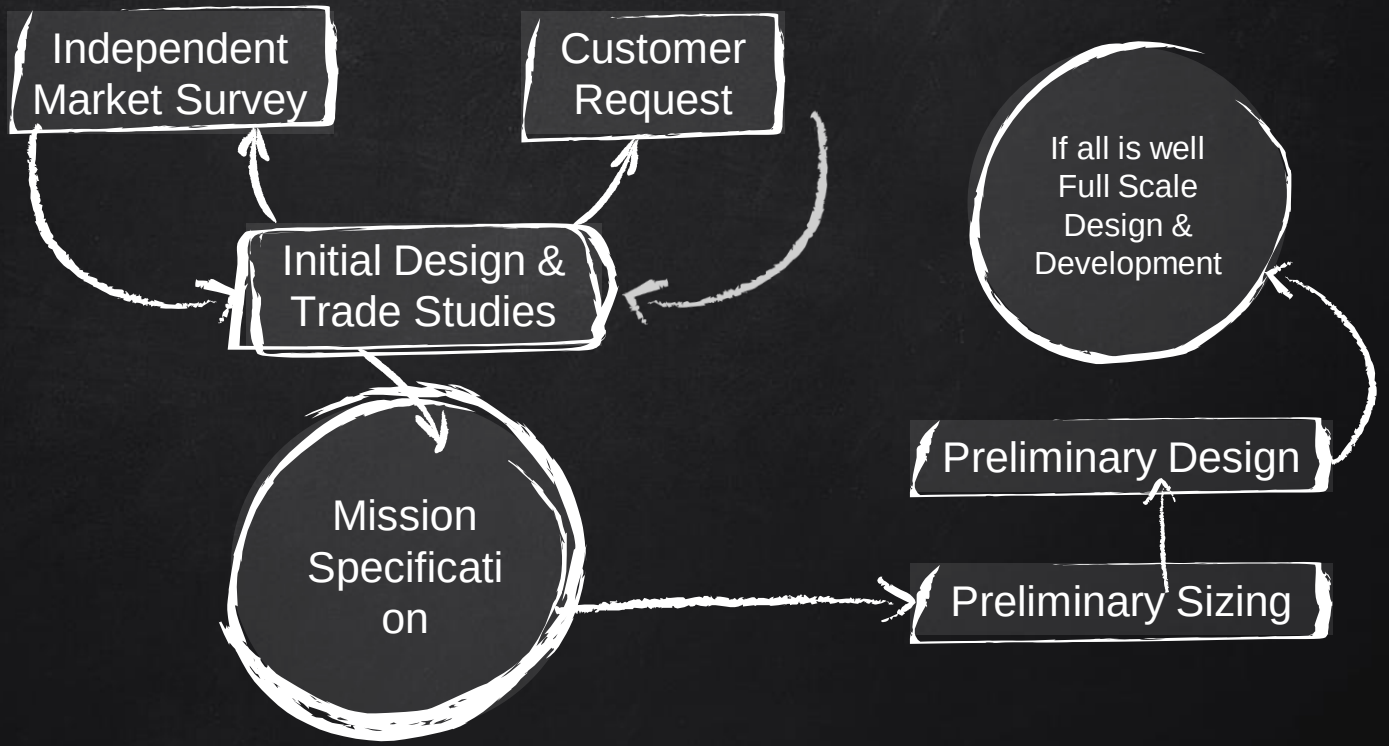
Design Book 1

Mission Specification & Market Survy

A Jet Transport Airplane Design

Evoluation of Mission Specification

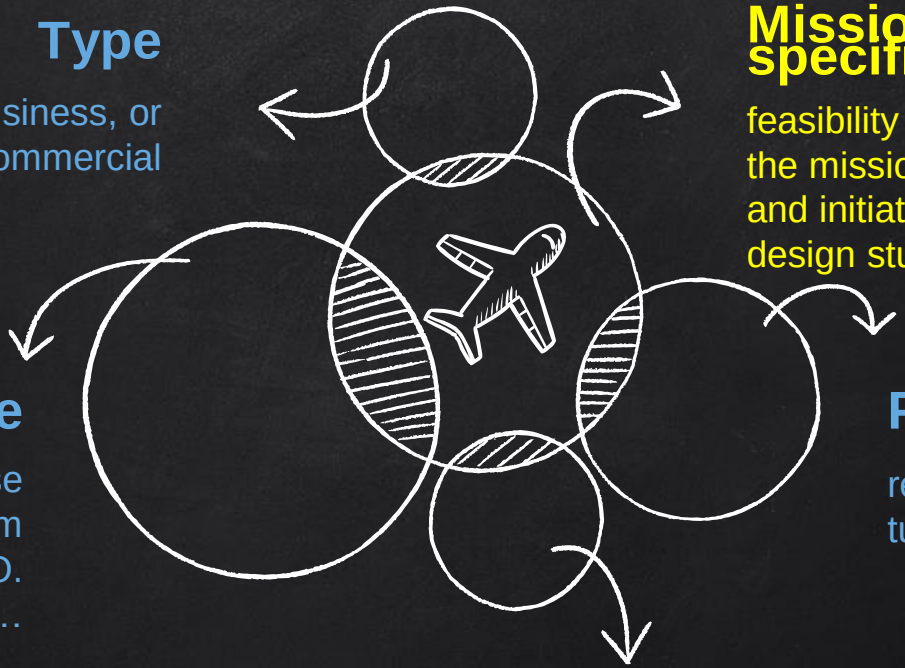


Type

private, business, or commercial

Mission specification

feasibility study to define the mission specification and initiate a preliminary design study



Performance

cruise speed, cruise altitude, & maximum range in cruise, T.O. & field length, …

Powerplant

reciprocating, turboprop, or turbofan

Capacity

Passanger & Cargo

هواپیمایی با ۳۰۰ صندلی برای فروش برای طی کردن مسافت ۱۰۰۰ مایل

ASM=300,000

اگر رگلاتوری یا مسائل فنی اجازه پرواز با بیش از ۲۵۰ مسافر را ندهد.

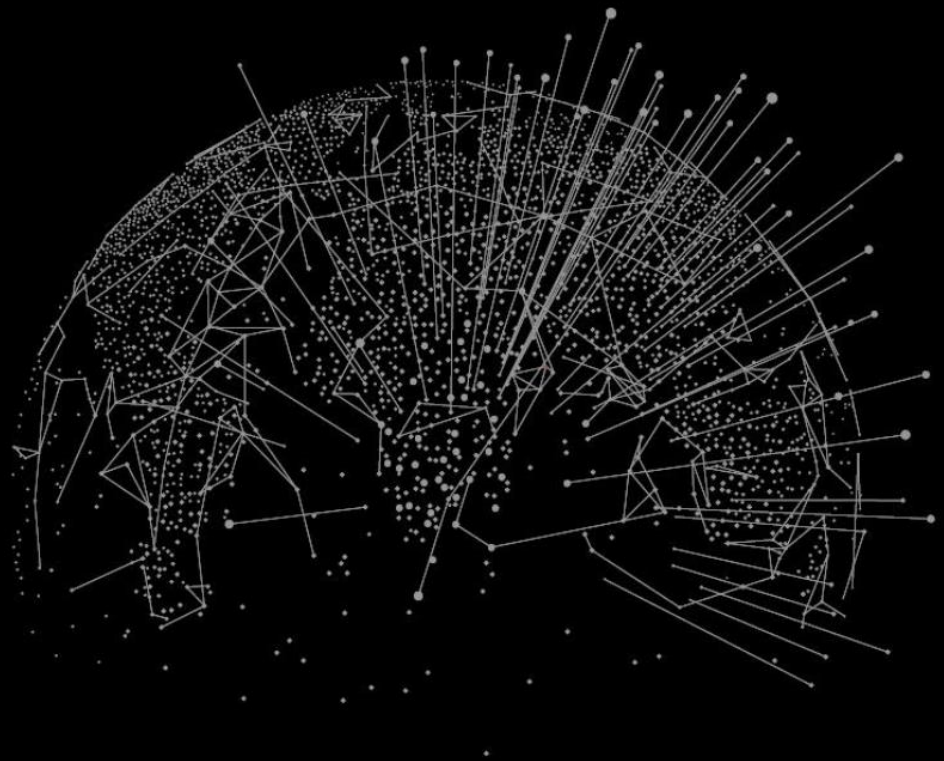
ASM=250,000

ایرلاینی ۵ پرواز با ۱۰۰ صندلی برای مسافتی در حدود ۲۰۰ کیلومتر دارد. فروش هر هواپیما ۶۰ صندلی است.

ASK=5x100x200

RPK=5x60x200

PLF=6/10=60%



Global Market Forecast

Presented by: JOHN LEAHY
Chief Operating Officer Customers

Mapping Demand

2016-2035

AIRBUS

Global Market Forecast 2016: Highlights

GMF 2016 key numbers and 20-year change

World Fleet Forecast	2015	2035	vs. GMF15	% change 2015-2035
RPK (trillions)	6.6	**16.0**	**+5.3%**	142%
Passenger Aircraft Fleet	18,020	**37,710**	**+5.5%**	109%
New passenger aircraft deliveries		**32,425**	**+650**	
Dedicated Freighters	1,560	**2,110**	**-21.5%**	35%
New freighter aircraft deliveries		**645**	**-150**	
Total New Aircraft Deliveries		**33,070**	**+500**	

New aircraft deliveries
–
+500 aircraft
GMF 2016 vs. GMF 2015

Passenger aircraft (≥ 100 seats)

Jet freight aircraft (>10 tons)

Source: Airbus GMF 2016

20-year demand for more than 33,000 new passenger and freight aircraft

23,530 single-aisle aircraft

8,060 twin-aisle aircraft

1,480 very large aircraft

33,070 new aircraft

Market Value of

–

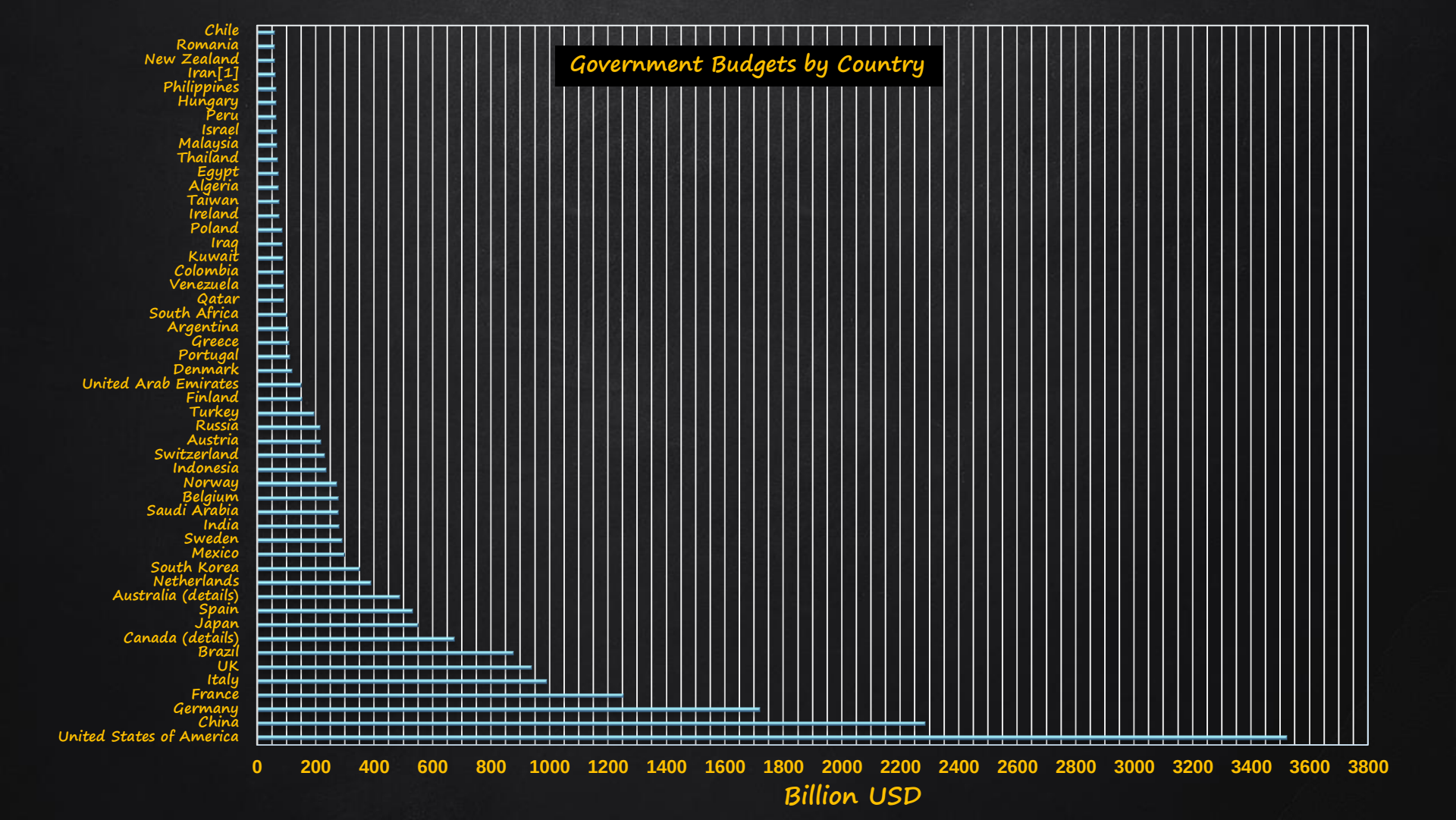
$5.2

trillion

Passenger aircraft (≥ 100 seats)

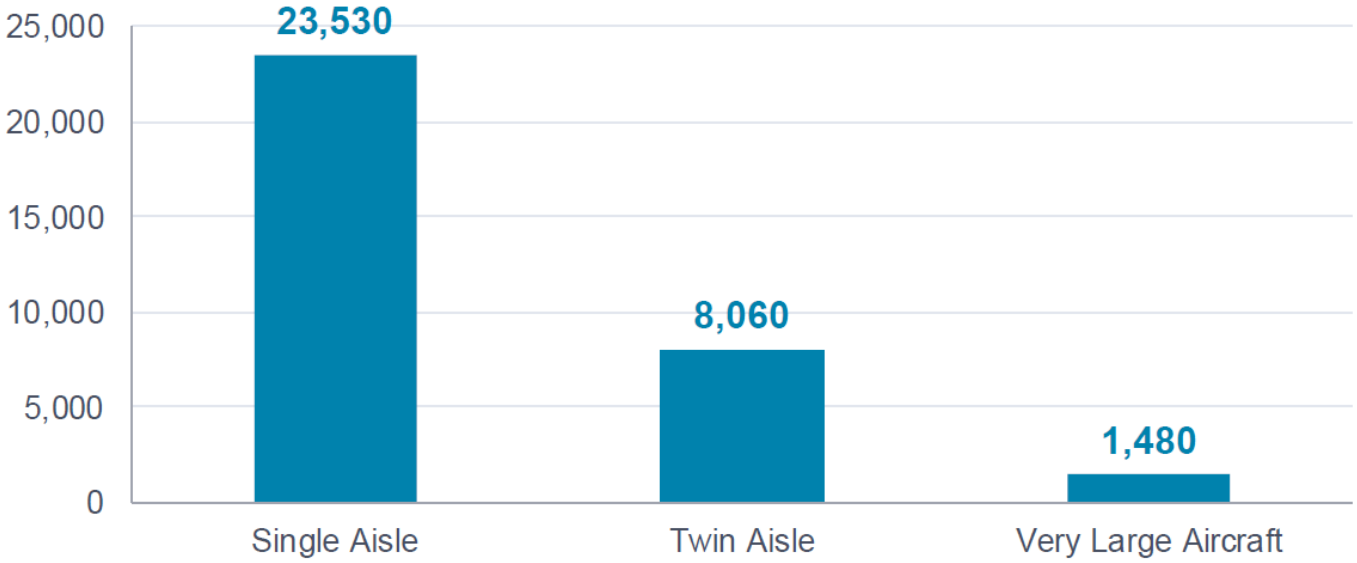
Jet freight aircraft (>10 tons)

Source: Airbus GMF 2016


Government Budgets by Country
Chile
Romania
New Zealand
Iran[1]
Philippines
Hungary
Peru
Israel
Malaysia
Thailand
Egypt
Algeria
Taiwan
Ireland
Poland
Iraq
Kuwait
Colombia
Venezuela
Qatar
South Africa
Argentina
Greece
Portugal
Denmark
United Arab Emirates
Finland
Turkey
Russia
Austria
Switzerland
Indonesia
Norway
Belgium
Saudi Arabia
India
Sweden
Mexico
South Korea
Netherlands
Australia (details)
Spain
Japan
Canada (details)
Brazil
UK
Italy
France
Germany
China
United States of America
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
Billion USD

