



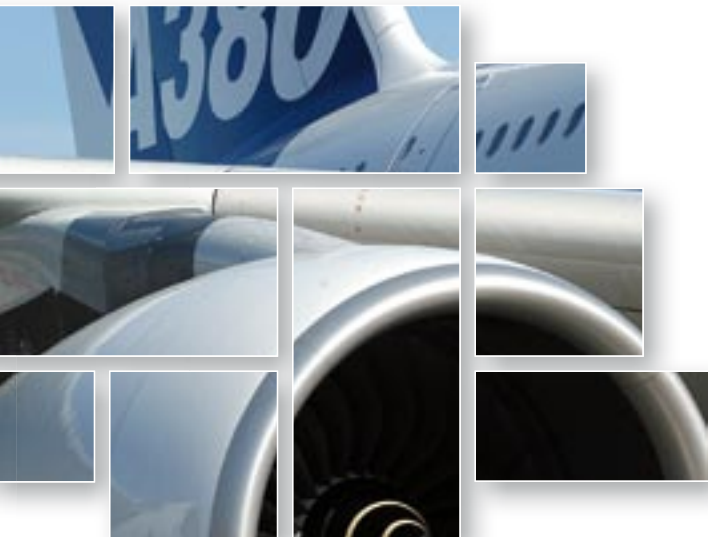
Rolls-Royce

# Market Outlook 2007

Forecast 2007 - 2026



reliability integrity innovation



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# Executive summary

## A \$700 billion engine market

**Rolls-Royce predicts continued strong long-term growth in all major segments of the commercial aircraft and jet engine market.**

Over the next 20 years, the Outlook forecasts demand for 132,000 engines, worth \$701 billion. Markets within Asia, both short-haul and intercontinental, will drive much of this growth. However, the more mature markets in Europe and North America require over 6,000 new airliner deliveries to replace older aircraft in today’s fleet. Delivery of these engines also creates an aftermarket opportunity of \$550 billion for services and parts over their lives.

As well as passenger airliners and cargo aircraft, a huge market exists for business jets. Aircraft and engine makers have experienced strong sales in this segment since 2003, with growing demand outside of North America, the traditional home to around 80 per cent of the fleet.

Rolls-Royce is committed to developing products and services to satisfy the opportunities provided by these global markets.

*The Outlook gives a summary of the forecast for 2007-2026, plus commentary on key trends and issues of the last 12 months. In-depth analysis and reference material is contained in the 2006 Outlook, available on the Rolls-Royce website.*

**Engine deliveries by sector**

Sector	Units	Value (\$bn)
Business jets	63,816	93
Regional aircraft	14,427	43
Mainline aircraft	51,126	528
Freighters	2,244	36
<b>Total</b>	<b>131,613</b>	<b>701</b>

**Aircraft delivery summary 2007-2026**

	<b>2007-2016</b>	<b>2017-2026</b>	<b>Total</b>
Very light jets	3,890	3,438	<b>7,328</b>
Small business jets	2,770	3,515	<b>6,285</b>
Medium business jets	4,504	5,979	<b>10,483</b>
Large business jets	2,704	3,589	<b>6,293</b>
<b>Business jet total</b>	<b>13,868</b>	<b>16,521</b>	<b>30,389</b>
30-50 seats	417	1,290	<b>1,707</b>
70-90 seats	2,573	2,278	<b>4,851</b>
<b>Regional aircraft total</b>	<b>2,990</b>	<b>3,568</b>	<b>6,558</b>
110 seats	926	835	<b>1,761</b>
130 to 180 seats	6,199	7,357	<b>13,556</b>
200 and 250 seats	1,361	1,468	<b>2,829</b>
300 and 350 seats	1,181	2,157	<b>3,338</b>
400+ seats	375	669	<b>1,044</b>
Freighters	475	312	<b>787</b>
<b>Mainline aircraft total</b>	<b>10,517</b>	<b>12,798</b>	<b>23,315</b>
<b>Grand total</b>	<b>27,375</b>	<b>32,887</b>	<b>60,262</b>

# Recent developments

## Industry upturn

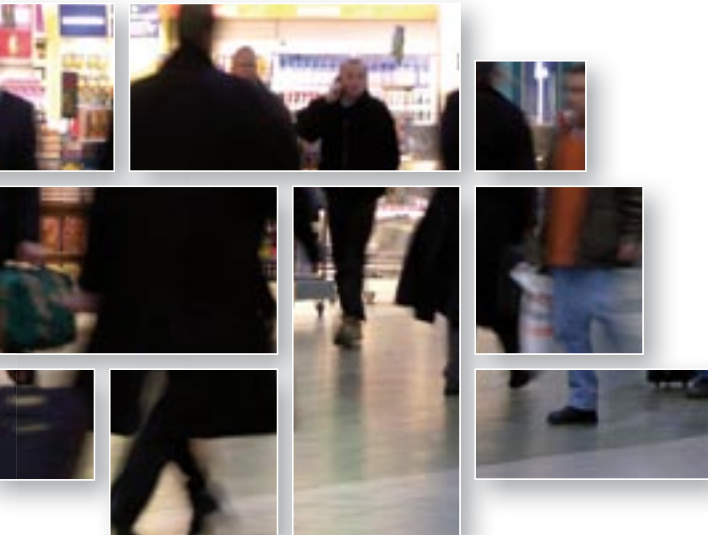
**The aviation industry now appears to be in full recovery. Passengers are travelling in record numbers, with load factors as high as ever. Yields are rising with 2007 being the first year since 2001 where all regions have seen profits simultaneously.**

Orders are at record levels, with the Paris Air Show having seen more orders than the last three Paris / Farnborough shows put together and production lines for certain types being sold out until the middle of the next decade. Manufacturers are incorporating new innovative technologies into aircraft that give airlines greater flexibility in how they are operated.

### Orders

The recent record orders demonstrate the industry returning to financial health. Orders in the widebody sector are buoyant as new designs generate commitments well into the future.

Narrowbody orders continue to be strong with new start ups establishing themselves in the developing world and established carriers expanding their fleets, both of which are leading to large orders for extremely successful aircraft types.

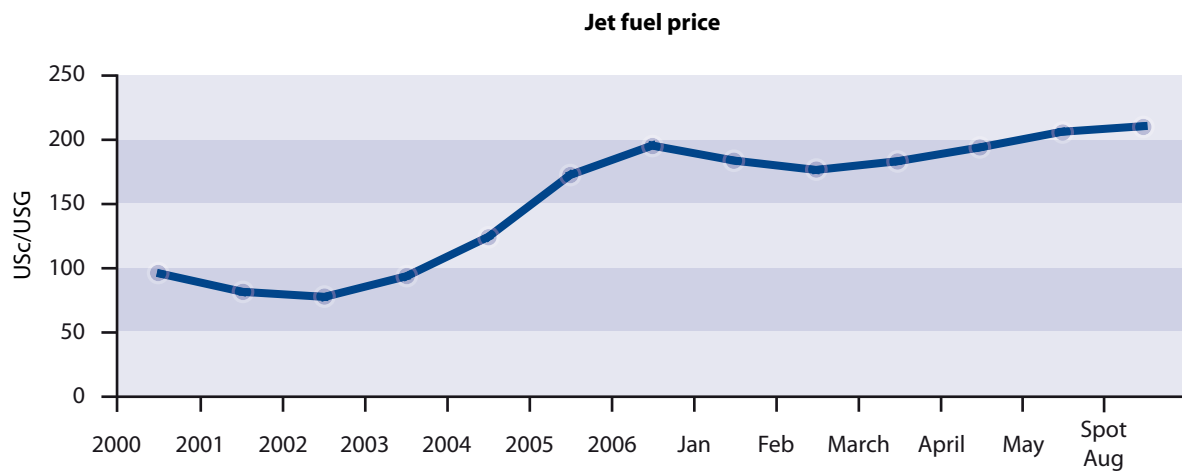


## Fuel - cost or opportunity?

### Fuel Price

There continues to be upward pressure on the price of jet fuel, with the latest spot prices available indicating current values over \$2 a gallon. This firmly positions fuel as the largest cost for all airlines and a priority for their attention, within some carriers the fuel bill can account for up to 50 per cent of direct operating costs and for most carriers it is at least 30 per cent of direct operating costs.

