



# Annual Analyses of the EU Air Transport Market 2015

Final Report

February 2016  
European Commission



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# Executive Summary

## Foreword

The European Commission has concluded annual reports since 1998 as part of its function as an observatory of the European Air Transport Industry. The reports have highlighted developments on legislative and regulatory measures and covered analysis of capacity, traffic and financial performance of airlines and airports, as well as topics such as air traffic control, environment, consumer issues and aircraft manufacturing.

This 2015 report covers latest developments in the air transport industry during 2014 and the first half of 2015. It is structured in 9 chapters covering:

- Air Traffic Trends
- Airlines
- Airports
- Aircraft Manufacturing and MRO
- Air Traffic Management
- Market and Competition Issues
- Environment and Sustainable Development
- Aviation Safety and Security
- Consumer Issues

The 2015 report is also accompanied by the Statistical Annex. The Annex provides in table format the key data-sets analysed to support each of the topics.

This Executive Summary provides highlights of the main report.

The key highlights are:

- Global aviation demand continued to grow in 2014 for the fifth consecutive year since the financial crisis of 2008/09, reaching another record performance of 3.3 billion passengers in 2014, a +5.5% increase on 2013.
- Air traffic is projected to grow in the long-term, driven by global GDP growth. Annual Revenue Passenger Kilometres (RPKs) are forecast to grow from 5.9 trillion in 2014 to between 14.5 trillion (Airbus projection) and 15.4 trillion (Boeing projection) by 2034, with average growth rates of between 4.6% and 4.9% per annum. The fastest growth rates are anticipated in the developing Asian and Middle Eastern markets.
- Technology advances over the last five years have changed the face of aviation, with the introduction of more point-to-point flying using advanced aircraft such as the Airbus A350 and the Boeing 787 families of efficient and environmentally-friendly twin-engine aircraft.
- Airlines globally achieved record net profits of \$16.4 billion in 2014 (up 55% on 2013) and are expected to grow profitability further to \$29 billion in 2015, buoyed by falling oil prices and other cost control measures.
- The airline industry has seen further consolidation, particularly amongst major airlines in US market, while Low Cost Carriers continue to increase their market share. The rapid growth of the hub airports in the Gulf and Istanbul has also continued during the past year.
- Airport revenues grew by 5.5% in the most recent year reported (2013), and non-aeronautical revenues now make up 44% of total income. Global investment in airport infrastructure is estimated at over \$59 billion during 2015.

## Air Traffic Trends

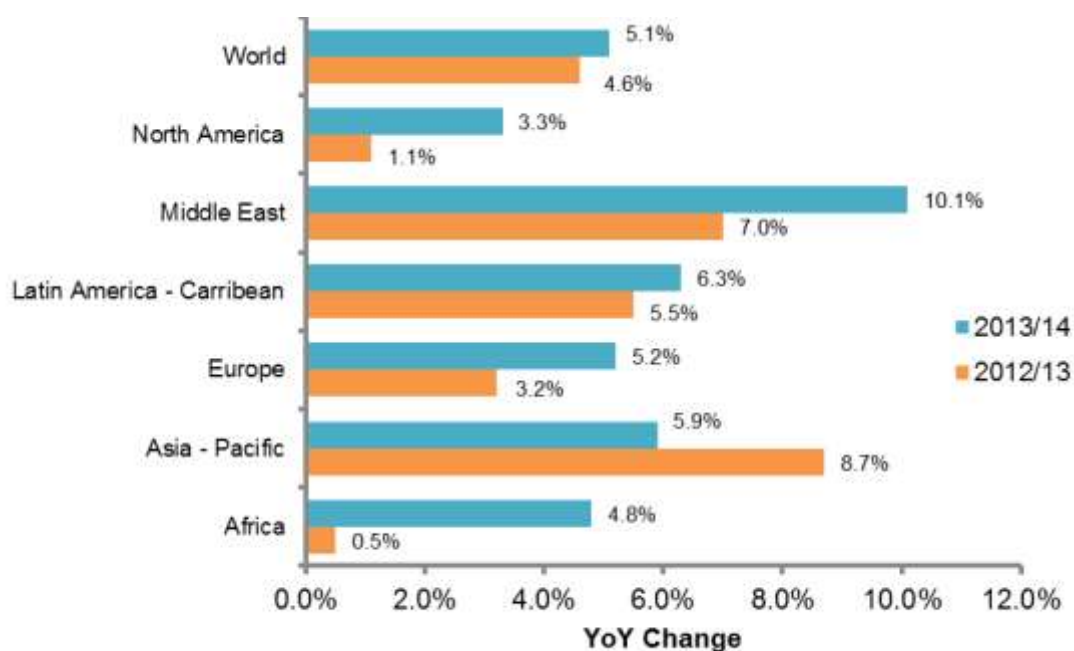
2014 was the fifth consecutive year of air travel demand growth across the world regions. The International Civil Aviation Organisation (ICAO) reported that airlines carried 3.3 billion passengers in 2014, a +5.5% increase on 2013.