Single Aisle: 71% of units; Wide-bodies: 54% of value

20-year new deliveries of passenger and freighter aircraft



% units	71%	24%	5%
% value	46%	43%	11%

New Deliveries

–

33,070

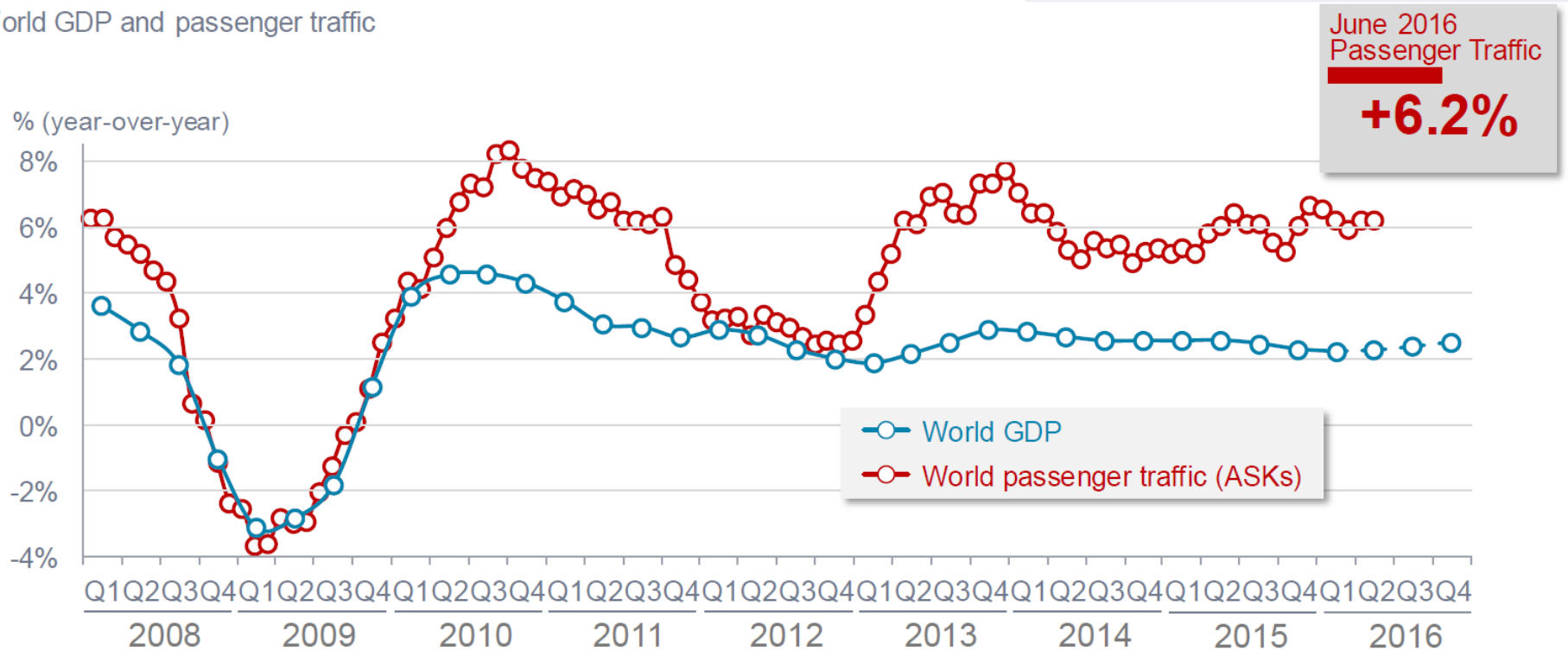
GMF 2016-2035

Passenger aircraft (≥ 100 seats) and jet freight aircraft (>10 tons)

Source: Airbus GMF 2016

Passenger traffic is outperforming GDP growth

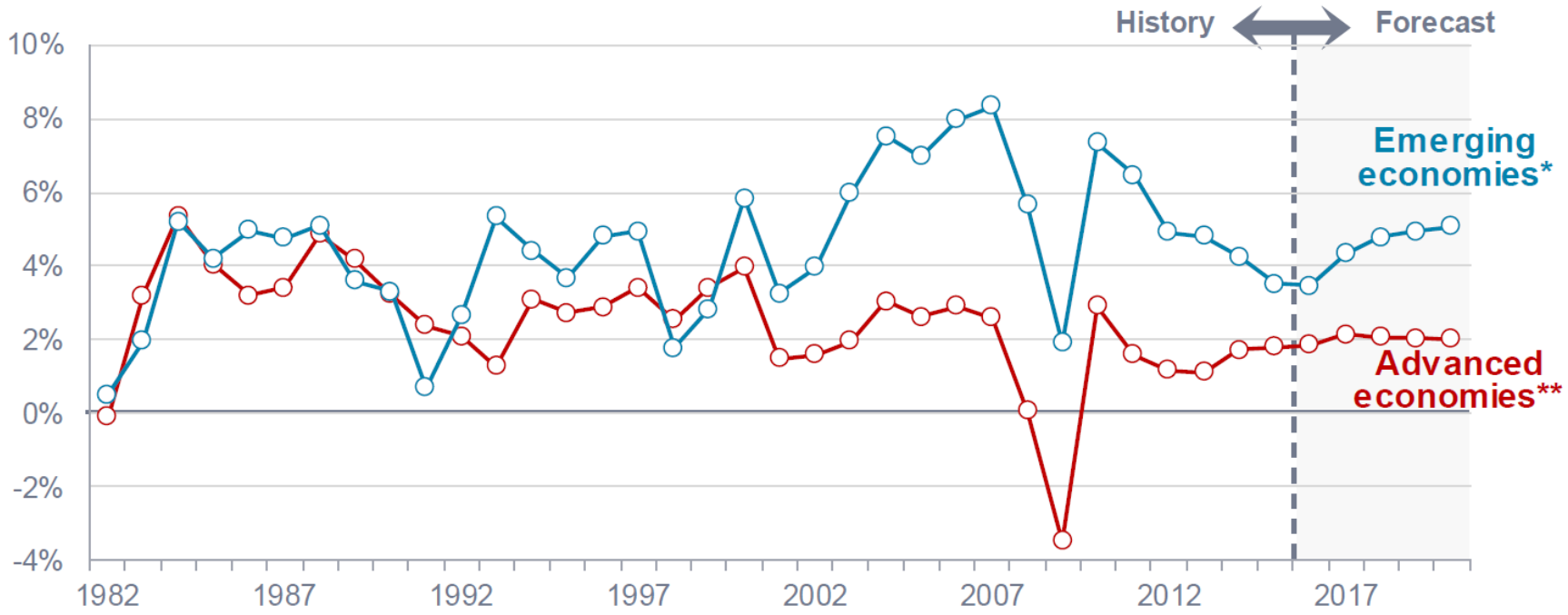
World GDP and passenger traffic



Source: IHS Economics (real GDP), OAG, Airbus

Still a two-speed economic world

Comparison of year-over-year GDP growth



Source: IHS Economics, Airbus

* 54 emerging economies

** 32 advanced economies

Air transport growth is highest in expanding regions

Emerging/Developing

China
India
Middle East
Asia
Africa
CIS
Latin America
Eastern Europe

6.2 billion people 2015

Yearly RPK growth 2016 - 2035

+5.6 %

Advanced

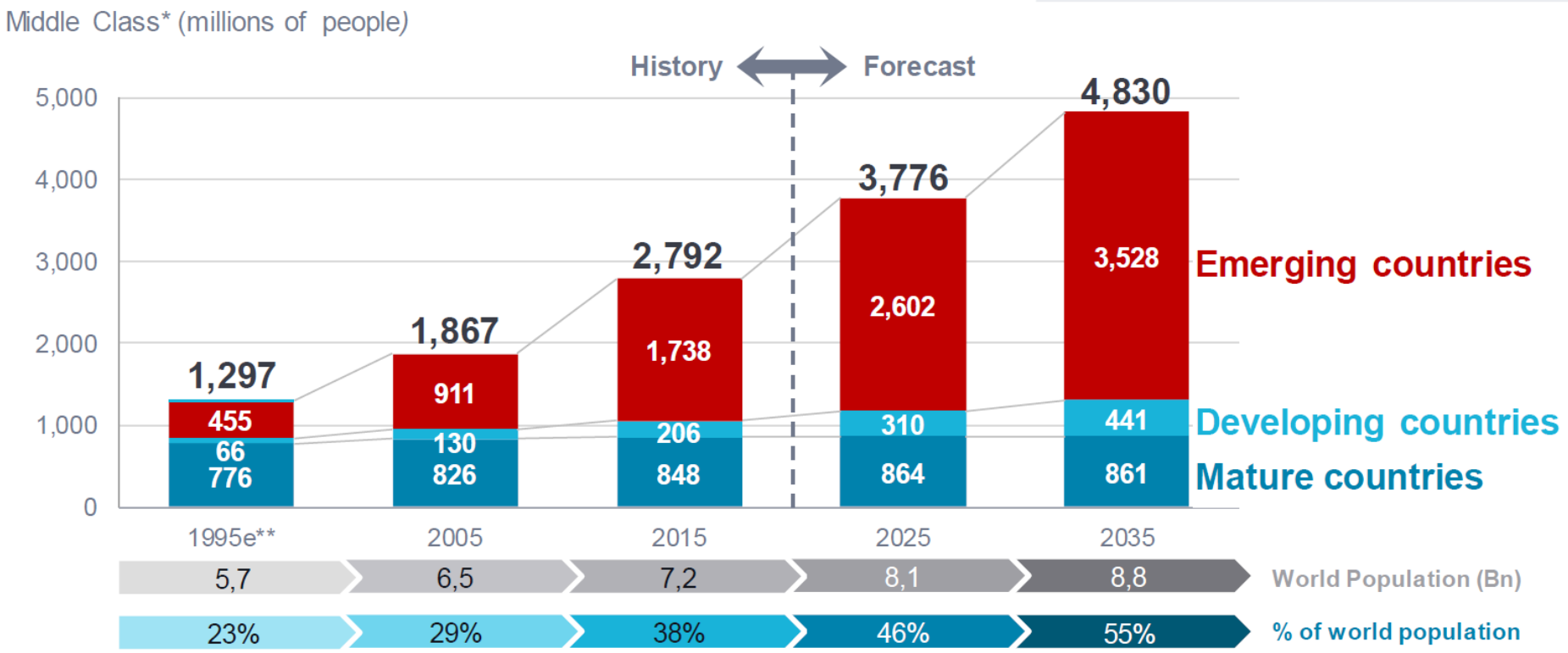
Western Europe
North America
Japan

1 billion people 2015

+3.7 %

Source: IHS Economics, Airbus GMF 2016

Middle Class* to move from 2.8 Billion to 4.8 Billion in 20 years

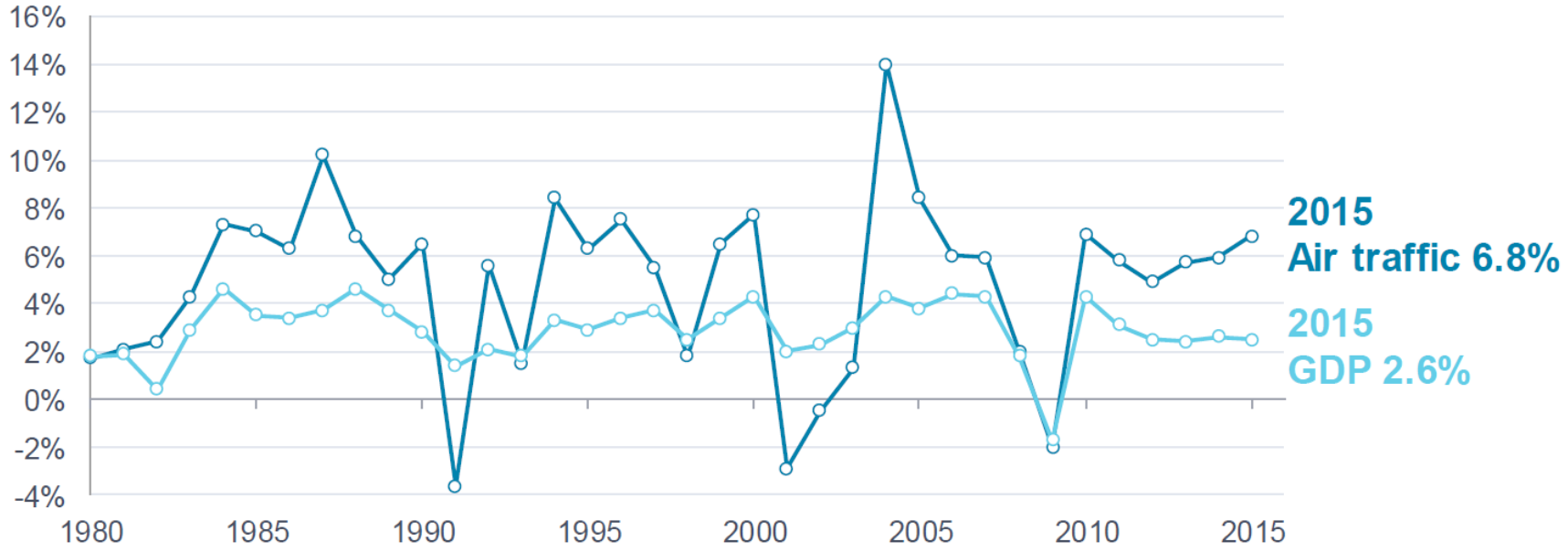


* Households with yearly income between $20,000 and $150,000 at PPP in constant 2015 prices
** Estimate for 1995 split by region

Source: Oxford Economics, Airbus

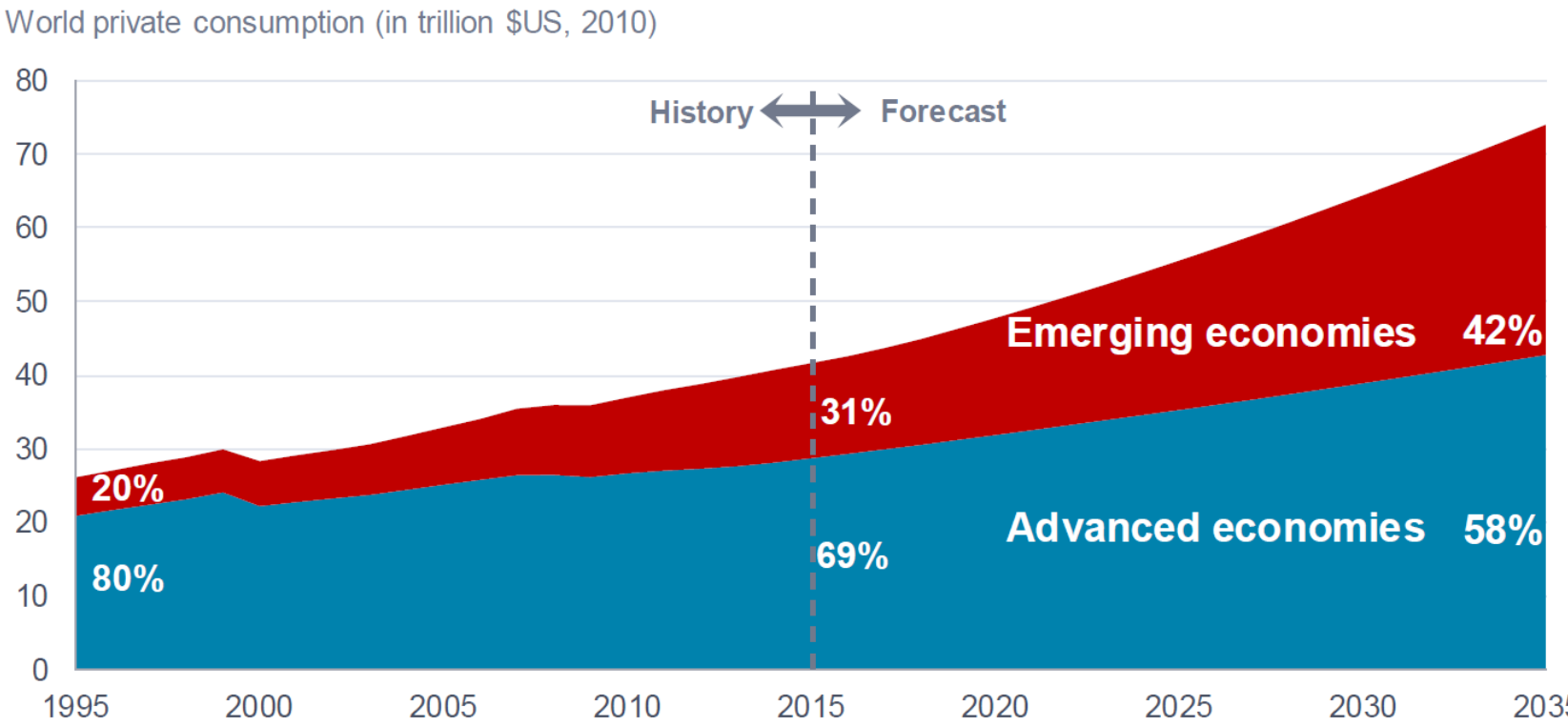
Economy is key factor in traffic growth but other drivers gaining importance…

Traffic and GDP Growth (%)



Source: ICAO, IHS Economics, Airbus

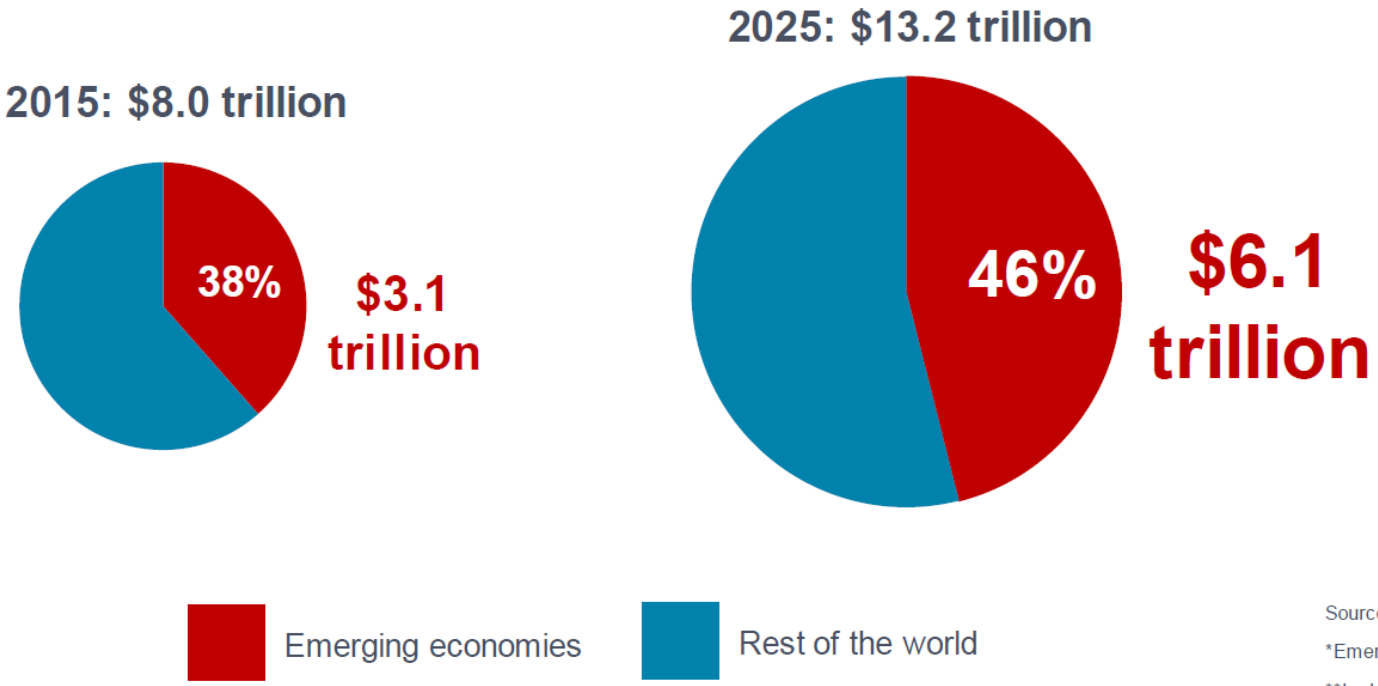
42% of world's private consumption to come from emerging markets