This makes the drive for fuel efficiency paramount in airlines' operations, it is reflected in the orders seen for newer types with better fuel burn characteristics and in the efforts of the operators implementing measures such as single engine taxi and charges for hold baggage. Whether in the longer term the fuel price will fall remains to be seen but fuel efficiency and managing the fuel bill will remain important to all airlines and fleet renewal will be an essential part of this.



## Widebody evolution

### More choice in the market

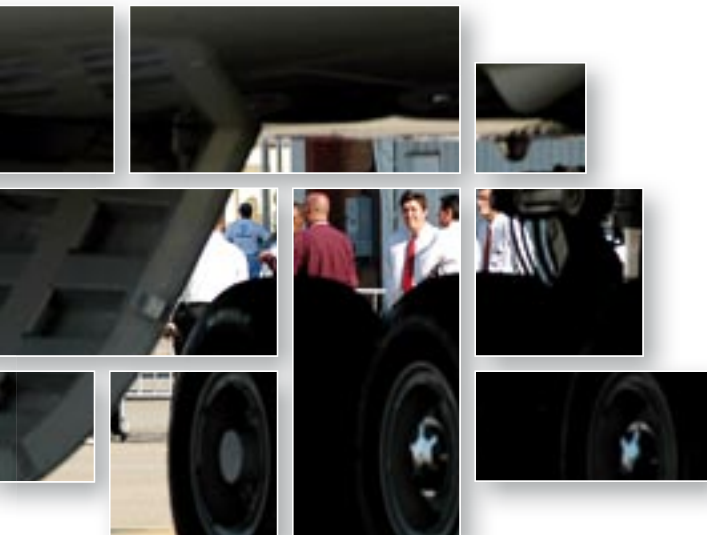
**The first flight of the Boeing 787 Dreamliner™ will usher in a new era of widebody aircraft. By 2013 Airbus expects to have the A350 XWB Family in service.**

These developments will bring to market more capable aircraft with greater levels of passenger comfort. The expectation is that these two types will dominate the widebody market, enabling new services, whilst also offering the airlines better margins.

These aircraft will not only be game changers for the airlines but also for the industry as a whole. Their increased use of composites reduces the impact of corrosion, thus offering increased aircraft life. New engine technology is being deployed utilising 'more electric' philosophy, and improved real-time condition monitoring. Airlines have responded to the clear advantages these new aircraft offer in their ordering levels. No other widebody has seen a ramp-up of ordering activity as fast as the Boeing 787.

#### **Airbus A380**

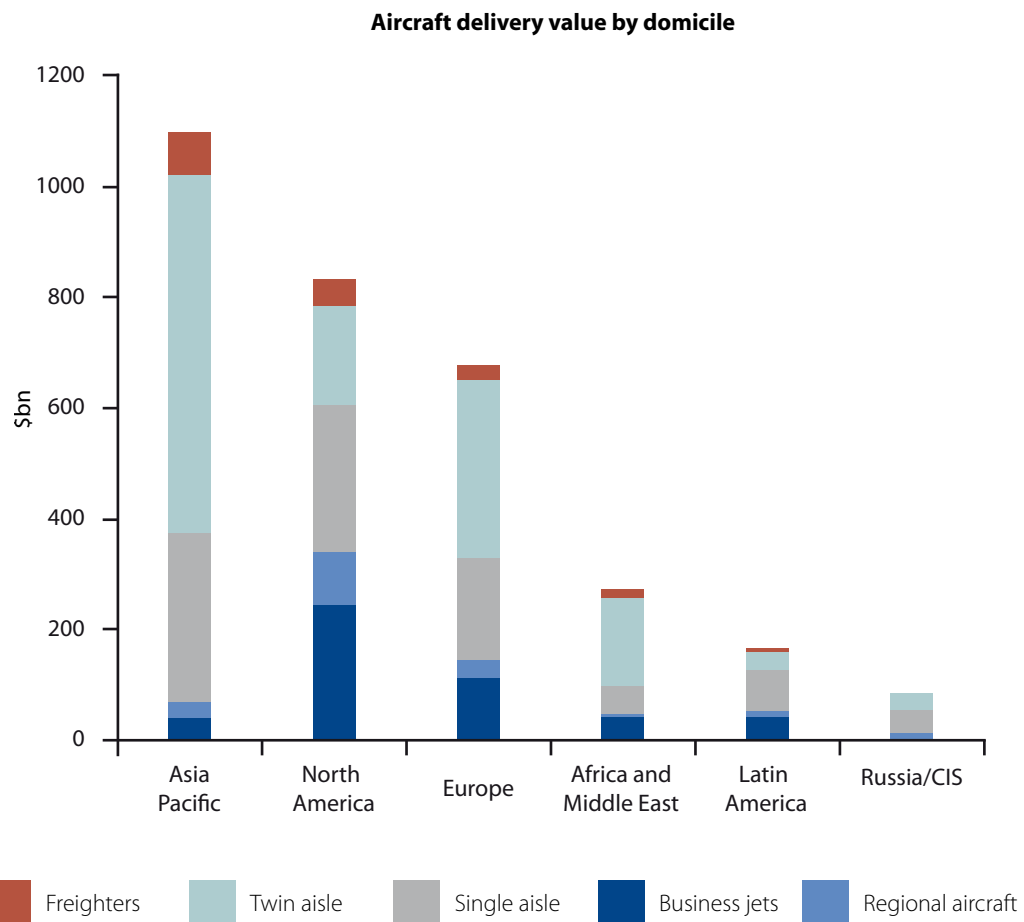
By the end of 2007 the A380 will be in service with Singapore Airlines. This widebody will enable airlines to operate more economically on the key high traffic routes. Major cities will be connected by an increased number of seats in greater levels of comfort than previously available.



## Aircraft deliveries

Over the next 20 years, the commercial aircraft market is worth \$3.1 trillion. Asia Pacific is the largest market for mainline aircraft and new-build freighters, but North America remains the prime region for deliveries of business jets and regional aircraft.

The Outlook does not attempt to forecast aircraft transactions between regions, so, for example, second-hand deliveries to Russia/CIS may actually create demand for additional new aircraft in Europe and North America.



