Global Market Forecast

Cities, Airports & Aircraft

2019-2038

AIRBUS

Cities, Airports & Aircraft

Introduction

“What is the city but the people?”

William Shakespeare

Cities, airports & aircraft

Welcome to the 2019 edition of Airbus’ Global Market Forecast (GMF). This year we explore the relationship between the World’s cities, their airports and the types of aircraft, in terms of size and range, which are supporting them.

In the past we have explored the importance of Aviation Mega-Cites (AMCs), particularly for larger aircraft, but this is just a part of the story. In 2018, there were 66 cities that we classify as AMCs, they account for 40% of all passengers, up from 29% in 2002, but well over 70% of long-haul passengers and 35% of the short-haul. Many of these cities have developed a need for more than one airport, some with as many as three or four today. More than 600 airlines or nearly 80% of the world’s airlines operate to AMC airports. A growing share of passengers are also flying with LCCs from or to these airports, nearly a quarter of AMC passengers today, from just 8% in 2002. Over this time average aircraft size has grown from ~155 seats in 2002, to ~175 today, as passenger numbers and for some, operational constraints increase.

But as Shakespeare wrote “What is the city but the people?” About a quarter of the World’s urban population live in AMCs, and are a focus for more than a quarter of global GDP. Given both are important drivers for aviation growth it is unsurprising that these cities are key points in the global aviation network. By the end of our forecast period in 2038, we expect there to be some 95 aviation mega-cities, with cities like Lagos, Muscat, Rio de Janeiro and Philadelphia being added to the growing list of AMCs.

Air transport will continue to play a key role in connecting cities and their people particularly in emerging markets or where cost or simply geography make alternatives impossible. In doing this commercial aviation contributes 3.6% of global GDP and supports more than 65 million jobs. However, we recognise that aviation also contributes 2% to 3% of the world’s manmade emissions of carbon dioxide (CO_2), with transportation as a whole (cars, trains, shipping etc.) producing ~24% according to the United Nations Intergovernmental Panel on Climate Change (IPCC). So our industry has worked diligently to limit its impact on the environment. For example aircraft today, are 75% quieter and 80% more fuel efficient per seat than they were when jets were becoming a more common sight in cities around the world. But this is by no means the end of these efforts.

Airbus is conscious of climate change and its responsibility to society as well as future generations. We have the ambition to continue serving society’s demand for air travel and transport and to continue delivering significant social benefits whilst ensuring a sustainable future of air travel.

We hope that you find the 2019 Global Market Forecast informative and useful. We seek to improve our analyses continually, and your questions, challenges and suggestions help us advance towards this goal. Don’t forget you can access tailored GMF2019 content on your phone or computer, including interactive material, and the forecast results in Excel format using this link: http://gmf.airbus.com/ or simply scan the QR code on the back cover.

EXECUTIVE SUMMARY

01 Executive summary

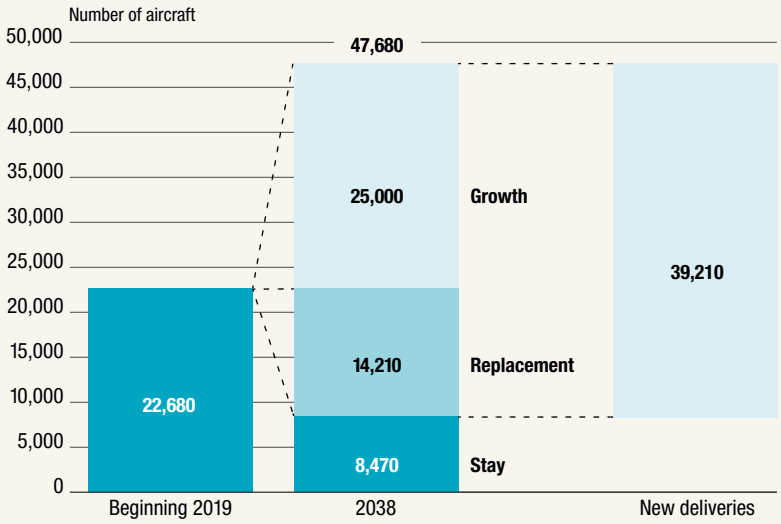
LONG TERM GROWTH POTENTIAL FOR OUR INDUSTRY IS CONFIRMED

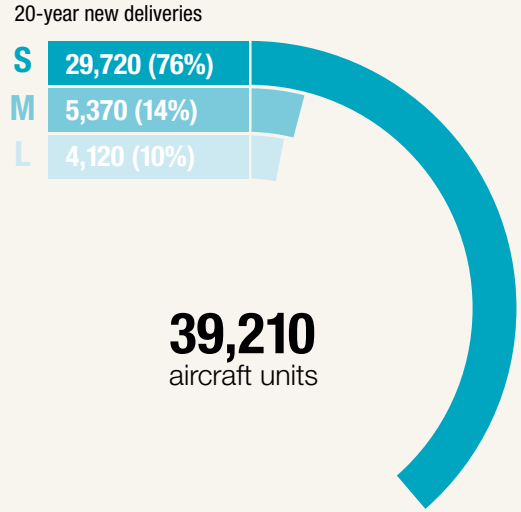
- The commercial aviation Industry has been resilient to external shocks, traffic has grown **x2.4** since 2000.
- Traffic forecast **to double** in the next 15 years.
- Our forecast confirms a **4.3%** average traffic growth p.a. over the next 20 years.
- Demand for **39,210** passenger and freight aircraft over the next 20 years.
- **36%** for aircraft replacement, and **64%** for growth.
- More than **14,200** aircraft will be replaced with **~38,360** passenger aircraft and **850** new build freighters.
- The S segment will represent **76%** of deliveries.
- The M and L segments will represent **24%** of demand in units.
- Asia-Pacific will account for **42%** of deliveries, with airlines in North America and Europe together **36%** of the passenger and freight aircraft deliveries.
- The services market is forecast to deliver a cumulative **US$4.9 trillion** over the next 20 years; see the services chapter for more details.

FLEET IN SERVICE EXPECTED TO MORE THAN DOUBLE OVER THE NEXT 20 YEARS

Source: Airbus 2019

Notes: Passenger aircraft (≥100seats), Jet Freight Aircraft (>10 tonnes) | Rounded figures to nearest 10

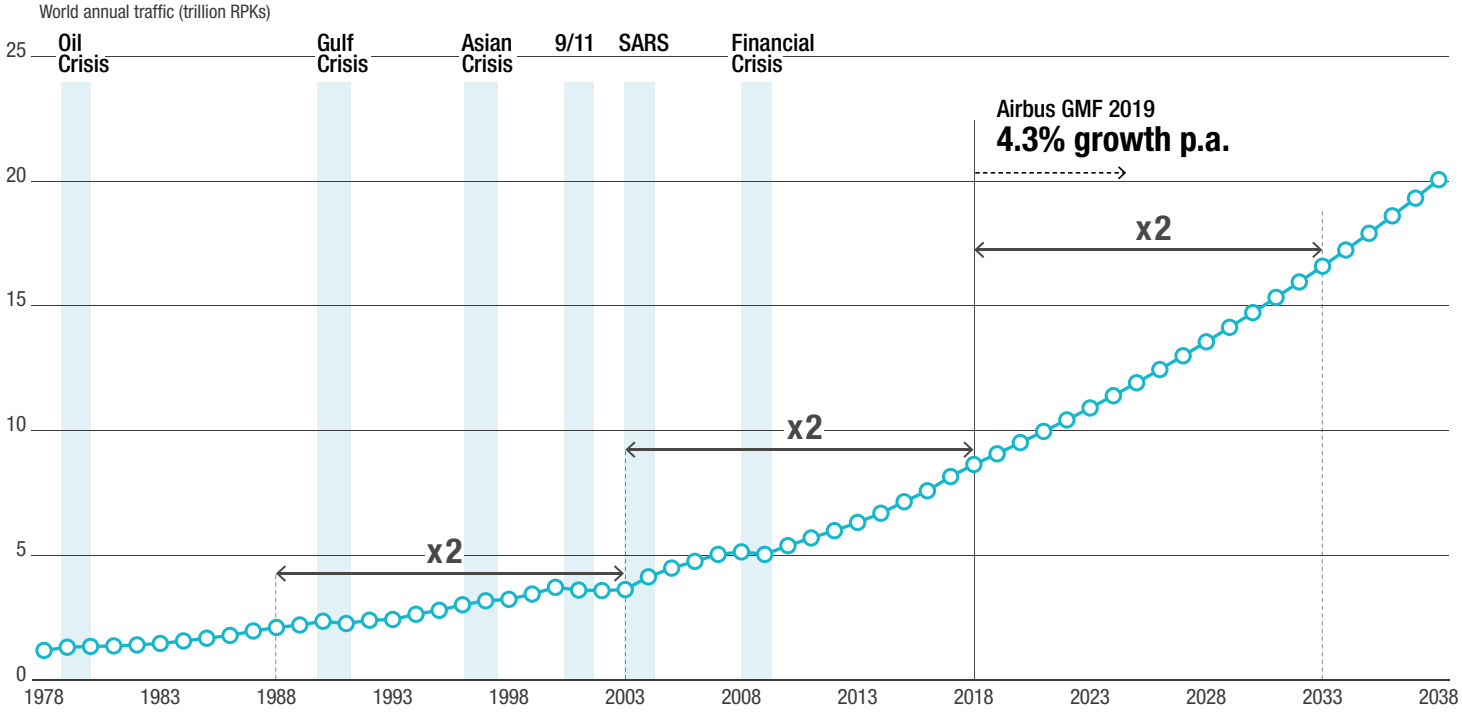




DEMAND FOR 39,210 NEW AIRCRAFT

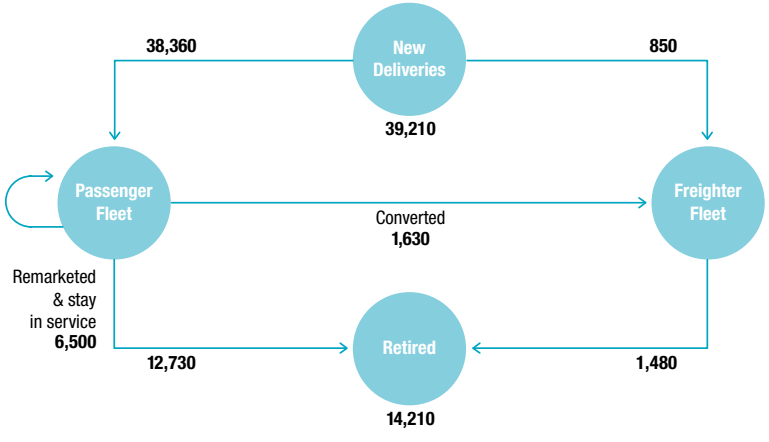
Source: Airbus 2019

Notes: Passenger aircraft (≥100 seats), Jet Freight Aircraft (>10 tonnes) | Rounded figures to nearest 10



TRAFFIC HAS PROVEN TO BE RESILIENT TO EXTERNAL SHOCKS AND DOUBLES EVERY 15 YEARS

Source: ICAO, Airbus GMF 2019
* RPK: Revenue Passenger Kilometer



	2019-2028	2028-2038	2019-2038	SHARE OF 2019-2038 NEW DELIVERIES
AFRICA	520	750	1,270	3%
ASIA-PACIFIC	6,500	10,040	16,540	42%
CIS	700	840	1,540	4%
EUROPE	3,790	3,750	7,540	19%
LATIN AMERICA	1,330	1,370	2,700	7%
MIDDLE EAST	1,410	1,830	3,240	8%
NORTH AMERICA	3,330	3,050	6,380	17%
WORLD TOTAL	**17,580**	**21,630**	**39,210**	**100%**

02 Demand for air travel

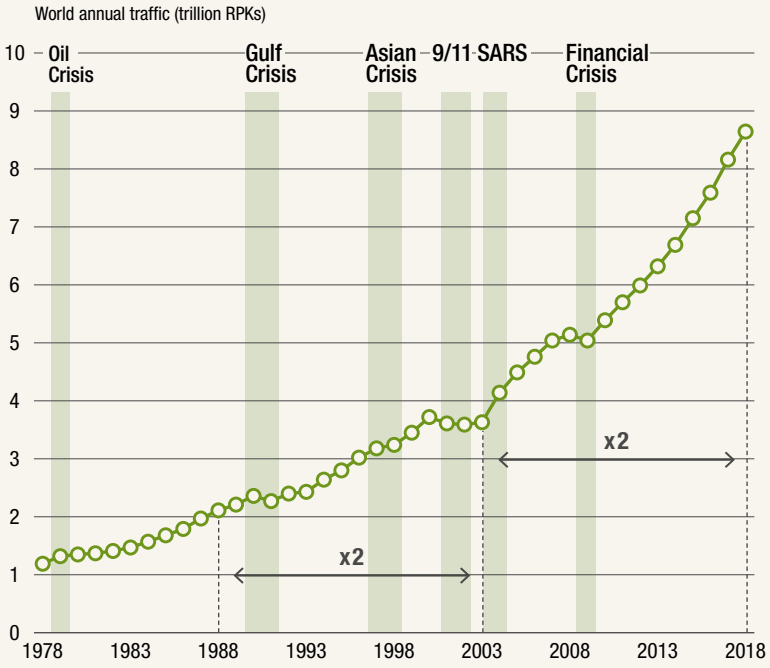
DEMAND FOR AIR TRAVEL

THE CYCLE & THE SHORT TERM

When the air transportation market is discussed, cyclicality is often a word that comes up early in the conversation. This is primarily due to the impact a number of cycles have had on the industry since the 1990s. These past cycles are typified with their roots in a general economic slowdown and then exacerbated with an adjacent so called “exogenous” shock. The decade from the beginning of the new millennium provide to be the most significant for such events with two global (the events of 2001 and the financial crisis in 2008/2009) and one more regional, but no less difficult, focused in Asia (the SARS outbreak). What made these more challenging was the fact they followed, more or less, one after the other. This said, each was followed by a rebound, with traffic able to eventually return to its long term trend. From 2010, the industry has been free from such perturbations and has been able to meet the needs of passengers who have been unimpeded by the impact of these cycles, and whilst margins are still thin, airlines have been able to make a profit at the same time. In fact, airlines’ have made almost as much profit since 2015, as they had between 1970 and 2014.

THE LAST 10 YEARS MORE STABLE FOR THE INDUSTRY THAN THE 10 YEARS PRECEDING

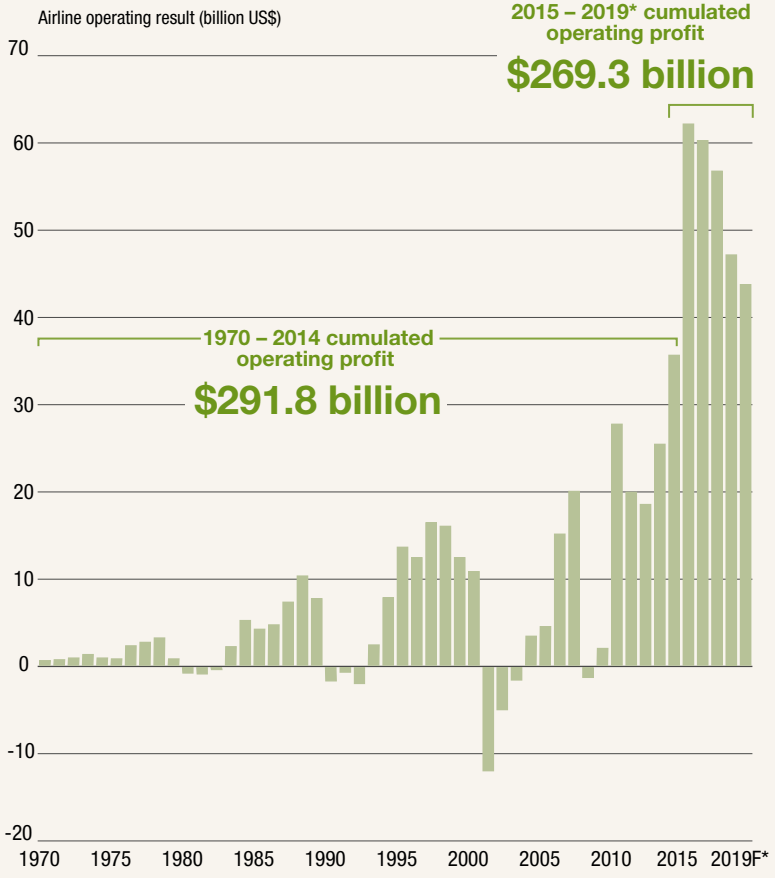
RPK: Revenue Passenger Kilometer
Source: ICAO, Airbus GMF 2019



Drivers during this period included the number of passengers able to grow driven by evolving business models, emerging markets, and deregulation and importantly unimpeded by the effects of an aviation cycle(s).

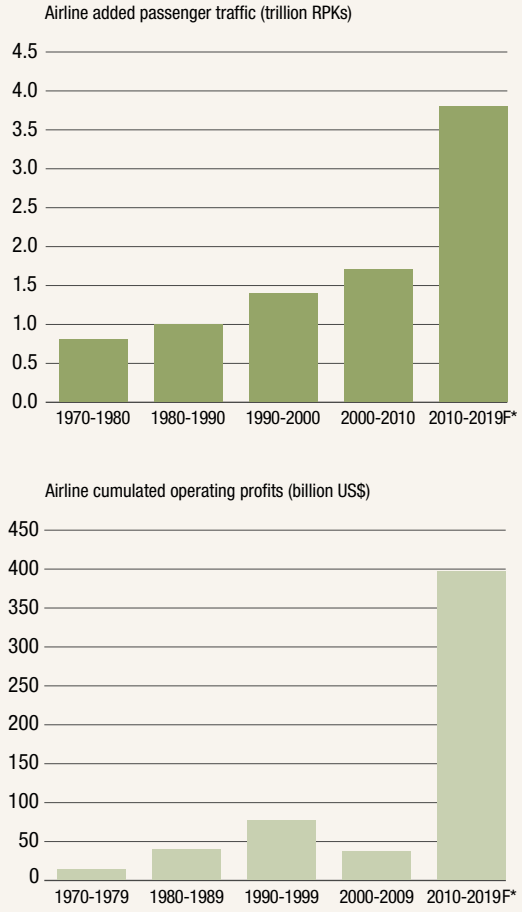
AIRLINES CUMULATED OPERATING PROFITS FROM 2015 TO 2019* EQUIVALENT TO CUMULATED OPERATING PROFITS FROM 1970 TO 2014: A NEW ERA FOR THE INDUSTRY?

Source: ICAO, IATA, Airbus
*forecast



AIRLINE ADDED PASSENGER TRAFFIC AND CUMULATED OPERATING PROFITS

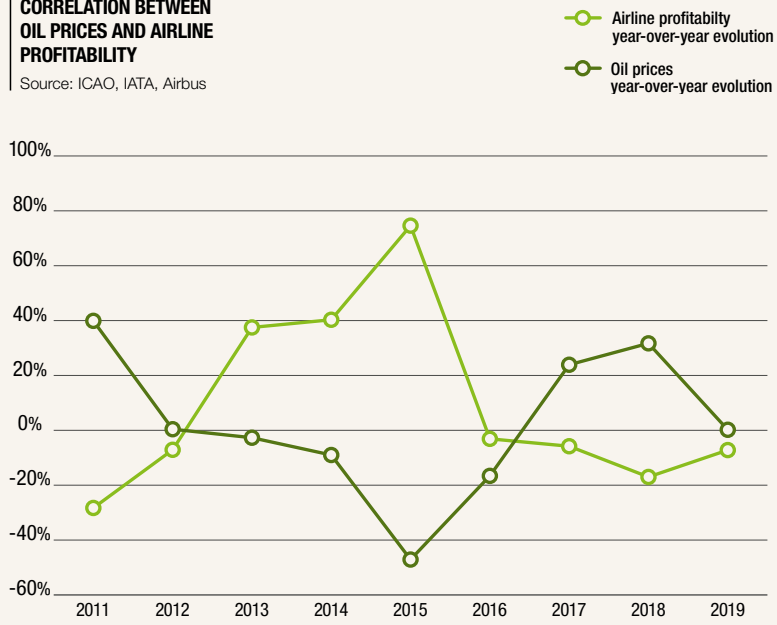
*forecast



Another contributing factor was the price of oil, which has a negative correlation to airline profitability. From 2010, airlines enjoyed a period of lower or more stable fuel prices which due to the fact that fuel cost can be over 30% of airline costs, had a significant contribution to profits over this period.

STRONG NEGATIVE CORRELATION BETWEEN OIL PRICES AND AIRLINE PROFITABILITY

Source: ICAO, IATA, Airbus



One question on the minds of most in the industry is when is the next cycle due? Given their potential effects it is unsurprising, with the forecasting team at Airbus monitoring leading indicators for some insight into the possibility and timing of at least an economically driven cycle. The traffic light chart shown here is one of the tools we employ. It summarises some of the indicators we monitor and their condition at the time of writing in the middle of 2019. As you will see many remain green, although geo-politics, particularly in the area of trade, remains a risk to the broader economic picture. However, productivity remains positive and stable, aircraft storage is at historically low levels, and load factors at historically high levels, indicating a continuing balance between supply and demand. So far in 2019, so good…

THE AIR TRANSPORT SHORT TERM OUTLOOK REMAINS POSITIVE

INDICATOR	STATUS	TREND	COMMENT
Geopolitics	○ ● ○	→	• Increased protectionism and other geo-political risks remain a concern
Economy	○ ○ ●	↘	• World real GDP growth is projected to gradually slow from +3.3% in 2017 and +3.2% in 2018, to +2.8% this year and +2.7% in 2020 (for reference, average World real GDP growth 2011-2016 was +2.5%). This as a result of slowing trade and industrial sectors growth
Passenger traffic	○ ○ ●	↘	• Sustained passenger traffic growth in the first half of 2019 (+4.6% year-over-year growth in terms of RPKs), especially for airlines from Emerging Markets • Passenger load factor at record level in the first half of 2019
Freight traffic	○ ● ○	→	• Weak air freight market in the first half of 2019 (-3.3% year-over-year in terms of FTKs) when compared with a strong first half 2018
Finance	○ ○ ●	→	• Some volatility in finance and stock markets • Generally, interest rates at historical low levels, although baseline forecasts suggest US rates may continue to grow marginally
Aircraft	○ ○ ●	→	• Stored aircraft remaining at historical low levels • Passenger aircraft productivity continues to improve
Airlines	○ ○ ●	→	• Airline profitability expected to remain solid in 2019, although it may marginally decrease as a consequence of increased jet fuel / labour costs and currency volatility

Traffic light code:
- ●: Positive
- ●: Concerns
- ●: Negative

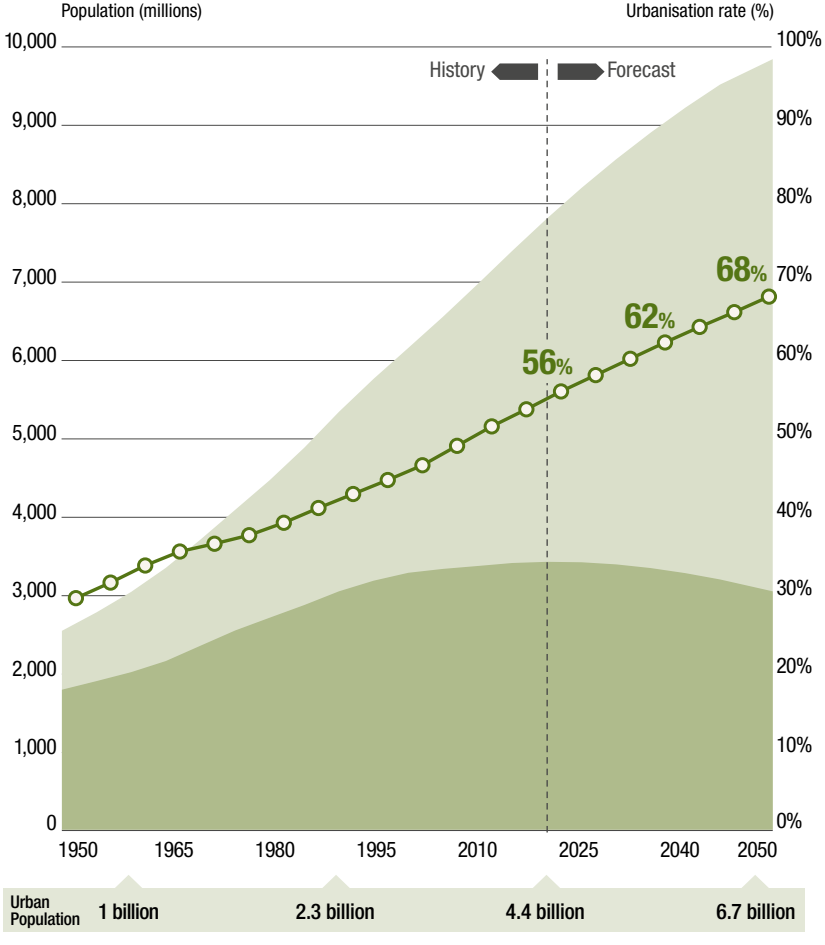
Trend indication:
- →: unchanged
- ↗: improving
- ↘: moderating

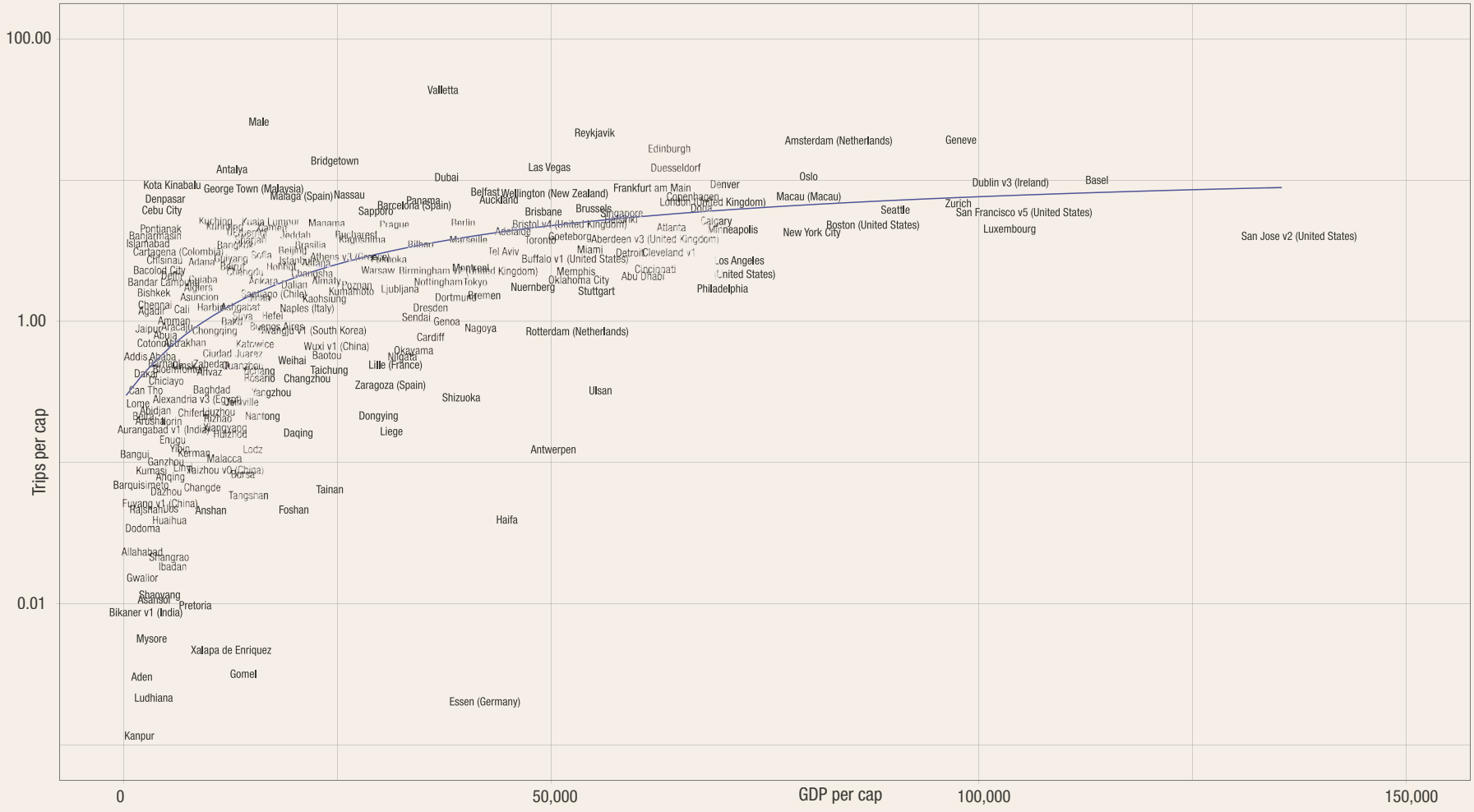
This year the theme of our forecast material is the importance of cities in the global aviation network and how airports and then aircraft evolve and support demand. As Shakespeare said "What is the city but the people" an insight as important today as it was in the fifteen hundreds. As the World's population has grown so too has the trend to greater urbanisation. At the start of the jet age in the 1950's about a third of the World's population was urbanised, today, it's over 50% and four billion people. Forecasts suggest this trend will continue reaching nearly seven billion people and 70% living in an urban environment by 2050. With greater urbanisation greater wealth is forecast with the number of people who can be classified as middle class expected to grow 50% over the next 20 years to 5.9 billion people from 3.9 billion today. There is little doubt that this demographic trend will also continue to shape the aviation network in the future as it has in the past.

In previous years, we have talked about the propensity to fly linked to countries and their wealth per capita, with this year's theme we have shown this but at a city level. Again there is a correlation to wealth, but at a city level some cities, particularly in Asia-Pacific, have achieved similar levels of flying to others with higher levels of GDP per Capita. This indicates the importance that aviation has on the daily lives of cities and their people. In fact from the cities studied 514 had at least one airport, with 50 cities having two or more.

WORLD URBAN POPULATION EXPECTED TO RISE FROM 4.4 BILLION PEOPLE TODAY UP TO 5.6 BILLION BY 2035 AND 6.7 BILLION BY 2050

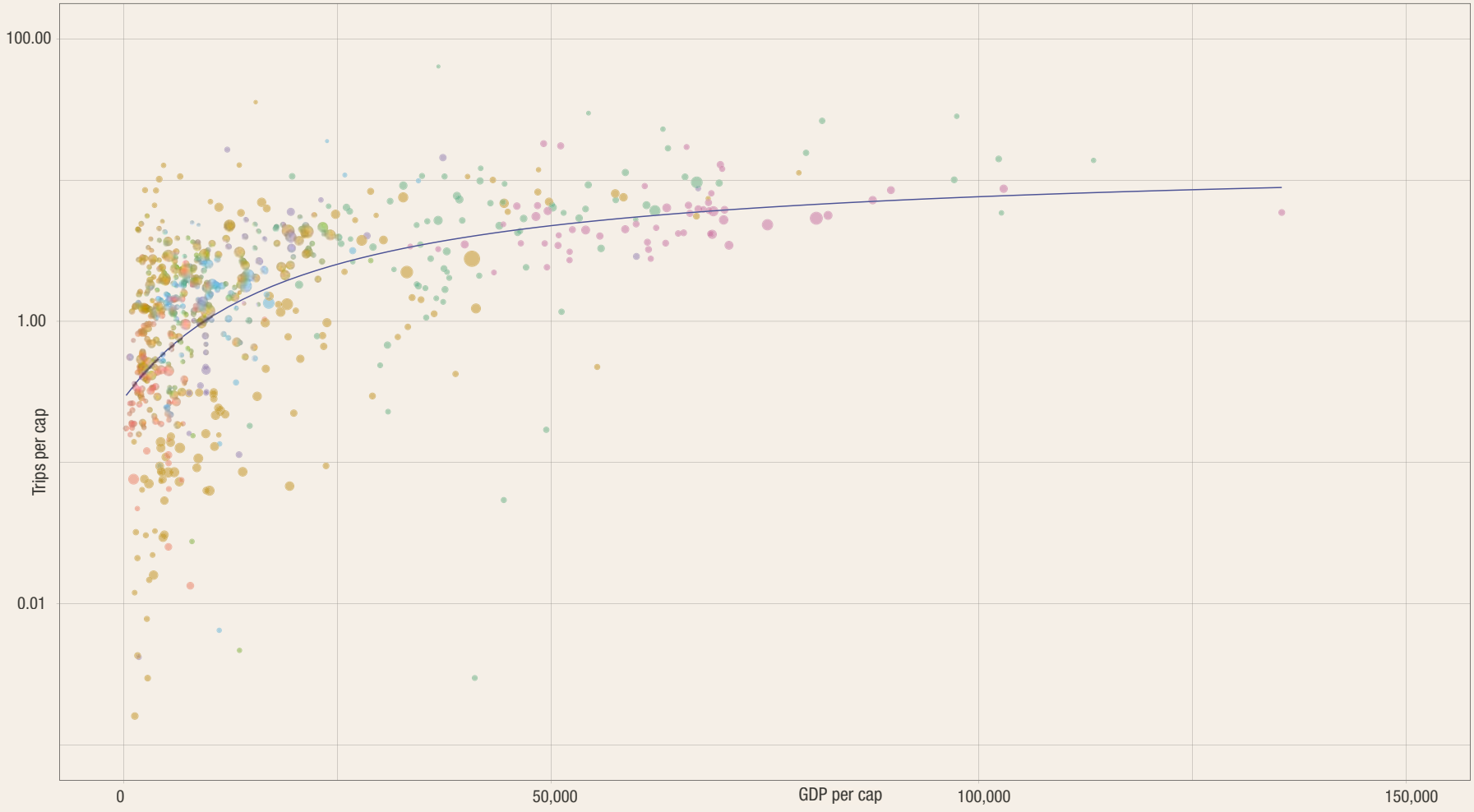
Source: United Nations, Airbus





PROPENSITY TO FLY AT A CITY LEVEL ALSO CLOSELY LINKED TO WEALTH

Source: SABRE 2017, OE cities 2017, GMF 2019

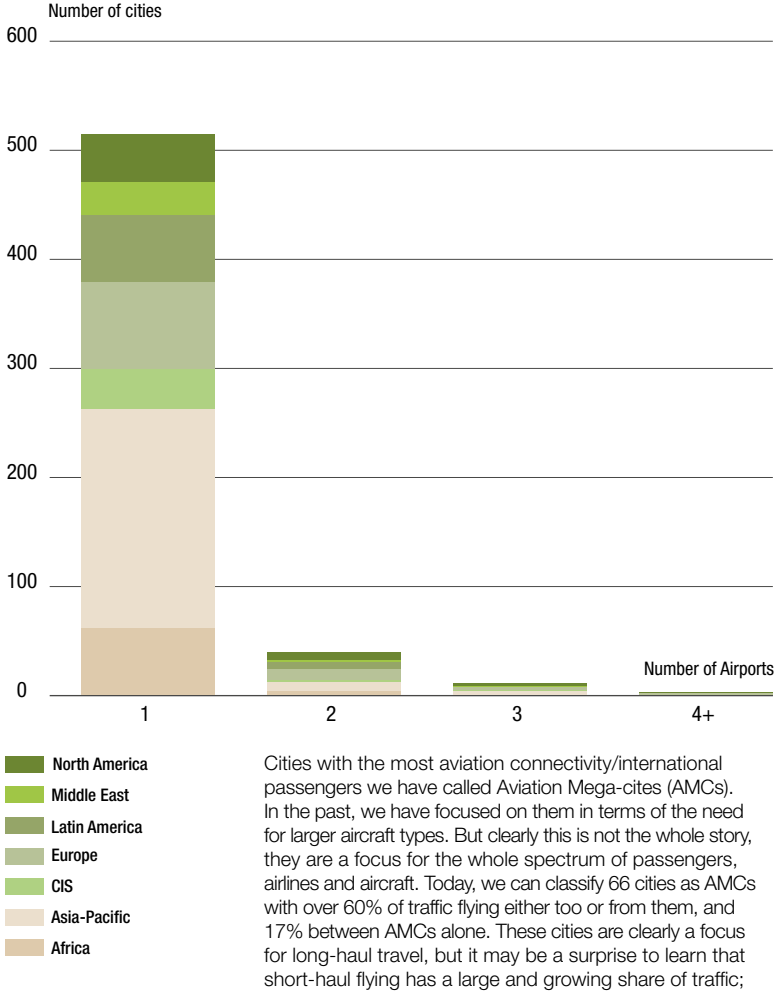


MANY CITIES IN THE ASIA-PACIFIC FLYING ABOVE TREND

Source: SABRE 2017, OE cities 2017, GMF 2019

MOST CITIES HAVE ONE AIRPORT, BUT MORE THAN 50 CITIES HAVE MORE

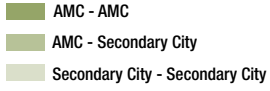
Source: SABRE 2017, OE cities 2017, GMF 2019



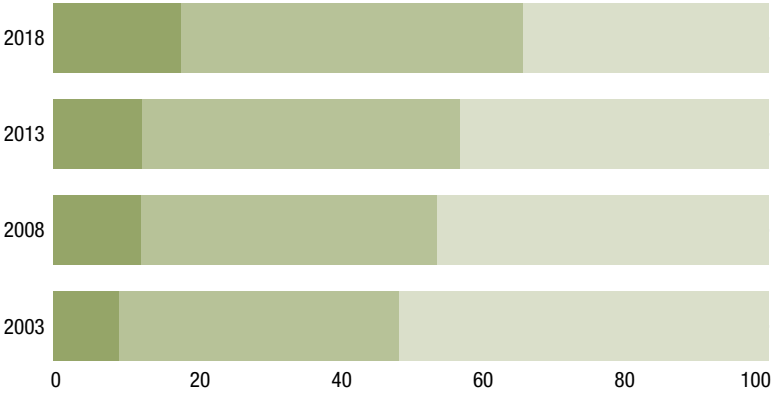
Cities with the most aviation connectivity/international passengers we have called Aviation Mega-cites (AMCs). In the past, we have focused on them in terms of the need for larger aircraft types. But clearly this is not the whole story, they are a focus for the whole spectrum of passengers, airlines and aircraft. Today, we can classify 66 cities as AMCs with over 60% of traffic flying either too or from them, and 17% between AMCs alone. These cities are clearly a focus for long-haul travel, but it may be a surprise to learn that short-haul flying has a large and growing share of traffic; growing from 75% of traffic in 2003, to 79% today.
One reason may be that the number of airlines serving at least one AMC has grown from 365 in 2003, to 516 in 2018, meaning that nearly 90% of airlines have some level of service to these cities. Another may be that the presence of low cost carriers has increased. In 2002, their share of traffic was ~8% today it is over 25%.

