



**Global Fleet Update & MRO Market Outlook**

IATA MCC Conference  
Hanoi

“Doing More with Less”

October 4, 2023

# Today's Agenda

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1.	Company Introduction	3
2.	Aviation Industry Update	7
3.	Global Fleet & MRO Demand Forecast	16
4.	MRO Industry Trends	20
5.	MRO Outlook	27



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*altonaviation.com*

## 5. COMPANY INTRODUCTION

A large, stylized letter 'A' graphic composed of three overlapping, semi-transparent teal shapes. The shapes are arranged to form a large 'A' that spans the right side of the slide. The top shape is a triangle, the middle is a horizontal bar, and the bottom is another triangle. The overlapping areas create a darker shade of teal.

# Alton Aviation Consultancy is a specialized consulting firm with deep expertise across the aviation value chain



**Airline**



**Aviation Finance**



**Aviation & Aerospace Investment**



**Business & General Aviation**



**MRO & Aftermarket**



**Aerospace Manufacturing**

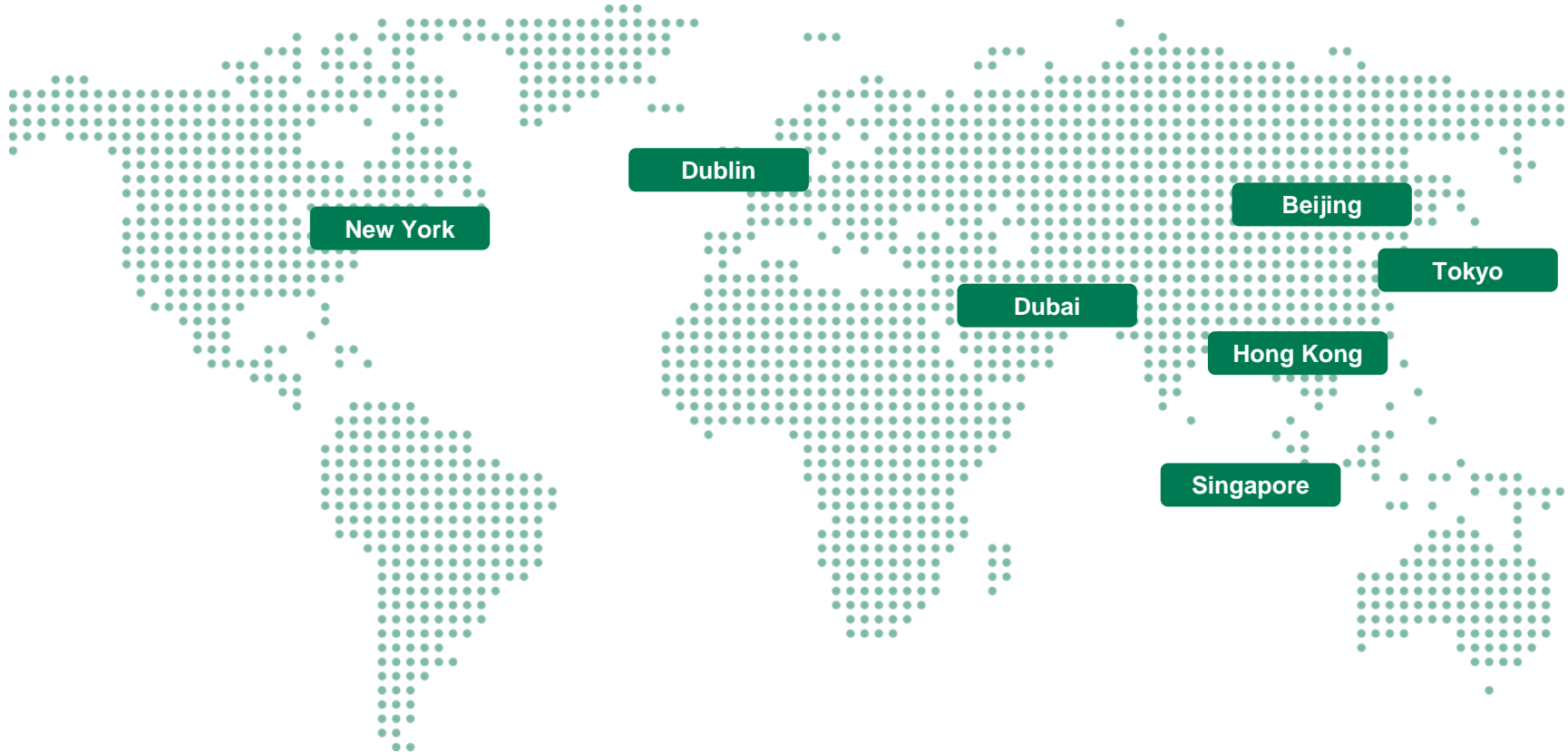


**Airport**



**Technology & Mobility**

# A global client base is supported from seven offices in every major aviation market



# Alton is globally recognized as the foremost MRO advisor to the world's leading MRO suppliers

## Dedicated Global MRO Practice



- Alton's **dedicated MRO advisory team** consists of former airline engineering & maintenance, MRO, and OEM executives, in addition to experts in aircraft maintenance data modeling and financial analysis
- With a global mandate, the Alton team has **worked in all major geographic regions**, ensuring relevant regional factors are accounted for during engagements

## Intellectual Property and Models



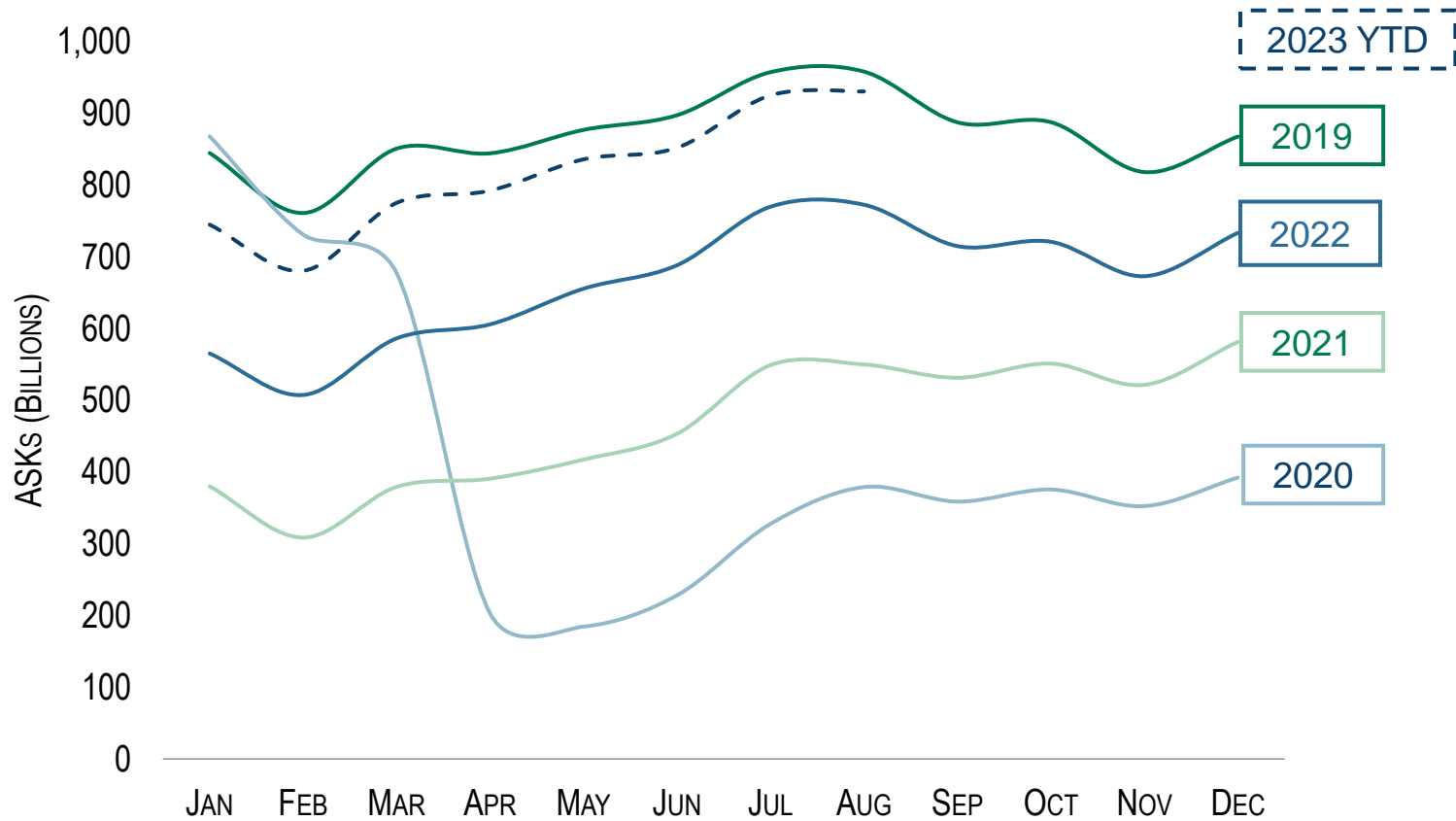
- **Proprietary airline E&M enterprise process model** that is continually refined to incorporate best practices that can be leveraged to compare and contrast with customer processes
- **Proprietary fleet & MRO demand forecast models** are leveraged by the world's leading MRO service providers
- **Proprietary MRO cost and operational database** allows for objective client benchmarking normalized to consider the client's unique characteristics (e.g., geography, capabilities, fleet age, utilization, hour/cycle ration, network, op. env't)

# 1. AVIATION INDUSTRY UPDATE

A large, stylized letter 'A' graphic composed of three overlapping, semi-transparent teal shapes. The shapes are arranged to form a bold, modern 'A' that occupies the right half of the slide.