# North America

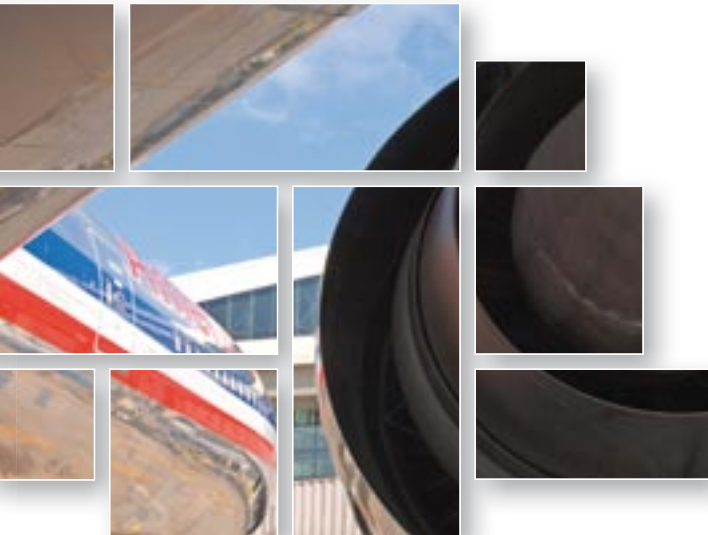
## US major airlines improve

**North American airlines are experiencing a profit recovery. In quarter two of 2007 all major US airlines have shown a profit, and this has been in line with the trend of improvement seen in previous quarters.**

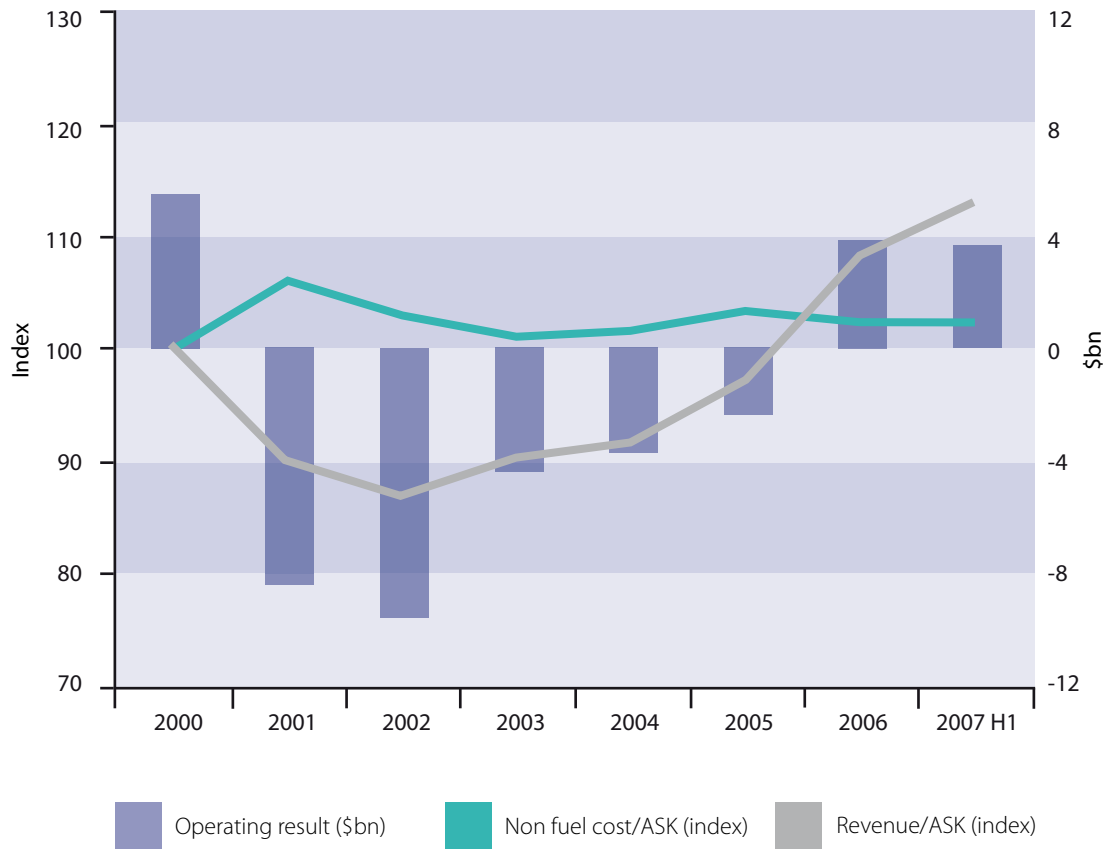
Open skies brings carriers the opportunity to access new markets. 2008 is likely to see many new routes across the Atlantic, although US carriers are currently hampered by a lack of new long-haul aircraft.

Ongoing restructuring has helped the recovery. Carriers have continued to find efficiencies year after year, cutting back their cost base and increasing their competitiveness. Nearly 100,000 fewer employees work in the six biggest carriers than in 2001. Rationalisation of these costs and improved internal structures has supported increasing yields.

The market is still incredibly competitive. Low cost carriers continue to keep domestic fares low and make it difficult for mainline carriers to compete. This has led to the continuing search for revenue from international routes and the switch of capacity from domestic to new international offerings.



**US airlines financial data**



# Europe

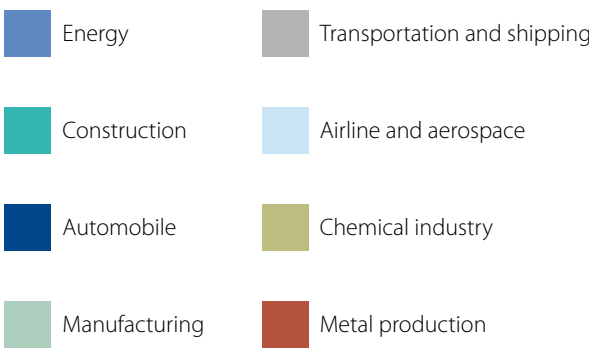
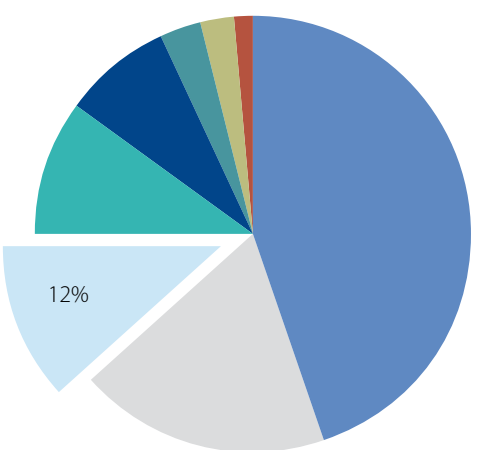
## The environment debate

