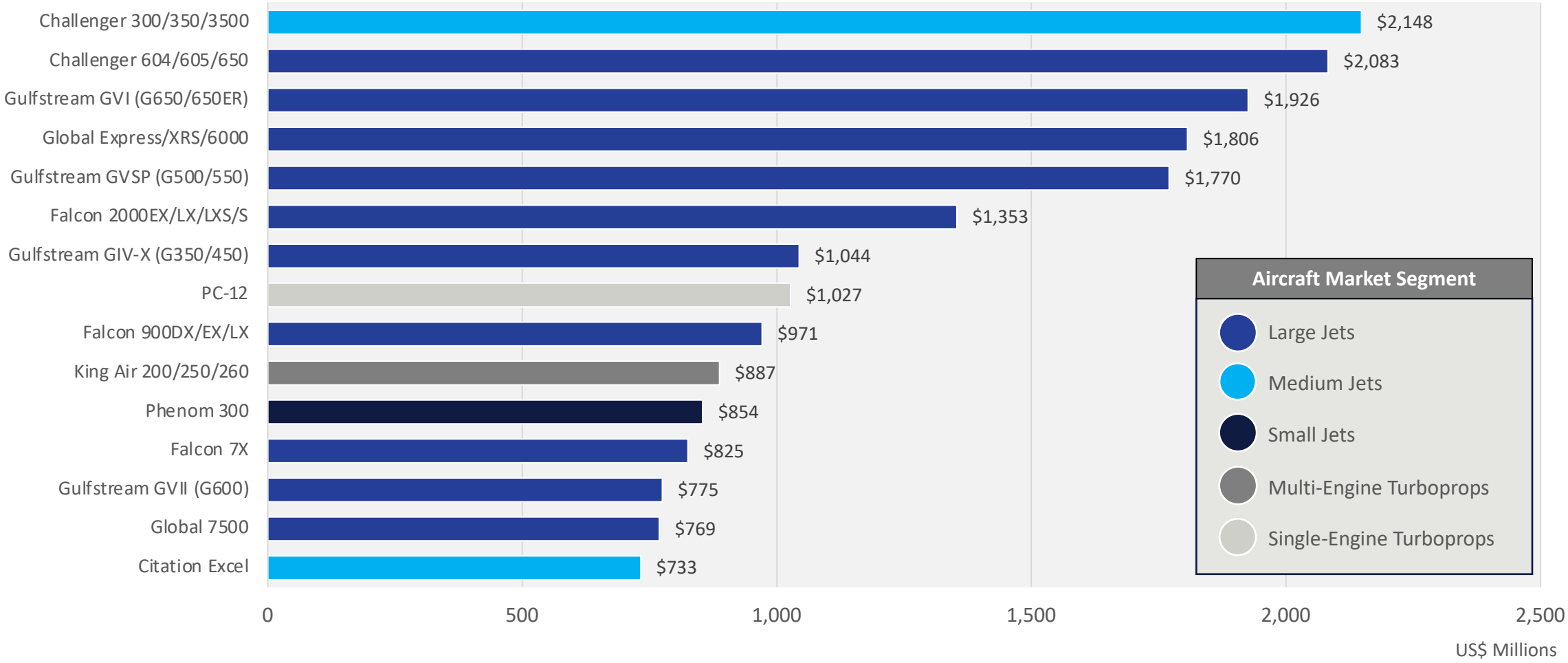




Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

Modification MRO Demand – 2024-33

Large Jets account for 44% of all modifications



Source: 2024 Business Aviation Fleet & MRO Forecast, Fleet Discovery, Aviation Week Network, Copyright 2023.