THE SHARE OF TRAFFIC TO AND FROM AVIATION MEGA-CITIES HAS GROWN

Source: OAG, Airbus GMF 2019

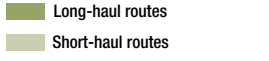


PERCENTAGE OF GLOBAL TRAFFIC BY TYPES OF AIRPORT CONNECTED

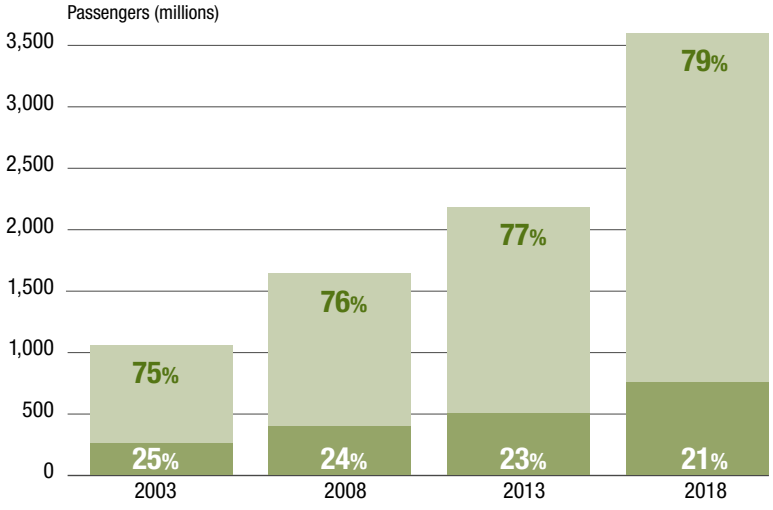


THE SHARE OF SHORT-HAUL TRAFFIC TO AMCS IS HIGH AND IS GROWING

Source: OAG, Airbus GMF 2019



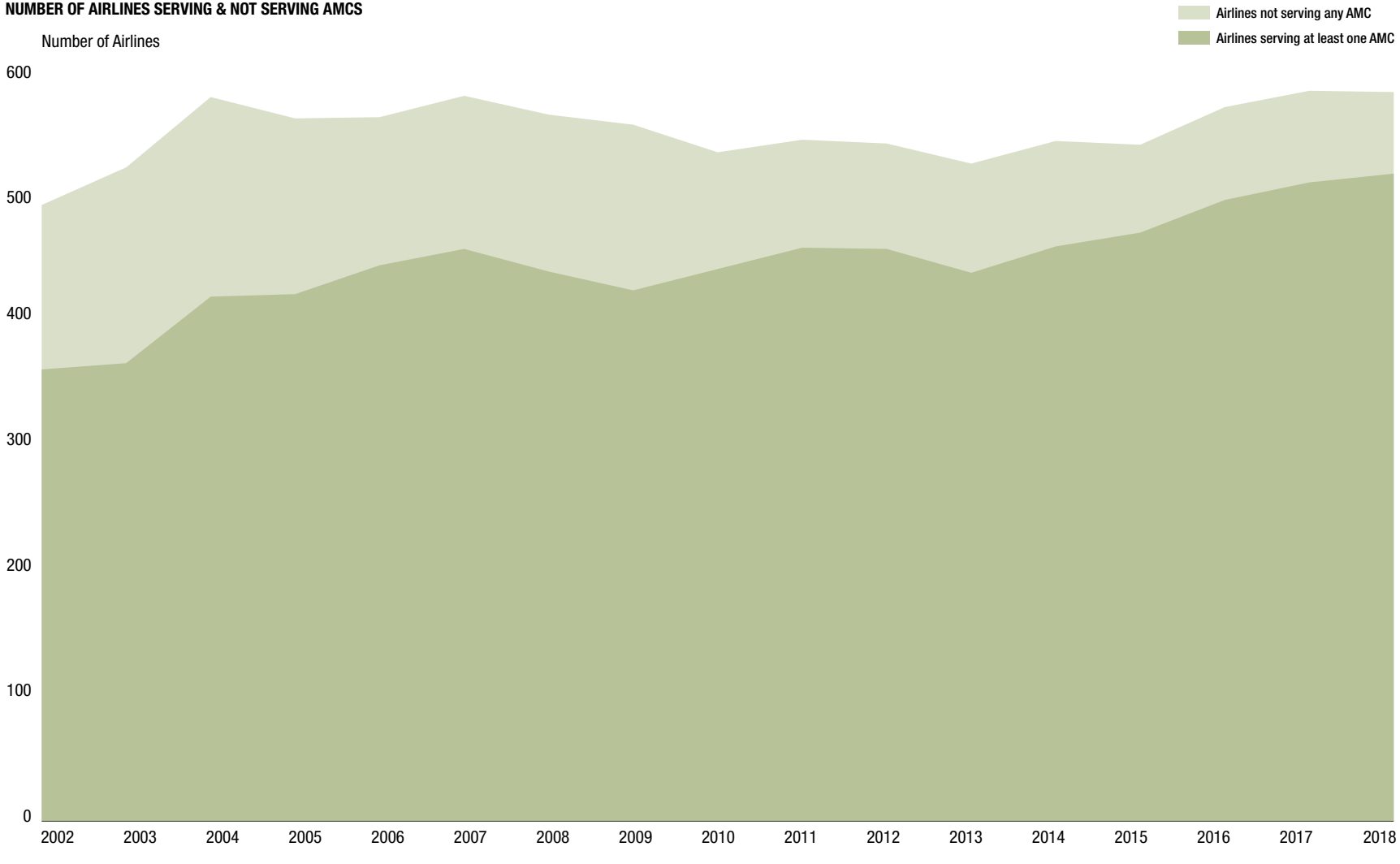
AMC TRAFFIC BY ROUTE LENGTH



MORE AIRLINES ARE SERVING AMCS

Source: OAG, Airbus GMF 2019

NUMBER OF AIRLINES SERVING & NOT SERVING AMCS



(Airlines with at least one aircraft and having more than 100 seats)

LCCS ARE A GROWING PRESENCE AT AMCS

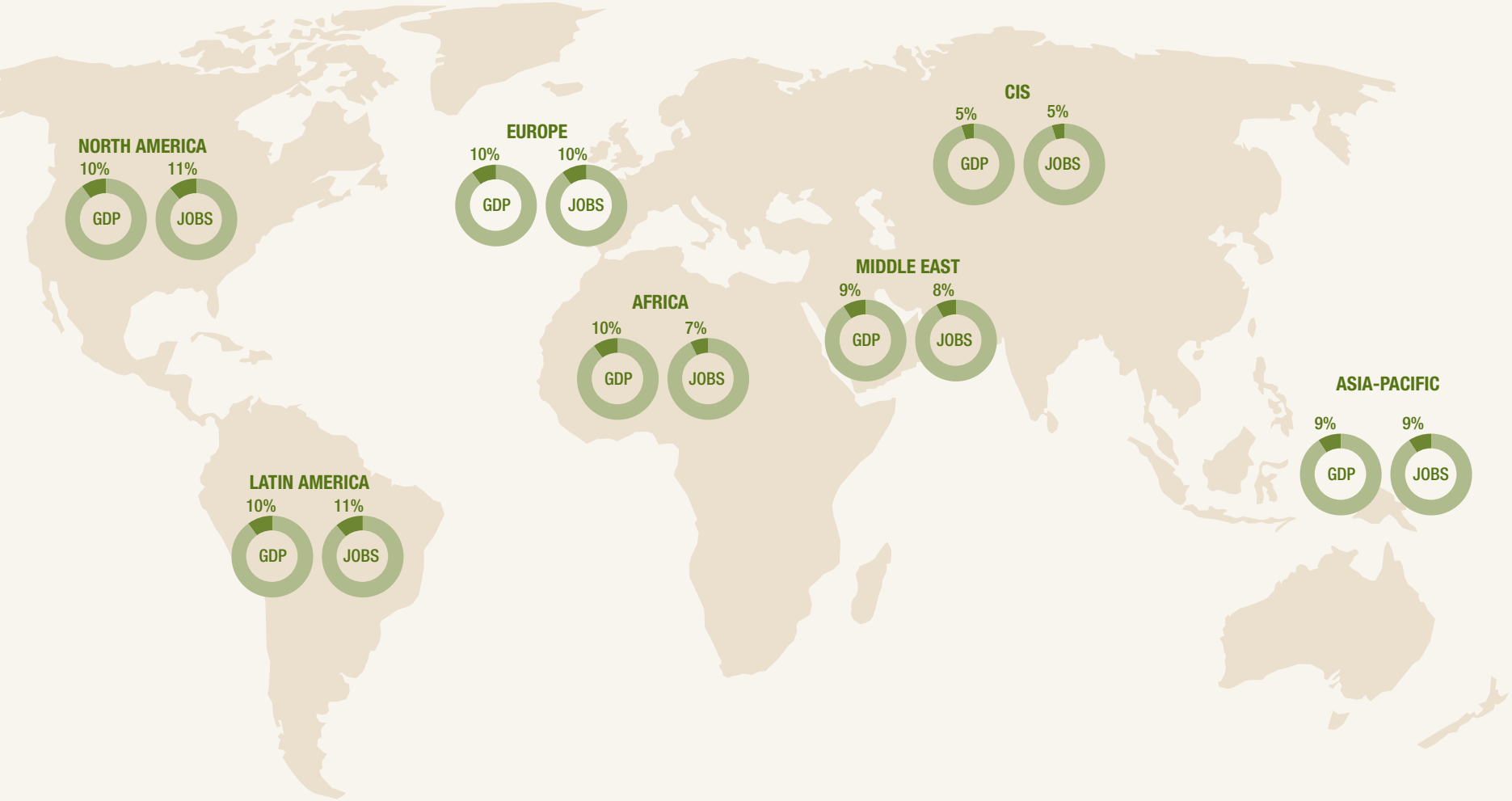
Source: OAG,
Airbus GMF 2019
Note: LCC = Low Cost Carrier,
FSC = Full Service Carrier

As well as being a focus for travel related to business,VFR (visiting friends or relatives) or education, AMCs are also often a focus for tourism due to their history and cultural activities, cities like London, Paris, Beijing and New York. How many people who have flown haven't benefited from visiting the museums, restaurants and even commercial centers of the cities such as these? Tokyo, another AMC, is set to be a significant draw this year with the Rugby World Cup and then in 2020, with the Olympics where more 200 nations are expected to participate with more than 11,000 athletes, not to mention the thousands of international spectators. During the Rio Olympics in 2016, there were 1.17 million associated tourists, 410,000 of whom were foreign.

GLOBALLY TOURISM CONTRIBUTES A TENTH OF GLOBAL GDP & EMPLOYMENT

Source: World Travel & Tourism Council reports, Airbus GMF 2019

Globally, tourism represents a tenth of GDP and employment, with aviation moving a growing number of tourists; today well over 50%.



NETWORK & TRAFFIC FORECAST

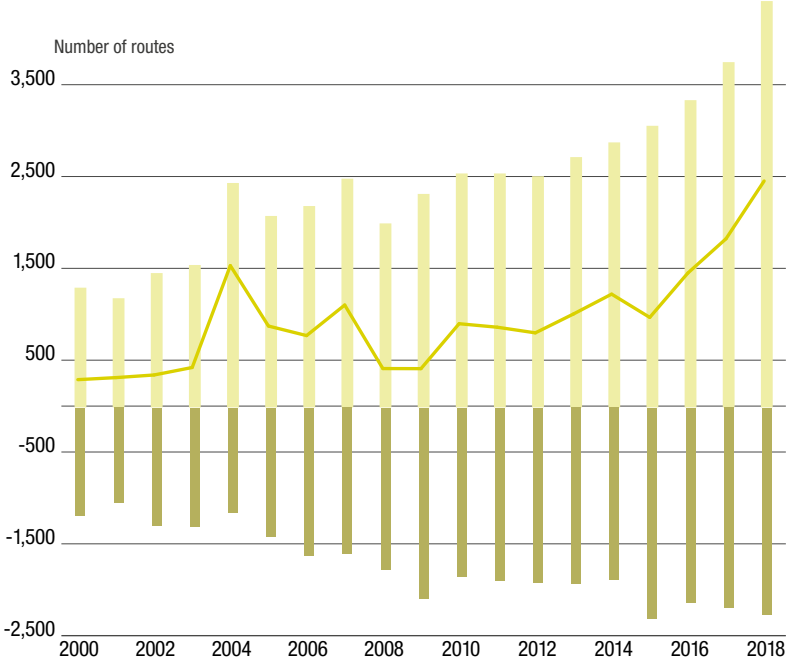
03 Network & Traffic forecast

NETWORK AND TRAFFIC FORECAST

- Compared to 2017, Revenue Passengers Kilometres (RPKs) grew impressively at 6.7% in 2018, according to IATA, with another 260 million passengers flying in the year. At the same time load factors continued to improve ending at nearly 82% on average for the year.
- This represents an impressive 4.4 billion passengers carried by air in 2018, flying on a network of some 55,000 routes.
- 57% of the world's tourists who travel across international borders each year were transported by air, important not only for the passenger but as an enabler for the 10% share tourism contributes to global GDP according to the UNWTO.
- The network continues to evolve, with the process of new routes being tried by airlines, with some dropped with many to be retried in subsequent years. Globally net new routes have grown over the last three years, many are short haul routes with a focus on China and some routes between Africa and Europe. Long haul low cost operations have also grown over this period.

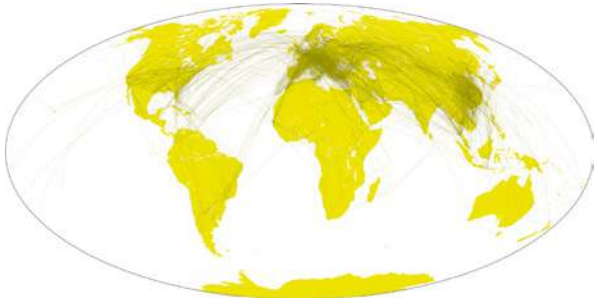
TOTAL ROUTE CREATION

Source: OAG, Airbus GMF 2019



TOTAL ROUTE CREATION

- Total number of new Routes created per year has steadily increased since the last significant downturn in 2008/2009
- The last 3 years in particular have been very active

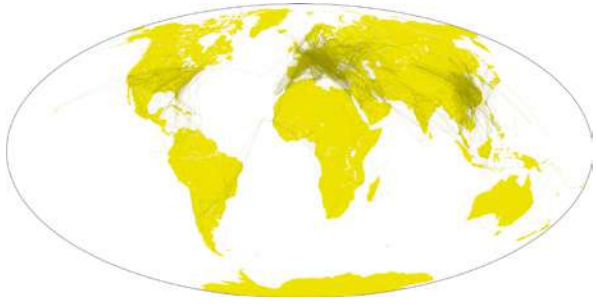


ALL NEW ROUTES ADDED IN 2017-2018

Source: OAG, Airbus GMF 2019

Primary focused around:
- Intra PRC Region
- Africa - Europe
- Trans-Atlantic

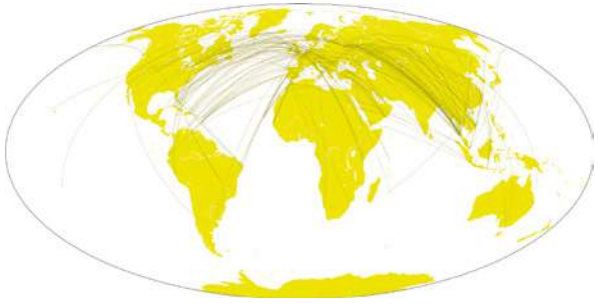
ROUTE CREATION BY MARKET TYPE



ALL NEW SHORT-HAUL ROUTES ADDED IN 2018

Source: OAG, Airbus GMF 2019

Most new routes added have been on short-haul markets
Primary focused around:
- Intra PRC Region
- Africa – Europe
- Within Europe



LONG-HAUL LCC ROUTES ADDED IN 2018

Source: OAG, Airbus GMF 2019

A proliferation of new routes in this market in recent year

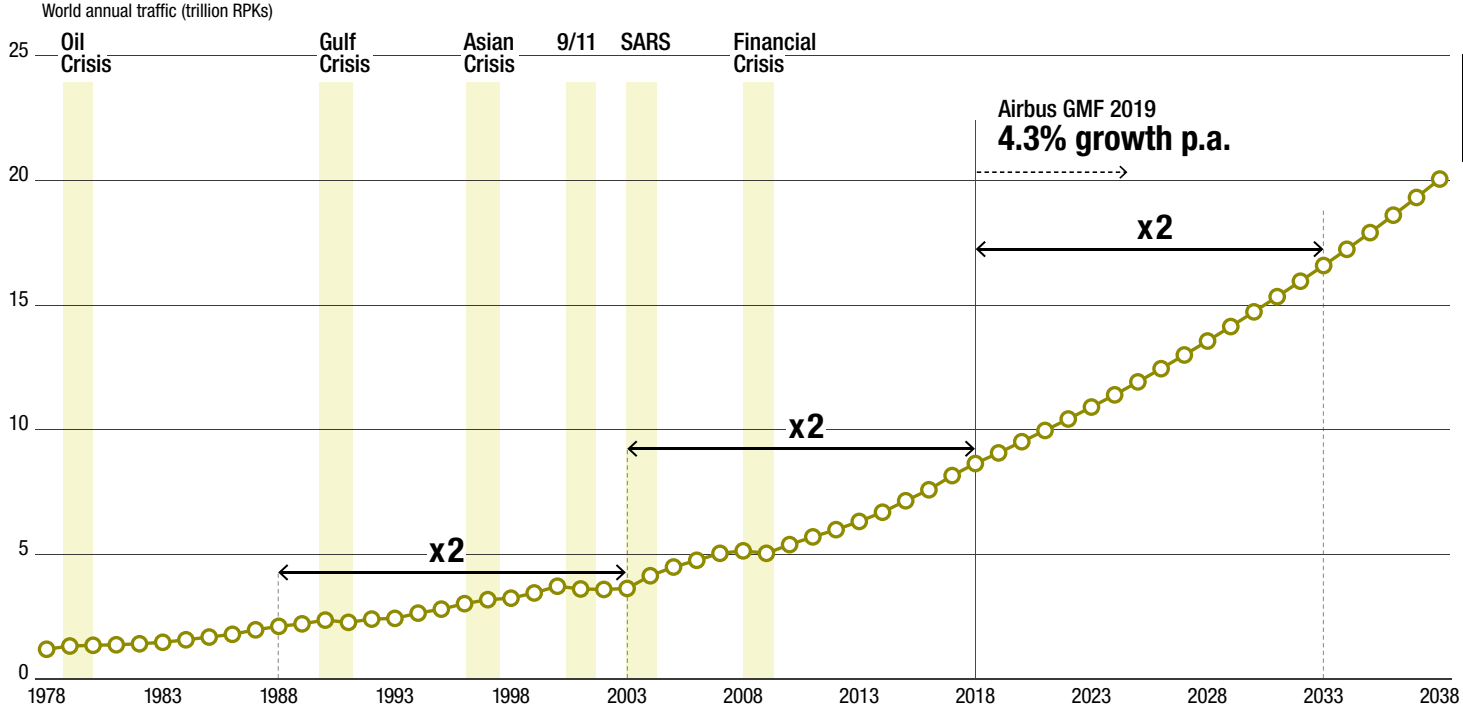
- As we have explored earlier in the GMF, Aviation Mega-cities play a significant role in the network today, a role which has grown and is expected to grow further. In recent years, growth in traffic between AMCs has grown faster than that even between AMCs and secondary cities.

AMC TO SECONDARY CITY TRAFFIC LARGER, BUT AMC-AMC SHARE IS GROWING QUICKLY

Source: OAG, Airbus GMF 2019

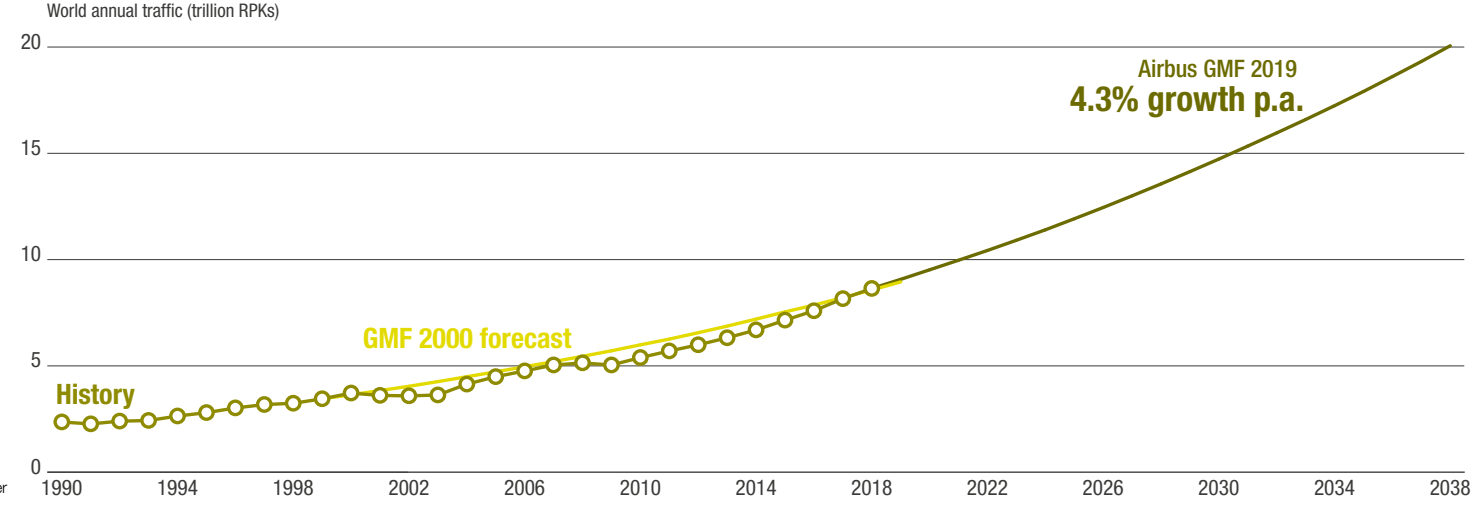
Notes:
AMC = Aviation Mega-City,
SC = Secondary City

- Air traffic continues to prove its resilience as it continues to outperform global GDP growth, demonstrating passengers' appreciation of the benefits that aviation brings.
- For the next 20 years, the Airbus GMF forecasts a 4.3% global annual air traffic growth. In our forecast the first decade will enjoy a 4.6% increase per year, with 4.0% average annual growth for the last decade, a lower figure but growth in those years based on absolute traffic numbers higher than today.
- We continue to monitor the reliability and validity of the Airbus GMF forecast. As an example, our GMF 2000 forecast continues to track the long-term trend, and our latest forecast, despite significant market perturbations in the years following its production.
- Asia-Pacific will lead world traffic by 2038, with a three-fold increase in the traffic serving this region by the end of the forecast period. With 10 of the biggest flows from Asia-Pacific.
- Traffic between emerging countries is forecast to grow at 5.9% per annum, and will represent a growing share of air traffic, from 30% of world traffic in 2018 up to 41% by 2038.
- Our forecast still indicates that the domestic China will become the largest traffic flow before the end of the forecast period. With Domestic Chinese traffic forecast to increase over 3 times, with Domestic USA increasing by half from an already high base.
- The three major flows connecting Western Europe are all expected to develop: Western-Europe – USA growing 70%, Intra-Western Europe to grow 60%.



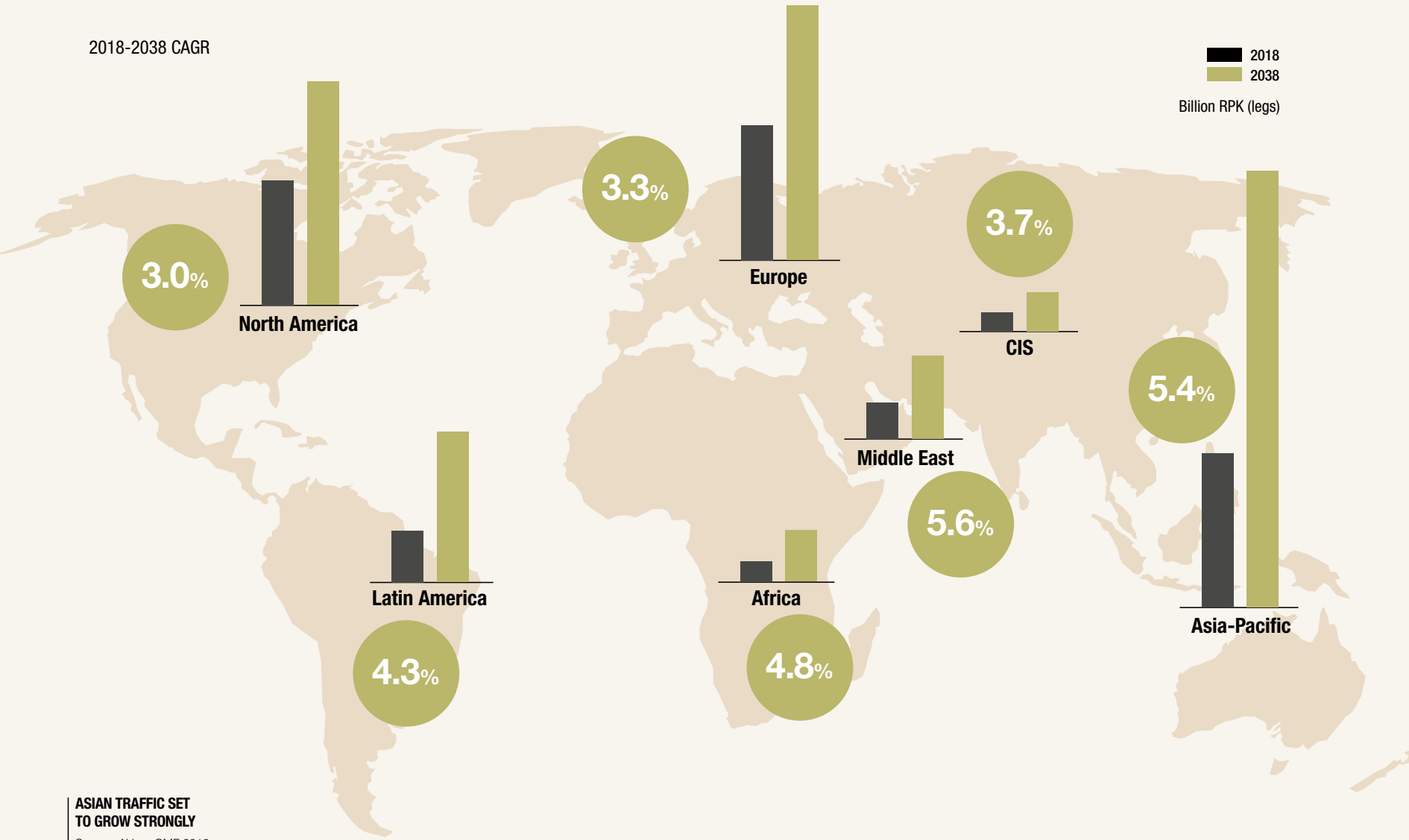
TRAFFIC HAS PROVEN TO BE RESILIENT TO EXTERNAL SHOCKS

Source: ICAO, Airbus GMF 2019
* RPK: Revenue Passenger Kilometer



AIRBUS GMF HAS ACCURATELY PREDICTED LONG TERM AIR TRAFFIC

Source: ICAO, Airbus GMF 2019
* RPK: Revenue Passenger Kilometer

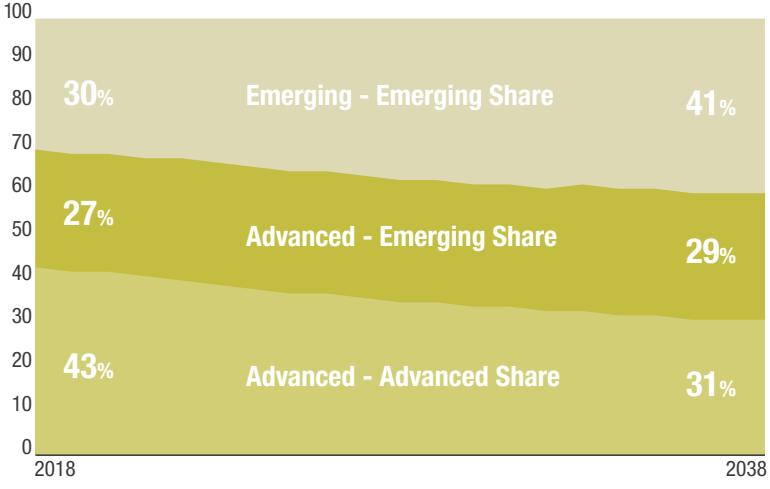


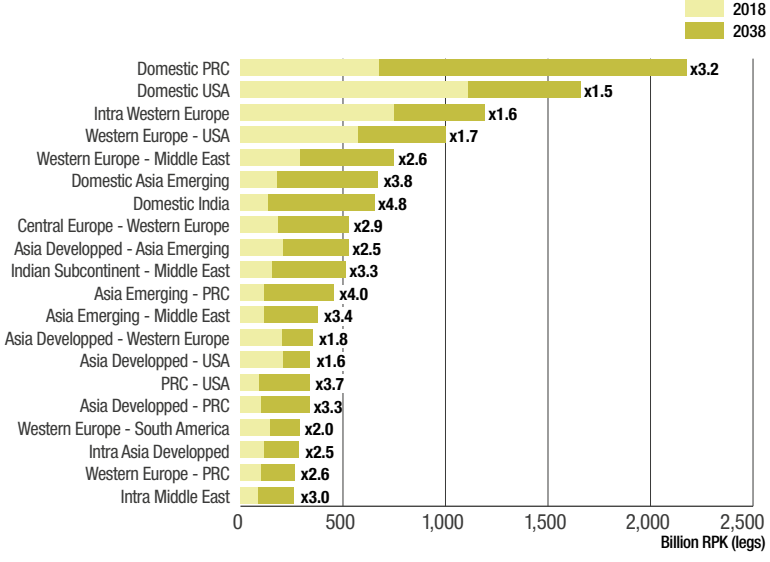
ASIAN TRAFFIC SET TO GROW STRONGLY

Source: Airbus GMF 2019
Note: growth from and to the region per annum

TRAFFIC BETWEEN EMERGING MARKETS TO REPRESENT A HIGHER SHARE OF WORLD TRAFFIC

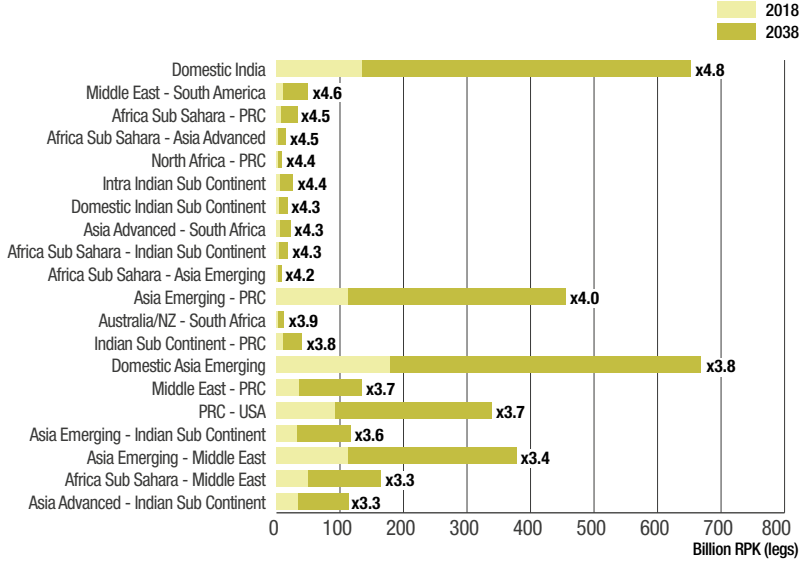
Source: Airbus GMF 2019





MORE THAN 50% OF THE TOP 20 BIGGEST FLOWS INVOLVED ASIA-PACIFIC

Source: Airbus GMF 2019



TOP 20 FASTEST GROWING FLOWS OVER THE NEXT 20 YEARS

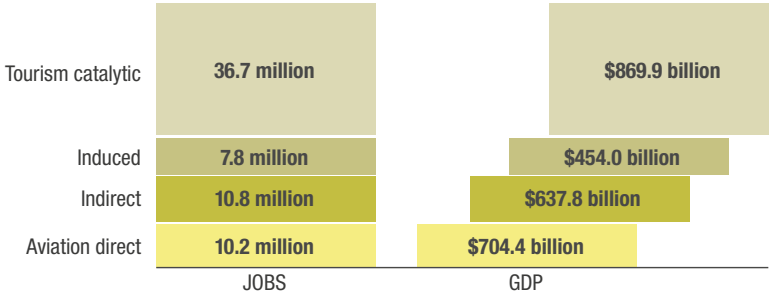
Source: Airbus GMF 2019

REDUCING ENVIRONMENTAL IMPACT, MAXIMIZING BENEFITS

Source: ATAG, Airbus GMF 2019

BEYOND THE INDUSTRY

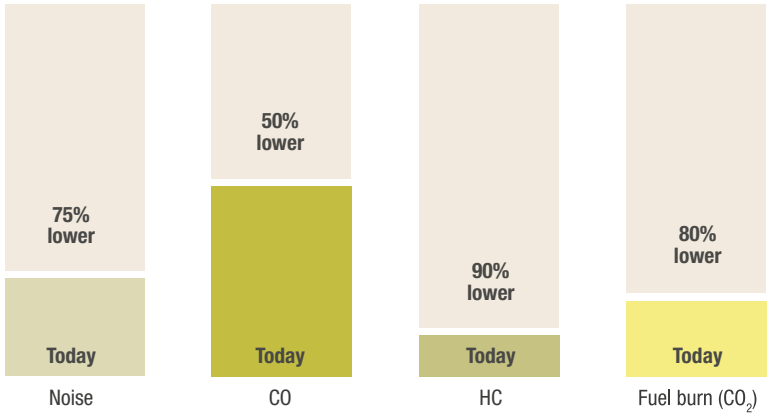
Aviation's global employment and GDP impact



- Air transport will continue to play a key role in connecting cities and their people particularly in emerging markets or where cost or simply geography make alternatives impossible. In doing this commercial aviation contributes 3.6% of global GDP and supports more than 65 million jobs. However, we recognise that aviation also contributes 2% to 3% of the world's manmade emissions of carbon dioxide (CO_2), with transportation as a whole (cars, trains, shipping etc.) producing ~24%, according to the United Nations Intergovernmental Panel on Climate Change (IPCC). So our industry has worked diligently to limit its impact on the environment. For example aircraft today, are 75% quieter and 80% more fuel efficient per seat than they were when jets were becoming a more common sight in cities around the world. But this is by no means the end of these efforts.