Source: IHS Economics, (May 2016) Airbus GMF

Emerging economies' discretionary spending will double in just 10 years

Emerging economies* spending on recreational good and services** (2010 $US, PPP)

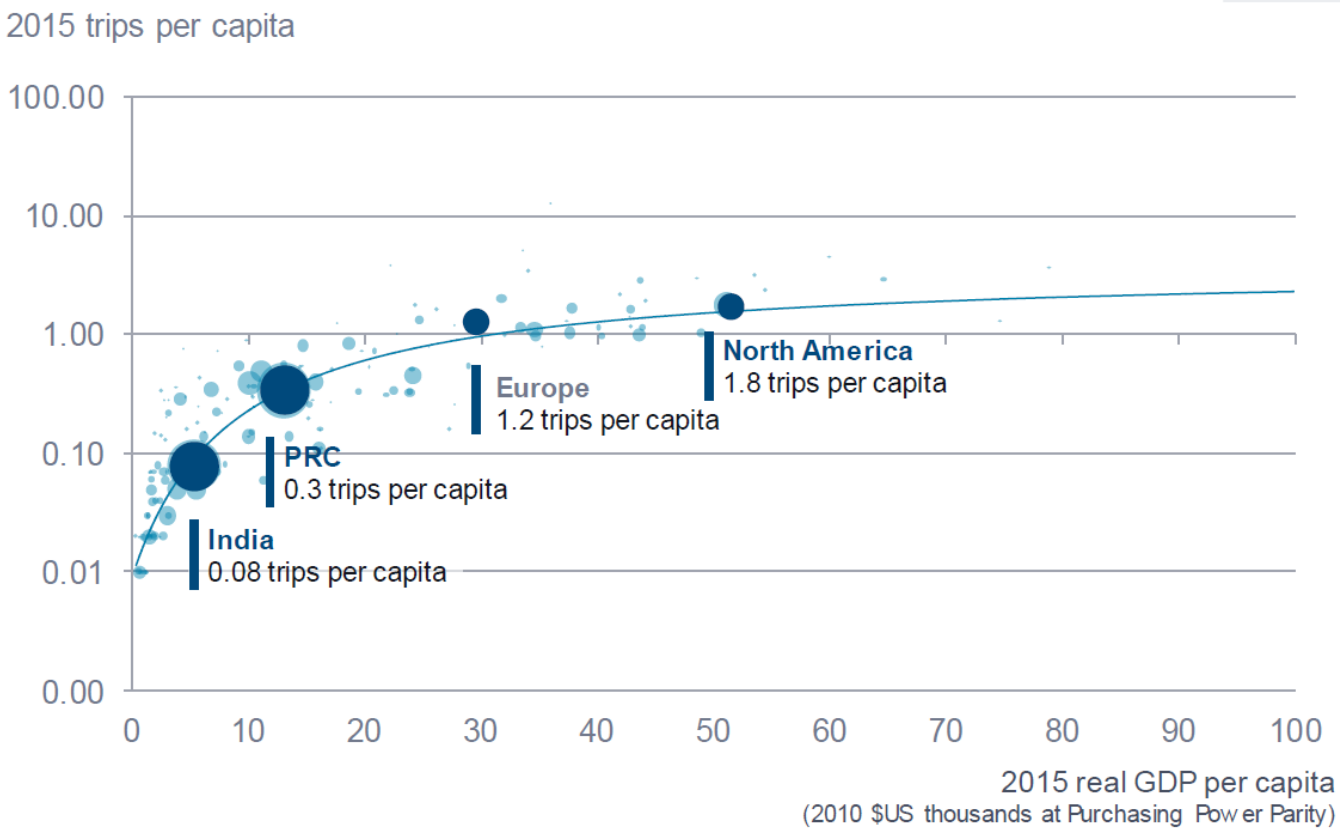


Source: Oxford Economics, Airbus GMF 2016

*Emerging + Developing economies

**Including restaurants and accommodation

Europeans and North Americans are the most willing to fly…



Propensity to travel

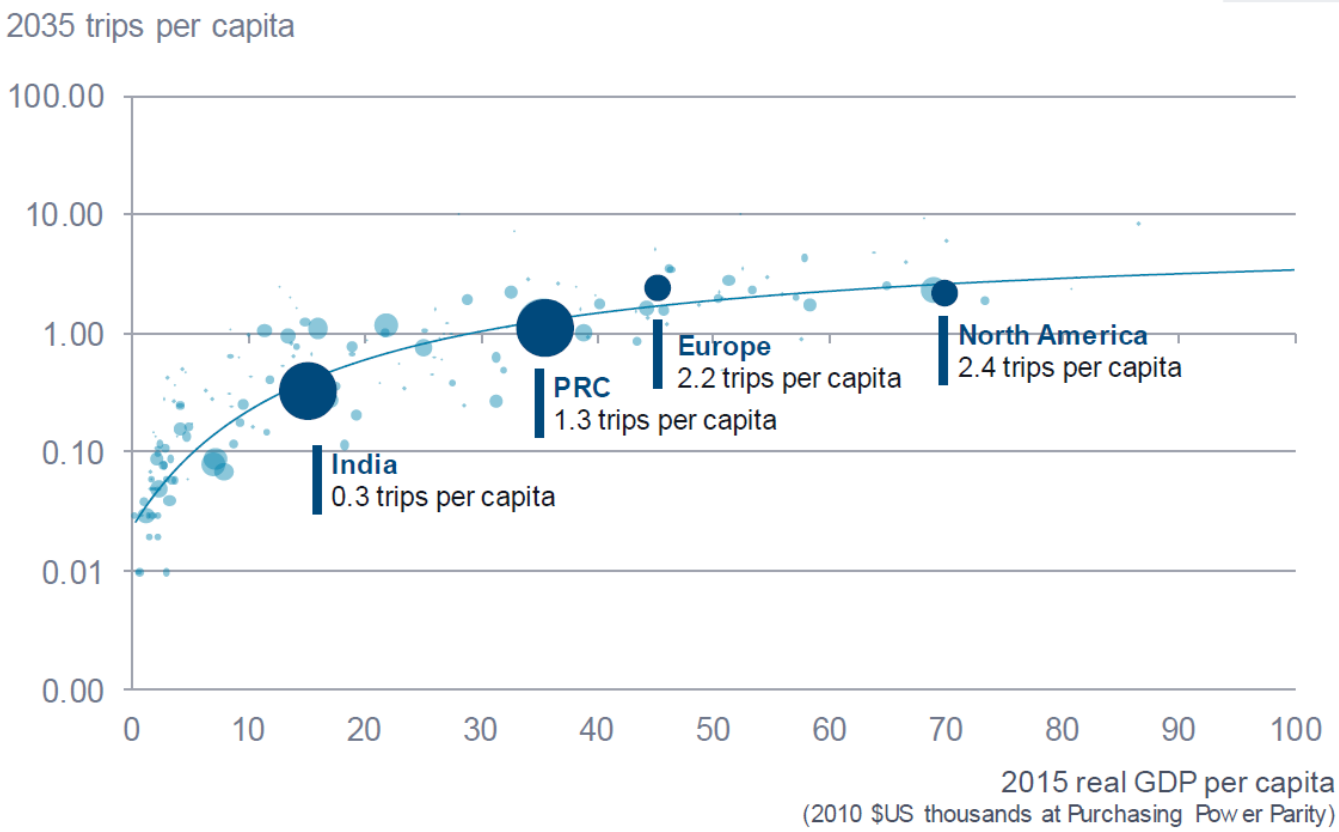
–

25%

of the population of the emerging countries took a trip a year in **2015**

Sources: Sabre, IHS Economics, Airbus GMF 2016

…but by 2035, PRC will reach current European levels



Propensity to travel

–

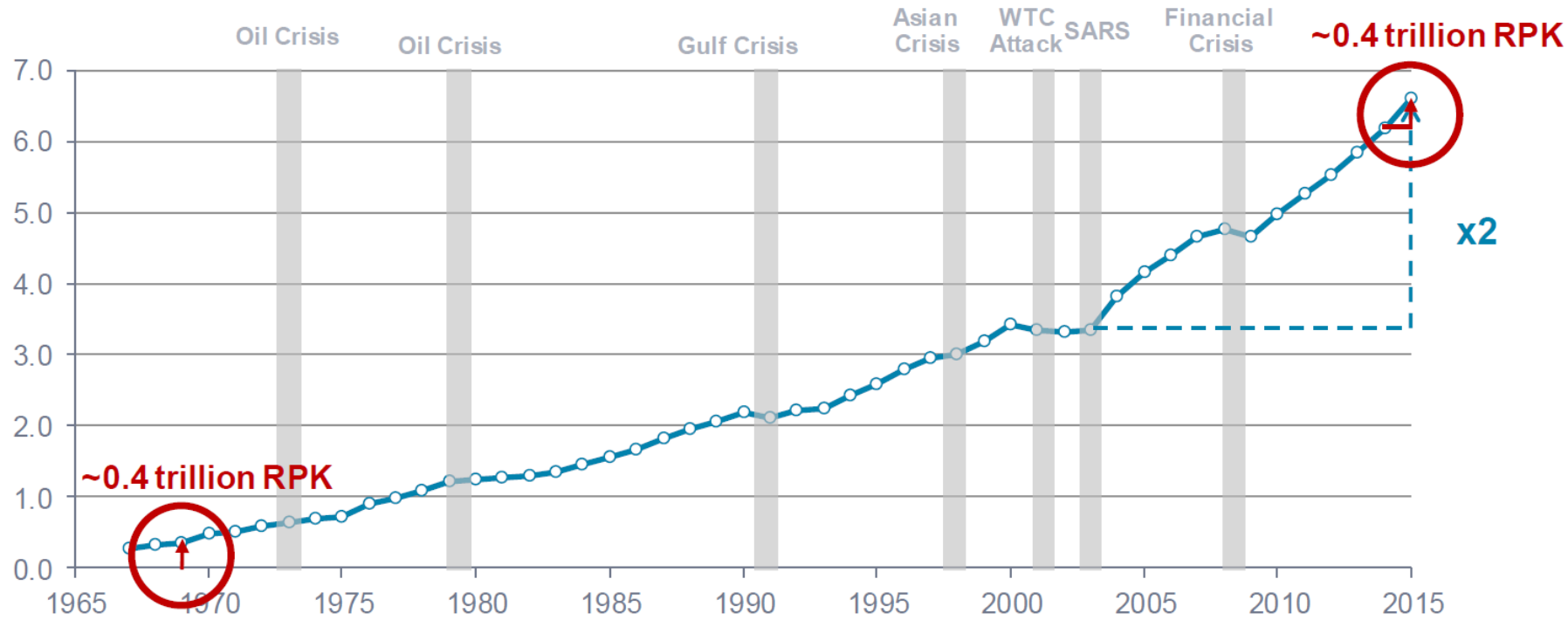
75%

of the population of the emerging countries will take a trip a year in **2035**

Sources: Sabre, IHS Economics, Airbus GMF 2016

Air travel has proved to be resilient to external shocks

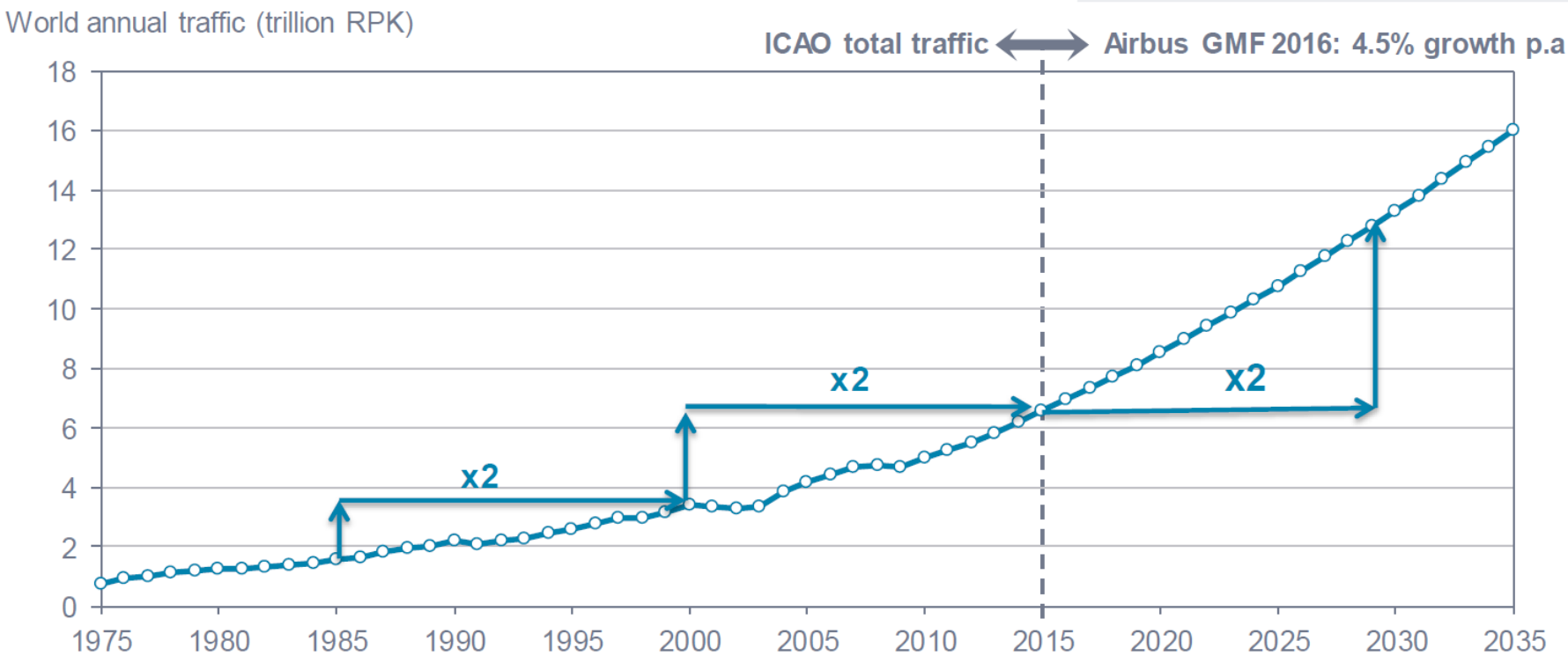
World annual traffic (trillion RPK)



Source: ICAO, Airbus GMF 2016

RPK = Revenue Passager Kilometre

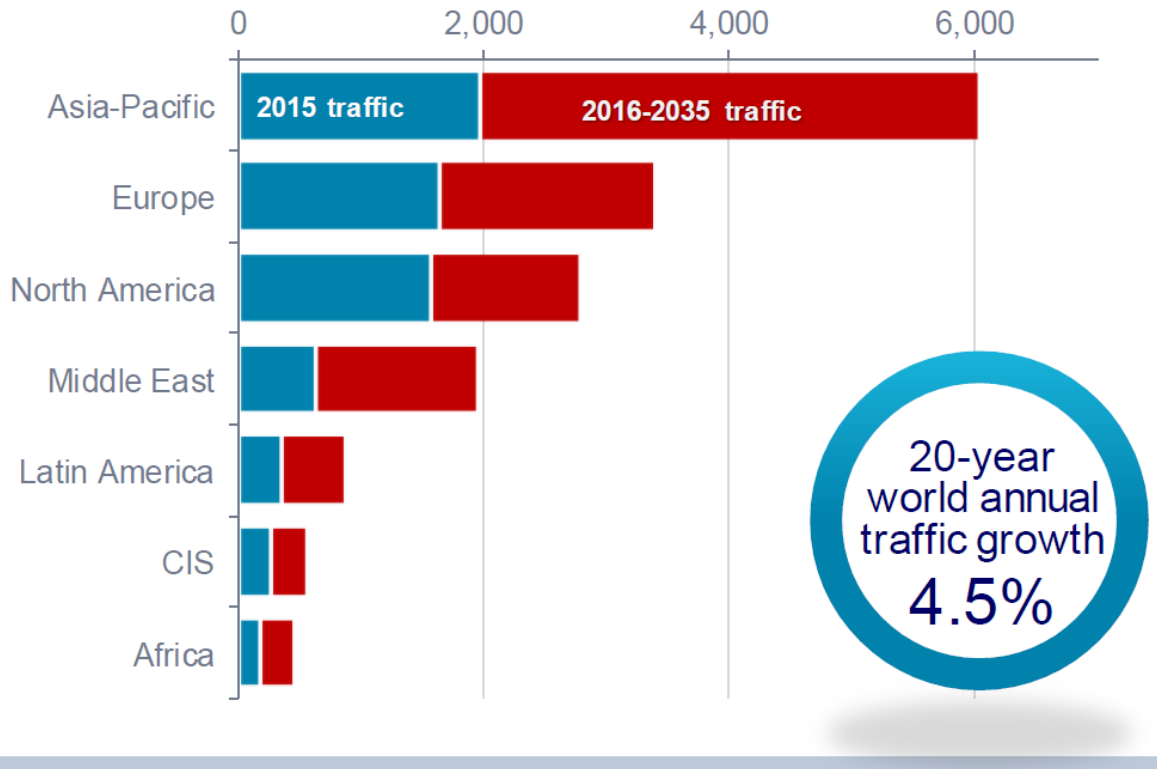
Air traffic will double in the next 15 years



Source: ICAO, Airbus GMF 2016

Asia-Pacific lead in world traffic will increase further by 2035

RPK traffic by airline domicile (billions)