Methodology

- Scope
- Modeling
- Assumptions

Methodology & Assumptions

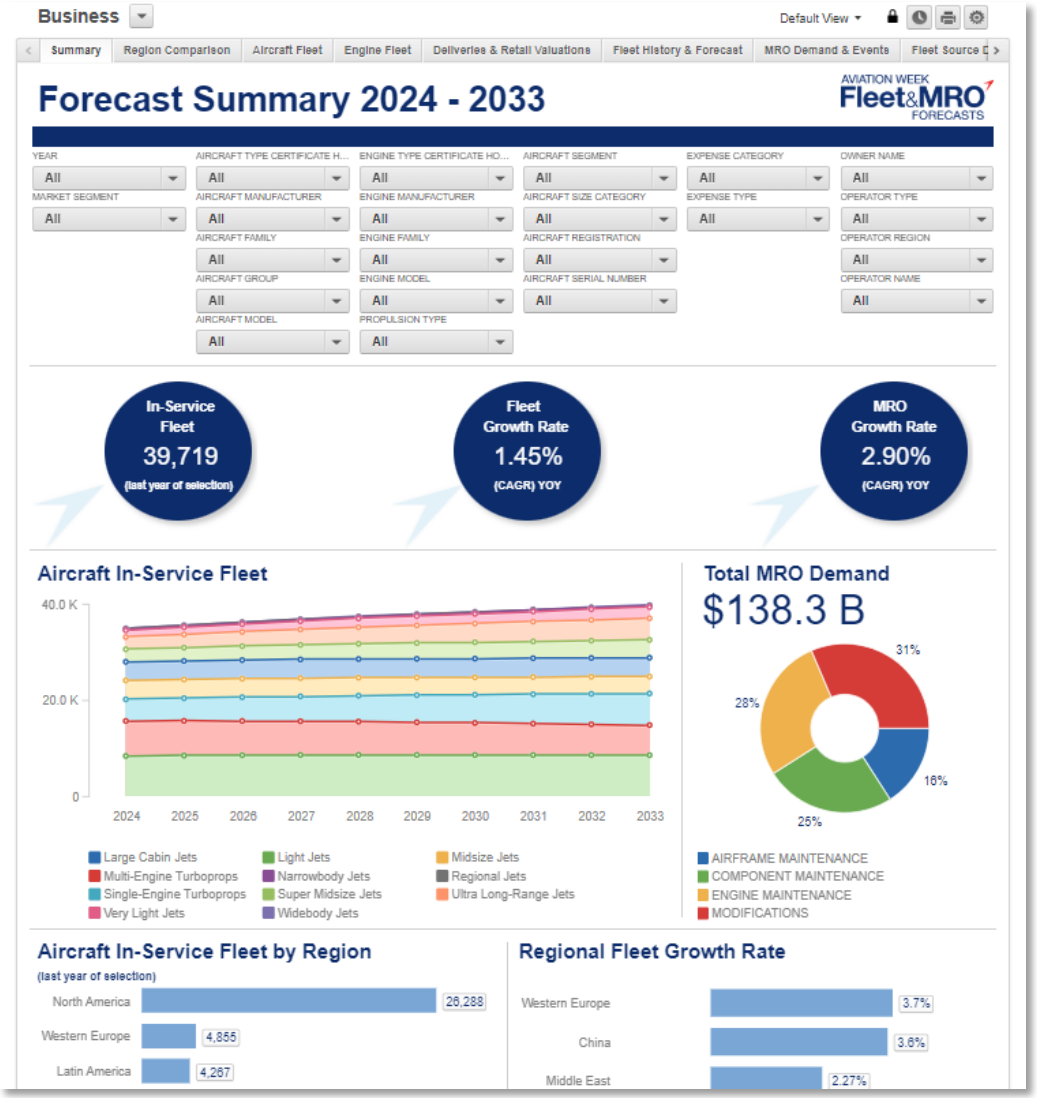
Overview

The comprehensive forecast dataset is available via an online business-information (BI) tool interface. The summation of an extensive dataset of fleet and MRO information is compiled in-house by Aviation Week Network, Intelligence & Data Services Department. Users may customize the tool by filtering through aircraft and various categories—aircraft family/group/model/category, geographic regions, OEMs, engines and operators, as well as MRO expense categories or expense types—to yield customized data, graphs and table displays for any segment of the fleet and MRO projections. Information contained in the dedicated summary, regional, fleet, engine and MRO tabs provides users with the most sought-after data for strategic planning.

Projections by the Aviation Week Fleet & MRO Forecast business-aviation segment are predicated on data for estimated aircraft production, deliveries, retirements and resultant in-service fleets, as well as projections for maintenance requirements based on trends, aircraft operating economics, regional variations and ownership types.

This independent industry effort combines Aviation Week's fleet database information with projected utilization rates and OEM hour-and-cycle MRO intervals along with cost assumptions at an aircraft-group/operator type level to develop an MRO forecast for strategic decisionmakers and analysts. Its dedicated research team, with more than 160 combined years' industry experience, acquires first-hand information and developments from industry surveys and OEM data feeds, as well as guidance from advisory board contributors representing top-tier OEMs, MRO providers, consultants and independent analysts.

Forecast Dashboard Tool



Methodology & Assumptions

Scope

The forecast examines the projected 10-year, 2024-33, market for business aircraft and allocates new deliveries and retirements across nine geographic regions (see Appendices). The in-service aircraft, aftermarket cost assumptions and utilization projections are combined to create a model of potential MRO demand at the aircraft, engine, operator, country, regional, and other levels.