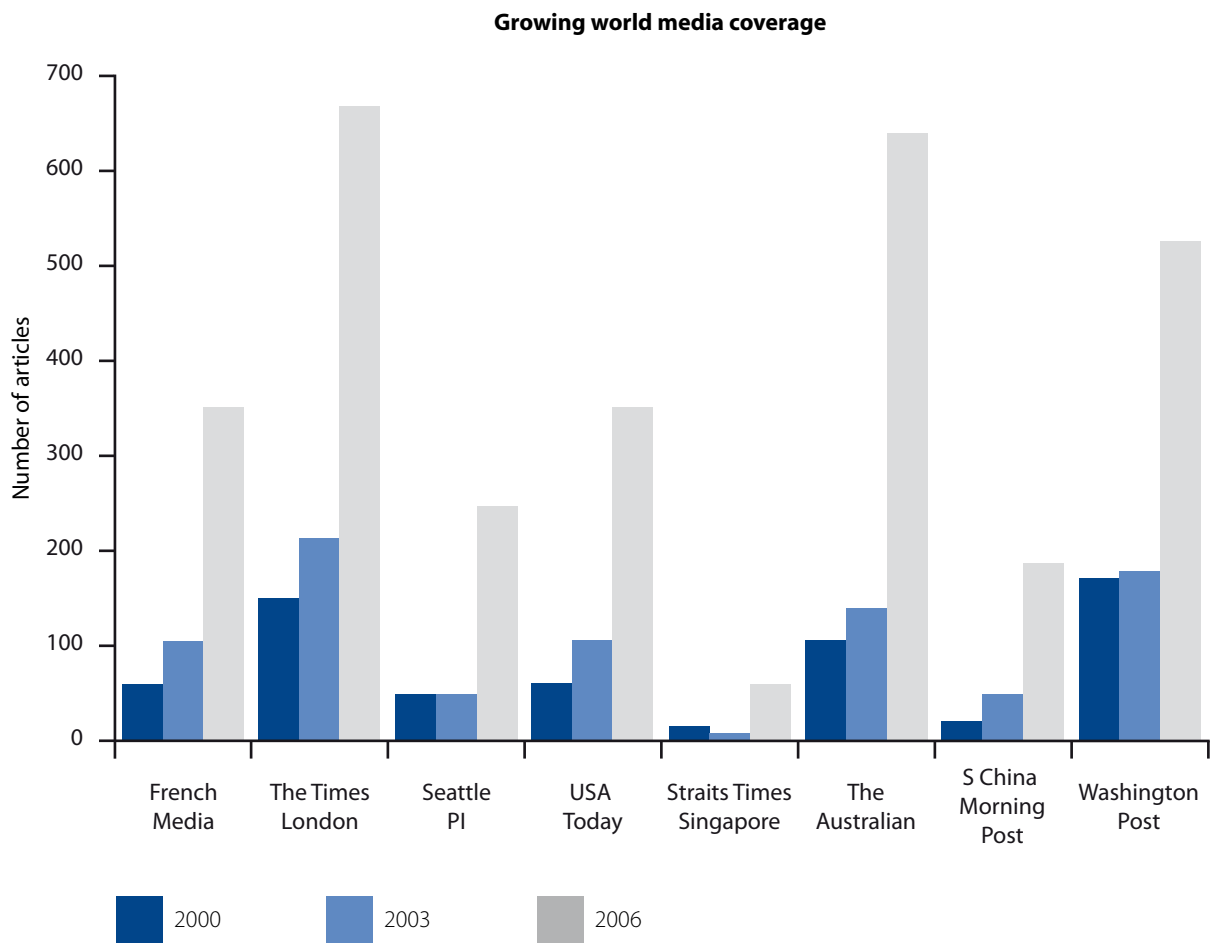
**In the last 12 months the environment issue has moved up the political agenda. In June newly elected French President, Nicolas Sarkozy, backed the European Emissions Trading Scheme. Gordon Brown, UK Prime Minister promotes tackling climate change and economic growth as compatible and Angela Merkel has made tackling climate change central to Germany’s presidency of the G8.**

This high level exposure combined with the public desire to do something has made environmental regulation of airlines within Europe very real. A proposal is making progress within the European Union to include international aviation within the emissions trading scheme of Europe. Air passenger duty has been increased in the UK and European travellers are continually being persuaded that short haul flights should be replaced by rail journeys.

These challenges must be met at an industry level. There are solutions but these involve the work of all players in the industry. Airframers and engine makers can develop technology, governments need to allow the development of efficient air traffic control systems, airlines need to optimise their efficiency and the flying public be prepared to contribute to counter their emissions. This is not an issue that will disappear, and is rapidly becoming a global concern.

**UK media coverage of global warming**





## Asia Pacific

### Continued liberalisation

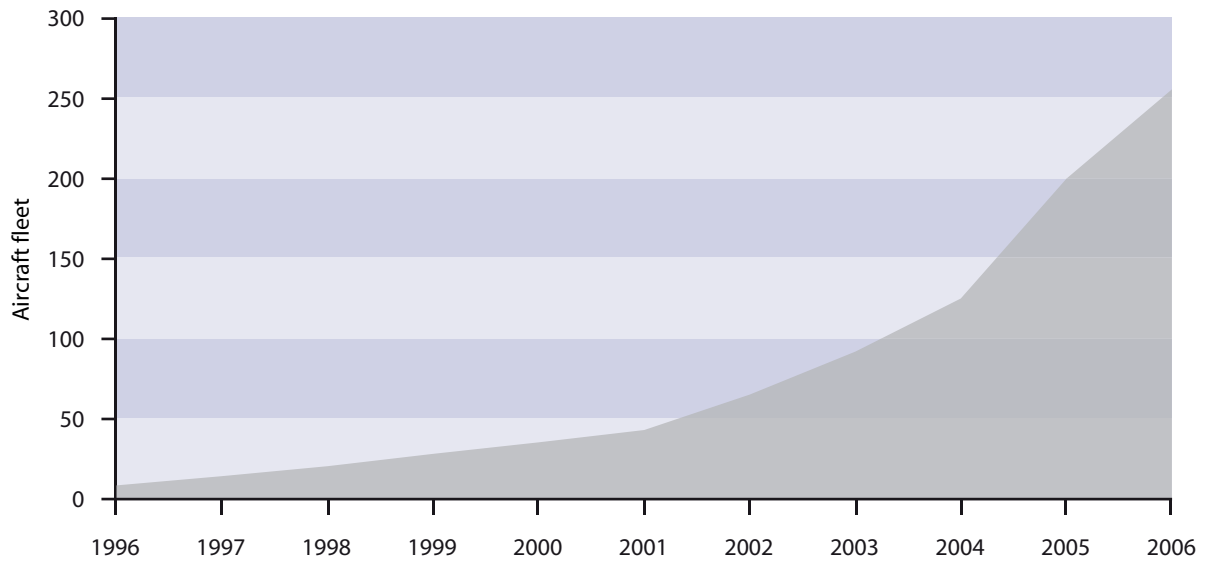
**In Asia new start-up airlines are leading the industry growth. In the last year there have been 29 start-up airlines in the region and 238 aircraft have been added to the passenger fleet. This represents a fleet growth of seven per cent, much of which has been in the narrowbody market.**

As with Europe, and the US before, liberalisation is allowing new carriers to enter the market using smaller aircraft and offering greater frequencies. Prices are generally lower, which attracts more of the public to fly. Low cost models are successfully being transplanted from America and Europe into the region as can be seen by the success of airlines such as Air Asia and Lion Air. This provides new levels of competition to the established carriers of the region, who are seeking new ways to succeed.

Many Intra-Asian routes are longer than in Europe and North America, therefore cargo and business-class service are still important. This means many airlines will continue to use widebody aircraft in significant quantities.



