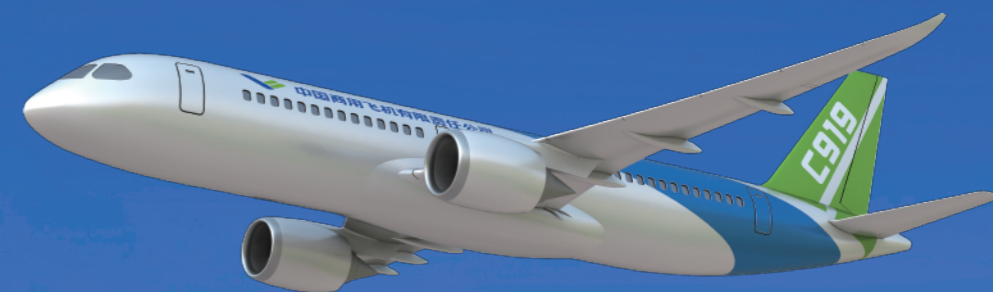




COMAC MARKET FORECAST 2019-2038

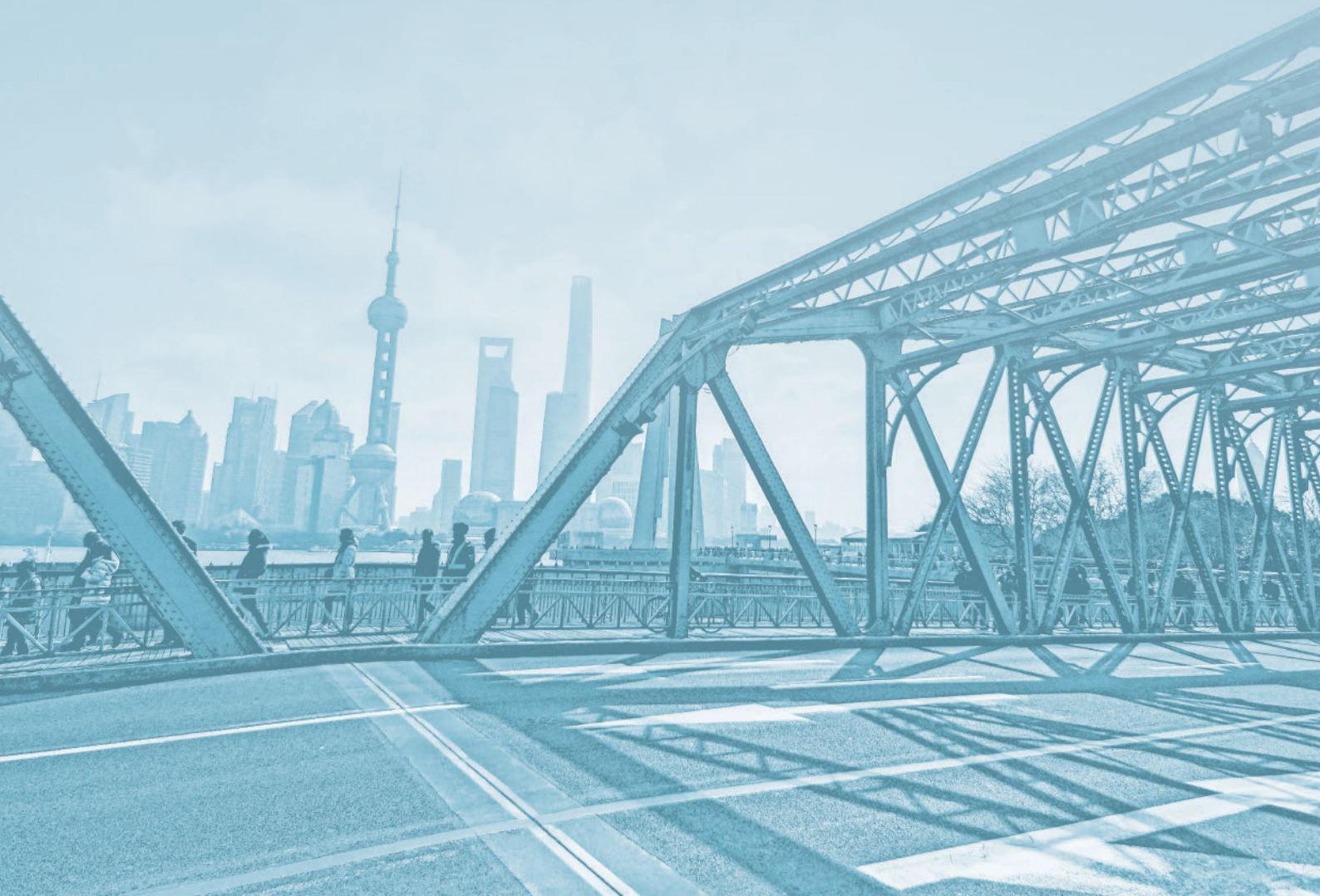
2019-2038

COMAC MARKET FORECAST



2019-2038

COMAC MARKET FORECAST





CONTENT		
1	PREFACE	4
2	EXECUTIVE SUMMARY	6
3	DRIVING FACTORS OF AIR INDUSTRY	10
	3.1 ECONOMY	12
	3.2 OIL PRICE	12
	3.3 NETWORK	13
	3.4 RETIREMENT AND RECYCLING TREND	14
4	CHINA AIR TRAVEL INDUSTRY OVERVIEW	16
	4.1 MARKET OVERVIEW	18
	4.2 CHINA REGIONAL MARKET	21
	4.3 CONNECTIVITY BETWEEN THE B&R AND CHINA AIR MARKET	23

5	TRAFFIC & FLEET FORECAST	26
	5.1 GLOBAL TRAFFIC FORECAST	28
	5.2 GLOBAL FLEET FORECAST	29
	5.3 CHINA	39
	5.4 ASIA PACIFIC	42
	5.5 NORTH AMERICA	45
	5.6 LATIN AMERICA	47
	5.7 EUROPE	49
	5.8 RUSSIA & CIS	51
	5.9 MIDDLE EAST	53
	5.10 AFRICA	56
6	FREIGHTER MARKET FORECAST	60
7	APPENDICIES & DATA TABLES	64
	7.1 FORECASTING METHODOLOGY	65
	7.2 AIRCRAFT SIZE CATEGORY DEFINITIONS	67
	7.3 GLOBAL RPK TRAFFIC FORECAST SUMMARY	68

PREFACE

A synergetic development of aircraft manufacturers, airlines, airports, air traffic control departments and civil aviation administration has promoted a steady and healthy development of the aviation industry. Despite facing the pressure of rising costs, the global air transport industry's net profit still reached 30 billion US dollars in 2018.

The International Air Transport Association predicts that the global air transport industry will continue to earn in 2019, will result in a 10th consecutive year of profit growth. Passengers will reach to 4.3 billion globally, which increased by 6.1% comparing to 2017. Passenger Load Factor increased by 0.6% to 81.9%, a historical high record.

China aviation market has taken the biggest market share of the global market. Air travel passengers are increasing to 59 million in 2018. In the future, China will usher in new opportunities along with the deepening reform, opening up and promoting "the Belt and Road" Initiative.

We also have reviewed the some potential risks which will restrict the aviation industry development. Negative factors from extending trade protectionism and de-globalization will inhibit aviation transport demand. Increasing oil price would be the potential challenge to sustainable profit. However, the technological progress

of aircraft and engine manufacturing, together with improvement in airlines' operations will lead to an increase in fuel efficiency, on reducing the aviation industry's adverse impact from increased oil price.

COMAC has participated in the global aviation industry development, since its inception establishment in 2008. In the past decade the COMAC marketing team has made forecasts of the aviation market to share our views on aviation market in the next 20 years.

Emerging markets presented a sustained rapid increase in demand on air travel. Based on our research on expectations of economic growth, air fare, fuel price, fleet development, replacement demand, airline strategic planning and network evolution, COMAC Market Forecast 2019-2038 (CMF). We forecast that the annual growth rate of RPK in the next 20 years will be 4.3%, total deliveries of all types of commercial jets will be 45,459, and market value will be 6.6 trillion UD dollars.

In this report, we outline an objective view of the demand growth of regional and global air passenger markets.

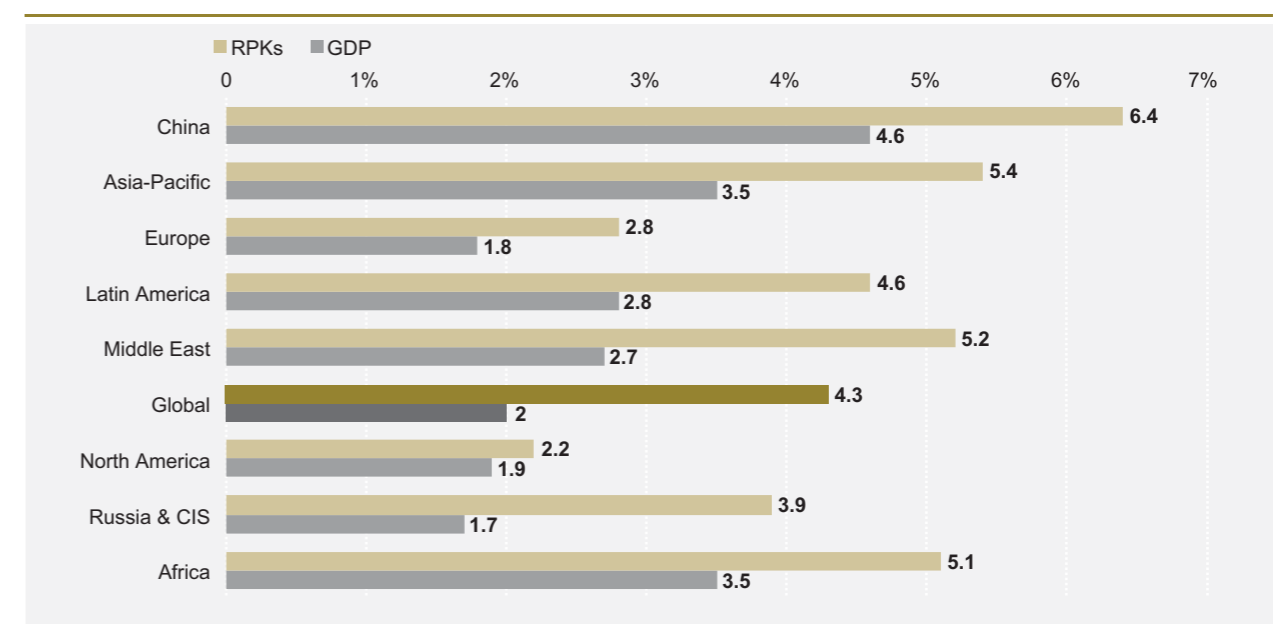
We have special focus on the fastest the China domestic market, providing new perspectives for aviation development in future.

2019-2038 Forecast Summary

	China*	Asia Pacific**	Europe	Latin America	Middle East	North America	Russia & CIS	Africa	Global
Average GDP Growth Rate	4.61%	3.52%	1.77%	2.84%	2.70%	1.85%	1.72%	3.52%	2.04%
Average RPK Growth Rate	6.40%	5.40%	2.80%	4.60%	5.20%	2.20%	3.90%	5.05%	4.30%
2035 RPKs (trillion)	4.1	4.3	3.4	1.1	2.3	2.9	0.6	0.5	19.1
Deliveries									
Twin-Aisle	2,128	1,969	1,506	359	1,254	744	321	367	8,648
Single-Aisle	6,119	6,518	7,249	2,403	1,737	6,040	1,082	907	32,055
Regional Jet	958	613	408	586	87	1,497	229	378	4,756
Total	9,205	9,100	9,163	3,348	3,078	8,281	1,632	1,652	45,459
Market Value B\$									
Twin-Aisle	684	632	479	114	431	211	94	111	2,756
Single-Aisle	694	755	815	272	196	687	113	100	3,632
Regional Jet	46	31	20	28	4	72	12	18	231
Total	1,424	1,418	1,314	414	631	970	219	229	6,619
End 2018 Fleet									
Twin-Aisle	688	1,021	946	158	728	668	131	163	4,503
Single-Aisle	3,118	2,487	3,608	1,230	567	4,142	830	475	16,457
Regional Jet	48	174	320	86	70	1,838	234	163	2,933
Total	3,854	3,682	4,874	1,474	1,365	6,648	1,195	801	23,893
End 2038 Fleet									
Twin-Aisle	2,420	2,337	1,795	370	1,470	720	372	444	9,928
Single-Aisle	6,938	6,635	8,206	2,373	1,884	6,484	1,103	1,022	34,645
Regional Jet	986	614	482	628	131	1,497	246	401	4,985
Total	10,344	9,586	10,483	3,371	3,485	8,701	1,721	1,867	49,558

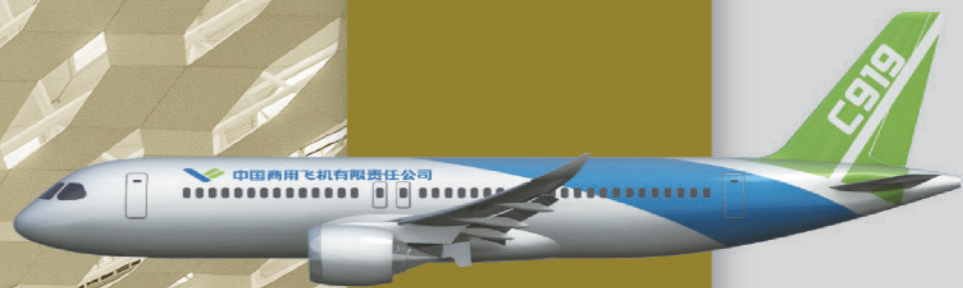
* China includes Hong Kong, Macau and Taiwan ** Asia-Pacific excludes China
Source: COMAC, Flightglobal, IHS

Global Forecast Outlook



Source: COMAC, IHS





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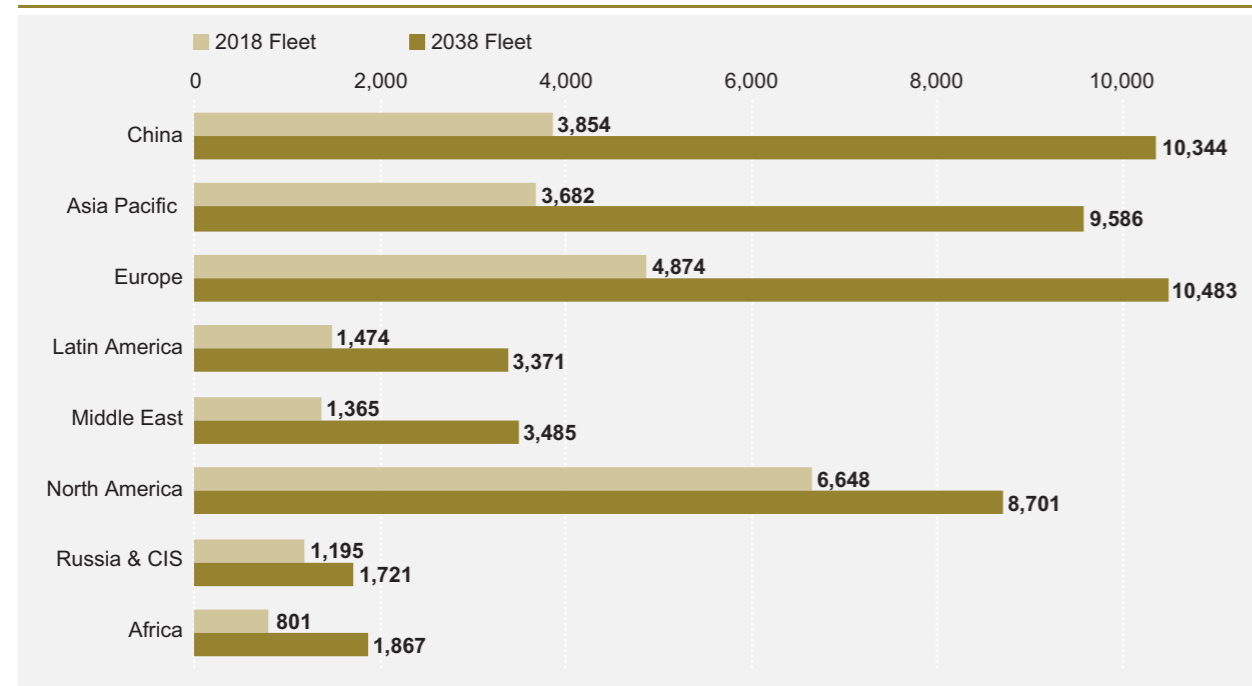
EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Total passenger demand, as measured in RPKs, is forecast to increase over the next 20 years at an average annual rate of 4.3%. We expect that RPKs in China related markets will grow at 6.4% per annum on average over the next two decades. This demand

forecast is based on the projection of long-term growth in the global economy of 2.0% per year for the period to 2038. The demand growth rates of emerging economies are higher than the world average.

Global Fleet Forecast



Source: COMAC, Flightglobal (China includes Hong Kong, Macau and Taiwan)

Passenger Jet Fleet and Traffic Forecast Summary

	Global total		China		
	Fleet	RPKs (trillion)	Fleet	% of the global total	RPKs (trillion)
2018	23,893	8.2	3,854	16%	1.2
2023F	29,668	10.2	5,417	18%	1.7
2028F	34,917	12.8	7,213	21%	2.4
2033F	42,194	15.7	9,067	21%	3.2
2038F	49,558	19.1	10,344	21%	4.1
2018-2038 CAGR	3.70%	4.30%	5.30%	--	6.40%

Source: COMAC, Flightglobal

We expect that the total air passenger demand in 2038 to be 2.3 times the current level; accordingly, the average seat per aircraft figure and efficient use of aircraft will increase gradually. However, the world's fleet size is expected to increase at a slower rate than demand. We forecast that the fleet size will reach to 49,558 aircraft by 2038, which is more than twice the current operating fleet of 23,893 aircraft.

It is expected that out of the current operating fleet, 19,786 aircraft (around 83%) will be retired from commercial passenger services in the next twenty years. They will be converted to business aircraft,

freighters and other roles, or permanently scrapped and subsequently be replaced. Additionally, there is a need of 25,673 new aircraft in the global fleet market. Therefore, we expect that there will be a need for the delivery of over 45,459 new aircraft worth \$6.6 trillion (based on 2018 dollar term and at list prices) over the next 20 years for both replacement and growth, and above two-thirds of them are single-aisle jets. We estimate that China-based airlines will need to take delivery of 9,205 aircraft worth around \$1.4 trillion at 2018 list prices. By the end of forecast period, China's share of the world's operating passenger aircraft fleet will rise from 16% to 21% in 2038.

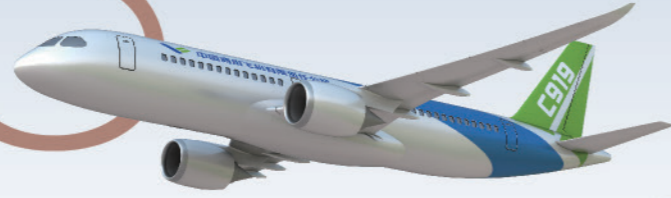
2019-2038 Passenger Jet Delivery Forecast Summary

		Global total		China
		Deliveries	Market value hundred million \$	New deliveries
Regional Jets	50-seats	160	47	0
	70-seats	436	197	0
	90-seats	4,160	2,061	958
Single-Aisle	120-seats	2,012	1,691	168
	160-seats	21,807	24,131	4,625
	200-seats	8,236	10,487	1,326
Twin-Aisle	250-seats	6,306	18,398	1,466
	350-seats	1,692	6,197	593
	400-seats	650	2,970	69

Source: COMAC



3



DRIVING FACTORS OF AIR INDUSTRY

- ECONOMY
- OIL PRICE
- NETWORK
- RETIREMENT AND RECYCLING TREND



Economy

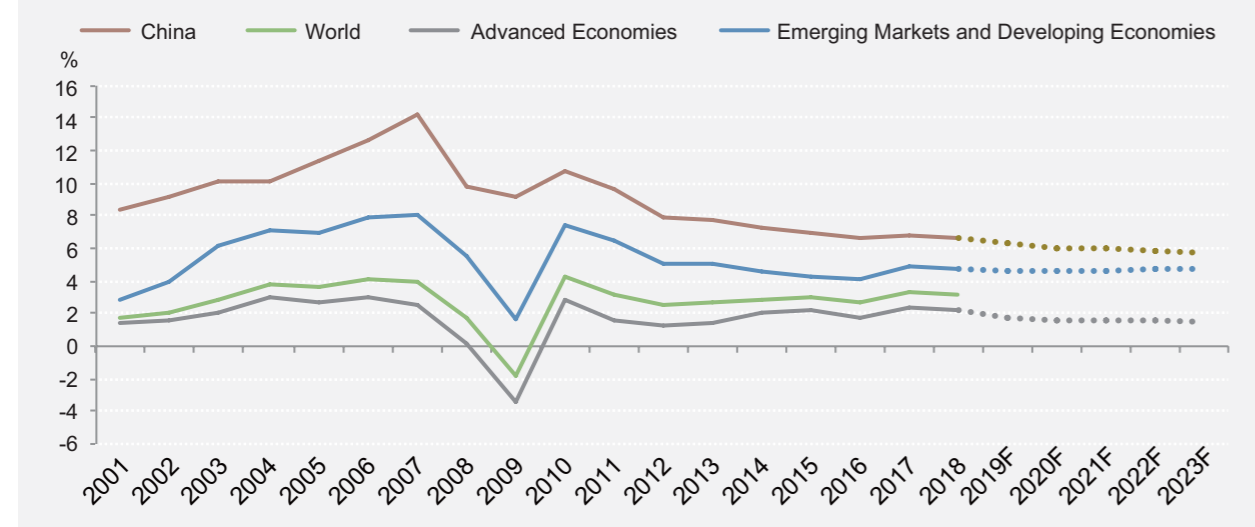
Global Economic Trends

In 2018, global GDP increased by 3.19%, reflecting a sluggish growth in the global economic. The major developed economies except the United States, such as the Eurozone and Japan, have seen a slowdown in economic growth; compared to last year, emerging markets have shown significant differentiation in 2018. The Middle East, North Africa and Russia have seen a certain rebound, but Latin America and the Caribbean have gone through a period of economic

instability/turmoil.

Heightened trade tensions have brought instability to international business activities and reduced investment confidence. The rising debt levels, the slowdown in international trade growth and the downturn in international direct investment will affect the development of the global economy in the coming period.

Real GDP Growth (%YoY) & Projections for Major Country Groups



Source: COMAC, IMF

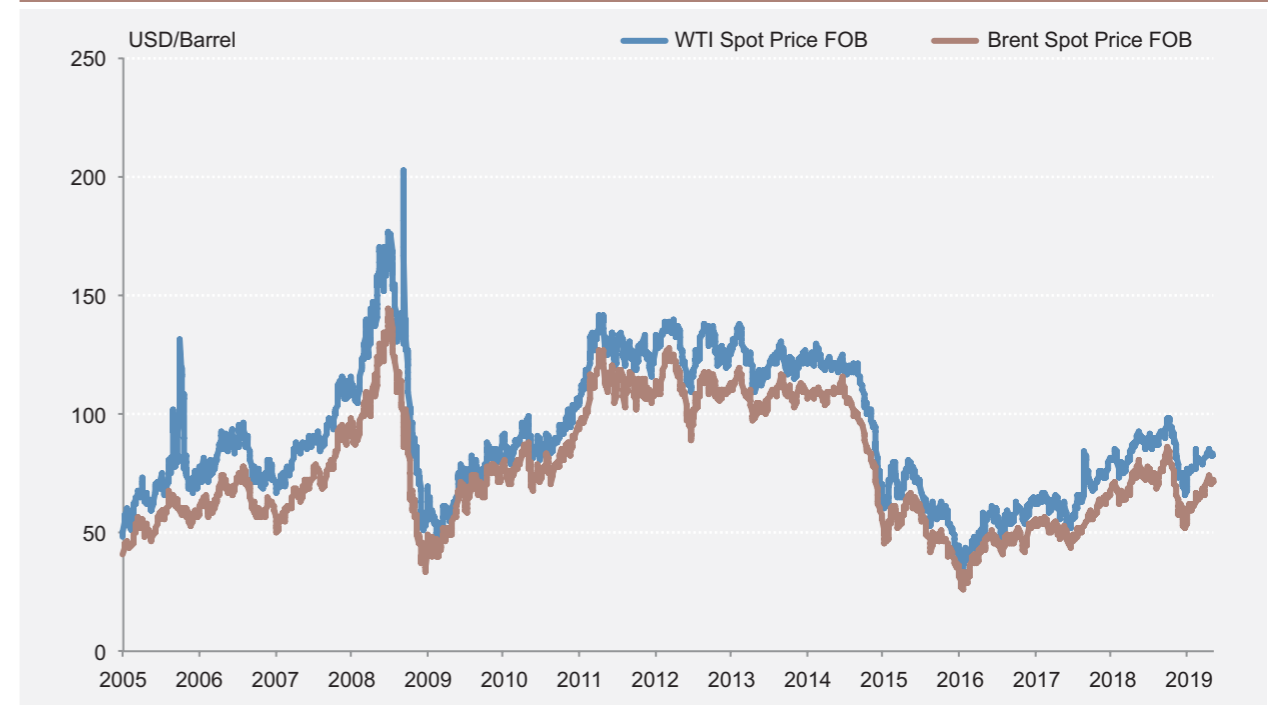
Oil price

In the past ten years, because of the impact of geopolitics and economic activities, the international oil price experienced dramatic fluctuations. Since the global financial crisis in 2008, the oil price dropped from \$145 per barrel to the lowest of \$26 per barrel, more than 80% reduction in price. In 2009, OPEC has adjusted down daily production to 450,000 barrels per day, the oil price recovered to the highest point of \$140 per barrel, and kept on the high price until 2014. The oil price went down again from 2014 mainly due to overcapacity

problems in developed countries.

Since 2018, driven by geopolitics and OPEC output cuts, international oil prices increased, exceeding \$85 in September, and declined sharply after October due to sustained easing in supply and geopolitical events. It fell to about \$60 as of December 7. It is expected that the oil price in 2019 will be affected by OPEC's output reduction, production cost driving and geopolitical instability, with a higher probability of rising.

Oil Spot price FOB (2005-2019.5)



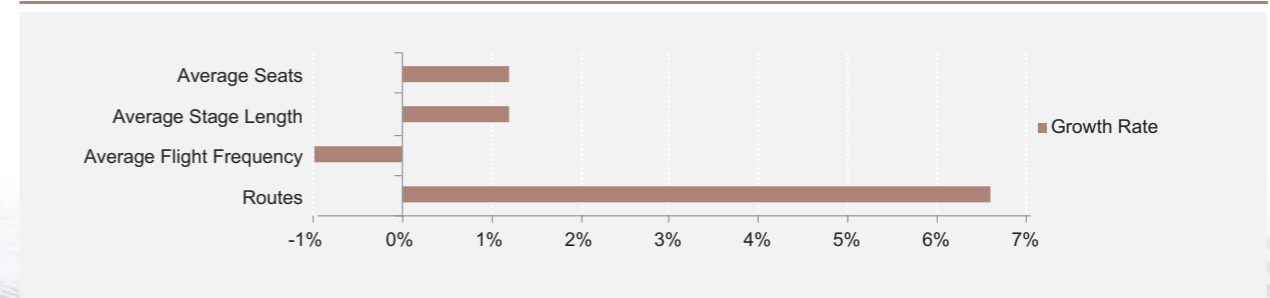
Source: COMAC, EIA

NETWORK

In 2018, the global ASK increased by 7.0%. The main driving factor is the increase in the number of routes. More new routes were launched with a total of 31,982 routes operated worldwide during the year, an increase

of 6.6% comparing with the previous year. Both the average seat number and the average flight distance increased by 1.2%, from 153 seats to 155 seats, 1,417 km to 1,434 km respectively.