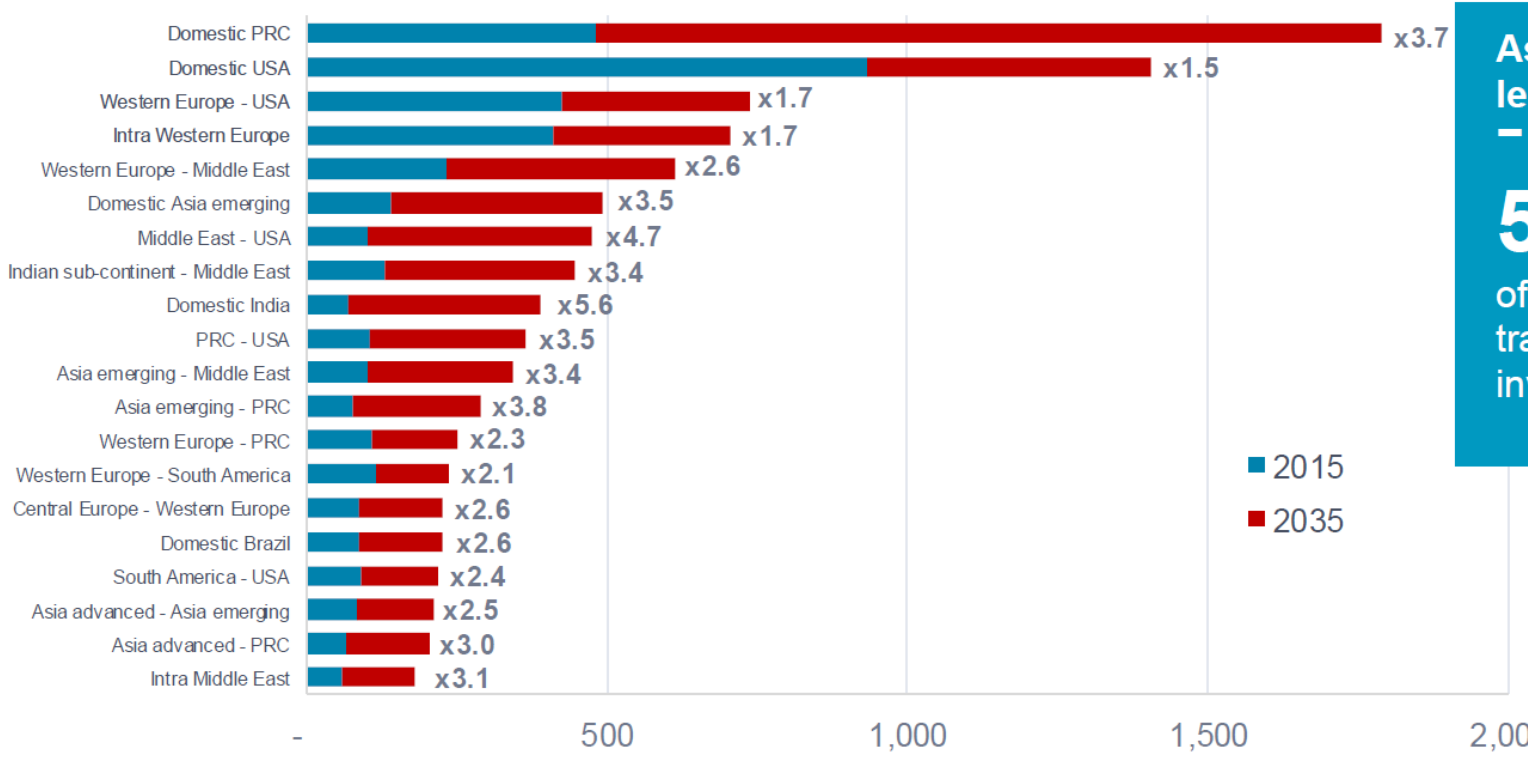


% of 2015 world RPK	20-year growth	% of 2035 world RPK
30%	5.7%	36%
25%	3.7%	22%
24%	2.9%	19%
9%	5.7%	11%
5%	4.8%	5%
4%	4.1%	4%
3%	4.8%	3%

Source: Airbus GMF2016

Domestic Chinese traffic flow to be number one

Annual traffic per leg flow (billion RPK)



Asia Pacific leading growth

–

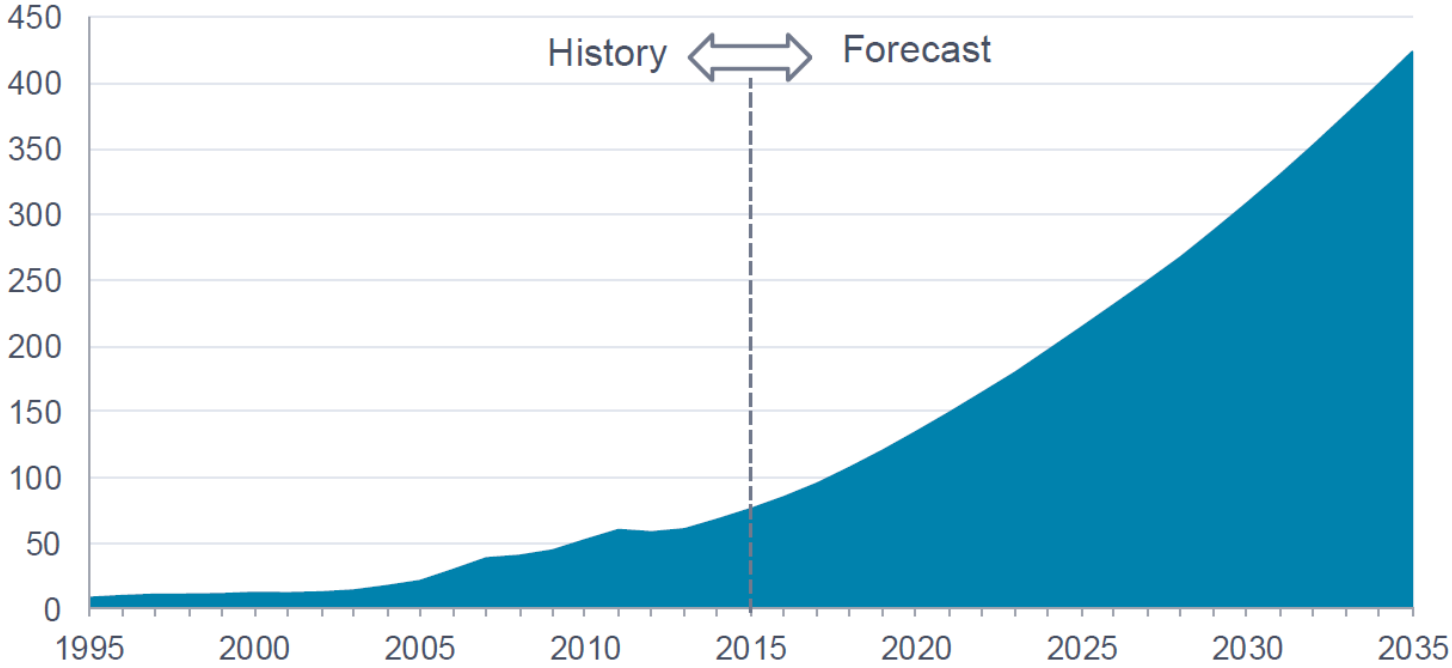
50%

of the top twenty traffic flows will involve Asia Pacific

Source: Airbus GMF 2016

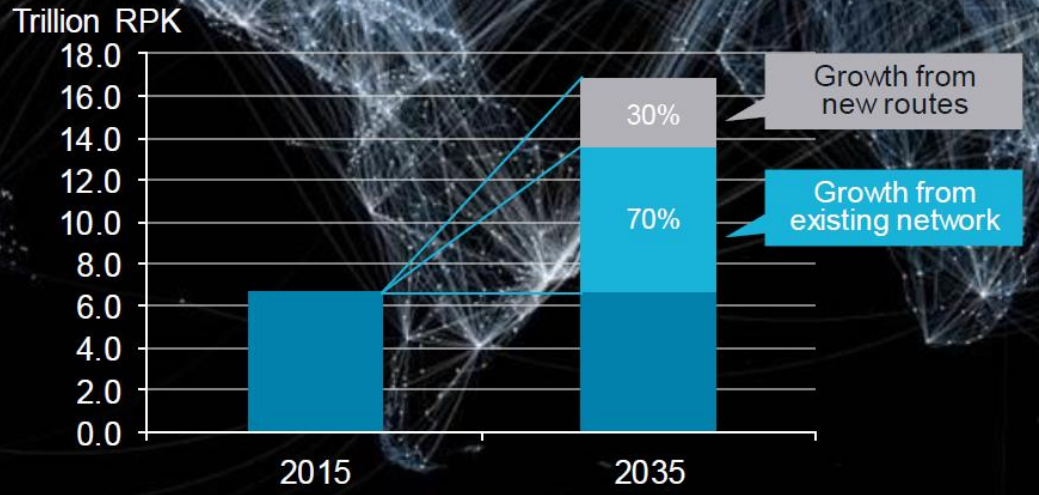
Domestic traffic in India to grow more than 5-fold over next 20 years

Domestic India - Annual traffic per leg flow (billion RPK)



Source: DGCA India, Airbus GMF

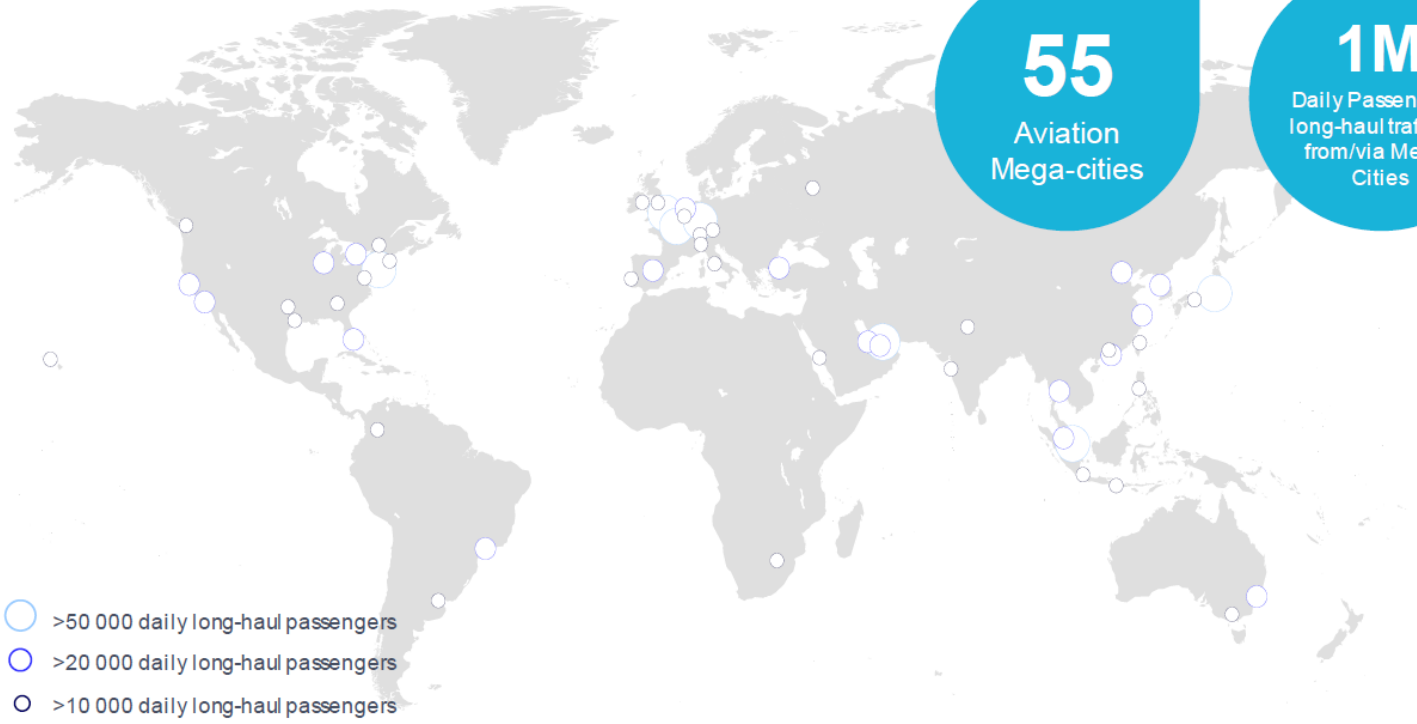
70% of traffic growth until 2035 will come from existing network



Source: Airbus GMF 2016

There are currently 55 Aviation Mega-Cities…

2015 Aviation Mega-Cities



55
Aviation Mega-cities

1M
Daily Passengers: long-haul traffic to/ from/via Mega-Cities

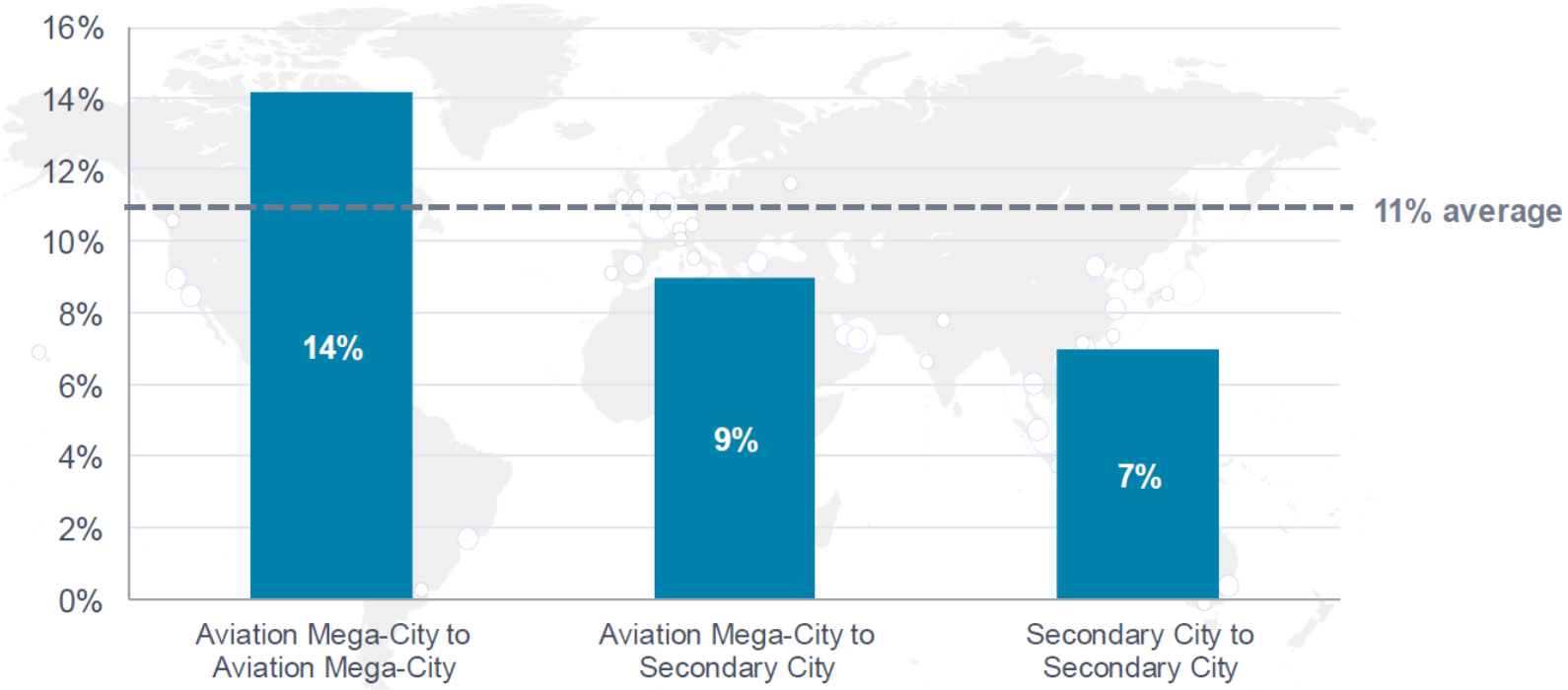
90%+
of long-haul traffic on routes to/from/via 55 cities

25%
of World GDP in 2015

Source: McKinsey, UNPD, Airbus GMF 2016

Routes between Aviation Mega-Cities have more premium passengers

Percentage of premium passengers on routes types

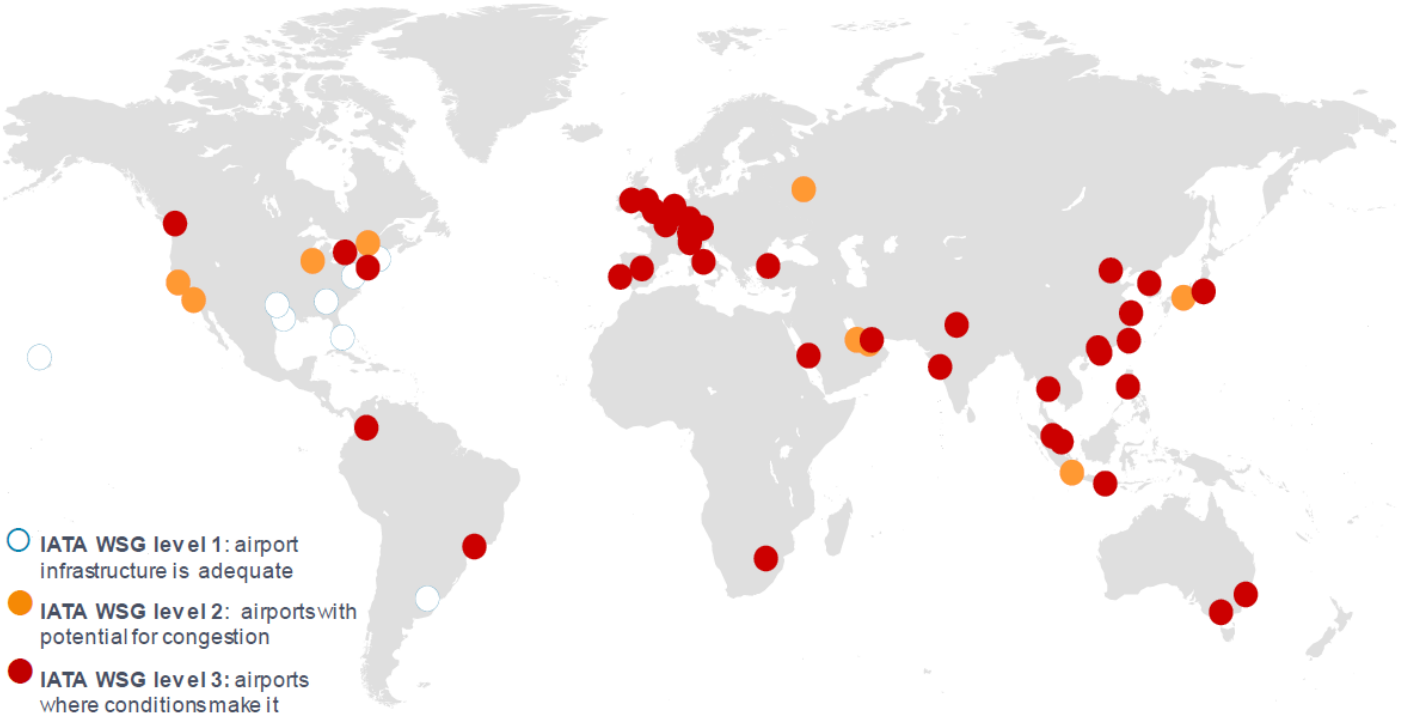


Cities with more than 10,000 daily passengers, Long-haul, flight distance >2,000nm, excl. domestic traffic