Business aircraft in this study are defined broadly as civil turboprop- and turbofan-powered, Western-built units whose original designs were for the business and/or executive market, plus other aircraft operated in an executive/business role. Included are aircraft operated under Part 91 or similar international standards for owner-operators, under Part 135 or similar international standards for charter/on-demand and freight certificates, fractional arrangements, corporate flight departments and some civil government operations.

Government-operated aircraft have roles for executive transport or flight-inspection services, particularly those whose airframes share a common, civil business-aircraft heritage. (In-scope aircraft family listings are found in the Appendices).

Nine world geographic regions are represented and are used to associate both future aircraft fleets and future MRO demand. Countries are allocated to regions where common market characteristics are represented and may not conform to popular associations.

Forecast World Regions – See also Appendices



Hierarchies/Typology

Aircraft Hierarchy (Arranged from highest to lowest level)	MRO Major Categories & Expense Types
Family	See Appendices
Group	
Type (unused)	
Model	

Methodology & Assumptions

Fleet Forecast, Models & Assumptions

The forecast begins with an initial extract from Fleet Discovery, Aviation Week's in-house database where aircraft are tracked at the serial-number level from manufacture, ownership, storage, and disposal.

The fleet elements are updated continuously with specific operator, owner and registration information throughout the preceding years and months. The effects on fleet totals of parked, stored or destroyed aircraft are calculated to determine annual active in-service fleet values until extracted for use in the forecast. The total in-service fleet (ISF) is calculated for each forecast year by factoring in annual retirements and deliveries. The basic in-service fleet formula used is:

ISF Year 2 =
ISF Year 1 + Year 2 deliveries
- Year 2 retirements

ISF Year 3 =
ISF Year 2 + Year 3 deliveries
- Year 3 retirements

(The formula continues
for the forecast years.)

Legend: ISF = in-service fleet

Deliveries

Forecast delivery projections are based on an analysis combining macroeconomic conditions, regional economic factors, historical averages, production capacity and known orders. Annual delivery estimates are created for a period beginning with the first entry into service either announced by OEMs or assessed by analysts—by year and model. Expected deliveries are estimated given anticipated economic conditions, projected economics-driven demand trends and production capacity evaluated by analyst assessments. The expected deliveries are then allocated to regions, operator types, and engine types, but not to individual operators or countries unless known at the time of the forecast.

Retirements

Initial retirement assumptions are assigned, based on age of the airframe, to project retirements. Since retirements are based on individual decisions and most are not announced or even officially recorded, they are notoriously difficult to predict. Projections initially are assigned among candidates in a specified age/airframe category, then evaluated by group/model and holistically by industry experts for consensus and final adjustments. Retirement curves are recalibrated throughout the analytical process enabling the forecast to incorporate the latest retirement data. These retirement trends are applied to the various target fleet segments once the selection criteria have been finalised.

Methodology & Assumptions

MRO Model

The model's predictive algorithms use a life-cycle analysis to model aircraft MRO aftermarket demand based on groups/models, size categories, engine families and operator types; and evaluate each model by age, region and projected average annual utilization during the forecast period. Average MRO expenses by group/model are modelled across the projected in-service fleets.

The goal is to derive a potential MRO demand across each aircraft model for its unique situation (operator type/region/age). Data outputs include projected dollar demand for airframe, engine, component and modification categories. Expense categories are further assigned within a number of related categories such as OEM, type certificate holder, operator type (fractionals, corporate, charters, etc.) and region. Further, 20 individual *expense types* are calculated as subcategories such as avionics, landing gear, flight controls, hard and soft goods. (See the Appendices for a complete table listing.)



AircraftBluebook

Retail Price-based Valuations

In the online dashboard, Aviation Week examines the value of new deliveries over the 10-year period in constant 2023 U.S. dollars. The study uses Aircraft Bluebook advertised, averaged equipped retail prices but does not adjust for discounts that a manufacturer may provide for multiple purchases or other contract concessions. The examination includes regional distribution by year, aircraft-size classes, aircraft families, manufacturers and roles, etc. to predict new delivery market trends by value. The range of filterable elements are hosted in the online tool.

Methodology & Assumptions

Engine Methodology

Engine Service Event Scope

Major maintenance service events (overhauls and hot section inspections) usually occur at engine repair facilities. It is assumed engines will be overhauled to manufacturers' type-certificate specifications. On-condition and life-limited component parts are inspected and/or replaced as necessary and accounted for in overhaul cost assumptions..