Global Network Growth in 2018 (compared with 2017)



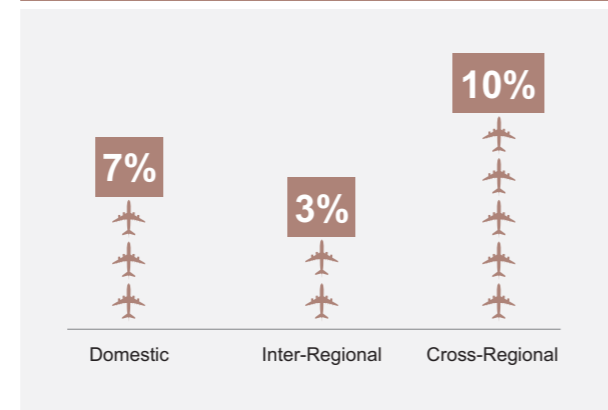
Source: COMAC, OAG

The cross-continental market has maintained high growth in recent years, and the connectivity in the long-haul market has been enhanced. The number of new routes increased by 10.1% in 2018, climbing from 7.2% in the previous year. Among these, the number of new routes in the Russia & CIS - Europe market increased 20.3%, and more new routes launched in the Middle East-Europe and Middle East-Asia Pacific market as well.

In the inner-regional market, the number of new international routes only increased 2.8%, but faster than the last year. International market in the Russia & CIS region grows the fastest, with the increase rate of the new routes reaching 11.7%.

Domestic market showed a slight decline, but the growth rate remained at 7.4%. The number of new routes in China, Russia & CIS increased much faster than in other regions.

Network Growth in Each Market in 2018 (compared with 2017)



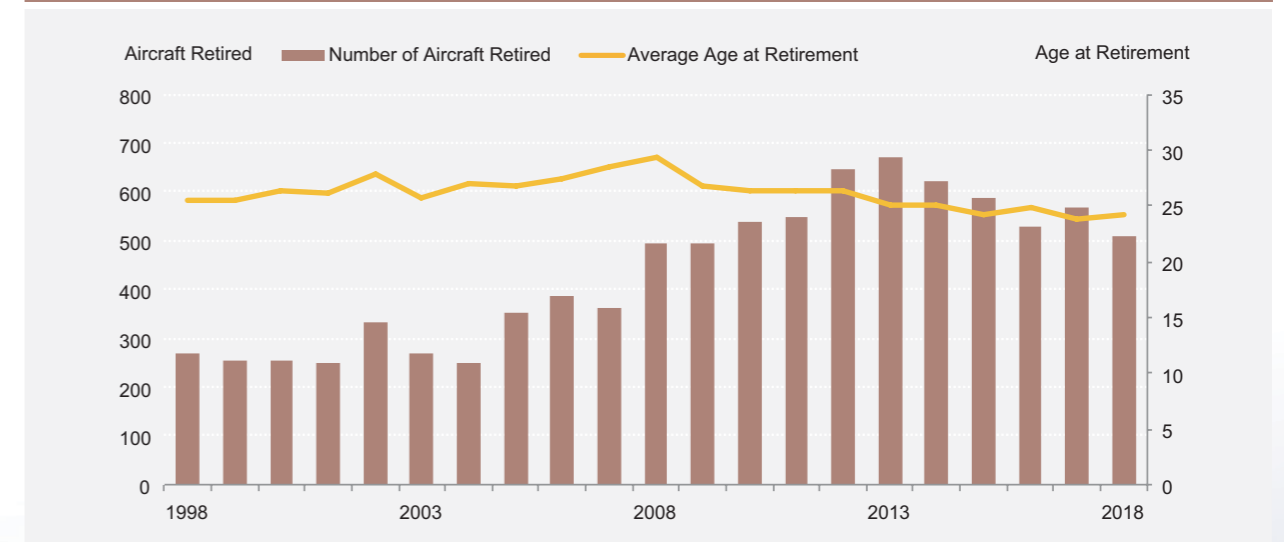
Source: COMAC, OAG

Retirement and Recycling Trend

A total number of 507 passenger aircraft had retired in 2018, which represents a slight decrease compared with the figure in 2017. The average aircraft age at retirement is currently at a historical low level. From 2005 to 2010, the average retirement age was higher, exceeding 27 years. In 2008, the figure once reached a historically high point of 30 years, and since then, it has been declining.

Comparing to a decade ago, the number of fleet retired is at a historical high level. During the period between 1998 to 2007, the yearly average number of passenger aircraft retired were below 400. Those figures became around 565 during the period between 2008 and 2018. The rising trend reflected replacement took place at a faster speed in major markets across the globe.

Historical Passenger Fleet Retirement Trends (1998-2018)



Source: COMAC, OAG

Fluctuation of fuel price is one major factor which affects the decision making of fleet retirement by the airlines in last 10 years. The pressure of declining profit will force airlines to replace old aircraft types with new high fuel efficient ones. The aircraft production rate of the global original equipment manufacturers (OEMs) also has impact on fleet retirement speed. The airlines will have

to keep their old fleet in order to maintain the capacities when there is not enough new aircraft slots available. For the OEMs, it is crucial to have both the capability to produce aircraft with better performances and the capability to raise and maintain the production levels as the market demands.



4



CHINA AIR TRAVEL INDUSTRY OVERVIEW

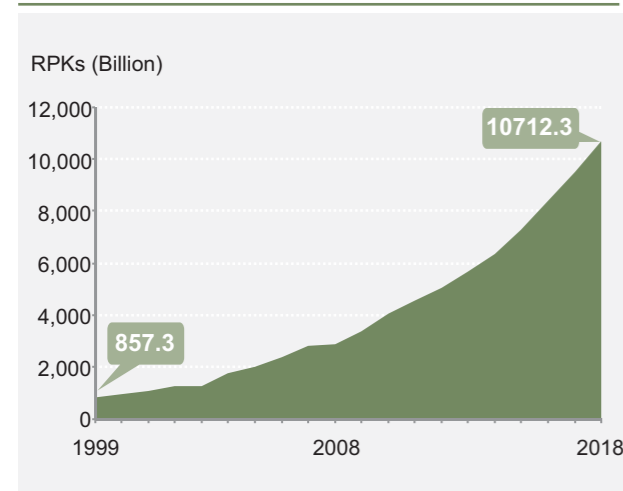
- 🌿 MARKET OVERVIEW
- 🌿 CHINA REGIONAL MARKET
- 🌿 CONNECTIVITY BETWEEN THE B&R AND CHINA AIR MARKET

Market Overview (Mainland China)

2018 was an important year for China to implement the 13th Five-Year plan. The keynote in this period is to pursue steady economic growth. Against this backdrop, the aviation industry has been carrying out its own development plan, and many breakthroughs have been achieved.

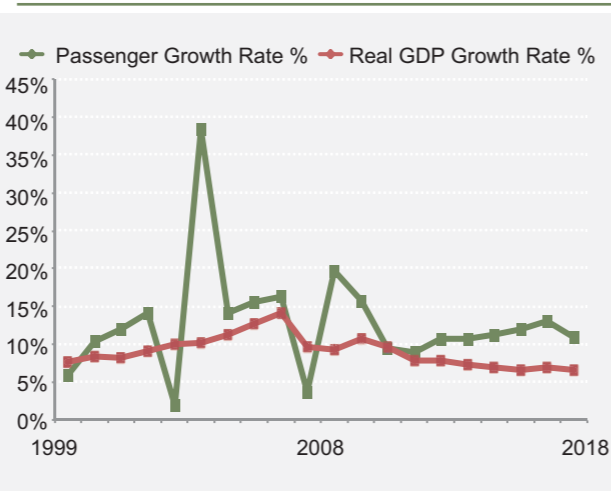
In 2018, total traffic, measured in RPKs, recorded by airlines in mainland China has increased by 12.6% compared with 2017, reaching the amount of 1071.2 billion, while the total number of passengers carried by airlines has grown by 10.9% to 610 million. There is still a growing strong demand in China's air transport market.

China RPKs Trends (1999-2018)



Source: COMAC

China Real GDP and Passenger Traffic Trends (1999-2018)



Source: COMAC CAAC IMF

Steady Increase and Upgrading in the Economy

China's real GDP grew by 6.6% to about 90 trillion RMB in 2018 which is an increase by 8 trillion compared with 2017. Growth in high-tech manufacturing industries, strategic emerging industries and equipment manufacturing industries increased by 11.7%, 8.9% and 8.1% respectively. China's economy is undergoing a transformation both in terms of industrial sectors upgrading and efficiency improvement, which will enable it to gain more potential and gather larger momentum for long term growth.

In terms of consumption, during the year 2018, the growth rate of total retail sales of consumer goods has decreased by 1.2%. On the other hand, the amount of service and innovative goods consumption has increased. In 2018, total retail sales reached 38.1 trillion RMB, representing a 9% year-on-year growth. Overall, consumption has accounted for 76.2% of the GDP. Increase in service consumption is considered to be the main reason for the decrease in total retail sales growth rate. Per capita disposable income reached 28,228 RMB, representing an increase of 6.5%, which is lower

than 2017's 7.3%.

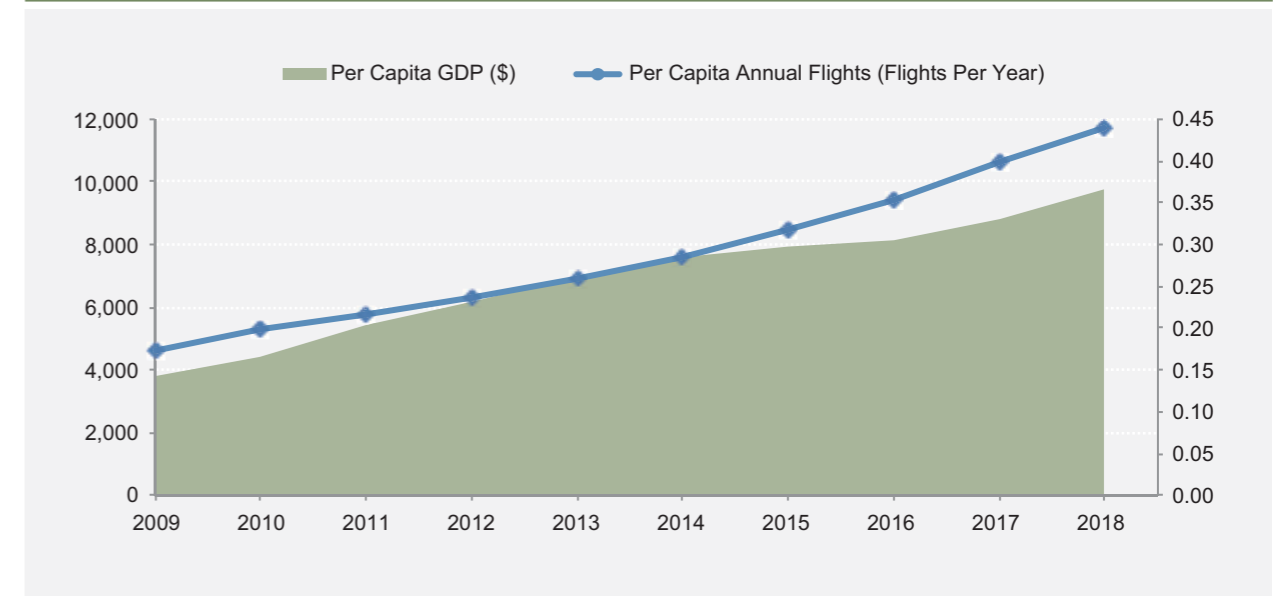
In terms of investment, fixed investments was 63.5 trillion RMB in 2018, a 5.9% increase compared with 2017. 60,533 more entities and projects have received foreign direct investment, the total amount of FDI has reached 885.6 billion RMB. Companies and capital from the countries in the Belt&Road initiative have established 4,479 new entities in China, the number has increased by 16.1% from the year 2017 reaching 42.4 billion RMB.

In 2018, China's economic structure and quality is steadily improving, and people's live standards continue to increase. We believe that the air transport industry will continue to prosper against this background.

China's GDP per capita was 9,768 U.S. dollars in 2018, 3 times the figure 10 years ago.

Per capita annual flight has reached 0.44 times in 2018, having increased by 255% compared with 10 years ago.

China Per Capita GDP and Per Capita Annual Flight (2009-2018)



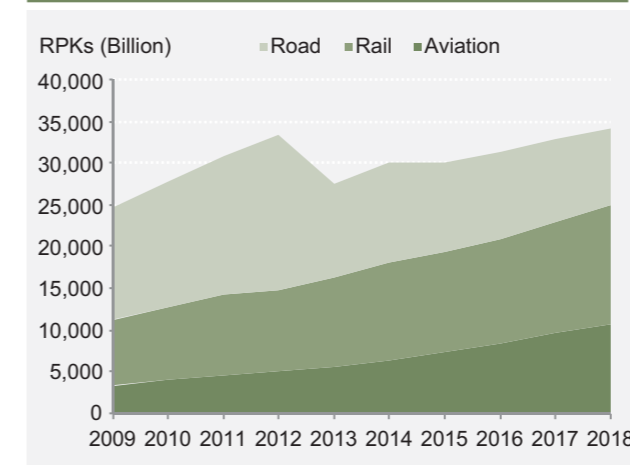
Source: COMAC, CAAC, IMF, STATS

Air Transport Market Demand

In the recent decade, China's transport markets have been developing rapidly. Notably, the amount of air transportation, measured in RPKs has been growing at

an average yearly rate of 12.6%, which has been the highest among all kinds of transportation.

Major Transport Modes RPKs Trends in Mainland China (2009-2018)



Source: COMAC, MOT

Comparison of Major Transport Modes in Mainland China (2009-2018)



The total volume of civil air transportation of cargo has kept steady growth. The growth rate was 4.6% in 2018, slightly lower than the 6.65% rate of 2017. However,

factor in the distance of transportation, air cargo transportation's turnover has increased quickly, grown by 7.7%, which is the highest of all modes of transportation.

Different Transport Modes' Freight Volume and Growth in 2018

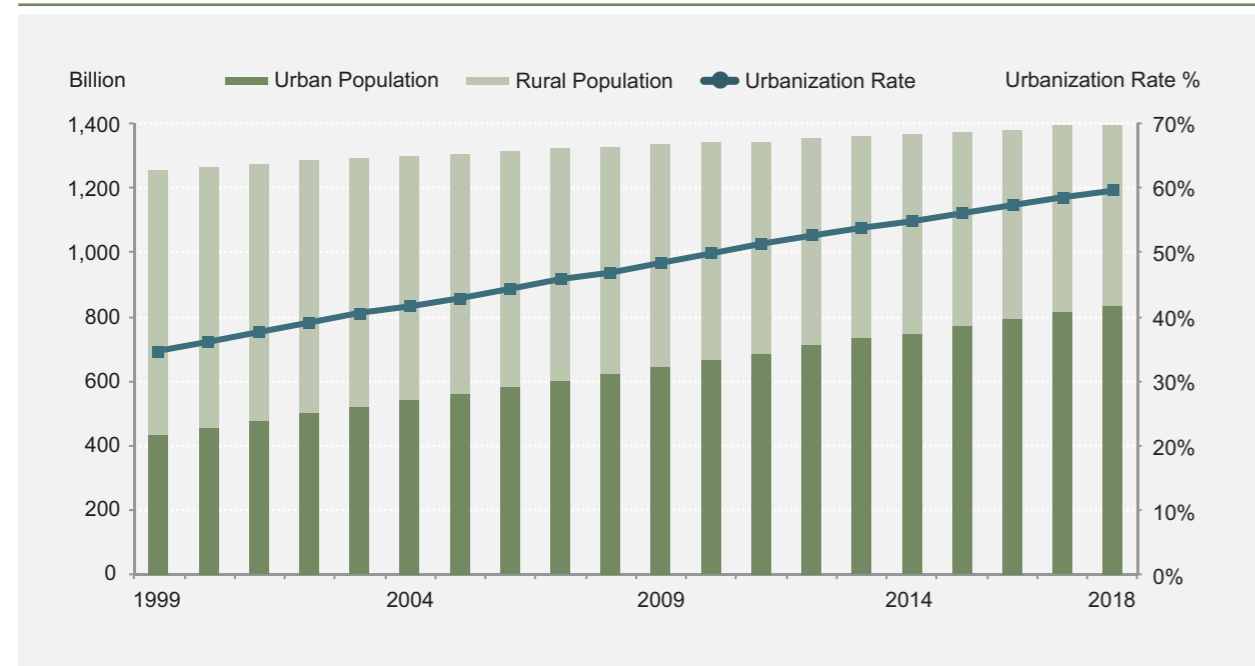
	Freight Volume (Billion Ton)	Rail (Billion Ton)	Road (Billion Ton)	Aviation (Million Ton)	Freight Turnover (Billion Ton-Km)	Rail (Billion Ton-Km)	Road (Billion Ton-Km)	Aviation (Billion Ton-Km)
2017	472.4	36.9	368.7	705.8	192,588.50	24,097.1	66,771.5	243.5
2018	514.6	40.3	395.9	738.5	205,451.60	28,821.0	71,202.5	262.4
Growth Rate (%)	7.3%	9.2%	7.4%	4.6%	4.1%	6.9%	6.6%	7.7%

Source: STATS

New Achievements in Urbanization

China's urbanization rate reached 60% in 2018, and population growth is stable.

Urbanization (1999-2018)



Source: STATS

The urbanization of China forged ahead steadily in recent years. As a result, the rise of small and middle cities extended the network of air transportation in those parts. Increasing income per capita improved the consuming behavior and abilities, making air transport, which was considered to be too expensive in the past, be widely accepted. The demand of pursuing fast and

convenient transportation service is growing in second and third tier cities. Much more small cities now need well-established, more convenient and economic regional air service, including more destinations available by air travel and more flights on the existing point-to-point schedule flights and point-to-hub routes.

The Belt & Road Initiative Powers Air Transportation

Recent years, China's air transport industry had been developing rapidly. Many airlines also expanded their inputs in the international markets. Both Chinese passengers' growing demand to go abroad by air and deepened internationalization give Chinese airlines incentive to enter more international markets. By the end of 2018, airline routes have already connected the

mainland China to 59 B&D countries, including all the countries in Central and East Asia, and 10 countries in Southeast Asia. Compared with 2017, the B&D market has seen increase in both airlines capacity, and the number of routes, with Southeast Asia recorded the highest growth.

Supply Side Reform

The Chinese economy has entered a period of high-quality development after decades of rapid growth. In 2018, the country's GDP growth rate was 6.6% while the economic structure continued to transform. China was experiencing a period of change from an industrial-dominating economy to one driven more by the advanced service sectors. The third industry currently contributes about 52.2% of GDP, which represented an

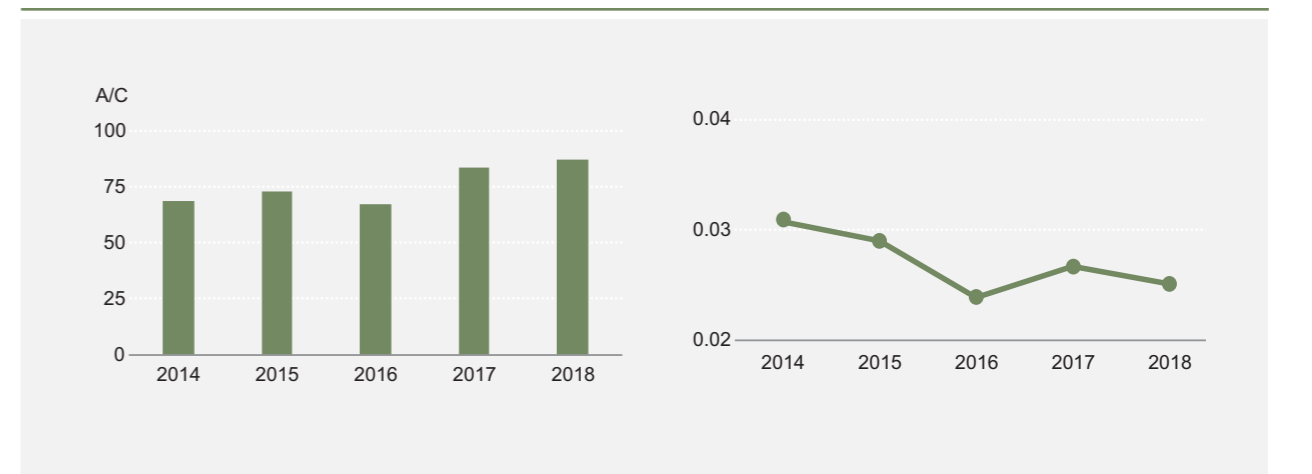
increase of 0.3% compared with 2017. As the supply side reform continues on deeper levels in 2018, the key tasks of capacity reduction, deleveraging, cost reduction and improving less developed areas are gaining solid progress. Through these reform measures, China is replacing its old model of economic growth with a new one at quicker paces.

The Regional Air Transport Market

By the end of 2018, Chinese mainland airlines operate 79 regional aircraft. Over the past five years, the number of Chinese regional aircraft remained stable. However, the percentage of regional fleet has declined over the years due to growth in the number of overall fleet.

As old generations of ERJ and CRJ aircraft gradually retired, at present, MA60 and CRJ900 are the main models in the Chinese regional market. As a new entrant, 12 ARJ21-700 have also been delivered and went into commercial service.

2014-2018 Chinese Regional Jet Fleet



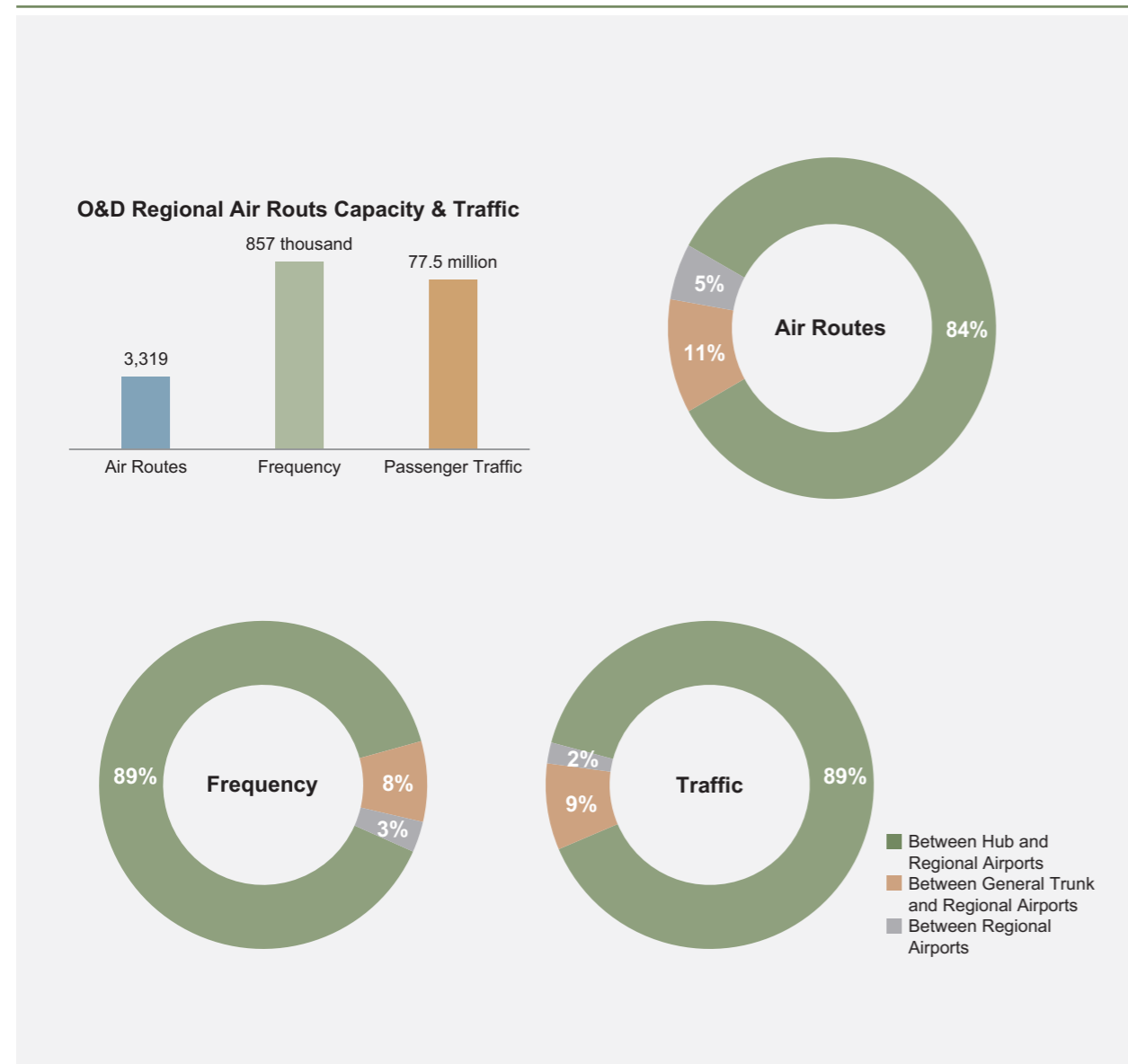
Source: ASCEND, COMAC

In 2018, China(excluding Hongkong and Macao) established 6 new regional airports, 168 airports are under 2 million throughput, among of which, 110 airports are under 500 thousand throughput.

Regional Airports in China

Almost half of the routes in China connect regional airports, most of them are between regional airports and hubs. These are also the routes with most flights and airlines capacity. Routes between the regional airports, however, are few and have seen small number of flights and passengers.