SINCE THE 1960'S AVIATION HAS COME A LONG WAY…

Source: ATAG, Airbus GMF 2019



- Airbus is conscious of climate change and its responsibility to society as well as future generations. We have the ambition to continue serving society's demand for air travel and transport and to continue delivering significant social benefits whilst ensuring a sustainable future of air travel.
- Airbus is engaging with other stakeholders to focus on measures that can provide improvements in environmental performance including, operational improvements, air traffic management and in the longer term disruptive technologies.

Global sectorial goals (Air Transport Action Group, ATAG, 2008):

- Improve fleet fuel efficiency by 1.5% per year between now and 2020 - between 2008 and 2018 the average fleet fuel efficiency improvement was greater than 2% per annum.

  The cumulative efficiency improvement (2009-2017) has been 17.3%.
- Stabilise: From 2020, net carbon emissions from aviation will be capped through carbon neutral growth. – ICAO's Carbon Offsetting & Reduction Scheme for Aviation (CORSIA) will play an important role in achieving Carbon Neutral Growth from 2020.
- By 2050, net aviation carbon emissions will be half of what they were in 2005 (or 320 million tonnes of carbon) This is an ambitious and challenging goal towards a 2 degrees pathway requiring significant research, investment and policy development.

…WE WANT TO GO A LOT FURTHER

Source: Airbus GMF 2019

THE FOUR PILLARS USED TO MEET THESE GOALS

Sustainable Aviation Fuels

Market-based measures – for achieving the 2020-goal of carbon neutral growth the ICAO CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) was devised to offset growth in CO_2 from international aviation

New technologies

Improved operations and more efficient infrastructure (potential for up to 10% CO_2 emission reductions)

DEMAND FOR PASSENGER AIRCRAFT

04 Demand for passenger aircraft

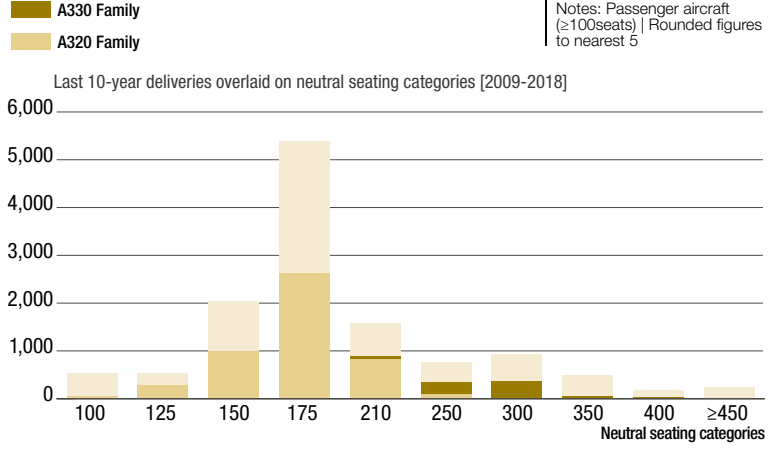
OUR PRODUCTS AND THEIR CORE MARKET SEGMENTS

Source: Airbus GMF 2019

As in GMF 2018, this years forecast retains its new segmentation which seeks to segment the market more accurately in the way airlines operate aircraft in terms of size and range. By taking this approach it is also possible to reflect the overlap that is developing between some market segments. To help illustrate this we have shown our aircraft portfolio next to the various segments we have named Small (S), with ranges up to 3,000nm, Medium (M) with ranges up to 5,000nm, and finally the Large category (L). From our graphic you can see that the A321 and it news variants can easily operate in the S & M segments, and the A330neo and A350-900 are displayed with their core markets, although can meet some requirements in other segments, as the A330 does today.

SOME SEAT BUCKET DEMAND MET BY BOTH A320 & A330 FAMILIES

Source: Cirium, Airbus 2019
Notes: Passenger aircraft (≥100seats) | Rounded figures to nearest 5

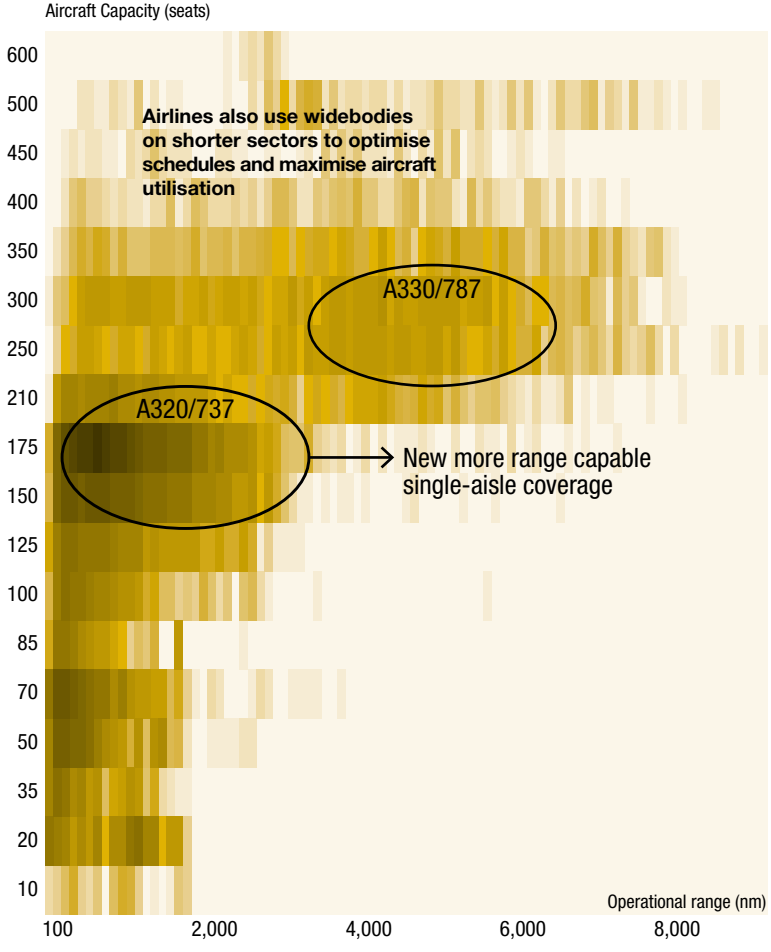


If we take all aircraft deliveries over the last 10 years, convert these into generic aircraft by Airbus neutral seat categories and then overlay A320 and A330 family deliveries it is easy to see the scope of deliveries across a number of different size categories. Another way of looking at this, including the range dimension, is to map all operations by aircraft capacity and range. This time it is clear to see the wide spread of sizes and ranges used by airlines in their real day to day operations.

HEATMAP OF TODAY'S AIRLINE OPERATIONS

Source: OAG, Airbus GMF2019

Notes: number of aircraft in operation defines heat.

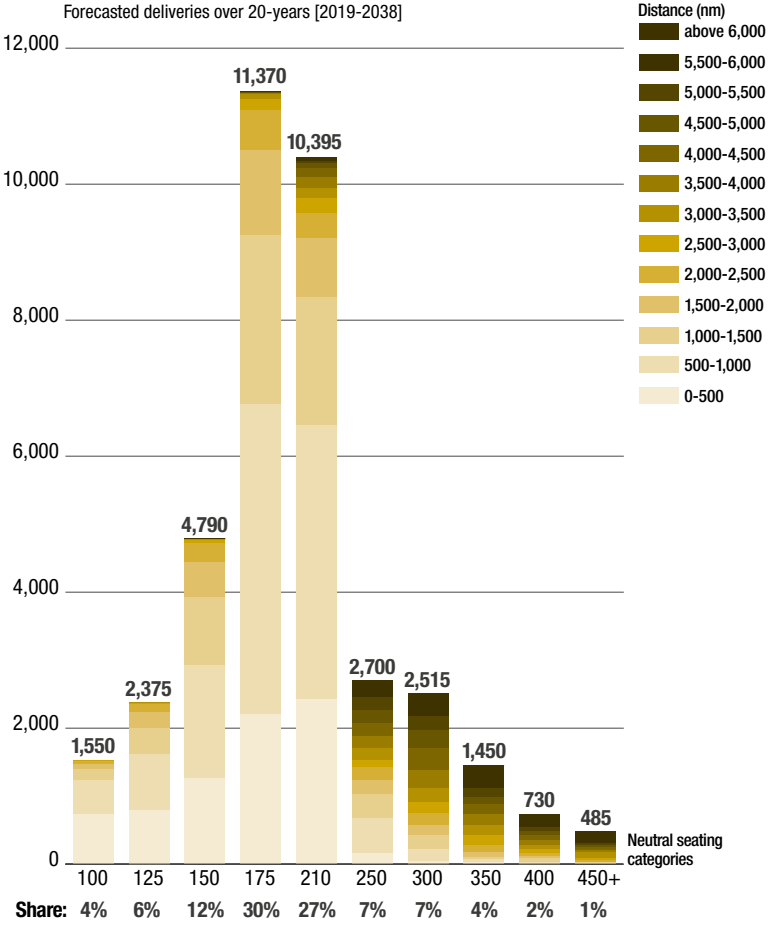


This year we have given you our passenger aircraft forecast delivery by neutral seat category from 100 to more than 400 seats. We also thought it might be of interest to represent the range bands these aircraft will operate in. Again using different shades of colour it is possible to see the diverse way these aircraft will be used not just in terms of size but also range, even within each neutral seat category. Part of this picture will be driven by airline business models, where different requirements like for example comfort levels can adjust this picture.

OUR FORECAST IS AT AIRPORT-PAIR / AIRLINE LEVEL

Source: Airbus 2019

Notes: Passenger aircraft (≥100seats) | Rounded figures to nearest 5

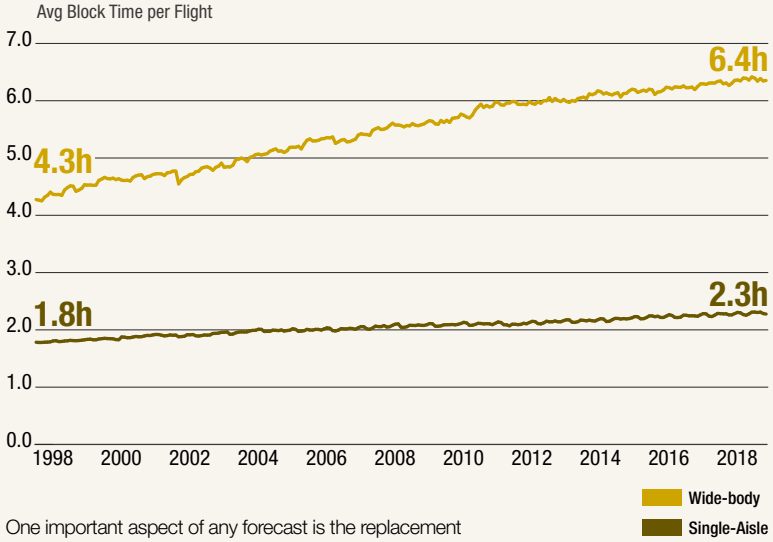


Another driver for this evolution has been increase in range for the some of the new routes in the market place, which has contributed to a corresponding increase in average block time for both wide-body and single-aisle. From historical data average block hours have increased nearly 50% from 4.3 hours to 6.4 hours for wide-bodies over 20 years. Single-aisle average block time has increased from 1.8 hours per flight to 2.3 hours a more than 25% increase. Again this has the effect of changing the weight of different range bands within seat categories.

AIRCRAFT AVERAGE FLIGHT TIME HAS BEEN INCREASING FOR BOTH SA & WB

Source: Cirium, OAG, Airbus GMF 2019

Notes: Passenger/Combi/ Quick-change aircraft usage

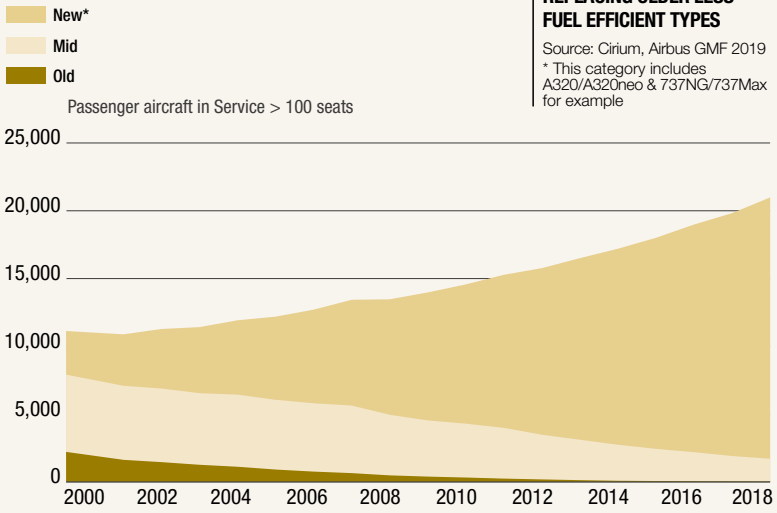


One important aspect of any forecast is the replacement of older less fuel efficient aircraft with newer aircraft incorporating the latest technologies, aircraft which tend to have a significantly smaller environmental impact than those they replace. Aircraft replacements account for as much as 40% of forecast future deliveries. By classifying aircraft into different generations and looking at the fleet composition over time this process is evident. In 2000, about a quarter of the fleet could be classified as the more eco-efficient new generation, by 2018, this had risen to nearly 85% of the fleet. Clearly as time passes and new technology is incorporated in to aircraft and new types and variants emerge we will need to re-classify some types as mid or old generation, all part of the process in fleet re-newel and progress in reducing the operating costs for airlines and environmental impact of the individual aircraft in the fleet.

NEW GENERATION AIRCRAFT REPLACING OLDER LESS FUEL EFFICIENT TYPES

Source: Cirium, Airbus GMF 2019

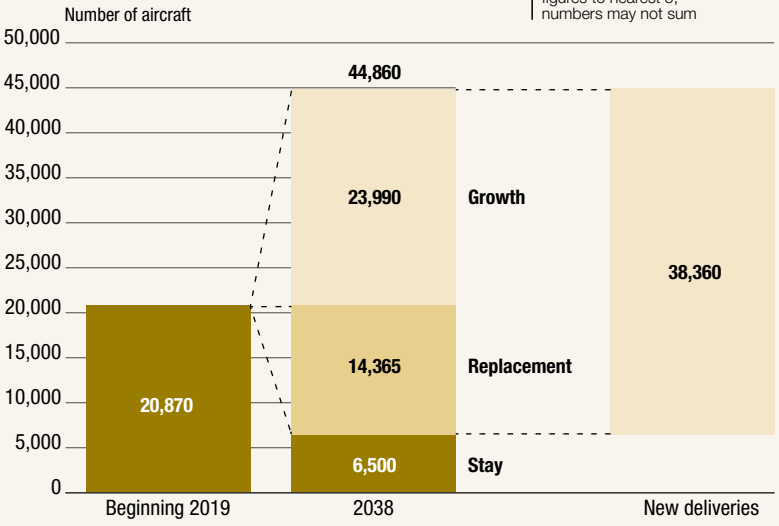
* This category includes A320/A320neo & 737NG/737Max for example



FLEET IN SERVICE EXPECTED TO MORE THAN DOUBLE OVER THE NEXT 20 YEARS

Source: Airbus 2019

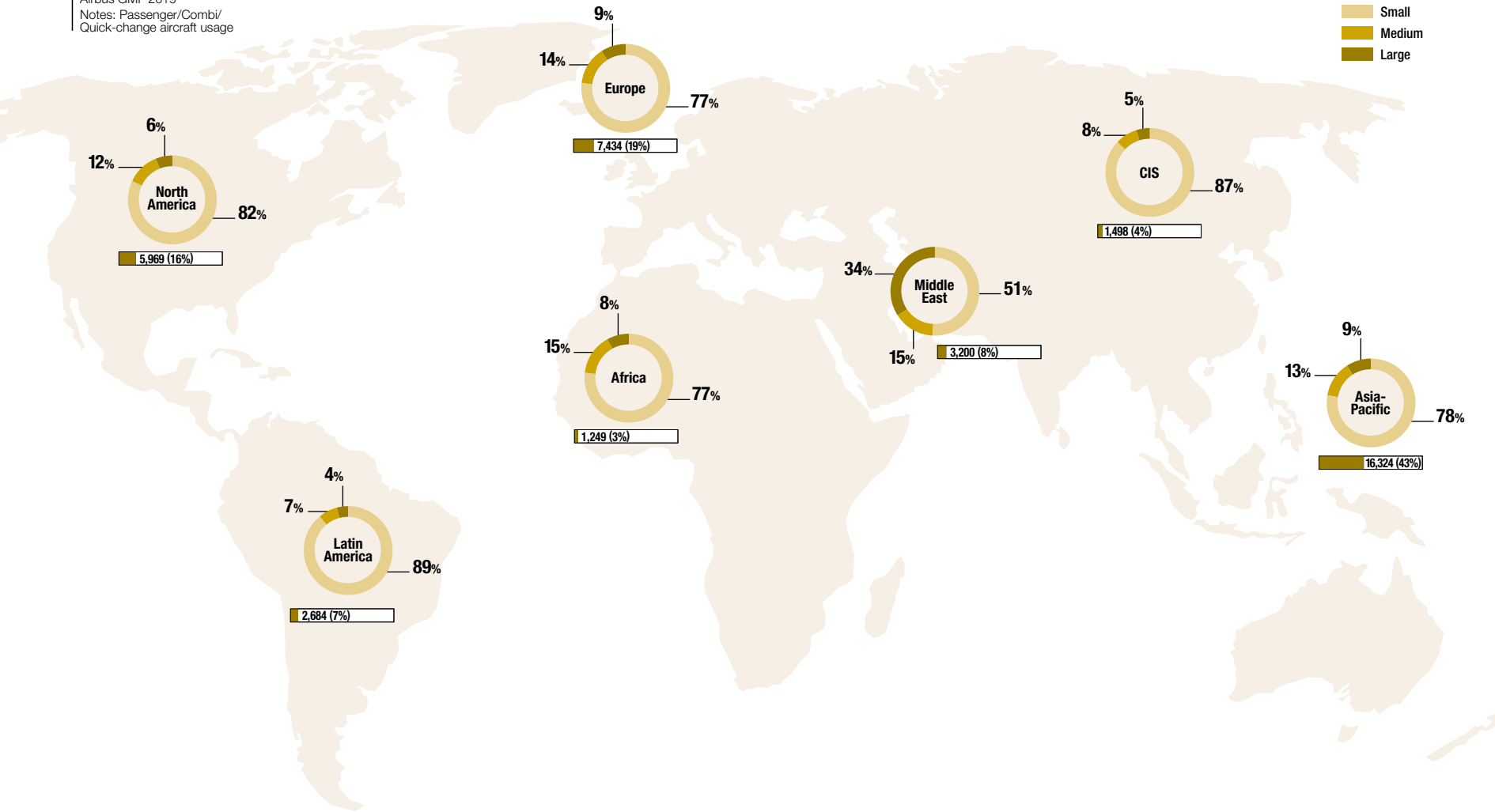
Notes: Passenger aircraft (≥100seats) | Rounded figures to nearest 5, numbers may not sum



DEMAND FOR PASSENGER AIRCRAFT SUMMARY (EXCL. FREIGHTERS)

Source: Cirium, OAG, Airbus GMF 2019

Notes: Passenger/Combi/ Quick-change aircraft usage



DEMAND BY REGION

05 Demand by region

Asia-Pacific

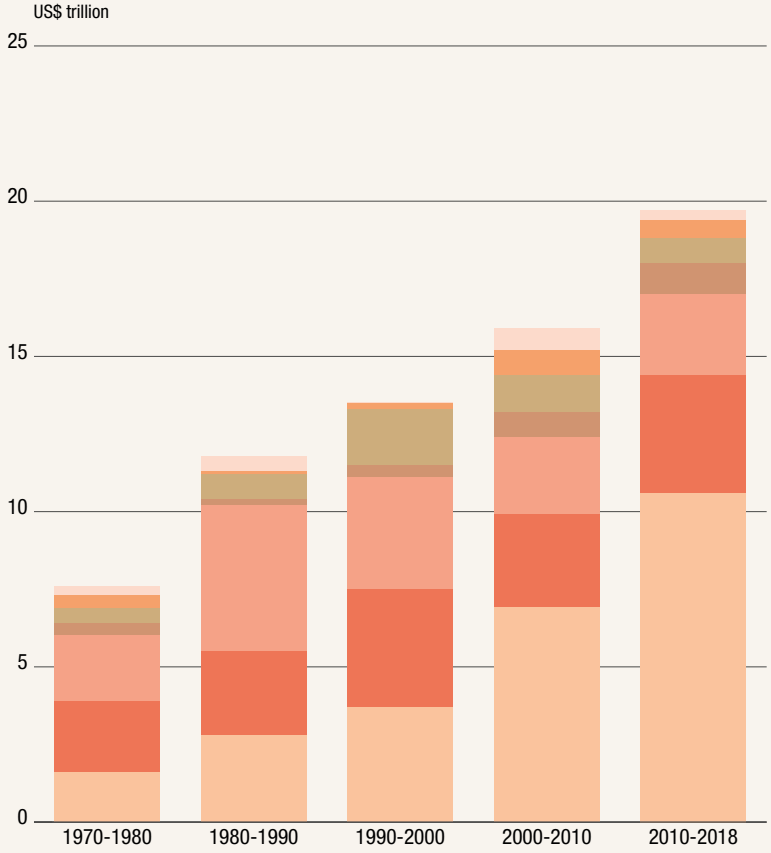
ECONOMY

- Since 1970, the Asia-Pacific share of global added GDP volume has been gradually increasing. It grew 21% between 1970 and 1980, to 54% between 2010 and 2018.
- Today, although India is now outpacing China in economic growth, Asia-Pacific remains linked to China and its transition to a service/domestic consumption based economy.
- Concerns over slowing Chinese economic growth have eased recently but trade tensions with the United States are a downside risk at least in the short term.
- New manufacturing hubs such as Vietnam and Indonesia are emerging which have the potential to stimulate traffic growth.
- Domestic and regional sources of growth - particularly private consumption - led by the Chinese economic transition to services, will play a larger role in the coming years.
- Despite a modest slowdown recently, Asia-Pacific will continue to lead World economic growth with an expected average real GDP growth of **+4.1%** per year over the next 20 years.

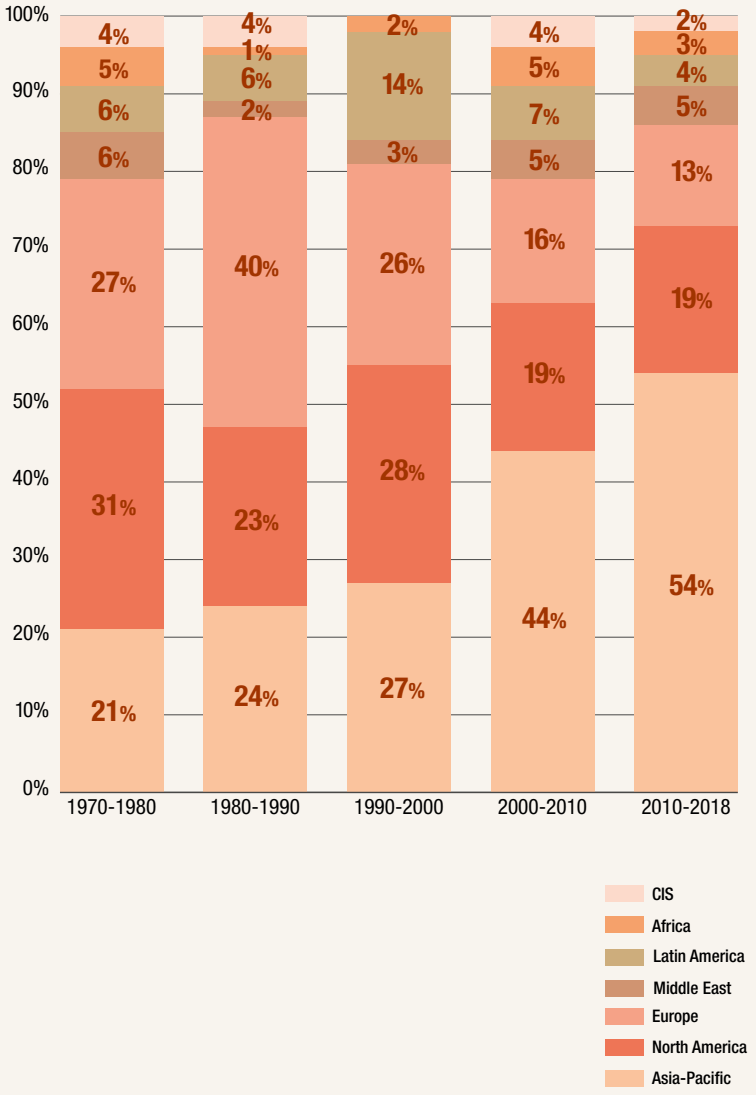
ASIA-PACIFIC, THE NEW RECENT "WORLD ECONOMIC GROWTH" ENGINE

Source: IHS Markit, Airbus

ADDED ECONOMIC VOLUME (REAL GDP)



SHARE OF ADDED ECONOMIC VOLUME (REAL GDP)



TRENDS

We have often said that the middle-class is an important socio-economic group in terms of air travel. From all the regions the transition of people to the middle class is the most impressive in terms of the speed of transition, share, but also in the sheer number of people. In 2008, 32% or 1.2 billion people in Asia-Pacific's could be considered middle-class. By 2018, this had grown to nearly 50% or 2 billion people and by the end of or forecast in 2038, this is projected to grow still further to 72% or 3.3 billion people.

As this picture of increasing wealth has developed, so too has the importance of the region for air travel. Twenty years ago Asia-Pacific's share of capacity (ASKs) was 23%, since then it has grown on average 6.5% per annum, significantly faster than Europe and North America. In 2018, Asia-Pacific is the largest region, with a third of all air travel capacity focused here.

Asia-Pacific Middle Class**
expected to represent
72%
of Asia-Pacific population by
2038

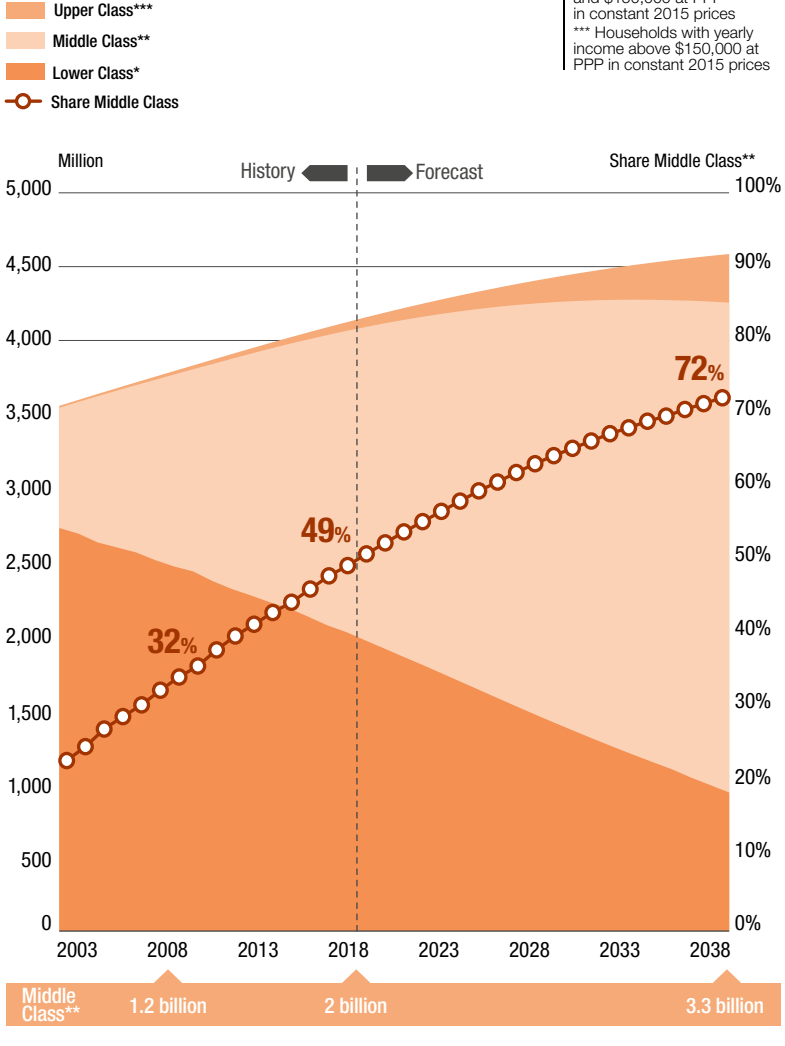
MIDDLE CLASS EXPECTED TO GROW FROM 2 BILLION PEOPLE TODAY TO 3.3 BILLION PEOPLE BY 2038**

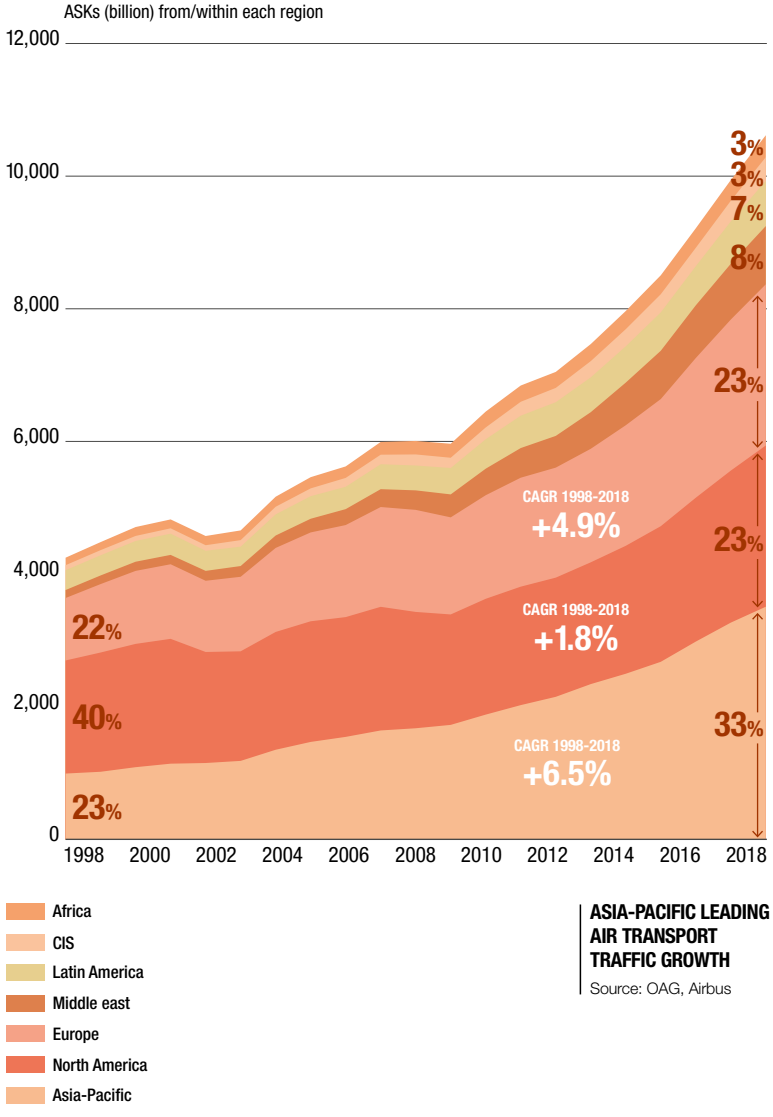
Source: Oxford Economics, Airbus

* Households with yearly income between $0 and $20,000 at PPP in constant 2015 prices

** Households with yearly income between $20,000 and $150,000 at PPP in constant 2015 prices

*** Households with yearly income above $150,000 at PPP in constant 2015 prices

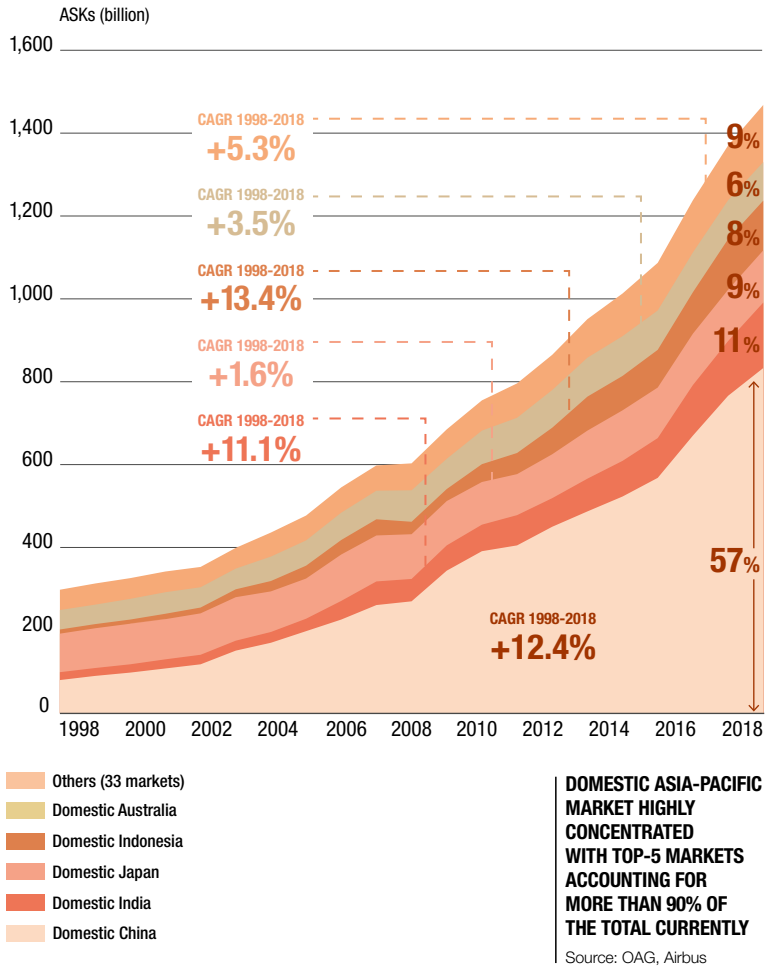




ASIA-PACIFIC LEADING AIR TRANSPORT TRAFFIC GROWTH

Source: OAG, Airbus

Over that time the importance of traffic within the region has grown, particularly domestic traffic i.e. traffic within individual countries. Since 1998, this has grown from 22% to 33%, together with other traffic in the region accounts for nearly 60% of all Asia-Pacific's traffic.