Global passenger airports handled 6.6 billion passengers in 2014, a 5.1% increase on 2013. Meanwhile, more airplanes were in the sky as total movements grew by 1.0% to 83 million flights in 2014.

From a global aviation industry perspective, 2014 was a strong year in terms of traffic growth and improved industry performance, indicating the recovery from a prolonged recession for a number of advanced economies and confirming the sustained growth achieved by emerging economies around the world. Overall industry performance was greatly assisted by lower fuel prices witnessed during 2014. From a regional perspective passenger growth accelerated in all regions in 2014 except in Asia-Pacific where growth slowed from +8.7% in 2013 to +5.9% in 2014. The Middle East grew fastest at +10.1. European traffic grew at +5.2% in 2014, far outpacing economic growth in the region, while North America grew more slowly due to market maturity and airline consolidation in the domestic market.

The global airline industry grew at or above the long-term growth rate for three consecutive years based on sound fundamentals, while productivity continued to increase on historically high aircraft utilisation and passenger load factors. Specifically, load factors in 2014 improved slightly to 80%, showing that airlines are matching demand without oversupplying capacity. This performance, continues the trend of growth seen since the global recession of 2008-09, and reflects the resumption of global economic growth discussed in detail in the relevant section of this report.

### Passenger Growth Rates & Traffic Shares by Region – 2014 v 2013 and 2013 v 2012



Source: ACI World Airport Traffic Database (2015)

In terms of international passenger traffic, Dubai (DXB) overtook London Heathrow (LHR) to become the world's busiest airport. Istanbul remains one of the fastest-growing airports among the world's top 30 airports for passenger traffic. The top 30 airport cities handled more than one-third of global passenger traffic in 2014. According to ACI, London remains the world's largest airport system with 147 million passengers handled at six airports.

One of the themes developing over the last five years in air transport is the strengthening of hub airports around the world. This phenomenon is mostly due to the consolidation in the airline industry, as witnessed lately in the US domestic market. As airlines merge to form more powerful groups, they are able to consolidate their operations within their main airport hubs, and offer more services from those hubs. The second theme is the continued growth of Low Cost Carriers (LCCs) offering more direct services between both major city centres and secondary points, and directly between secondary points.

Between 2009 and 2014, direct passengers grew at a rate of +6.6% per annum, while connecting passengers grew at a rate of +3.0% pa. The global connecting share dropped from 14.4% in 2009 to 12.2% in 2014. This is due to both increased direct connectivity provided by LCCs and due to new direct long-haul services on thinner routes made possible by aircraft such as the Boeing 787 and Airbus A350.

Regarding European airports, four airports are within the top 30 in passengers carried: London Heathrow, Paris Charles de Gaulle, Frankfurt Main and Madrid Barajas airport. Similar to US airports, growth since 2005 has been low at European airports (with Madrid slightly negative overall, but with +5.3% growth in 2014 v 2013). This is a reflection of the lasting effects of the 2008/09 recession and relatively slow Euro Zone recovery, as well as the capacity constraints at Heathrow.

Europe's air travel market remained strong in 2014 despite significant economic uncertainties. Europe's GDP grew by 1.4% in 2014 and is forecast to grow by 1.8% annually through 2034. The key air passenger flows for 2014 are between EU and non-EU and they account for almost 40% of the traffic. The strong evolution of this traffic flow (+44% since 2008) can be mostly attributed to the beneficial impact on connectivity between the EU and non-EU Eastern European destinations (e.g., the Balkan states, Russia and Turkey) due to the expansion of low cost carrier services. North America to Europe captured almost 20% of the total traffic from/to EU, albeit not showing any significant passenger growth since 2008. Finally, passengers to North Africa have decreased since the start of the events of Arab Spring, while Near, Middle and Far East flows maintained the growth momentum built in the past six years.