The business model assumes engines have events/costs at set cycle intervals for each of two major events: overhauls and hot-section inspections, with unique costs for each. An engine-unique hourly "unscheduled maintenance" rate factor also is applied and allocated based on projected utilization rates. Tech inserts, unscheduled engine removals, airworthiness-directive (AD)/service-bulletin (SB) compliance and dilution rates for spare engines are not assumed as unique events, but compliance costs for ADs and SBs are incorporated into major service events.



Credit: Antoine Fafard, Aviation Week Network

Engine Service Event Modeling

Engine events are forecast based upon the following parameters:

- Current aircraft utilization (flight cycles accumulated).
- Projected utilization (flight cycles per forecast year).
- Engine service intervals (average engine cycle intervals derived from surveys of OEMs and MROs) triggered for each powerplant by projected utilization.

The servicing algorithm connects engines continuously to aircraft within the forecast model. Roughly speaking, the algorithms make the following calculations: Engine utilization history + projected utilization in Year 1 + projected utilization in Year 2 = total utilization for year 2. The algorithms then follow the formula for subsequent years. Utilization event-trigger algorithms are used to note when an event should occur, a service event is counted, and the corresponding expense is recorded. Utilization is informed by in-house flight tracking sources.

By nature of the modelling and the online dashboard, costs are associated with the operator, aircraft types, aircraft categories, country, region, OEM, type-certificate holder and multiple other connections. No factors are applied for a particular operator's harsh environmental conditions or for proprietary engine maintenance practices/schedules assumed under their certification authority.

Engine Count Modeling

Aircraft deliveries and retirements provide a collective proxy for engine counts in the forecasts. For example, when an Embraer Phenom 300 is delivered, the model adds two Pratt & Whitney Canada PW535E engines to the engine in-service count. The utilization rate starts accruing for the aircraft/engine combinations and anticipated MRO spending builds on event triggers; turboprop engines now follow the same modeling as turbofans – cycle-based intervals for overhaul determination. An engine hourly rate factor is applied. As an aircraft is retired, so are the corresponding engines. The forecast does not account for spare engines.

Methodology & Assumptions

MARKET SITUATION

The pandemic aftermath is the overarching influence of this market. Its ramifications were abrupt and severe but the new normal is characterized by continuing tail winds in utilization and new orders, especially in North America and in Europe. The welcome newfound demands being placed on the business aviation market to fulfil high-end commercial passenger's demands, as well as robust business travel rebounds, gives reasons for optimism in this market. What we've seen is that swings may occur in this market, but passenger demand seems abundant with new users enjoying the benefits of business aviation.

Economic, manufacturing and financial factors influenced this forecast. Debt levels and inflation is high in the Americas and Europe. Fuel costs are relatively high impacting corporate margins. Capital costs are rapidly increasing, while the US dollar lower, but still near all time highs. Manufacturing issues include supply chain problems and labor shortages/costs. The potential for continued economic softening in many regions, including inflation and recessions, could all potentially conspire to impact the market negatively.

GENERAL ASSUMPTIONS

OEM production estimates are derived from corporate announcements, one-on-one discussions, internal staff research, and are evaluated against external and internal sources during the buildup to the forecast release. GDP predictions from major sources are used to estimate overall economic conditions over the forecast period and shape the end results.

Model assumptions reflect internal projections for utilization rates that influence service intervals as well as average costs at the airframe, engine, modification, and component-maintenance levels, which are based on survey data and other primary research. The forecast does not model characteristics of individual operators nor their unique maintenance programs; however, it provides valuable trend information for strategic investment, planning, and decisions.

Constant U.S. 2023 dollars, without further adjustments for future inflation or escalation, are used in all cost figures. Additionally, material costs and regional labor rates are not escalated in MRO assumptions, but costs are adjusted for inflation in each annual release of the forecast.

Future global, regional recessions and/or major geopolitical economic shocks cannot be predicted and are not accounted for in the forecast; however, current global risks and trends are accounted for to shape the forecast results.