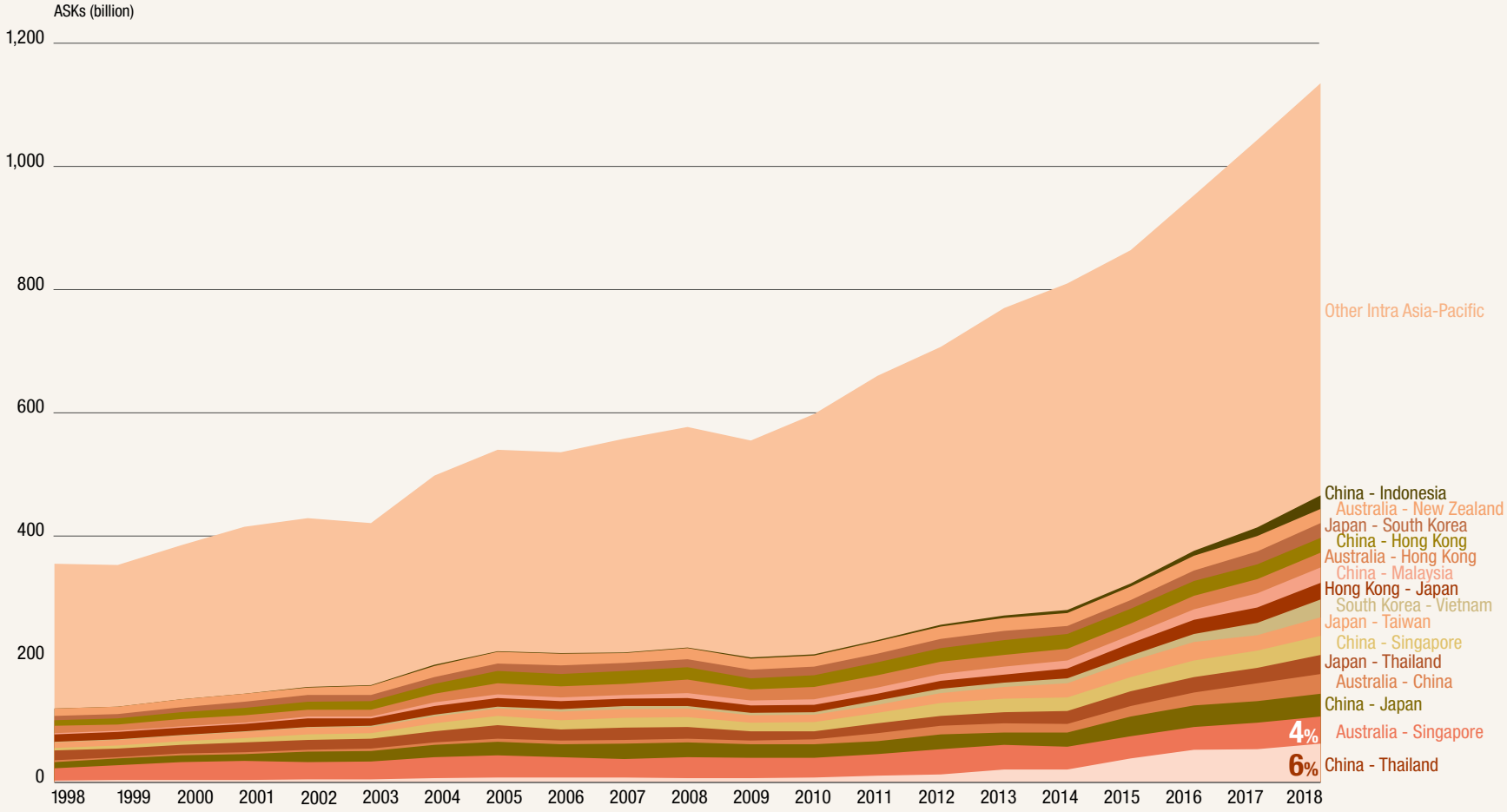
DOMESTIC ASIA-PACIFIC MARKET HIGHLY CONCENTRATED WITH TOP-5 MARKETS ACCOUNTING FOR MORE THAN 90% OF THE TOTAL CURRENTLY

Source: OAG, Airbus

For domestic traffic, China, with a 57% share, and India 11%, are the dominant markets. Both markets have grown at impressive rates over the last 20 years, with annual growth rates of 12.4% and 11.1% respectively. Japan, Indonesia and Australia follow, but even their growth rates have been very strong compared to the global level. For the intra-regional traffic that is that performed between Asia-Pacific countries the story is quite different, with a much more fragmented market. Without looking at the data, it would have been hard to guess that the largest flow would have been between China and Thailand for example.

STRONG GROWTH OF HIGHLY FRAGMENTED INTRA ASIA-PACIFIC MARKET

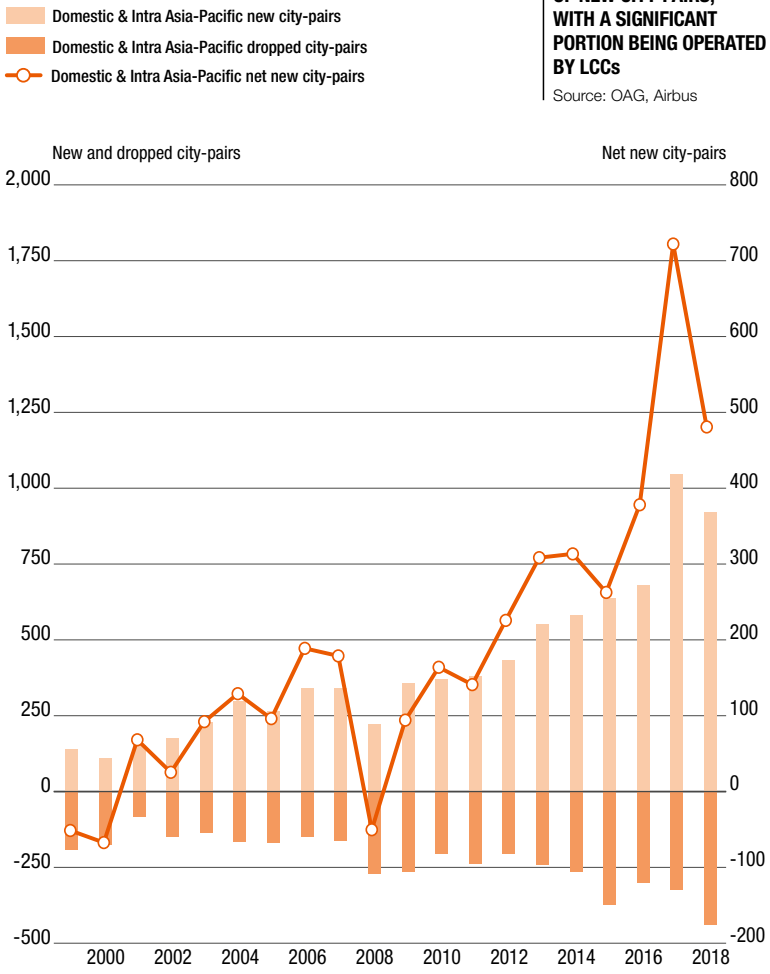
Source: OAG, Airbus



As in Europe, growth within Asia-Pacific has been stimulated by new routes being opened by the regions airlines. Whilst LCCs have played an important role, other airlines have played a greater role than in Europe. In 2018, Asia-Pacific airlines opened more new operations within their region than any other.

INTRA AND DOMESTIC ASIA-PACIFIC MARKETS HAVE BEEN STIMULATED BY THE ADDITION OF NEW CITY-PAIRS, WITH A SIGNIFICANT PORTION BEING OPERATED BY LCCs

Source: OAG, Airbus

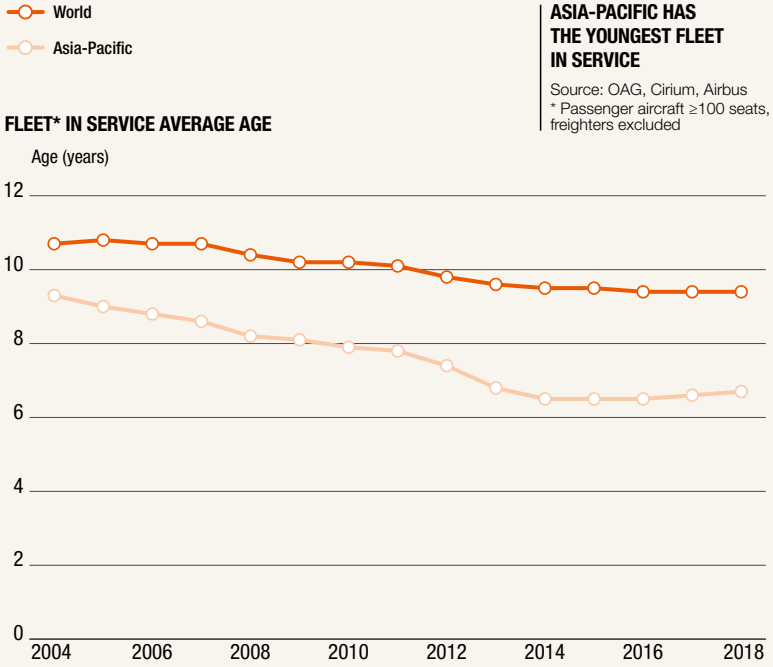


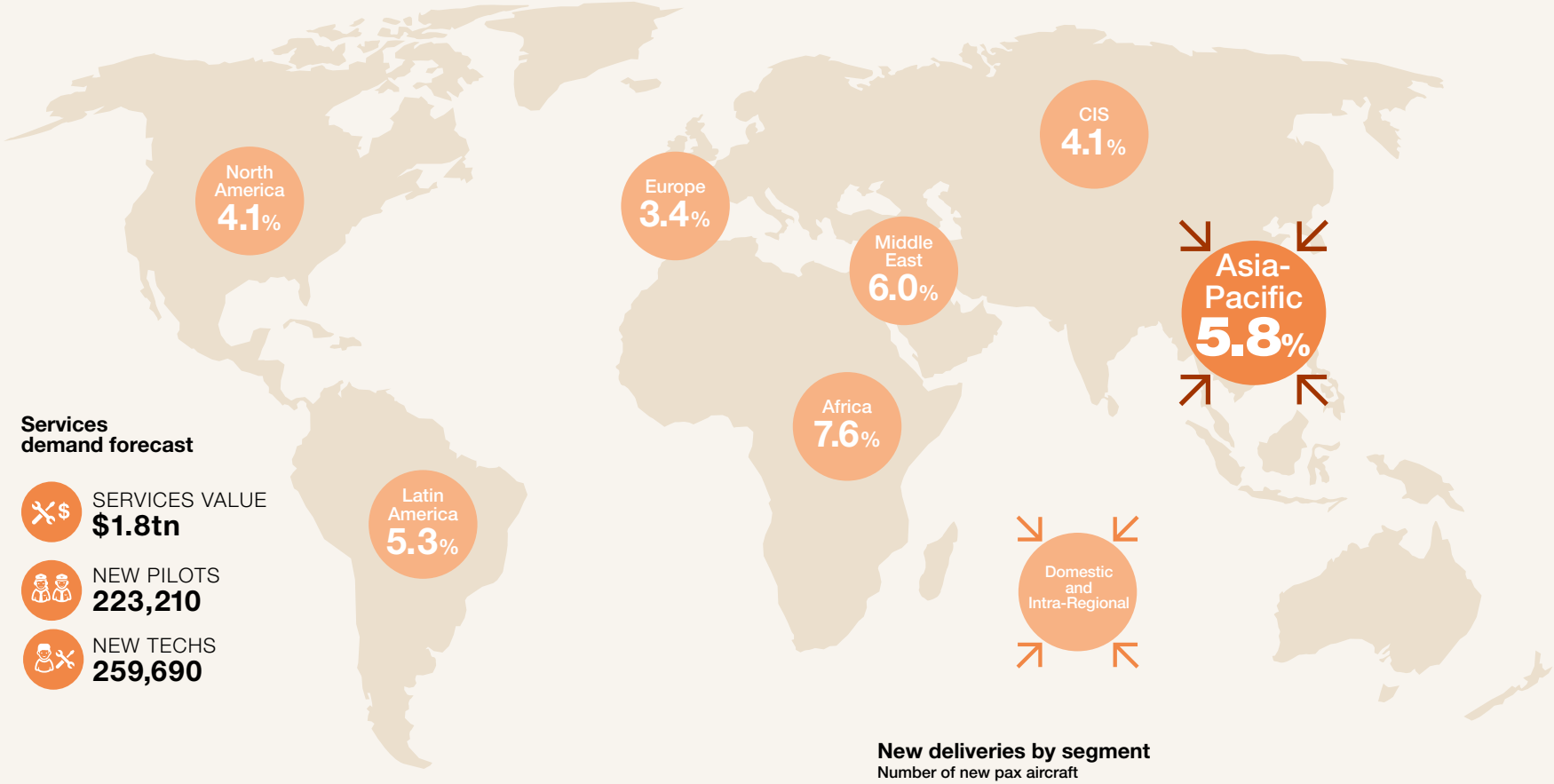
In terms of international traffic to and from the region, North America, the Middle East and Europe are the most significant with a share in 2018, of 32%, 32% and 29% respectively. Traffic to the Middle East has grown the fastest over the last 20 years, at 12% per annum, as airlines from this region expanded their operations connecting the east with the West.

ASIA-PACIFIC HAS THE YOUNGEST FLEET IN SERVICE

Source: OAG, Cirium, Airbus
* Passenger aircraft ≥100 seats, freighters excluded

FLEET* IN SERVICE AVERAGE AGE





Services demand forecast

SERVICES VALUE **$1.8tn**

NEW PILOTS **223,210**

NEW TECHS **259,690**

Economy**

Real Trade 4.1%

Real GDP **4.1%**

Traffic**

Intra-regional & domestic 5.8%

Inter-regional 4.6%

Total traffic **5.4%**

Fleet*

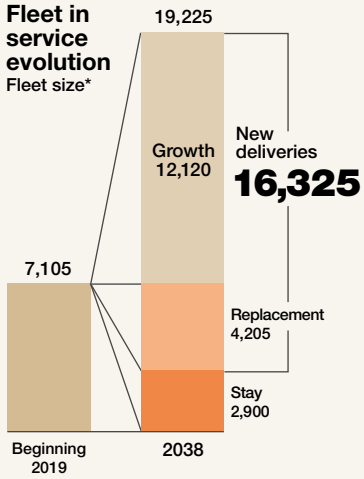
Fleet in service 2019 7,105 2038 19,225

20 year new deliveries **16,325**

* Passenger aircraft ≥100 seats
** 2018-2038 CAGR

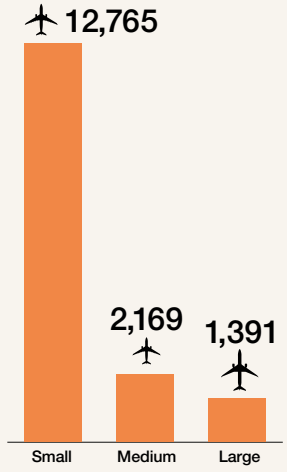
Fleet in service evolution

Fleet size*

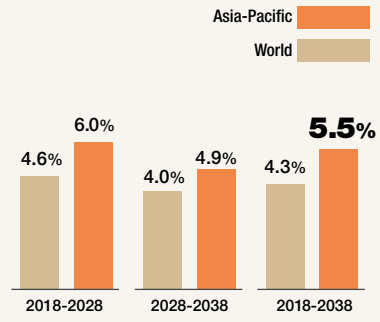


New deliveries by segment

Number of new pax aircraft



Total RPK traffic growth



Europe

ECONOMY

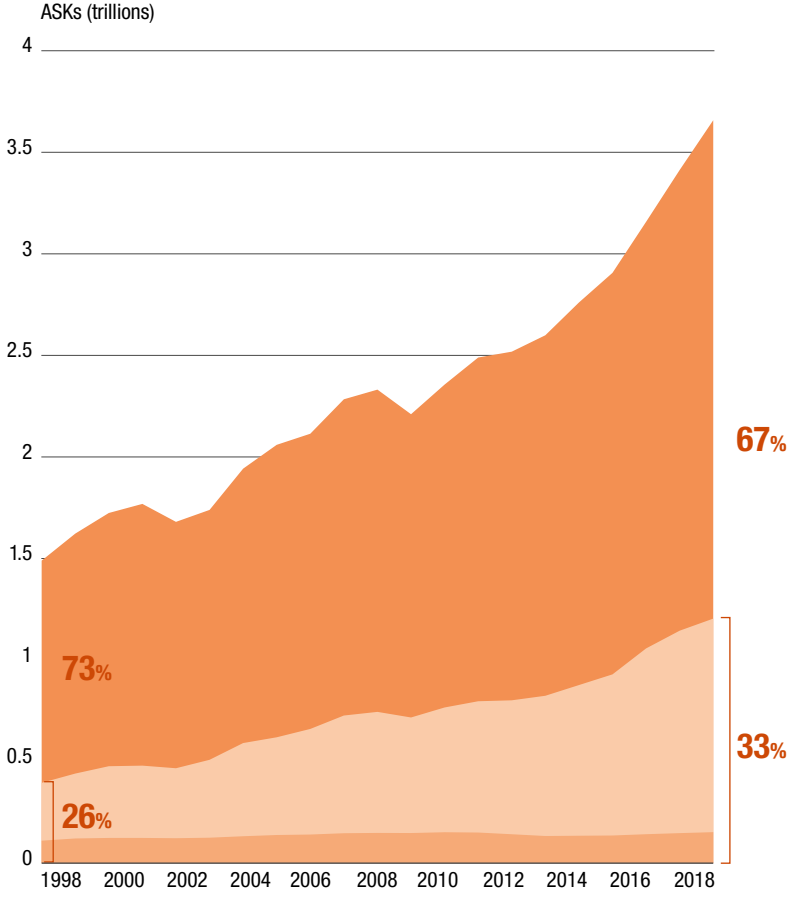
- European economic growth is being sustained by monetary stimulus, better access to credit, reduced fiscal headwinds, and rising consumer and business confidence.
- Political uncertainty remains high as a consequence of indecisive past and future elections, Brexit impact and escalation in trade protectionism.
- The Eurozone faces long term challenges such as fiscal and financial union as well as the need for structural reforms on labour, pensions and market liberalisation.
- Real GDP is expected to grow at **+1.5%** per year in the 2018-2038 period, influenced by evolving demographics in Europe.

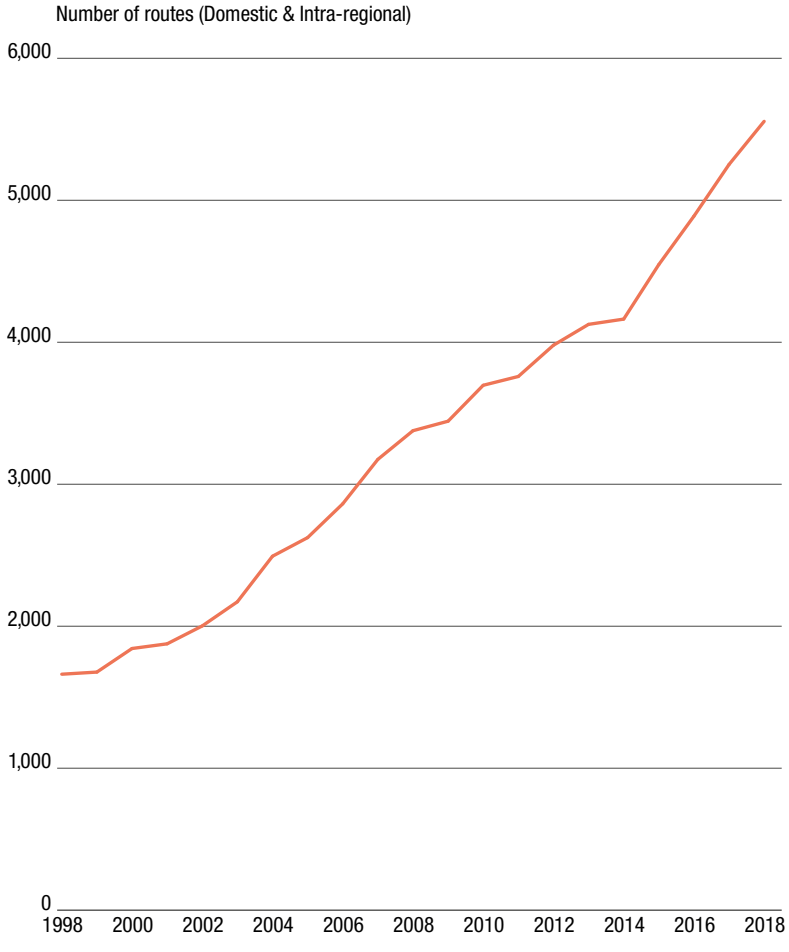
TRENDS

Over the last 20 years, the European market has continued to grow. Whilst international growth has been strong at 4.1% per annum, the traffic within Europe has grown 5.7% a year, and grown its share 6 percentage points to a third of all capacity flying to, from and within Europe in 2018.

EUROPEAN DOMESTIC & INTRA-REGIONAL TRAFFIC HAS GROWN ITS SHARE

Source: OAG. GMF 2019

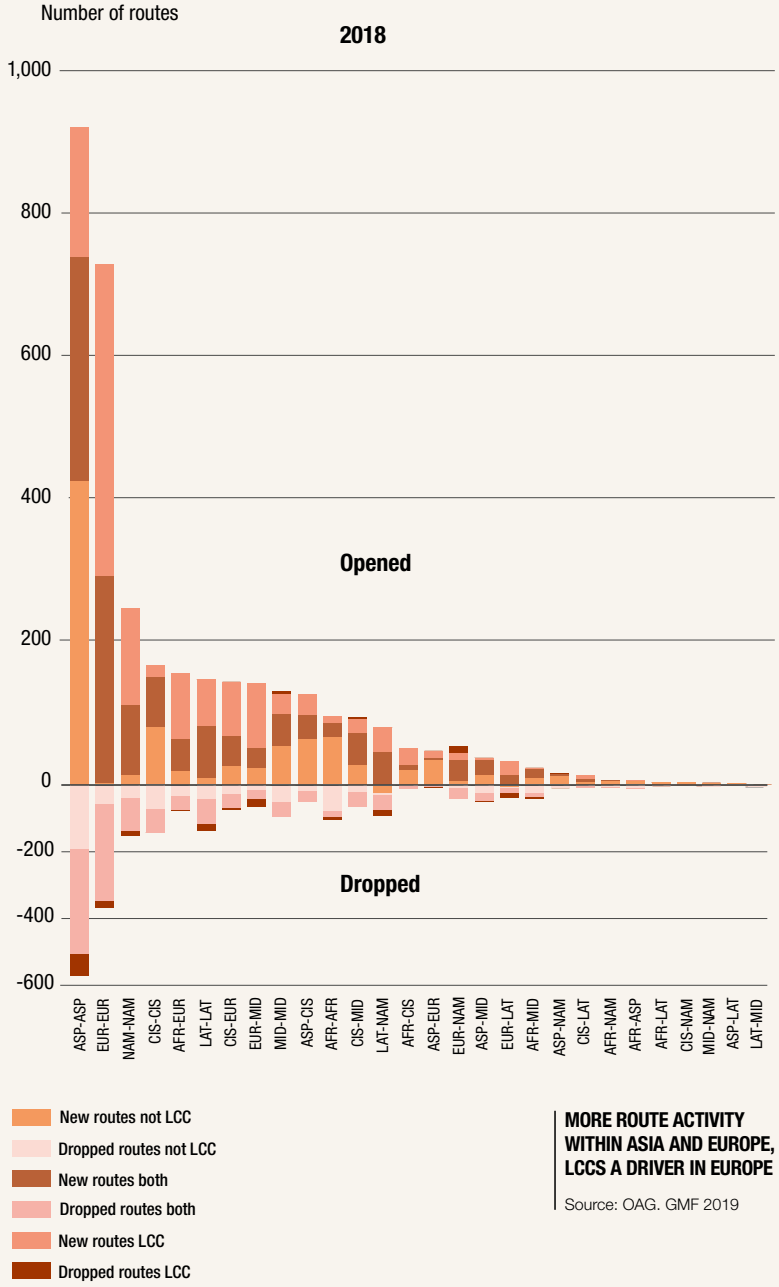




One factor explaining this evolution is the growth in the number of new routes that have been opened between European destinations over that period. These have more than trebled from about 1,600 in 1998 to more than 5,500 in 2018. A significant part of the explanation for this expanded network has been the growth in LCC operations. Europe together with Asia has had the largest number of new route opening (and closure). Taking 2018, for example these two regions were responsible for some 1,600 new routes. However, in Asia the proportion opened by LCCs is much lower than Europe.

BENEFITS OF AIR TRANSPORT MORE ACCESSIBLE IN EUROPE TODAY THAN 20 YEARS AGO

Source: OAG. GMF 2019



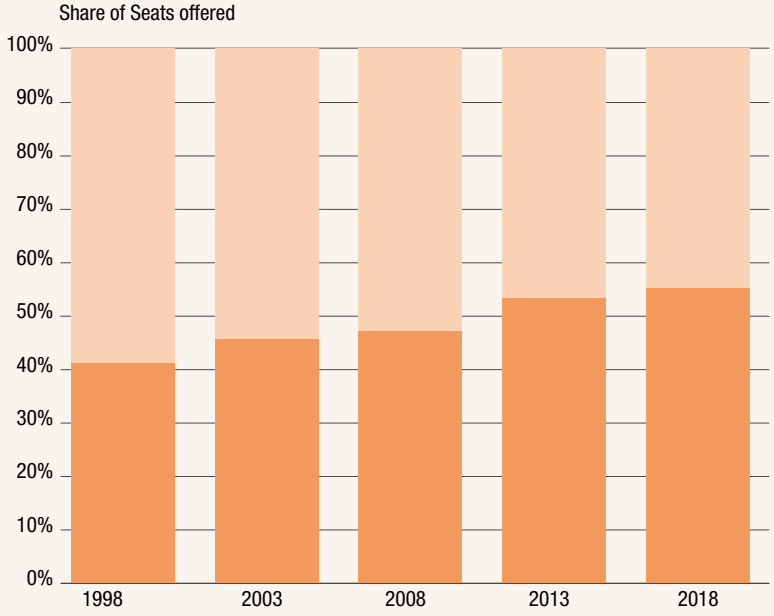
MORE ROUTE ACTIVITY WITHIN ASIA AND EUROPE, LCCS A DRIVER IN EUROPE

Source: OAG. GMF 2019

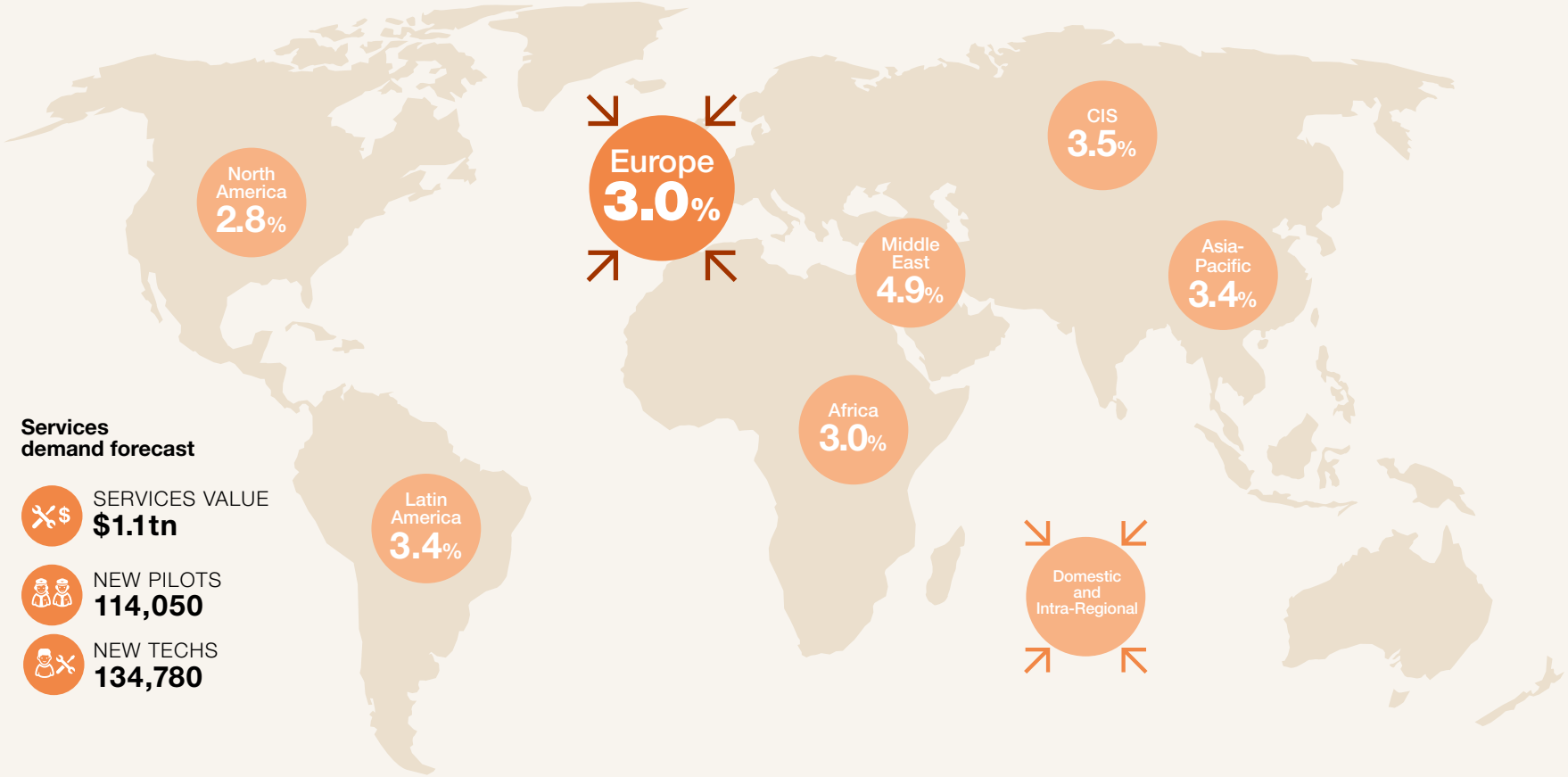
FOR TRAFFIC WITHIN EUROPE A COMBINATION OF 5 LCC AND AIRLINE GROUPINGS HAVE GROWN THEIR EUROPEAN SHARE

Source: OAG. GMF 2019

Note: Five airlines are EZY, RYR, IAG, AFRKLM, LH Group
Excludes regional aircraft



Just looking at traffic within Europe, this time in terms of seats offered, the rise of LCCs combined with the main European airline groupings has led to a gradual consolidation within the market. Twenty years ago ~40% of the seats were offered by large LCCs and airline groupings in Europe, in 2018 the share had increased to about 55%.



Services demand forecast

SERVICES VALUE
$1.1tn

NEW PILOTS
114,050

NEW TECHS
134,780

Economy**

Real Trade 2.6%

Real GDP **1.5%**

Traffic**

Intra-regional & domestic 3.0%

Inter-regional 3.4%

Total traffic **3.3%**

Fleet*

Fleet in service

2019 4,870

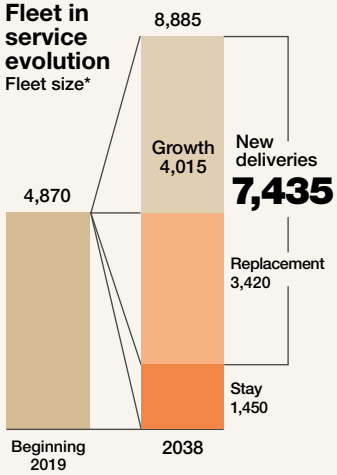
2038 8,885

20 year new deliveries **7,435**

* Passenger aircraft ≥100 seats
** 2018-2038 CAGR

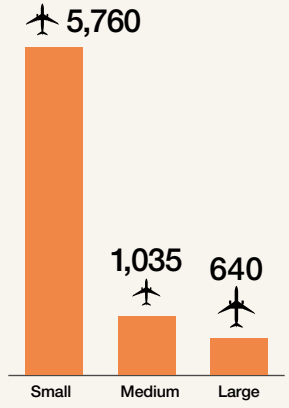
Fleet in service evolution

Fleet size*

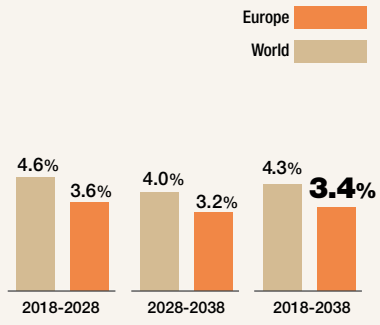


New deliveries by segment

Number of new pax aircraft



Total RPK traffic growth



North America

ECONOMY

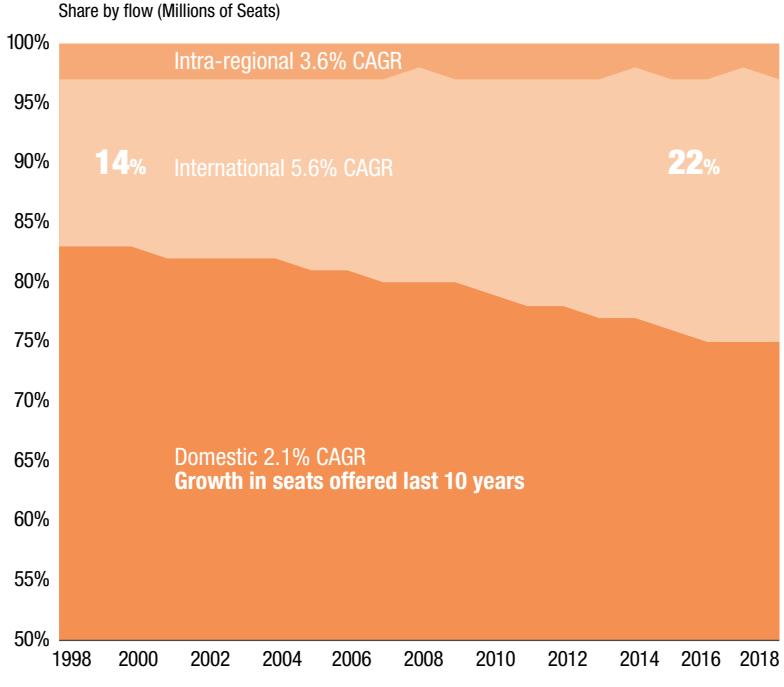
- US economic expansion is becoming more balanced, with consumer spending, residential construction, business fixed investment and government spending all contributing to sustained economic growth.
- Consumer spending is driving current US expansion, supported by growth in employment and real incomes.
- Business investment is expected to continue to benefit from expanding global markets, an easing of regulatory policies, and a more competitive tax environment.
- North American real GDP growth are expected to hold up fairly well in the long term with an average **+1.9%** per year in the 2018-2038 period.