Distribution of Regional Routes Capacity&Traffic Volume



Source: COMAC, IATA Airport-IS, COMAC

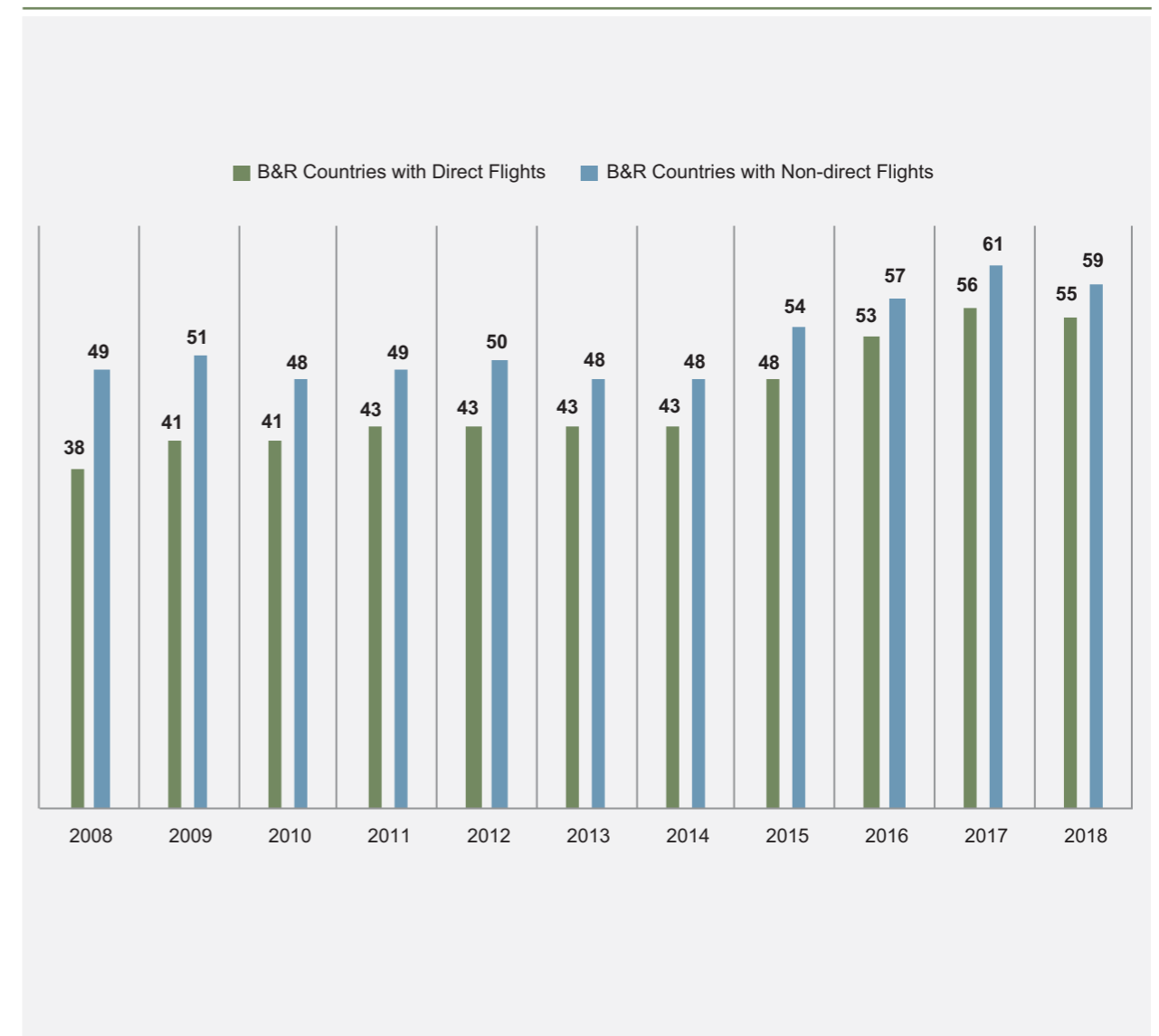
Air Transport Between the B&R Countries and China

By the end of 2018, among the 128 B&R countries, 95 have signed air transport bilateral agreements with China; 59 countries have commercial schedule flights connecting to China, and 55 countries have direct flights to China. Czech Republic, Oman, Belarus, Portugal, Serbia, Panama, Iraq, South Sudan, Fiji, Papua New Guinea and Syria are the new countries which started to have direct flights with China in 2018.

development of air transport market between China and B&R countries sees large developmental potential. Among them, the market between China and Southeast & East Asian is a highlight, and also countries in Eurasia, Western Asia and North Africa. From 2013 to 2018, the annual composite growth rate of market capacity (ASK) between China and B&R countries is about 12.7%, while the domestic market growth rate of B&R countries is 7.17%, and the inter-country markets among B&R countries is 8.30%.

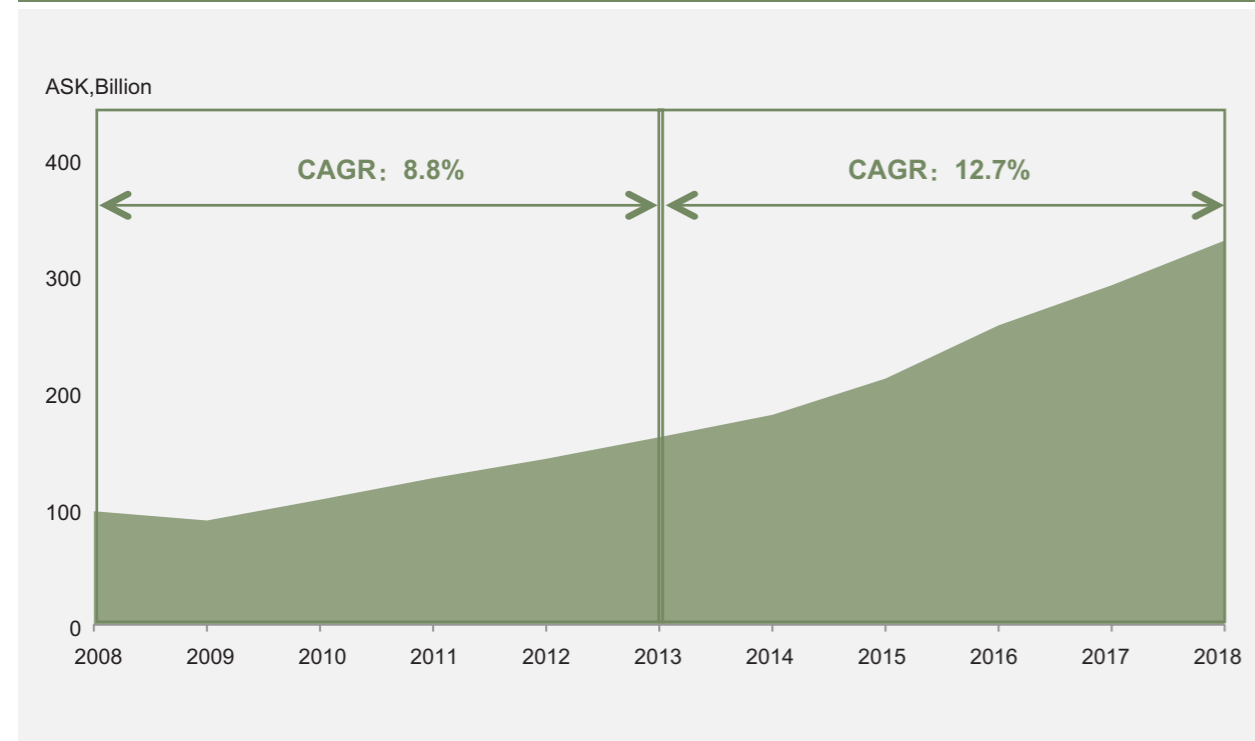
As the membership of B&R continues to expand, the

Flights between China and B&R Countries



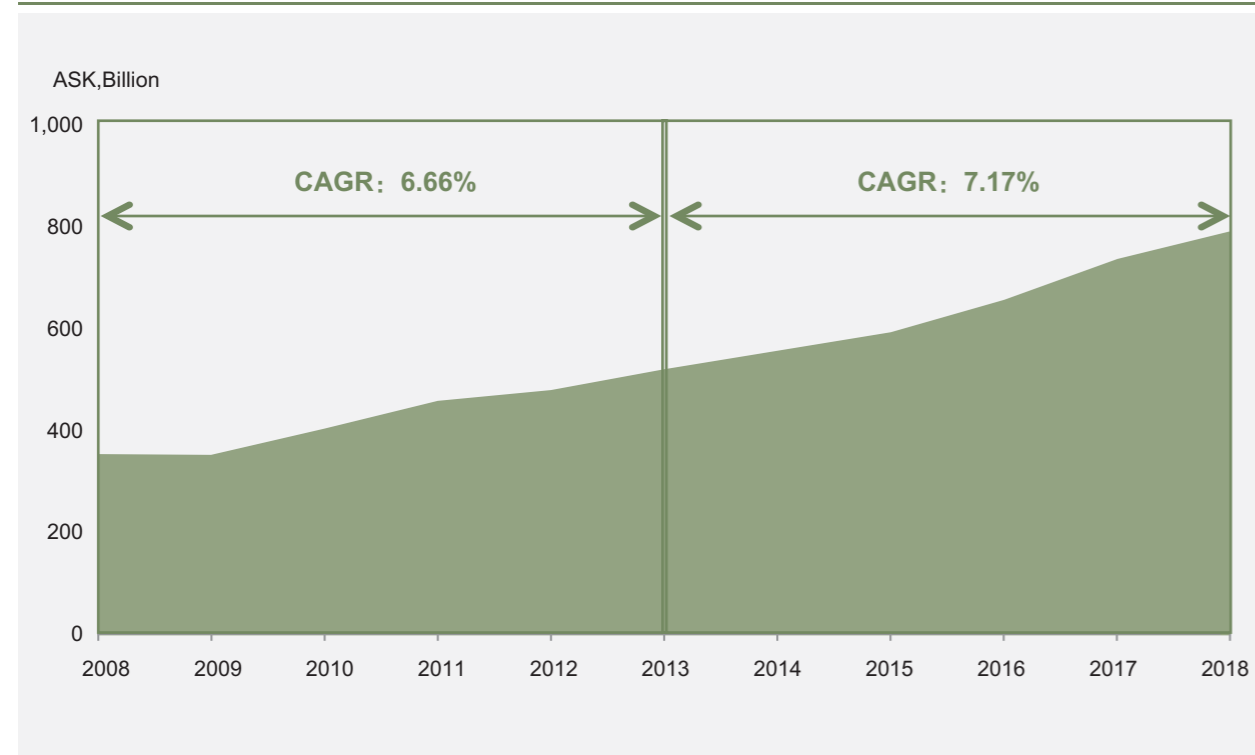
Source: COMAC, OAG, Belt and Road Portal, CAAC Portal

Historical ASKs Trend between China and B&R Countries



Source: COMAC, OAG, Belt and Road Portal, CAAC Portal

Historical ASKs Trend of B&R Countries Domestic



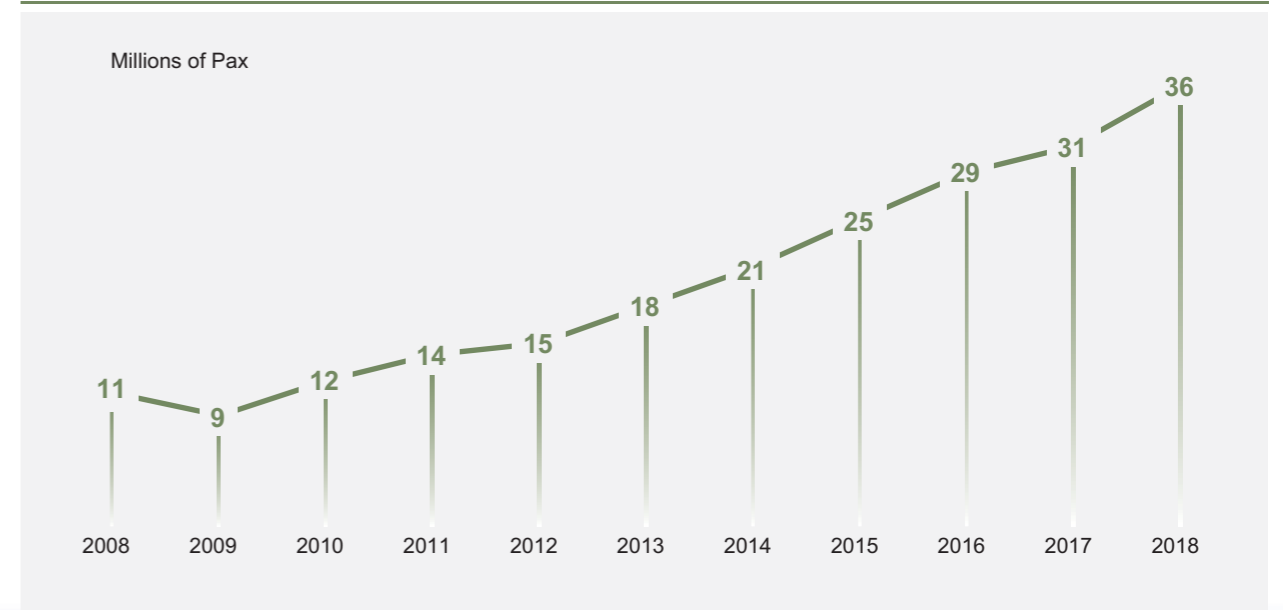
Source: COMAC, OAG, Belt and Road Portal, CAAC

Six years after the initiative first commenced, the number of air routes between China and B&R countries has increased significantly. The number of O&D routes between China and B&R countries increased from 439 to 908. The largest number of routes are between China and other East Asian and Southeast Asian countries, followed by China-Eurasia routes.

Over the past decade, the O&D passenger traffic between China and B&R countries has grown from just

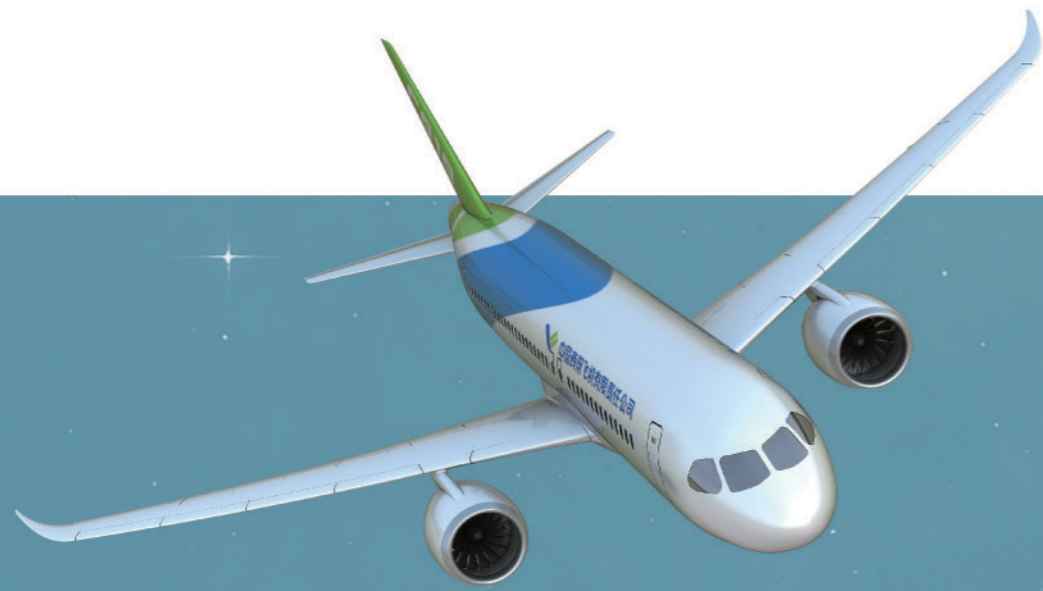
under 9.5 million in 2009 to over 36 million in 2018. During the period from 2013 to 2018, the CAGR of O&D passenger traffic from China to B&R countries was about 12.04%. Thailand and South Korea are the top 2 destination countries, 47.3% of all the outbound passengers from China are destined for the two countries. In the meantime, Cambodia, Egypt and Pakistan witnessed the most significant growth in O&D passenger traffic.

Historical O&D Passenger Traffic Between China and B&R Countries



Source: COMAC, IATA Airport-IS, Belt and Road Portal, CAAC Portal





5

TRAFFIC & FLEET FORECAST

- GLOBAL TRAFFIC FORECAST
- GLOBAL FLEET FORECAST
- CHINA
- ASIA PACIFIC
- NORTH AMERICA
- LATIN AMERICA
- EUROPE
- RUSSIA & CIS
- MIDDLE EAST
- AFRICA

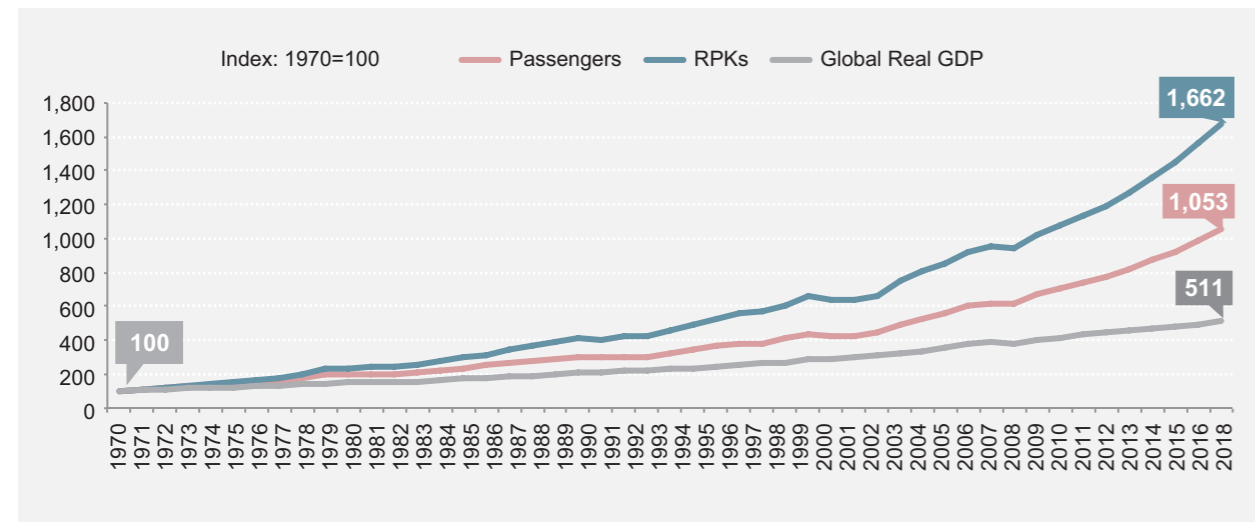
Global Traffic Forecast

In 2018, global GDP increased by 3.19%, RPKs increased by 7.4%, ASKs increased by 6.1%, and the average passenger load factor has reached a record high of 81.9%. In the second half of 2018, with the slowdown in global economic growth, passenger growth has declined, but global aviation demand growth is still greater than supply

growth, representing a booming market.

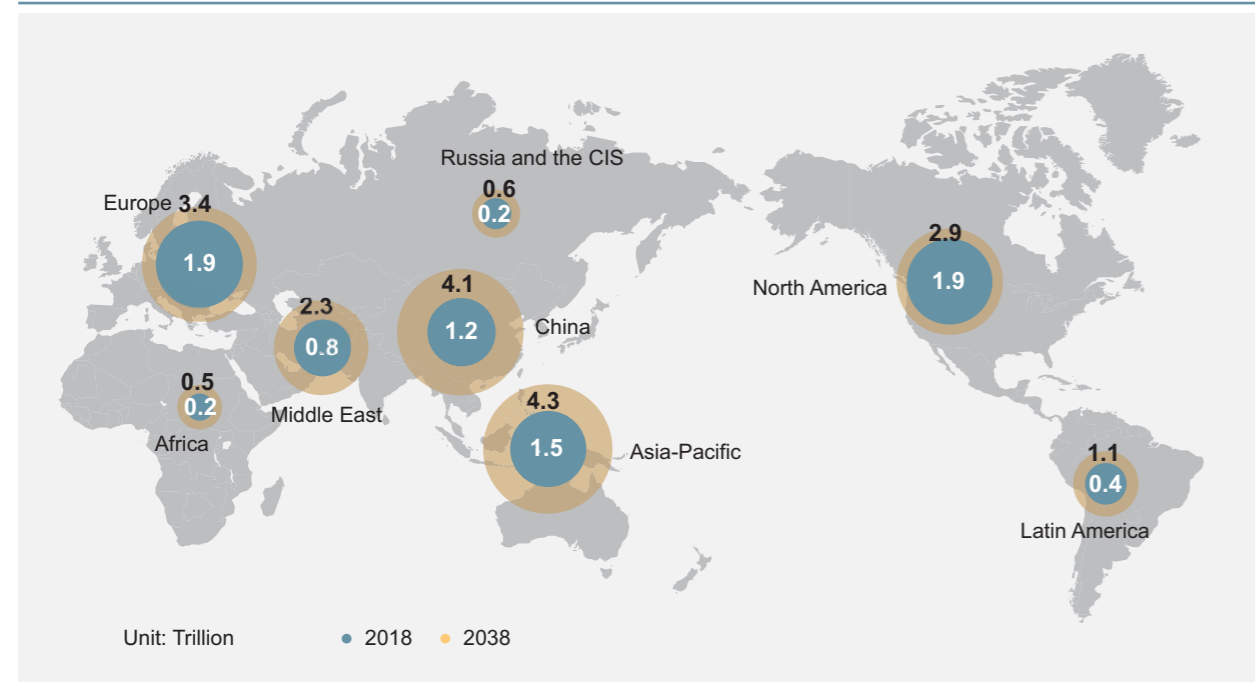
In the next years, the global GDP will grow by 2.0% annually. The global RPKs will increase at a rate of 4.2% per year, and reach to 19.1 trillion by 2038.

Trends of Global Passengers, RPKs and Real GDP (1970-2018)



Source: COMAC, IATA, IHS

Global Traffic in 2018 and 2038



Inner and multi regional RPKs has been allocated to each separate district
Source: COMAC, ICAO, IATA, OAG

Global Fleet Forecast

Fleet Forecast Summary

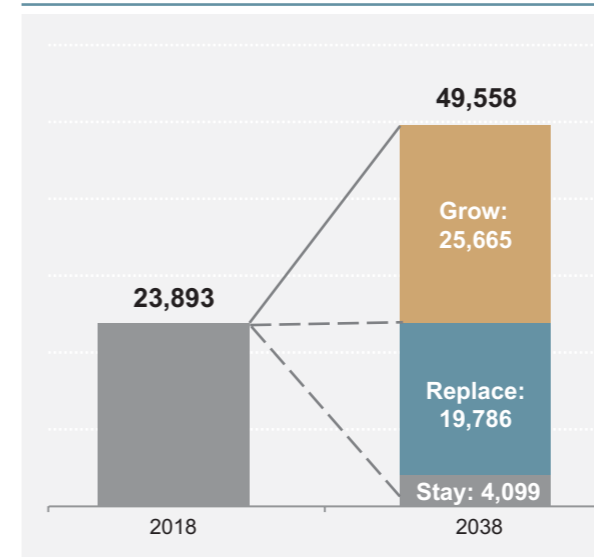
By the end of 2018, 23,893 passenger jets were in service across the globe, which represented an increase of 5.5% compared with 2017. 324 jets were added to airlines based in China in 2018, which was the largest growth amount over the world. Fleets in operation in Europe and North America increased by 296 and 265 jets respectively. The fleet operated by airlines in Russia & CIS has only increased 9 aircraft in 2018.

climbed to 6.1%. Airlines in Russia & CIS continued the trend of 2017, growing by 8.9% in 2018 which is the second only behind by China. While the fleet in Latin America has been decreased by 0.6% than in 2017.

For the next 20 years, COAMC forecasts a 3.7% global annual passenger jet fleet growth and a 4.1% global airlines capacity (ASKs) growth. The average seat number will also be on the rise from the current 177 to around 196. By the end of 2038, the global total number of passenger jets is estimated to reach 49,558. The forecast number of total new passenger jet deliveries in the next 20 years is 45,459. During the period, 18,176 jets (76% of the current fleet) are estimated to be retired.

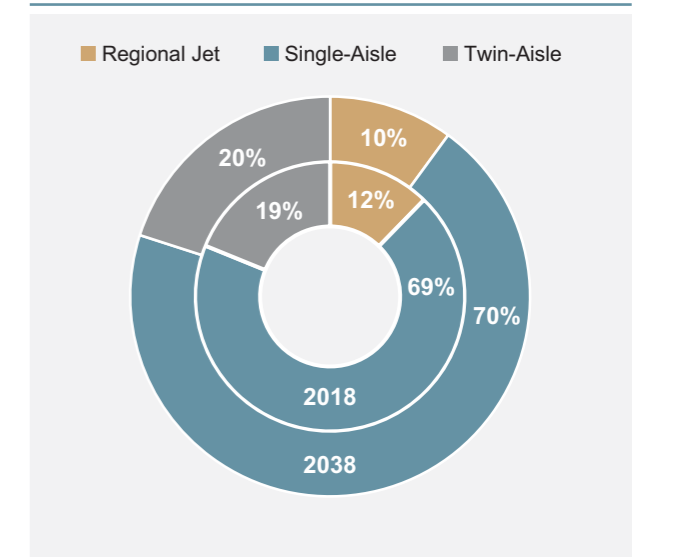
In terms of growth rates, while mature markets in Europe and North America had maintained relatively slow but stable growth rates, the emerging markets had continued their fast paces of fleet expansion. The current fleet in China had expended by 9.2%. The growth rate in Africa

Global Forecast Outlook



Source: COMAC, Flightglobal

Current and Forecast Fleet By Category



Source: COMAC, Flightglobal

Global Fleet Forecast by Category

	Regional Jet	Single-Aisle	Twin-Aisle	Total
2018	2,933	16,457	4,503	23,893
2023F	3,074	21,001	5,592	29,668
2028F	2,982	25,071	6,865	34,917
2033F	3,963	29,919	8,313	42,194
2038F	4,985	34,645	9,928	49,558

Source: COMAC

70% of the 2038 passenger jet fleet is forecast to be single-aisle aircraft types, and the category will remain to be the largest one. The share for twin-aisle fleet will rise from its current level of 19% to 20%. In terms of capacity (available seats), by 2038, the share for twin-aisle seats provided by the airlines will reach 48% of the total forecast amount. For single-aisle fleet the figure is forecast to be 50%, and for regional jets the share will be around 2%.

market, and the share of its fleet size in the global total will rise from the current 31% to 40% by 2038. Fleet size in China alone is forecast to rise from 16% to 21%. With the development of the emerging markets, North America's fleet size share, which currently is the largest, will decline from 28% to about 18%. Russia & CIS's share will also decrease from the current level of 5% to around 3%. While Europe, Middle East and Africa's shares in global fleet are expected to rise from their current levels.