The Association of European Airlines reports that member airlines carried 3% more passenger traffic in 2014 than in 2013. Overall, European airlines experienced strong growth in passenger traffic for 2014, with the likes of WizzAir, Norwegian, Turkish Airlines, Aeroflot and Ryanair achieving double digit growth rates. There were three European airlines that did not record growth in 2014: Air France, Alitalia and Thomson Airways. Airline operations in Europe continue to evolve with the launch of new ventures, routes, and business models.

### *Air Cargo*

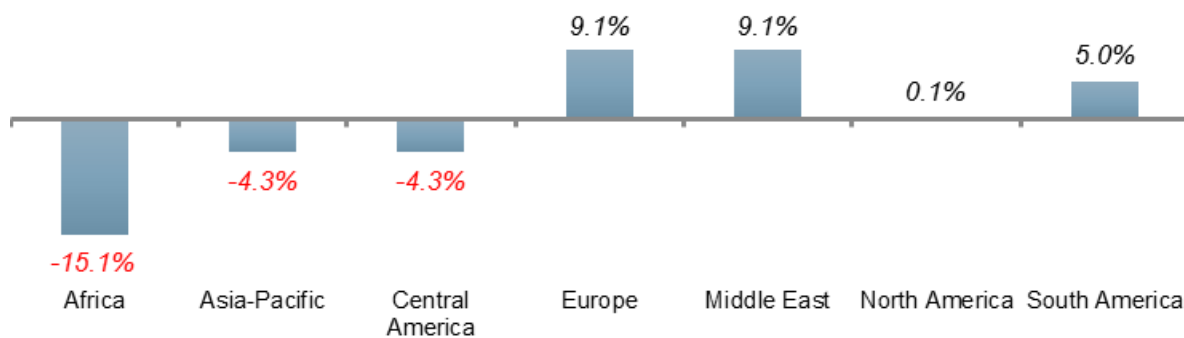
Referring to a report by World Development Indicators, 2014 showed that the air cargo market built on the recovery that began in the second quarter of 2013. Global cargo traffic volume growth in 2014 was close to the long-term average, while cargo operators improved their profitability as the oil prices fell. Capacity metrics also improved as utilisation of large freighters returned to recent highs.

Despite the recent weak performance of dedicated air cargo services, many airlines rely on air freight as an important part of their businesses due to the improved capabilities of passenger aircraft in providing belly hold cargo capacity.

### Business Aviation

The main indicators that measure the performance of Business Aviation are the business jet transaction prices and sales activity, as well as the hours or segments flown by business jets. While the global average growth in flight hours was +1.2% in 2014, regional performance was uneven, with Europe and Middle East accounting for most of the growth.

#### JSSI Business Aviation Index of Business Aviation Flight Hours by region

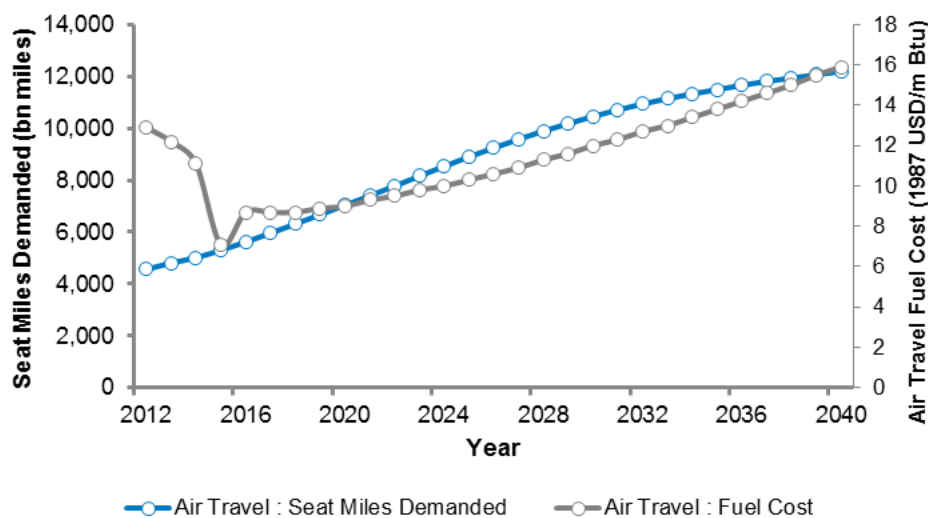


Source: JSSI Index Outlook 2014

## Air Transport Forecasts

Forecasts of air transport are affected by a number of different factors, all of which can play a key role in projecting annual passenger volumes. Historically, Gross Domestic Product (GDP) and population demographics have been the main drivers for aviation growth. However, in more recent times, due to the volatility of the price of oil, jet fuel prices have become a significant driver.