# Global passenger traffic has almost recovered to 2019 levels, but significant headwinds remain

GLOBAL MONTHLY COMMERCIAL ACTIVITY (ASKs – BILLIONS)



**Alton Insight**

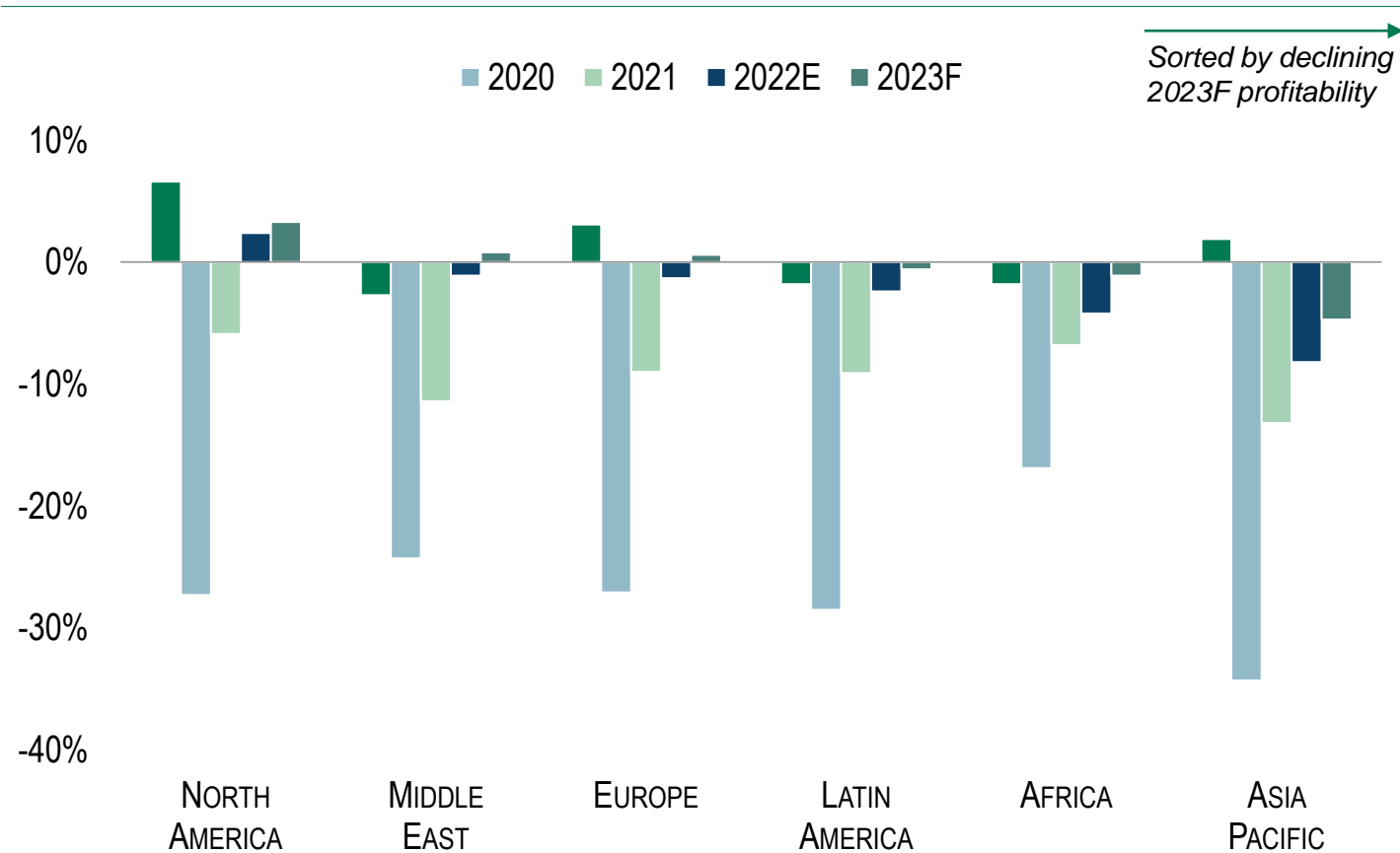
- Global passenger traffic has gradually returned to post-COVID levels with **all markets fully opened in 2023**
- **Today: 93% of 2019 traffic**
  - International recovering
  - Domestic exceeds 2019 numbers

Source: Alton; Cirium



# Airline profitability continues to recover globally; Asia-Pacific slightly lags due to the delayed lifting of travel restrictions in the region

COMMERCIAL AIRLINE NET PROFIT MARGIN BY REGION

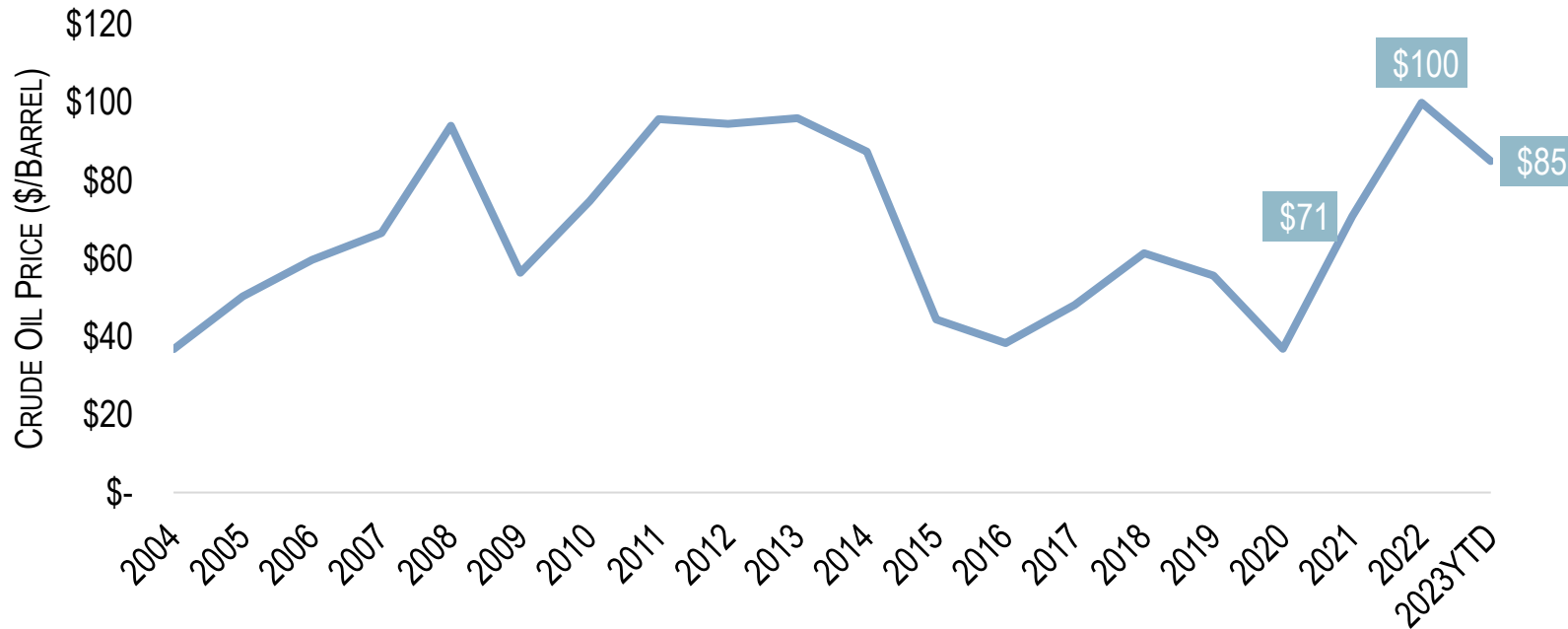


**Alton Insight**

- North American-based airlines saw the strongest recovery
- Asia Pacific airlines' profitability are recovering
- **Significant headwinds remain** for airlines, MROs, and OEMs, including:
  - Geopolitical tensions
  - Potential global recession
  - Inflation / interest rates
  - Fuel price
  - Labor shortage, particularly for MRO
  - Supply chain challenges