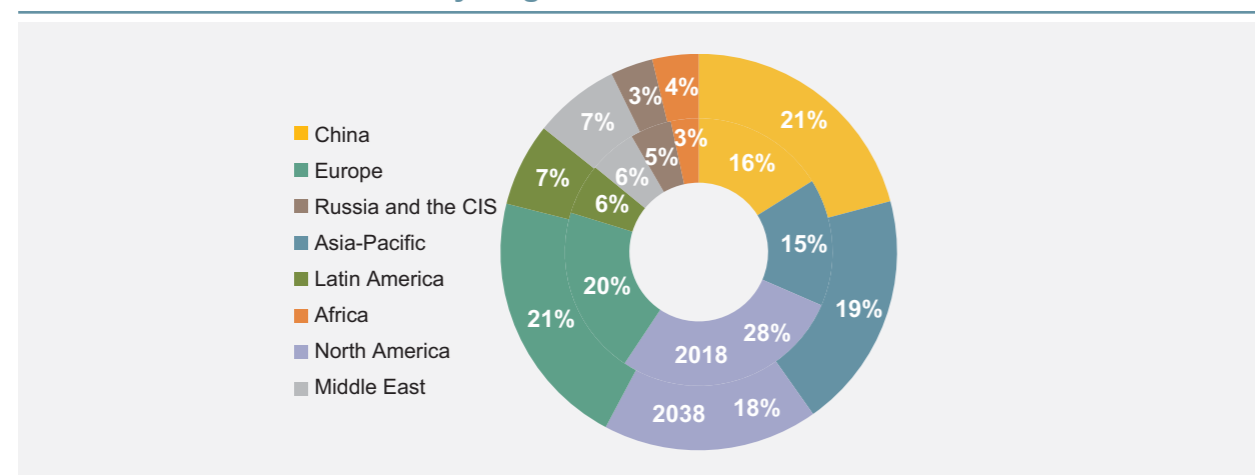
Asia Pacific (including China) is the fastest growing

Global Fleet Forecast by Region

	2018		2038F		2018-2038
	Fleet	% of the global total	Fleet	% of the global total	Annual growth rate
China*	3,854	16%	10,344	21%	5%
Asia Pacific **	3,682	15%	9,586	19%	5%
North America	6,648	28%	8,701	18%	2%
Europe	4,874	20%	10,483	21%	3%
Latin America	1,474	6%	3,371	7%	5%
Middle East	1,365	6%	3,485	7%	5%
Russia & CIS	1,195	5%	1,721	3%	4%
Africa	801	3%	1,867	4%	4%
Global	23,893	100%	49,558	100%	4%

* China includes Hong Kong, Macao and Taiwan ** Asia-Pacific excludes China, Hong Kong, Macao and Taiwan
Source: COMAC, Flightglobal

Current and Forecast Fleet by Region



Source: COMAC, Flightglobal

Delivery Forecast Summary

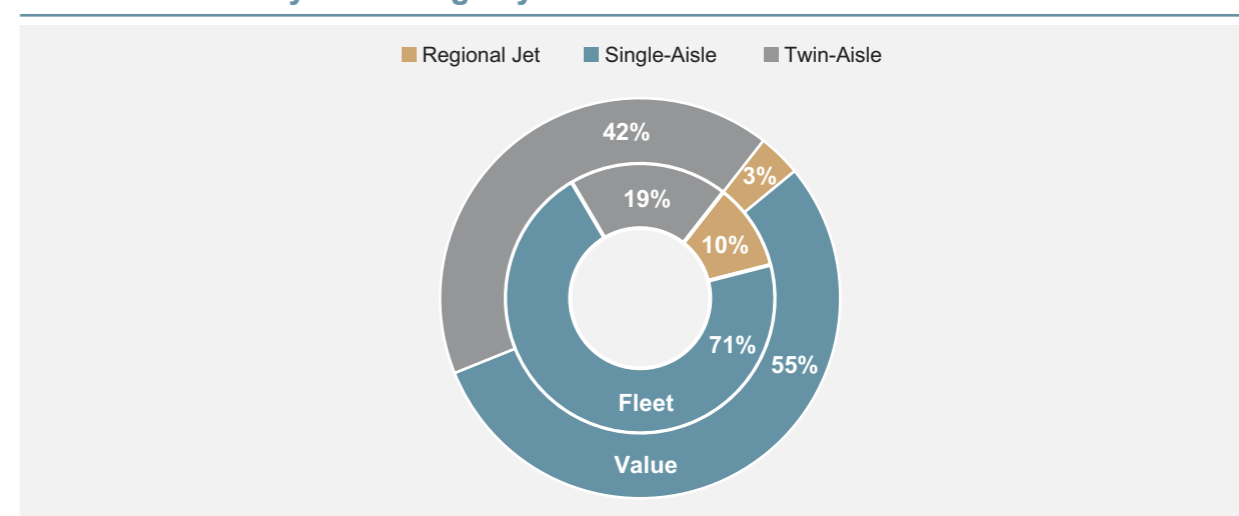
45,459 deliveries of new passenger jets are expected over the next 20 years due to the replacement and market demands. The total delivery value is predicted to be \$ 6.6 trillion (under 2018 aircraft list prices).

2019-2038 Global Delivery Forecast by Category

	Regional jet	Single-Aisle	Twin-Aisle	Total
2019-2038 deliveries	4,756	32,055	8,648	45,459
Market Value Billion \$	231	3,632	2,756	6,619

Source: COMAC

2019-2038 Delivery Percentage by Volume and Value



Source: COMAC

Single-aisle aircraft types will account for around 71% of the forecast deliveries, while around 19% will be twin-aisle types, and 10% will be regional jets. In terms of delivery value, twin-aisle deliveries will account for 42% of the total amount, whereas single-aisle deliveries will account for 55%.

Global Historical and Forecast Deliveries by Region

	1999-2018 historical deliveries		2019-2038 forecast deliveries	
China*	3,968	17%	9,205	20%
Asia Pacific **	3,572	15%	9,100	20%
North America	6,498	28%	8,281	18%
Europe	4,799	21%	9,163	20%
Latin America	1,435	6%	3,348	7%
Middle East	1,297	6%	3,078	7%
Russia & CIS	1,036	4%	1,632	4%
Africa	698	3%	1,652	4%
Global	23,303	100%	45,459	100%

* China includes Hong Kong, Macao and Taiwan ** Asia-Pacific excludes China, Hong Kong, Macao and Taiwan
Source: COMAC, Flightglobal

In the next 20 years, Asia Pacific including China will be the largest market in terms of aircraft deliveries, with 18,305 new deliveries which account for 40% of the total amount, and China is forecast to account for 20% of the world forecast deliveries. Airlines in Europe

and North America are expected to receive 9,163 and 8,281 deliveries respectively. Latin American and Middle Eastern airlines will also enjoy great expansions in their fleets. It is estimated that the two regions' shares of new jet deliveries will reach 3,348 and 3,078 respectively.

Regional Jet Forecast

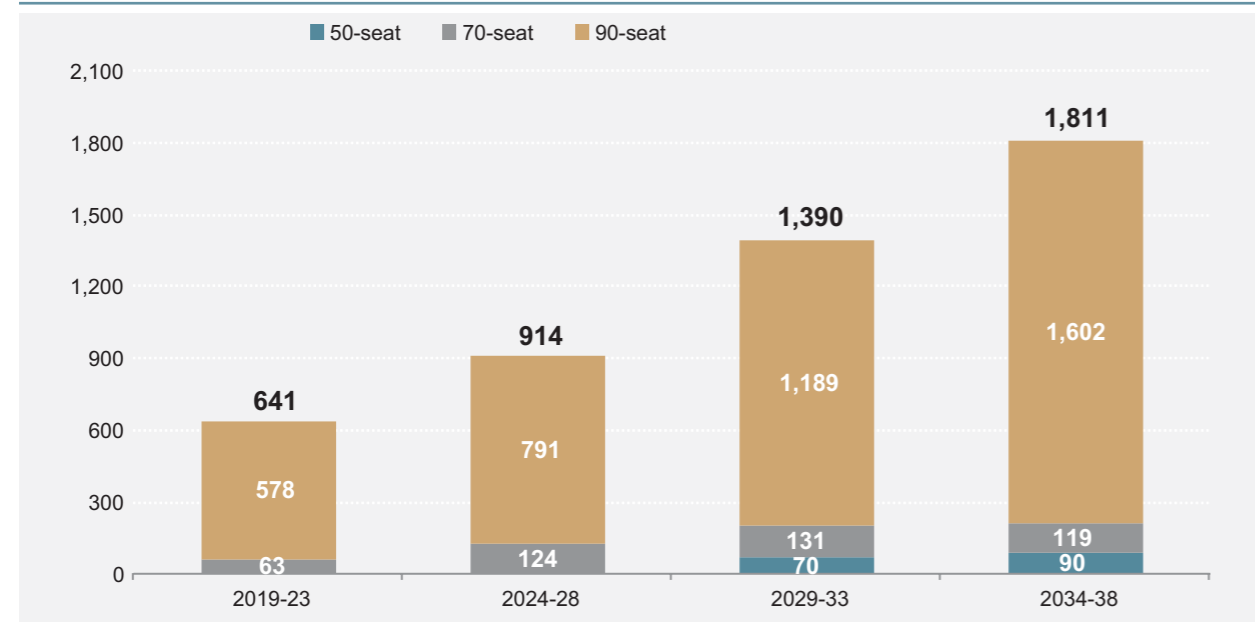
The share of current regional jets accounts for 12%, and it is forecasted to decrease to the level of 10% in 2038 fleet. The 90-seat segment is expected to become the centre of gravity in this category.

types have become competitors to large regional jets.

Within the next 20 years, 79% of the currently in-service regional jets will gradually retire. 4,756 new regional jets will be delivered, among which 87% (about 4,160) will be 90-seat aircraft types. The boundary between large regional jets and small single-aisle aircraft continues to blur. In many markets, 110-seat single-aisle aircraft

In next 20 years, new aircraft deliveries illustrate an increasing trend, about 96% regional jets will focus on 70 seats and above. COMAC forecasts that regional jet fleet will grow at an average annual rate of 2.7% in the forecast period, and the number of 2038 fleet will reach to 4,985. Global regional jet ASKs will grow at an average annual rate of 3.7% and the category's per aircraft seat will reach to 88 in 2038.

2019-2038 Regional Jet Forecast Deliveries by Seat Size



Source: COMAC

2019-2038 Global Regional Jet Forecast Deliveries

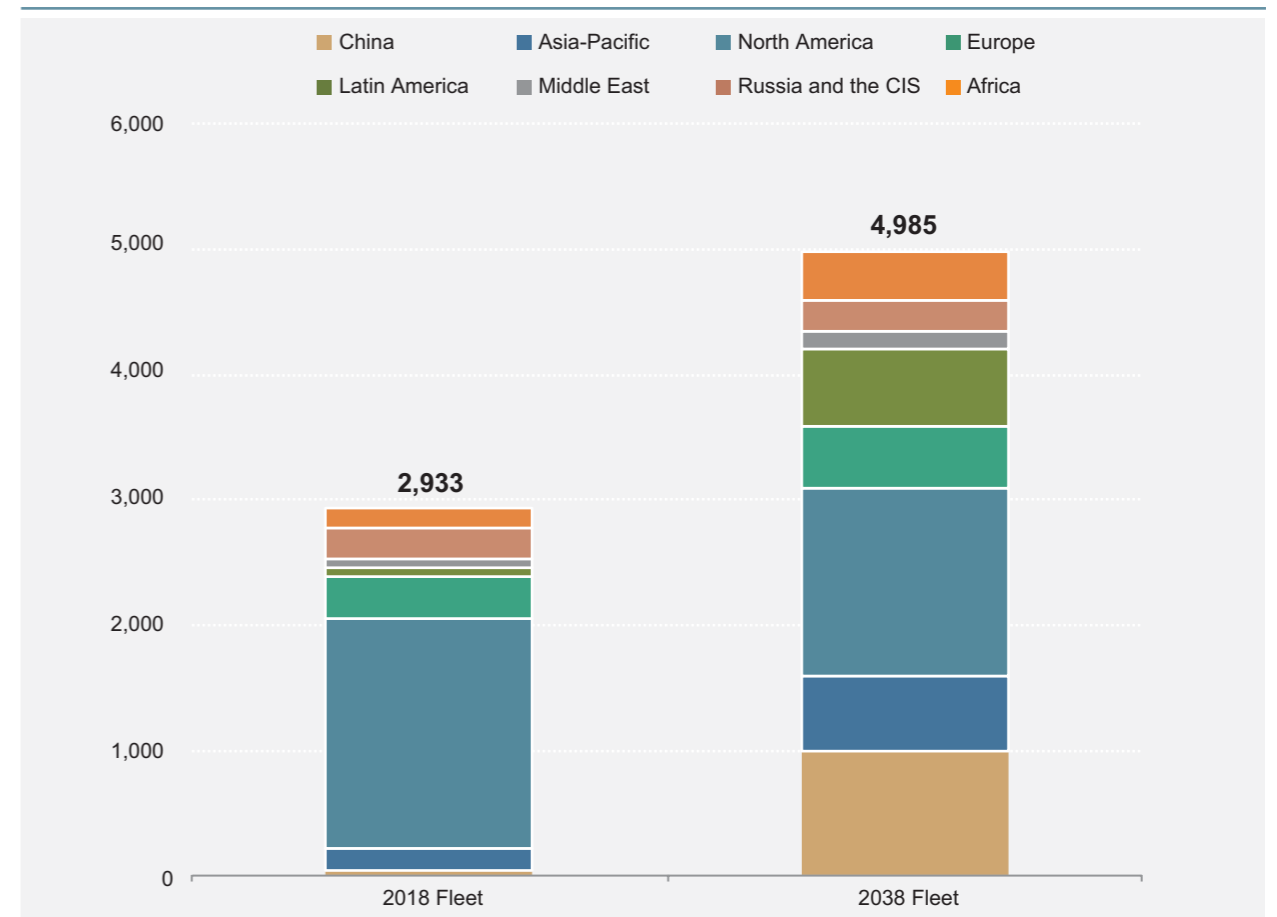
	50-seat	70-seat	90-seat
2019-23	0	63	578
2024-28	0	124	791
2029-33	70	131	1,189
2034-38	90	119	1,602
2019-2038 deliveries	160	437	4,160
Market Value hundred million \$	47	197	2,061

Source: COMAC

North America will remain to be the largest market for regional jets, as 30% of the forecast regional jet deliveries will go to airlines in this region. This forecast estimates that 20% of the forecast regional jet deliveries will go to the Chinese airlines. Given national policy supports for regional air transportation, and the largely unexploited regional air travel markets, demand for regional jets are expected to enter a rapid growth period.

In Latin America, airlines are forecast to take 13% of the forecast deliveries, which makes the region the third largest market in terms of aircraft demand. By 2038, regional jet fleet in Asia Pacific (including China) will increase from 7% to 32% of the global total fleet size in this category, and become the largest market surpass North America.

Current and Forecast Regional Jet Fleet by Region



Source: COMAC, Flightglobal

2018 and 2038 Current and Forecast Regional Jet Fleet by Region

	End 2018 Fleet	End 2038 Fleet
China*	48	986
Asia Pacific **	174	614
North America	1,838	1,497
Europe	320	482
Latin America	86	628
Middle East	70	131
Russia & CIS	234	246
Africa	163	401
Global	2,933	4,985

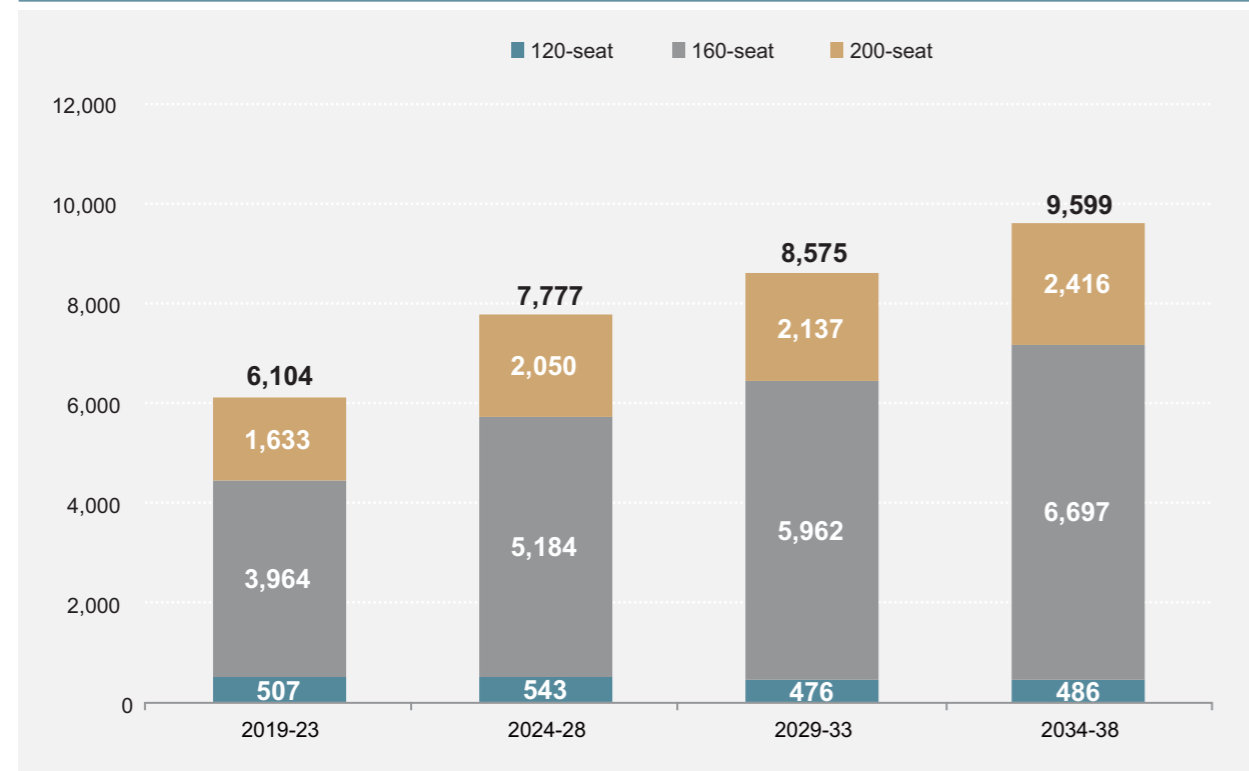
* China includes Hong Kong, Macao and Taiwan ** Asia-Pacific excludes China, Hong Kong, Macao and Taiwan
Source: COMAC, Flightglobal

Single-Aisle Jet Forecast

The single-aisle category will remain to be the largest among the 3 passenger jet categories. 66% of the category's existing fleet is forecasted to be replaced by more efficient new generation aircraft in next 20 years. Increase in the number of trunk routes in the emerging markets and the development of low cost airlines (LCCs) are the prime causes for the growth.

In the next 20 years, 32,055 single-aisle passenger jets are expected to be delivered by 2038, 68% of which will be 160-seat aircraft types. Average annual growth rate for the global fleet will be around 3.8%, the average annual ASKs will increase by 4.2%. The average seat number per single-aisle aircraft in the category will rise from 163 to 175.

2019-2038 Single-Aisle Jet Forecast Delivery by Seat Size



Source: COMAC

2019-2038 Global Single-Aisle Jet Forecast Delivery

	120-seat	160-seat	200-seat
2019-23	507	3,964	1,633
2024-28	543	5,184	2,050
2029-33	476	5,962	2,137
2034-38	486	6,697	2,416
2019-2038 deliveries	2,012	21,807	8,236
Market Value hundred million \$	1,691	24,131	10,487

Source: COMAC

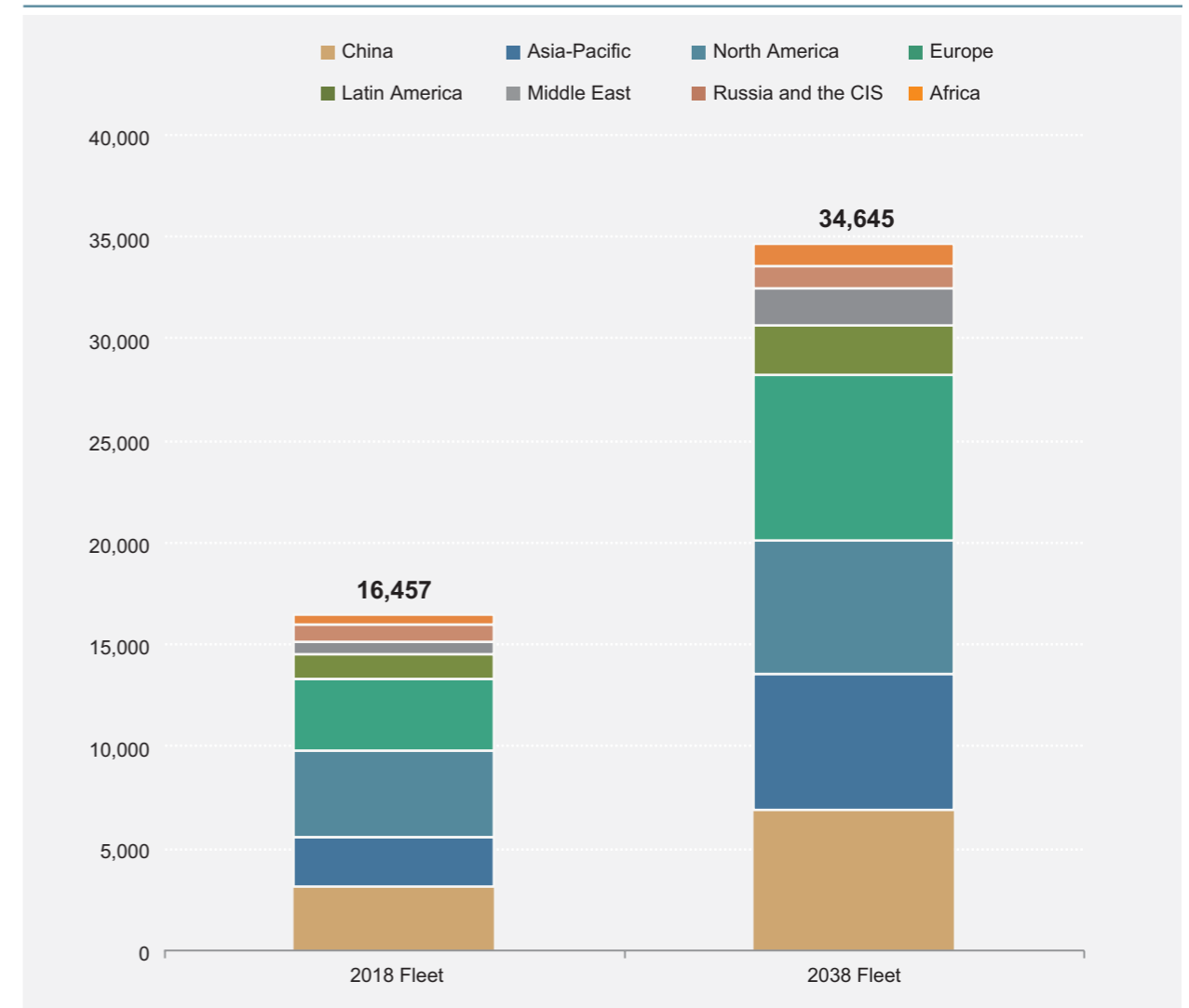
In next 20 years, new generation of single-aisle aircraft will enter into the market gradually by emerging manufacturers, such as COMAC. Capacity of the supply side is expanding due to the arrivals of new types of single-aisle aircraft. These new generation of aircraft types have also added to the variety of options for airlines in terms of seat number and airborne systems.

Asia Pacific (including China) is forecasted to become the largest market for single-aisle aircraft in terms of deliveries. The region as a whole is estimated to receive 39% of the total global 20 years' deliveries. China alone is estimated to receive 20% of the global total. Most of emerging economies are located in Asia-Pacific, including China, domestic and intra-regional markets

within and among China, India and Southeast Asia are all suitable markets for single-aisle aircraft operation.

Europe and North America will remain to be the regions of great market importance for single-aisle aircraft. It is estimated to account for around 24% and 19% of the total forecast deliveries. Demand for aircraft replacing and increase in the number of LCCs and their expansion in the mature markets will remain to be strong driving forces for single-aisle aircraft demand. In Latin America, the development of air transport markets in countries such as Brazil and Mexico also promotes the increase in the number of single-aisle aircraft, and the program of replacing of old aircraft is in progress in the CIS region and Africa.

Current and Forecast Single-Aisle Jet Fleet by Region



Source: COMAC, Flightglobal

2018 and 2038 Current and Forecast Single-Aisle Jet Fleet by Region

	End 2018 Fleet	End 2038 Fleet
China*	3,118	6,938
Asia Pacific **	2,487	6,635
North America	4,142	6,484
Europe	3,608	8,206
Latin America	1,230	2,373
Middle East	567	1,883
Russia & CIS	830	1,103
Africa	475	1,022
Global	16,457	34,645

*China includes Hong Kong, Macau and Taiwan ** Asia-Pacific excludes the China region
Source: COMAC, Flightglobal

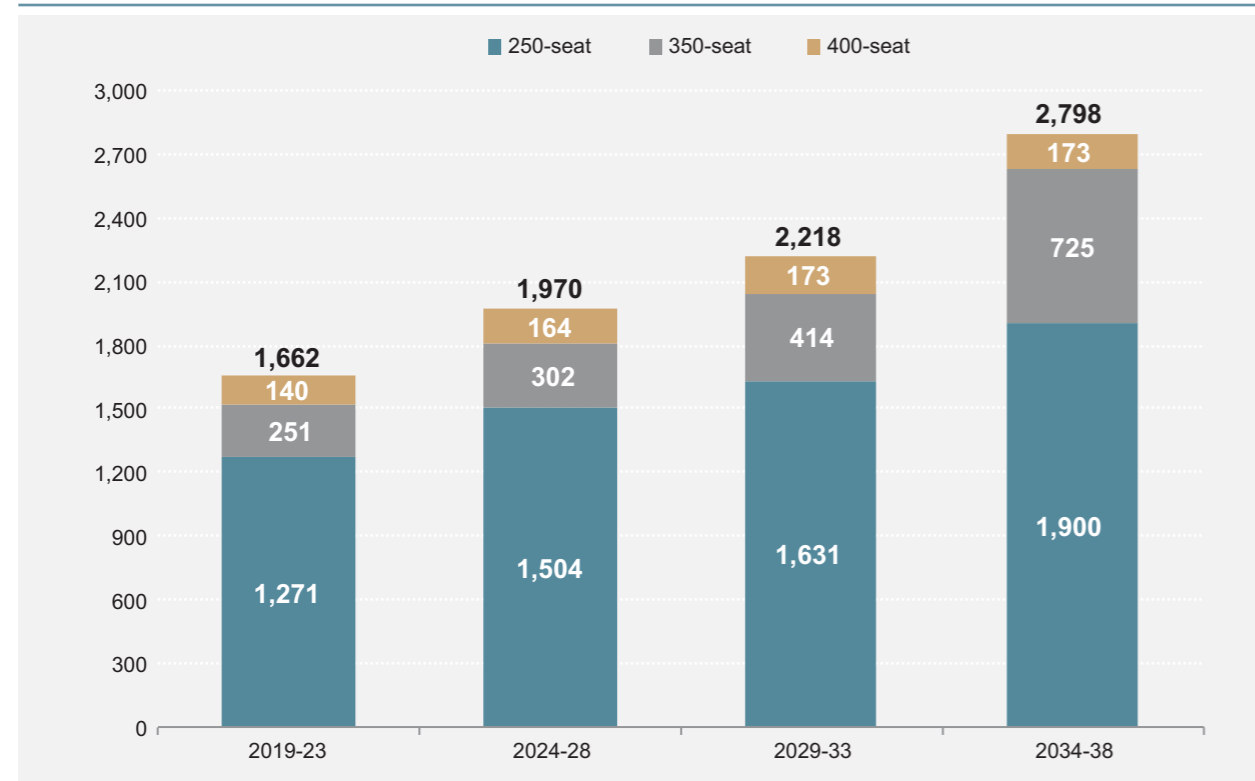
Twin-Aisle Jet Forecast

The ramping up in production of the existing twin-aisle aircraft types and the arrival of new types are encouraging airlines to renew their fleets. Major brands of traditional airlines continue to aim at the upper end of markets where aircraft with advanced technologies, comfortable cabin and high fuel efficiency tend to be vital to achieve their strategies.