#### Demanded Seat Miles vs. Air Travel Fuel Cost Forecast



Source: U.S. Energy Information Administration

Boeing and Airbus have both produced a broad long term global market forecast for the period 2015 to 2034 using 2014 as the base year. Their growth rates are comparable given the similar methodologies to form the forecast.

#### Boeing & Airbus Forecast Comparison

	Boeing	Airbus
RPK (trillion) 2014	5.9	5.9
RPK (trillion) 2034	15.4	14.5
Total Growth 2014 – 2034	161%	146%
<b>Average Annual Growth Rate</b>	<b>4.9%</b>	<b>4.6%</b>

Source: Boeing, Airbus

Eurocontrol's latest forecast of European aircraft movements predicts growth rates of 2.5% per annum through to 2021, when a total of 11.4 million aircraft are expected to operating in European airspace, up 19% from 2014. Turkey is expected to see the fastest growth rates (+6% pa) and the most additional flights (+2330 flights per day by 2021), and is the biggest contributor to air travel growth in Europe.

## Airlines

The global economy showed moderate growth during 2014 and the first half of 2015. Advanced economies picked up in growth while emerging and developing markets slowed down relatively to previous years. April 2015 IMF projections show a 3.3% global growth in 2015, marginally lower than in 2014. Mid-2015 events in Europe (e.g., the Greek economic crisis) and China (stock market uncertainty) created uncertainty in the economic outlook.

In general, the economic drivers have been favourable to the global airline industry since mid-2014. While passenger demand grew during the period, falling fuel costs allowed airlines to reduce costs and made 2014 one the most profitable years for the airline industry in recent times. The cost of jet fuel continues to remain a key source of cost volatility for airlines. The recent decline in oil prices was the most significant event impacting on the financial performance of the airline industry during 2014. The price dropped from over \$110 per barrel in June 2014 to below \$50 by the end of 2014. Fuel prices are highly volatile and unpredictable, but by mid-2015 jet fuel prices were still around \$60 per barrel, well below average of around \$100 per barrel seen in previous years.

Labour is the second-largest operating expense for airlines after fuel and the availability of key labour skills is seen by airline CEOs as a significant issue for sustained business growth. Airlines have generally been effective in holding down labour costs and improving productivity in 2014, aided by the underlying growth in traffic. This trend is continuing into 2015.

Globally, airline operational efficiencies are increasing. Traffic, in terms of Revenue Passenger Kilometres (RPKs), are growing faster than capacity, in terms of Available Seat Kilometres (ASKs), leading to an improvement in load factors to 79.8% in 2014, and expected to be over 80% in 2015. Breakeven load factors are decreasing to 64.1% in 2014 and 62.7% in 2015, with consequent improvements in operating margins. Industry wide net profits of \$16.4 billion were \$5.8 billion higher (55%) than in 2013, and net profit per departing passenger increased 44% to \$4.98. Revenues increased by 2.2% while expenses, driven by the reduction in oil price, increased by only 1%. Operating profit was up 34% to \$33.9 billion, generating an operation margin of 4.6%.

The outlook for 2015 is positive. Although revenues are expected to decrease by 0.7% to \$727 billion, lower fuel costs are expected to improve net profits by 78%, to a record \$29.9 billion. Ancillary

revenues (revenues generated by activities and services other than air fares) generated a higher income to airlines during 2014 as well as an increasing share of the total revenues. Ancillaries represented 6.4% of total revenues, with an estimated value of \$49.9 billion. With regards to cargo revenues, air traffic freight in 2014 performed well due to an upturn in the economic cycle and growth in demand for airfreight. Indeed, 2014 saw the strongest growth in airfreight volumes (+5.8%) since the 2010 recovery in world trade. It should be noted that air cargo yields saw a decline in 2014 of 2.0%, with 2015 initial projections identifying a 7.0% drop over 2014 levels.

The global industry has been driven by consolidation in North America, and hybridisation of business models between LCCs moving into business markets and legacy carriers offering more disaggregated fare structures.