TRENDS

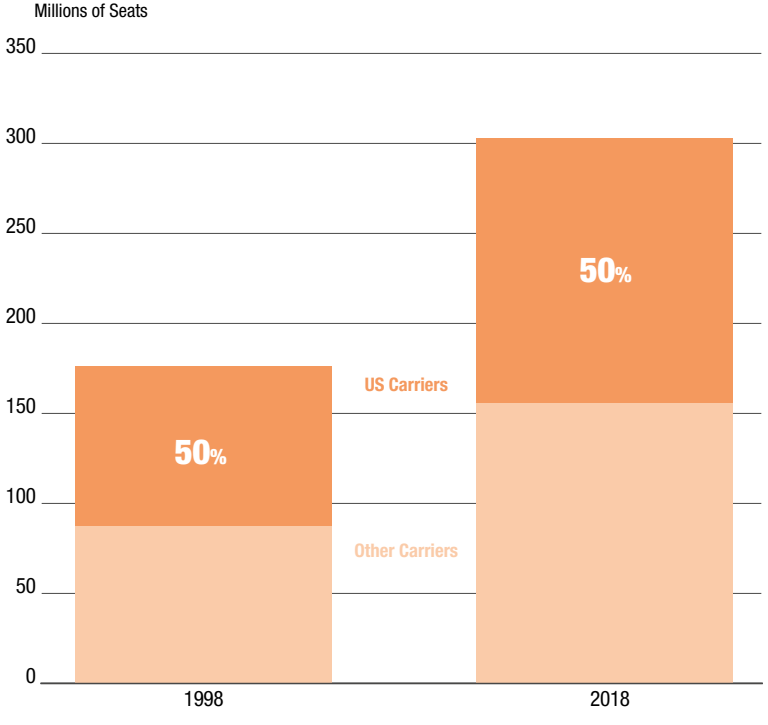
North America is home to some of the World's largest air passenger traffic flows, including the largest today, the US Domestic market. Twenty years ago, more than 80% of the seats offered were on domestic markets. Today, whilst the domestic market has grown, its overall share has decreased to 75%. This change has largely resulted from the increasing importance of the North American international market which now represents 22% of the seats offered to and from the region. The growth on international markets over the last ten years was also higher than domestic and intra-regional markets with 5.6% AAGR compared to 2.1% and 3.6% respectively.

IN NORTH AMERICA INTERNATIONAL TRAFFIC SHARE HAS GROWN

Source: OAG, GMF 2019



Since 1998, the North American carrier share of seats offered to and from the region has been relatively stable. Whilst there was some fluctuation, with North American carriers reaching around 54%, interestingly around the time of the last financial crisis, their share is roughly the same today as twenty years ago.



NORTH AMERICAN CARRIER SHARE OF SEATS TO AND FROM THE REGION HAS BEEN STABLE

Source: OAG, GMF 2019

As in other regions, airport infrastructure and capacity constraints are never far from the minds of regulators, airlines and indeed passengers. However, a number of airport improvement projects are underway in the region. According to CAPA, there are over 180 projects or 19% of the global total, valued at around USD$128 billion or 23% of the total. However, activity in the building of new airports is lower, with three new airport construction projects in North America now out of 219 worldwide.

With the growth in international traffic it is not surprising that some of these airport developments are focused on improving international facilities. At LAX two of the region's largest airlines have launched billion dollar plus programmes to improve their facilities at the airport. Asked why the investment, one airline executive responded "Los Angeles is an important gateway for international travelers, especially visitors from Asia." His carrier has in the region of 200 daily flights to 68 destinations on five continents from LAX today.

Airport	Current known capex (USD billion)	Known or estimated completion date
Atlanta	10.0	2025
Baltimore-Washington	1.5	2020
Boston	1.2	2019
Charlotte Douglas	2.3	2035
Chicago O'Hare	15.0	2026
Dallas Fort Worth	3.3	2022
Detroit	1.6	2020
Fort Lauderdale	1.3	2019
Hollywood Burbank	1.2	2025
Honolulu	2.7	2022
Houston GB	1.4	2022
Columbus	1.3	2020
Kansas City	1.4	2021
Los Angeles LAX	16.0	2023
Minneapolis	1.6	2020
New York JFK	2.0	2020
New York Newark	2.5	2026
New York La Guardia	5.1	2024
Orlando	2.9	2021
Philadelphia	7.5	2023
Pittsburgh	1.1	2023
Raleigh Durham	2.7	2040
Salt Lake City	2.9	2025
San Diego	2.1	2022
San Francisco	4.4	2023
Seattle	2.7	2033
Tampa	4.2	2023
Washington Dulles	2.3	2019
MEDIAN COMPLETION DATE		**2023-2024**

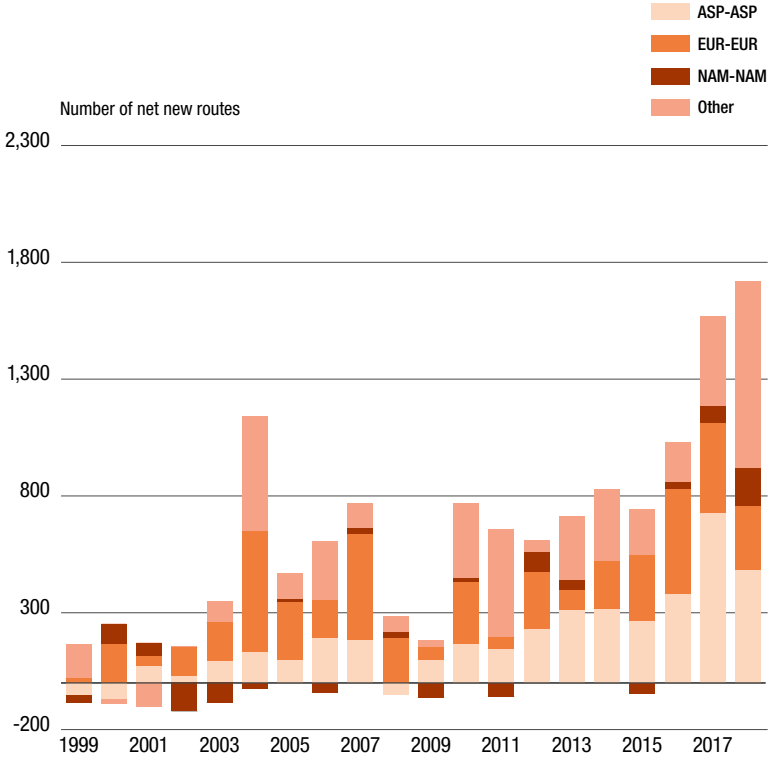
US AIRPORT UPGRADE PROJECTS ARE UNDERWAY

Source: CAPA Airport Database, GMF 2019

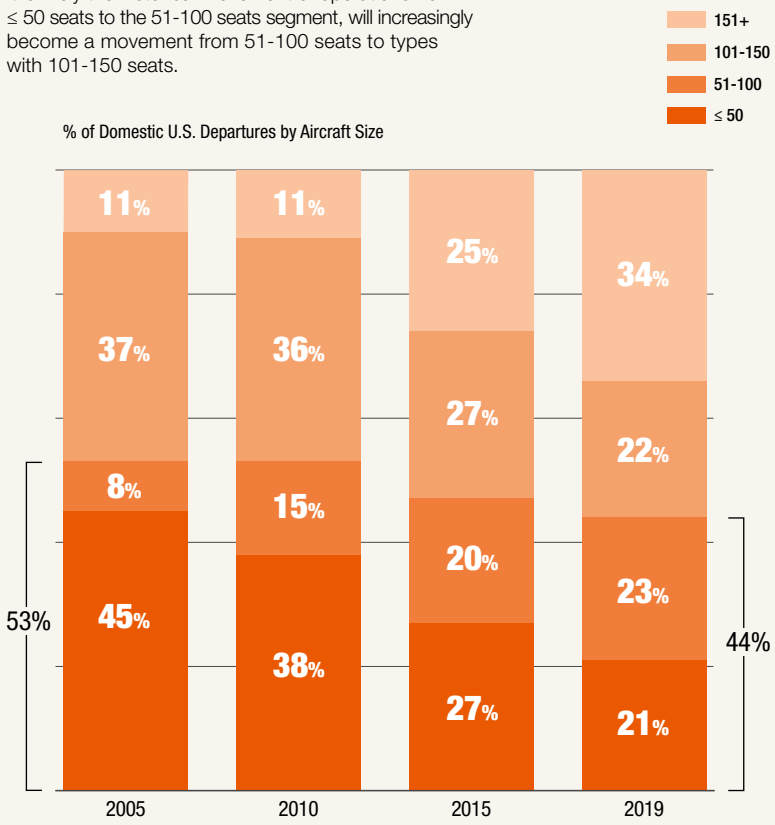
The domestic and intra-North American market has grown largely organically i.e. growth on existing city pairs compared to other regional markets where the opening of new routes has been far more significant. This is particularly true in Europe and Asia-Pacific. In Europe, this has been through the growth in LCC operations and in Asia largely through the development of domestic markets in India and China. As a side point it is interesting to note that the level of new route opening is significantly lower during downturns as airlines consolidate their networks and minimise risk.

NORTH AMERICA HAS SIGNIFICANTLY LESS NEW ROUTE OPENING THAN EUROPE OR ASIA-PACIFIC

Source: OAG, GMF 2019
Note: Can include routes that were dropped and re-opened

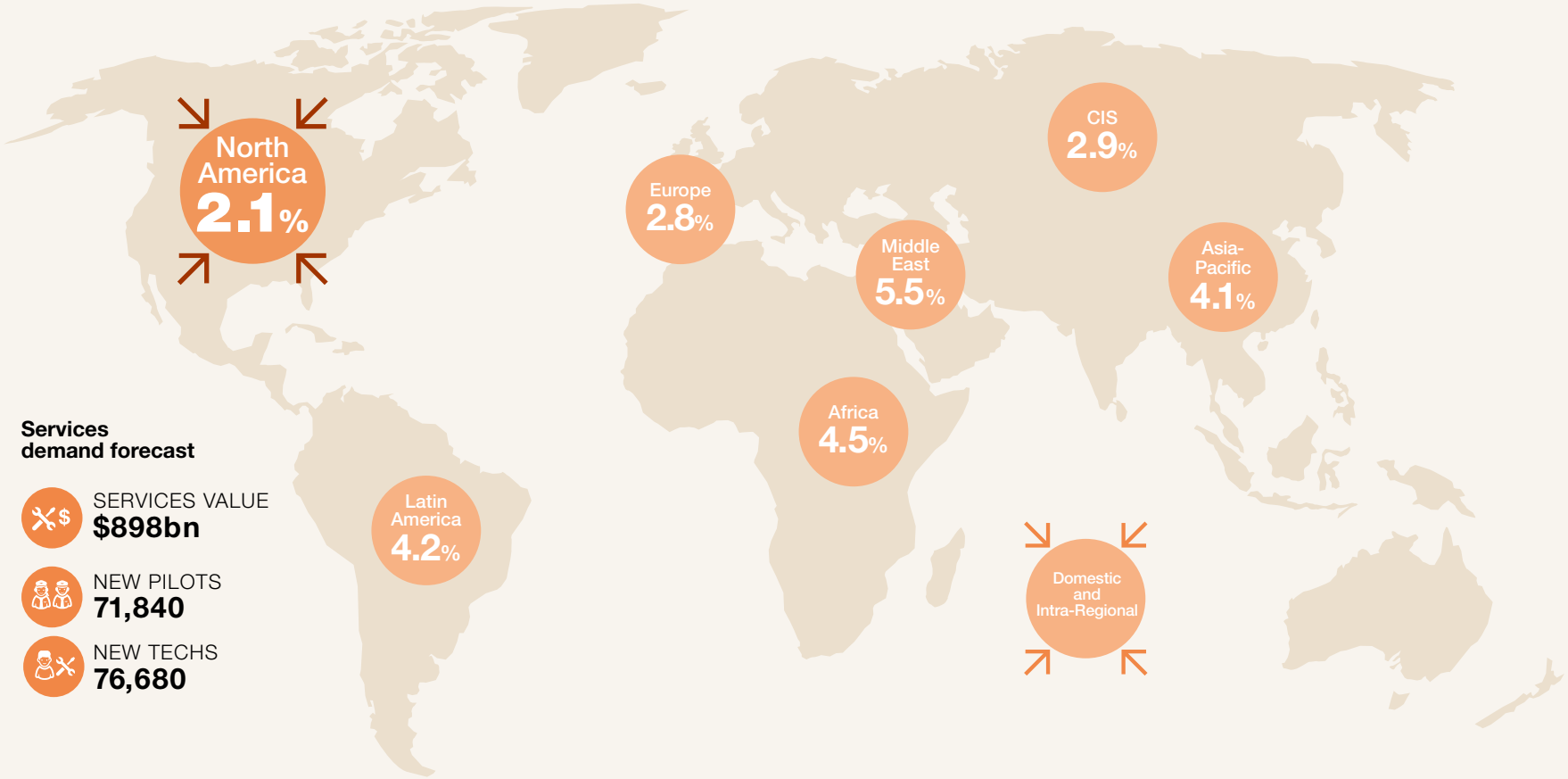


On the US Domestic market, which is a significant part of the North American market, this organic growth has led to growing average aircraft size over time. Data from A4A shows this trend well. In 2005, just over 50% of the aircraft operated domestically in the US were less than 100 seats. Today, some 56% of the aircraft operated are over 100 seats. The biggest positive net gain has been in the 150+ seat category which has grown from 11% of departures to 34% over the last 20 years, a tendancy expected to continue. In addition, as organic growth continues into the future, it is likely the historical movement of operations from ≤ 50 seats to the 51-100 seats segment, will increasingly become a movement from 51-100 seats to types with 101-150 seats.



AVERAGE AIRCRAFT SIZE GROWING ON US DOMESTIC OPERATIONS

Source: A4A, GMF 2019



Services demand forecast

SERVICES VALUE
$898bn

NEW PILOTS
71,840

NEW TECHS
76,680

Economy**

Real Trade 3.2%

Real GDP **1.9%**

Traffic**

Intra-regional & domestic 2.1%

Inter-regional 3.6%

Total traffic **3.0%**

Fleet*

Fleet in service

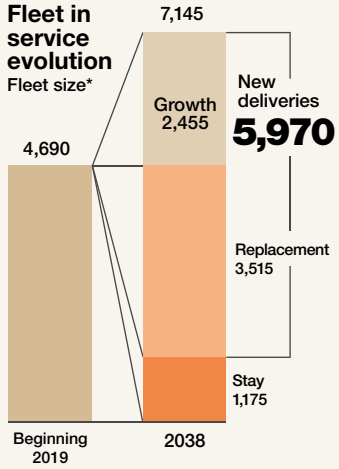
2019 4,690 — 2038 7,145

20 year new deliveries **5,970**

* Passenger aircraft ≥100 seats
** 2018-2038 CAGR

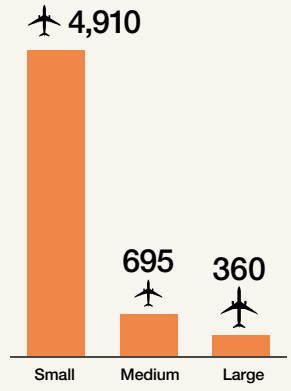
Fleet in service evolution

Fleet size*

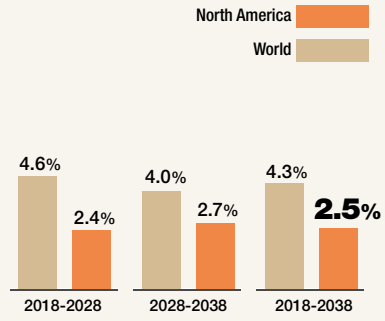


New deliveries by segment

Number of new pax aircraft



Total RPK traffic growth



Middle East

ECONOMY

- Unstable oil revenues, fiscal tightening, and regional political instability has impacted Middle East economic growth.
- The region shifted from current-account surpluses to deficits, but a return to surplus is expected in the medium term as oil prices recover.
- Middle East economic outlook remains supported by its substantial petroleum resources, proximity to energy-hungry Asian economies, growing tourism potential and strategically important geopolitical location.
- The Middle East region's real GDP is expected to grow at **+2.9%** per year over the next 20 years.

TRENDS

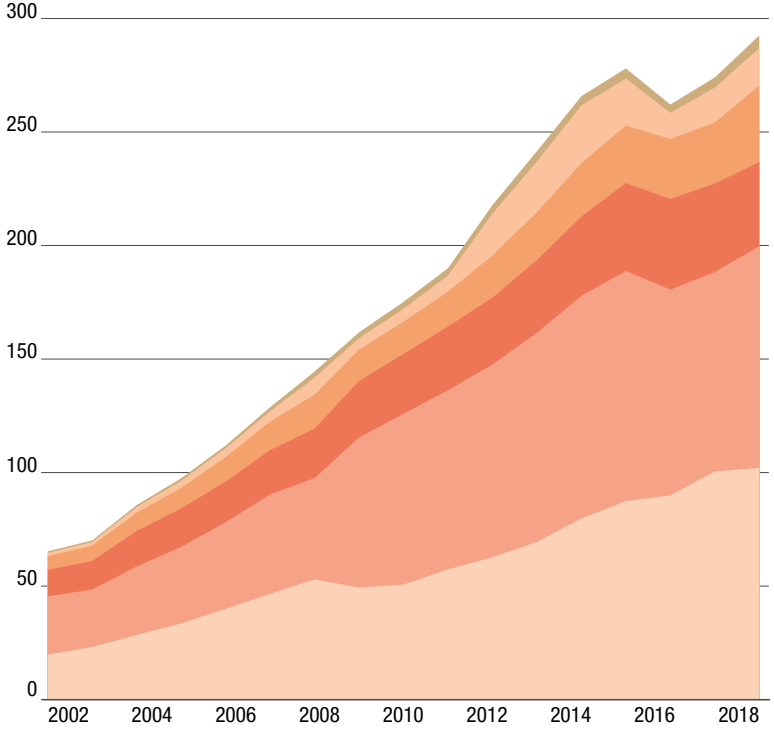
It is well known that the region has been able to benefit from its geographical location over hundreds and even thousands of years, being on the pathway between east and west, routes for both trade and for the movement of people over the years. This fact has meant that in the modern era bustling sea ports in the region have been complemented by airports, a number of which have become impressive aviation hubs. Today, there are 5 aviation mega-cities in the region, by 2038, we forecast that there will be 11. These developments can be seen from origin and destination data for in bound and out bound traffic growth for the Middle East, which are equally impressive. For example inbound traffic to the region grew nearly 10% per annum between 2002 and 2018, and both resilient to a number of global crisis over that period, especially when compared to other regions.

Latin America
CIS
Africa
North America
Europe
Asia-Pacific

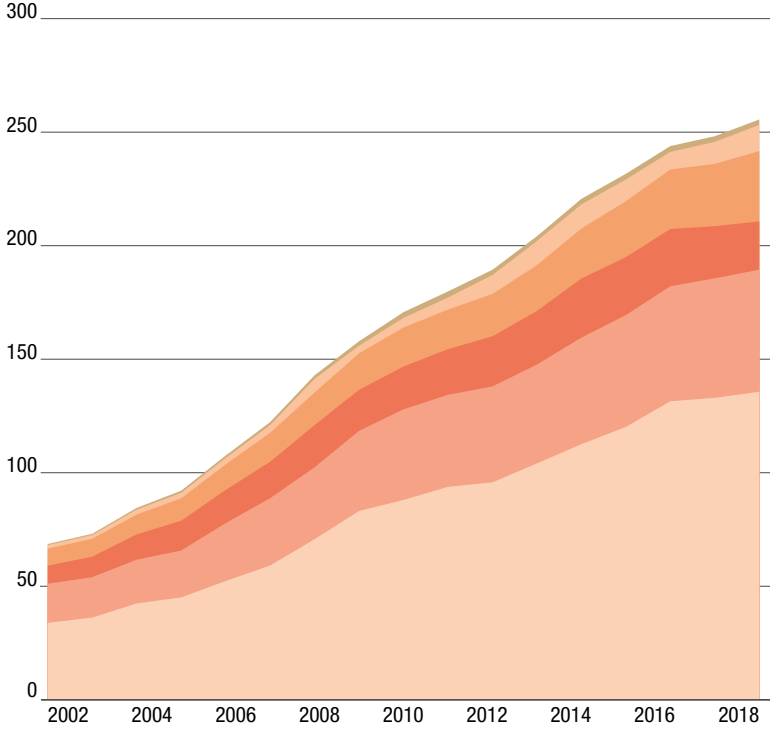
OUTBOUND TRAFFIC FROM MIDDLE EAST IS MORE RESILIENT TO CRISIS

Source: Airbus GMF, Sabre

Inbound traffic (RPK) to Middle East (billions)



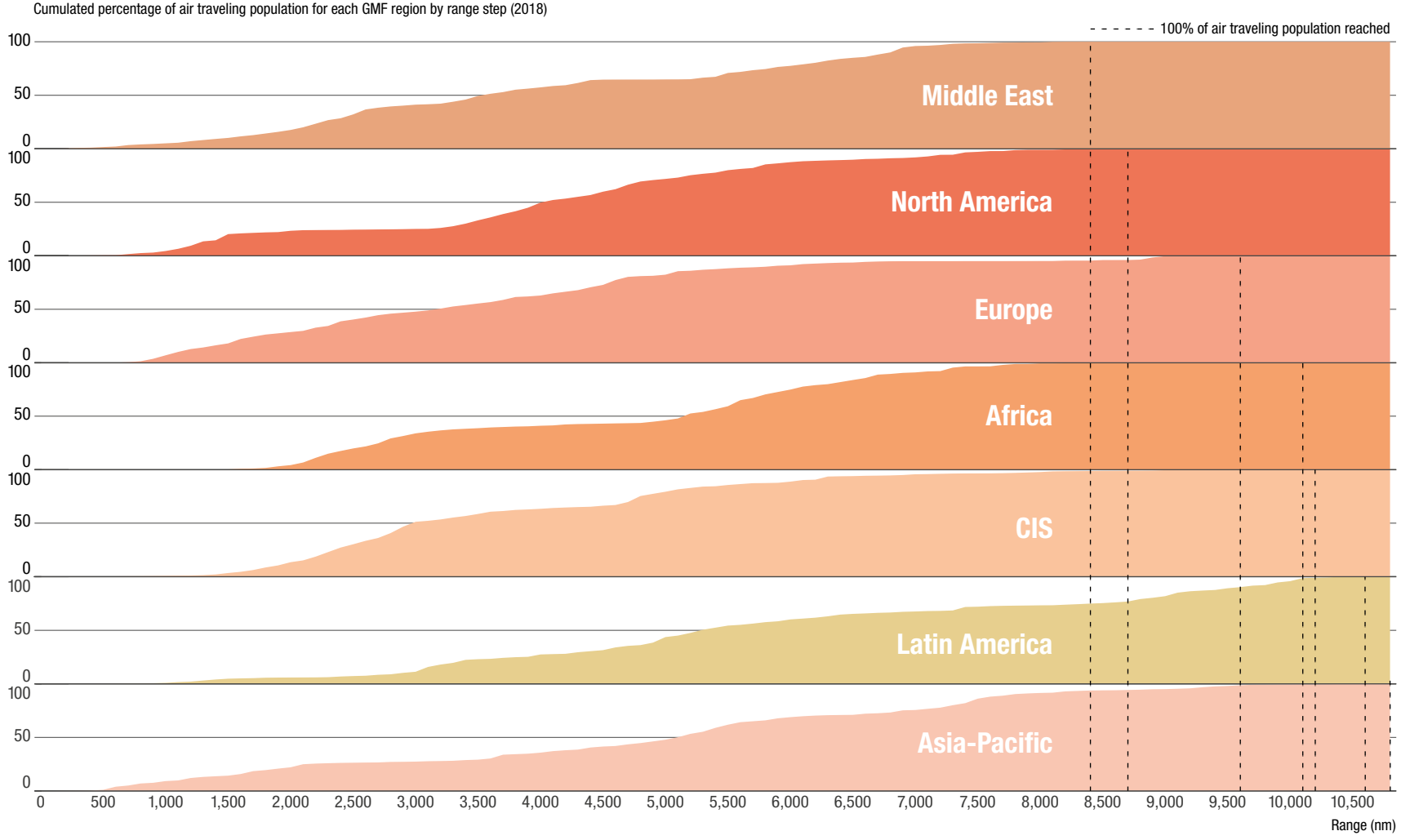
Outbound traffic (RPK) from Middle East (billions)

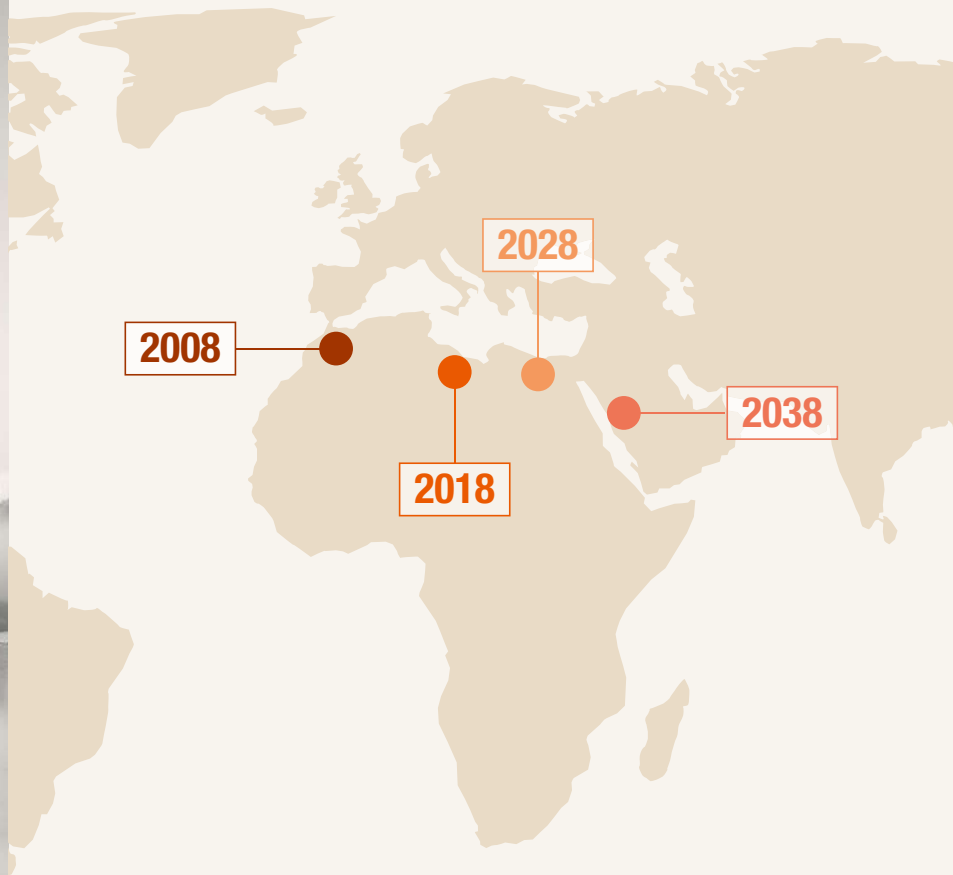


More than being a cross roads, the region is also well located in terms of people and wealth. Plotting global population against regions the Middle East is closest to the World's travelling population. In fact 100% are within 8,400nm.

100% OF AIR TRAVELLING POPULATION IS REACHED AT 8,400NM FROM MIDDLE EAST

Source: Airbus GMF, Oxford Economics, IHS Markit





MIDDLE CLASS* CENTRE OF GRAVITY MOVING SOUTH AND EAST

Source: Oxford Economics, Airbus

* Households with yearly income between $20,000 and $150,000 at PPP in constant 2015 prices

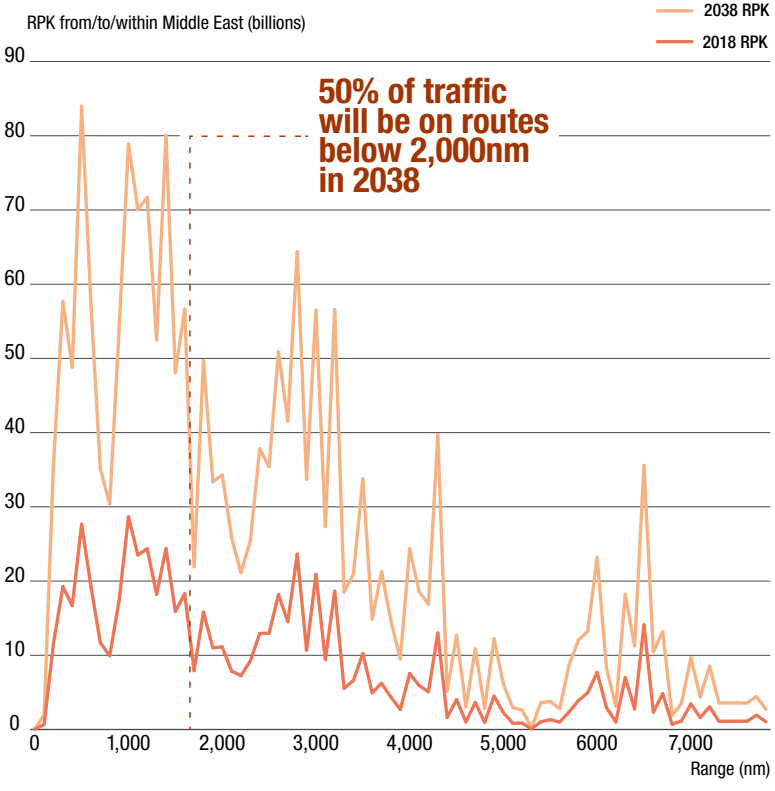
In terms of wealth, we have often mentioned the increasing number of middle classes in various region's as a driver for aviation growth. If the centre of gravity for the global middle class is calculated it should not be a surprise that this too shows the Middle East's favourable position, a position which is set to improve over our forecast period.

Another trend in evidence in the region is the growth in LCCs which grew seat capacity more than 12% in 2018. European LCCs have begun opening routes into the region including into Jordan and the Lebanon. Codeshare activity between at least one European LCC and a Middle Eastern carrier is another development. This is not to mention indigenous LCCs which are rapidly growing in terms of their size and operations.

When we examine our 20 year traffic forecast, 50% of traffic measured in RPKs is forecast to be below 2000nm, fertile territory for the LCC business model. With the increasing range capability of the latest single variants a further significant tranche of traffic will also become increasingly accessible.

THE MIDDLE EAST MUCH MORE THAN A BIG LONG-HAUL HUB?

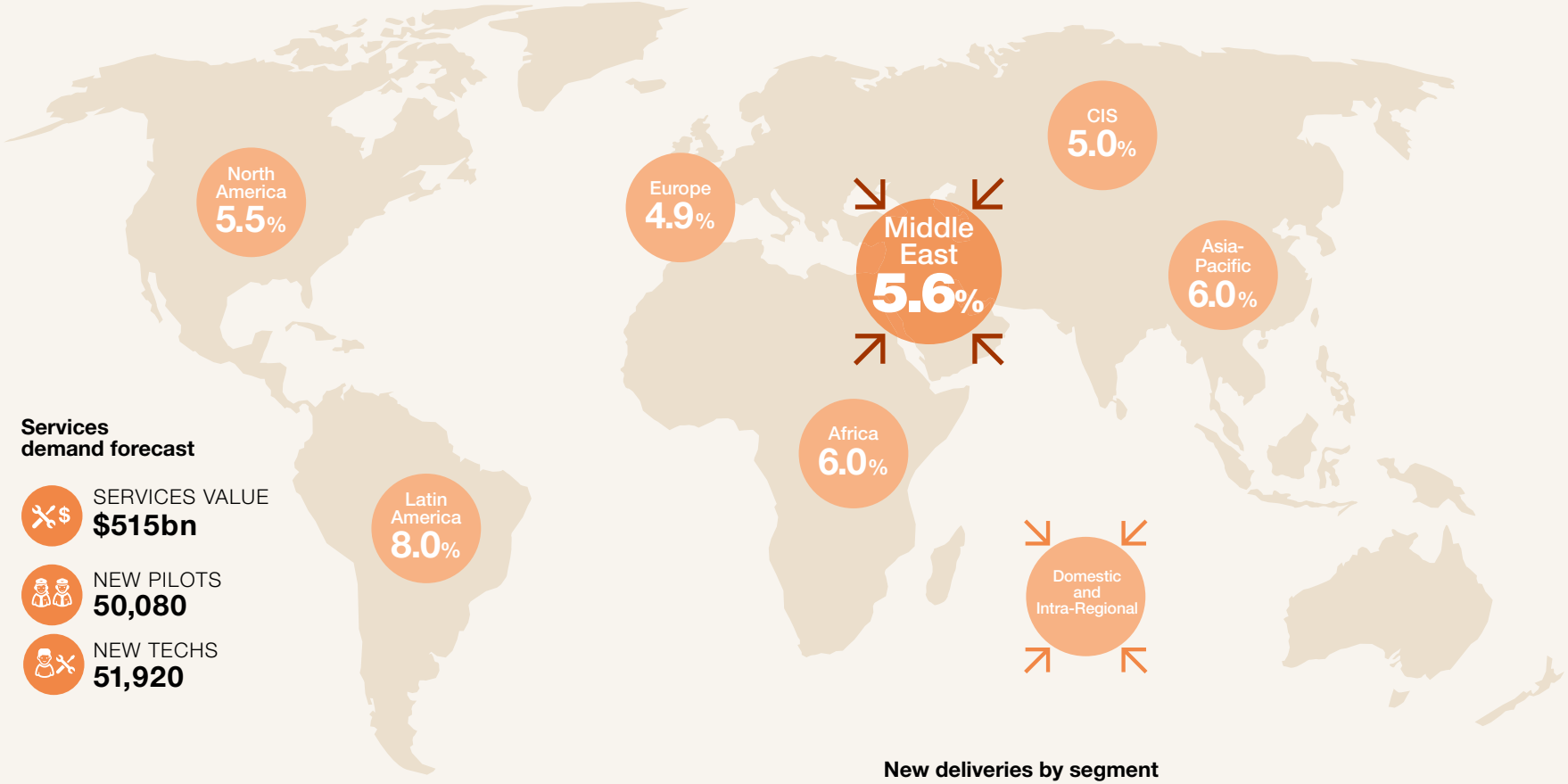
Source: Airbus GMF



Tourism to the Middle East is also expected to be a continuing driver, with growth in 2018 more than 10%, consolidating its 2017 recovery, with international tourist arrivals reaching 64 million. Airports in the region have/are being developed in part to accommodate increased numbers of tourists and importance of tourism to Middle Eastern economies.

A good case study is Salalah in Oman which is intent in growing its tourism market. It is interesting as a location as it appeals to visitors from the region during Khareef season (June 21st – September 21st). When many western tourists are looking for sun, sand and sea during their summer breaks, some in the region are keen to escape the seasonal high temperatures that can be experienced in the Middle East at this time. This is due to the fact that Salalah has a famously cool and refreshing climate during this period, benefiting from weather systems coming from India at this time. It can also benefit from visitors in the "winter" months as northern Europeans travel eager to escape climatic extremes of their own at this time of year.

According to statistics from the National Centre for Statistics and Information (NCSI), the total number of tourists who visited Salalah in 2018 was 826,376, an increase of 28.1% in comparison to 2017. Infrastructure to support this growth has taken place over recent years in Salalah. Its airport growing to a four stage plan, with the first stage completed in 2014, and today the new terminal building which has a gross floor area of 65,638 m^2 and features seven boarding bridges. In terms of accommodation, there are 34 hotels with 4,115 hotel rooms and 6,312 beds available to receive tourists during the current tourist season; this includes seven new hotels.