BUSINESS

MARKET SUMMARY REPORT

Appendices - Scope

- MRO Expense Categories/Expense Types
- Region-Country Assignments
- Aircraft Type Certificate Holder/Group/Size Category

Appendix 1 - MRO Expense Categories/Expense Types

Expense Category	Expense Type
AIRFRAME HEAVY	AIRFRAME
COMPONENT MAINTENANCE	APU
	CABIN SYSTEMS
	COCKPIT AVIONICS
	ELECTRICAL
	FLIGHT CONTROLS
	FUEL SYSTEMS
	HYDRAULIC POWER & UTILITY SYSTEMS
	LANDING GEAR
	OTHER CATEGORIES
	THRUST REVERSERS
	WHEELS & BRAKES
ENGINE MAINTENANCE	HOT SECTION INSPECTION (HSI)
	OVERHAUL (OH)
	UNSCHEDULED ENGINE
MODIFICATIONS	AVIONICS
	CABIN ELECTRONICS
	HARD GOODS
	PAINT
	SOFT GOODS

Appendix 2 – Region-Country Assignments



Region	Country
Africa	Algeria
Africa	Angola
Africa	Botswana
Africa	Burkina Faso
Africa	Burundi
Africa	Cameroon
Africa	Central African Republic
Africa	Chad
Africa	Congo (Brazzaville)
Africa	Congo (Democratic Republic)
Africa	Djibouti
Africa	Egypt
Africa	Equatorial Guinea
Africa	Ethiopia
Africa	Gabon
Africa	Gambia
Africa	Ghana

Region	Country
Africa	Guinea
Africa	Ivory Coast
Africa	Kenya
Africa	Lesotho
Africa	Libya
Africa	Madagascar
Africa	Malawi
Africa	Mali
Africa	Mauritania
Africa	Mauritius
Africa	Morocco
Africa	Mozambique
Africa	Namibia
Africa	Niger
Africa	Nigeria
Africa	Reunion
Africa	Senegal

Region	Country
Africa	Seychelles
Africa	Somalia
Africa	South Africa
Africa	Sudan
Africa	Tanzania
Africa	Togo
Africa	Tunisia
Africa	Uganda
Africa	Zambia
Africa	Zimbabwe
Asia Pacific	Australia
Asia Pacific	Bangladesh
Asia Pacific	Brunei
Asia Pacific	Cook Islands
Asia Pacific	Fiji
Asia Pacific	French Polynesia
Asia Pacific	Hong Kong

Region	Country
Asia Pacific	Indonesia
Asia Pacific	Japan
Asia Pacific	Kiribati
Asia Pacific	Laos
Asia Pacific	Macau
Asia Pacific	Malaysia
Asia Pacific	Marshall Islands
Asia Pacific	New Caledonia
Asia Pacific	New Zealand
Asia Pacific	Pakistan
Asia Pacific	Papua New Guinea
Asia Pacific	Philippines
Asia Pacific	Samoa
Asia Pacific	Singapore
Asia Pacific	South Korea
Asia Pacific	Taiwan
Asia Pacific	Thailand

Appendix 2 – Region-Country Assignments, *cont.*



Region	Country
Asia Pacific	Tuvalu
Asia Pacific	Vanuatu
Asia Pacific	Vietnam
China	China
Eastern Europe	Albania
Eastern Europe	Armenia
Eastern Europe	Azerbaijan
Eastern Europe	Belarus
Eastern Europe	Bosnia & Herzegovina
Eastern Europe	Bulgaria
Eastern Europe	Croatia
Eastern Europe	Czech Republic
Eastern Europe	Estonia
Eastern Europe	Georgia
Eastern Europe	Hungary
Eastern Europe	Kazakhstan
Eastern Europe	Kyrgyzstan

Region	Country
Eastern Europe	Latvia
Eastern Europe	Lithuania
Eastern Europe	Moldova
Eastern Europe	Montenegro
Eastern Europe	North Macedonia
Eastern Europe	Poland
Eastern Europe	Romania
Eastern Europe	Russia
Eastern Europe	Serbia
Eastern Europe	Slovakia
Eastern Europe	Slovenia
Eastern Europe	Tajikistan
Eastern Europe	Turkmenistan
Eastern Europe	Ukraine
Eastern Europe	Uzbekistan
India	India
Latin America	Anguilla

Region	Country
Latin America	Argentina
Latin America	Aruba
Latin America	Bahamas
Latin America	Barbados
Latin America	Belize
Latin America	Bermuda
Latin America	Bolivia
Latin America	Brazil
Latin America	British Virgin Islands
Latin America	Cayman Islands
Latin America	Chile
Latin America	Colombia
Latin America	Costa Rica
Latin America	Curacao
Latin America	Dominican Republic
Latin America	Ecuador
Latin America	El Salvador