# Wider impact on oil prices remains unpredictable but likely to sustain at current levels for some time

CRUDE OIL PRICE (USD/BARREL)



## CORSIA

Market-based mechanisms to tax on carbon emissions

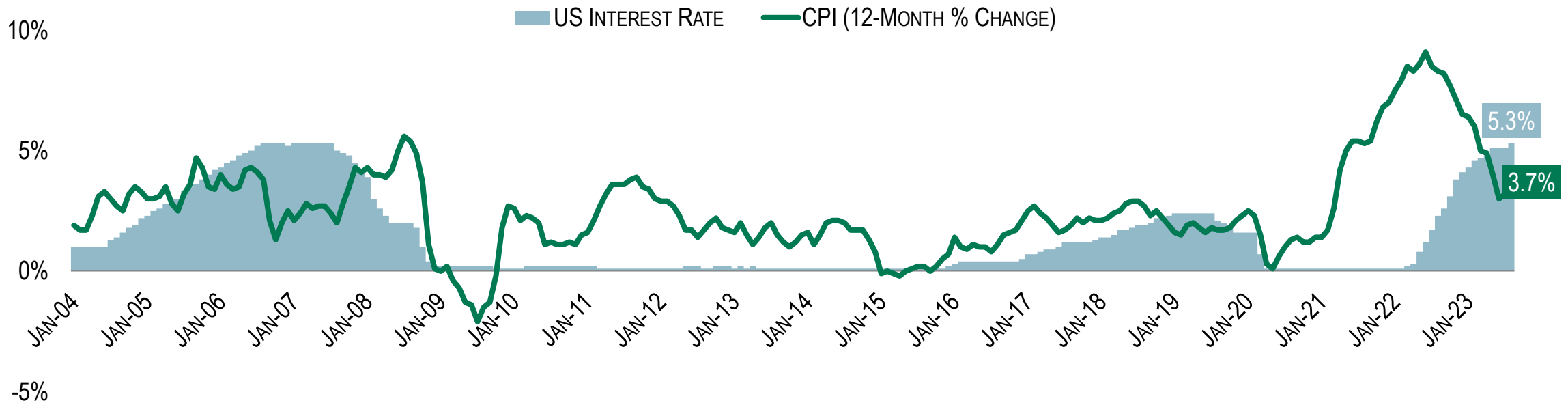
## Sustainable Aviation Fuels (SAF)

Alternatives to fossil fuels with low carbon emissions profile

- **Fossil Fuel Costs:** Sanctions imposed against Russia as a result of the Russo-Ukrainian conflict have severely strained the global energy market, raising fuel prices and fuel price volatility in 2022
- **Green Energy Costs:** Taxes on carbon emissions and increasing usage of expensive SAF and other green fuels

# Industry will need to contend with a high interest rate and supply-led high inflation environment

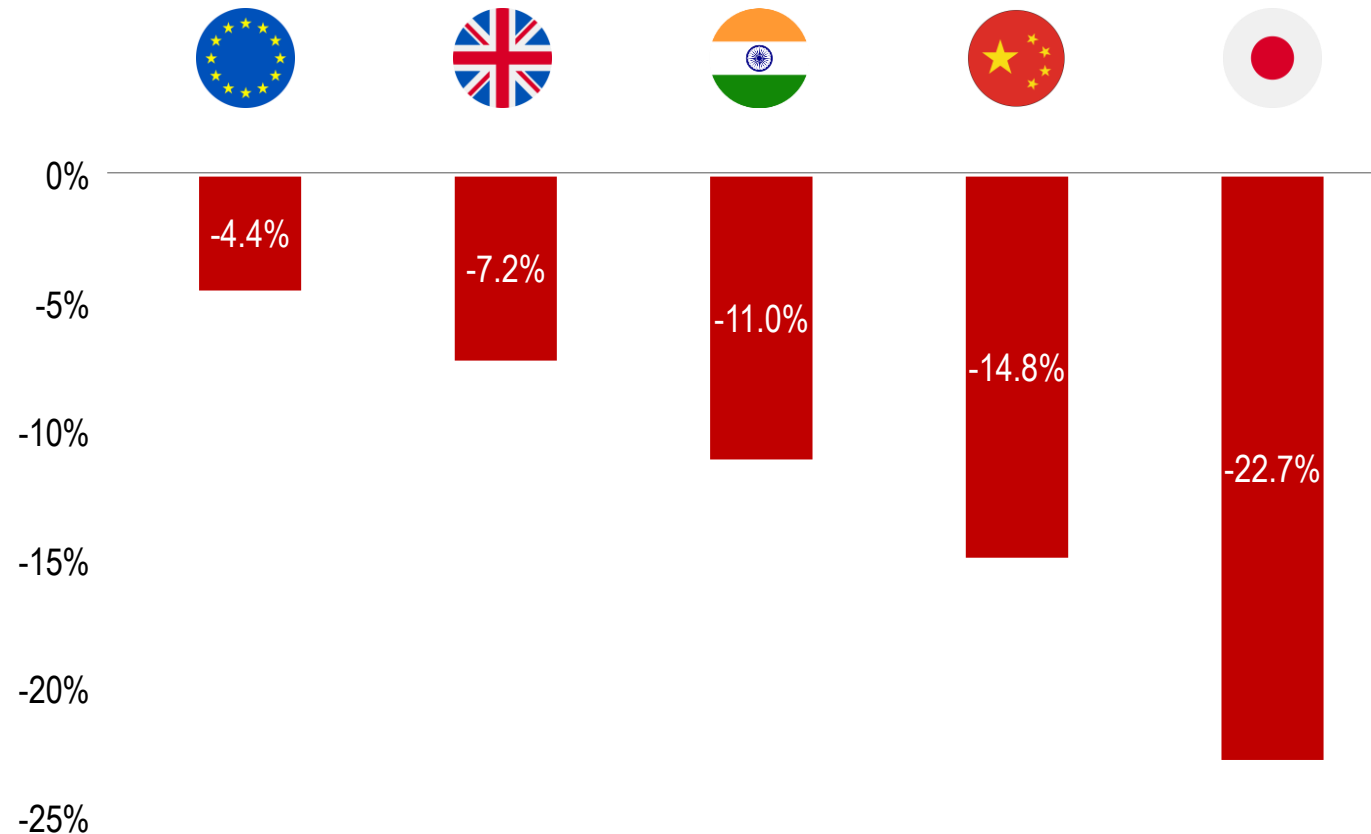
US CONSUMER PRICE INDEX (CPI) AND US FEDERAL INTEREST RATE



- **Record high CPI growth that has since moderated** amidst persistent uncertainties in the near term
  - Airlines have been able to pass-through higher ticket prices, but input costs (fuel, labour) are also increasing
- **Interest rates have stabilized but at rates not seen in the last 15 years**
  - Borrowing and leasing costs expected to increase