Services demand forecast

SERVICES VALUE
$515bn

NEW PILOTS
50,080

NEW TECHS
51,920

Economy**

Real Trade 3.4%

Real GDP **2.9%**

Traffic**

Intra-regional & domestic 5.6%

Inter-regional 5.6%

Total traffic **5.6%**

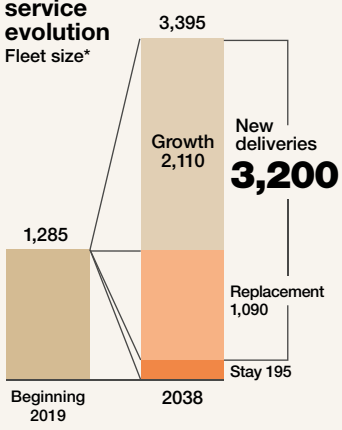
Fleet in service 2019 1,285 2038 3,395

20 year new deliveries **3,200**

* Passenger aircraft ≥100 seats
** 2018-2038 CAGR

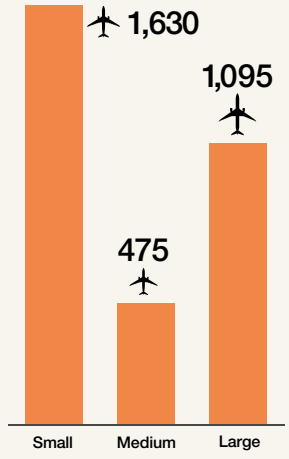
Fleet in service evolution

Fleet size*

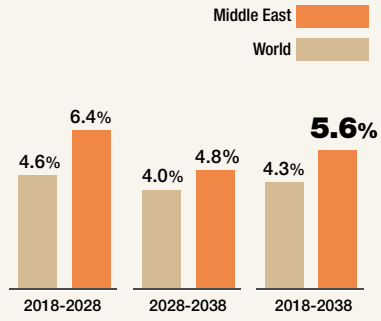


New deliveries by segment

Number of new pax aircraft



Total RPK traffic growth



Latin America & the Caribbean

ECONOMY

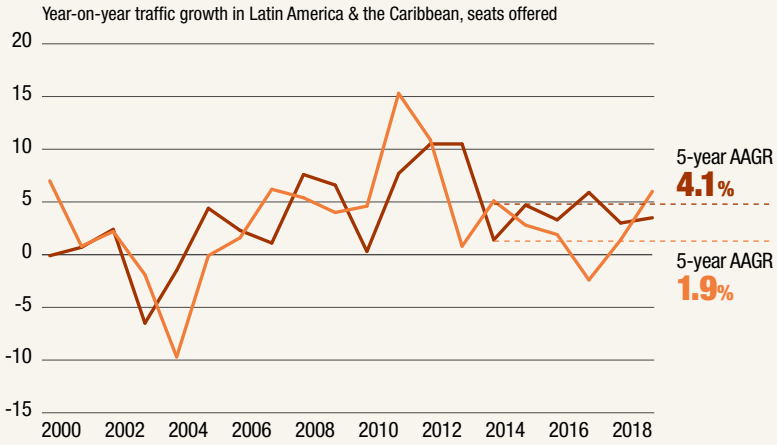
Today, economic performance varies across Latin America with recession in some countries and recovery in Brazil together with positive growth prospects for Colombia, Chile and Peru. Mexico will continue to be linked to the US economy through trade, capital inflows, and remittances. Despite long-term challenges including infrastructure, and income inequality, the long term prospect for Latin America & the Caribbean is positive. Real GDP growth is expected to average **+2.9%** per year over the period 2018-2038, with trade forecast to grow at 3.2% per annum over the same period.

TRENDS

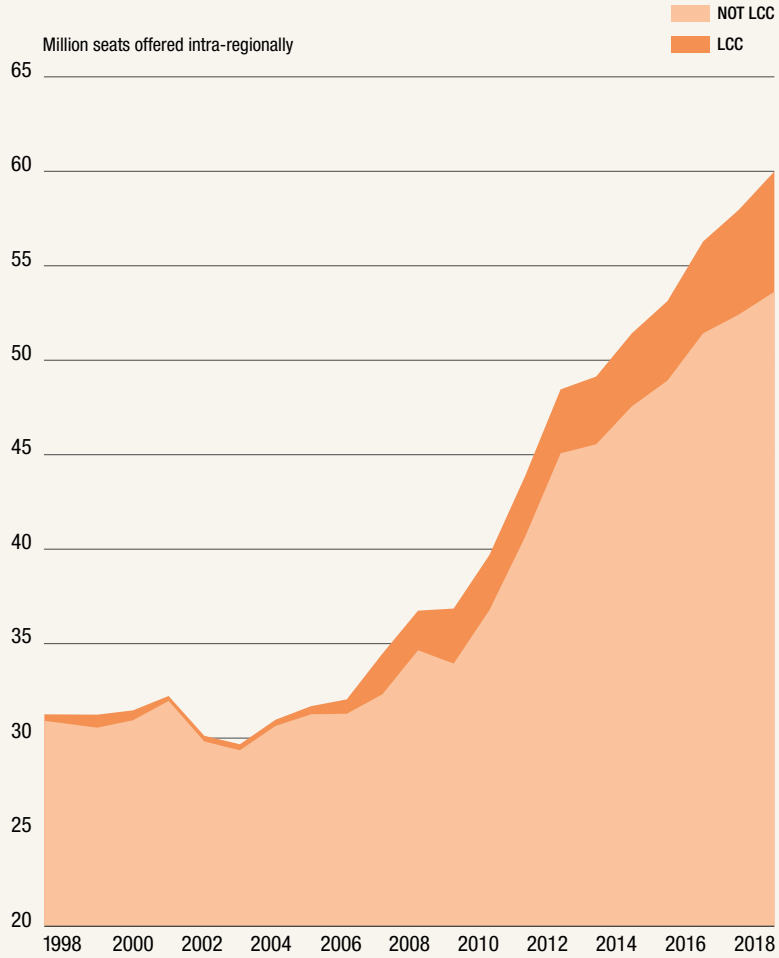
Latin America covers 21,950,000 km² only slightly less than North America with 60% of its road roads unpaved compared to ~30% in North America and 46% in the emerging economies of Asia. It is unsurprising therefore that given its size and ground transportation constraints aviation plays a key role in the region. In recent years, economic factors have meant that domestic traffic growth, that is traffic growth within individual countries in the region, only managed 1.9% AAGR over the last five years. Intra-regional traffic growth, that between countries in the region, grew somewhat faster at 4.1% AAGR over the same period, appearing less impacted by economic fluctuations in the region and even some of the more global cyclical downturns for example in 2008/2009. Part of the reason for these differing growth rates is that as carriers face issues on domestic markets they look to use spare capacity intra-regionally.

INTRA-REGIONAL TRAFFIC GROWTH OVER THE LAST 5 YEARS WAS STRONGER AND MORE RESILIENT

Source: OAG, Airbus



But the most significant reason has been the growth in Low Cost Carrier operations which have grown from 1% of intra-regional flying in 1998, to more than 10% in 2018. Evidence of this evolution can be seen in the number of new airports being served in the region. Since 2008, 57 new airports have recorded new aviation service, many located in Brazil, with 19 of these only operated by LCCs.

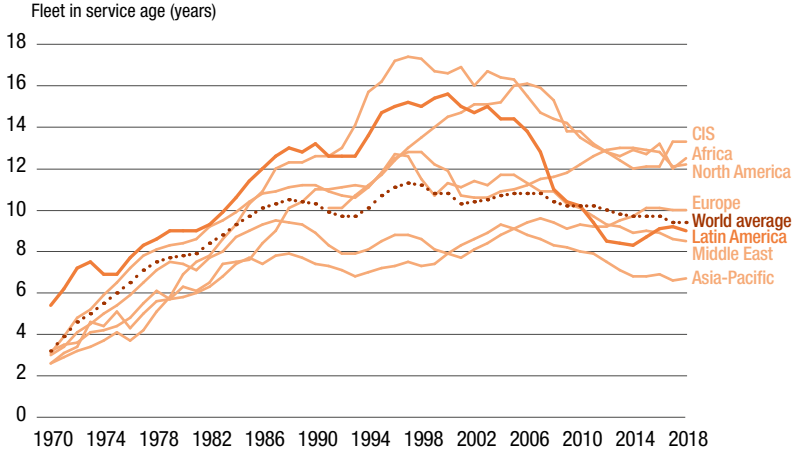


LCCS ARE ADDING MORE CAPACITY TO INTRA-REGIONAL TRAFFIC

Source: OAG, Airbus

MORE CONNECTIVITY IN LATIN AMERICA & THE CARIBBEAN OVER THE LAST 10 YEARS

The Latin American fleets average age has fallen over the latest 20 years, from being one of the oldest to one of the youngest and below the World average.



LATIN AMERICA FLEET IS ONE OF THE YOUNGEST IN THE WORLD

Source: Cirium, Airbus GMF
Notes: As at end of year, 100 seats and above

The importance of air transport to the Caribbean, often overlooked when combined with Latin America, should not be underestimated. Most Caribbean countries are island states that rely heavily on tourism as a source of income; therefore, air connectivity is critical for supporting the tourism industry which contributes more to its economy than any other region, with 15.5% of GDP and 13.5% of total employment coming from tourism.

Given that ~40% of tourists come from the US and ~20% from Europe, aviation's key role in the economies of the Caribbean states in the coming years is likely to continue.

TOURISM IN THE CARIBBEAN ECONOMY CONTRIBUTES MORE THAN ANY OTHER ECONOMY

Source: WTTC, Airbus GMF 2019

CONTRIBUTION OF TRAVEL & TOURISM TO GDP

15.5% of total economy

Total T&T GDP = USD62.1BN

+2.1%

2018 Travel & Tourism GDP growth

CONTRIBUTION OF TRAVEL & TOURISM TO EMPLOYMENT

2.4 jobs (MN)

(13.5% of total employment)

2.9 jobs (MN)

Expected in 2029

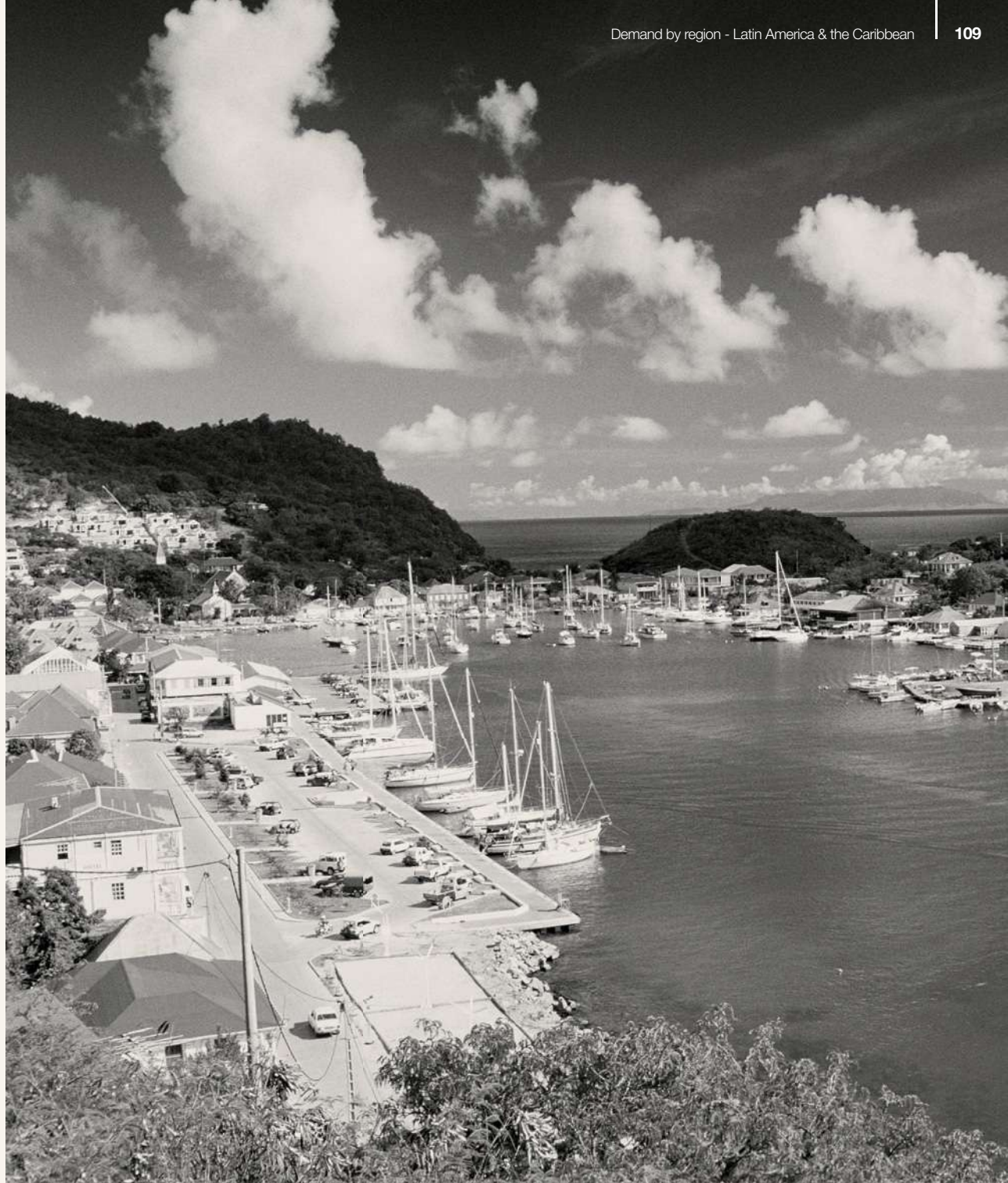
INTERNATIONAL VISITOR IMPACT

USD35.4BN

in visitor spend (20.7% of total exports)

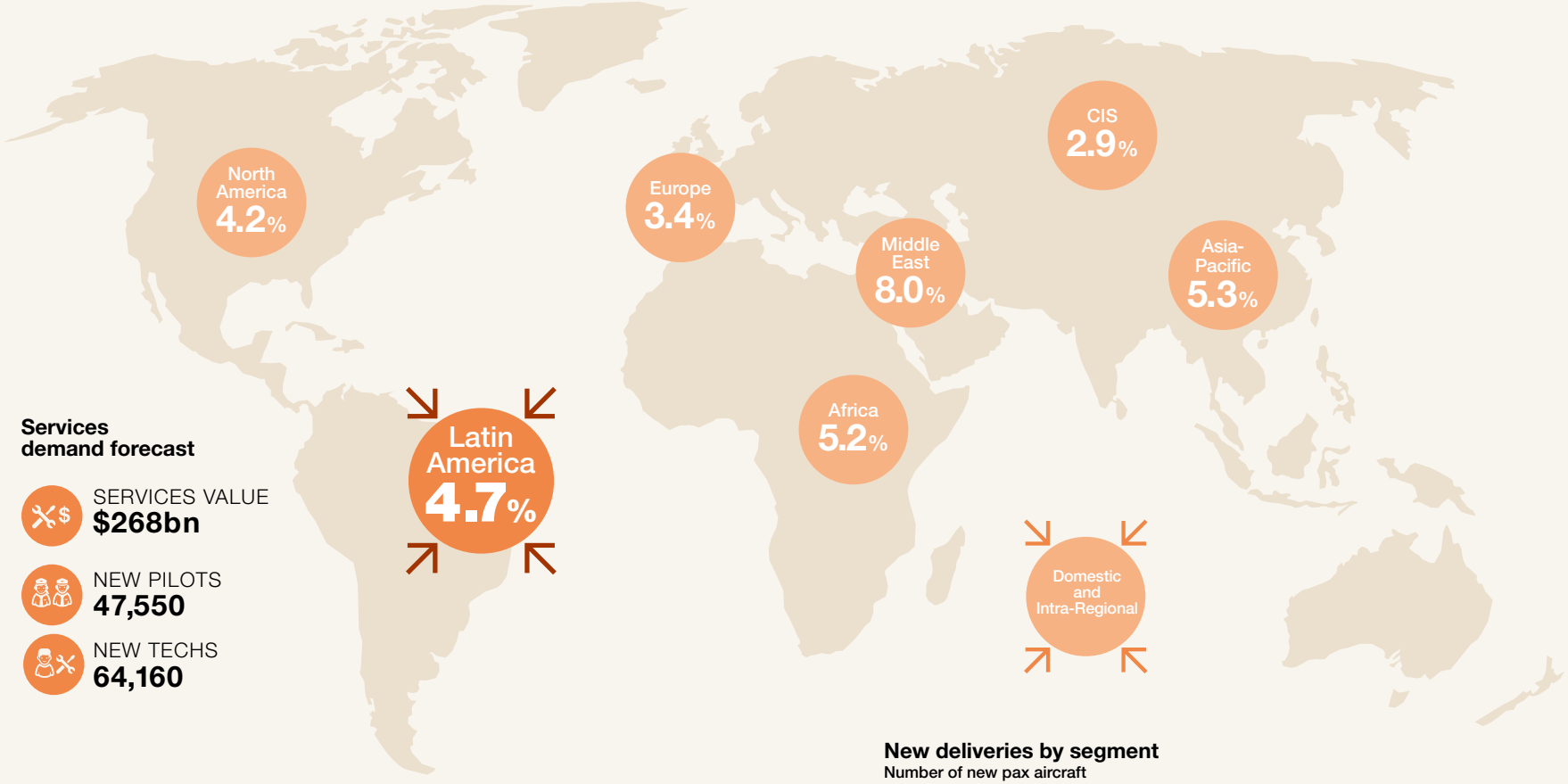
26.6mn

Expected international arrivals for 2019



IATA reported earlier in 2019, that Cartagena Rafael Núñez International Airport has more than halved its fees from $92 to $38, with international arrivals growing, positively impacting the local economy. Since the fee was reduced in 2015, international passenger numbers have risen by 26%, with tourist arrivals to Cartagena increasing by 38%. A more competitive cost structure has also allowed airlines to establish new routes, with flights to Atlanta, Fort Lauderdale, Amsterdam and Madrid being introduced at the airport. As with deregulation and the relaxation of border controls, policy makers can stimulate growth, both in terms of tourists and its contribution to GDP by reviewing taxation in these areas.

REDUCING AIRPORT CHARGES HELPS INCREASE TOURISM



Services demand forecast

SERVICES VALUE
$268bn

NEW PILOTS
47,550

NEW TECHS
64,160

Economy**

Real Trade 3.2%

Real GDP **2.9%**

Traffic**

Intra-regional & domestic 4.7%

Inter-regional 4.0%

Total traffic **4.3%**

Fleet*

Fleet in service

2019 1,375

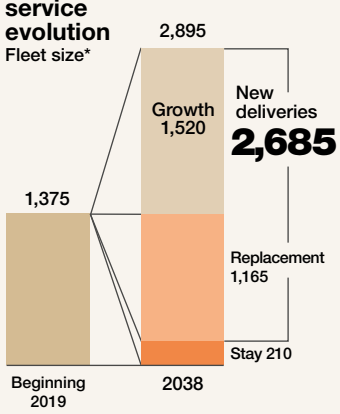
2038 2,895

20 year new deliveries **2,685**

* Passenger aircraft ≥100 seats
** 2018-2038 CAGR

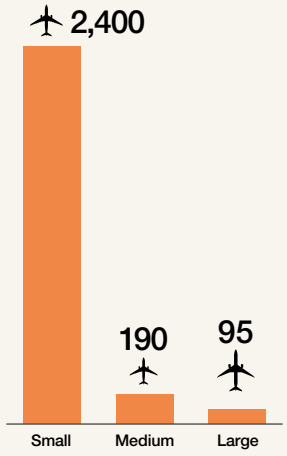
Fleet in service evolution

Fleet size*

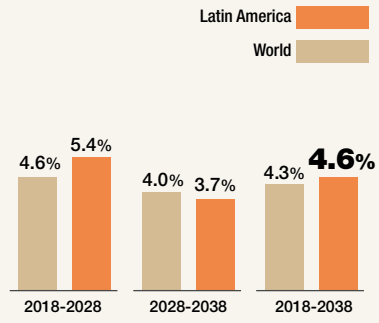


New deliveries by segment

Number of new pax aircraft



Total RPK traffic growth



Commonwealth of Independent States

ECONOMY

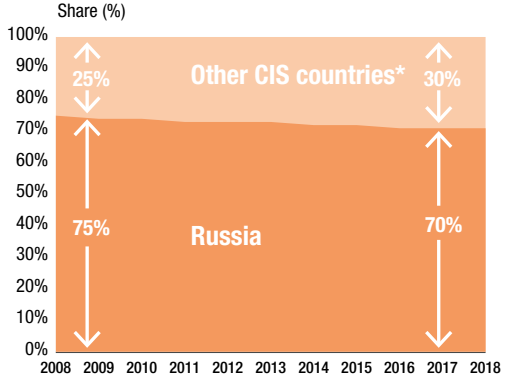
- After two years of decline, mainly as a consequence of decreasing commodity prices, the Russian economy, the main economy in the region, is rebounding led by upturns in consumer spending and fixed investment.
- The weight of other economies in the CIS has grown five percentage points for both GDP (30%) and Private Consumption (29%) over the last ten years.
- CIS region's real GDP expected to grow at **+2.1%** per year over the next 20 years.

RUSSIA STILL THE MAJOR PLAYER IN CIS, BUT OTHER CIS COUNTRIES* ECONOMIC WEIGHT HAS INCREASED OVER THE LAST 10 YEARS

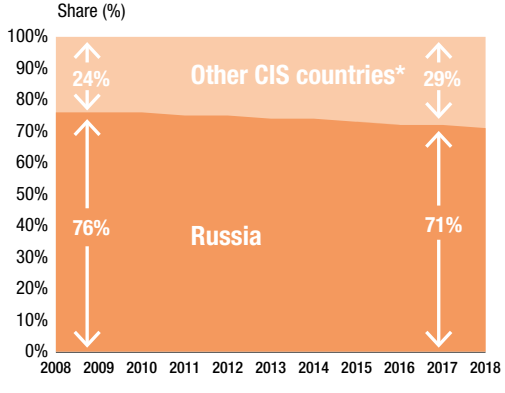
Source: IHS Markit, Airbus

*Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan

GDP

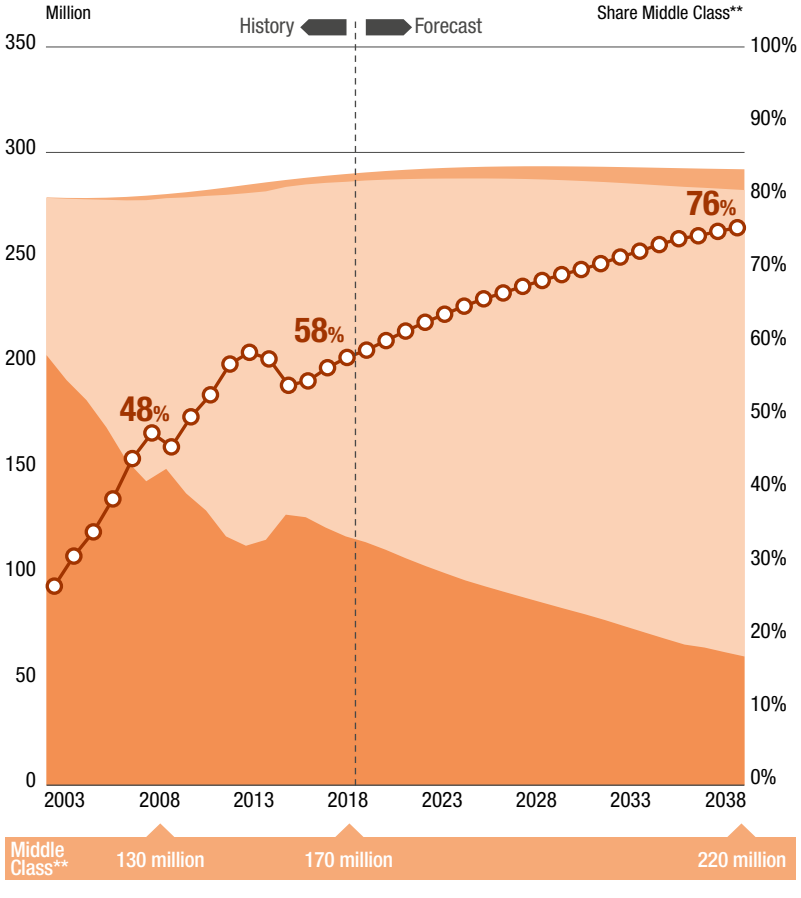


PRIVATE CONSUMPTION



TRENDS

Whilst the population in the CIS is only forecast to grow moderately in the coming years, the share that could be classified as middle class is expected to continue to grow. Since 2003, the "middle class" in the CIS has grown dramatically. Today, some 60% of the CIS' population is considered middle class and by the end of the forecast period is projected to be around 75%. As in the past where this growing wealth has translated into strong growth in Available Seat Kilometre (ASK) growth, this trend to increased wealth is expected to translate into an increased propensity to fly in the region.



Upper Class***
Middle Class**
Lower Class*
Share Middle Class

CIS Middle Class expected to represent 76% of CIS population by 2038**

CIS MIDDLE CLASS EXPECTED TO GROW FROM 170 MILLION PEOPLE TODAY TO 220 MILLION PEOPLE BY 2038**

Source: Oxford Economics, Airbus

* Households with yearly income between $0 and $20,000 at PPP in constant 2015 prices

** Households with yearly income between $20,000 and $150,000 at PPP in constant 2015 prices

*** Households with yearly income above $150,000 at PPP in constant 2015 prices

STRONG TRAFFIC GROWTH FOR ALL CIS COUNTRIES OVER THE LAST 20 YEARS

Source: OAG, Airbus

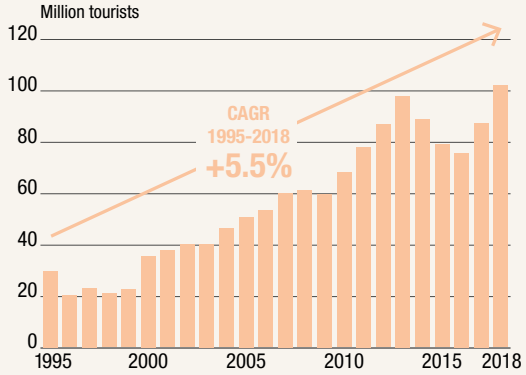
CIS Countries	2018 ASKs share (%)	CAGR ASKs 1998-2018
Russia	77%	+7.9%
Ukraine	7%	+11.5%
Kazakhstan	5%	+7.7%
Uzbekistan	2%	+5.1%
Georgia	2%	+11.3%
Azerbaijan	1%	+5.3%
Armenia	1%	+5.2%
Kyrgyzstan	1%	+8.8%
Tajikistan	1%	+30.6%
Turkmenistan	1%	+9.5%
Belarus	1%	+8.3%
Moldova	1%	+10.5%

This strong growth in capacity was in part due to growth in tourism from outside the region and between CIS countries. Inbound tourism in terms of tourist numbers grew more than 7% per annum from 1995. Outbound traffic, whilst slower, still managed 5.5% growth per annum, itself an indicator of growing wealth in the region and connectivity between major cities. In Russia, discussions have taken place for the relaxation of visa regulations, particularly for tourists, with a number of countries outside the CIS including China, India and Indonesia, some of the largest countries in the World, and with the potential to increase dramatically air traffic between Russia and the Asia-Pacific.

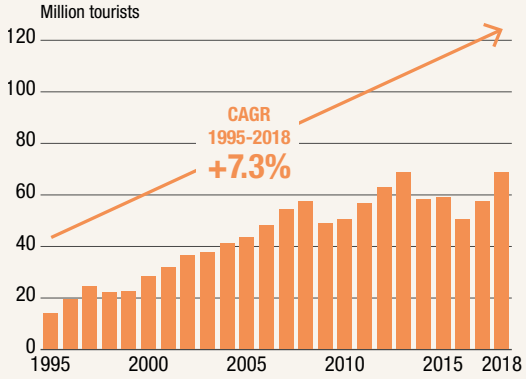
STRONG GROWTH OF TOURISM TO/FROM CIS WITH STRONG REBOUND FOLLOWING THE 2014/2015 CRISIS

Source: World Tourism Organisation, Airbus

CIS OUTBOUND TOURISM



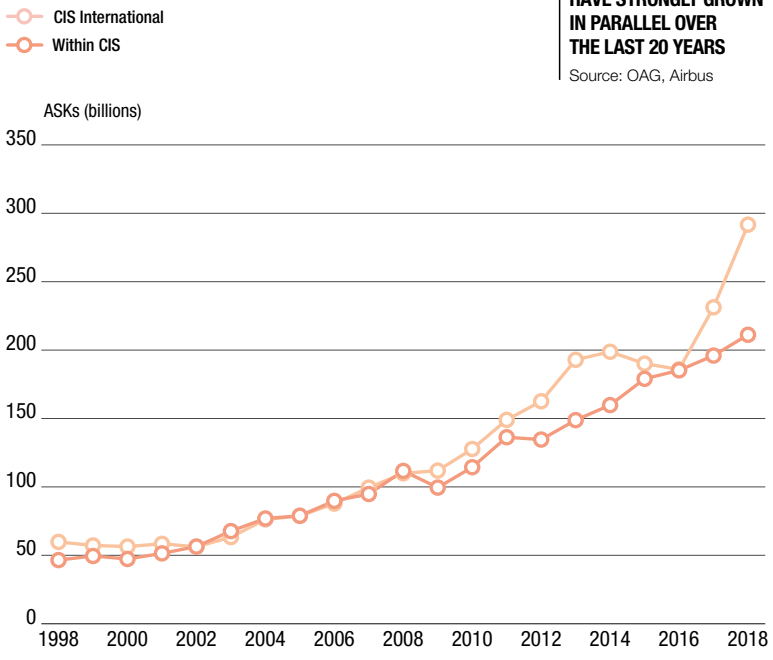
CIS INBOUND TOURISM

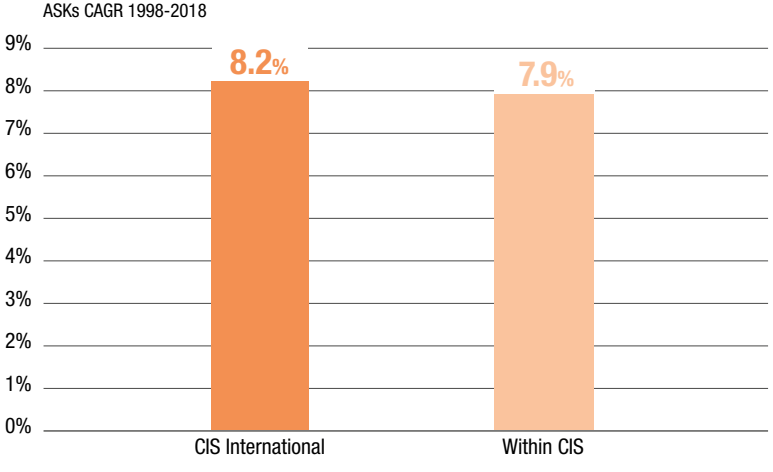


These factors have been supported by impressive growth in capacity to and from the region, which until 2016, had international and domestic/inter-regional growth at similar levels. However, from 2016, international capacity growth has outpaced that within the region. As well as these developments the region's operations have become more efficient, with close to 60% more ASKs flown per aircraft in 2018, compared to just 10 years earlier. This has largely been due to the average age of the fleet falling by two years to just over 13 years of age; this itself due to an increase in the number of modern more eco-efficient aircraft coming into the region's fleet.

CIS INTERNATIONAL AND REGIONAL MARKETS HAVE STRONGLY GROWN IN PARALLEL OVER THE LAST 20 YEARS

Source: OAG, Airbus



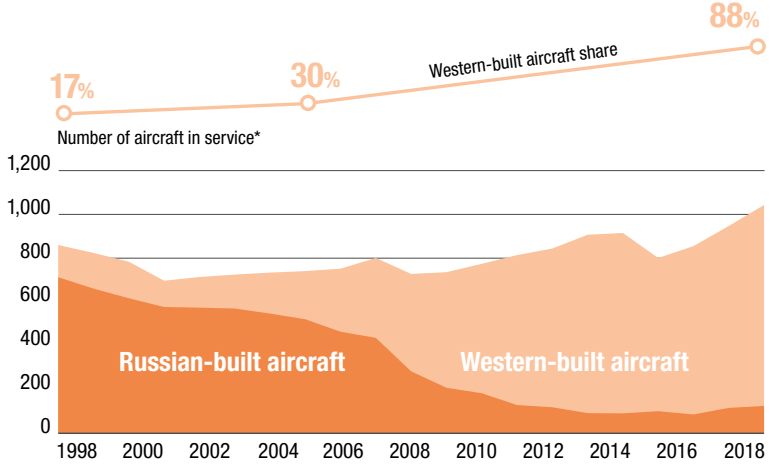


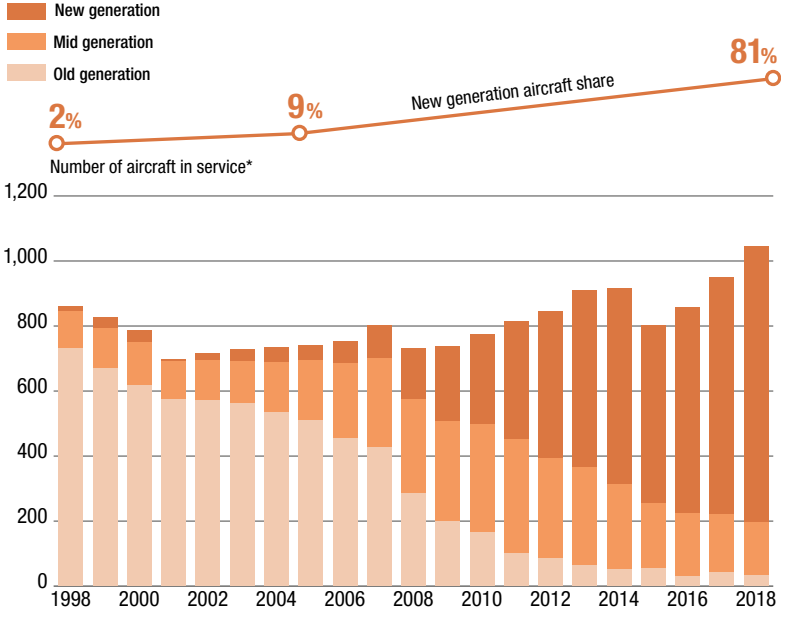
In 2005, just 9% of the fleet could be considered "new generation", today more than 80% of the fleet are in this category of aircraft technology, providing both operating cost and reduced environmental impact as a result of their operation compared to the types they replaced.