Source: Sabre (September 2015 data), Airbus GMF 2016

47 of 55 Aviation Mega-Cities main airports are schedule-constrained

2015 Aviation Mega-Cities



- **IATA WSG level 1**: airport infrastructure is adequate
- **IATA WSG level 2**: airports with potential for congestion
- **IATA WSG level 3**: airports where conditions make it impossible to meet demand

Source: IATA WSG database, Airbus GMF 2016

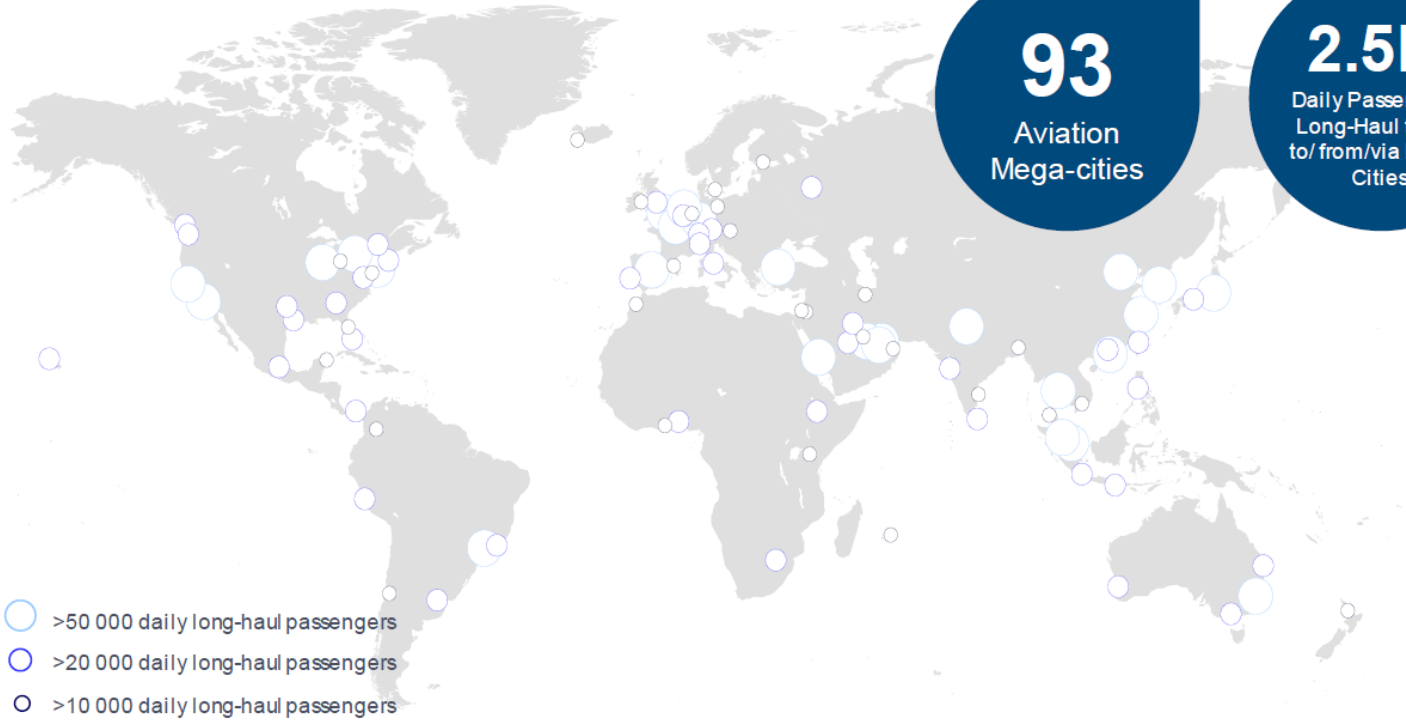
38 of the Aviation Mega-Cities fly the A380

2015 Aviation Mega-Cities

Source: McKinsey, UNPD, OAG (Sept 2015), Airbus GMF 2016

There will be 93 Aviation Mega-Cities by 2035

2035 Aviation Mega-Cities



93
Aviation Mega-cities

2.5M
Daily Passengers: Long-Haul traffic to/ from/via Mega-Cities

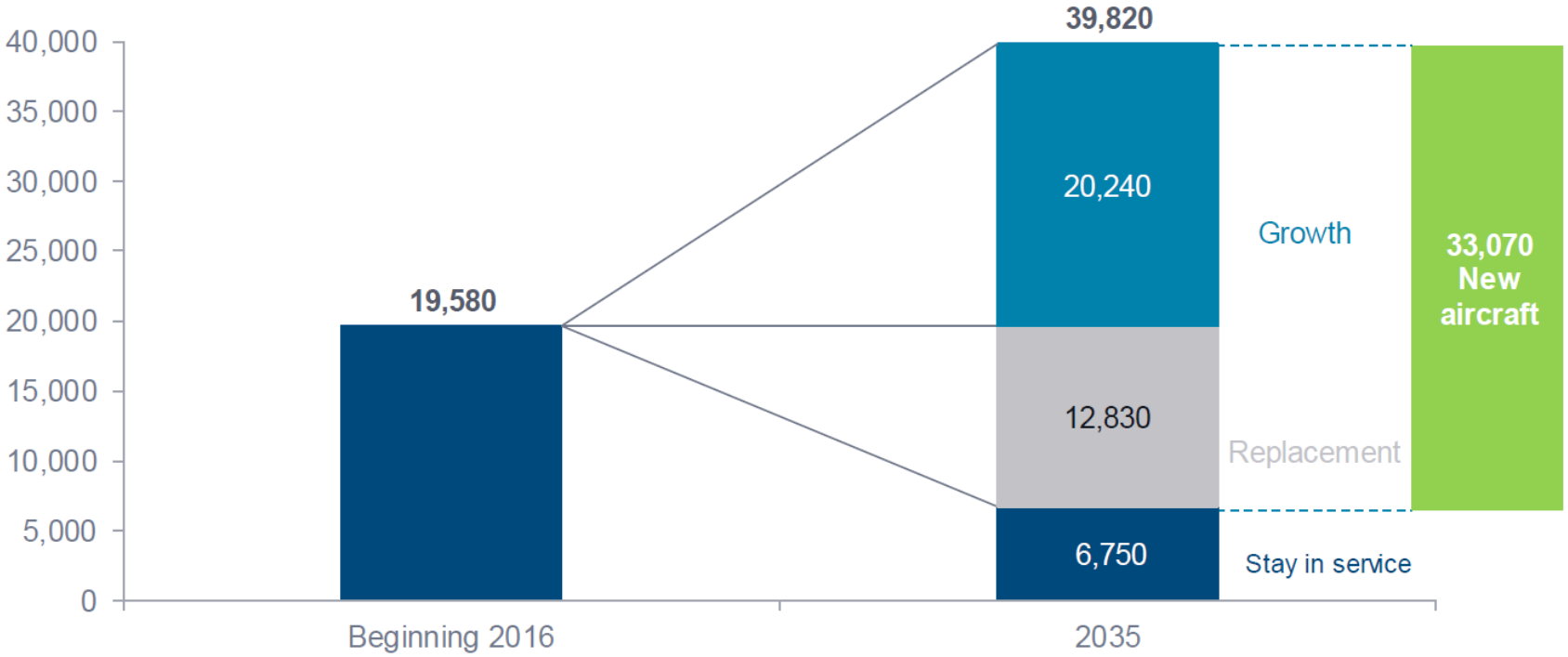
95%+
of long-haul traffic on routes to/from/via 93 cities

35%
of World GDP in 2035

Source: McKinsey, UNPD, Airbus GMF 2016

Demand for some 33,000 new passenger and freighter aircraft

Fleet in service evolution: 2016-2035



Source: Airbus GMF 2016

Note: Passenger aircraft ≥100 seats, Freighter aircraft ≥10 tonnes

In 2015, an aircraft generates 50% more RPKs than in 1995

1995	**9,800** pax a/c above 100 seats =	**7.6** hours/day	**160** seats/flight	**68%** load factor
2015	**18,000** pax a/c above 100 seats =	**8.6** hours/day	**172** seats/flight	**80%** load factor

1 2015 = Yearly RPK per a/c **1.5x** 1 1995

Source: ICAO, OAG, Ascend, Airbus

Summary

- Strong and **resilient** passenger traffic growth
- **Air traffic** (RPK) **doubles** every **15 years**
- As air transport develops, **new drivers** become more significant
- Demand for 33,070 new aircraft by 2035: ~**32,430** passenger aircraft and **650** freighters
- **40%** of passenger aircraft demand needed for **replacement**, and **60% for growth**
- Single-aisle represent 71% of units, and wide-bodies represent 54% of value
- VLA demand largely concentrated on **Aviation Mega-Cities** and network efficiencies will facilitate new VLA destinations

Market drivers

2035 WORLD ECONOMIES

POSITIVE ECONOMIC OUTLOOK

2.9%

AAGR to 2035

6.2 bn

people in **emerging** economies

1.0 bn

people in **advanced** economies

62%

of the world's population will live in cities in **2035**

PROPENSITY TO TRAVEL

25%

of the **emerging economies** population took a trip in **2016**

75%

of the **emerging economies** population will take a trip in **2035**

Traffic forecast

Aviation Megacities

2016
55

2035
93

WORLD RPK TRAFFIC

+98%
since 2001

PASSENGER TRAFFIC

4.5%
growth p.a.
2015-2035

world traffic
has always outperformed
world economic growth

X 2
Traffic to more
than double in
next 20 years

New deliveries

23,530
SINGLE-AISLE

8,060
TWIN-AISLE

1,480
VLA

MARKET VALUE
NEW DELIVERIES

5.2 $US trillion

33,070
AIRCRAFT
required over
the next 20 years

passenger 32,425 + freighter 645

AIRCRAFT
FLEET
X2
2016 > 2035

2035 Aviation Mega-Cities

93
in 20 years
Aviation
Mega-Cities

2.5M
Daily Passengers:
Long-Haul traffic
to/ from/via Mega-Cities

95%+
of long-haul traffic
on routes to/from/via
93 cities

35%
of World GDP
in 2035

Airbus Global Presence Today

- Customer support centres (6)
- Training centres (14)
- Satair Group Material and Logistics centres (10)
- M&E centres (9)

Aviation Mega-cities

- >60 000 daily long-haul passengers
- >20 000 daily long-haul passengers
- >10 000 daily long-haul passengers

SA – Single Aisle aircraft (e.g. A320 Family)
TA – Twin Aisle Aircraft (e.g. A330, A350 XWB)
VLA – Very Large Aircraft (e.g. A380)

MRO – Maintenance Repair & Overhaul
New Pilots – New pilots required
New Techs – New technicians required

Delivery numbers rounded to the nearest ten

NORTH AMERICA

New deliveries by segment

SA	TA	VLA
4,730	1,000	90

Services demand forecast

- MRO VALUE $314bn
- NEW PILOTS 73,600
- NEW TECHS 64,400

LATIN AMERICA

New deliveries by segment

SA	TA	VLA
2,030	520	20

Services demand forecast

- MRO VALUE $126bn
- NEW PILOTS 44,400
- NEW TECHS 42,500

EUROPE

New deliveries by segment

SA	TA	VLA
4,990	1,410	180

Services demand forecast

- MRO VALUE $382bn
- NEW PILOTS 111,600
- NEW TECHS 107,000

AFRICA

New deliveries by segment

SA	TA	VLA
760	230	10

Services demand forecast

- MRO VALUE $76bn
- NEW PILOTS 21,700
- NEW TECHS 22,200

CIS

New deliveries by segment

SA	TA	VLA
1,000	190	30

Services demand forecast

- MRO VALUE $103bn
- NEW PILOTS 30,800
- NEW TECHS 33,500

MIDDLE EAST

New deliveries by segment

SA	TA	VLA
950	1,020	450

Services demand forecast

- MRO VALUE $184bn
- NEW PILOTS 48,100
- NEW TECHS 53,400

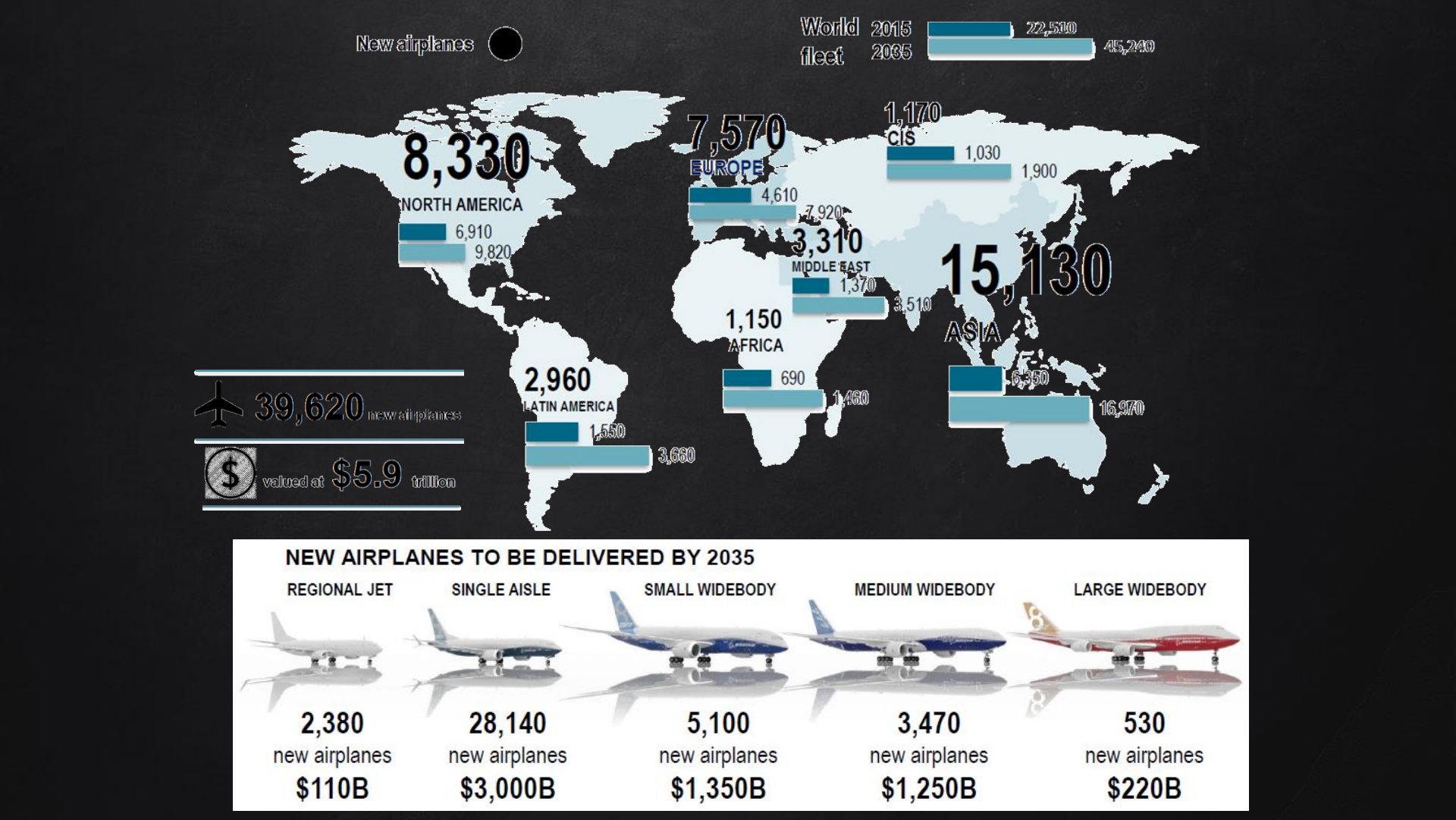
ASIA PACIFIC

New deliveries by segment

SA	TA	VLA
9,070	3,690	700

Services demand forecast

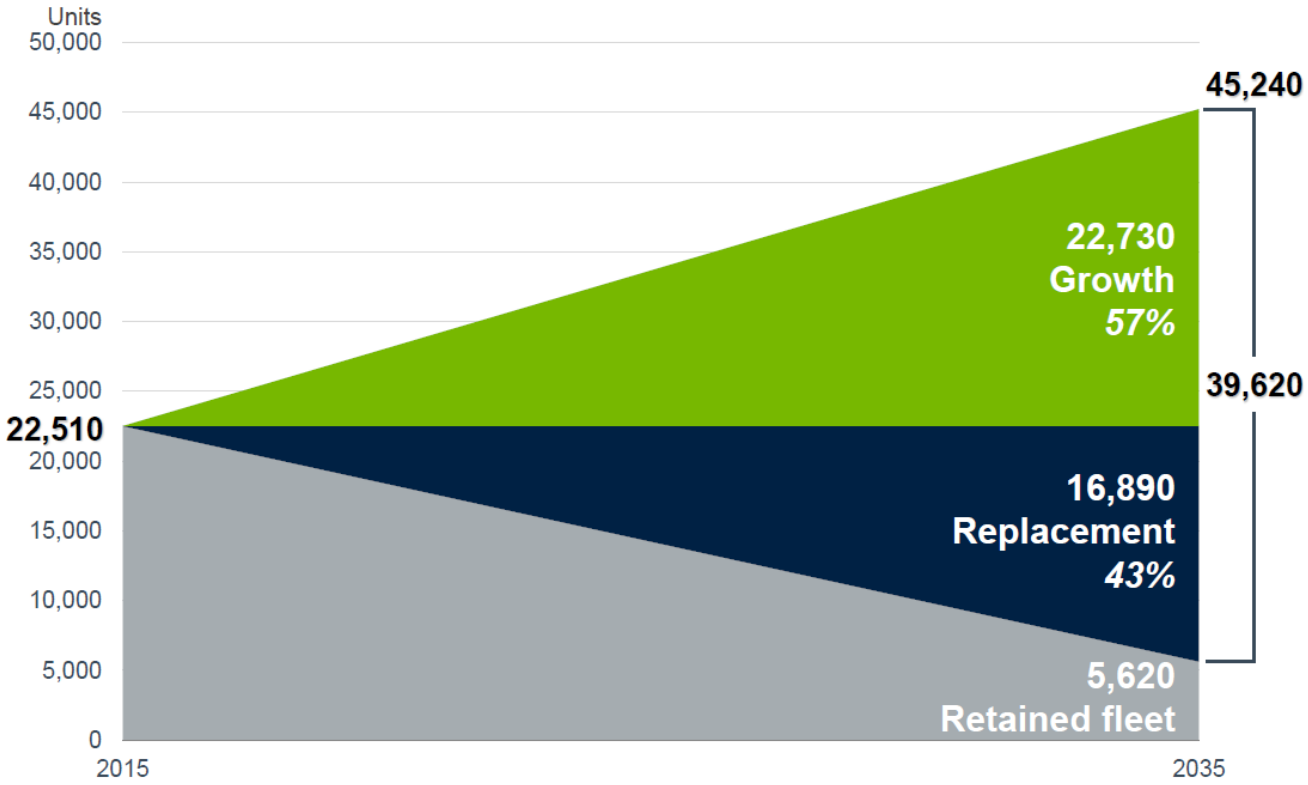
- MRO VALUE $646bn
- NEW PILOTS 232,000
- NEW TECHS 217,700