Driven by this strategy (as well as the economic drivers discussed above) the three big American carrier groups, American Airlines Group, Delta Air Lines and United Continental Holdings were the top 3 airlines in terms of operating revenues during 2014. The European airline groupings Lufthansa Group Air and Air France-KLM were ranked in fourth and fifth places respectively. The IAG Group was ranked 8<sup>th</sup> after FedEx and Emirates, in 6<sup>th</sup> and 7<sup>th</sup> places respectively.

In relation to operating profit, four North American airlines (American Airlines Group, United Continental Holdings, Southwest Airlines and Delta Air Lines) were in the top 5 ranking of most profitable carriers during 2014. China Southern Airlines improved to second place as the airline with most profitable operations. For further details, the World Airline Financial Results 2014 ranking published by Air Transport World magazine is presented in the Statistical Annexes of this report.

The North America region achieved profits equivalent to 68% of the worldwide airline industry. However, the structure of the airline industry in the majority of other regions remains fragmented.

European airlines experienced an increase in profitability in 2014, driven by the lower oil prices and other cost controls, which allowed a decrease of the breakeven load factor. IATA's expects a continuation of this trend in 2015 with the net post-tax profit per passenger in Europe projected to increase from \$3.82 to \$6.30. Margins remain slim, however, at only 1.6% in 2014. All big three European groups (IAG, Air France-KLM and Lufthansa group) experienced negative growth in operating revenue between 2013 and 2014. The carriers are still undergoing a process cost reduction and maximising use of their low-cost vehicles, and with the recent acquisition of Aer Lingus by IAG, 2015 may see a marked improvement for European carriers.

LCCs continued to increase market share in Europe in 2014. The share of intra-European seat capacity provided by LCCs grew to over 40% for the first time in 2014. A sign of the strength of these airlines is that for 2014 five out of the top six highest operating margins in the European airline industry were from LCCs, led by Ryanair. More information for all regions of the world is available in the relevant chapter.

## Airport

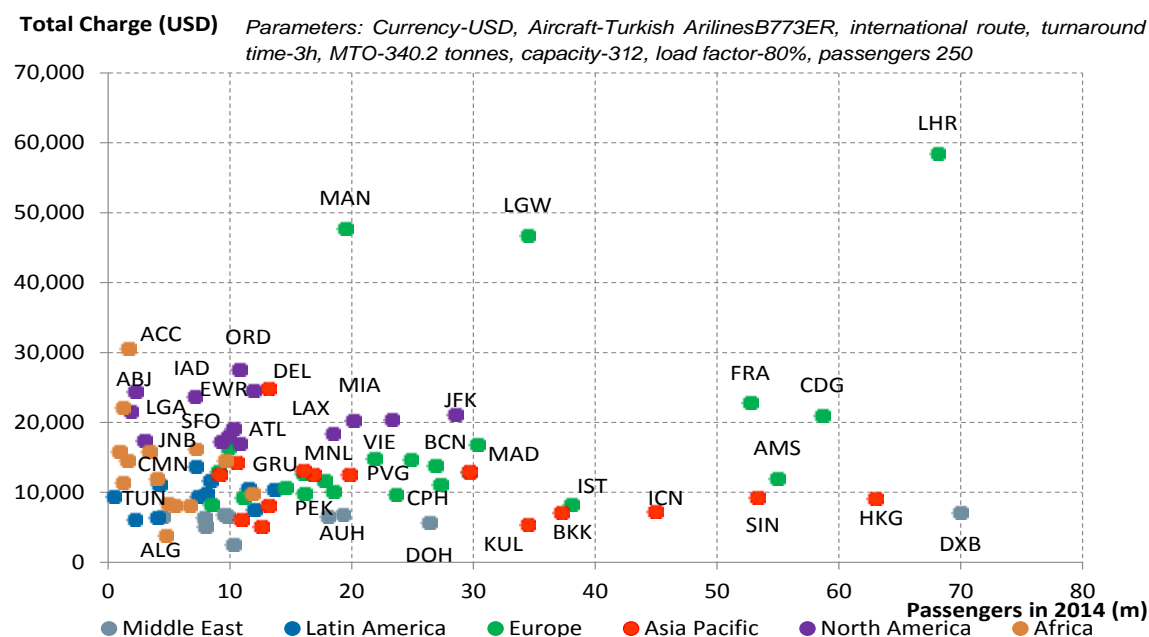
Airports recorded strong financial results in the more recent period reported (2013), showing increased profitability. Expectations are for 2014 financial performance to continue the same trend, as traffic growth was higher than historic averages. While there are differences in the financial performance of airports by region, a trend towards reduced dependency on aeronautical revenue is apparent. Non aeronautical revenue accounts for almost 50% of total airport revenue while, for airports in each region, different sources of non-aeronautical revenue have increased in importance. Aeronautical revenue deriving from the charges set at each airport can also vary significantly, not only