In the next 20 years, a total number of 8,648 twin-aisle passenger jets are forecasted to be delivered, with

a total value of 2.7 trillion U.S. dollars. Among those deliveries, 73% will be 250-seat aircraft, including aircraft types containing 200-300 seats. Those kinds of aircraft are believed to have high flexibility in operation and can be adapted to wider range of routes in different environments. Average annual growth rate for twin-aisle fleet is forecast to be 4%, with average seat number per aircraft rising from 302 to 324. In the next 20 years, 50% of the current in-service fleet are expected to be replaced by new jets.

2019-2038 Twin-Aisle Jet Forecast Delivery by Seat Size



Source: COMAC

2019-2038 Twin-Aisle Jet Forecast Delivery by Seat Size

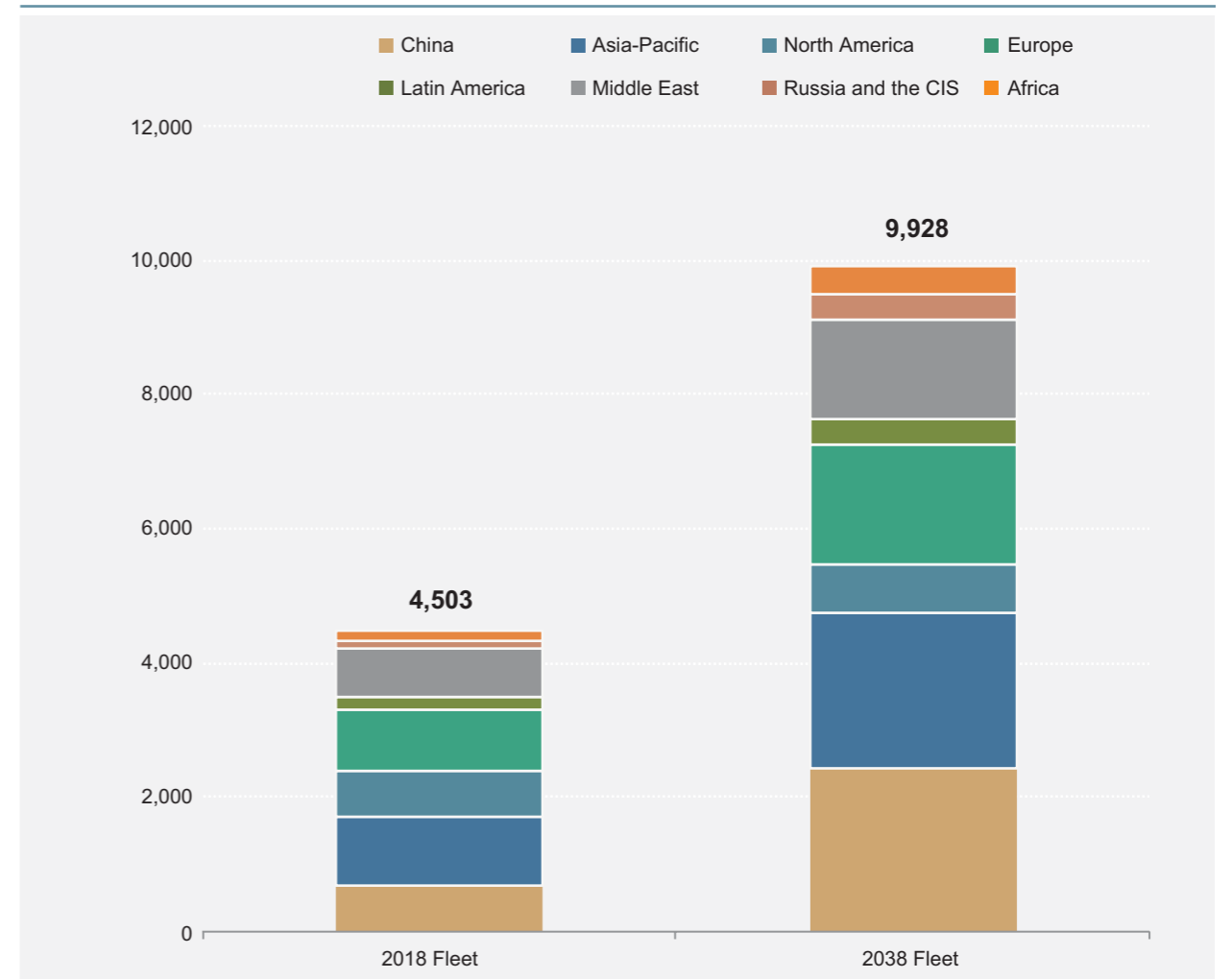
	250-seat	350-seat	400-seat
2019-23	1,271	251	140
2024-28	1,504	302	164
2029-33	1,631	414	173
2034-38	1,900	725	173
2019-2038 deliveries	6,306	1,692	650
Market Value hundred million \$	18,398	6,197	2,970

Source: COMAC

Most of the twin-aisle fleet will be used to operate on long range routes, where aircraft weight reduction and improvements in fuel efficiency generate greater improvements on operating cost than on short routes. New twin-aisle aircraft types make more use of composite materials on aircraft structure parts, and are equipped with newly developed engines. Those features help lower the airlines costs and enable more load capacity increase.

Twin-aisle aircraft are also increasingly used on domestic and regional routes with large passenger flow, especially in Asia Pacific. In the next 20 years, airlines based in Asia Pacific, including China, are estimated to account for 48% of the total twin-aisle deliveries. Meanwhile, Europe and Middle East have great demands for this category aircraft as well.

Current and Forecast Twin-Aisle Jet Fleet by Region



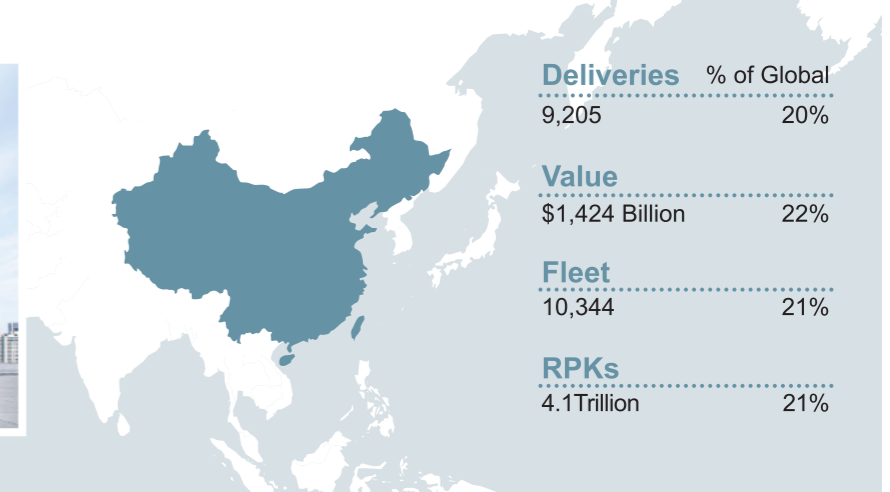
Source: COMAC, Flightglobal

2018 and 2038 Current and Forecast Twin-Aisle Jet Fleet by Region

	End 2018 Fleet	End 2038 Fleet
China*	688	2,420
Asia Pacific **	1021	2,337
North America	668	720
Europe	946	1,795
Latin America	158	370
Middle East	728	1,470
Russia & CIS	131	372
Africa	163	444
Global	4,503	9,928

*China includes Hong Kong, Macau and Taiwan ** Asia-Pacific excludes the China region
Source: COMAC, Flightglobal

China



Source: COMAC

Market

In 2018, the GDP growth rate of China is 6.6%. The unstable global financial market and China-U.S. trade frictions have cast shadows over market expectation. Consequently, China's economic transformation is facing enormous challenges. The consumption, which would remain the main driver of economic growth, has continued its rapid growth, and the service industry has contributed around 60% to overall economic expansion. The development of emerging industries, the transformation and upgrading of traditional industries, and some new growth drivers are now profoundly changing the mode of production and the way of life, creating new strengths for China's development. Besides, People's living standards continue to be improved, and per capita disposable income increases by 6.5% in real terms.

China (Excluding Hongkong, Macau, and Taiwan) nationals made more than 5.5 billion domestic trips and the number of inbound and outbound tourist totaled around 300 million in 2018, marking a year-on-year increase of 10.8% and 7.8% respectively, which indicates that China ushers in a new era of mass tourism. Regional tourism exchanges and cooperation have been further deepened. In 2018, there were 180 million two-way tourist exchanges between the mainland and Hongkong and Macau, 2.22 million visits by mainland tourists to Taiwan, and 6.14 million visits by compatriots in Taiwan to the mainland.

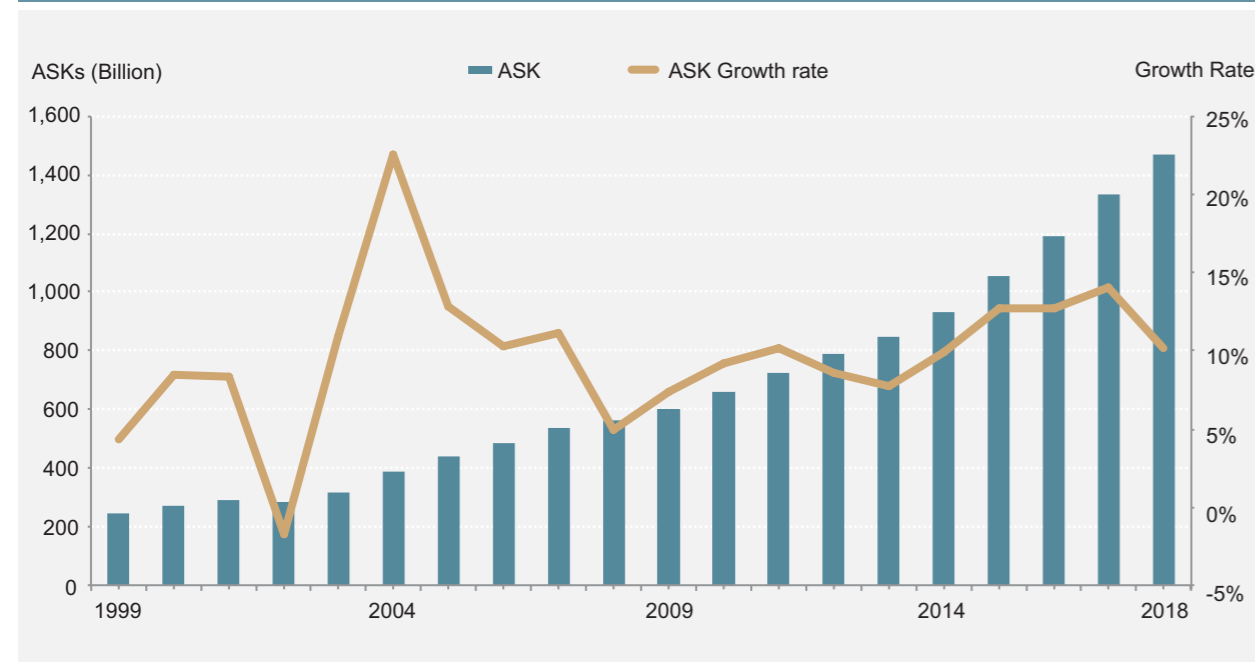
China (Excluding Hongkong, Macau, and Taiwan) carried around 612 million air passengers in 2018 with a

year-on-year increase of 10.9%, which is slightly lower than that of the previous years. The international airlines, which made the sharpest increase, carried over 63 million passengers, the domestic airlines carried more than 540 million passengers, and around 11.27 million passengers flew among Hongkong, Macao, and Taiwan, with a year-on-year increase of 14.8%, 10.5%, and 9.8% respectively.

In the next 20 years, Chinese GDP is expected to grow at a 4.61% CAGR, with 5.2% average annual fleet growth, and 6% RPK average annual growth. Airlines based in China are expected to receive 9,205 passenger jets. By 2038, RPKs on domestic and international routes connecting Chinese cities will reach 4.08 trillion, accounting for 21% of the global total.



China Historical ASKs Trends (1998-2018)



Source: COMAC, OAG

Network

Driving by China's economic growth, the future development and scale of China's air market, especially the domestic market aroused widely attention.

Over 80% of Chinese airlines' ASKs are placed on domestic routes, maintaining a steady growth. Even though the growth rate and the market share of Asia Pacific both contracted slightly during 2018, as the most important international market that Chinese airlines always pay attention to, Asia Pacific area accounts around 12% to 14% of the ASKs of Chinese airlines capacity.

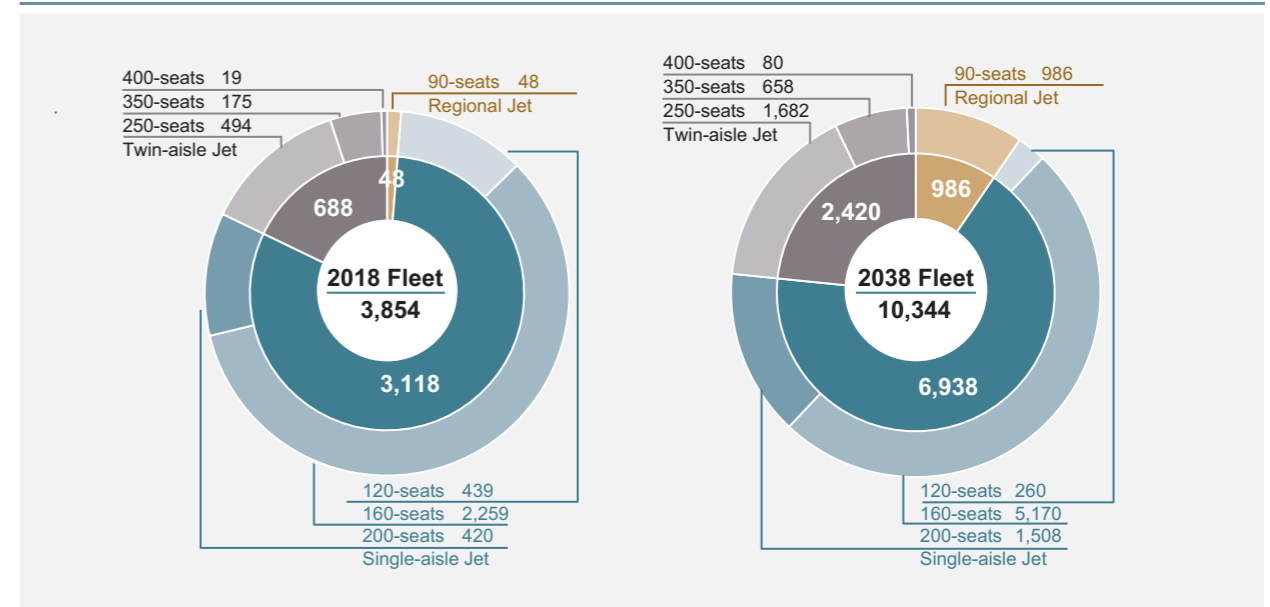
North American market is the second largest

international market to Chinese carriers, which maintained a growth rate of 1.5 % to 2 %, with a market share of nearly 70 %. With the further implement of the 'One Belt and One Road' initiative, Chinese airlines have focused more on Europe and Russia & CIS market, in which the ASKs of Chinese airlines have increased sharply during past several years, scoring a double-digit CAGR, and the market share has increased by 5 to 6 %.

What's more, Latin American market has become a new option for Chinese airlines to open direct flights as a result of the improvement of relations between China and Latin America, taking about one third of market share and forecast to increase rapidly in short term.

Fleet

China Fleet Growth



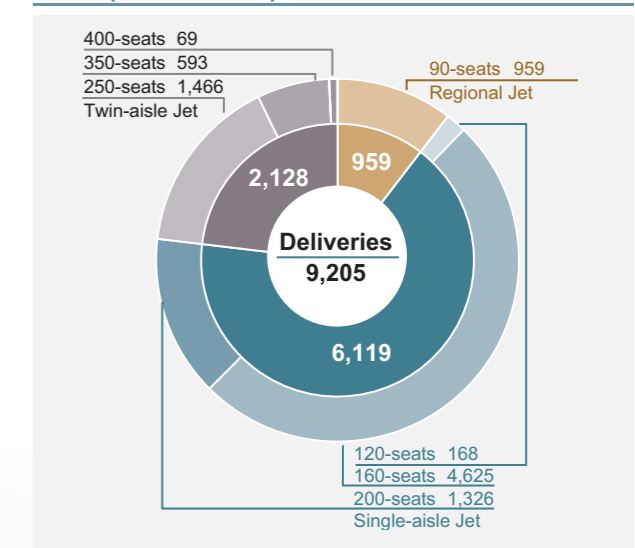
Source: COMAC, Flightglobal

By 2038, the fleet size in China is estimated to reach 10,344, among which 6,938 are Single Aisle passenger jets, 2,420 are Twin Aisle passenger jets, and 986 are regional jets.

In the future 20 years, Chinese airlines are estimated to receive 9,205 aircraft, among which 66.5%, about 6,119 are predicted to be Single-Aisle passenger jets, with 4,625 160-seat jet deliveries.

Twin-Aisle passenger jet deliveries are expected to reach 2,128, accounting for 23.1% of the total, among which around 1,466 will be 250-seat jets. 10.4% of the total, around 959 deliveries, are estimated to be regional jets, which consist mainly of 90-seat jets.

China Deliveries by Category & Seat Size (2019-2038)



Source: COMAC



Asia-Pacific



Source: COMAC

Market

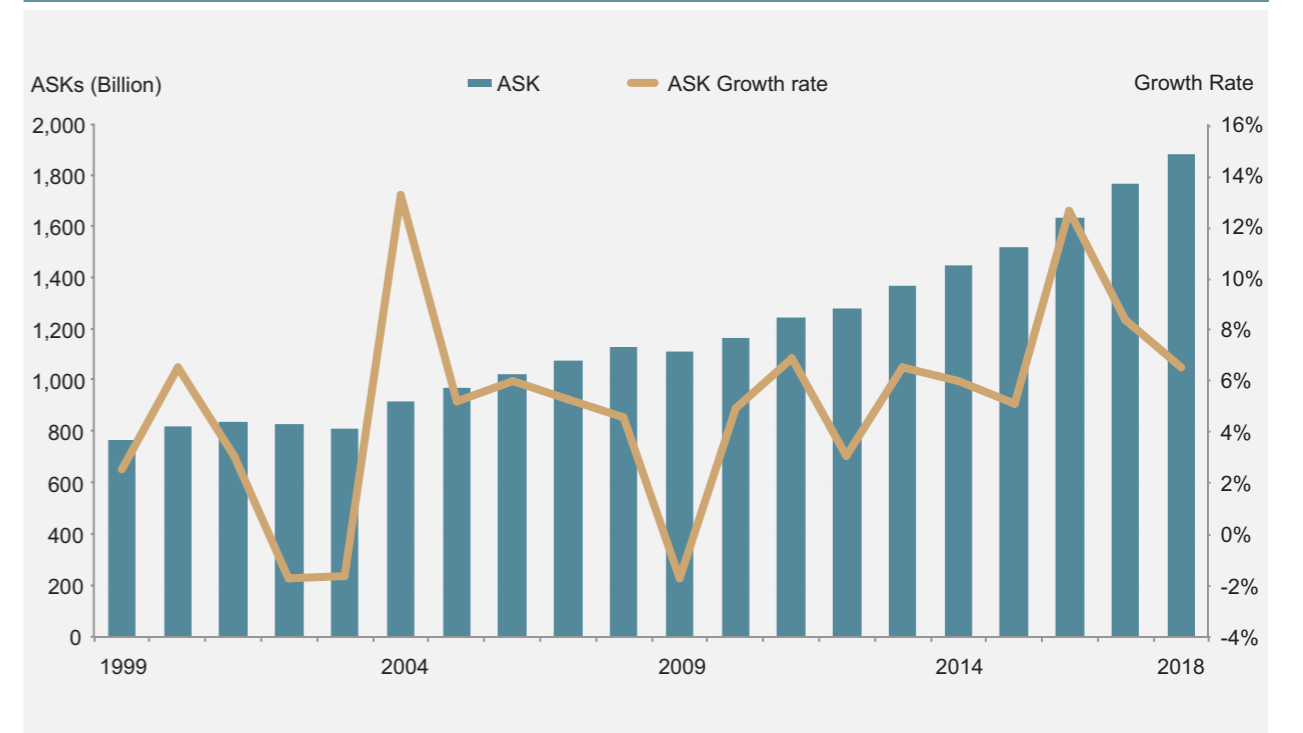
In 2018, the world economy continued to grow moderately. Major economies are obviously differentiated in growth trend, inflation level, and monetary policy. Capital outflows from emerging economies are intensifying, and the financial market continues to oscillate. The year 2018 is the 10th anniversary of the outbreak of the international financial crisis and the turning point of the change of the world economic structure.

According to disclosed data from IMF, in 2018, the Asia-Pacific region has the highest total GDP of \$30.1 trillion, which is more than a third of the world's \$84.9 trillion. Asia-Pacific region is still the engine of the world economy. In 2018, the economic growth in Asia-Pacific region has reached its expectation of 5.5 %, and the total GDP is expected to continue its strong growth to reach at approximately 5.6 % in 2019.

In 2018, the Asia-Pacific region is still undergoing constant changes. Although enterprises in Asia-Pacific are facing numerous challenges, such as environmental risks and population aging, there are still tremendous opportunities in this complex change. Innovative technologies, automotive applications, and infrastructure improvements will provide more impetus for the development of the Asia-Pacific region.

However, in the short-and-mid term, the Asia-Pacific region will still face downside risks due to facts below. Constantly intensive situation in trade, which comes from the rise in U.S interest rates, sudden deterioration of risk tolerance, escalating trade tensions and political and policy uncertainty, may further destroy commercial confidence, cause damage to financial market, disturb supply chain and hinder investment and trade in this region. To deal with the risks, economies in Asia-Pacific region will need to adopt policies that support financial stability and constant growth. Besides, regional trade and investment liberalization will help enhance Asia's prospect and offset the negative impacts from the global trade tension.

Asia-Pacific Historical AKSs Trends (1999-2018)



Source: COMAC, OAG

Network

In 2018, among all the routes to and from Asia Pacific, airlines put 86% of seat capacity, and 89.6% of flights on routes within the region, of which the proportions are both quite high. Among other market areas, China and Middle East account for the largest airlines capacities, and the proportions of airlines are 57.8% and 22.1% respectively.

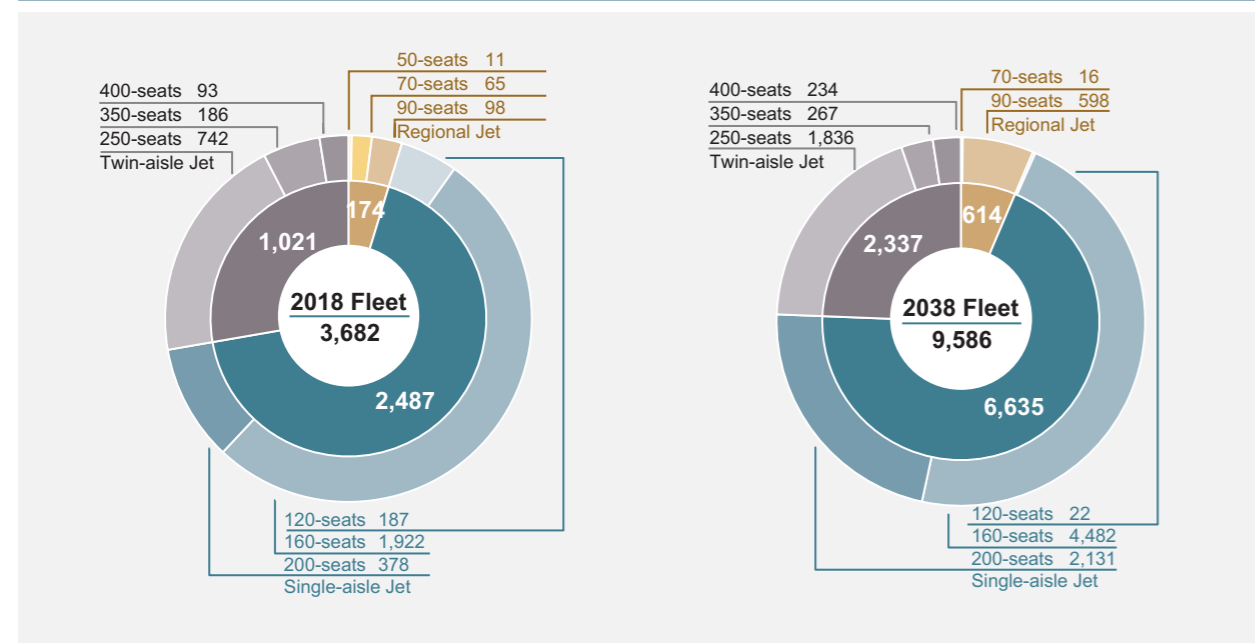
Pacific carriers account for 99.2 % of total ASKs among Asia-Pacific internal routes but only account for 61.3 %, 47.9 %, 43.1 % and 39.1 % respectively of total ASKs among cross regional routes connecting Asia-Pacific with North America, Europe, China, and Latin America. Clearly, Asia-Pacific carriers only have relatively strong competitive strength in Asia-Pacific region and routes to North America thus they need to enhance competitiveness in other regions, especially in African regions, of which the proportion is only 16.5 %.

Carriers of Asia Pacific have considerable different performance on different regional routes. ASKs of Asia-



Fleet

Asia-Pacific Fleet Growth



Source: COMAC, Flightglobal

Passenger jet fleet in Asia-Pacific has grown by 5.4% from 2017 to 2018 to 3,682, accounting for 13.5 % of total world fleet. The fleet in Asia-Pacific is estimated to expand to 9,586, which will account for 20.3 % of the world fleet by 2038. In the following 20 years, 9,100 aircraft are estimated to be delivered, valuing \$1.42 trillion.

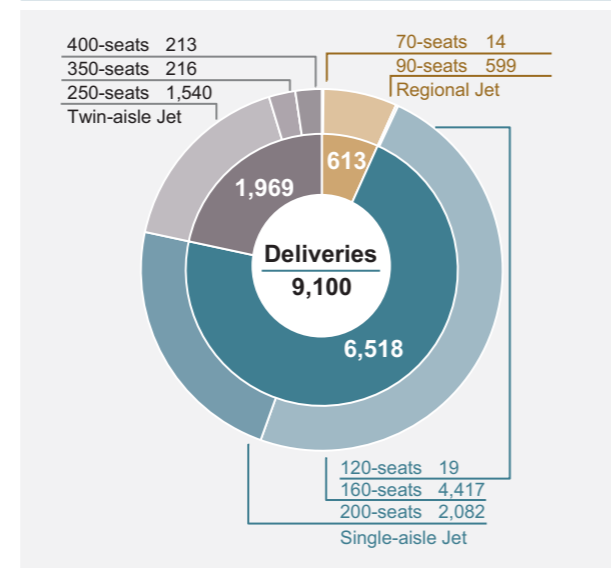
jet fleet accounts for only 5.9% of the global total, which remains unchanged as last year. The fleet number of turbofan regional jet by the end of the next 20 years is forecast to reach 614 with 613 new aircraft, which makes up 12.3% of the global turbofan regional jet deliveries.