Region	Country
Latin America	Guadeloupe
Latin America	Guatemala
Latin America	Haiti
Latin America	Honduras
Latin America	Jamaica
Latin America	Mexico
Latin America	Panama
Latin America	Paraguay
Latin America	Peru
Latin America	St. Barthelemy
Latin America	St. Kitts & Nevis
Latin America	St. Lucia
Latin America	St. Maarten
Latin America	St. Vincent & The Grenadines
Latin America	Suriname
Latin America	Trinidad & Tobago
Latin America	Turks & Caicos

Appendix 2 – Region-Country Assignments, *cont.*



Region	Country
Latin America	Uruguay
Latin America	Venezuela
Middle East	Bahrain
Middle East	Iran
Middle East	Iraq
Middle East	Israel
Middle East	Jordan
Middle East	Kuwait
Middle East	Lebanon
Middle East	Oman
Middle East	Qatar
Middle East	Saudi Arabia
Middle East	Syria
Middle East	United Arab Emirates
North America	Canada
North America	Guam
North America	USA

Region	Country
Western Europe	Austria
Western Europe	Belgium
Western Europe	Cyprus
Western Europe	Denmark
Western Europe	Finland
Western Europe	France
Western Europe	Germany
Western Europe	Greece
Western Europe	Greenland
Western Europe	Guernsey
Western Europe	Iceland
Western Europe	Ireland
Western Europe	Isle Of Man
Western Europe	Italy
Western Europe	Jersey
Western Europe	Liechtenstein
Western Europe	Luxembourg

Region	Country
Western Europe	Malta
Western Europe	Monaco
Western Europe	Netherlands
Western Europe	Norway
Western Europe	Portugal
Western Europe	San Marino

Region	Country
Western Europe	Spain
Western Europe	Sweden
Western Europe	Switzerland
Western Europe	Turkey
Western Europe	United Kingdom



P.180 Avanti

Credit: Antoine Fafard, Aviation Week Network

Appendix 3 – Aircraft Type Certificate Holder/Group/Size Category



Type Certificate Holder	Aircraft Group	Aircraft Size Category	Aircraft Size Segment
328 Support Services	Dornier 328Jet	Regional Jets	Airliners
Airbus	A310	Widebody Jets	Airliners
Airbus	A319	Narrowbody Jets	Airliners
Airbus	A320	Narrowbody Jets	Airliners
Airbus	A330	Widebody Jets	Airliners
Airbus	A340	Widebody Jets	Airliners
Airbus	ACJ220	Narrowbody Jets	Airliners
Airbus	ACJ318	Narrowbody Jets	Airliners
Airbus	ACJ319	Narrowbody Jets	Airliners
Airbus	ACJ319neo	Narrowbody Jets	Airliners
Airbus	ACJ320	Narrowbody Jets	Airliners
Airbus	ACJ320neo	Narrowbody Jets	Airliners
Airbus	ACJ321	Narrowbody Jets	Airliners
Airbus	ACJ330	Widebody Jets	Airliners
Airbus	ACJ340	Widebody Jets	Airliners
Airbus	ACJ350	Widebody Jets	Airliners
Boeing	727	Narrowbody Jets	Airliners

Type Certificate Holder	Aircraft Group	Aircraft Size Category	Aircraft Size Segment
Boeing	737 Classic	Narrowbody Jets	Airliners
Boeing	737-200	Narrowbody Jets	Airliners
Boeing	737MAX / BBJ	Narrowbody Jets	Airliners
Boeing	737NG / BBJ	Narrowbody Jets	Airliners
Boeing	747 Classic	Widebody Jets	Airliners
Boeing	747-400	Widebody Jets	Airliners
Boeing	747-8	Widebody Jets	Airliners
Boeing	757	Narrowbody Jets	Airliners
Boeing	767	Widebody Jets	Airliners
Boeing	777	Widebody Jets	Airliners
Boeing	787	Widebody Jets	Airliners
Bombardier	Challenger 300/350/3500	Super Midsize Jets	Medium Jets
Bombardier	Challenger 600	Large Cabin Jets	Large Jets
Bombardier	Challenger 601	Large Cabin Jets	Large Jets
Bombardier	Challenger 604/605/650	Large Cabin Jets	Large Jets
Bombardier	Global 5000	Large Cabin Jets	Large Jets
Bombardier	Global 5500	Large Cabin Jets	Large Jets