New airplanes
World fleet
2015
2035
22,510
45,240
8,330
NORTH AMERICA
6,910
9,820
7,570
EUROPE
4,610
7,920
1,170
CIS
1,030
1,900
3,310
MIDDLE EAST
1,370
3,510
15,130
ASIA
6,350
16,970
1,150
AFRICA
690
1,460
2,960
LATIN AMERICA
1,550
3,660
39,620 new airplanes
valued at $5.9 trillion
NEW AIRPLANES TO BE DELIVERED BY 2035
REGIONAL JET
2,380
new airplanes
$110B
SINGLE AISLE
28,140
new airplanes
$3,000B
SMALL WIDEBODY
5,100
new airplanes
$1,350B
MEDIUM WIDEBODY
3,470
new airplanes
$1,250B
LARGE WIDEBODY
530
new airplanes
$220B

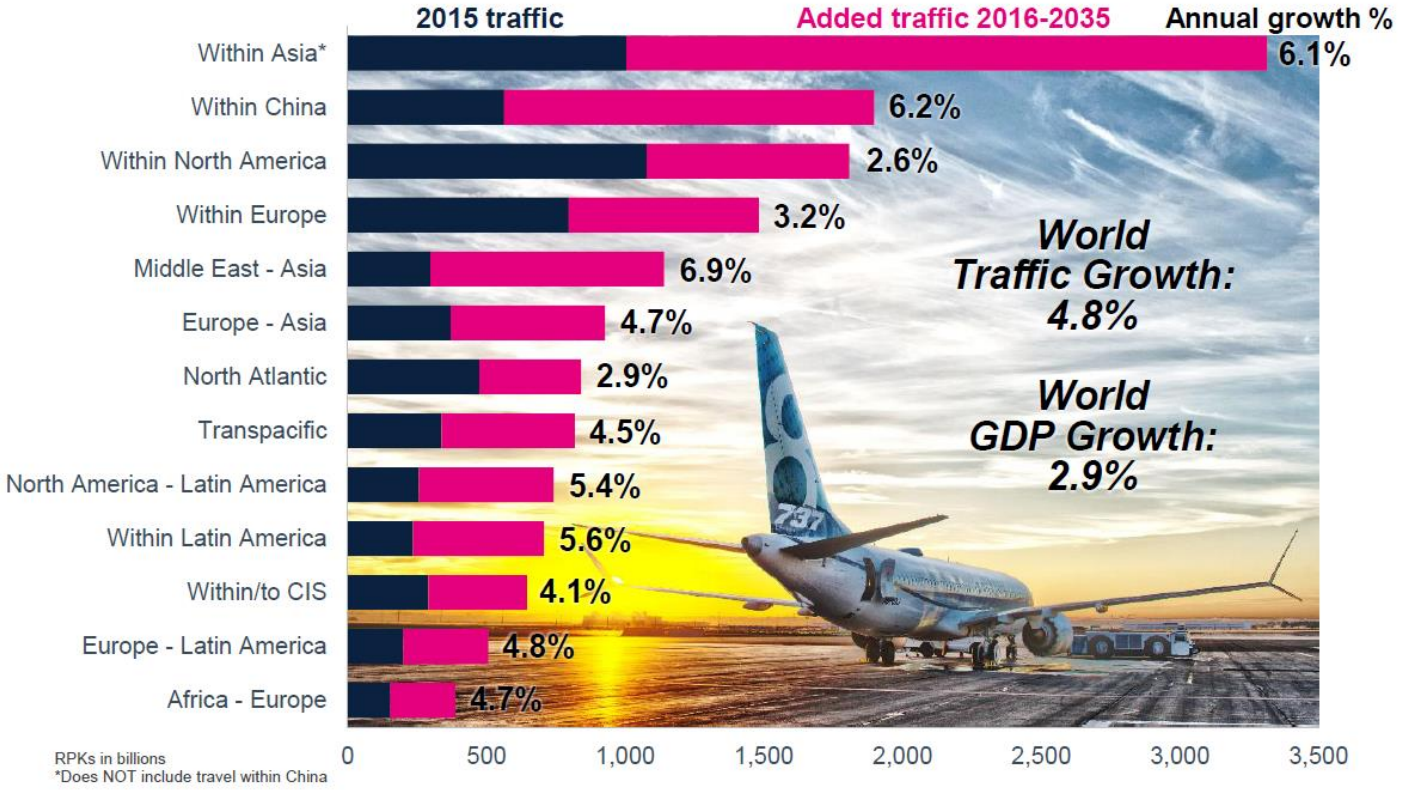
FARNBOROUGH INTERNATIONAL AIRSHOW 2016

1916 100 2016 YEARS OF BOEING

World fleet will double



Air travel growth varies by market

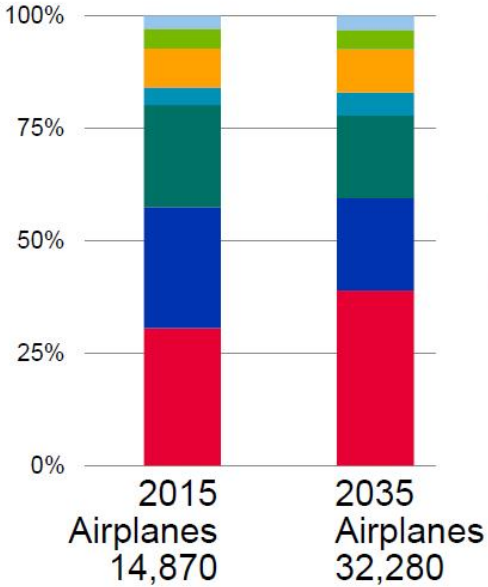


Airlines will need 28,140 single-aisles valued at $3 trillion

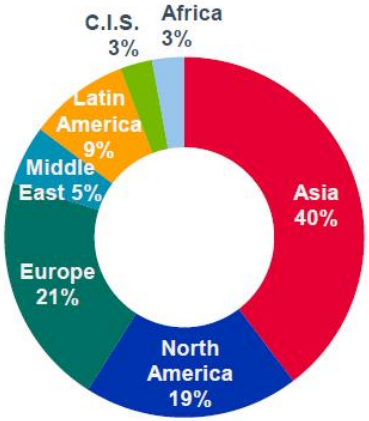
FARNBOROUGH INTERNATIONAL AIRSHOW 2016

1916 100 2016 YEARS OF BOEING

Share of fleet



Delivery units

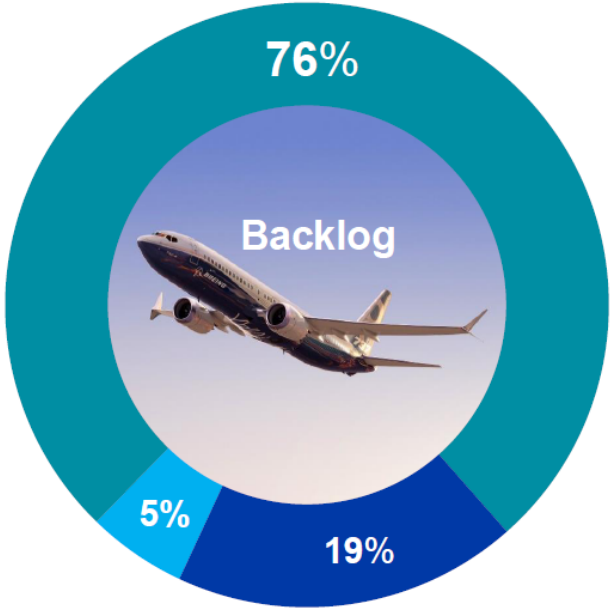


2016 to 2035
New airplanes
28,140

Medium-size aircraft are at heart of single-aisle market

FARNBOROUGH INTERNATIONAL AIRSHOW 2016

1916 100 2016 YEARS OF BOEING



Small – MAX 7 size

Medium – MAX 8 size

Large – MAX 9 size

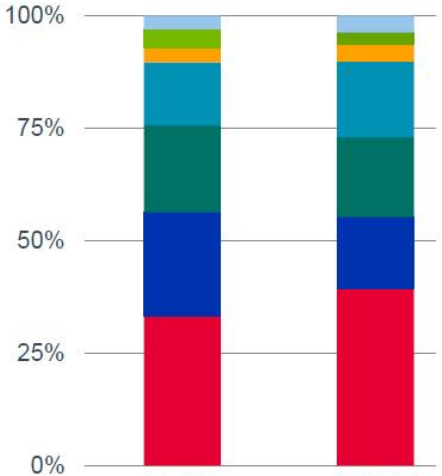
SOURCE: Ascend Online Data June 28, 2016
All passenger jet airplanes >110 seats in commercial use

Airlines will need 9,100 wide-bodies valued at $2.8 trillion

FARNBOROUGH INTERNATIONAL AIRSHOW 2016

1916 100 2016 YEARS OF BOEING

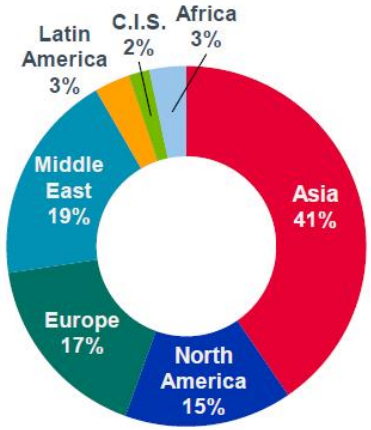
Share of fleet



2015 Airplanes 5,040

2035 Airplanes 10,450

Delivery units

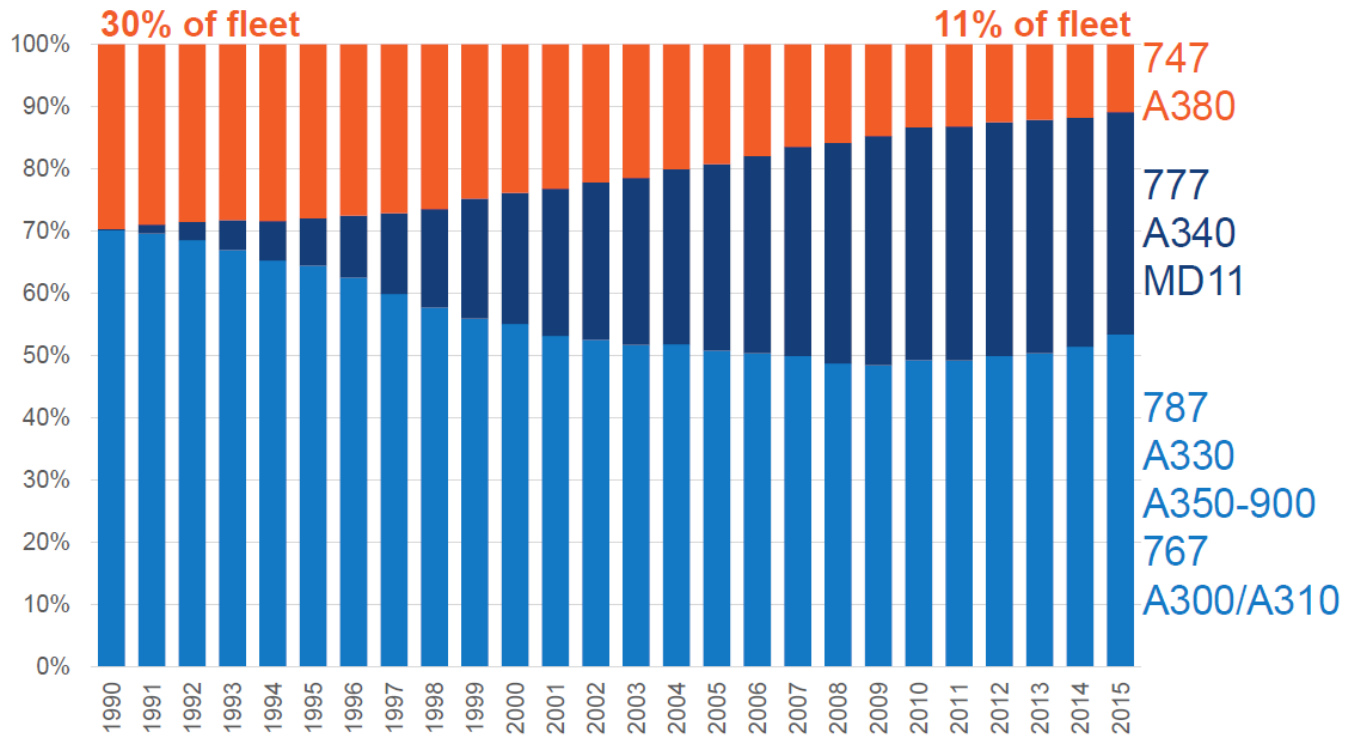


2016 to 2035 New airplanes 9,100

Shift from large to smaller wide-bodies

FARNBOROUGH INTERNATIONAL AIRSHOW 2016

1916 100 2016 YEARS OF BOEING



SOURCE: Ascend commercial passenger widebody fleet in service at year-end

Single Aisle commercial aircraft

Global demand for 39,210 new passenger & freighter aircraft

SMALL

29,720 aircraft

76% share of total new del.

MEDIUM

5,370 aircraft

14% share of total new del.