**Asian start-ups fleet growth**



## Middle East

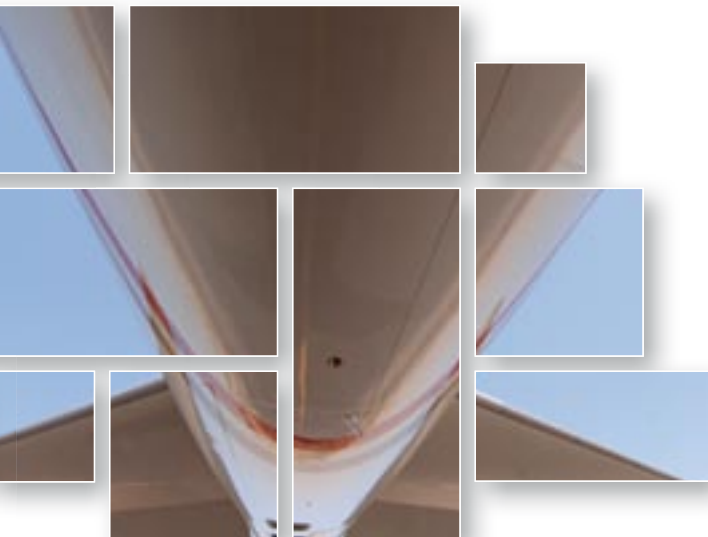
### A new world hub?

**In the Middle East there appears to be no end to aircraft orders. 350 aircraft are currently on firm backlog, almost 100 of which will be delivered to Emirates alone.**

Qatar, Etihad and Royal Jordanian are also ordering in high numbers and with a number of new start-ups promising to bring low cost to the region, the capacity increase will be enormous. The question is whether such a small region with a small indigenous population can sustain this amount of capacity.

The viewpoint of many, including the carriers of the region, is that this growth is not reliant solely on the region's population and own growth. Instead the airlines believe that they are in the unique geographic position of being able to connect anywhere in the world to anywhere in the world through one single stop in what is hoped will become one of the major tourist destinations of the world.

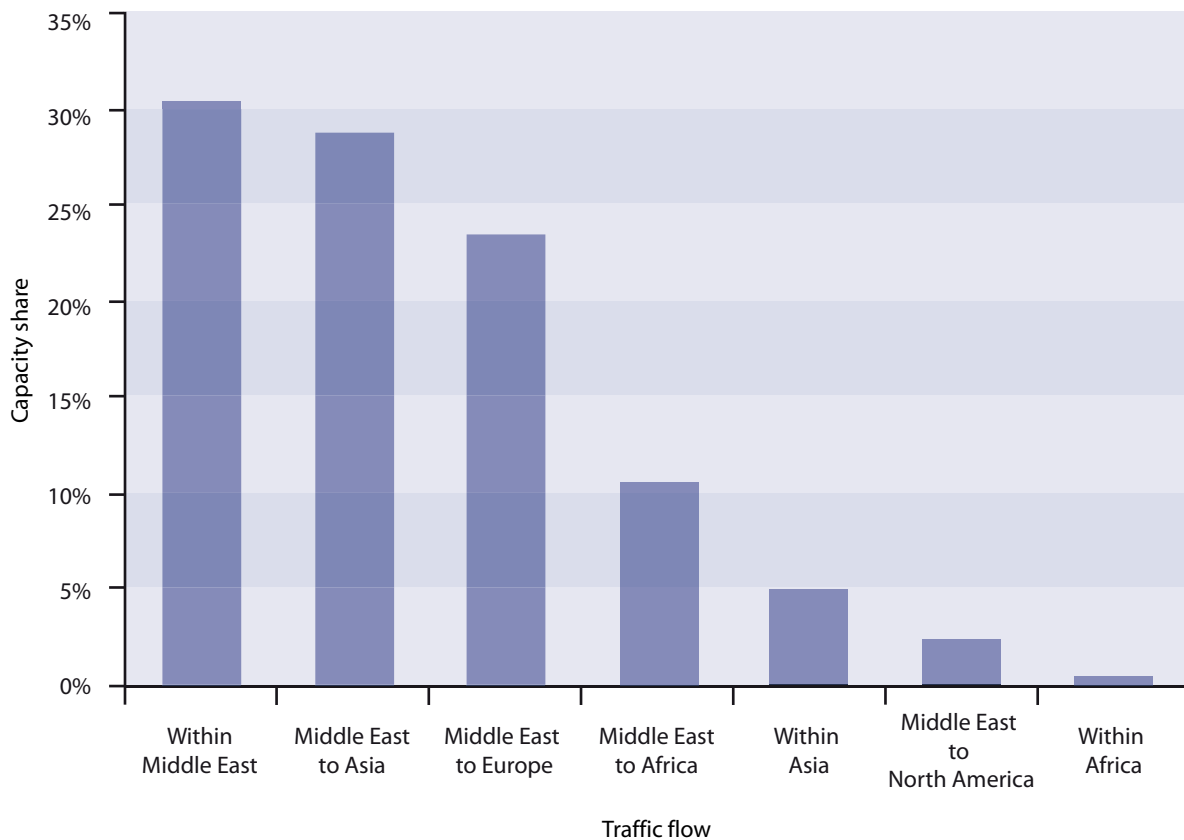
If this can be accomplished then it presents a serious challenge to the established airlines of Europe and Asia whose business models rely upon them being able to route traffic to their hubs within their own regions, often at a loss, and then fly long haul to passengers' final destinations.



However, prices will have to remain extremely attractive for passengers to fly the additional hours compared to a non-stop flight. Will carriers become victims of their own success, as their hub airports become more congested? As aircraft

capabilities improve this raises the opportunity for new direct services. Whilst this allows other competitors to by-pass hubs in the region it also allows Middle East carriers to offer new services themselves to the Americas for example.

**Distribution of Middle East airlines' capacity 2007**



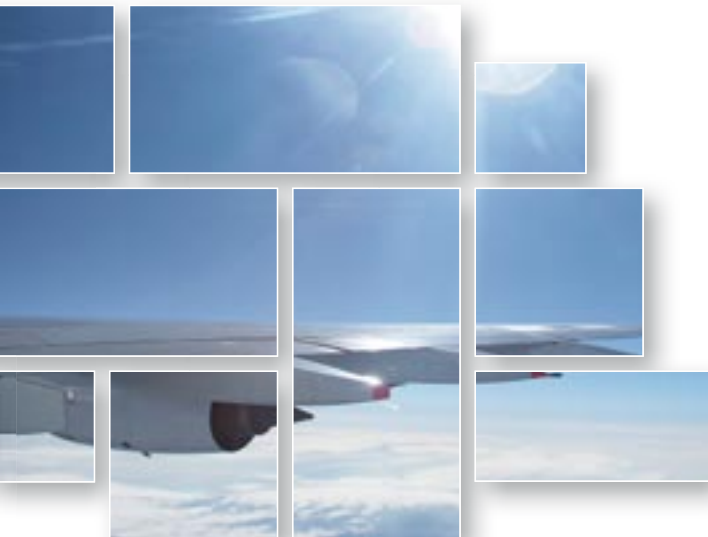
## Latin America

### New widebody orders drive market forward

**It seems economic and political stability in this region is having a positive effect on growth. Growing financial success at many airlines is driven by good yields on intra-Latin American routes, evident in the profits of LAN and TAM for example.**

This success is being translated into an ordering boom for the major carriers in Latin America, with a strong focus on widebody aircraft for the international market. In recent months orders have been placed in record numbers by Avianca with 787s and A330s, TAM with A350 XWBs, LAN with 787s and GLAI is currently reviewing a decision on its widebody fleet plan. GLAI is the parent company for GOL and the newly-acquired Varig, this acquisition can be seen as a strategic move for GOL, enabling the Brazilian low cost carrier to enter the international market.