# The strength of the US dollar presents potential headwinds for global aviation

US DOLLAR VS MAJOR GLOBAL CURRENCIES % VALUE CHANGE  
(JAN 2022 – AUG 2023) <sup>1</sup>



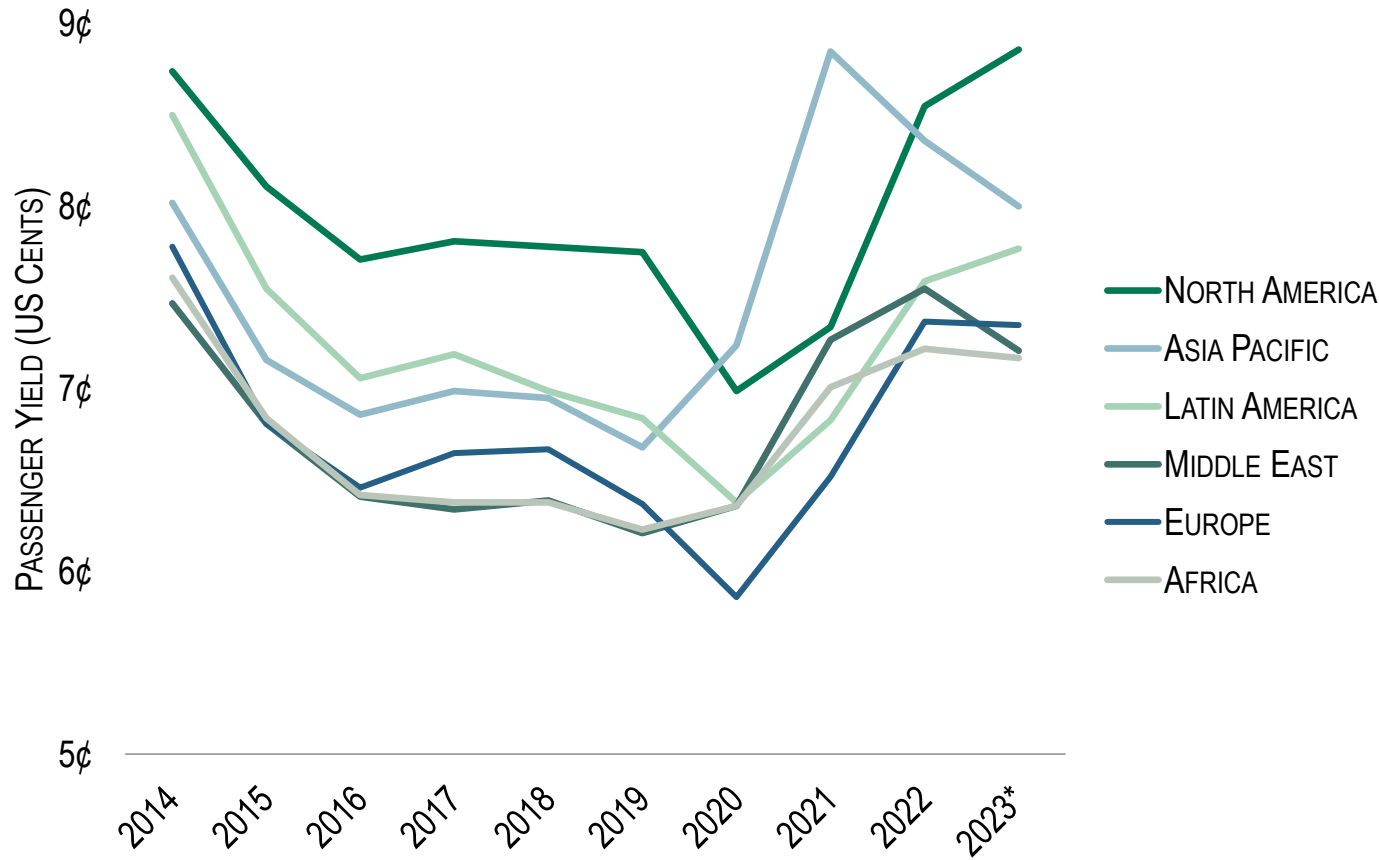
**Alton Insight**

- MRO and spare parts typically sold in US dollars = higher costs
- Jet fuel typically sold in US dollars = higher costs
- Aircraft financing sold in US dollars = higher costs
- Non-US point of sales = lower revenue

Note: [1] Currency values taken at the closing of month at midmarket rates  
Source: Alton; XE

# Heightened airline yields have shown signs of easing

PASSENGER YIELDS BY REGION (2014 – Q2 2023)



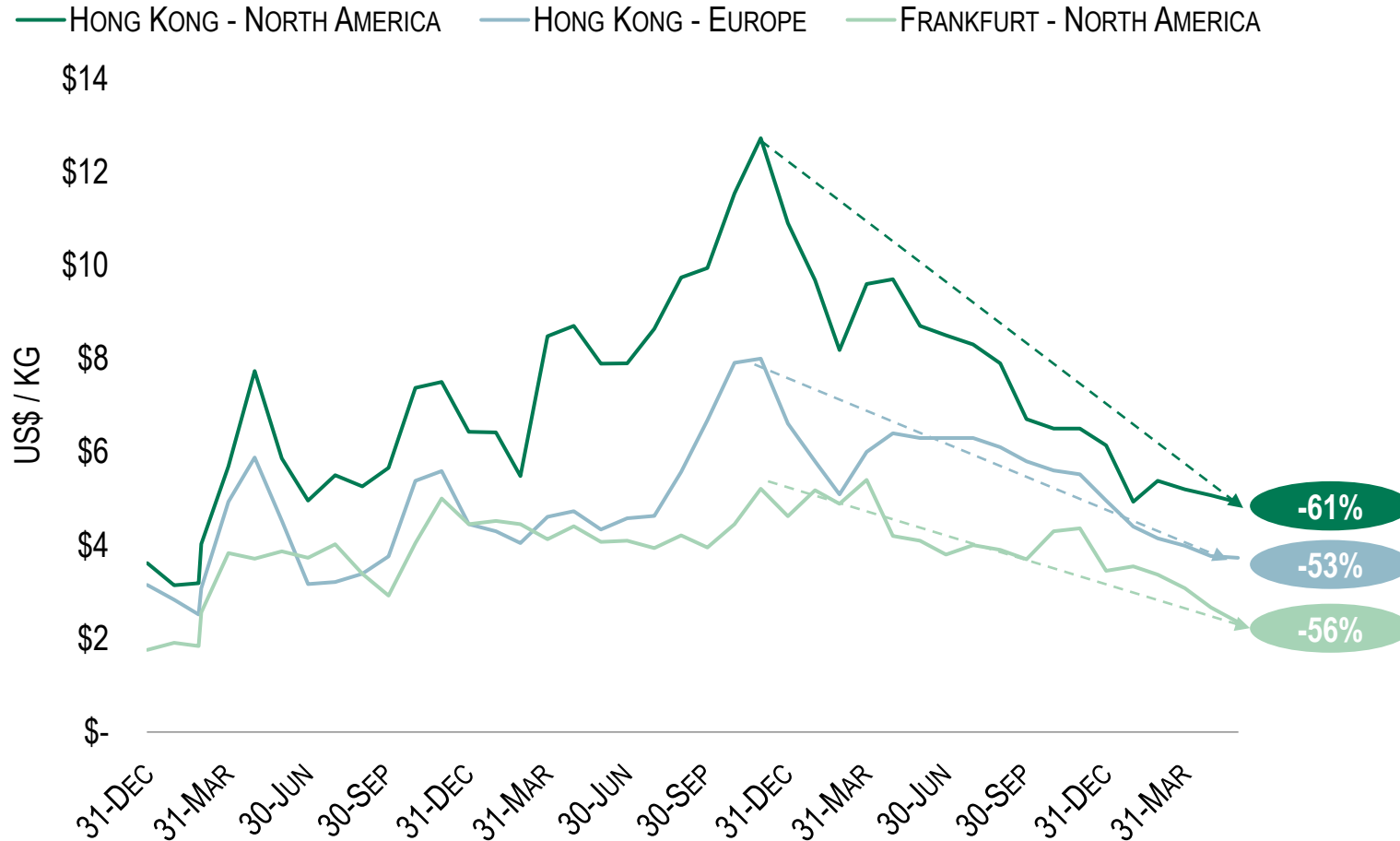
## Regional Observations

- Yields are up post-pandemic**
  - Sustained air travel demand following the reopening of borders
  - Limited supply as aircraft are brought back to service
- Yield weakness have declined in certain regions**
  - North America: Q2 2023 domestic unit revenues showing declines
  - Asia Pacific: yields continue their decline through 2024 in line with capacity recovery back to pre-COVID levels

Note: [\*] 2023 yield data as of 2Q 2023  
 Source: Alton; Cirium

# Air cargo prices have significantly declined since 2021 heights, with both increased capacity and tapering demand sustaining downward pressure

AIR FREIGHT COST (DEC 2019 – JUN 2023)