LARGE

4,120 aircraft

10% share of total new del

Source: Airbus GMF 2019

Note: demand for all commercial aircraft above 100 seats & freighters above 10t

AIRBUS

Our products & their core market segments

A320 FAMILY

A220

A330neo

A321 XLR

A350-1000

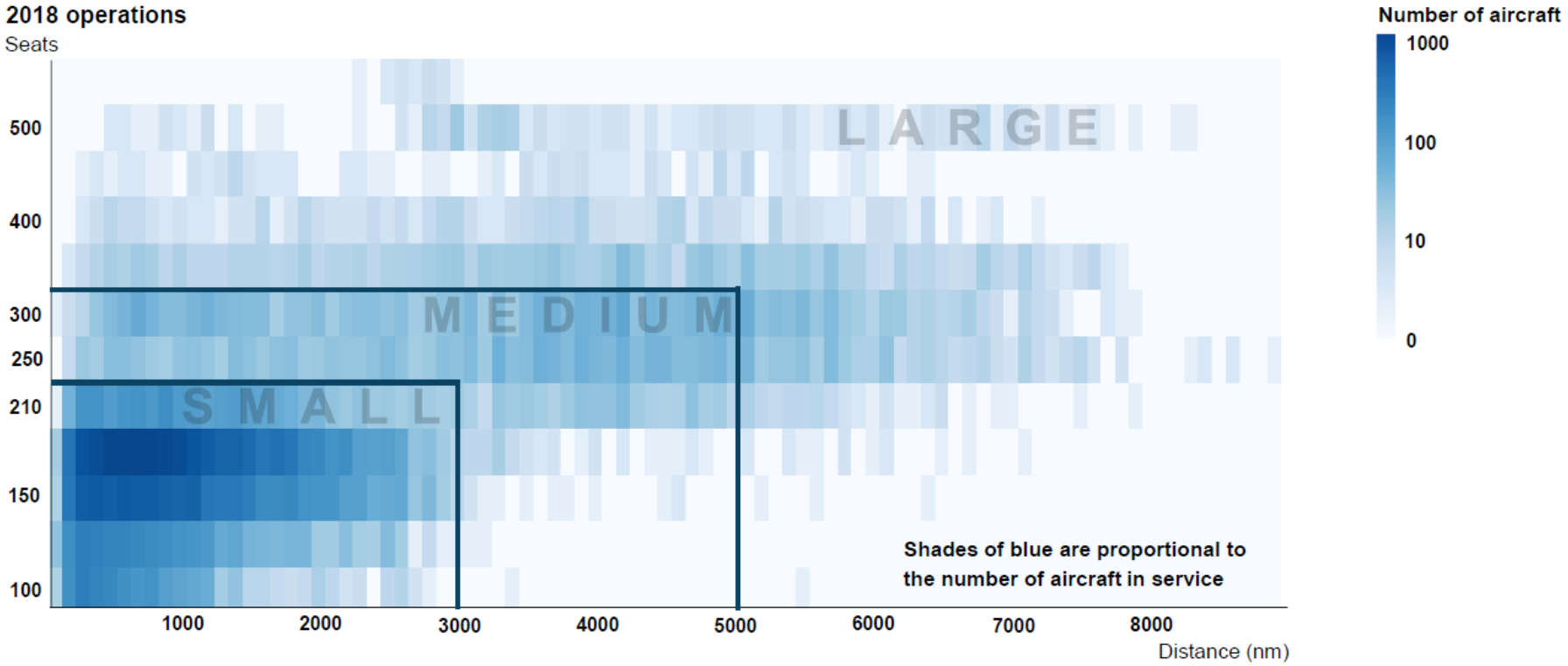
A350-900

SMALL MEDIUM LARGE

AIRBUS

Single Aisle commercial aircraft

In today's operations, aircraft are used flexibly in capacity and range

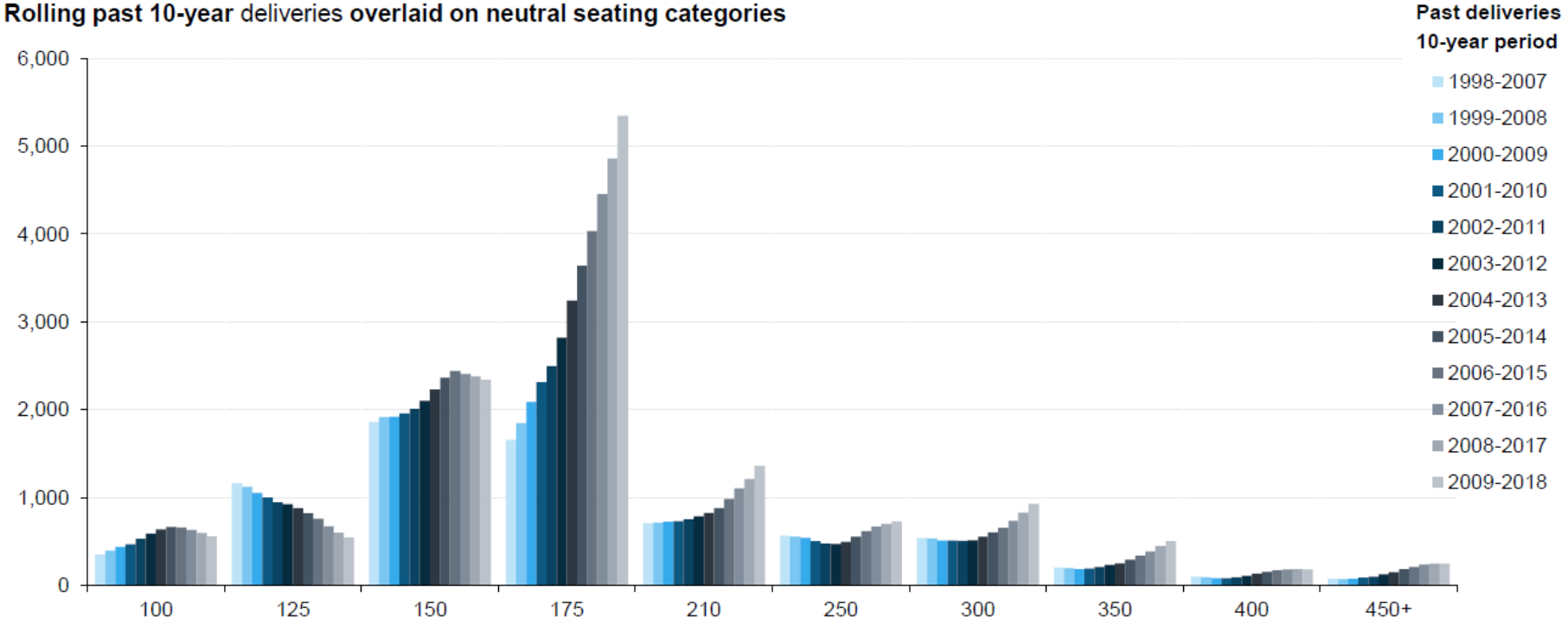


Source: OAG, Airbus GMF 2019

AIRBUS

Increasing deliveries in 175-seat and now 210-seat neutral categories

Rolling past 10-year deliveries **overlaid on neutral seating categories**

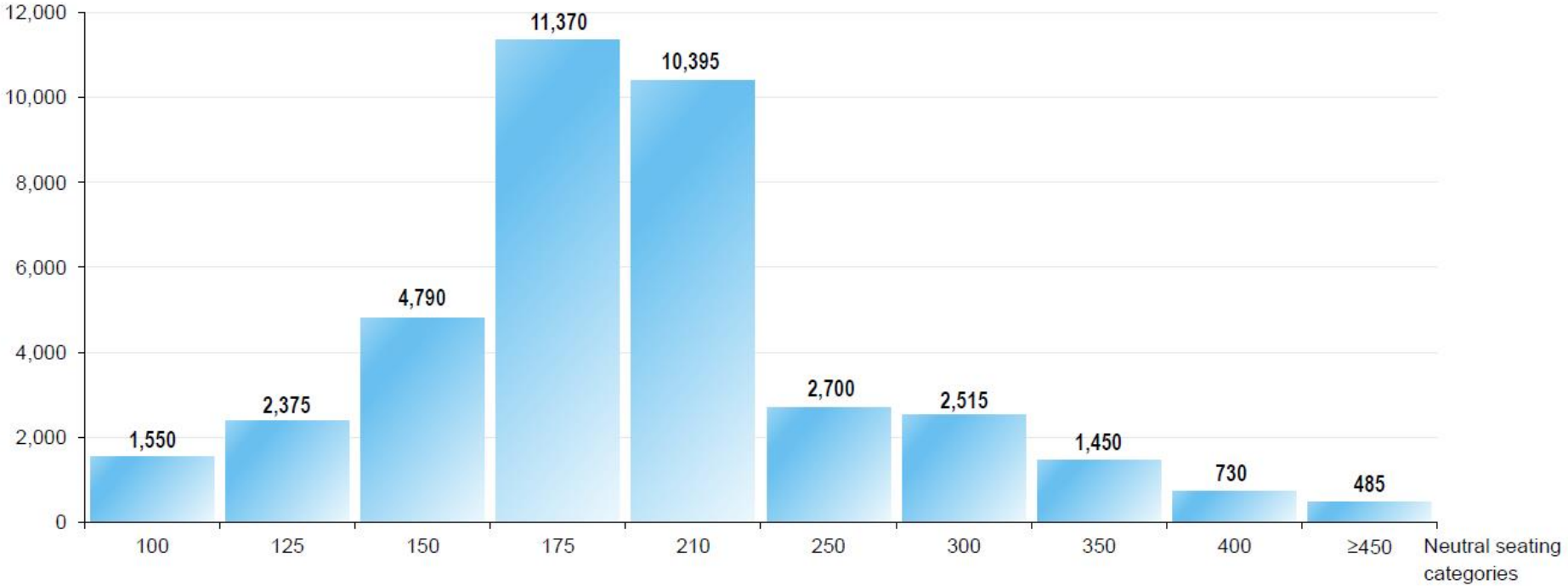


Source: Cirium, Airbus GMF 2019

AIRBUS

Forecast new deliveries: move upwards to 210-seat neutral category

Forecast deliveries 2019-2038

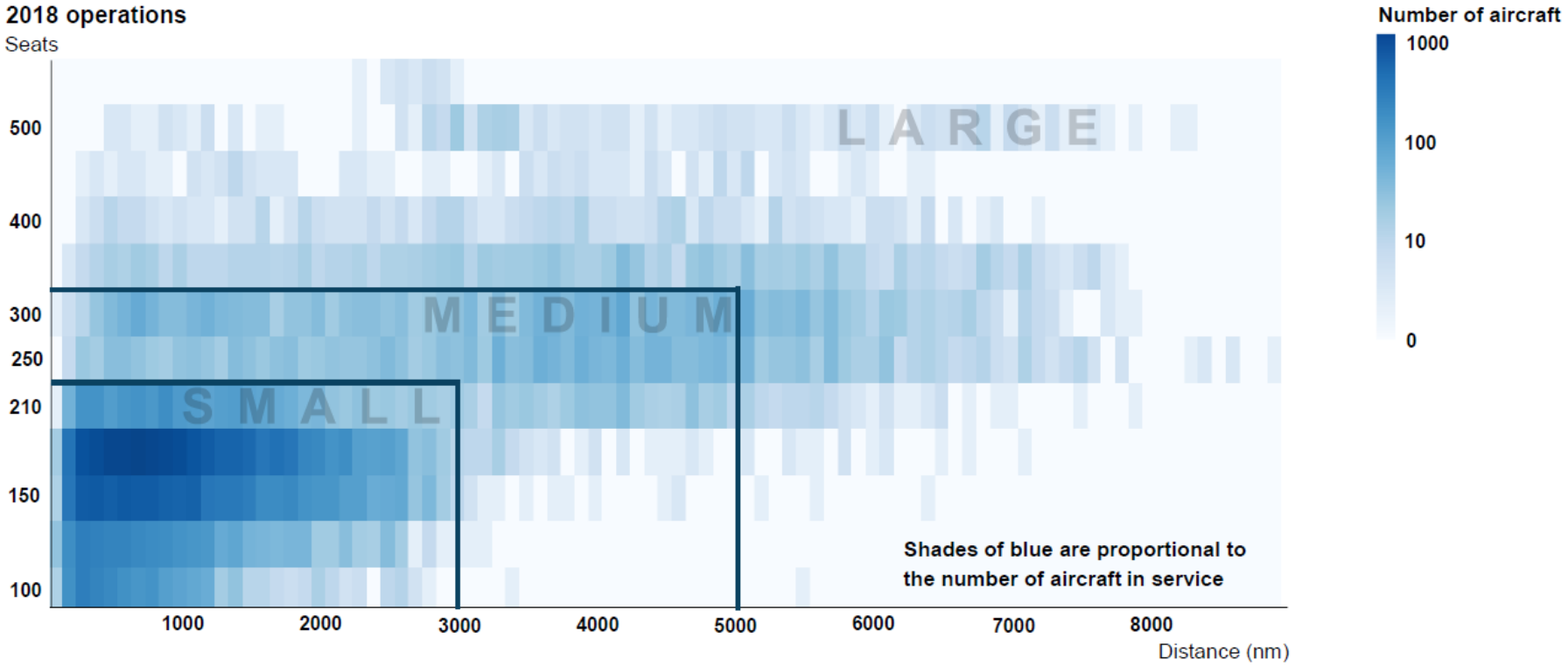


Notes: Passenger aircraft (≥100seats) | Rounded figures to nearest 5
Source: Airbus GMF 2019

AIRBUS

Single Aisle commercial aircraft

In today's operations, aircraft are used flexibly in capacity and range



Source: OAG, Airbus GMF 2019

AIRBUS

Market Survey

Airbus A320 (200)

Boeing B737 (800,max 8)

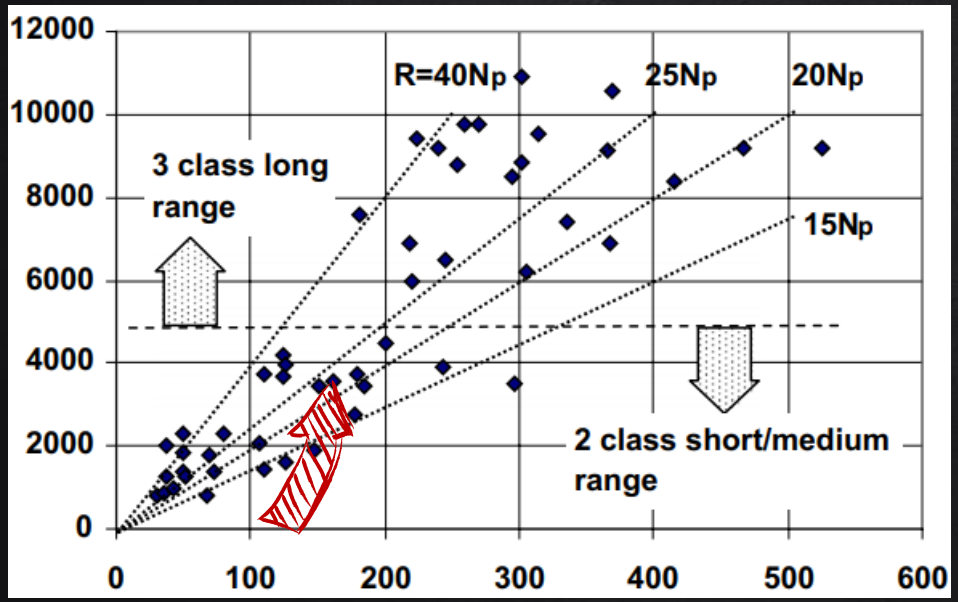
Irkut Mc21

Comac C919

Airbus A220-300 (CS300)

Range vs Number of Passenger Seats

Fig. 1.11, Sforza



Data Base: 46 operational commercial jet transports

Table F.2 Selected Weight Data for Aircraft of Gross Weight Over 100,000 lbs

Manufacturer	Aircraft	Np	R (mi)	Engine	W_{to} (lbs)	W_e (lbs)	W_c (lbs)	W_f (lbs)
Boeing	B737-500	110	2752	2xCFM56-3C-1	115,500	70,440	10,060	110,000
Boeing	B717-200	106	2389	2xBR BR700-715	121,000	68,500	10,800	110,000
Boeing	B737-300	126	3600	2xCFM56-3C-1	138,500	72,360	7,440	116,600
Boeing	B737-600	110	2384	2xCFM56-7BE	145,500	82,480	9,670	120,500
Airbus	A318	124	3713	2xCFM56-5B/PW6000	149,910	86,650	12,700	123,500
Boeing	B737-400	147	3696	2xCFM56-3C-1	150,000	76,760	7,420	124,000
Boeing	B737-700ER	126	3961	2xCFM56-7BE	154,500	84,990	11,810	129,200
Airbus	A320-200	150	3455	2xCFM56-5B4/AE V2527-A5	169,800	92,800	14,900	142,200
Boeing	B737-900	177	3160	2xCFM56-7B	174,200	94,740	10,160	146,300
Boeing	B737-900ER	180	3720	2xCFM56-7BE	187,700	98,190	14,790	157,300

Airbus	A320-200	150	3455
Boeing	B737-800	162	3587

Tehran Imam Khomeini International Airport

IKA/OIIE

1:36 PM +0330 (UTC +03:30) | Oct 3 | Elev. 3,305 ft

CONDITIONS	TEMPERATURE	WIND
Cloudy	31 °C	340° 12 kts

More weather & METAR

3.1

386 myFlightradar24 users have rated Tehran Imam Khomeini International Airport

Read reviews

SCHEDULED FLIGHTS - NEXT 7 DAYS

DEPARTURES	BUSIEST ROUTE
264	IKA – IST 54 flights
AIRPORTS SERVED	COUNTRIES SERVED
49	29

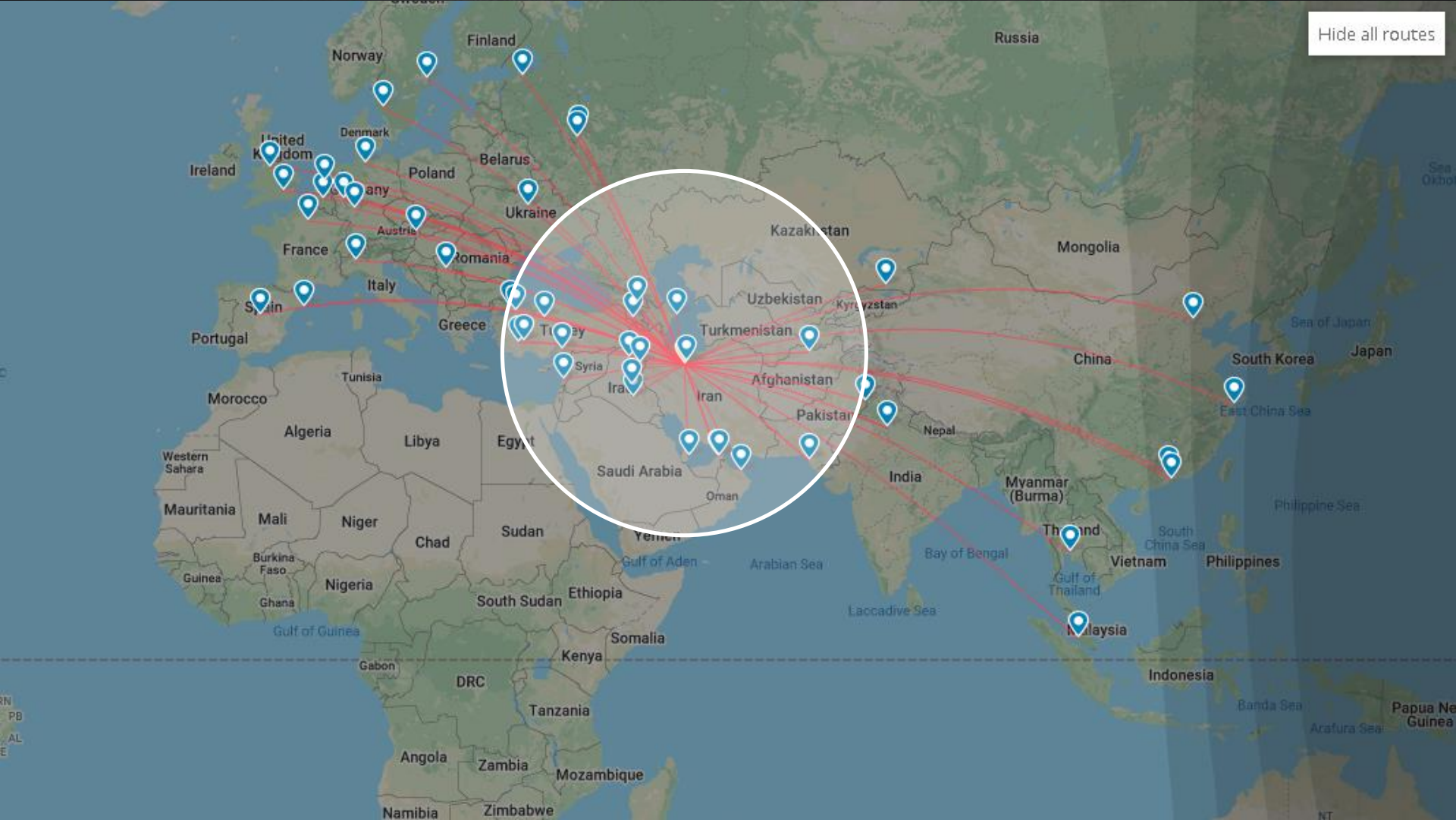
Complete schedule and route map

Runway details

General | Arrivals | Departures | On ground | More

ردیف	مسیر	مسافت (nm)	فرودگاه جایگزین	مسافت تا فرودگاه جایگزین (nm)	فرودگاه جایگزین برای مسیر برگشت	مسافت تا فرودگاه جایگزین در مسیر برگشت (nm)
۱	ارومیه ـ چابهار	۹۷۴	ایرانشهر	۱۰۸	تبریز	۶۱
۲	اصفهان ـ اهواز	۱۷۷	ماهشهر	۵۱و۸	یزد	۱۰۵
۳	اصفهان ـ شیراز	۱۹۶	بوشهر	۹۹	یزد	۱۰۵
۴	اصفهان ـ ارومیه	۴۴۴	تبریز	۶۱	یزد	۱۰۵
۵	اهواز ـ تبریز	۴۷۳	ارومیه	۶۱	ماهشهر	۵۱
۶	تهران ـ ارومیه	۳۰۲	تبریز	۶۱	امام خمینی	۲۵
۷	تهران ـ مشهد	۴۱۹	بیرجند	۱۷۶	امام خمینی	۲۵
۸	تهران ـ شیراز	۳۷۴	بوشهر	۱۰۰	امام خمینی	۲۵
۹	تهران ـ بندرعباس	۵۳۱	بندر لنگه	۹۴	امام خمینی	۲۵
۱۰	تهران ـ خرم آباد	۲۰۱	ایلام	۹۴	امام خمینی	۲۵
۱۱	تهران ـ اهواز	۲۹۹	شیراز	۵۱	امام خمینی	۲۵
۱۲	تهران ـ چابهار	۷۴۶	ایرانشهر	۷۹	امام خمینی	۲۵
۱۳	تهران ـ رشت	۱۲۷	رامسر	۲۷	امام خمینی	۲۵
۱۴	تهران ـ اصفهان	۱۸۸	یزد	۱۰۵	امام خمینی	۲۵
۱۵	تهران ـ خارک	۴۳۵	بوشهر	۳۲	امام خمینی	۲۵
۱۶	مشهد ـ شیراز	۵۴۸	بوشهر	۱۰۰	بیرجند	۱۷۶
۱۷	مشهد ـ اهواز	۶۴۹	ماهشهر	۵۱	سبزوار	۱۰۱
۱۸	مشهد ـ ارومیه	۷۲۰	تبریز	۶۱	سبزوار	۱۰۱
۱۹	نوشهر ـ اهواز	۳۵۷	ماهشهر	۵۱	ساری	۵۱
۲۰	نوشهر ـ مشهد	۳۹۶	سبزوار	۱۰۱	ساری	۵۱
۲۱	اصفهان ـ مشهد	۴۷۱	سبزوار	۱۰۱	یزد	۱۰۵
۲۲	تبریز ـ تهران	۲۸۳	امام خمینی	۲۵	ارومیه	۶۱
۲۳	تبریز ـ مشهد	۸۳۳	سبزوار	۱۰۱	ارومیه	۶۱
۲۴	بندرعباس ـ مشهد	۶۰۷	سبزوار	۱۰۱	بندرلنگه	۹۴
۲۵	نوشهر ـ اهواز	۳۵۷	ماهشهر	۵۱	ساری	۵۱
۲۶	نوشهر ـ مشهد	۳۹۶	سبزوار	۱۰۱	ساری	۵۱
۲۷	اصفهان ـ رشت	۳۴۲	رامسر	۲۷	یزد	۱۰۵
۲۸	رشت ـ شیراز	۵۳۸	بوشهر	۹۹	رامسر	۲۷
۲۹	همدان ـ مشهد	۵۵۰	سبزوار	۱۰۱	سنندج	۷۹
۳۰	شیراز ـ اردبیل	۵۸۲	رشت	۸۱	بوشهر	۹۹