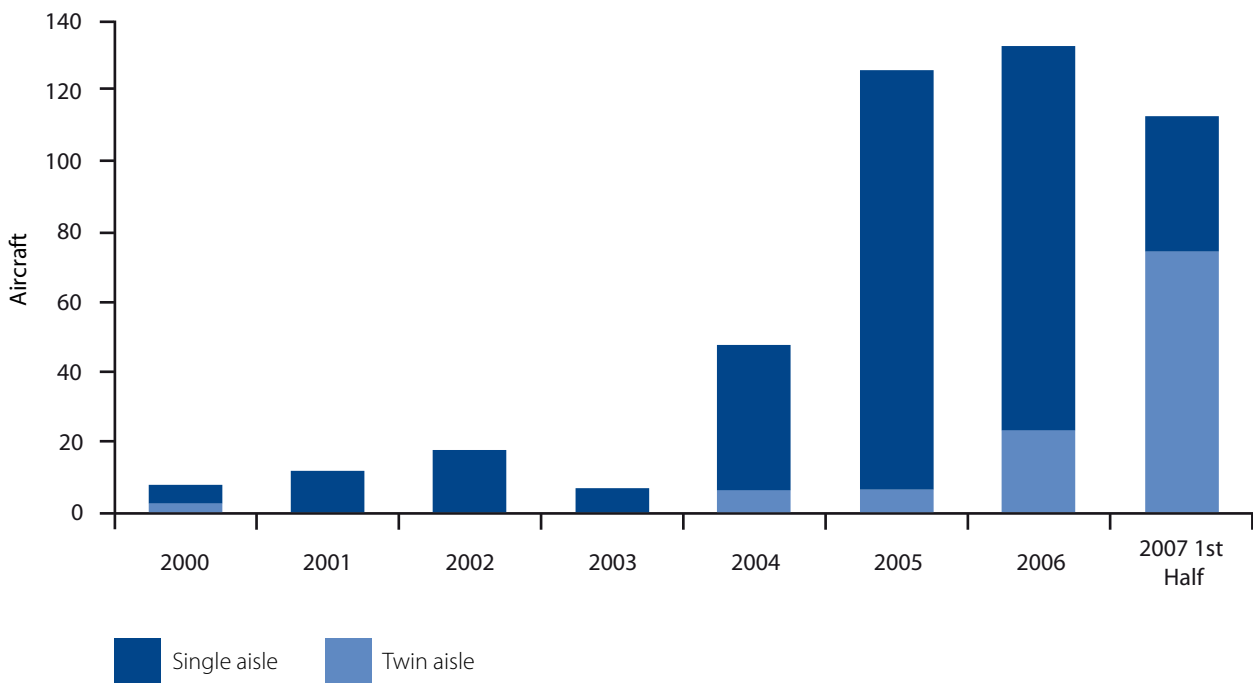
These airlines have all recognised the importance of their own international markets and are seeking to regain these from foreign competition, which over a number of years has entered their markets with high quality product offerings at reasonable prices. The Latin American carriers have recognised the need to offer similar products and



have worked to improve their reputation, marketing and fleet standards. The future for low cost operators in the region is quite favourable; these operators will see the benefits of high indirect government support, in terms of infrastructure and development, as the industry is seen as a key resource to

generate economic growth and open up the region to enable greater population mobility. These key operators need to remain vigilant to control their cost base, as they will continue to be exposed to fuel costs and economic cycles, even if favourable operating agreements exist.

**Orders placed by Latin American carriers**



# Freight

## The emergence of the mid-market aircraft

**The last 12 months has seen the growth of the mid range, mid-market freighter.**

In June Airbus launched the A330-200F. With a range of 4000 nm and a 64 tonne capability, this aircraft is placed between narrowbody aircraft, such as the 757, operated primarily by express carriers, and large freighters such as the 747-8F with a 140 tonne payload.

This makes it well suited to opening up new routes into the fast growing markets of the Middle East, China and India. It has the range capability to serve key markets in Europe, Asia and North America, whilst having the payload to reduce the risks of trade imbalances, which often imply lower payloads and yields on return legs. Boeing is already taking orders for its 777 freighter, based on the Boeing 777-200LR and in the fullness of time freight versions of Boeing 787 Dreamliner™ and Airbus A350 XWB Family will be developed.

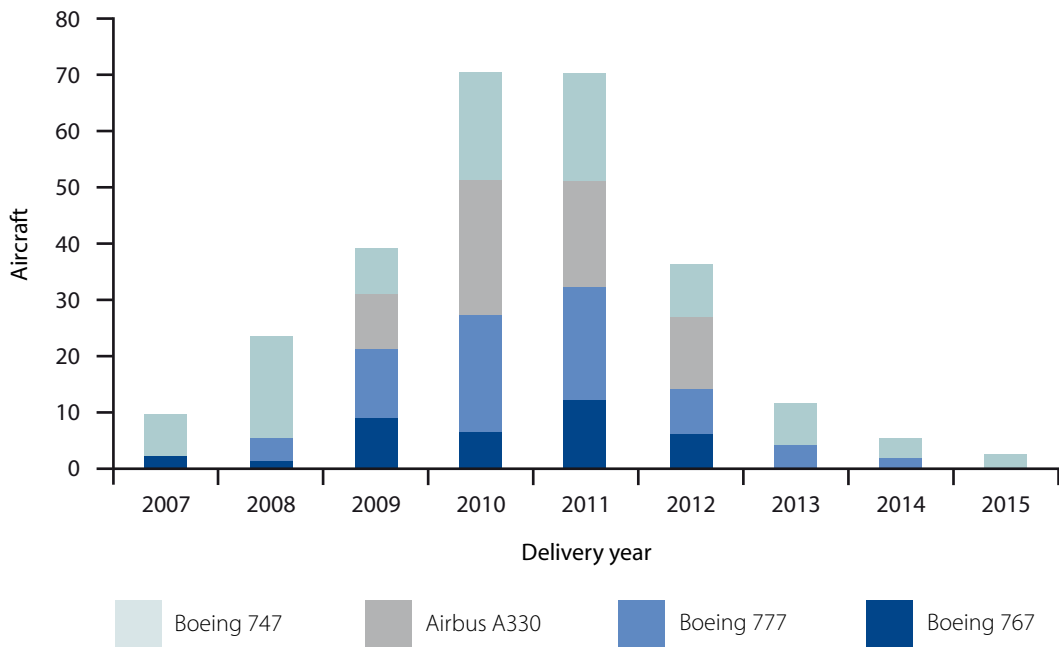
These developments will offer freight operators increased capability and flexibility. This will be increasingly important in long haul markets, with continued competition from sea freight operators attempting to offer enhanced products to win new customers from air cargo. The express market continues to plan capacity expansion. Since last year Fedex has announced its intention to acquire 10 Boeing 777F and up to 90 Boeing 757s to replace and expand upon its existing fleet. DHL has launched operations in China, and UPS has taken delivery of the first of 7 Boeing 747-400F in addition to



27 Boeing 767 freighters it expects in the next decade. The need for businesses and consumers to send packages faster seems to be a trend that is spreading across the globe, but home markets for these express carriers will need constant

monitoring. With fuel price rises, cost conscious shippers are re-evaluating their decision and looking at the possibilities trucking may offer.