by region but also by airport size. With the exception of Africa where over 70% of total airport revenue derives from aeronautical revenue, all the other regions are close to the global average. This is a result of the change in perception for airports being not merely a public-sector infrastructure provider, but rather commercial entities that can provide value via their services to their end users and their operators alike.

## Airport Revenues

Airport charges worldwide differ based on the number of passengers served as well as the size of aircraft serving the airport. Some airports choose to set rates and charges based on a goal to entice certain aircraft to operate over others. Irrespective of region of the world, or aircraft size, airports serving up to 30 million international passengers per annum, the charges are relatively consistent. As a general rule, airports in Europe which are congested and have significant demand charge higher rates than airports in the Middle East who are charging relatively low rates to promote growth. Many of these airports are newer facilities, or in growing markets, where their goal is to receive the highest satisfaction survey results, as well as increase their passenger volumes. The figure in the following page displays airport charges for wide body aircraft at selected airports by world region.

### Airport Charges [wide body aircraft only] at selected airports by region



Source: [Airportcharges.com](http://Airportcharges.com)

Non-Aeronautical revenue continues to increase in significance as airports look for alternate revenue sources to those provided through landing fees and terminal charges. The key sources of airport non-aeronautical revenue include rents to various concessionaires, car parking, retail, advertising and car rental facilities. For the last financial year that data is available, airports around the world have managed to improve their non-aeronautical revenue streams by 4.9% year on year for 2013

The main airport costs comprise of personnel costs (such as staff salaries), operating expenses (such as contracted services or utility bills) and capital costs (such as depreciation/amortisation of airport infrastructure assets). As displayed in the table below, overall total airport costs for 2013 grew by 1.9%, compared to 5.5% growth in revenues in the same period. This however is not the case across

all the regions, with Latin American & Caribbean airport costs growing faster than revenues, mainly due to increased capital costs.

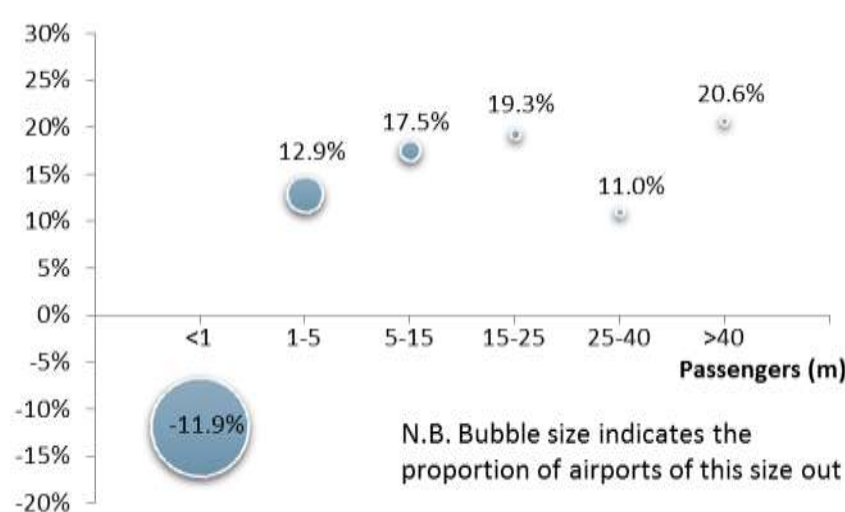
#### Airport Costs by World Regions

Region	Total Costs (Operating + Capital)	2013/12 % Change
Africa	2,100	-3.9%
Asia-Pacific	25,800	6.2%
Europe	42,100	-2.5%
Latin America & Caribbean	5,100	11.4%
Middle East	7,400	6.4%
North America	22,700	4.2%
<b>World</b>	<b>106,500</b>	<b>1.9%</b>

Source: ACI Airport Economics Survey 2014

In accounting terms, the net profit of an airport is defined as the difference between its total revenues and its total costs, often presented on a per passenger basis for comparison purposes. Total revenues include both aero and non-aeronautical revenues, while total costs include operating expenses, capital costs and taxes.