Due to the rapid growth of LCCS, Asia-Pacific region is expected to have increasing demand for Single Aisle passenger jets. In the following 20 years, the number of Single Aisle fleet in this region is estimated to grow to 6,635, with deliveries of 6,518 new aircraft. The amount of the 160-seat jets will account for 67.8% among the total deliveries in this region.

The Asia-Pacific region currently has the world's largest Twin Aisle jet fleet, accounting for 22.7% of the global total, and the fleet size is expected to continuously expand according to the future demand. In the following 20 years, the fleet size is estimated to be 2,337 with 1,969 aircraft deliveries, among which 78.2% are forecast to be the 250-seat category.

The size of Asia-Pacific regional aviation market is comparably small, and the number of turbofan regional

Asia-Pacific Deliveries by Category & Seat Size (2019-2038)



Source: COMAC

North America



Source: COMAC

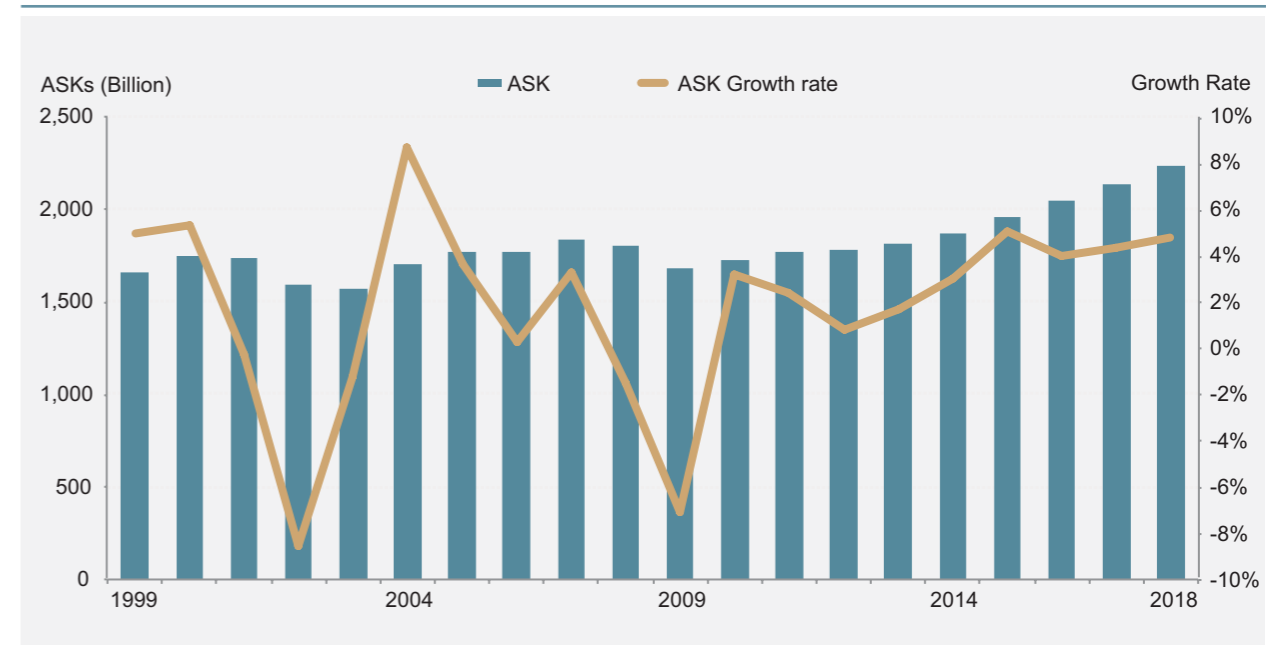
Market

Since 2018, the United States has undergone strong economic growth, sustained strong economic fundamentals, increased endogenous growth momentum, slightly reduced inflationary pressure, achieved the lowest unemployment rate since 1969, and continued scale expansion of foreign trade. However, the trade deficit has reached a seven-month high, the financial situation is not optimistic, and the scale of government debt remains high.

in 2018 is around \$38.4 billion, while that of North American Airlines is \$16.4 billion, up from \$15.6 billion in 2017. The market continues to be strong, with a 3.4 3.4% capacity growth, which is slightly lower than the 3.5% passenger volume growth. Over the past three years, North American airlines have contributed more than half of the industry's profits, but rising cost pressures have slowed down the growth rate. Low hedging ratio indicates that the constantly rising fuel prices will first affect this region. Labor cost pressures remain unresolved and are expected to ease in 2019.

According to statistics, the net profit of global airlines

North America Historical ASKs Trends (1999-2018)



Source: COMAC, OAG

Network

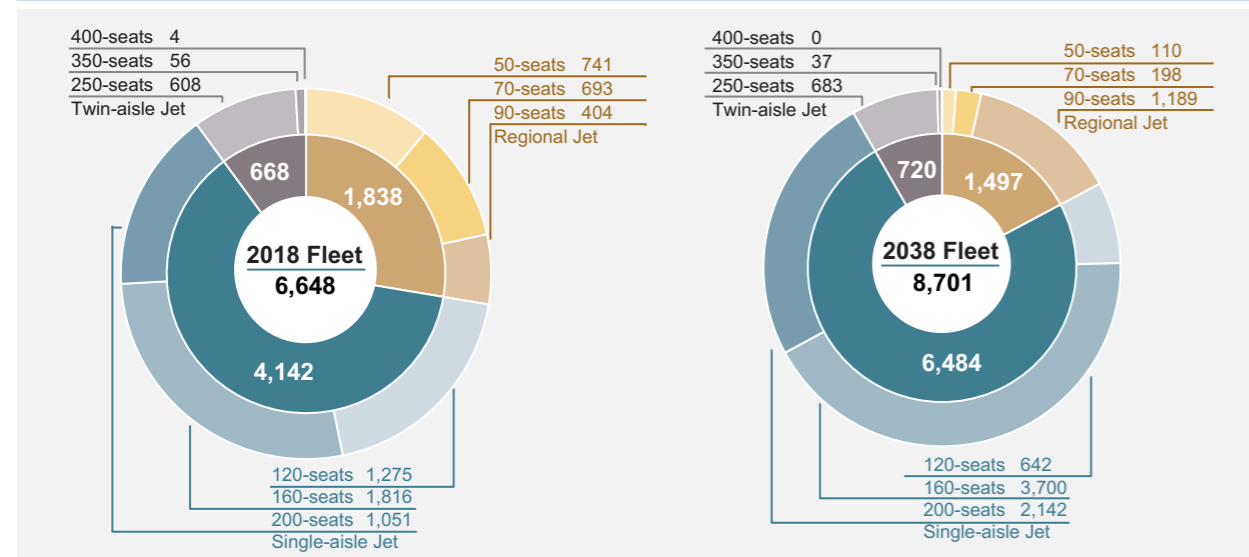
In 2018, ASKs in North America increases 4% and the growth rate remains stable. The North American regional market is still the largest market in terms of North American carriers, which accounts 87% of their total capacity.

On the cross-regional markets, apart from the three major markets, which are Latin America, Europe, and Asia Pacific, China has gradually become the fourth

emerging market for North America. Latin America has advantages over geographic location, developing tourism, and abundant mineral resources. The stable political situation as well as recovering commodities price in recent years are expected to promote the development between North America and Latin America. In 2018, North America carriers account for 8% of the capacity of North America to Latin America routes, while only 3% on Europe markets.

Fleet

North America Fleet Growth



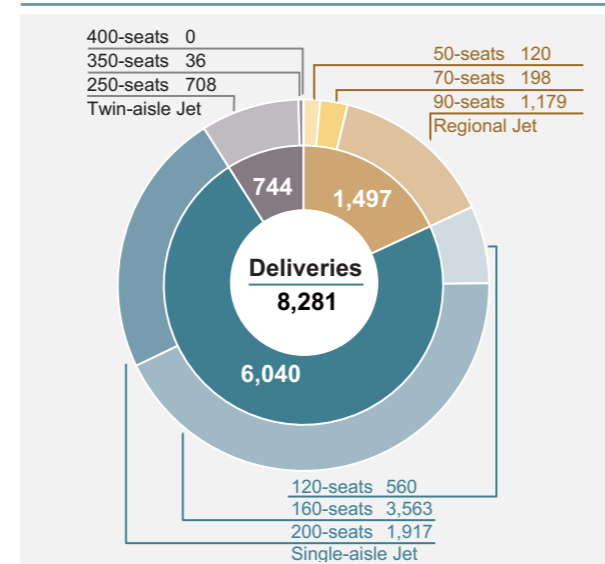
Source: COMAC, Flightglobal

Passenger aircraft fleet in North America has increased by 265, with a 4.2% increase from 2017 to 2018.

In 2018, there are 6,648 passenger jets in service in this region, among which 62% are Single Aisle jets. The regional jet accounts for 28% of the total fleet number. By 2038, North America passenger jet fleet in service is forecast to reach 8,701, accounting for 18% of the global total. The proportion keeps unchanged from last year's forecast.

In the following 20 years, this region is estimated to have 8,281 new deliveries, with the value of \$970 billion. Single aisle passenger aircraft is still the main growth driver and its delivery number is expected to reach 6,485, which will account for 20% of the global total. 1,497 new turbofan regional jets are expected to be delivered, accounting for around 30% of the global total. The twin aisle passenger jets are only estimated to deliver 720 aircraft, which accounts for 8% of the global total.

North America Deliveries by Category & Seat Size (2019-2038)



Source: COMAC

Latin America



Source: COMAC

Market

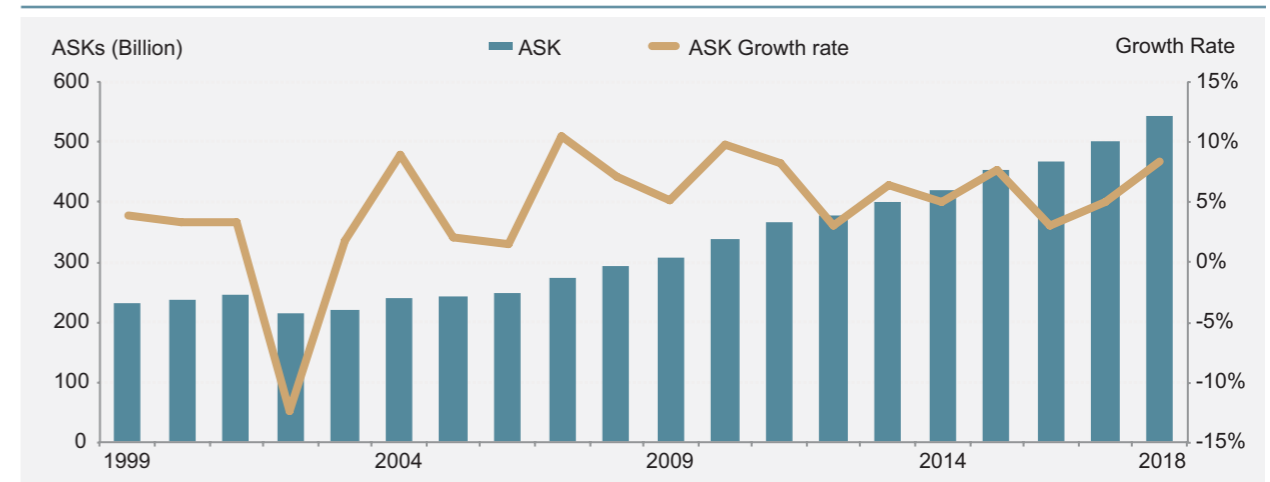
In 2018, Latin America achieved growth for two consecutive years and got rid of the market decline. Major countries maintained the momentum of economic recovery, economic growth sustained globally led to an increase in aggregate demand, international trade continued to rise, which benefit the further economic recovery in Latin America. At the same time, the global value chain has entered a deep restructuring stage, providing opportunities to Latin American region for the integration for global production. Under the guidance of building 'The Belt and Road' with China, Latin America is now embracing new opportunities for further development.

However, the risk of financial markets is gathering and capital liquidity keeps increasing. Those factors accompanied by the shrinkage of debt market and

the increase of interest rate in the U.S. and in Europe, the loose conditions of global monetary policy may be reversed, further increasing the debt pressure in Latin America and drive up its financing difficulties. Besides, the trend of protectionism and anti-globalization is still on the rise, represented by the Trump Administration's "America First" proposition, the inward-looking tendency of policy in developed economies is intensifying, which significantly increased competitive squeeze on developing economies, including Latin America.

At this stage, Latin American market's risk resistance capability is relatively weak, and its economic situation largely depends on the change of external environment. All in all, opportunities and risks coexist, and the future of this market is still promising.

Latin America Historical ASKs Trends (1999-2018)



Source: COMAC, OAG

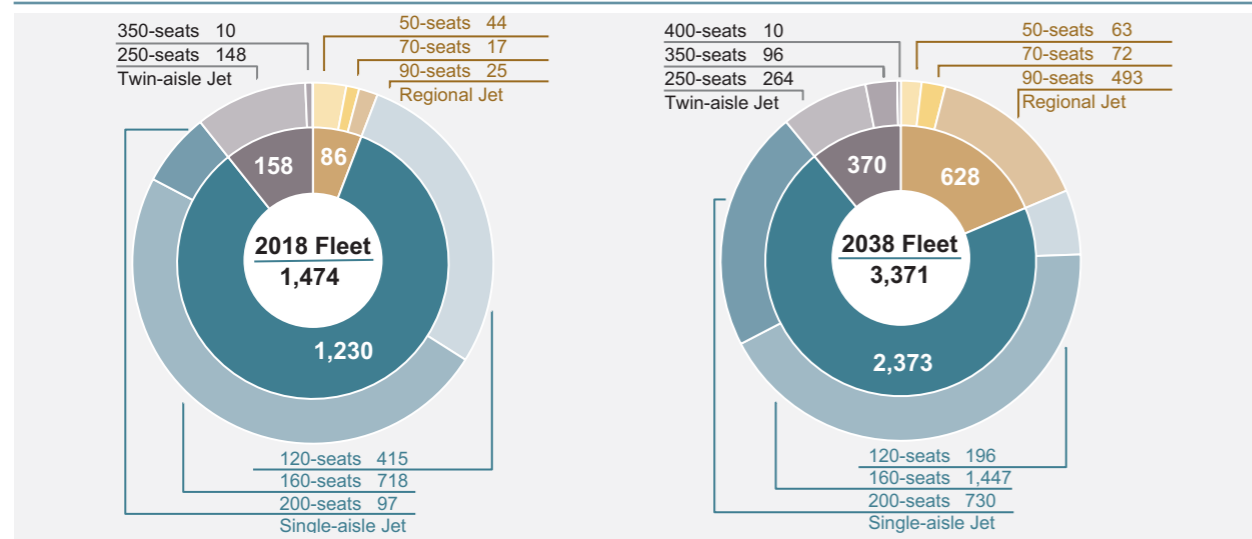
Network

The number of internal flights within Latin America accounts for 91.8% from all routes depart at local airports in 2018, and the proportion of ASKs is 89.8%. On routes to and from other regions, the number of flights to and from North America and Europe accounts for 7% and 0.9%, and ASKs occupied 8% and 2% of the total ASKs respectively.

ASKs of Latin American airlines accounts for 99.1% on regional routes. Turbofan regional jets, Single Aisle jets and Twin Aisle jets are all available in this region.

Fleet

Latin America Fleet Growth



Source: COMAC, Flightglobal

The fleet size of Latin America reach to 1,474 in 2018, and is forecast to 3,371 in 2038, including 628 turbofan regional jets, 2,373 Single Aisle jets, and 370 Twin Aisle jets.

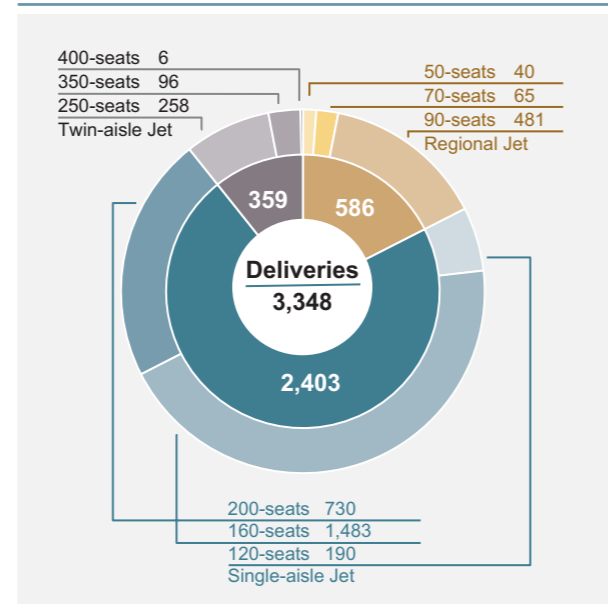
Over the next 20 years, the proportion of aircraft deliveries in Latin America is estimated to increase to 7.3%, and single aisle jets are expected to account for 71.2% of new aircraft deliveries, of which 53% will be 160-seat class jets.

In the past 5 years, 86.6% regional jets delivered in Latin America were larger than 70-seat class. Larger seat class turbofan regional jets were mainly used to replace the previous generation of single aisle jets, as well as to develop new regional routes and domestic routes. It is expected that, in the next 20 years, 586 turbofan regional jets will be delivered.

Compared to other regions, twin aisle jets that are lower than 300-seat class have become more popular in Latin America. Within the forecast period, Latin America is expected to deliver 359 Twin Aisle jets, of which 250-seat class will occupy the largest part.

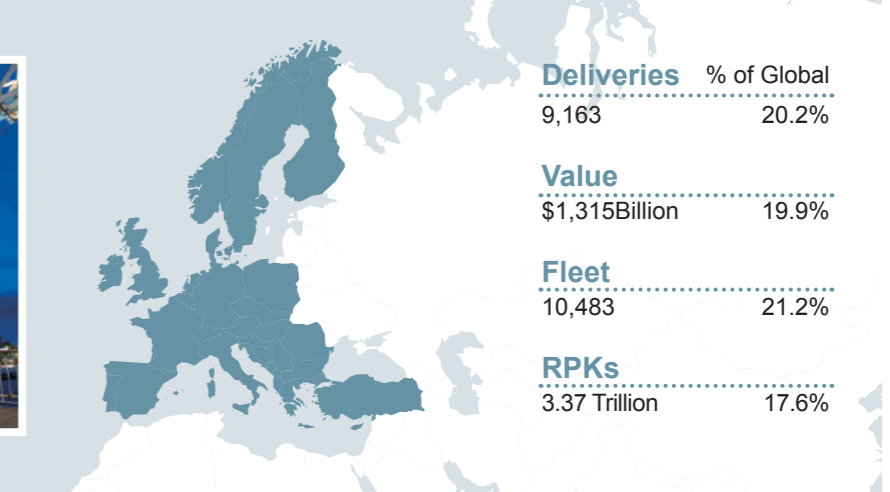
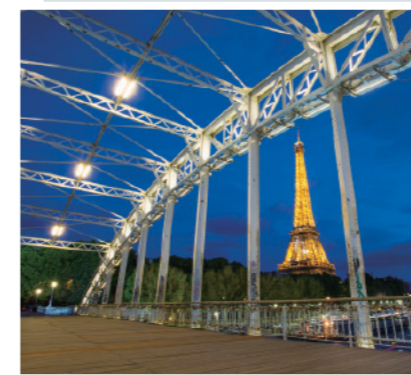
However, Latin American airlines only offer 23.9% available seats among routes between Latin America and North America, the rest of seats are provided by North American airlines. On routes between Latin America and Europe, ASKs of Latin American airlines are even less, only accounting for 20.2% of the total ASKs, while European airlines account for around 81%. From above, Latin American airlines take the dominant position on regional routes but need to improve the competitive ability on other routes.

Latin America Deliveries by Category & Seat Size (2019-2038)



Source: Comac

Europe



Source: COMAC

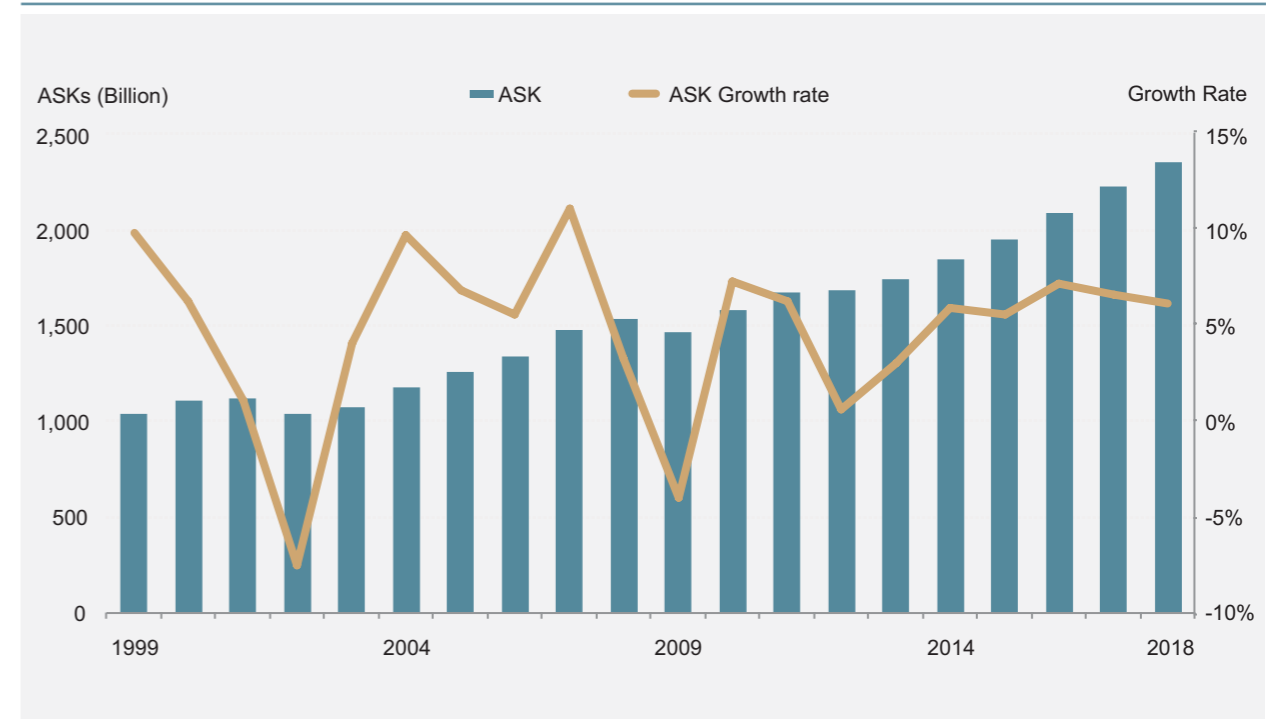
Market

In 2018, due to the impact of Brexit, trade tightening and political instability, the European economy declined in the second half of the year, GDP growth slowed down from 2.7%, which was the fastest growth since 2017 financial crisis, to 2%.

Despite the slowdown in economic growth, the

European aviation market has maintained a high growth rate. The growth rate of capacity delivery has increased from 5.9% in 2017 to 7% in 2018. In 2018, Lufthansa Group remains the largest aviation group in Europe, with passenger traffic increasing by 10% to 142 million. Ryanair holds the second place, with its passenger traffic increasing by 8% to 139 million.

Europe Historical ASKs Trends (1999-2018)



Source: COMAC, OAG

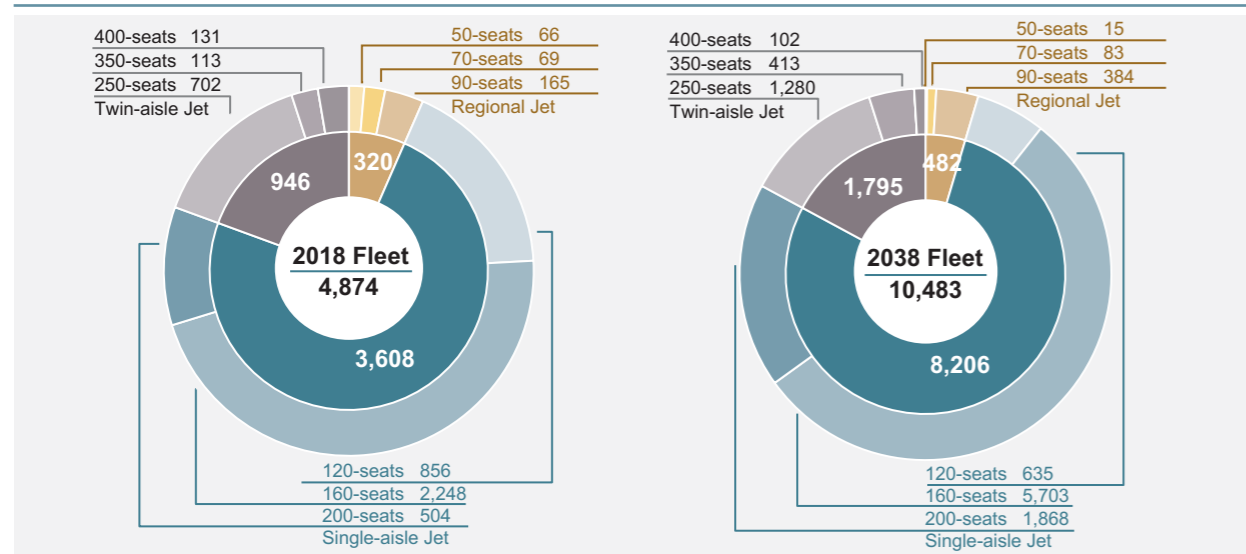
Network

In 2018, the European-American market is still the largest international market for European carriers. The seat capacity maintains a growth rate at 9.1%, and the revenue growth rate is 5.2%, which is the highest one among all routes'. The second largest market is Europe-Africa market, in which seats available have increased by 13.4% and overall revenue has increased by 3.8%. The European-Russian& CIS market grew the fastest in all cross-regional markets in 2018. The number of

overall available seats has increased by 19.8% but the revenue growth rate remains unchanged. In the Europe-Asia Pacific market, European carriers have increased their capacity by 8.3%, and the revenue growth rate is 1%. Within the Europe-Asia Pacific market, the Europe-India market grows rapidly. Two main carriers, which are Indian Jet Airways Co Ltd. and Air India, have both achieved high growth rates.