**Freight orders by year of delivery**



# Business aircraft

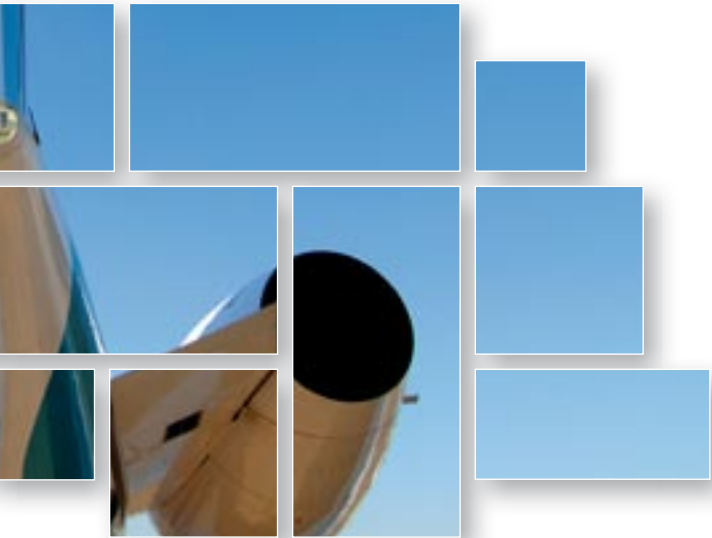
## Demand growing outside North America

**The demand for business aircraft has surged in recent years. Deliveries of business jets in the first half of 2007 have increased 15 per cent over the same time period in 2006.**

Primary drivers include corporate profits, diversity of available aircraft models, and a dramatic increase in sales to markets outside the US.

Deliveries for 2007 are expected to be roughly 1,000 aircraft. While the traditionally strong US market will continue to drive a majority of business aircraft sales, rest of the world markets such as Russia, South America, India, and China are forecast to have an impressive increase in business aircraft sales in the coming years.

Airframe manufacturers traditionally provide incremental improvements to their products rather than launch all-new platforms. These enhancements to existing aircraft have provided various range, cockpit, cabin, and other efficiency upgrades to successfully expand and update existing product lines.



This strategy will remain, however major business jet manufacturers are now planning clean sheet designs to fill product gaps or replace aging designs. These upgraded and all-new designs will lead to a strong demand for new and derivative engines offering next generation levels of environmental, cost, and reliability improvements. While all business aircraft market segments are forecast to grow, strong demand is expected for medium and large aircraft that offer long range, high speed, and superior levels of comfort. The availability of aircraft in diverse combinations of size, range, speed, and interior space will continue to stimulate sales as customers will have a choice of numerous aircraft that cover all price points from very light jets to airliner-based business jets.

The historical ratio of business aircraft deliveries to the US relative to the rest of the world has been three to one. In the near term this is forecast to reduce to 60 per cent to the US. The primary reasons for the difference lie in the economies of individual countries as well as air transportation infrastructure.

The GDP growth rates of emerging markets such as India and China are growing faster than western countries and strong profits from their indigenous corporations, an increasing number of ultra-wealthy individuals, and improved local aviation infrastructure will correlate to a rapid increase in orders for business aircraft in these and other growing economies.



## Traffic forecast

Average growth rate of 4.9 per cent per year

**Today North America forms the largest passenger market. However, driven by an annual growth rate of 6.6 per cent per year, Asia Pacific overtakes to become the most important travel market by 2012.**

CIS markets refers to traffic carried by airlines domiciled in Russia and other CIS countries. Traffic carried to / from these countries by airlines based outside the CIS is included in the relevant market flows. Europe Leisure Airlines includes traffic carried by airlines whose business is predominantly non-scheduled or inclusive tour. This includes a substantial amount of long-haul traffic, as well as Intra-Europe.

Domicile	2006 RPKs (bn)	2026 RPKs (bn)	Average annual growth rate
Europe (excl CIS)	1,218	2,755	4.2%
North America	1,391	2,768	3.5%
Asia Pacific	1,121	4,039	6.6%
Africa and Middle East	290	916	5.9%
Latin America	186	508	5.2%

<b>Market</b>	<b>2006 RPKs (bn)</b>	<b>2026 RPKs (bn)</b>	<b>Average annual growth rate</b>
Within North America	1,015	1,794	2.9%
Within Europe	418	819	3.4%
Europe Leisure Airlines	214	360	2.6%
Within Asia Pacific	546	1,698	5.8%
Within China	185	967	8.6%
Within India	31	183	9.4%
Within Africa and Middle East	98	292	5.6%
Within Latin America	108	306	5.4%
North America - Europe	393	829	3.8%
North America - Asia Pacific	267	864	6.0%
North America - Latin America	131	344	4.9%
Europe - Asia Pacific	316	1,070	6.3%
Europe Africa and Middle East	216	617	5.4%
Europe - Latin America	133	330	4.6%
Asia Pacific - Africa and Middle East	107	396	6.8%
CIS Markets	116	330	5.4%
Others	28	116	7.4%
<b>World Total</b>	<b>4,322</b>	<b>11,316</b>	<b>4.9%</b>

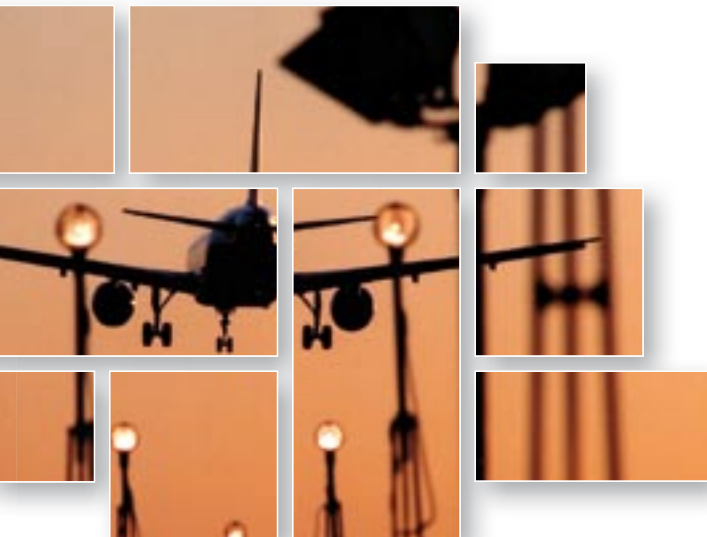
## Fleet development

Fleet grows at 3.3 per cent per year

**The in-service fleet of airliners is expected to roughly double over the next 20 years. The fleet does not increase as fast as traffic, due to improvements in aircraft utilisation and load factors, as well as a modest increase in average aircraft size.**

The fastest growing airline size categories are expected to be small and intermediate size twin-aisles (200-350 seats) and large regional aircraft. The former is driven by the faster than average growth in Asian and long-haul markets – the latter category is driven by airlines moving up from the smaller 30-50 seat sector. The 110-seat market is forecast to grow slowly, but this size band is very sensitive to factors such as airline scope agreements as well as manufacturer product families.