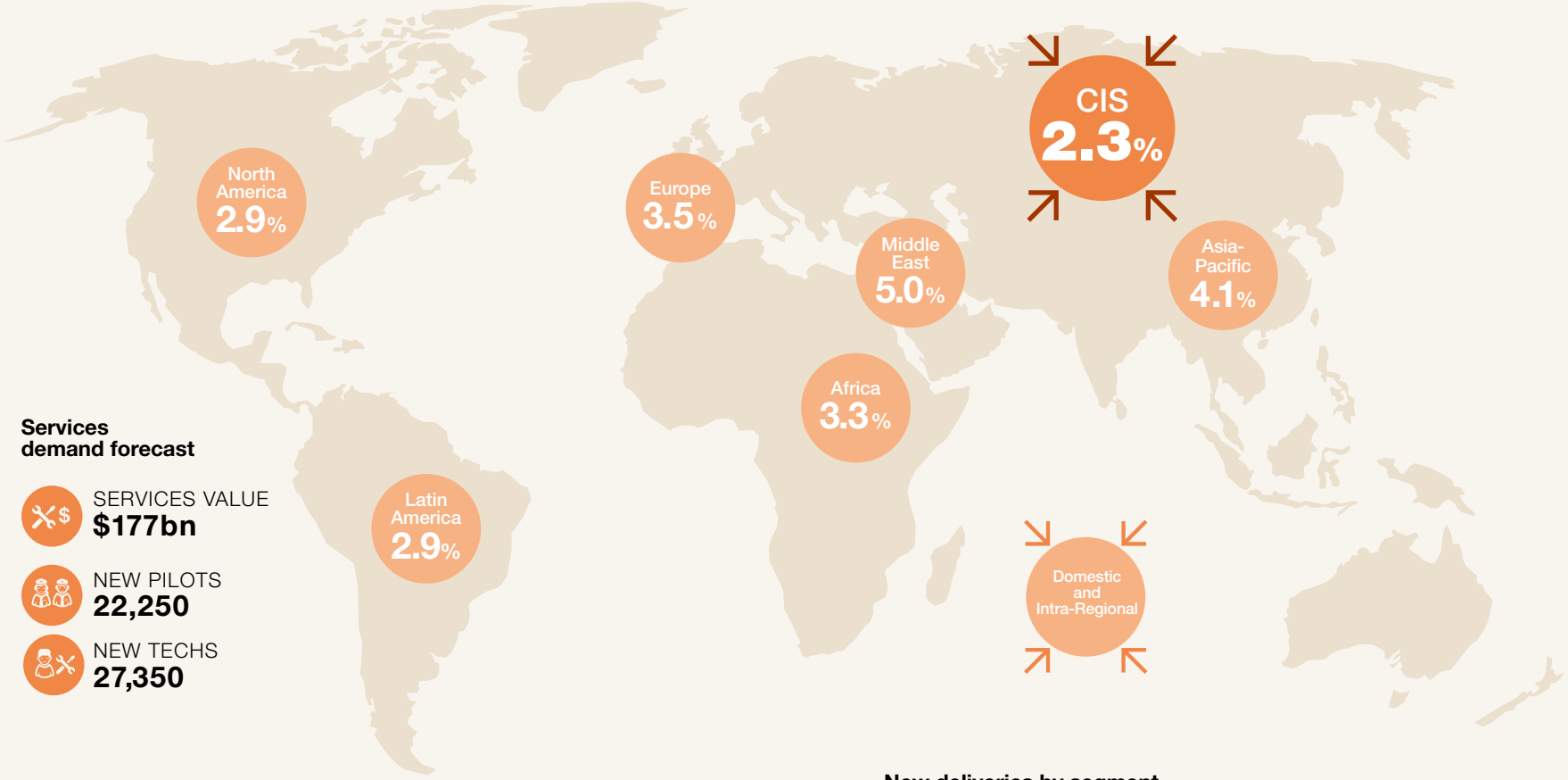
NEW GENERATION AIRCRAFT NOW REPRESENTS THE MAJORITY OF THE CIS FLEET IN SERVICE

Source: OAG, Cirium, Airbus

*Passenger aircraft ≥100 seats, freighters excluded







Services demand forecast

SERVICES VALUE
$177bn

NEW PILOTS
22,250

NEW TECHS
27,350

Economy**

Real Trade 2.6%

Real GDP **2.1%**

Traffic**

Intra-regional & domestic 3.3%

Inter-regional 4.0%

Total traffic **3.7%**

Fleet*

Fleet in service

2019 935

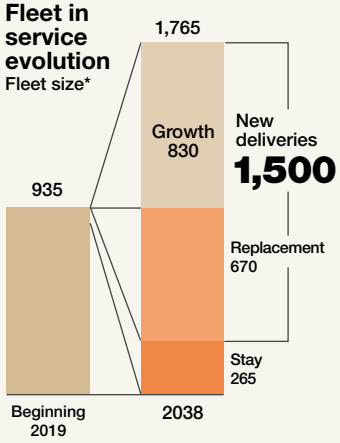
2038 1,765

20 year new deliveries **1,500**

* Passenger aircraft ≥100 seats
** 2018-2038 CAGR

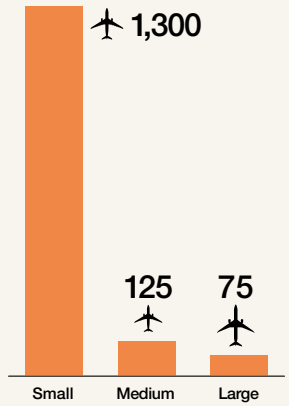
Fleet in service evolution

Fleet size*

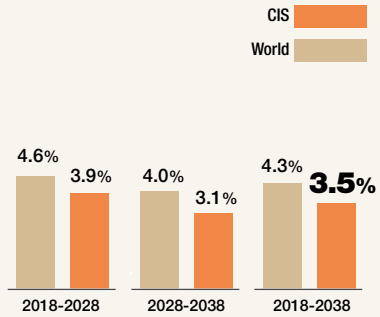


New deliveries by segment

Number of new pax aircraft



Total RPK traffic growth



Africa

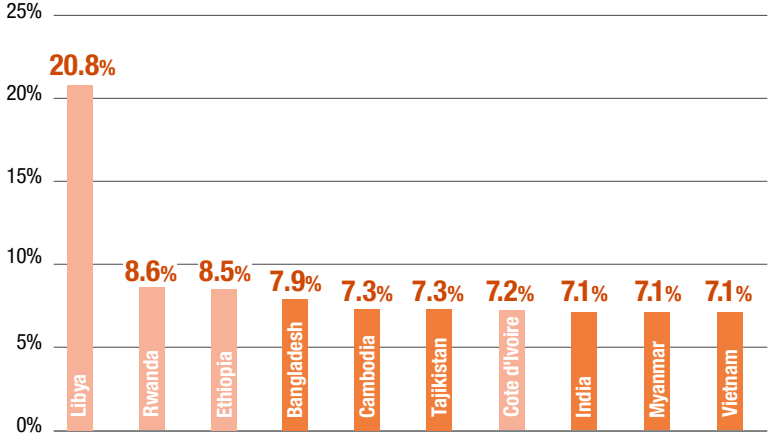
ECONOMY

A rebound in commodity prices and rising exports are expected to revive economic growth in the region. Beyond developments in global commodity markets, expanding domestic markets, growing middle-class populations, and greater regional integration will support long term economic growth.

Economic growth is a strong driver for aviation growth and is therefore an important variable when we produce our traffic forecasts. When looking at Africa it is encouraging to note that in 2018, four of the top 10 fastest growing countries were from the continent. Longer term, Africa's real GDP is forecast to grow at **+3.6%** per year over the next 20 years. Improvements to infrastructure, greater political stability, economic diversification, and regional integration would enhace this view by helping the region to deliver more of its economic growth potential.

4 OF THE TOP 10 FASTEST GROWING ECONOMIES WHERE IN AFRICA IN 2018

Source: IHS Markit, Airbus GMF 2019



TRENDS

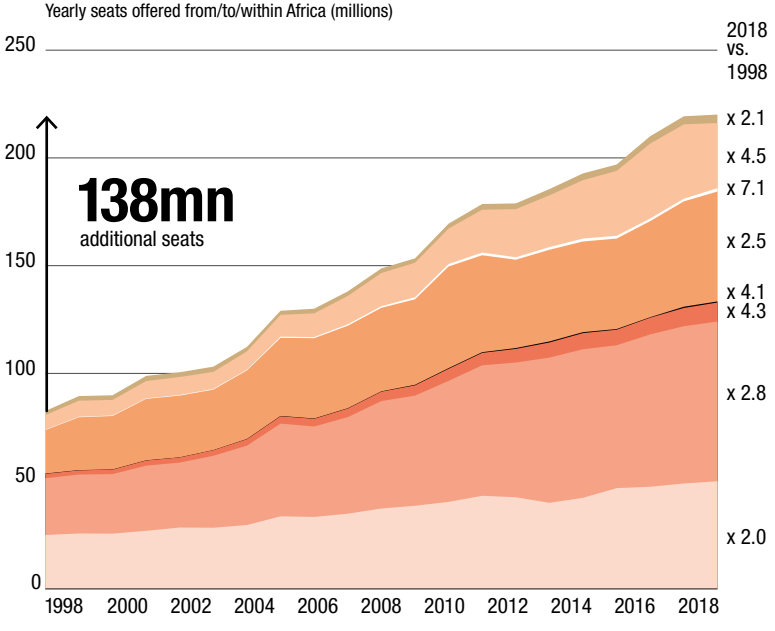
Africa is the second largest continent, only smaller than Asia, and covers about fifth of the Earth's total land area. Roughly half of the continent sits on either side of the Equator, and is bounded by the Atlantic and Indian Oceans, with the Mediterranean and Red Seas to the north and east. Theories suggest it was the origin of human kind, with its population today around 1.3 billion people. With challenges to ground infrastructure development coming from investment or simply its geography and climate. Data from the African Development bank suggests that the region has two kilometres of paved road per 100 km² of land area and 46,000 kms of railway, this compares to 122 kms per 100 km² and 86,000 kms for road and rail in Europe. Air transportation therefore plays an important role in connecting African countries with each other and to the rest of the World. Over the last 20 years, 138 million additional seats have been added to routes to, from and within Africa, almost trebling since 1999. This impressive growth has been achieved despite the fact that the pace of liberalisation in Africa, particularly between African states has lagged that achieved in other continents. It is not unreasonable to suggest that the pace of growth and the benefits obtained could have been more significant over that time with greater liberalisation.

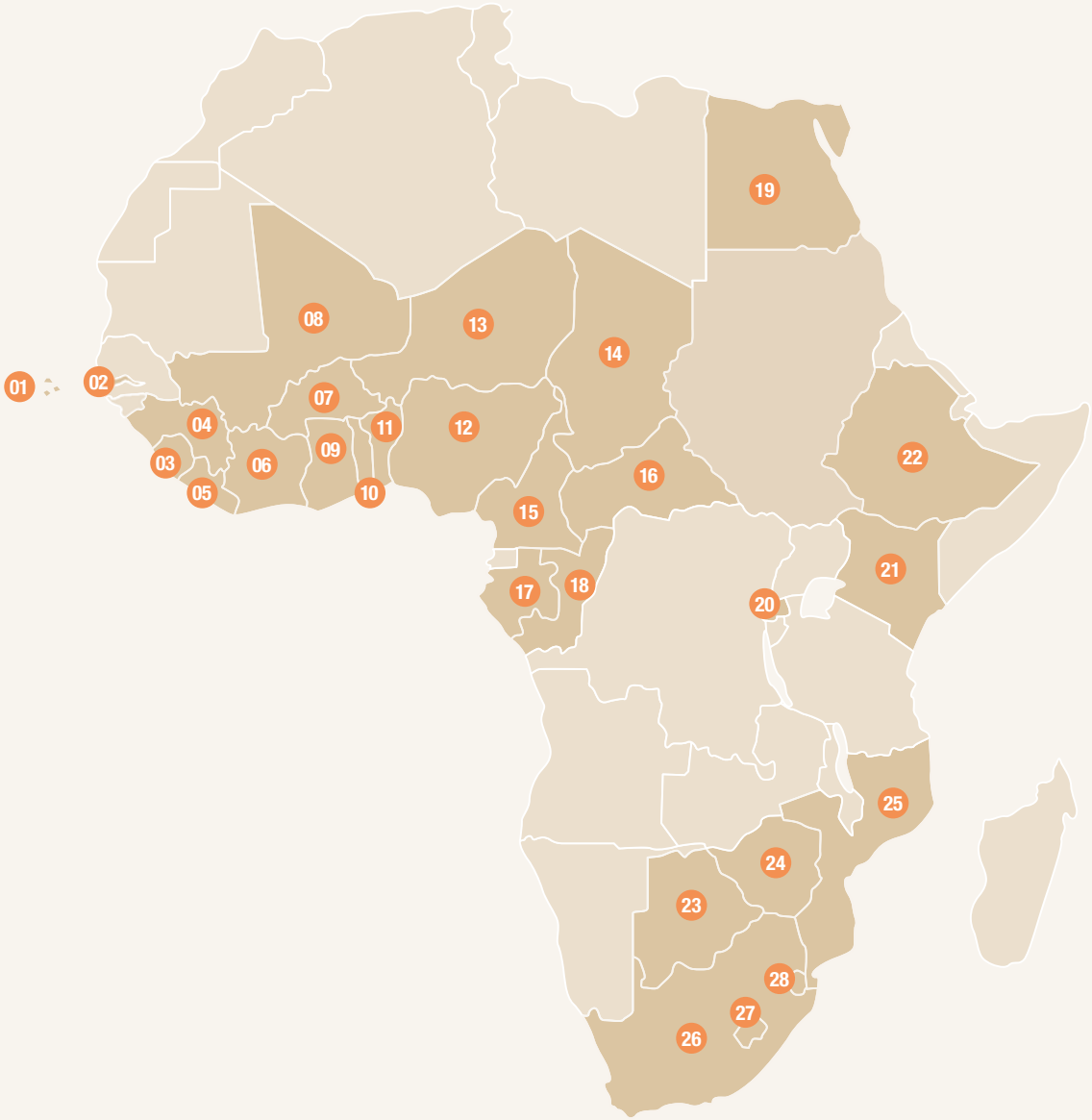
That is not to say that greater liberalisation, a strong driver of aviation growth, has not been an ambition in Africa. The concept of liberalisation of air transport in Africa emerged in 1988, with the adoption of the Yamoussoukro Declaration, this followed in 1999, by the Yamoussoukro Decision which provides for the full liberalisation of intra-African air transport services in terms of market access, the free exercise of first, second, third, fourth and fifth freedom traffic rights for scheduled passenger and freight air services by eligible airlines. It removes restriction on ownership and provides for the full liberalisation of frequencies.

Striving to implement this decision the African Union has created a flagship project called the Single African Air Transport Market (SAATM) as part of its Agenda 2063. To date, 28 countries have agreed to SAATM since it was launched in 2018: Benin, Burkina Faso, Botswana, Capo Verde, Central African Republic, Chad, Congo, Côte d'Ivoire, Egypt, Ethiopia, Gabon, Gambia, Ghana, Guinea Conakry, Kenya, Liberia, Mali, Mozambique, Niger, Nigeria, Rwanda, Sierra Leone, South Africa, Swaziland, Togo, Zimbabwe, Lesotho and Cameroon. These countries represent over 80% of the existing aviation market in Africa. About a half of these have also signed a Memorandum of Implementation pledging to unlock the benefits of aviation in their respective states.

SEATS OFFERED IN AFRICA MULTIPLIED x 2.7 SINCE 1998

Source: OAG, Airbus GMF 2019





Relaxation or simplification of imigration procedures can also be a potent and instant driver of aviation growth. The African Visa openess index stated in 2018 that:

- Africans do not need a visa to travel to 25% of other African countries (up from 22% in 2017, and 20% in 2016).
- Africans can get visas on arrival in 24% of other African countries (also 24% in 2017, and 25% in 2016).
- Africans need visas to travel to 51% of other African countries (down from 54% in 2017, and 55% in 2016).

An improving picture with more potential.

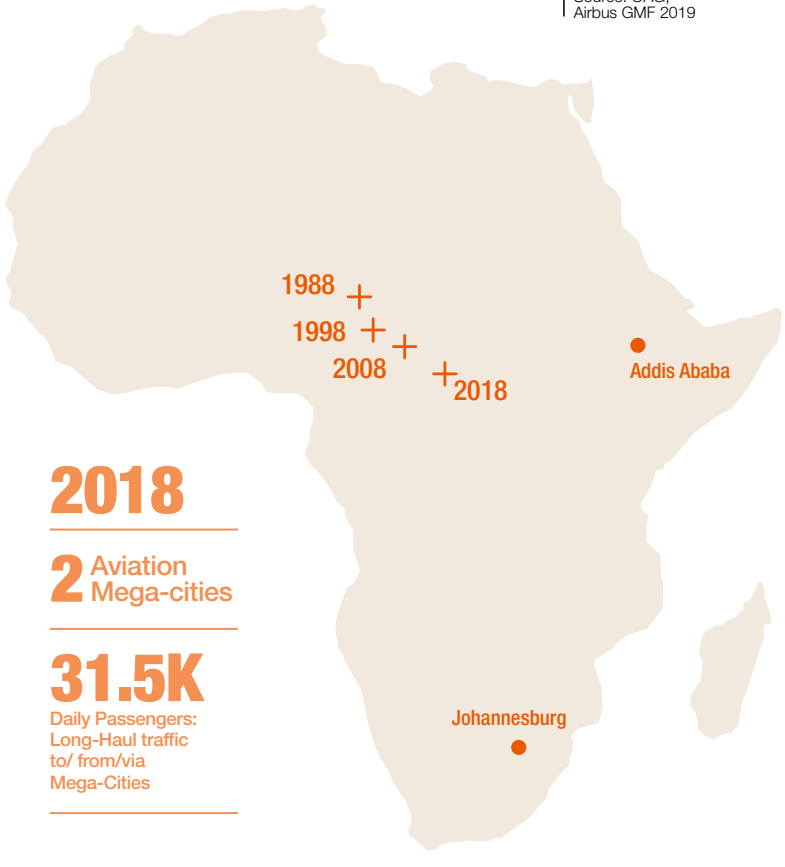
As aviation continues to grow in Africa so too will the number of aviation mega-cities in the continent. Today, there are two having more than 10,000 daily long haul passengers, Addis Ababa and Johannesburg. At the end of our forecast period there will be eight. It is interesting to note how the centre of gravity has moved south and east over the last 20 years, as the market has evolved. It is also interesting to note how little it will move in the next 20 years indicating more balanced growth around the continent.

28 AFRICAN COUNTRIES HAVE SIGNED UP TO AFRICA'S SAATM

01 Capo Verde
02 Gambia
03 Sierra Leone
04 Guinea
05 Liberia
06 Côte d'Ivoire
07 Burkina Faso
08 Mali
09 Ghana
10 Togo
11 Benin
12 Nigeria
13 Niger
14 Chad
15 Cameroon
16 Central African Republic
17 Gabon
18 Congo
19 Egypt
20 Rwanda
21 Kenya
22 Ethiopia
23 Botswana
24 Zimbabwe
25 Mozambique
26 South Africa
27 Lesotho
28 Swaziland

IN 2018, AFRICA HAD TWO AVIATION MEGA-CITIES

Note: Long-haul: Above 2000Nm
Source: OAG, Airbus GMF 2019



2018

2 Aviation Mega-cities

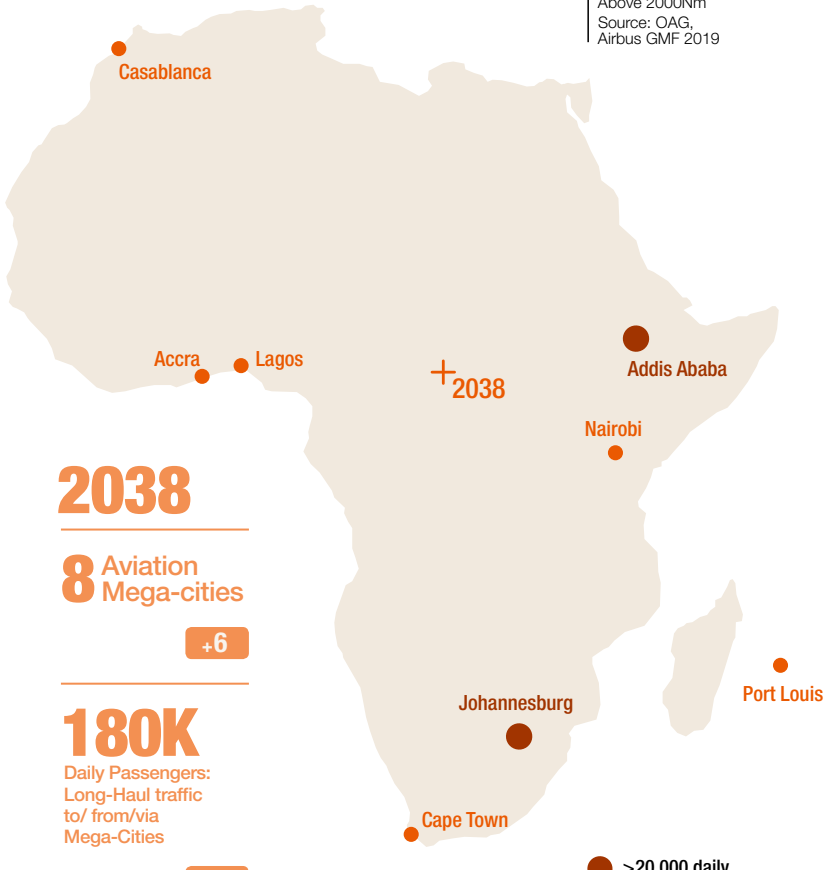
31.5K
Daily Passengers: Long-Haul traffic to/ from/via Mega-Cities

African aviation centre of gravity

>10,000 daily long-haul passengers

BY 2038, AFRICA HOME TO EIGHT AVIATION MEGA-CITIES

Note: Long-haul: Above 2000Nm
Source: OAG, Airbus GMF 2019



2038

8 Aviation Mega-cities

+6

180K
Daily Passengers: Long-Haul traffic to/ from/via Mega-Cities

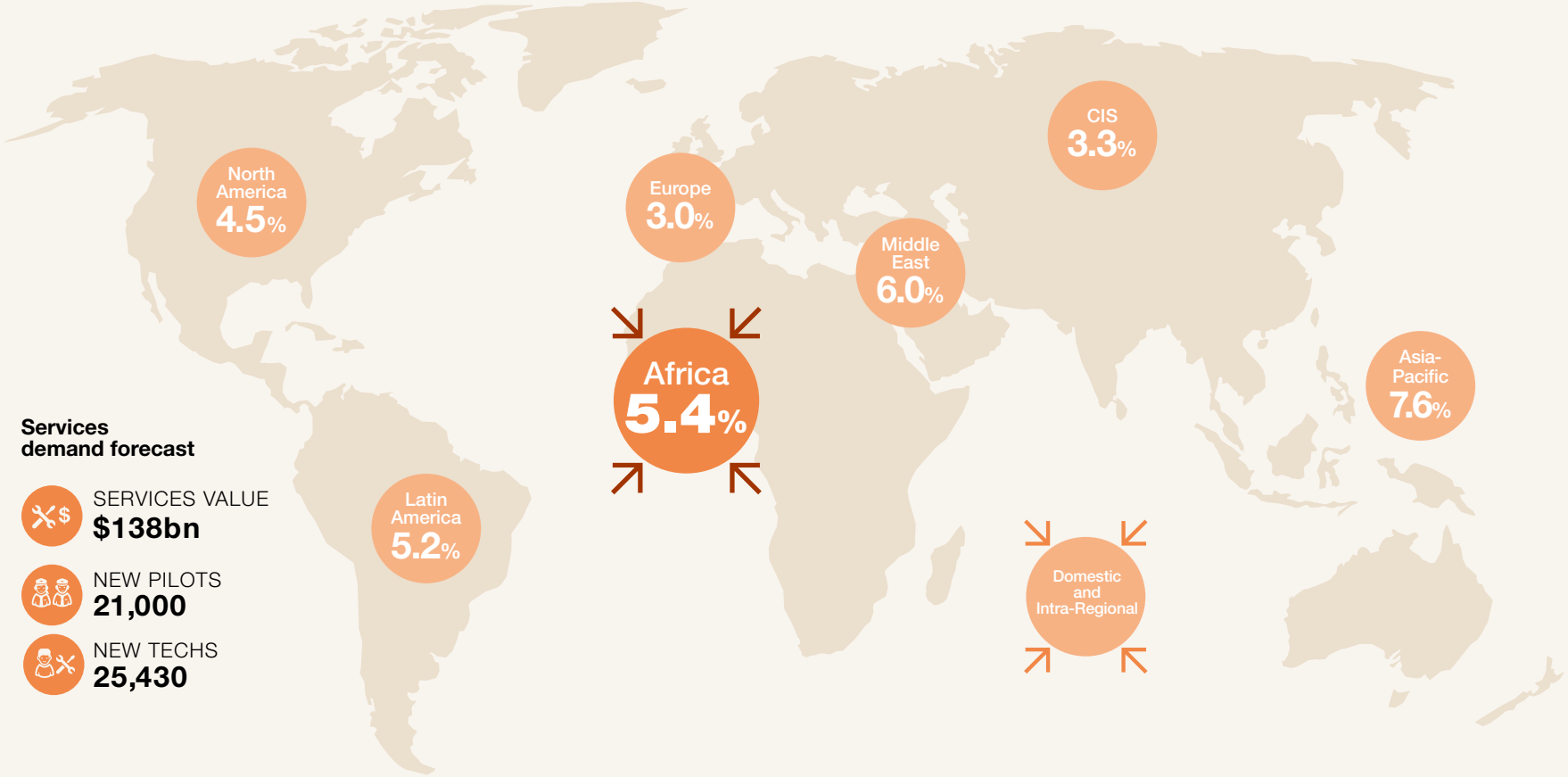
x5.7

>20,000 daily long-haul passengers

>10,000 daily long-haul passengers

African aviation centre of gravity

With these developments African traffic is forecast to grow strongly over the next two decades at 4.8% per annum. Domestic and intra-regional traffic is expected to grow at 5.4% per year on average over the forecast period, but has upside potential should the developments discussed here progress.



Services demand forecast

SERVICES VALUE
$138bn

NEW PILOTS
21,000

NEW TECHS
25,430

Economy**

Real Trade	Real GDP
4.5%	**3.6%**

Traffic**

Intra-regional & domestic 5.4%

Inter-regional 4.8%

Total traffic **4.8%**

Fleet*

Fleet in service

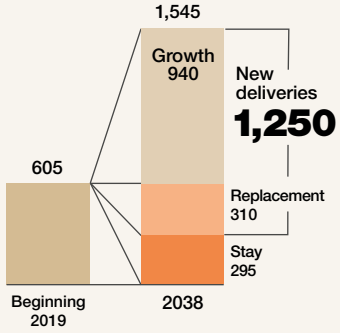
2019	2038
605	1,545

20 year new deliveries **1,250**

* Passenger aircraft ≥100 seats
** 2018-2038 CAGR

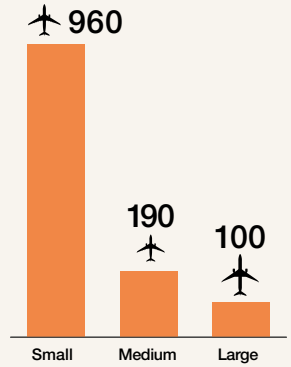
Fleet in service evolution

Fleet size*

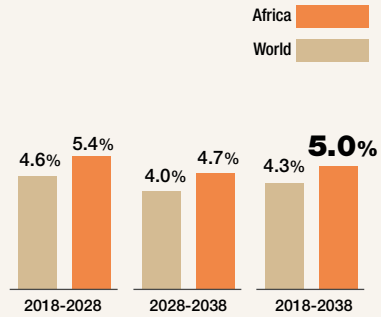


New deliveries by segment

Number of new pax aircraft



Total RPK traffic growth



FREIGHTER FORECAST

06

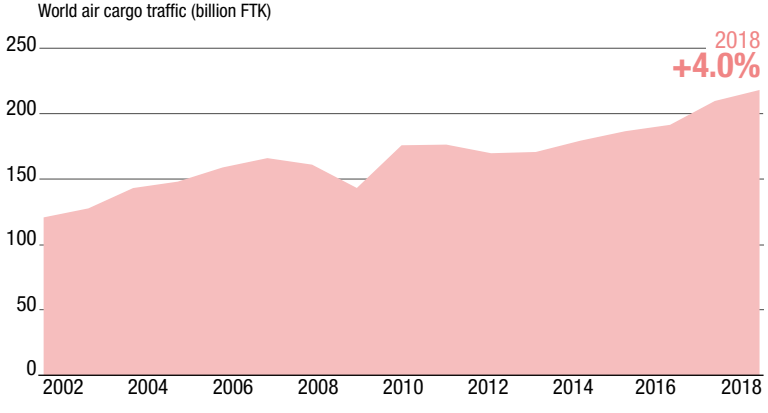
Freighter forecast

THE FREIGHT MARKET TODAY

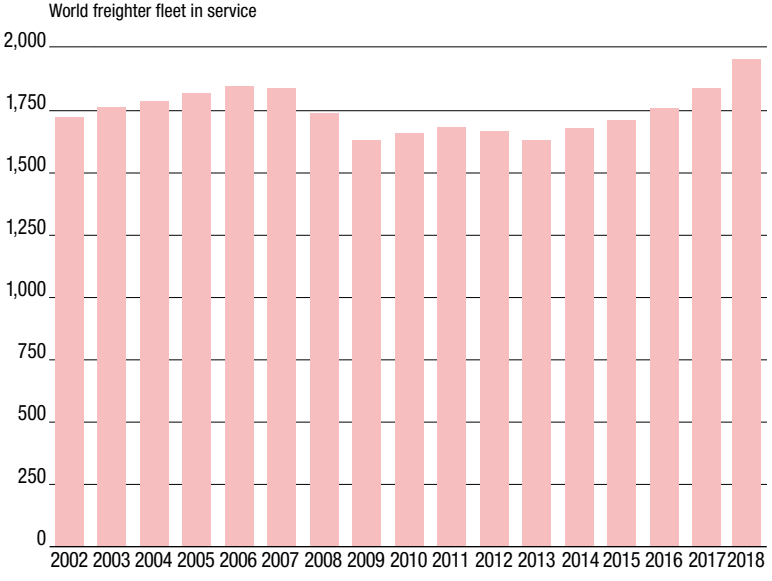
- Air freight grew an estimated 4% in 2018, above the long term trend.
- However, in the final few months of 2018, the end of a restocking cycle and increasing global trade tensions led to a slowing trade environment. This served to slow and even reverse some of the growth in air freight experienced in the last three years as 2019 started.
- More positively however, some economists have suggested, that should GDP forecasts be realised then some upward revision in trade growth might be expected in 2020, particularly if trade tensions can be eased, with air freight possibly benefiting as a result.
- Ironically, pressure on trade and economic activity in the short term could lead to lower demand for oil and therefore potentially lower fuel costs for airlines improving their bottom lines.
- Despite these headwinds to the airfreight market, stored aircraft levels have remained low. At the time of writing in the middle of 2019, freighter storage was at historically low levels of ~6% of the fleet. For comparison at the time of the financial crisis in 2009, the level was nearly 23%.
- As well as low freighter storage levels, freighter retirements in 2018, were also at extremely low levels. In the 10 years before 2018, freighter retirements averaged 108 aircraft a year. In 2018, just over 30 were reported to have been retired. Both positive indicators that the freight market was not facing over capacity issues at this time, that needed to be managed with freighter aircraft storage or retirements.

WORLD AIR CARGO TRAFFIC GROWTH ABOVE LONG-TERM TREND, IN 2018

Source: IATA, Seabury, Airbus Market Forecasts



- The freighter fleet grew for the fifth consecutive year to just under 2000 aircraft, growing 20% since the financial crisis in 2008/2009.
- In 2018, two thirds of the aircraft added to the fleet were freighter conversion in the small and mid-size freighter categories.



FREIGHTER FLEET IN SERVICE AT ALL-TIME HIGH IN 2018

Source: Cirium (data as of end of each year), Airbus Market Forecasts

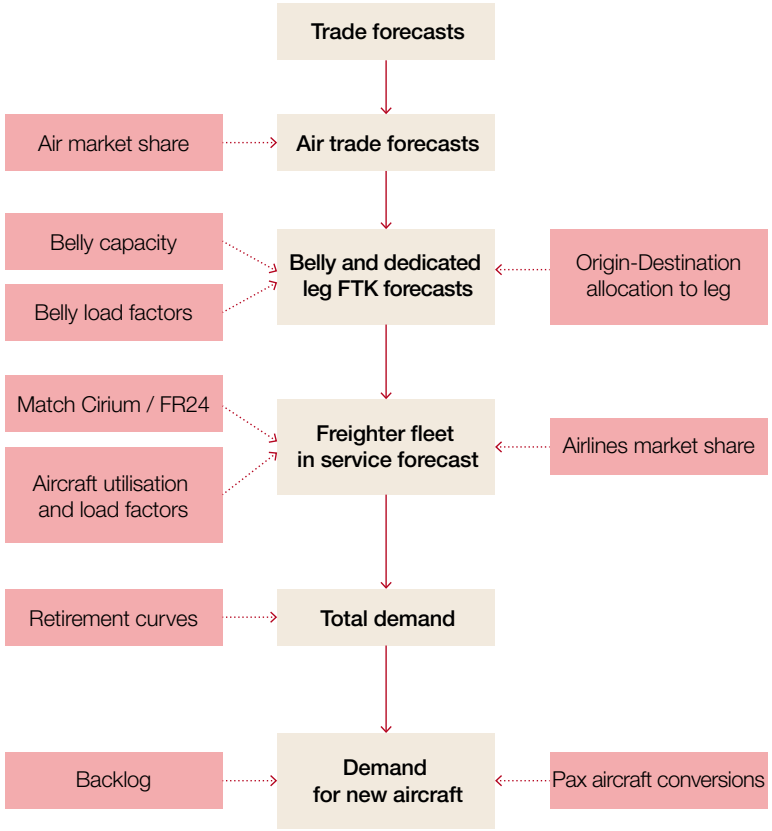
Jet aircraft > 10 ton

GMF FREIGHT FORECAST METHODOLOGY

- Whilst drawing on techniques, tools, data and some results from our passenger aircraft forecast, due the differences between the passenger and freight markets, the GMF freighter forecast is a separate piece of analysis. Key differences include the drivers for freight growth, how cargo is split between dedicated freighters and the below main deck ("belly hold") capability of passenger aircraft, and ultimately the share of new build freighters and freighter conversions. The last highly dependent on suitable second hand passenger aircraft i.e. the right numbers, price and age, and the conversion programs offered by aircraft manufacturers or third parties.

GMF CARGO METHODOLOGY

Source: Airbus Market Forecasts



GMF FREIGHT FORECAST

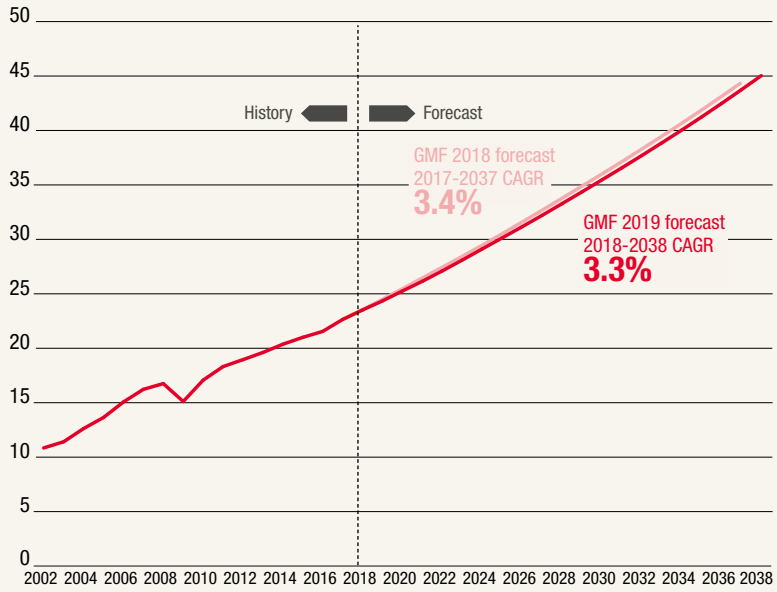
- In the long term World international trade, a key driver of freight traffic, is expected to grow at 3.3% per annum over the next 20 years, almost doubling from today's levels to ~$45 trillion. This is a slight downward revision to the forecast that was used in GMF 2018.
- Asia-Pacific will become the largest region in terms of international trade over this period, growing its share from ~36% today to ~43% in 2038. With intra Asia-Pacific forecast to be the largest trade flow, expected to grow 2.4 times over this period.
- Whilst air freight represents a relatively small share of the international trade in terms of tonnage ~1%, it accounts for nearly a third of the value, with benefits of speed and security helping to drive this ratio.