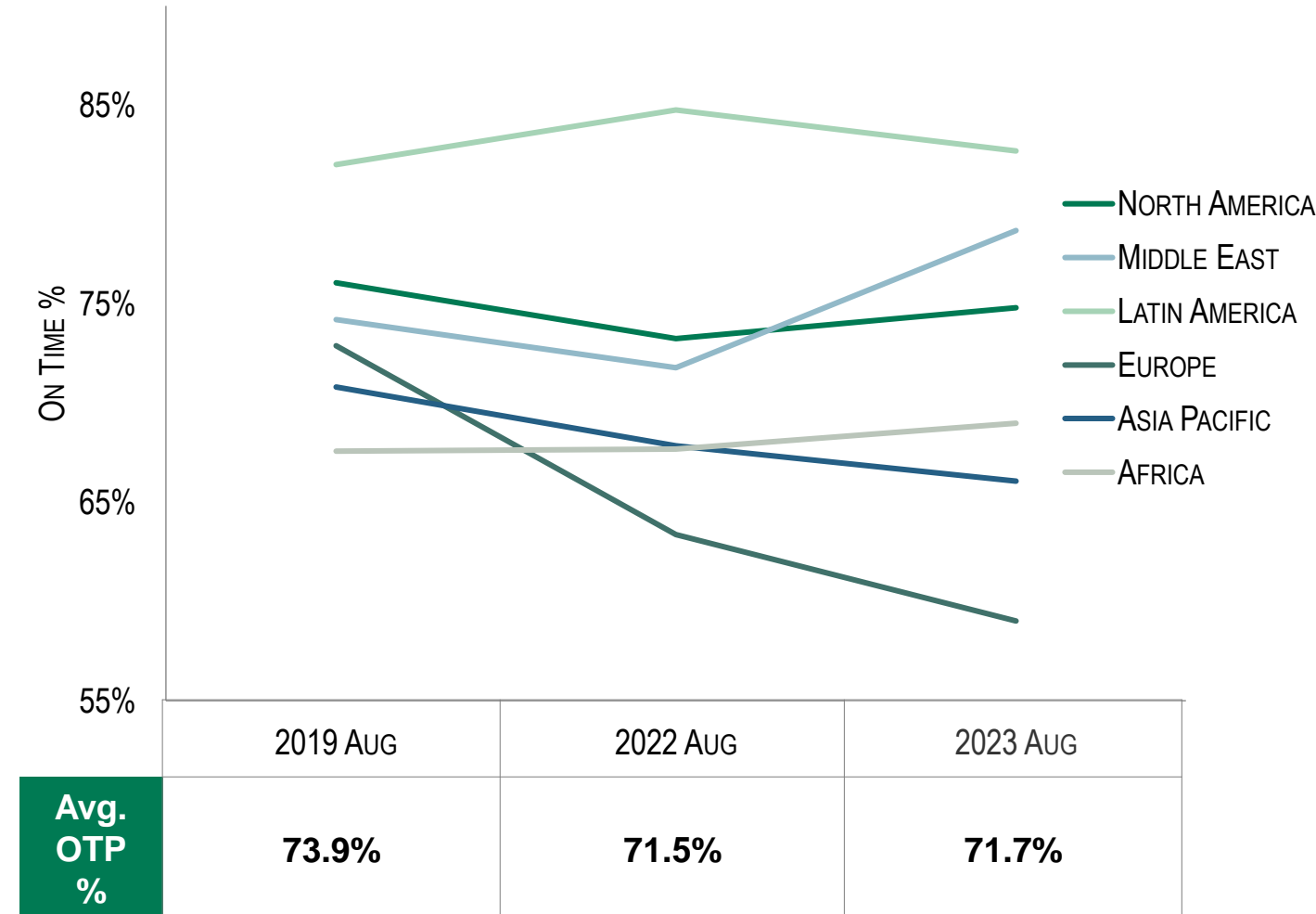


**Alton Insight**

- **Air cargo rates rose significantly during the pandemic**
  - Belly-hold capacity sharply decreased
  - Demand for transporting highly volumetric personal protective equipment by air jumped
  
- **Return of belly-hold cargo has pressured air cargo rates downward**
  - As of 1H2023, air cargo rates have continued to fall
  - Air cargo prices and demand can be expected to continue to stabilize

# Airlines have been struggling to achieve strong on-time performance due to significant ramp-up in traffic coupled with skills shortages

ON-TIME PERFORMANCE BY REGION (AUG 2019 – AUG 2023) <sup>1</sup>



**Alton Insight**

- **OTP has declined in 2022 as travel restrictions were lifted**
  - Ramp-up of traffic while lacking the skilled manpower to support operations
  
- **Lessons learnt in 2022 have led to more proactive management of improve OTP in 2023**
  - Manpower shortages will improve gradually: takes time to train ramp agents, pilots, ATC controllers
  - Better disruption management tools

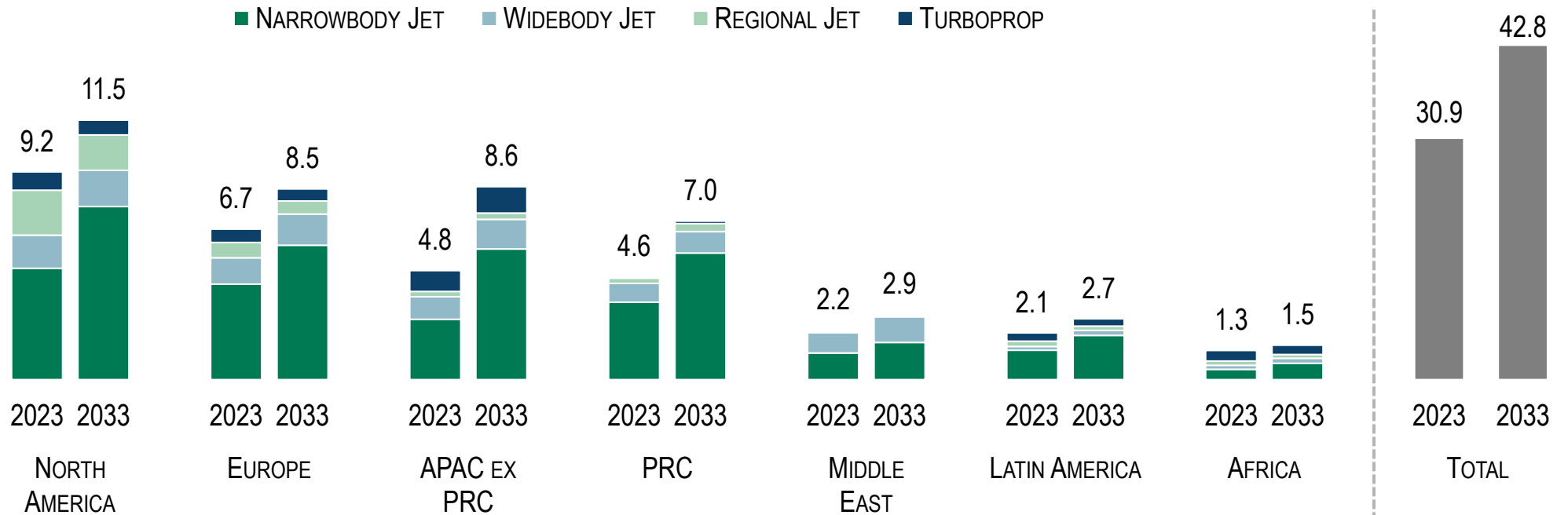
Note: [1] Average OTP for top 5 airlines in each region by fleet count, certain regions may incl. 6<sup>th</sup> largest airline due to missing top 5 data  
 Source: Alton; OAG OTP Reliability Reports

## **2. GLOBAL FLEET & MRO DEMAND FORECAST**



# The fleet is expected to grow from 30.9k to 42.7k aircraft over the next 10 years, with a global average growth rate at 3.3% p.a.

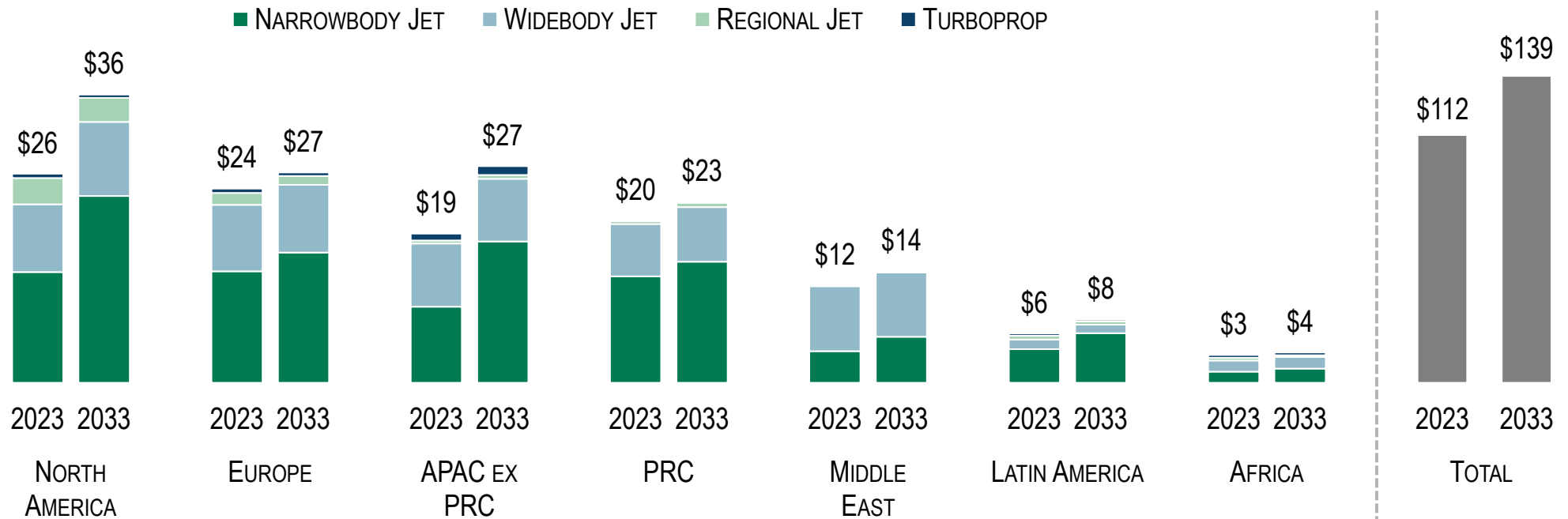
## GLOBAL COMMERCIAL AIRCRAFT FLEET FORECAST BY REGION (THOUSANDS)