Fleet

Europe Fleet Growth



Source: COMAC, Flightglobal

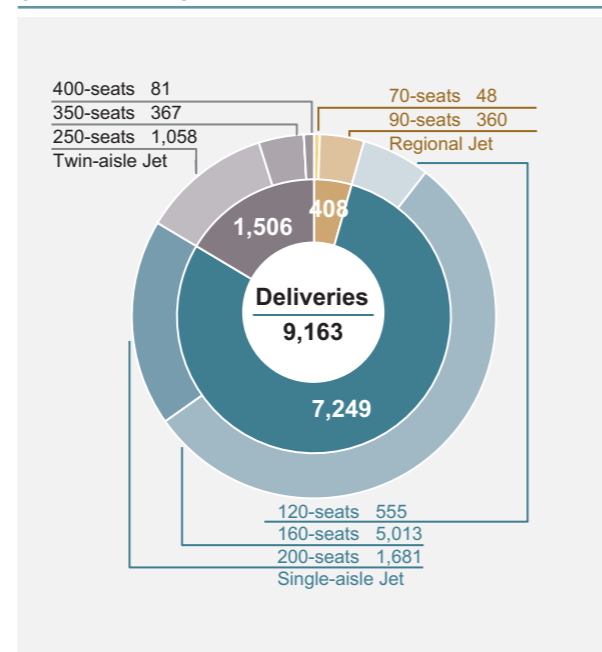
In 2018, there are 4,874 aircraft in Europe. The total fleet, with an average age of 10.6 years, has increased by 6.4% compared with 2017, accounting for 20.4% of the global fleet. In the next two decades, 9,163 aircraft are expected to be delivered in Europe, and the fleet size is forecast to be 10,483 aircraft, accounting for 21.2% of the global total and valuing \$1.02 trillion.

The small seat category in the regional jet segment is encountering a peak of retirement. In the next two decades, 360 regional jets of 90-seat category are expected to be delivered, and the future fleet will be composed mainly of 90-seat category.

Single aisle fleet is estimated to double in Europe for the next 20 years. 160-seat category will continue to rise, accounting for 69.5% of single aisle fleet. The number of 200-seat aircraft will reach to 1,868, 3.7 times of the current.

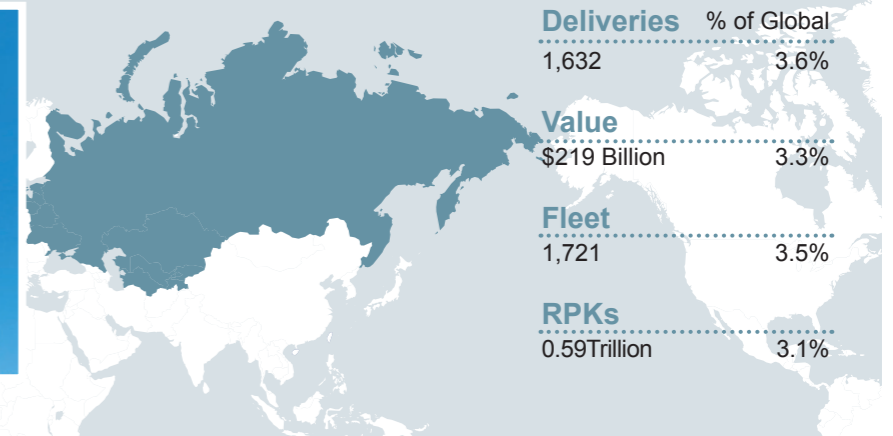
946 wide-body passenger aircraft are operating in Europe. In 2038, twin aisle aircraft fleet are expected to expand to 1,795 aircraft, and the portion of 250-seat class aircraft will reach to 70%.

Deliveries by Category & Seat Size (2019-2038)



Source: COMAC

Russia & CIS



Source: COMAC

Market

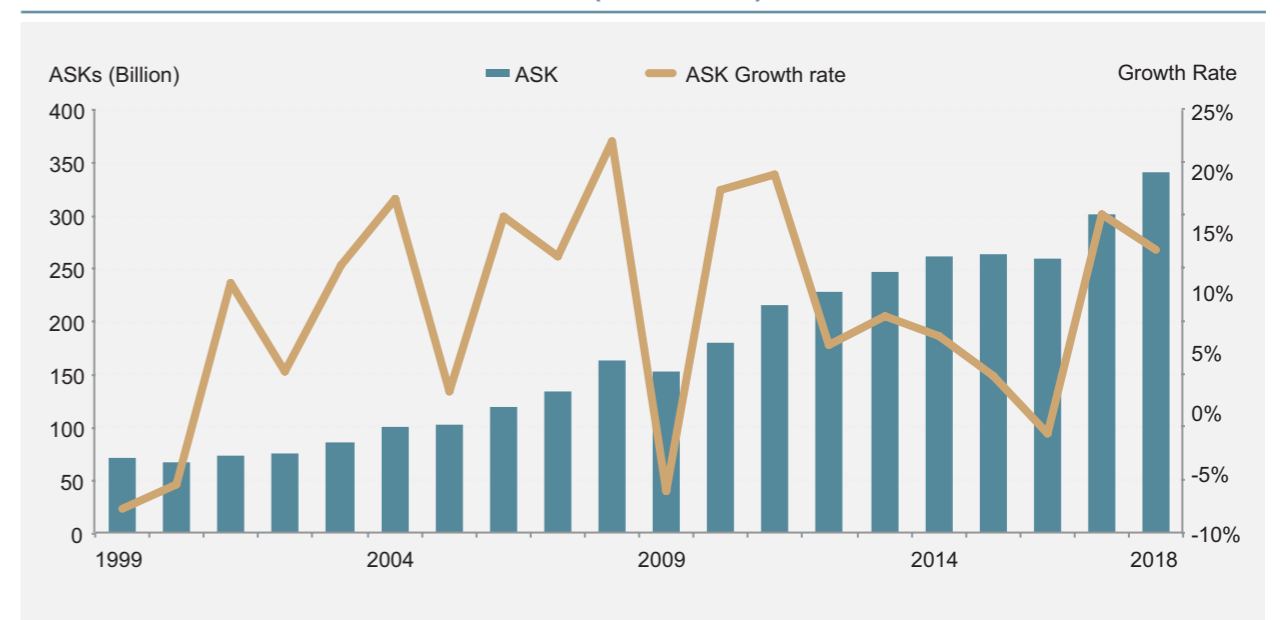
Previously, the economic development trend in the Russian & CIS region was slowed down by the economic downturn in EU and Russia. However, with increasing oil prices and stronger market vitality, the region is expected to have 1.7% growth of general economy for the next two decades .

The real GDP of Russia & CIS region has positively increased in 2018, and the economic volume of Russia accounts for more than 70% of CIS region. Despite the intensification of economic sanctions, Russia's inflation rate is relatively low and stable, and oil production has increased. Due to the strong activities, Russia's

economy has grown by 2.2% in 2018.

The constantly growth of international and domestic tourism industry will play an important role in promoting the development of regional aviation industry. Tourism contributes more than 80% to the added value of the transportation industry, including more than 90% to civil aviation transportation and ancillary services. As a result of the terrorist attacks in Europe in recent years, many Chinese tourists have shifted their destinations from Europe to Russia. In 2018, the number of Chinese tourists to Russia has a year-on-year growth of 21.1%, which reached 1.84 million.

Russia & CIS Historical ASKs Trends (1999-2018)



Source: COMAC, OAG

Network

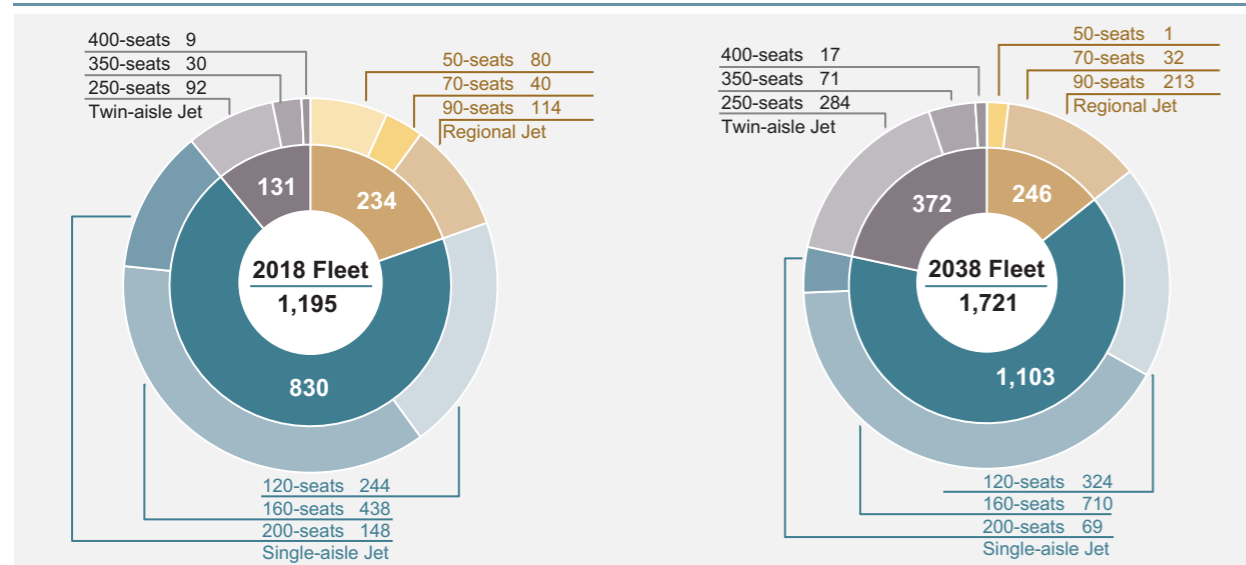
The RPKs of Russia & CIS accounts for 3.1% in 2018.

Carriers in Russia & CIS delivered the most capacity on domestic and international routes to Europe, Asia-Pacific, Middle-East and China. Russia carriers focus more on their intra-CIS market because of the national strategy. The capacity has been put on the intra-CIS market has reached to 48.3%. The second largest market is European market, which accounts for 27% of the total capacity. Remaining capacity delivered to Asia-Pacific market is 9.4% in 2018.

From the view of aircraft types, regional jets are mainly operated on internal CIS and Europe routes. Single aisle jets are major aircraft type for the routes to and from Europe, Middle East and internal region. 110 and 150-seat classes are widely used, especially the 150-seat class. Twin aisle jets are used for long-haul routes, in region such as China, Asia-Pacific, Middle East and Europe.

Fleet

Russia & CIS Fleet Growth

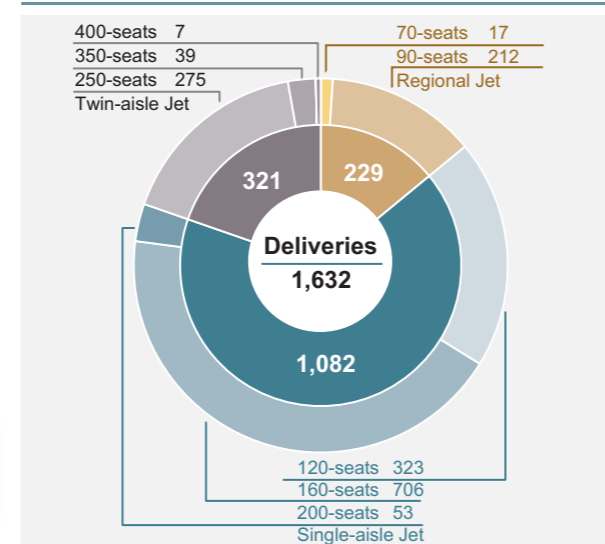


Source: COMAC, Flightglobal

The number of fleet has increased by 97 in 2018, 9% more than the year 2017. By 2038, the fleet size of Russia & CIS is expected to reach 1,721, 64% of which will be single aisle jets.

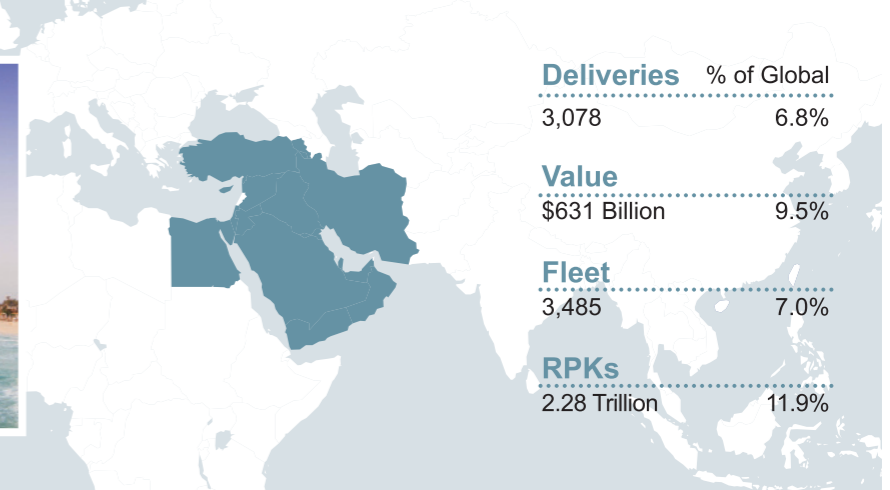
According to the deliveries in the next 20 years, single aisle aircraft fleet will be the major workforce of global fleet growth, while regional aircraft and single aisle aircraft are also expected to have a stable growth. In the next two decades, the demand for regional jets and single aisle aircraft will increase along with the growth of regional flight capacity and the tight connection to Europe, Asia-Pacific, Africa, and Middle East. Meanwhile, the growth of air travel to Asia-Pacific, Latin America and Africa will stimulate the development of twin aisle jets which operate on those long-haul routes.

Russia & CIS Deliveries by Category & Seat Size (2019-2038)



Source: COMAC

Middle East



Source: COMAC

Market

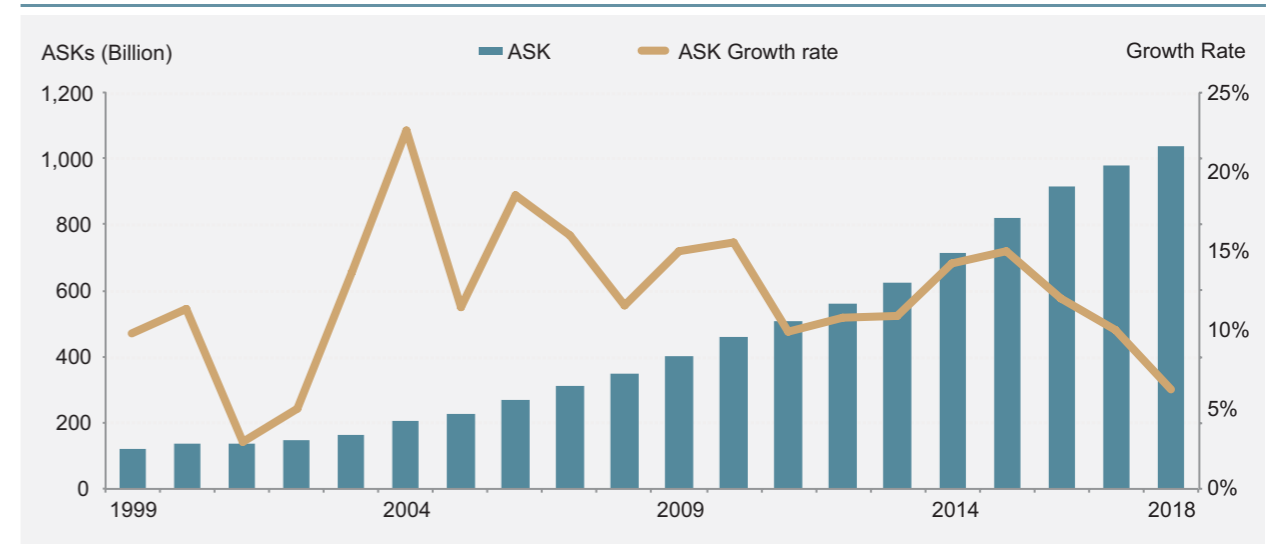
In 2018, despite the political tension and the severe security situation, which have a great impact on the Middle East aviation market, the rise in global crude oil price will help the recovery of market demand. On the demand side, the three major airlines in the Middle East, Emirates Airlines, Etihad Airways and Qatar Airlines are slowing down their expansion.

In 2018, carrier capacity in the Middle East grew by only 4.4%, which is lower than the global average growth rate of 7%. Emirates Airlines has almost completed its arrangement of global waypoint, and is currently focusing on increasing the frequency of flights on valuable commercial routes and operating with larger aircraft. Etihad Airways is restructuring due to the high

cost pushed up by increasing fuel prices and losses from equity investments. In 2018, Etihad Airways did not expand drastically, but focused on point-to-point route layout. Hence the revenue of such routes is more assured.

It is expected that the market demand in the Middle East will continue to increase in 2019, especially the rise in crude oil prices will help to enhance the purchasing power of the region and boost the aviation demand, thus the growth of aviation demand in Saudi Arabia is promising. The airline fares in this region is expected to rise by 1%, but the international long-haul flight fares will remain under pressure or will be flat.

Middle East Historical ASKs Trends (1999-2018)



Source: COMAC, OAG

Network

In 2018, Middle East carriers have big market shares in cross region market of Middle East-Asia Pacific, Middle East-Europe and Middle East-North America.

The capacity delivered by Middle East carriers to Asia-Pacific, Europe, and Africa markets has increased by 5.4%, 9.8%, and 8.3% respectively in 2018, while the capacity delivered to North America market has decreased by 4.2%.

As the tourism development in the Asia-Pacific and

Middle East regions greatly promotes the travel demand and makes the bilateral exchanges frequent, it is expected that the Middle East carriers will perceive the Asia-Pacific region as their most important market. Middle East is very close to Europe, so 4 to 6 hours' flights can almost cover all Europe countries. Thus, Europe will become the first market that Middle East carriers are willing to explore. Because North America is a mature air transport market and carriers are very competitive, the capacity growth rate is expected to slow down in the future.

Compared with the year 2017, the jet fleet in Middle East has grown by 3.4% and has reached to 1,365 in 2018, accounting for 5.7% of the global total. By 2038, the fleet size in this region is forecasted to grow to 3,485, accounting for 7% of the world fleet. In the following 20 years, 3,078 new aircraft are estimated to be delivered, which will value \$631.3 billion.

For regional jet, Middle East has a small demand on this category, which only takes 1.8% of the world regional jets. 90-seat class is the main category now. The new regional jet deliveries are expected to be 87, account for 1.8% of the world regional jet fleet, and expected to reach to 135 aircraft by 2038.

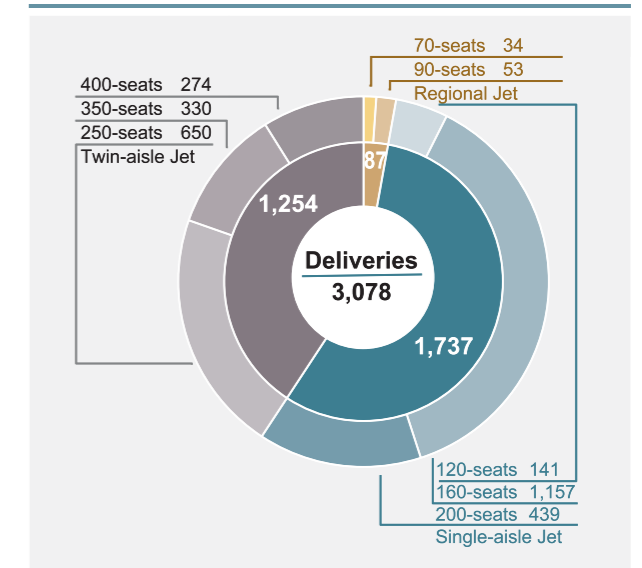
For single aisle aircraft, 160-seat class aircraft are the major workforce in service, which take 83% of single aisle jets in this region. The market demand in Middle East region for this class will continue to expand. In the following 20 years, there will be 1,737 single aisle jets deliveries to Middle East market. The fleet will be doubled in size from 567 to 1,884 jets.

For twin aisle aircraft, 250-seat class aircraft are the main aircraft type in service, which take 52% of Twin aisle jets in this region. However, the advantage of this class is no longer obvious because the market share has been divided by larger size aircraft.

According to the number of orders from this region, Middle East intends to build a global air transportation hub. Thus lots of countries in this region are actively developing their aviation industries. Taking advantages

of geographic location, Europe, Africa and Asia-Pacific will be the priority markets for Middle East carriers. Middle East market has a big demand on large twin aisle jets, and the orders are mainly Boeing 777. It is forecasted that twin aisle jet fleet will reach to 1,470 aircraft, and 1,254 new aircraft will be delivered for service, among which 274 aircraft will be 400-seat class aircraft, accounting for 42% of the global new 400-seat class deliveries.

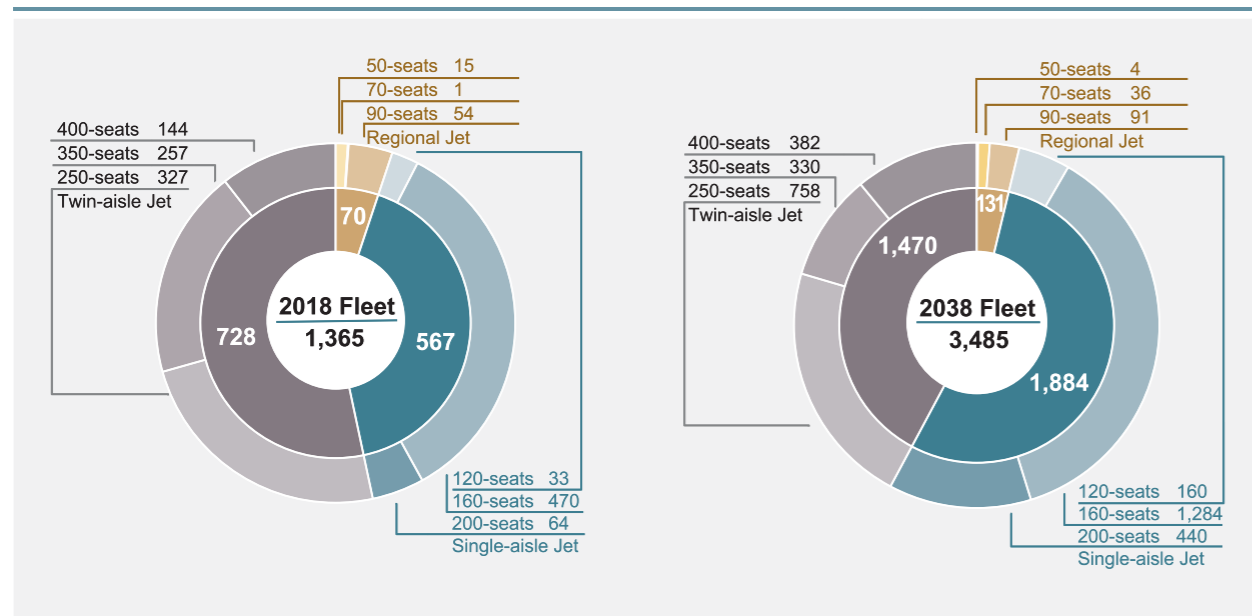
Middle East Deliveries by Category & Seat Size (2019-2038)



Source: COMAC

Fleet

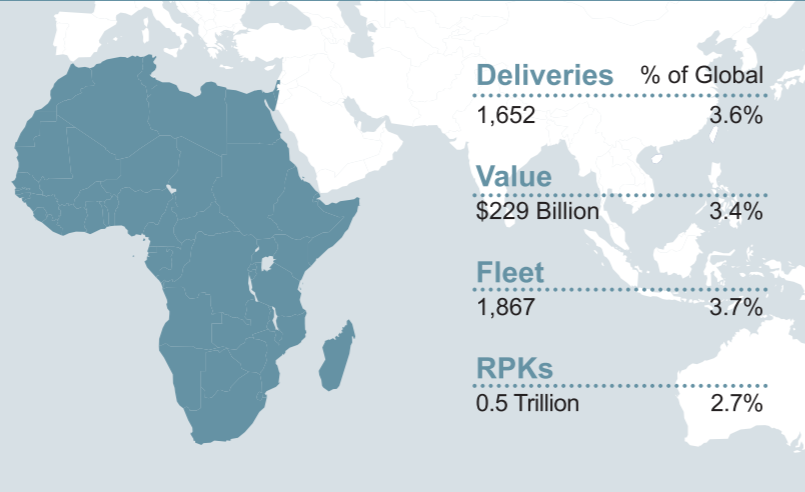
Middle East Fleet Growth



Source: COMAC, Flightglobal



Africa



Source: COMAC

Market

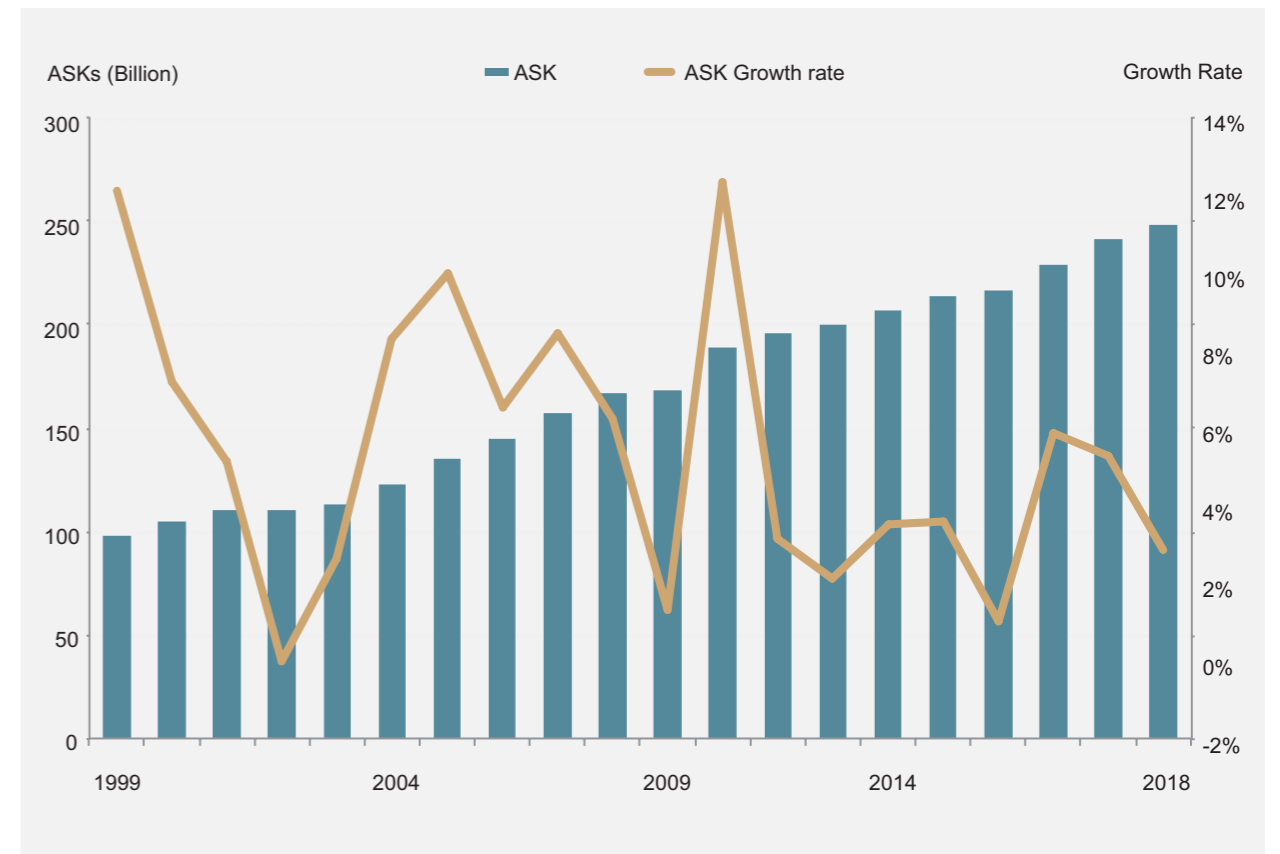
Africa, as the second largest continent in the world, contributes to 16.8% of the world's population; however, political and economic turmoil of recent years is continued to this year. Since 2018, Africa has stepped out of recession, and its economy grew by 3.5%. The commencement of the African Continental Free Trade Agreement is a milestone in Africa's development. Judging by the number of members, the African Continental Free Trade Area will become the largest free trade area in the world since the establishment of the World Trade Organization. This free area in Africa will promote a large market covering 1.2 billion people with a total GDP of \$2.5 trillion. The African Continental Free Trade Area aims to promote intra-regional trade and investment development by lowering tariffs and removing trade barriers, thus realizing the free flow of goods, services, capitals and labor within the region, and establishing a unified aviation market.