WORLD INTERNATIONAL TRADE EXPECTED TO DOUBLE IN THE NEXT TWENTY YEARS

Source: IHS Economics, Airbus Market Forecasts

Trade of goods and non-factor services

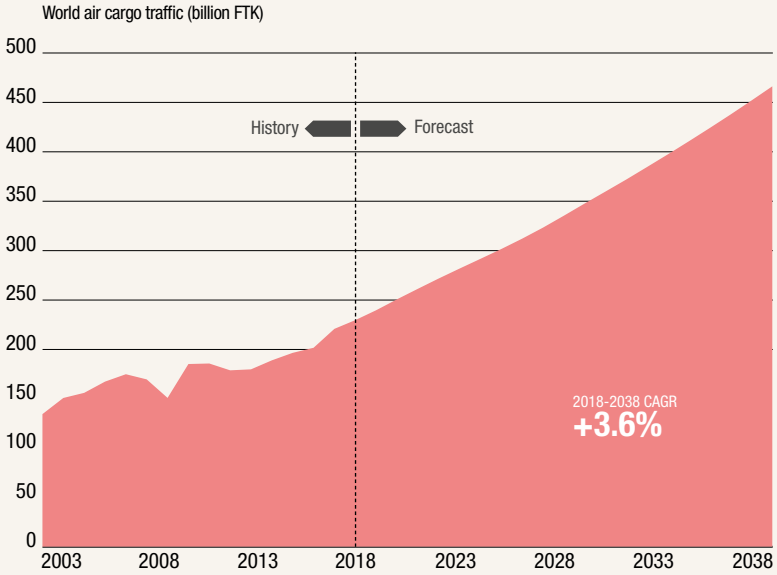
World international trade, by date of forecast (trillion 2010 $US)



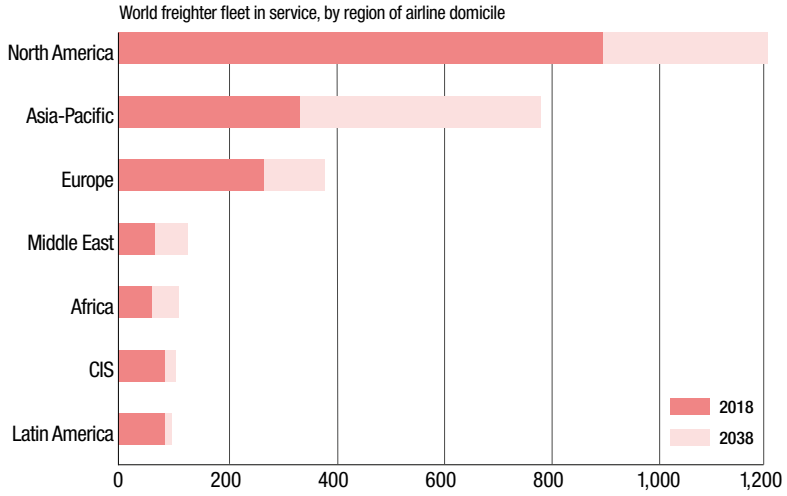
- This year we forecast that air cargo traffic will grow 3.6% per annum to 2038. This will mean that cargo traffic is expected to double. Belly cargo is forecast to grow at a faster rate than main deck freight at 4.3% per annum compared to 2.8%. This means that by 2038, ~60% of freight will be carried by passenger aircraft. This is unsurprising given the growth in the passenger fleet over the same period. By using spare lower deck capacity in passenger flights to move freight provides revenue benefits to airlines and greater environmental efficiency.

AIR CARGO TRAFFIC TO DOUBLE IN THE NEXT TWENTY YEARS

Source: IATA, Seabury, Airbus Market Forecasts



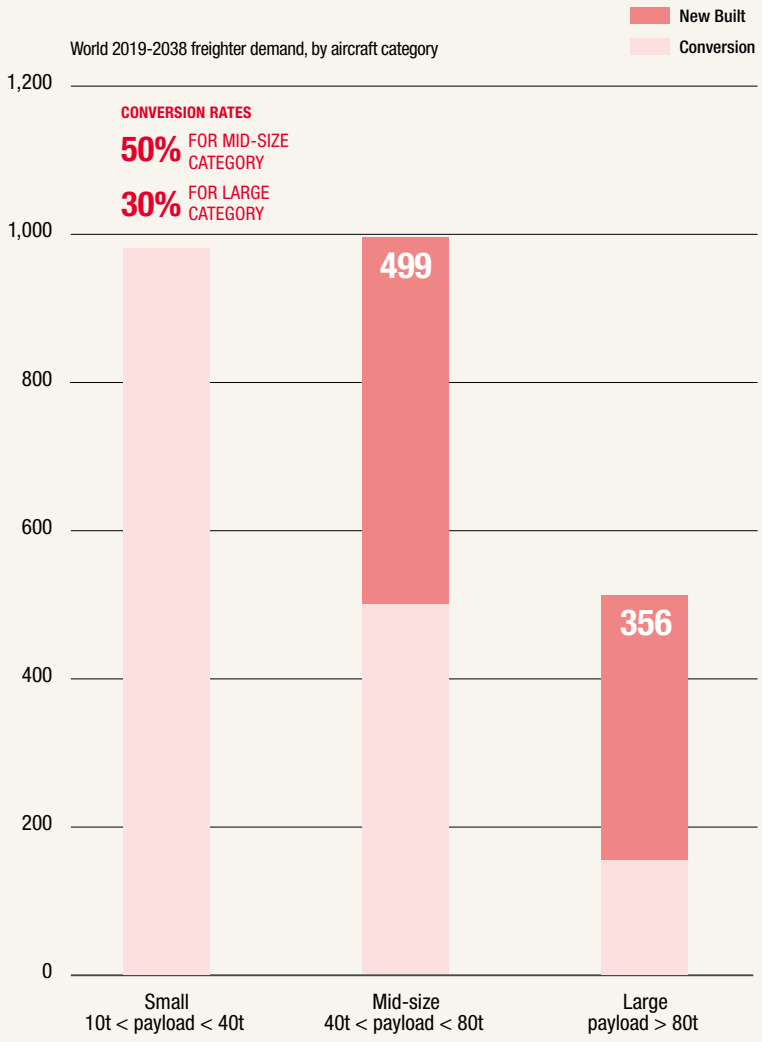
- Whilst nearly 80% of air cargo is expected to be general cargo, express freight is expected to grow significantly over the next 20 years, with more than 2.5 times the volume in FTKs forecast to be transported in 2038 compared to 2018.



- As a result of the growth in demand for the transportation of freight by air, the fleet of dedicated freighters is forecast to grow over 50%, to just over 2,800 aircraft, from the ~1,800 freighters in service today. The largest freighter fleet today, and in 20 years, will be domiciled in North America with ~40% of the aircraft, and Asia-Pacific with nearly 30% in 2038, up from ~20% in 2018.
- A combination of 2,500 new build and converted freighters will be needed with 60% for replacement and 40% for growth of the freighter fleet. From these, 850 aircraft are expected to be new build.
- Most new build freighters, ~500, are forecast to be in the mid-size freighter category, where aircraft payload ranges from 40-80t. Some 360 new build aircraft will be needed in the large category with payloads above 80t.

FREIGHTER AIRCRAFT FLEET EXPECTED TO INCREASE BY 55% IN THE NEXT TWENTY YEARS

Source: Airbus Market Forecasts
Jet aircraft > 10 ton



DEMAND FOR MORE THAN 850 NEW FREIGHTER AIRCRAFT IN THE NEXT TWENTY YEARS

Source: Airbus Market Forecasts
Jet aircraft >10 ton

SERVICES FORECAST

07

Services forecast

NEW GLOBAL SERVICES FORECAST

- Each year we endeavor to improve and expand the scope of our Global Services Forecast in order to reflect new trends and opportunities.
- With the passenger at heart, and airlines in mind, the results are grouped into three main areas:
  - **Optimised Aircraft Availability** including Hangar activities: Maintenance, technician training, e-solutions, system upgrades and Material Management: spares, tooling.
  - **Streamlined Operations** including On ground Operations and In Flight Performance: services needed to operate the aircraft: Pilot training, pilot pools, e-solutions.
  - **Enhanced Passenger experience** including the Passenger Travel Experience: services to provide passenger experience primarily linked to the airport but can also include ticketing for example. Whereas Passenger In-Flight Experience are services needed to maximise the passengers flight experience including the need for cabin upgrades, cabin crew training, etc.

OPTIMISED AIRCRAFT AVAILABILITY

- The Optimised Aircraft Availability segment combines all the services required to have an aircraft ready to fly. It is a growing market worth a cumulative **$ 2.4Tn** over the next 20 years. Services are provided throughout the aircraft's lifecycle from design to dismantling.
- An aircraft will have a different lifecycle depending on its ownership structure be it leased or owned and will undergo a series of modifications throughout its life to ensure the asset continually generates revenue for the operators and the Lessors. Leased aircraft currently represent over 50% of the overall flying fleet.
- Aircraft can have several stages in their lifecycle after initial order and delivery to its first operator. These are typically:
  - Aircraft Transitions between two operators (Sale or lease transition)
  - P2F conversion
  - Aircraft dismantling and recycling
- All have been included in our services forecast this year as they often represent important commercial considerations for lessors and operators alike.

Aircraft transitions

Transitioning an aircraft from one operator to the next including conversion, and ensuring contractual and regulatory compliance is a time consuming and costly task. Time is a key factor as at times in the transition the aircraft is not earning revenue.

The number of aircraft transitions for commercial aircraft, today at more than 900, will double in the coming 20 years, bringing the total number to ~2000 by 2038, representing a service market of $57Bn.

Passenger to Freighter (P2F) conversions

To prolong the life of the asset to in some cases greater than 35 years, one option is to change the role of the aircraft from passenger to freighter with a conversion.

We forecast that some 1,600 passenger to freighter aircraft conversions over the next 20 years representing a cumulated market value of $13.4Bn. This market is driven by increased international trade volumes that is expected to double in the next 20 years combined with express cargo traffic in particular that is expected to almost triple over the same period.

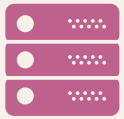
Dismantling / recycling

- One of the key elements in our efforts to minimise the environmental impact of aviation is to ensure our capacity to dismantle the aircraft in an eco-efficient way and ensure that a maximum amount of parts and raw materials can be re-used or recycled. Up to 92% of the parts and raw materials making up the aircraft weight are today re-used or recycled by the Airbus company TARMAC AEROSAVE in France and Spain.
- The fleet will more than double from today's ~ 22,680 aircraft to 47,680 in 20 years' time. This in turn will result in more retirements and the need for deliveries to replace these aircraft. In the GMF >30% of all deliveries are for replacement. Indeed with the development of air traffic, the aging fleet and older technology, aircraft retirements are set to increase to as many as 1,100 aircraft a year by 2038. Therefore, aircraft storage capacity and efficient dismantling capabilities will be required in the coming years.
- A total spend of $2Bn over the next 20 years for aircraft dismantling is forecast.

Irregular Operations

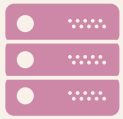
- Cancellations, in-flight turn backs or diversions are irregular operations and cost not only billions of dollars in airline revenue, but also demand as passengers hesitate to rebook.

Fleet
data



Work orders
Technical logs
MELs

Operations
data

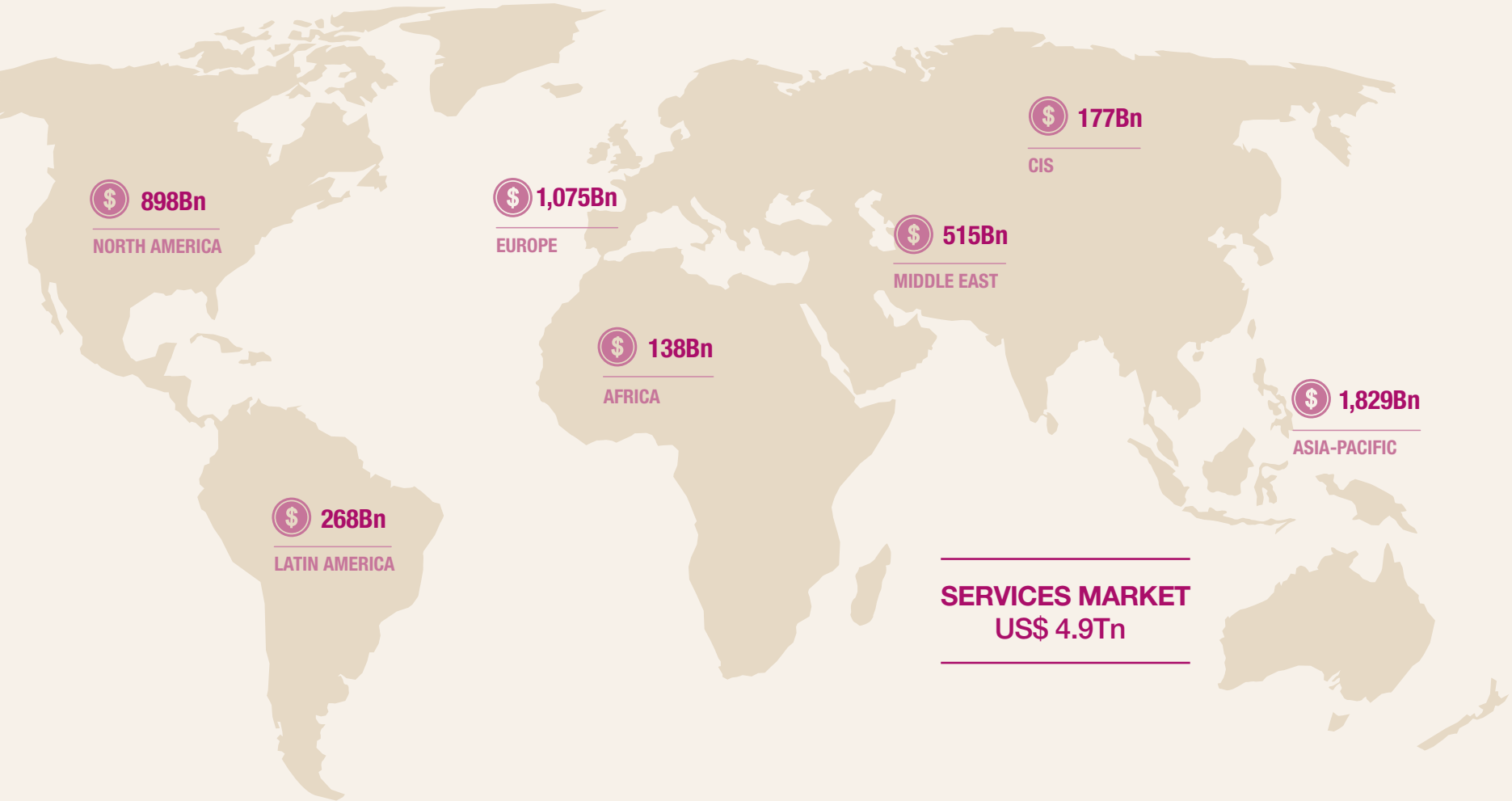


Flight plans
Load sheets
Delays

In-flight
sensor data

Predictive maintenance

- New technologies, including an increase in the number of connected aircraft, will lead to a growth in Digital services.
- It will bring new opportunities to deliver services that will benefit not just airline customers, but also the passenger. Access and analysis to data from aircraft and their operations will be at the heart of these innovations.
- Airlines are striving to significantly reduce operational interruptions. Their goal is to predict when and why a system will fail in a bid to turn unscheduled events into scheduled maintenance.
- Airlines want to measure and quantify the operational impact of aircraft technical flight interruptions as a complementary performance indicator in addition to Operational Reliability (OR).
- Engine OEMs have been performing predictive maintenance for some time by using health monitoring, now it's the turn of airframe OEMs who are developing cutting edge predictive maintenance solutions.
- In order to achieve this they are exploring vast amounts of aircraft data and then use data analytics to anticipate part failures, servicing activities, to enable the identification of major cost drivers and their quantification.
- Predictive maintenance is now included as part of Digital solutions in this new Global Services Forecast.


$ 898Bn
NORTH AMERICA
$ 1,075Bn
EUROPE
$ 177Bn
CIS
$ 515Bn
MIDDLE EAST
$ 138Bn
AFRICA
$ 1,829Bn
ASIA-PACIFIC
$ 268Bn
LATIN AMERICA
SERVICES MARKET
US$ 4.9Tn

STREAMLINED OPERATIONS

- **Streamlined Operation Services** include the services needed to operate the aircraft e.g. pilot training, pilot pools, e-solutions to improve aircraft operations (flight planning, EFB…).

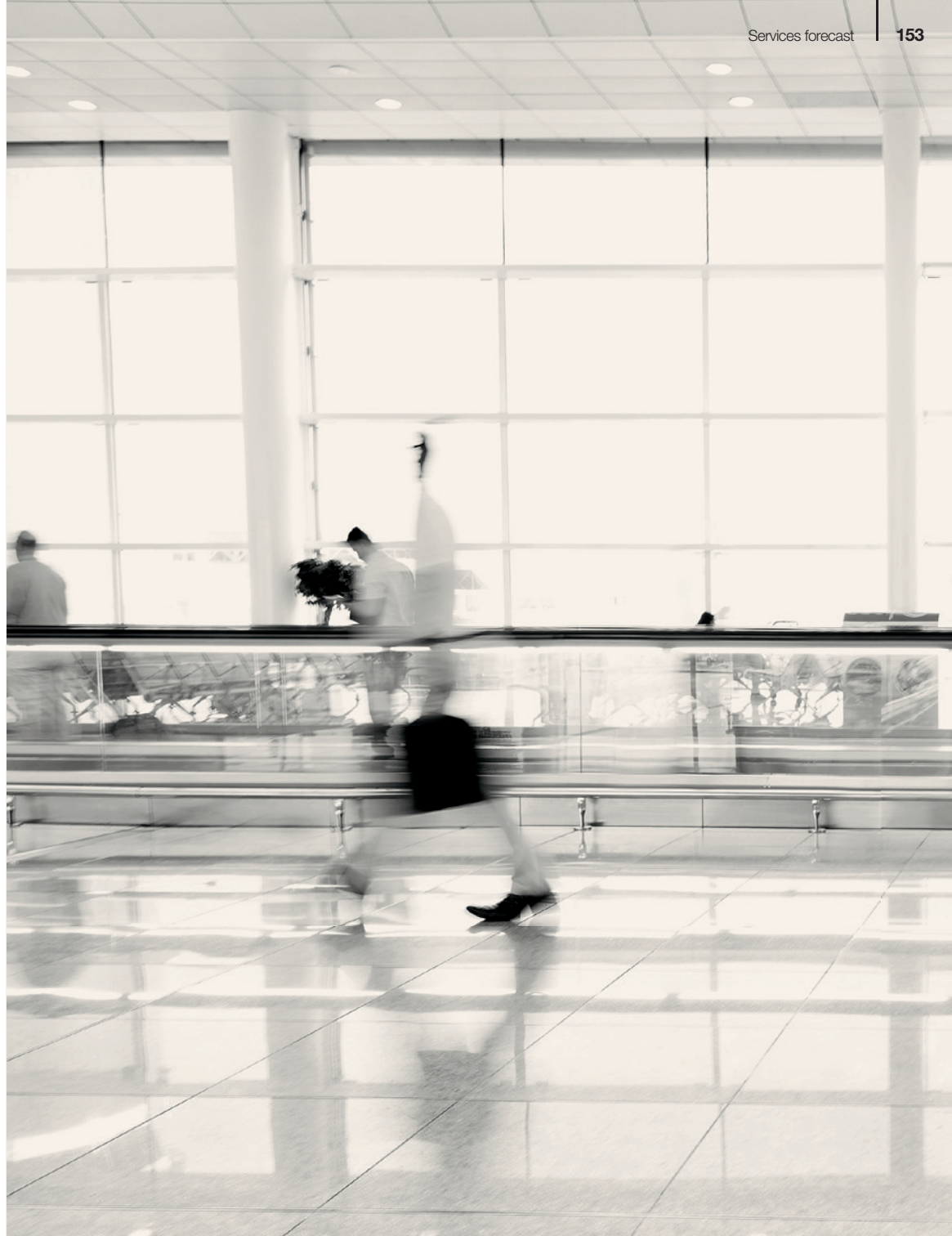
a. Pilot demand
With the fleet more than doubling over the next 20 years this will give rise to the need for **550,000** new pilots over that period.

b. Airport
As air traffic grows airport congestion is and will be an issue in the future. Airports will need to cope with the increase in passengers and air traffic. A solution will need to include, more capacity at gates, terminals, airside and runways.

However, whilst infrastructure improvements will be needed and will help, air traffic growth will be such that it is unlikely airport infrastructure improvements alone will be able to match this. In some parts of the World it can take as long as 15 years to build new capacity at major airports due to political, environmental and cost factors.

Improved capacity management at airports is a challenge. However, new technology, big data analysis techniques and the gathering of all information on airport, airline, ground handling and passenger flows in collaborative data platforms can be used to optimise capacity management at airports.

In addition through real-time data sharing between stakeholders such as airport operators, air traffic control, network operations, ground handlers, and terminal stakeholders another aim is to deliver customer value with improved overall Target Off Block Time and also reduce the recurrence and impact of irregular operations (IROPs).



ENHANCED PASSENGER EXPERIENCE

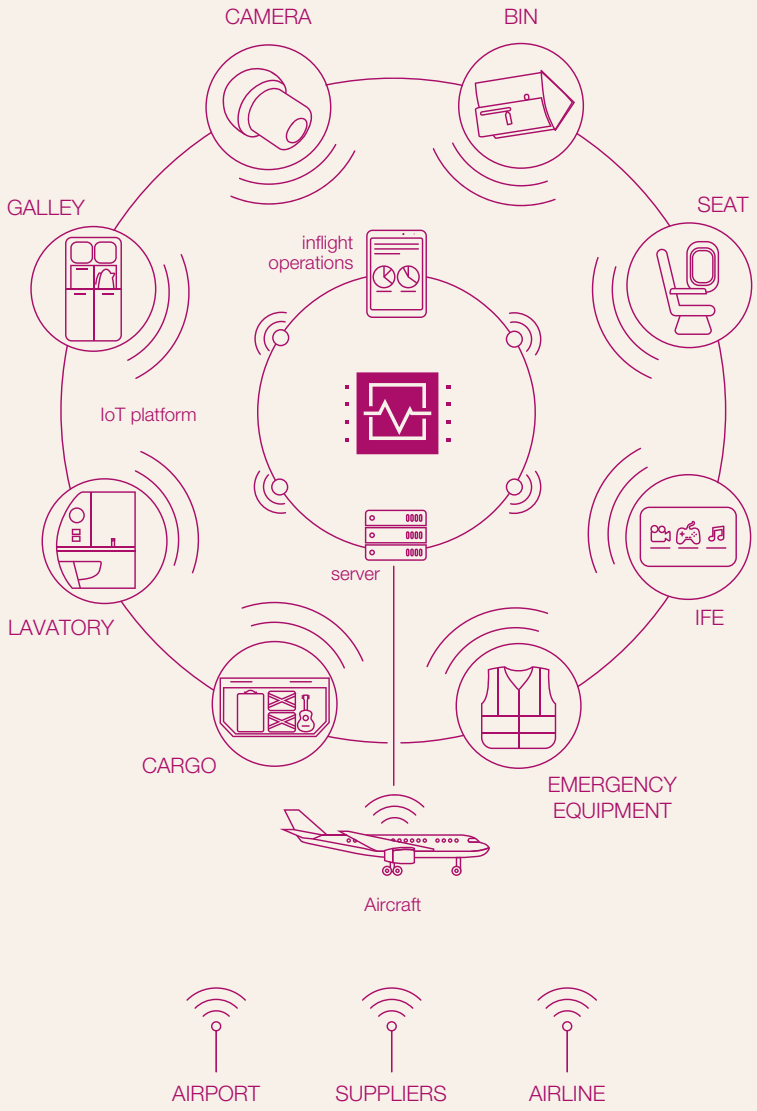
- Services related to passenger experience includes those services needed to maximise their flight experience. This can include cabin upgrades, cabin crew training, in flight entertainment (IFE), connectivity and booking. This market is expected to represent a cumulative $ **1.1**Tn over the next 20-years.

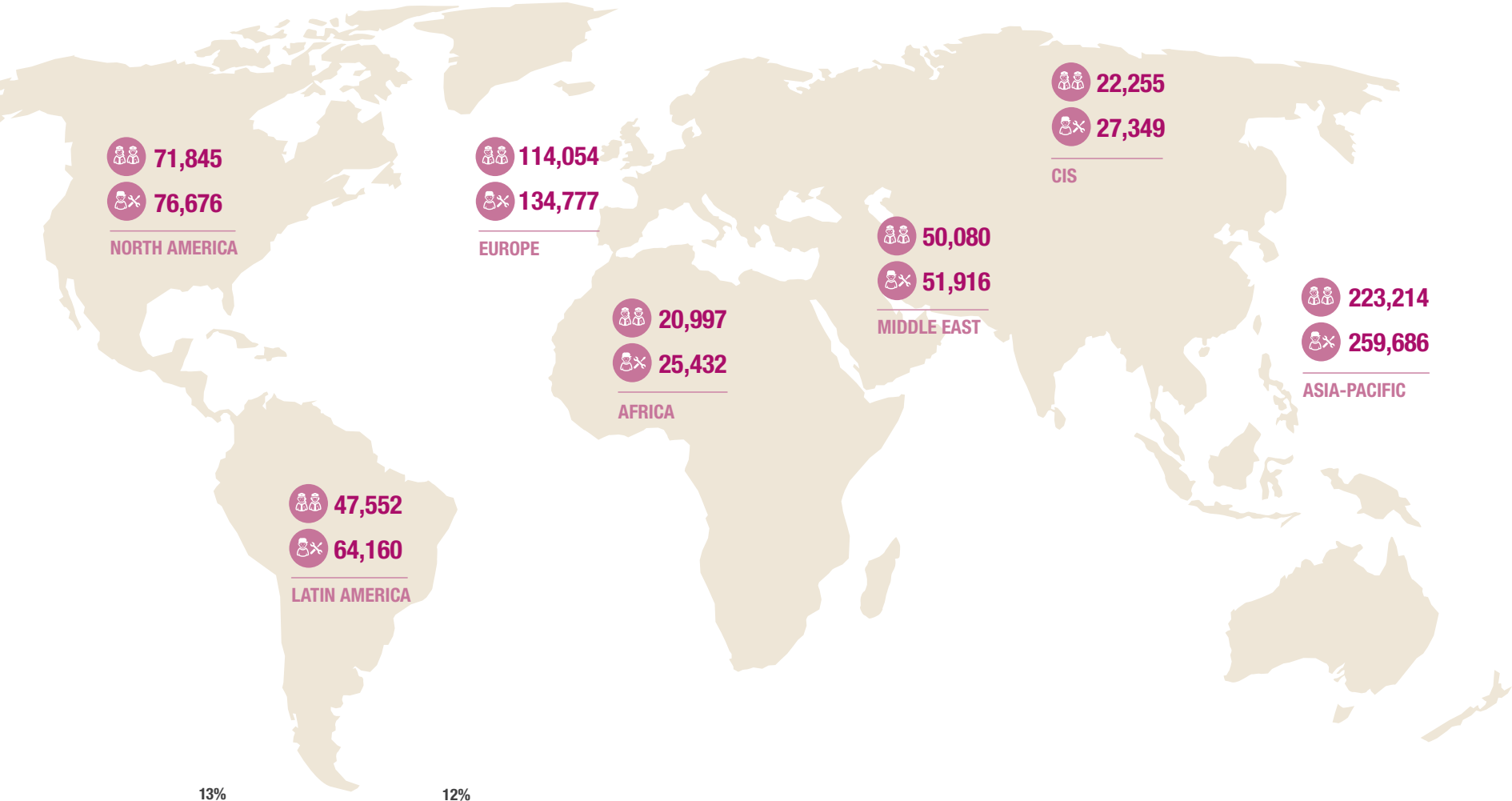
Cabin upgrades

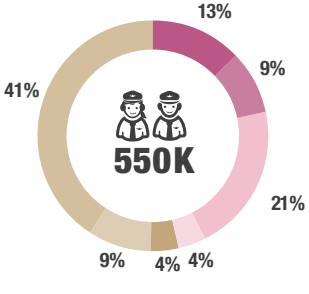
- Airlines are increasingly performing retrofit and product upgrades linked to cabin efficiency, in order to improve operational economics, this can include lightweight seats, space efficient monuments for example. These changes are also designed to meet the latest passenger experience standards which themselves are continuously evolving.
- By 2038, the cabin upgrade market is forecast to represent $270Bn. Seating, IFE and connectivity segments will form the major parts of the future cabin interiors market
- With an increasing number of connected aircraft, airlines are positioning themselves to address data driven operational efficiency as well as passenger experience topics. The connected cabin is a solution to answer passenger needs and give to airlines' flight crews significant benefits in the ways these can be met.

Internet of things

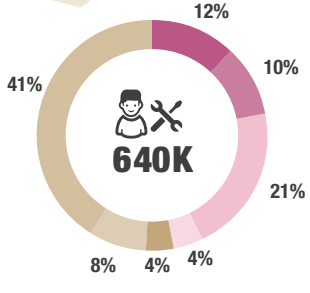
- The Internet of Things (IOT) will be an important enabler being able in real time to link core cabin components, including the galleys, meal trolleys, seats, overhead bins and other cabin elements. At the same time as allowing data exchange throughout the cabin for the crew.
- Airlines will also be able to use increased cabin connectivity to perform predictive maintenance analytics over their entire fleet – thus improving the overall cabin service reliability, quality and performance on board all of their aircraft.



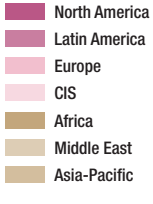




PILOTS NEEDS



TECHNICIANS NEEDS



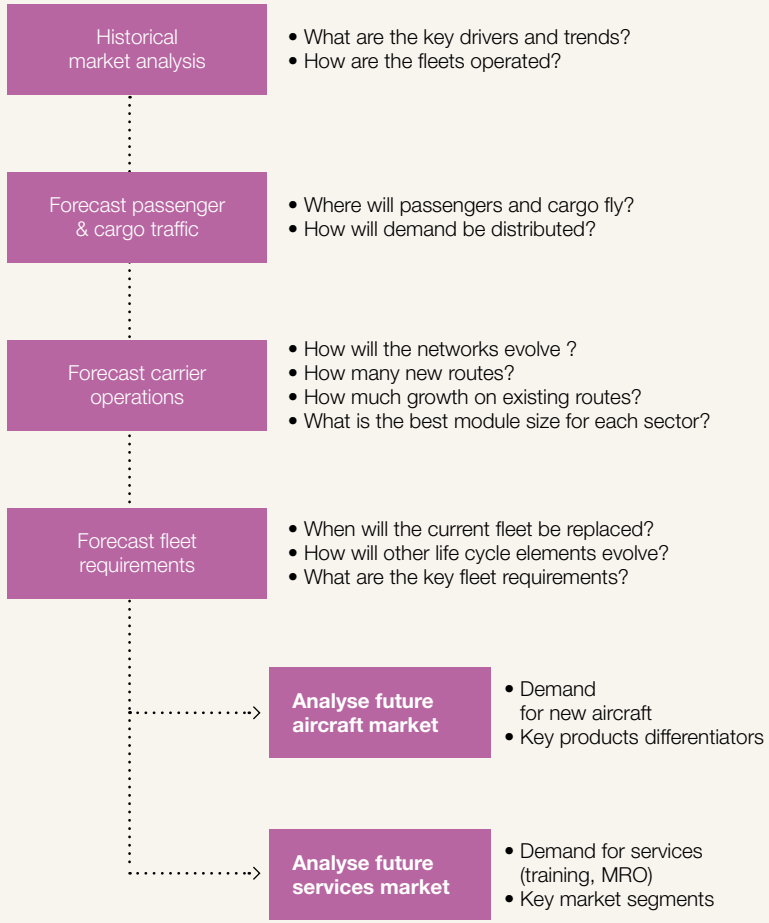
NEW PILOTS AND TECHNICIANS DEMAND FORECAST

For passenger aircraft ≥ 100 seats over the next 20 years
Source: Airbus GMF 2018

METHODOLOGY & SUMMARY DATA

08 Methodology & summary data

OUR METHODOLOGY AT A GLANCE



FORECASTING - ASKING THE RIGHT QUESTIONS

Our main data sources: OAG, Cirium, ACAS, Sabre, Seabury, IHS Economics, Oxford Economics, DoT, Eurocontrol, IATA, ICAO

NEW DELIVERIES 2019-2038

	AFRICA	ASIA-PACIFIC	CIS	EUROPE	LATIN AMERICA	MIDDLE EAST	NORTH AMERICA	TOTAL
SMALL	960	12,765	1,298	5,760	2,400	1,630	4,911	**29,724**
MEDIUM	188	2,168	125	1,035	189	473	696	**4,874**
LARGE	101	1,391	75	639	95	1,097	362	**3,760**
TOTAL	**1,249**	**16,324**	**1,498**	**7,434**	**2,684**	**3,200**	**5,969**	**38,358**

NEW PASSENGER AIRCRAFT DELIVERIES BY REGION

	AFRICA	ASIA-PACIFIC	CIS	EUROPE	LATIN AMERICA	MIDDLE EAST	NORTH AMERICA	TOTAL
CONVERSIONS	**85**	**493**	**39**	**244**	**81**	**34**	**655**	**1,631**

CONVERTED FREIGHT AIRCRAFT BY REGION

	AFRICA	ASIA-PACIFIC	CIS	EUROPE	LATIN AMERICA	MIDDLE EAST	NORTH AMERICA	TOTAL
SMALL	-	-	-	-	-	-	-	-
MEDIUM	14	102	16	56	12	14	285	**499**
LARGE	6	117	29	49	-	31	124	**356**
TOTAL	**20**	**219**	**45**	**105**	**12**	**45**	**409**	**855**

NEW FREIGHT AIRCRAFT DELIVERIES BY REGION

	AFRICA	ASIA-PACIFIC	CIS	EUROPE	LATIN AMERICA	MIDDLE EAST	NORTH AMERICA	TOTAL
SMALL	960	12,765	1,298	5,760	2,400	1,630	4,911	**29,724**
MEDIUM	202	2,270	141	1,091	201	487	981	**5,373**
LARGE	107	1,508	104	688	95	1,128	486	**4,116**
TOTAL	**1,269**	**16,543**	**1,543**	**7,539**	**2,696**	**3,245**	**6,378**	**39,213**

NEW PASSENGER AND FREIGHT AIRCRAFT DELIVERIES BY REGION

Source: Airbus 100+ seats (passenger aircraft) and 10t+ (freighters), Airbus GMF 2019

SAFE HARBOUR STATEMENT

Disclaimer

This presentation includes forward-looking statements. Words such as anticipates, believes, estimates, expects, intends, plans, projects, may, forecast and similar expressions are used to identify these forward-looking statements. Examples of forward-looking statements include statements made about strategy, ramp-up and delivery schedules, introduction of new products and services and market expectations, as well as statements regarding future performance and outlook. By their nature, forward-looking statements involve risk and uncertainty because they relate to future events and circumstances and there are many factors that could cause actual results and developments to differ materially from those expressed or implied by these forward-looking statements.

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