Hide all routes
Black Sea
Makhachkala
Махачкала
Georgia
Tbilisi
თბილისი
Caspian Sea
Uzbekistan
Shymkent
Шымкент
Bishkek
Бишкек
Kyrgyzstan
Tashkent
Ankara
Armenia
Azerbaijan
Baku
Turkey
Turkmenistan
Ashgabat
Dushanbe
Душанбе
Tajikistan
Adana
Tehran
تهران
Cyprus
Syria
Kabul
کابل
Lebanon
Beirut
بيروت
Damascus
دمشق
Baghdad
بغداد
Iraq
Afghanistan
Islamabad
اسلام آباد
JAMMU AND KASHMIR
Jerusalem
Jordan
Israel
Iran
Lahore
لاہور
HIMACHAL PRADESH
Kuwait
Pakistan
PUNJAB
HARYANA
New Delhi
नई दिल्ली
Dammam
الدمام
Persian Gulf
RAJASTHAN
Jaipur
जयपुर
Bahrain
Riyadh
الرياض
Qatar
Karachi
کراچی
Medina
المدينة المنورة
Gulf of Oman
United Arab Emirates
Saudi Arabia
Muscat
مسقط
GUJARAT
Ahmedabad
Mecca


Hide all routes
Russia
Finland
Norway
Sweden
Denmark
Ireland
United Kingdom
Poland
Belarus
Ukraine
Austria
France
Romania
Italy
Spain
Portugal
Greece
Kazakhstan
Mongolia
Uzbekistan
Kyrgyzstan
Turkmenistan
Syria
Iraq
Iran
Afghanistan
Pakistan
China
South Korea
Japan
Sea of Japan
East China Sea
Nepal
India
Myanmar (Burma)
Thailand
Vietnam
Philippines
Philippine Sea
South China Sea
Bay of Bengal
Gulf of Thailand
Malaysia
Indonesia
Laccadive Sea
Arabian Sea
Gulf of Aden
Saudi Arabia
Oman
Yemen
Somalia
Kenya
Ethiopia
South Sudan
Sudan
Chad
Libya
Egypt
Tunisia
Morocco
Algeria
Western Sahara
Mauritania
Mali
Niger
Nigeria
Burkina Faso
Guinea
Ghana
Gulf of Guinea
Gabon
DRC
Tanzania
Angola
Zambia
Mozambique
Namibia
Zimbabwe
Banda Sea
Arafura Sea
Papua New Guinea

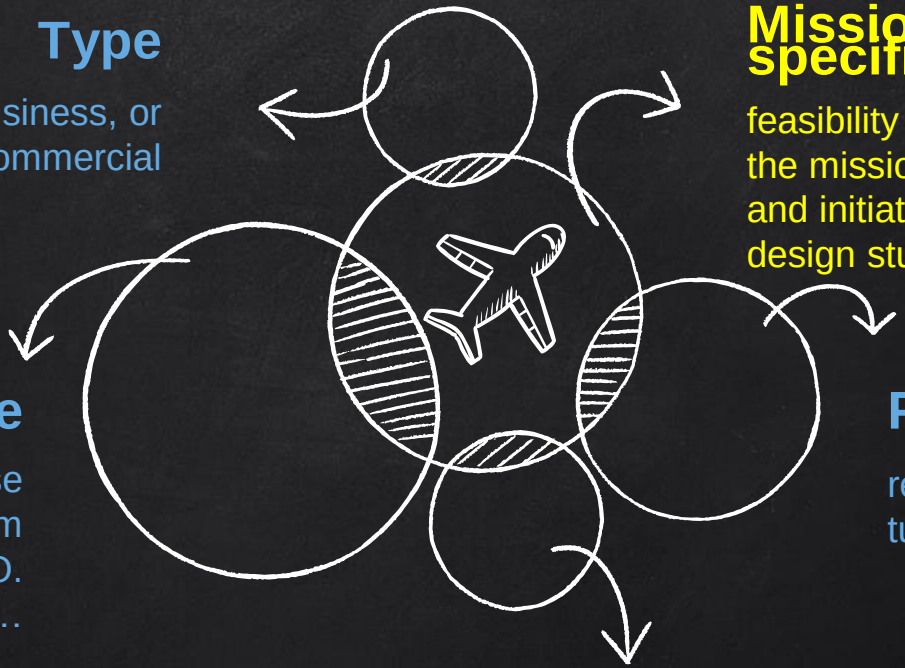
Payload & Range

Type

private, business, or commercial

Mission specification

feasibility study to define the mission specification and initiate a preliminary design study



Performance

cruise speed, cruise altitude, & maximum range in cruise, T.O. & field length, …

Powerplant

reciprocating, turboprop, or turbofan

Capacity

Passanger & Cargo

“

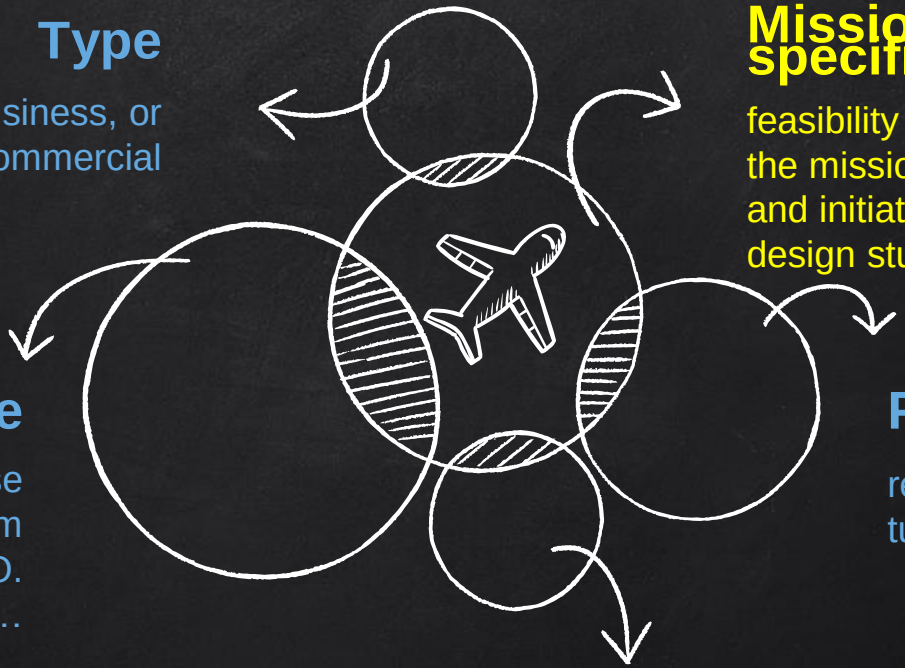
Power plant:
Two Turbofan Engines

Type

private, business, or commercial

Mission specification

feasibility study to define the mission specification and initiate a preliminary design study



Performance

cruise speed, cruise altitude, & maximum range in cruise, T.O. & field length, …

Powerplant

reciprocating, turboprop, or turbofan

Capacity

Passanger & Cargo

ردیف	نام فرودگاه	طول باند		ارتفاع فرودگاه از سطح دریا		نوع باند
		متر	پا	متر	پا	
۱	ارومیه	۳۲۵۰	۱۰۶۵۸	۱۳۲۴	۴۳۴۳	آسفالت
۲	اصفهان	۴۳۹۷	۱۴۴۲۵	۱۵۴۲	۵۰۵۹	آسفالت
۳	اهواز	۳۳۹۸	۱۱۱۴۸	۲۰	۶۶	آسفالت
۴	امام خمینی(ره)	۴۲۵۰	۱۳۹۴۰	۱۰۰۷	۳۳۰۵	آسفالت
۵	ایرانشهر	۲۳۵۵	۷۷۲۶	۶۲۲	۲۰۴۰	آسفالت
۶	بندر عباس	۳۶۶۰	۱۲۰۰۸	۷	۲۲	آسفالت
۷	کرمانشاه	۳۴۲۰	۱۱۲۱۶	۱۳۱۱	۴۰۳۱	آسفالت
۸	بیرجند	۴۰۰۰	۱۳۱۲۳	۱۵۰۹	۴۹۵۲	آسفالت
۹	بوشهر	۴۴۷۰	۱۴۶۶۳	۲۱	۶۸	آسفالت
۱۰	بندر لنگه	۲۵۰۰	۸۲۰۳	۲۰	۶۷	آسفالت
۱۱	تبریز	۳۶۵۶	۱۱۸۲۵	۱۳۵۹	۴۴۵۹	بتن
۱۲	خرم آباد	۳۶۰۰	۱۱۸۱۱	۱۱۵۳	۳۷۸۲	آسفالت
۱۳	رامسر	۲۷۰۰	۸۸۵۸	۲۱	۷۰	آسفالت
۱۴	رشت	۲۹۱۷	۹۵۷۱	۱۲	۴۰	آسفالت
۱۵	زاهدان	۴۲۶۵	۱۳۹۹۳	۱۳۹۱	۴۵۶۴	آسفالت
۱۶	زابل	۳۰۰۲	۹۸۴۸	۴۹۶	۱۶۲۸	آسفالت
۱۷	سنندج	۳۰۵۰	۱۰۰۰۵	۱۳۷۸	۴۵۲۲	آسفالت
۱۸	ساری	۲۶۴۸	۸۶۸۸	۱۱	۳۵	آسفالت
۱۹	شیراز	۴۳۳۴	۱۴۲۲۰	۱۵۰۰	۴۹۲۰	آسفالت
۲۰	کرمان	۳۸۴۷	۱۲۶۲۰	۱۷۵۰	۵۷۴۱	آسفالت
۲۱	مهرآباد	۴۰۳۸	۱۳۲۴۸	۱۲۰۸	۳۹۶۲	آسفالت
۲۲	مشهد	۳۹۲۵	۱۲۸۷۷	۹۹۵	۳۲۶۳	آسفالت
۲۳	نوشهر	۲۰۳۴	۶۶۷۷	۱۹	۶۱	آسفالت
۲۴	همدان	۳۲۳۴	۱۰۶۱۱	۱۷۵۴	۵۷۵۵	آسفالت
۲۵	یزد	۴۰۹۸	۱۳۴۴۶	۱۲۳۶	۴۰۵۴	آسفالت
۲۶	کیش	۳۶۶۰	۱۲۰۰۴	۳۱	۱۰۱	آسفالت
۲۷	قشم	۴۲۲۶	۱۳۸۶۴	۱۴	۴۵	آسفالت
۲۸	یاسوج	۲۵۹۸	۸۵۲۲	۱۸۱۰	۵۹۳۹	آسفالت
۲۹	اراک	۳۷۰۰	۱۲۱۳۹	۱۶۵۸	۵۴۴۰	آسفالت
۳۰	شهر کرد	۳۲۹۸	۱۰۸۱۹	۲۰۴۹	۶۷۲۳	آسفالت

Table F.8 Selected Thrust Data for Aircraft of Gross Weight Over 100,000 lbs

Manufacturer	Aircraft	Engine	F_{to} (lbs)	W_g (lbs)	F_{to}/W_g	S_{to} (ft)	S_l (ft)
Boeing	B737-500	2xCFM56-3C-1	40,000	115,500	0.346	8700	4500
Boeing	B717-200	2xBR700-715	42,000	121,000	0.347	5750	5000
Boeing	B737-300	2xCFM56-3C-1	44,000	138,500	0.318	7600	4700
Boeing	B737-400	2xCFM56-3C-1	47,000	138,500	0.339	8880	5050
Airbus	B737-600	2xCFM56-7BE	39,000	145,500	0.268	6180	4380
Boeing	A318	2xCFM56-5B/PW6000	47,600	149,910	0.318	4200	4200
Boeing	B737-700ER	2xCFM56-7BE	54,600	154,500	0.353	5500	4690
Airbus	A319-100	2xCFM56-5B6/IAE V2524-A5	47,000	166,500	0.282	4800	4700
Airbus	A320-200	2xCFM56-5B4/IAE V2527-A5	53,200	169,800	0.313	5900	4800
Boeing	B737-800	2xCFM56-7BE	52,600	174,200	0.302	7330	5440
Boeing	B737-900	2xCFM56-7BE	54,600	174,200	0.313	7900	5450
Boeing	B737-900ER	2xCFM56-7BE	52,600	187,700	0.280	8970	5200
Airbus	A321-200	2xCFM56-5B3/IAE V2533-A5	64,000	206,100	0.311	7100	5200
Boeing	B757-200	2xRB.211-535E4/PW2037/2040	86,200	255,000	0.338	7750	5100
Boeing	B757-300	2xRB.211-535E4/PW2037/2040	86,200	272,500	0.316	8650	5700
Airbus	A310-300	2xCF6-80C2/PW4000	118,000	361,600	0.326	7400	4950
Boeing	B787-3	2xGEnx-1B54	106,400	364,000	0.292	–	–
Boeing	B767-200ER	2xCF6-80C2/PW4000	115,800	395,000	0.293	8150	5300
Boeing	B767-300ER	2xCF6-80C2/PW4000	121,600	412,000	0.295	8900	5500
Boeing	B767-400ER	2xCF6-80C2/PW4000	121,600	450,000	0.270	10800	6200

Mission Specification

Payload & Crew

170 Passengers (190 lb) + 30 lb Baggage, Two Pilots (190 lb) + 50 lb Baggage, 1+4 Cabine Attendants (170 lb) + 50 lb Baggage

Range

5000 km + 1 hour Additional Flight Loiter + 370 km Diversion

Cruise Speed & Altitude

Economical Cruise Mach Number 0.78, High Speed Cruise 0.82

Cruise Ceiling 35000 ft

Climb

Direct Climb to 35000 ft at Max T.O. Weight

T.O. & Landing

FAR 25 Field Length (T.O. Field length 6000 to 7500 ft, <10000 ft @ 5500 ft OAT=45 °C

Power Plants

Two Turbofan Engines

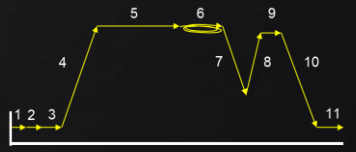
Pressurization

5000 ft Cabin at 35000 ft

Certification Base

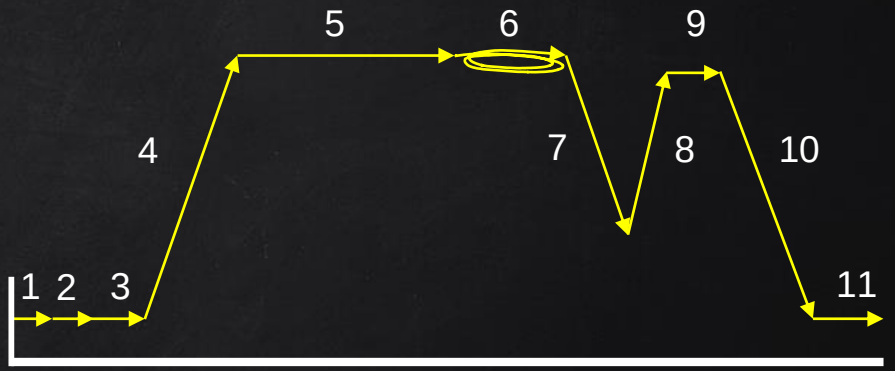
FAR 25

Mission Profile



Mission Profile

Segment	Description
1	Engine start and warm-up
2	Taxi
3	Takeoff
4	Climb
5	Cruise to full range
6a	One hour additional flight at cruise conditions or loiter
6b	Ten percent nominal flight time additional
7a	Descent to destination and refused landing
8a	Climb
9a	Diversion to alternate airport 200 nm (370 km) distant
9b	Diversion to alternate airport 200 nm distant + 0.5 hour hold at 15000 ft altitude at alternative airport
10	Descent
11	Landing



a Flight diversion for domestic flight
b International flights.

thanks!

Any questions?