The passenger traffic flow of Africa's civil aviation has a year-on-year growth of 6.5% in 2018, which was higher than 6% growth in 2017: transportation capacity increased by 4.4%, passenger occupancy increased by 1.4 percentage points to 71%. The official launch of the single air transport market in Africa will attract more opportunities for enhancing trade between African countries, promoting transnational investment and boosting development for tourism, which greatly promotes the economic and social integration of the continent.

China's "The Belt and Road Initiative" has brought historic development opportunities to African countries. In 2018, Sino-Africa trade volume reached \$204.2 billion, with an increase of 20% over the previous year. China has become Africa's largest trading partner for ten consecutive years. Joint establishment of "The Belt and Road Initiative", "Agenda for Sustainable Development in 2030" from the United Nations, "The Vision of African Union in 2063" and the development strategies in African countries, China will support the construction of a single air transport market in Africa, promoting the integration process of African countries, boosting the interconnection of Africa, and strengthen the connection between China and Africa. With the interconnection and communication between them, African civil aviation industry is facing new opportunities for development.



Africa Historical ASKs Trends (1999-2018)



Source: COMAC, OAG

Network

The scale of Africa's civil aviation industry is small. Even with a large population that accounts for 15% of global population, Africa's ASKs only account for 5.2% of the global total in 2018. African airlines' capacity, fleet size, and total revenue are all comparatively behind airlines on other continents and seriously lacking on competitive capabilities. At the same time, shortage and poor accessibility of network connection lead to domestic transfer flights among Africa countries.

In 2018, Europe is still the largest international market for Africa, with ASKs occupied for more than 50%. Among Africa-Europe routes, European airlines have occupied almost 70% of the market share (ASKs).

Africa-Middle East routes have become the second largest international market for Africa. Middle East airlines take advantage of geographic location to increase their capacity on flights from and to Africa and increase the density of flights which accounts for 65% of

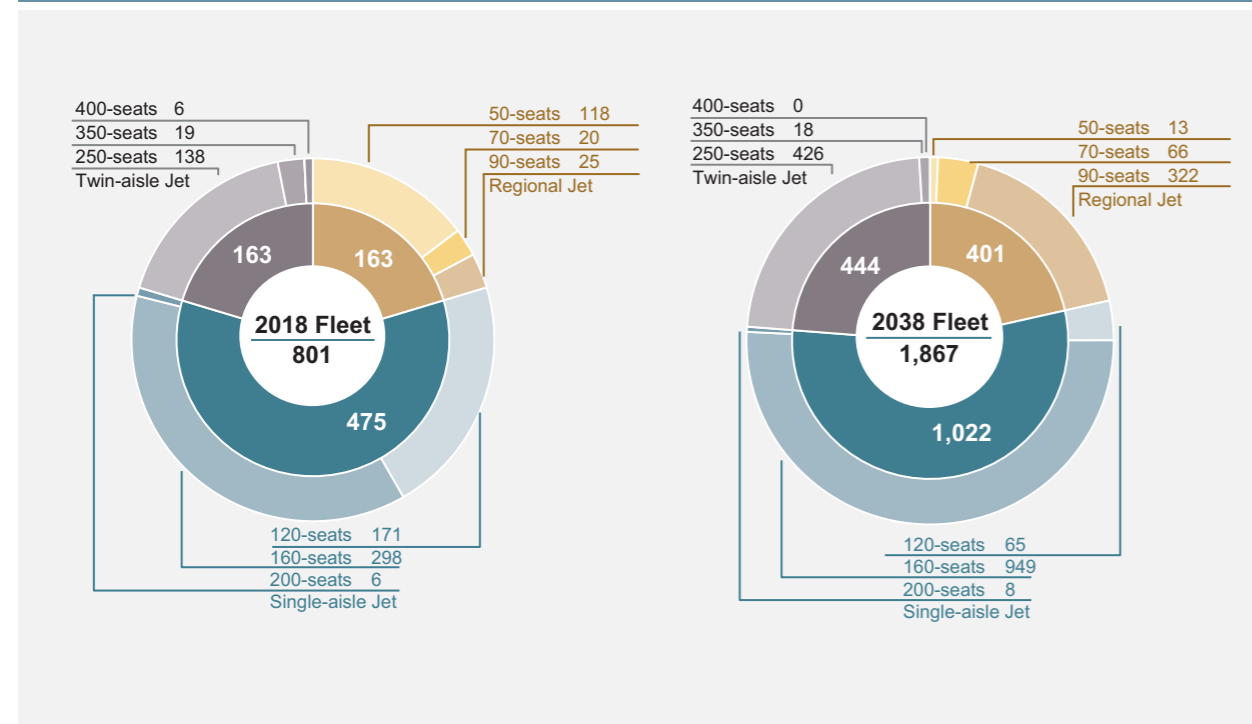
the total market share.

The closed market in Africa is one of the key reasons to African airlines' struggle. Within this single aviation transportation market, many African airlines, taking Ethiopian airlines as an example, are actively exploring international routes recently, striving to create an international hub that connects Africa and the world. However, the development of Africa's hub still faces many problems, such as inadequate infrastructure, unhealthy regional networks, and serious security threats.

Africa significantly orientates the construction of "The Belt and Road Initiatives of China", as well as the important partner of China. Through implementing "The Eight Major Initiatives", the regional cooperation of aviation between China and Africa will stimulate the mutual connections within Africa.

Fleet

Africa Fleet Growth



Source: COMAC, Flightglobal

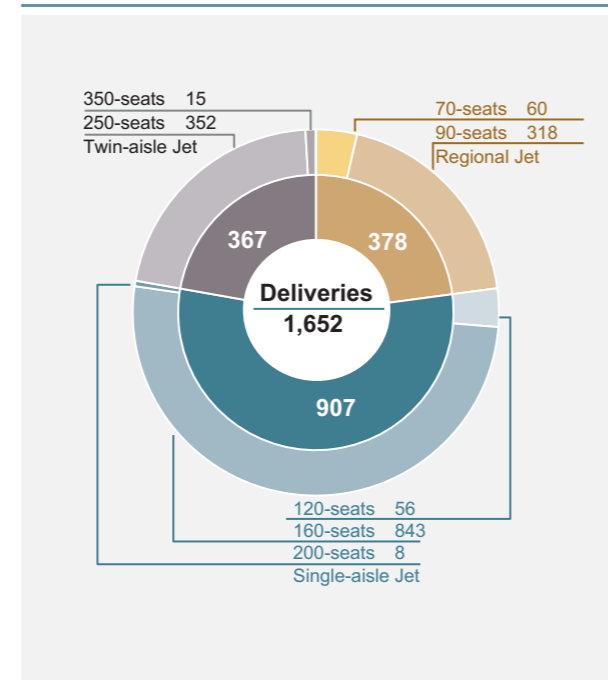
In 2018, Africa fleet has a number of 801 jets, only 1% increase compare to 2017 and accounting for 3.3% of the global total. In the future two decades, 1,652 new aircraft are expected to be delivered, valuing over \$229 billion. The fleet size will expand to 1,867 by 2038, reaching to 3.8% of the global market share.

The regional jets are facing a retirement peak . The single transport market in Africa will lead to an increase in regional demands in the future, which is expected to be helpful completing the routes network, improving airport connections, and accelerating the development of air transportation industry in Africa. In the next 20 years, there will be 318 regional jets of 90-seat category delivered to Africa.

Single-aisle jets are forecasted to increase sharply by 2038, from 475 to 1,022 aircraft, among which the portion of 160-seat aircraft is expected to go up continuously, reaching to 92.8% from 62.7%.

There are 163 Twin-aisle jets in operation in 2018, among which the portion of 250-seat aircraft is over 80%.

African Deliveries by Category & Seat Size (2019-2038)



Source: COMAC



6



FREIGHTER MARKET FORECAST

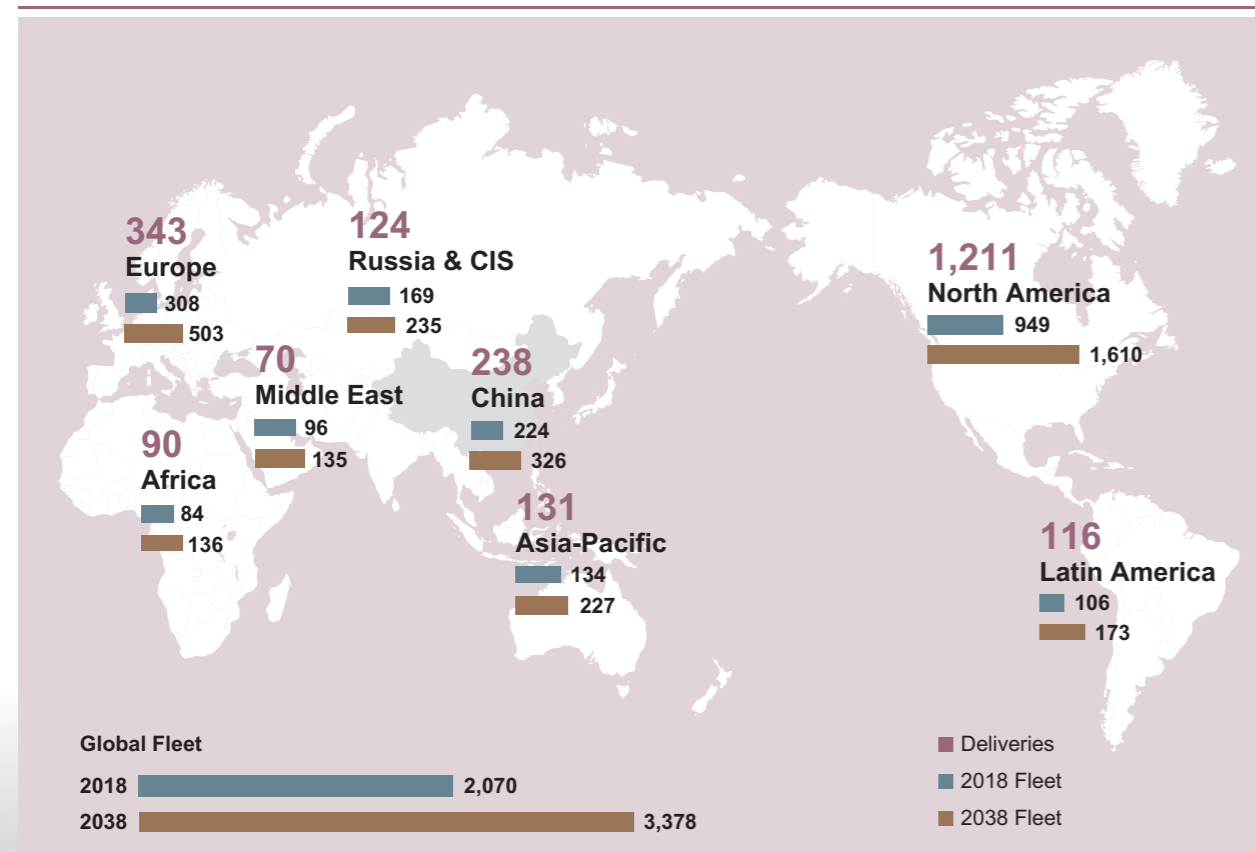
In 2018, the FTK has increased by 3.5%, down from 9.7% in 2017. Overall, supply growth performs better than demand, capacity grew 4.5%, rate of loading decreased by 0.9%, yet freighter revenue still maintained a high growth rate of 9.2%. Among them, FTK of Asia-Pacific accounts for the largest proportion, reaching 35% and North America has the fastest growth rate, 6.8%. According to IATA forecasting, the annual growth rate of FTK will remain at 4.4% from 2018 to 2023.

In 2018, more than 272 carries around the world operated 2070 cargo aircraft, of which the top two carries Fedex and UPS accounted for 30% of the fleet, SF Express has become the third largest cargo carried

in the world, with an existing fleet of 51.

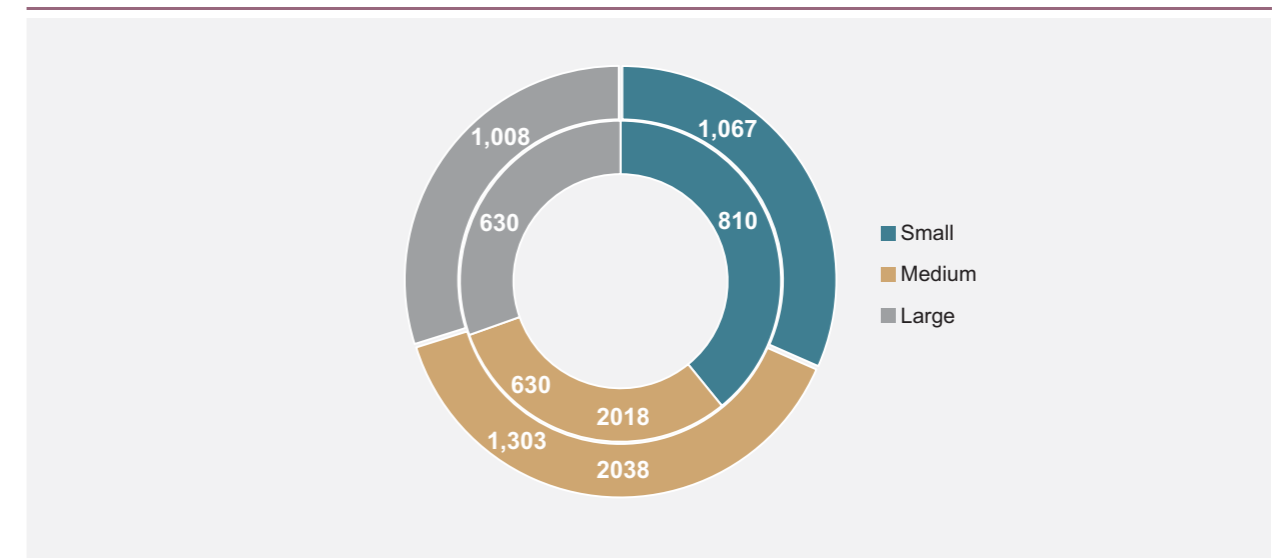
We expected that in the next 20 years, the turnover of the global air cargo market will maintain an annual growth rate of 2.5%, and by 2038, the global cargo fleet will reach 3,378, including 1,067 narrow-body freighters and 1,008 large wide-body freighters were delivered, including 94 narrow-body freighters, 502 medium-sized wide-body freighters and 296 large scale wide body freighter. In addition, 1431 passenger planes will enter the cargo market through the way of passenger to cargo, including 797 narrow-body cargo planes, 433 medium-sized wide-body cargo planes and 201 large-scale wide-body cargoes.

Global Freighter Fleet Growth by Region

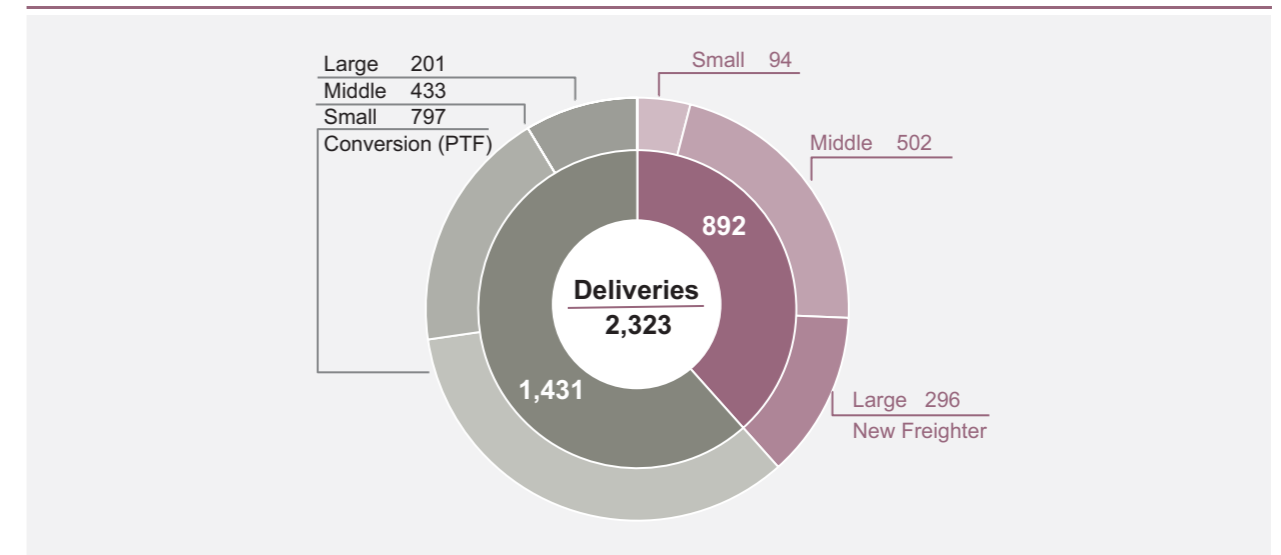


Source: COMAC, Flightglobal
China including Hong Kong, Macau and Taiwan

Global freighter fleet growth



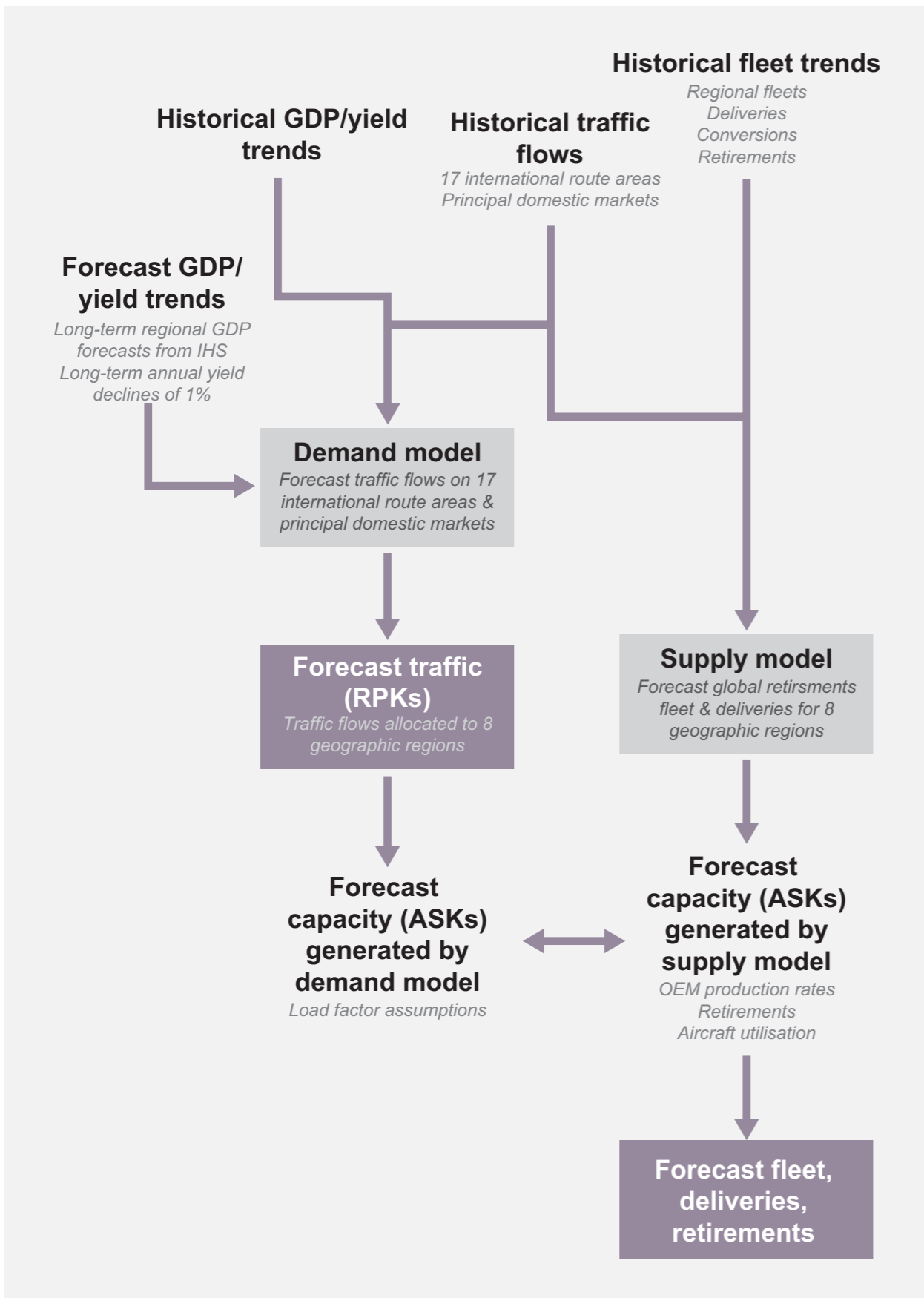
Global deliveries by Category & Size (2019-2038)



Source: COMAC, Flightglobal



Methodology



Aircraft Size Category Definition

	Passenger Regional Jets	Passenger Single-Aisle Jets	Passenger Twin-Aisle Jets
50 seats	Bombardier CRJ100 / 200 Dornier 328Jet Embraer ERJ135/140/145 Yakovlev Yak-40		
70 seats	Bombardier CRJ700 / 705 Embraer E170 Antonov An-148 Mitsubishi MRJ70 Avro RJ70 BAE 146-100 Fokker 70 Fokker F28-1000		
90 seats	COMAC ARJ21 Bombardier CRJ900 / 1000 Embraer E175 / 175-E2 Mitsubishi MRJ90 Sukhoi Superjet Antonov An-158 Avro RJ85/RJ100 BAE 146-200/300 Fokker F28-4000 / 100		
120 seats		Embraer E 190 / 195 / 190-E2 / 195-E2 Airbus A318 / A319 / A319neo Boeing 737-600 / 700 / MAX 7 Airbus A220 Boeing 717 Boeing 737-200 / 300 / 500 McDonnell Douglas DC-9/ MD-87 Tupolev Tu-134 / Yakovlev Yak- 42	
160 seats		Airbus A320 / A320neo Boeing 737-800 / MAX 8 COMAC C919 Irkut MS-21 Boeing 727 Boeing 737-400 McDonnell Douglas MD-80 / 90 Tupolev TU-154	

	Passenger Regional Jets	Passenger Single-Aisle Jets	Passenger Twin-Aisle Jets
200 seats		Airbus A321 / A321neo Boeing 737-900 / MAX 9 Boeing 737 MAX 10 Tupolev TU-204 <i>Boeing 757</i> <i>Ilyushin IL-62</i>	
250 seats			Airbus A330-200 / 300 / 800 / 900 Airbus A350-800 / 900 Boeing 767 Boeing 777-200 Boeing 787-8 / 9 / 10 <i>Airbus A300</i> <i>Airbus A310</i> <i>Airbus A340-200 / 300 / 500</i> <i>Ilyushin IL-86 / 96</i> <i>Lockheed L1011</i> <i>McDonnell Douglas DC-10 / MD-11</i>
350 seats			Airbus A350-1000 Boeing 777-300 Boeing 777X <i>Airbus A340-600</i>
400 seats			Airbus A380 Boeing 747-8 <i>Boeing 747-400</i> <i>Boeing 747 Classics</i>

Note: Aircraft in Bold represents "In Production"

Aircraft Size Category Definitions

Small	Medium	Large
<i>Antonov An-72</i> <i>Antonov An-74</i> <i>Antonov An-148</i> <i>Antonov An-178</i> <i>BAE 146</i> <i>Boeing 707</i> <i>Boeing 727</i> <i>Boeing 737</i> <i>Boeing 757</i> <i>Bombardier CRJ</i> <i>Caravelle</i> <i>Embraer ERJ 145</i> <i>Ilyushin IL-62</i> <i>McDonnell Douglas DC-8/-9</i> <i>McDonnell Douglas MD-80</i> <i>Sukhoi Superjet 100</i> <i>Tupolev TU-204</i> <i>Tupolev TU-144/145</i> <i>Yakovlev Yak-40</i> <i>Yakovlev Yak-42</i>	<i>Airbus A300</i> <i>Airbus A310</i> <i>Airbus A330</i> <i>Boeing 767</i> <i>Ilyushin IL-76</i> <i>Lockheed L-1011</i>	<i>Airbus A380</i> <i>Antonov An-124</i> <i>Antonov An-225</i> <i>Boeing 747</i> <i>Boeing 777</i> <i>Ilyushin IL-96</i> <i>McDonnell Douglas DC-10/MD-11</i>



Global RPK Traffic Forecast Summary

	2018	2023	2028	2033	2038	2019-2038 CAGR
International RPKs (billions)						
Between North America and Central America/Caribbean	98	117	140	169	203	3.7%
Between and within Central America and the Caribbean	8	10	12	15	19	4.1%
Between Bermuda, Canada, Mexico and the United States	145	163	181	205	230	2.3%
Between North America/Central America/Caribbean and South America	146	171	206	250	304	3.7%
Local South America	34	43	57	76	101	5.5%
Local Europe	822	925	1,010	1,090	1,167	1.8%
Local Middle East	44	49	57	67	76	2.7%
Local Africa	42	50	59	86	142	6.2%
Between Europe and Middle East	285	330	391	462	541	3.3%
Between Europe/Middle East and Africa	271	338	432	554	703	4.9%
North Atlantic	763	854	960	1,066	1,176	2.2%
Mid-Atlantic	167	176	195	215	234	1.7%
South Atlantic	113	129	152	179	209	3.1%
Local Asia/Pacific	821	1,190	1,687	2,243	2,880	6.5%
Between Europe/Middle East/Africa and Asia/Pacific	950	1,288	1,746	2,276	2,902	5.7%
North/Mid-Pacific	415	493	586	705	843	3.6%
South Pacific	77	91	109	130	155	3.6%
Total International	5,204	6,415	7,979	9,784	11,883	4.2%
Domestic RPKs (billions)						
US	149	169	194	221	252	2.7%
Japan	77	80	85	89	94	1.0%
Europe	772	1,160	1,680	2,223	2,802	6.7%
China	1,074	1,169	1,260	1,372	1,488	1.6%
Other	933	1,203	1,571	2,006	2,533	5.1%
Total Domestic	3,006	3,782	4,791	5,912	7,168	4.4%
World Total	8,210	10,198	12,770	15,696	19,051	4.3%