Appendix 3 – Aircraft Type Certificate Holder/Group/Size Category, *cont.*



Type Certificate Holder	Aircraft Group	Aircraft Size Category	Aircraft Size Segment
Bombardier	Global 6500	Ultra Long-Range Jets	Large Jets
Bombardier	Global 7500	Ultra Long-Range Jets	Large Jets
Bombardier	Global 8000	Ultra Long-Range Jets	Large Jets
Bombardier	Global Express/XRS/6000	Ultra Long-Range Jets	Large Jets
Bombardier	Learjet 23-29	Light Jets	Small Jets
Bombardier	Learjet 31	Light Jets	Small Jets
Bombardier	Learjet 35/36	Light Jets	Small Jets
Bombardier	Learjet 40/45	Light Jets	Small Jets
Bombardier	Learjet 55	Midsize Jets	Small Jets
Bombardier	Learjet 60	Midsize Jets	Medium Jets
Bombardier	Learjet 70/75	Light Jets	Small Jets
Cirrus	Cirrus Vision	Very Light Jets	Small Jets
COMAC	ARJ21	Regional Jets	Airliners
Daher	Kodiak	Single-Engine Turboprops	Single-Engine Turboprops
Daher	TBM700/850/900	Single-Engine Turboprops	Single-Engine Turboprops
Dassault Aviation	Falcon 10/100	Light Jets	Small Jets
Dassault Aviation	Falcon 10X	Ultra Long-Range Jets	Large Jets

Type Certificate Holder	Aircraft Group	Aircraft Size Category	Aircraft Size Segment
Dassault Aviation	Falcon 20/200	Midsize Jets	Medium Jets
Dassault Aviation	Falcon 2000	Large Cabin Jets	Large Jets
Dassault Aviation	Falcon 2000EX/LX/LXS/S	Large Cabin Jets	Large Jets
Dassault Aviation	Falcon 50	Super Midsize Jets	Medium Jets
Dassault Aviation	Falcon 6X	Large Cabin Jets	Large Jets
Dassault Aviation	Falcon 7X	Large Cabin Jets	Large Jets
Dassault Aviation	Falcon 8X	Ultra Long-Range Jets	Large Jets
Dassault Aviation	Falcon 900	Large Cabin Jets	Large Jets
Dassault Aviation	Falcon 900DX/EX/LX	Large Cabin Jets	Large Jets
Eclipse Aerospace	Eclipse 500/550	Very Light Jets	Small Jets
Embraer	Legacy 450/Praetor 500	Super Midsize Jets	Medium Jets
Embraer	Legacy 500/Praetor 600	Super Midsize Jets	Medium Jets
Embraer	Legacy 600/650	Large Cabin Jets	Airliners
Embraer	Lineage 1000	Regional Jets	Airliners
Embraer	Phenom 100	Light Jets	Small Jets
Embraer	Phenom 300	Light Jets	Small Jets
Epic	Epic E1000	Single-Engine Turboprops	Single-Engine Turboprops

Appendix 3 – Aircraft Type Certificate Holder/Group/Size Category, *cont.*



Type Certificate Holder	Aircraft Group	Aircraft Size Category	Aircraft Size Segment
Epic	Epic Jet	Very Light Jets	Small Jets
Fokker	F28	Regional Jets	Airliners
Gulfstream	Gulfstream G-I	Multi-Engine Turboprops	Multi-Engine Turboprops
Gulfstream	Gulfstream G-II	Large Cabin Jets	Large Jets
Gulfstream	Gulfstream G-III	Large Cabin Jets	Large Jets
Gulfstream	Gulfstream G-IV	Large Cabin Jets	Large Jets
Gulfstream	Gulfstream G-IV (G300/400)	Large Cabin Jets	Large Jets
Gulfstream	Gulfstream G-V	Ultra Long-Range Jets	Large Jets
Gulfstream	Gulfstream G280	Super Midsize Jets	Medium Jets
Gulfstream	Gulfstream GIV-X (G350/450)	Large Cabin Jets	Large Jets
Gulfstream	Gulfstream GVI (G650/650ER)	Ultra Long-Range Jets	Large Jets
Gulfstream	Gulfstream GVII (G400)	Large Cabin Jets	Large Jets
Gulfstream	Gulfstream GVII (G500)	Large Cabin Jets	Large Jets
Gulfstream	Gulfstream GVII (G600)	Ultra Long-Range Jets	Large Jets
Gulfstream	Gulfstream GVIII (G700)	Ultra Long-Range Jets	Large Jets
Gulfstream	Gulfstream GVIII (G800)	Ultra Long-Range Jets	Large Jets
Gulfstream	Gulfstream GVSP (G500/550)	Ultra Long-Range Jets	Large Jets
Honda Aircraft Company	HondaJet	Light Jets	Small Jets
Honda Aircraft Company	HondaJet 2600	Light Jets	Small Jets
Israel Aircraft Industries	Gulfstream G100	Midsize Jets	Medium Jets
Israel Aircraft Industries	Gulfstream G150	Midsize Jets	Medium Jets
Israel Aircraft Industries	Gulfstream G200	Super Midsize Jets	Medium Jets
Israel Aircraft Industries	Westwind	Midsize Jets	Medium Jets
Mitsubishi	Challenger 850/Execliner	Regional Jets	Airliners
Mitsubishi	CRJ700/900/1000	Regional Jets	Airliners
Mitsubishi	Mu-2	Multi-Engine Turboprops	Multi-Engine Turboprops
Ontic Engineering & Manufacturing	Merlin	Multi-Engine Turboprops	Multi-Engine Turboprops
Piaggio Aerospace	P.180 Avanti	Multi-Engine Turboprops	Multi-Engine Turboprops
Pilatus Aircraft	PC-12	Single-Engine Turboprops	Single-Engine Turboprops
Pilatus Aircraft	PC-24	Light Jets	Small Jets
Piper	PA-31	Multi-Engine Turboprops	Multi-Engine Turboprops
Piper	PA-42	Multi-Engine Turboprops	Multi-Engine Turboprops
Piper	PA-46TP	Single-Engine Turboprops	Single-Engine Turboprops
Sabreliner Aviation	Sabre	Midsize Jets	Medium Jets