<b>2023-2033 Net Fleet Growth</b>	<b>+2,300</b>	<b>+1,800</b>	<b>+3,700</b>	<b>+2,500</b>	<b>+700</b>	<b>+600</b>	<b>+200</b>	<b>+11,800</b>
<b>2023-2033 CAGR</b>	<b>2.3%</b>	<b>2.4%</b>	<b>5.9%</b>	<b>4.4%</b>	<b>2.8%</b>	<b>2.7%</b>	<b>1.7%</b>	<b>3.3%</b>

# MRO spend is expected to grow from \$112B to \$139B over the next 10 years at a 2.2% p.a. CAGR

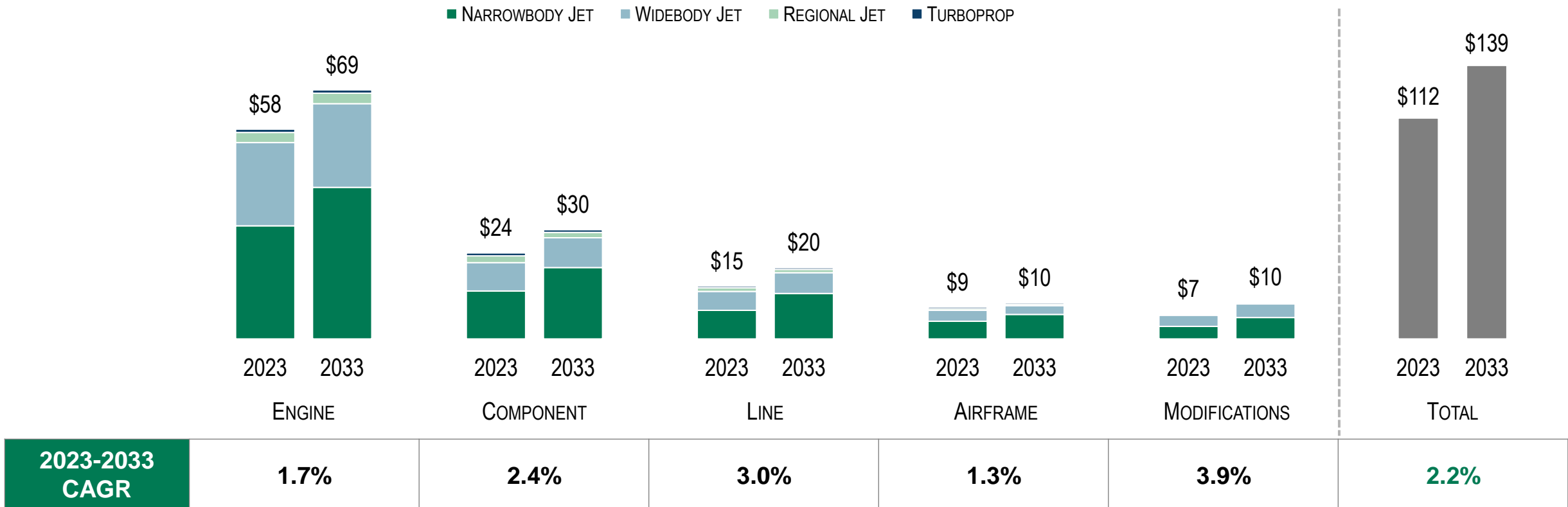
GLOBAL COMMERCIAL MRO DEMAND FORECAST BY REGION (US\$ BILLIONS , CONSTANT 2023\$)



2023-2033 CAGR	3.3%	0.8%	3.8%	1.1%	1.3%	2.5%	0.9%	2.2%
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# While the modifications segment is the fastest growing, engine MRO continues to consume an ever-increasing share of total MRO spend

GLOBAL COMMERCIAL MRO DEMAND FORECAST BY SEGMENT (US\$ BILLIONS, CONSTANT 2023\$)

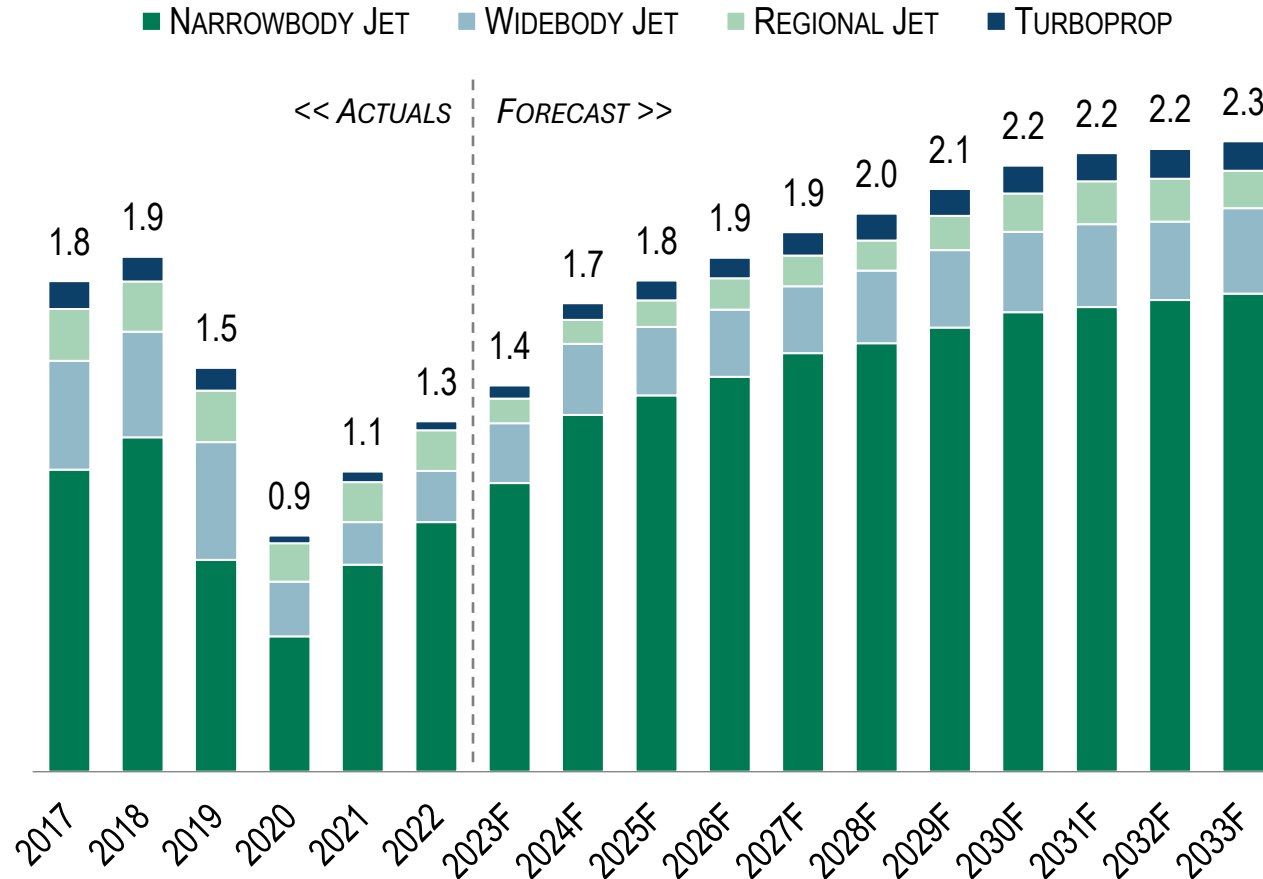


## 3.MRO INDUSTRY TRENDS



# Ongoing new aircraft production issues to drive sustained MRO demand for existing aircraft that may remain in service for longer

AIRCRAFT PRODUCTION FORECAST ('000s, 2019 – 2033F)