#### Net Profit Margin by airport size



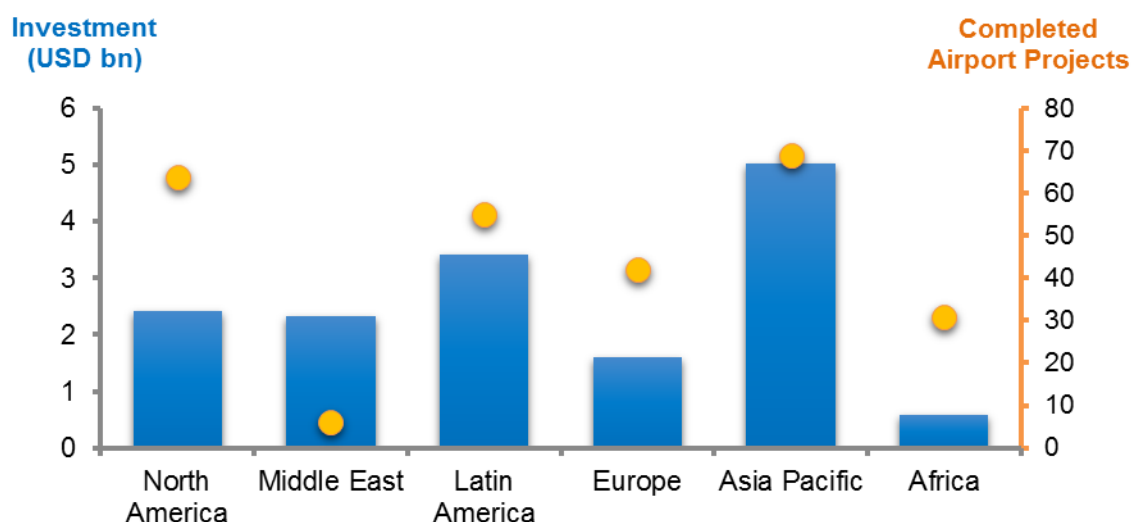
Source: Adapted from 2014 ACI Economics Report

## Airport Infrastructure Investment

The growing demand for air travel, both current and projected, drives investment in airport infrastructure across the globe. There were 267 airport projects completed worldwide in 12 month period to July 2015, with investments being highest in the Asia Pacific region. There are currently 346 new airport projects under construction, as countries plan to accommodate growing passenger demand and also offer increased air connectivity in order to gain the economic benefits.



## Airport with Completed Infrastructure Investment Projects (12 months ending July 2015)



Source: CAPA Centre for Aviation

However, the drop of oil price might prove to be harmful for the future of the many large airport investments by oil producing countries. This challenge may be another argument supporting the already growing trend of airport privatisation and in particular airport PPP projects. This trend has been evident in Europe, Latin America and Asia Pacific, where many airport concessions have been confirmed or are in progress; Middle East, North America and Africa on the other hand, do not see much privatisation activity for different reasons, although all three regions offer their own airport privatisation opportunities in the near term.

Despite the overall profitability of the airport sector, it is clear that only a small minority of large airports are actually profitable and able to offset the losses that the majority of the smallest airports incur. The capital extensive structure of airport costs requires passenger numbers of over one million per annum in order to allow for the airport owner to operate profitably.

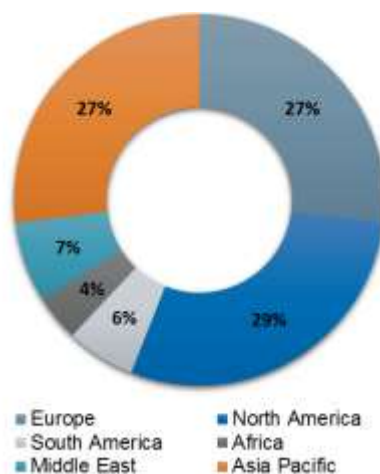
## Aircraft Manufacturing and MRO

The global civil MRO spent in 2014 was USD \$62.1 billion, up 2.3% compared to the USD \$60.7 billion spent in 2013. The strongest driver of this value is the Engine market, accounting for 40% of total market. With the continuous growth of aircraft deliveries and the possibility of deferring older aircraft retirements, the medium term prospects for this activity are also positive.