Appendix 3 – Aircraft Type Certificate Holder/Group/Size Category, *cont.*



Type Certificate Holder	Aircraft Group	Aircraft Size Category	Aircraft Size Segment
Syberjet Aircraft	SJ30	Light Jets	Small Jets
Textron Aviation	Beech 2000	Multi-Engine Turboprops	Multi-Engine Turboprops
Textron Aviation	Beechjet	Light Jets	Small Jets
Textron Aviation	Caravan	Single-Engine Turboprops	Single-Engine Turboprops
Textron Aviation	Citation CJ1	Light Jets	Small Jets
Textron Aviation	Citation CJ2	Light Jets	Small Jets
Textron Aviation	Citation CJ3	Light Jets	Small Jets
Textron Aviation	Citation CJ4	Light Jets	Small Jets
Textron Aviation	Citation Excel	Midsize Jets	Medium Jets
Textron Aviation	Citation I	Light Jets	Small Jets
Textron Aviation	Citation II	Light Jets	Small Jets
Textron Aviation	Citation III	Midsize Jets	Medium Jets
Textron Aviation	Citation Latitude	Midsize Jets	Medium Jets
Textron Aviation	Citation Longitude	Super Midsize Jets	Medium Jets
Textron Aviation	Citation M2	Light Jets	Small Jets
Textron Aviation	Citation Mustang	Very Light Jets	Small Jets
Textron Aviation	Citation Sovereign	Midsize Jets	Medium Jets
Textron Aviation	Citation V	Light Jets	Small Jets
Textron Aviation	Citation X	Super Midsize Jets	Medium Jets
Textron Aviation	Citation XLS Ascend	Midsize Jets	Medium Jets
Textron Aviation	Citation XLS+/Gen2	Midsize Jets	Medium Jets
Textron Aviation	Conquest1	Multi-Engine Turboprops	Multi-Engine Turboprops
Textron Aviation	Conquest2	Multi-Engine Turboprops	Multi-Engine Turboprops
Textron Aviation	Denali	Single-Engine Turboprops	Single-Engine Turboprops
Textron Aviation	Hawker 4000	Super Midsize Jets	Medium Jets
Textron Aviation	Hawker 750/800/850/900	Midsize Jets	Medium Jets
Textron Aviation	HS125	Midsize Jets	Medium Jets
Textron Aviation	King Air 100	Multi-Engine Turboprops	Multi-Engine Turboprops
Textron Aviation	King Air 200/250/260	Multi-Engine Turboprops	Multi-Engine Turboprops
Textron Aviation	King Air 300/350/360	Multi-Engine Turboprops	Multi-Engine Turboprops
Textron Aviation	King Air 90	Multi-Engine Turboprops	Multi-Engine Turboprops
Textron Aviation	Mu300	Light Jets	Small Jets
Textron Aviation	Premier I/IA	Light Jets	Small Jets
Twin Commander Aircraft	Turbo Commander	Multi-Engine Turboprops	Multi-Engine Turboprops



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Contact:

Melissa Crum
+1 913 284 2951

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