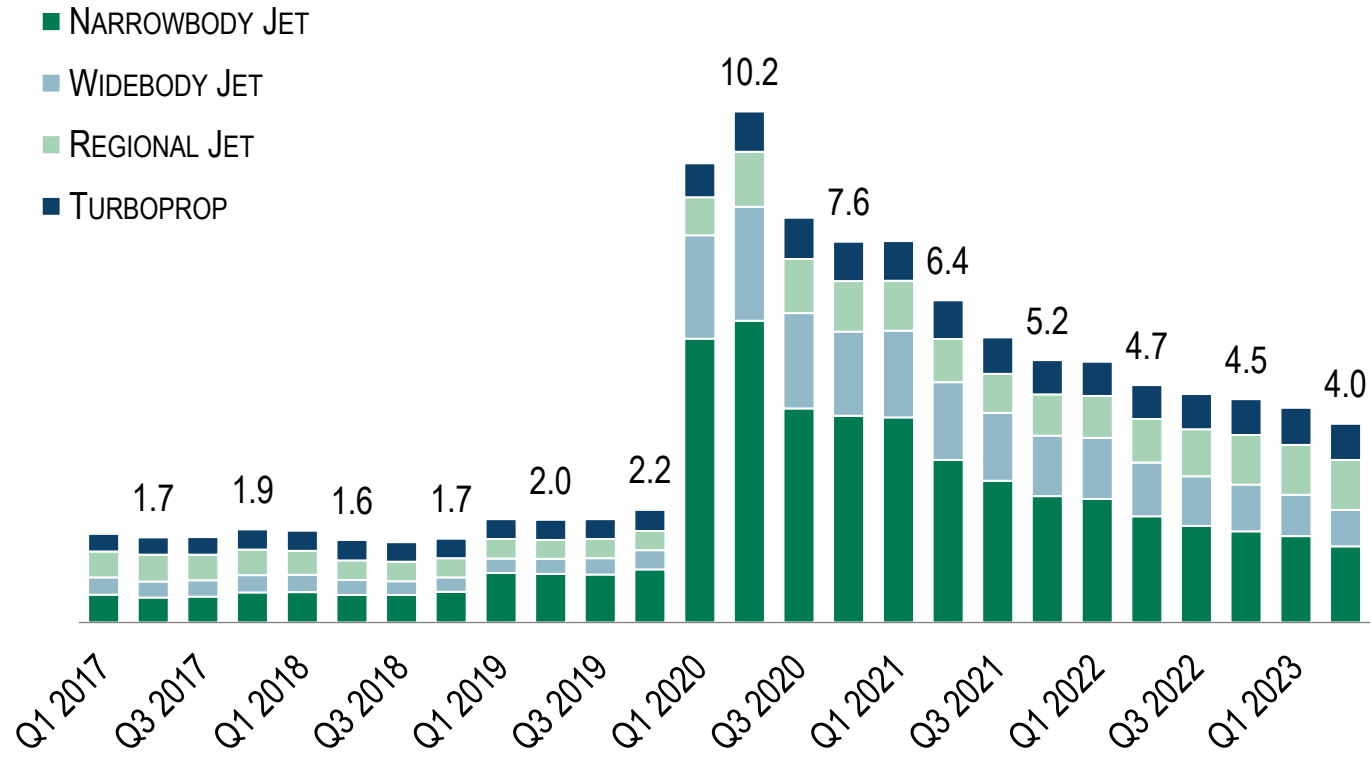
ORDER BACKLOG AND PRODUCTION RATES

Aircraft Family	Order Backlog as of Dec 2022	Forecasted Avg. Annual Production Rate <sup>1</sup>	Years of Backlog
A320neo	4,517	775	5.8
737MAX	3,089	540	5.7
A350	361	78	4.6
787	504	100	5.0
A220	355	104	3.2

Note: [1] 2023 – 2030  
Source: Alton

# Current inactive aircraft fleet remains stubbornly high, almost double the pre-pandemic count

PARKED & STORED AIRCRAFT (THOUSANDS)<sup>1</sup>



**Alton Insight**

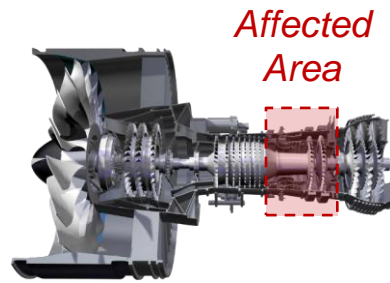
- **Many airlines are still in the process of reactivating their parked fleet**
- **Parked fleet remains substantial compared to pre-COVID levels:**
  - International travel recovering – demand for widebodies coming back
  - Airlines’ ceased operations during COVID
  - Uncertainty around pending recession
- **Alton expects the number of parked fleet to gradually decrease as demand recovers**

Note: [1] Excluding Russian-made aircraft  
Source: Alton; CAPA

# New engine issues leading to groundings and delayed deliveries of next-gen narrowbodies, leading to increased MRO demand

## RECENT ENGINE ISSUES FOR NARROWBODY AIRCRAFT

### PW1100G ENGINE

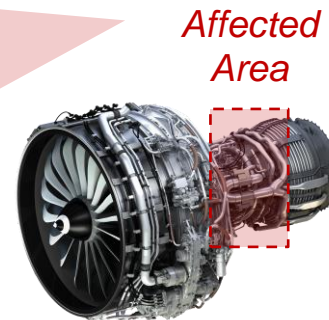


#### PW1100G Engine Issues

- 2017: Combustion chamber degradation issues especially in coastal environments
- 2017: No. 3 bearing failures
- 2018: Premature wear and deterioration of the knife edge seal
- 2023: Microscopic cracks caused by powdered metal used to make the engines' high-pressure turbine disks

### CFM Leap Engine Issues

- 2016: Software glitches and issues with sensors
- 2017: Premature wear and deterioration of high-pressure turbine (HPT) blades in severe environment
- 2018: Wear and tear on the No. 3 bearing spring finger housing



LEAP-1A ENGINE

### Alton Insight

- **Ongoing engine issues affecting new-gen fleet**
  - Unpredictable MRO event scheduling
  - Long engine MRO TATs
- **Airlines managing supply crisis, but with some yield advantage**
  - No production slots available
  - In-service “gliders” parked
  - Supply constrained market = higher airfares
- **Engine MROs are full**
  - New-gen engines: Lack of spares driving engine MRO inefficiency
  - Current-gen engines: increased demand
  - Hospital visits for off-wing repairs

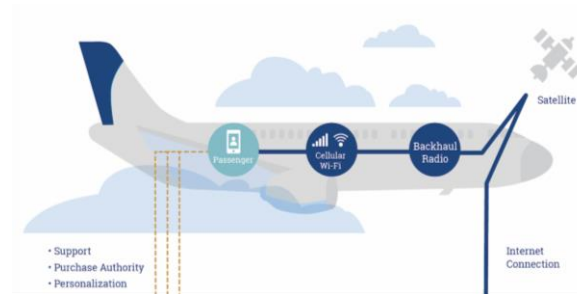
# Cabin interiors, connectivity, and cargo conversions are key drivers of aircraft modification demand

## CABIN INTERIORS



- Improve passenger comfort
- Keeping up with evolving passenger preference
- Maintenance and safety concerns related to older cabin equipment

## CONNECTIVITY



- Offering options for passengers to stay connected during their journeys
- Additional revenue streams through in-flight Wi-Fi and other connectivity services
- Facilitates real-time communication between the flight and ground crew