In the business jet market, there is much excitement about the emergence of the very light jets sector, although in value terms this is small. Strong fleet growth is expected in the larger aircraft market, continuing the recent trend, much of which is based on rapid expansion of intercontinental corporate travel requirements.



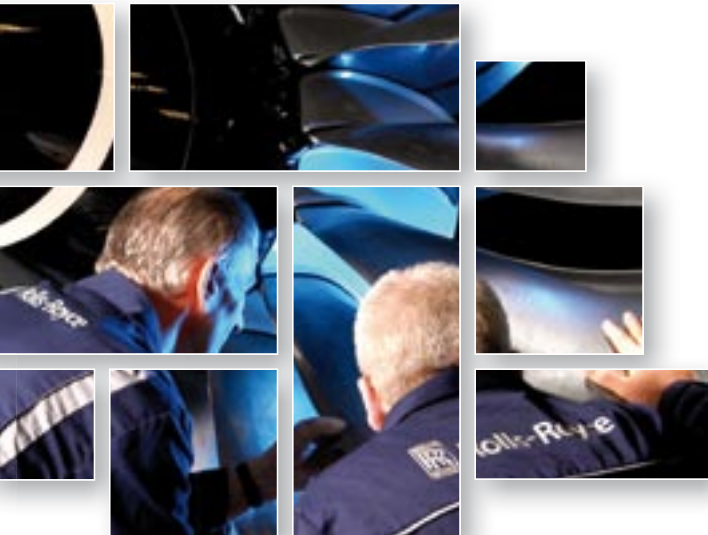
	<b>2006 fleet</b>	<b>Retirements</b>	<b>Deliveries</b>	<b>2026 fleet</b>
Very light jets	0	140	7,328	<b>7,188</b>
Small business jets	6,822	2,765	6,285	<b>10,342</b>
Medium business jets	5,817	1,752	10,483	<b>14,548</b>
Large business jets	1,610	615	6,292	<b>7,288</b>
<b>Business jet total</b>	<b>14,250</b>	<b>5,272</b>	<b>30,388</b>	<b>39,366</b>
30-50 seats	3,870	2,733	1,707	<b>2,844</b>
70-90 seats	1,286	499	4,851	<b>5,638</b>
<b>Regional aircraft total</b>	<b>5,156</b>	<b>3,232</b>	<b>6,558</b>	<b>8,482</b>
110 seats	1,777	1,276	1,761	<b>2,262</b>
130 to 180 seats	8,799	5,121	12,556	<b>17,234</b>
200 and 250 seats	1,357	984	2,829	<b>3,202</b>
300 and 350 seats	1,216	872	3,338	<b>3,682</b>
400+ seats	552	483	1,044	<b>1,113</b>
Freighters	1,656	1,190	787	<b>3,150</b>
<b>Mainline aircraft total</b>	<b>15,357</b>	<b>9,926</b>	<b>23,315</b>	<b>30,643</b>
<b>Grand total</b>	<b>34,763</b>	<b>18,430</b>	<b>60,261</b>	<b>78,491</b>

# Engine deliveries

High thrust, high value

**Over the last 20 years we have seen a steady move towards higher thrust engines.**

Airlines have demanded aircraft with better payload-range performance, more flexibility to take-off from short runways, and improved climb rates. There is no sign of the drive for performance declining. Therefore, Rolls-Royce continues to forecast that the sectors above 45,000lb take-off thrust will be the largest in terms of value.



**Engine delivery value (\$bn)**

<b>Category</b>	<b>2007-2016</b>	<b>2017-2026</b>	<b>Total</b>
Turboprops	4	3	<b>7</b>
<3,000lb	6	6	<b>12</b>
3,000 - 6,000lb	12	15	<b>27</b>
6,000 - 10,000lb	11	18	<b>29</b>
10,000 - 22,000lb	33	36	<b>69</b>
22,000 - 45,000lb	96	113	<b>209</b>
45,000 - 75,000lb	82	65	<b>147</b>
>75,000lb	67	135	<b>202</b>
<b>Total</b>	<b>310</b>	<b>391</b>	<b>701</b>

**Engine delivery units**

<b>Category</b>	<b>2007-2016</b>	<b>2017-2026</b>	<b>Total</b>
Turboprops	1,670	1,452	<b>3,122</b>
<3,000lb	9,986	9,484	<b>19,469</b>
3,000 - 6,000lb	9,619	12,572	<b>22,191</b>
6,000 - 10,000lb	5,849	9,344	<b>15,194</b>
10,000 - 22,000lb	9,537	10,507	<b>20,044</b>
22,000 - 45,000lb	14,731	17,207	<b>31,938</b>
45,000 - 75,000lb	5,396	4,070	<b>9,466</b>
>75,000lb	3,348	6,842	<b>10,190</b>
<b>Total</b>	<b>60,136</b>	<b>71,477</b>	<b>131,613</b>

## Acknowledgments and further information

**The forecast includes Russia, and includes commercial airliners in passenger, cargo and combination / quick change usage, plus business jets in VIP and corporate use. The regional aircraft forecast includes turboprops with more than 20 seats. Fuller analysis and reference material is available on the Rolls-Royce website.**

### **Data sources**

Fleet data: Ascend CASE database

Schedules data: BACK Aviation Link Airline Schedules

Traffic data: IATA, ICAO, AEA, ATA, AAPA, CAA, ALTA

Rolls-Royce analysis.

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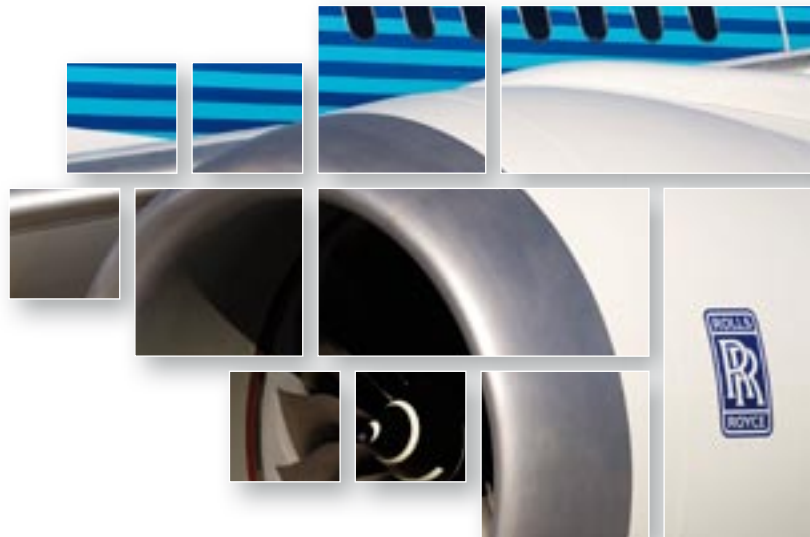


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