## CARGO CONVERSIONS

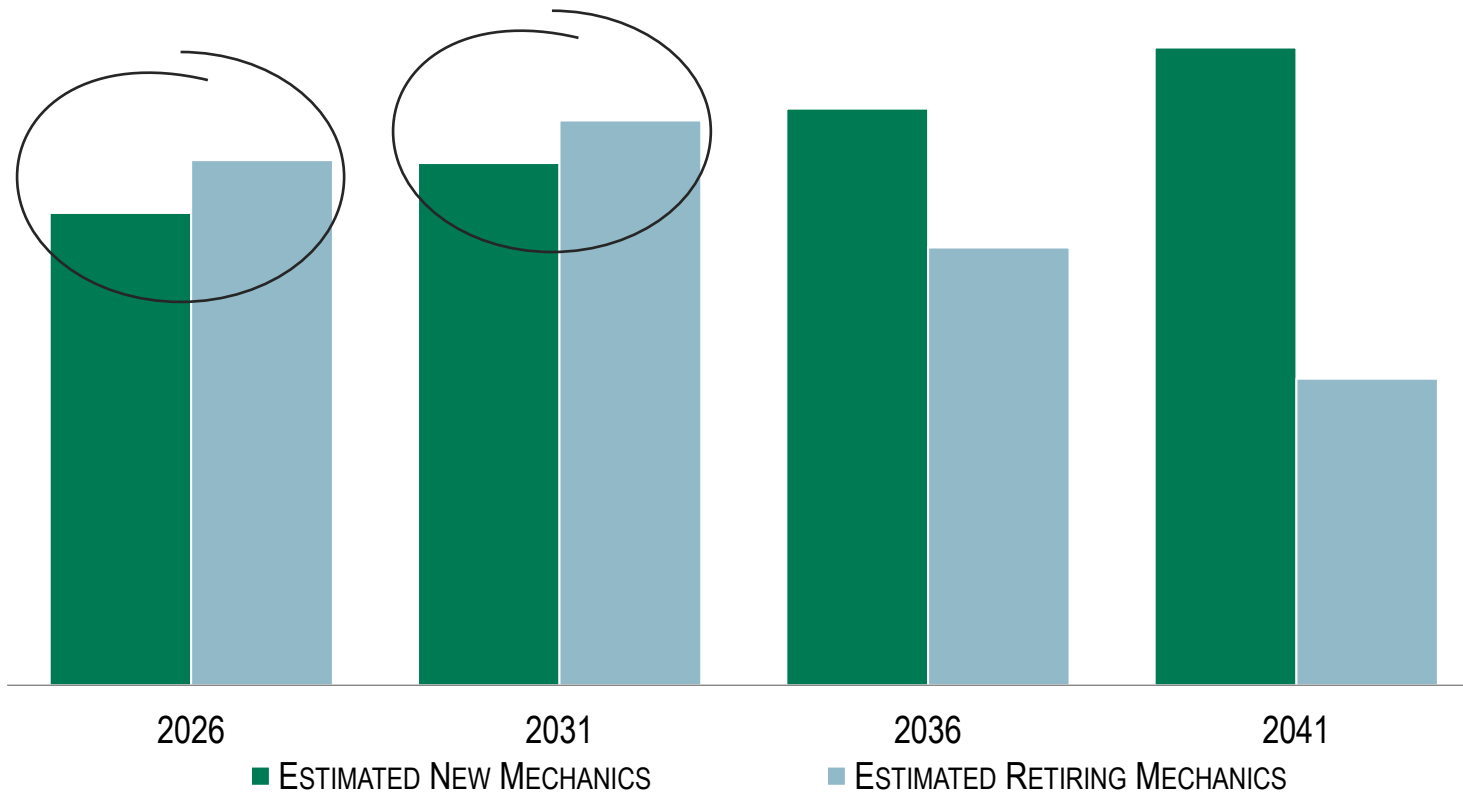


- Fueled by e-commerce demand that was turbocharged throughout the pandemic
- Ongoing freighter fleet replacement due to aging in-service fleet
- Tight aircraft supply may temper conversion volumes



# Labor shortage has been observed in North America and Europe; in the US, technician retirement rates are outpacing new hires...

## ESTIMATED INFLOW & OUTFLOW OF A&P MECHANICS IN THE USA



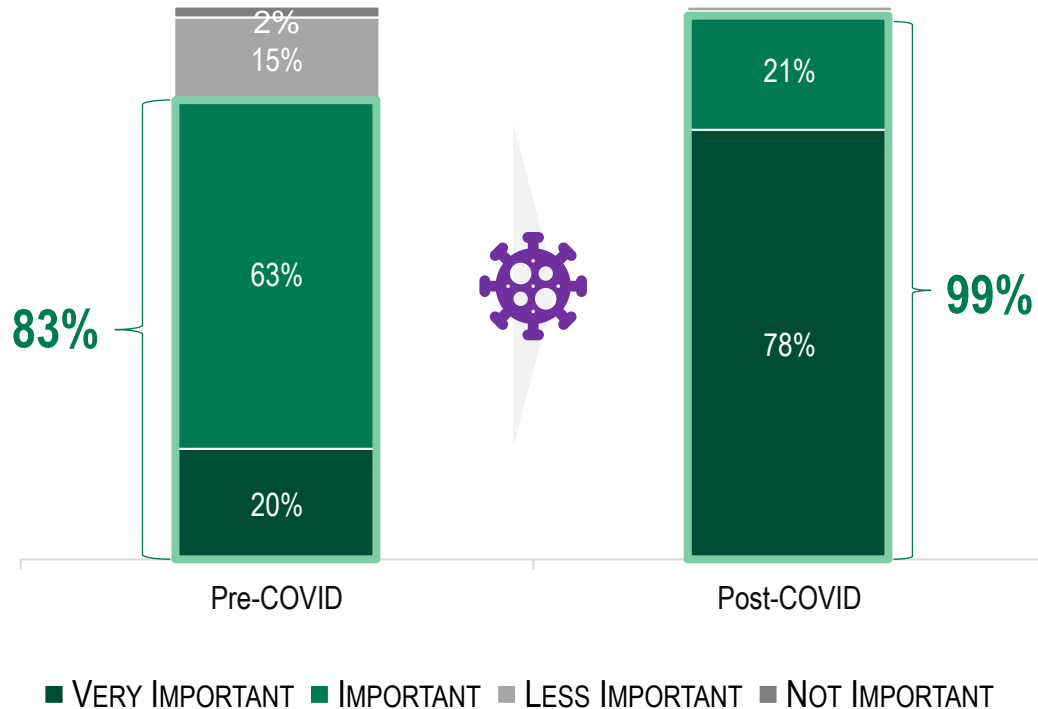
**51**  
The average age of an aircraft mechanic in the US as of 2019

— 4 icons (light green)  
+ 3 icons (dark green)

*“For every 4 aviation maintenance technicians leaving the industry, only 3 are coming in to fill their positions” – Former Chairman, NBAA Maintenance Committee*

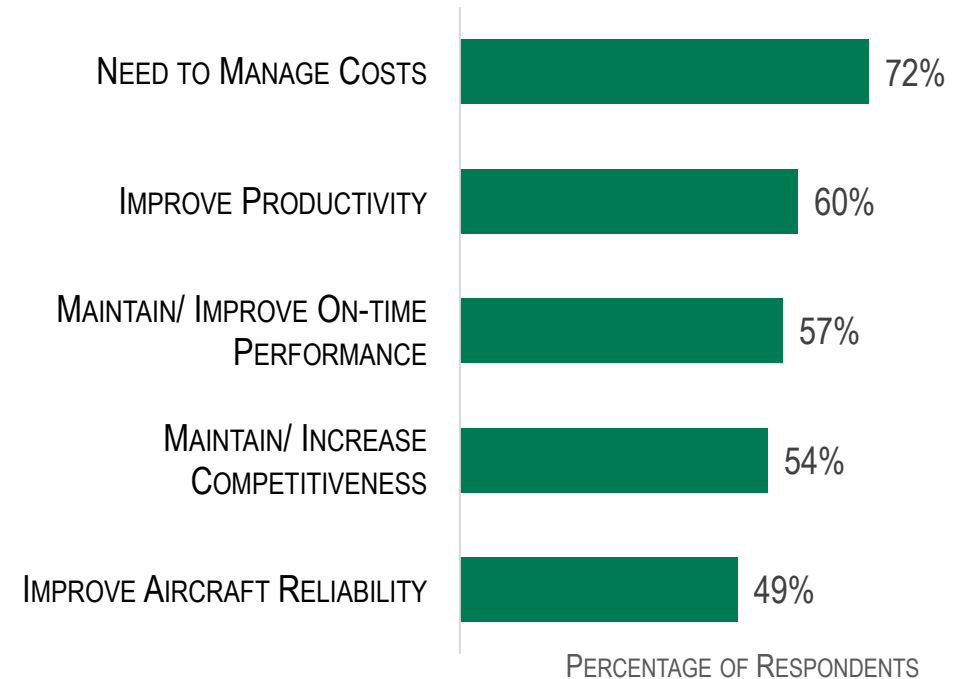
# Pursuing digital optimization initiatives is becoming more important in a post-COVID world

## IMPORTANCE OF DIGITAL OPTIMIZATION INITIATIVES



## POST-COVID (NEXT 5 YEARS)

Only for those who believe digital optimization initiatives are very important / important post-COVID



**Doing more with less is a top airline priority**

## 4.MRO OUTLOOK

# Key Takeaways

1

## ■ Aviation industry is recovering, but macro headwinds exist

- As global passenger traffic recovers to and exceeds 2019 levels, airline yields will ease as supply gradually returns to the market
- Economic headwinds may dampened recovery in the near-to-medium term: inflation, volatile fuel prices, forex, geopolitical tensions and supply-chain challenges

2

## ■ Strong fleet growth over the next decade serves as the key driver of demand for MRO

- Fleet is expected to grow from 31k to 42.7k over the next 10 years, with APAC, North America and Europe the three largest regions
- Narrowbodies will take a larger share of the fleet as the midsize aircraft market transitions

3

## ■ Sustained MRO demand - \$112B to \$139B over the next 10 years

- Older aircraft kept in service due to slower production ramp-up
- New-gen engines require additional maintenance
- Modifications (cabin, connectivity, cargo) with the faster growth

4

## ■ Doing more with less – supply challenges in the spotlight

- Labour shortages have highlighted that human capital is one of the most important resources for the MRO industry
- Pursuing digital strategies is paramount, and should be seen as complementary to the workforce

**Thank You.**

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