Thanks to improvements in aircraft technology, airlines around the world have been steadily retiring aircraft as they receive new and more efficient airliners. However, as airlines waited to receive new aircraft types – such as Airbus A320neo and A350, Boeing 737MAX and 787 - fuel prices started declining. The situation is reflected in the number of aircraft retired during 2014, which fell from over 700 aircraft in 2013 to just over 500 in 2014.

Forecasters still predict the Asia-Pacific region of the world to require more new planes in the future than other regions, resulting in it becoming the largest global region for the MRO activity in the coming years. The trend is reflected in the figure below.

## Global MRO Market Share 2014



Source: CAVOK

## Aerospace Industry Mergers and Acquisitions

Revenues for the Top 20 aerospace companies grew by +2.7% during 2014, but within this there was strong +7.7% growth in civil aerospace offsetting a -1.3% decline in the defence market in the nine months ending in September 2014 .

The global commercial aerospace sector is expected to sustain its revenues and earnings growth in 2015, while continued declines are expected in the defence sector. The decrease has been partially driven by U.S. defence budget cuts as a result of the cessation of a prolonged period of armed conflict in Iraq and Afghanistan. Also the number of megadeals (transactions above \$1 billion or greater) doubled from 2013. As an example, 2014 saw British defence specialist Cobham's acquiring its US competitor Aeroflex for \$143 billion. As a matter of fact, the M&A activity in the sector showed a supply chain consolidation trend that seems to be gaining momentum. This consolidation has allowed profits to be maintained or improved despite falling revenues.

Air transport is a major global employer. The Air Transport Action Group (ATAG) reports that the air transport industry sustains more than 58 million jobs globally. Direct aviation employment is 8.7 million, with over 49 million other jobs supported by aviation in the tourism and other related sectors.

The air transport industry impact (including direct, indirect, induced and catalytic) is estimated of over \$2.4 trillion, equivalent to 3.4% of world Gross Domestic Product (GDP).

Between 2014 and 2015 a small but significant change in the distribution of airliners in the major world aviation regions occurred.

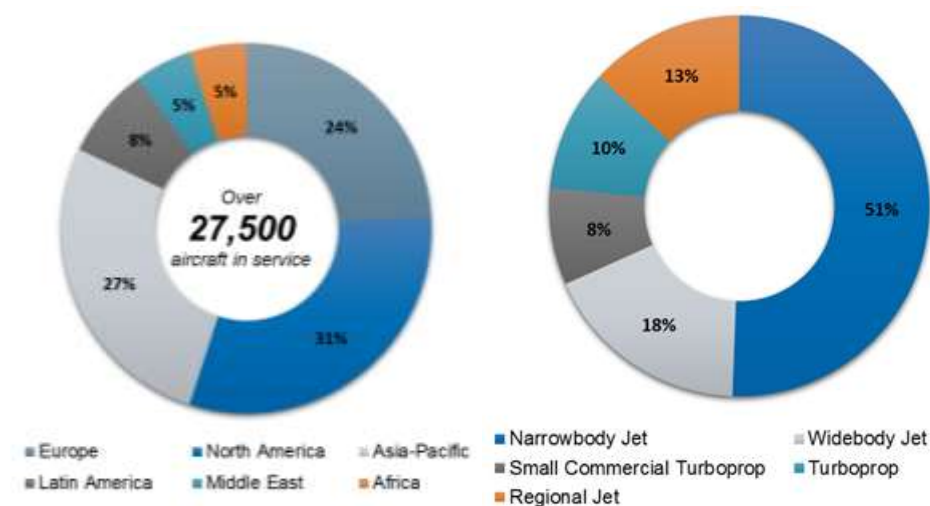
Asia emerged as the second biggest major aviation region, as its market share accounted for 27% of total number of commercial units in service around the world. This represented a 2% point increase compared to 2014.

Worldwide, narrow-bodies continue to be the most popular aircraft. This aircraft segment accounted for 51% of total aircraft in operation in August 2015. These units are more popular in regions such as Europe or Asia-Pacific, where they represented 57% and 58% of total units in service in each region, respectively. In 2014, the number of current-generation A320s and B737s in service rose,

respectively by 8% and 9%. For 2015, there were more than 6,000 Airbus A320s family jets in service and more than 5,100 Boeing's B737s in operation.

Widebodies represent 18% of the aircrafts in service around the world, but represent 49% of the fleets of Middle-East airlines.

Airliners in service by world region (Jul 2015) vs Airliners in service by segment (Aug 2015)



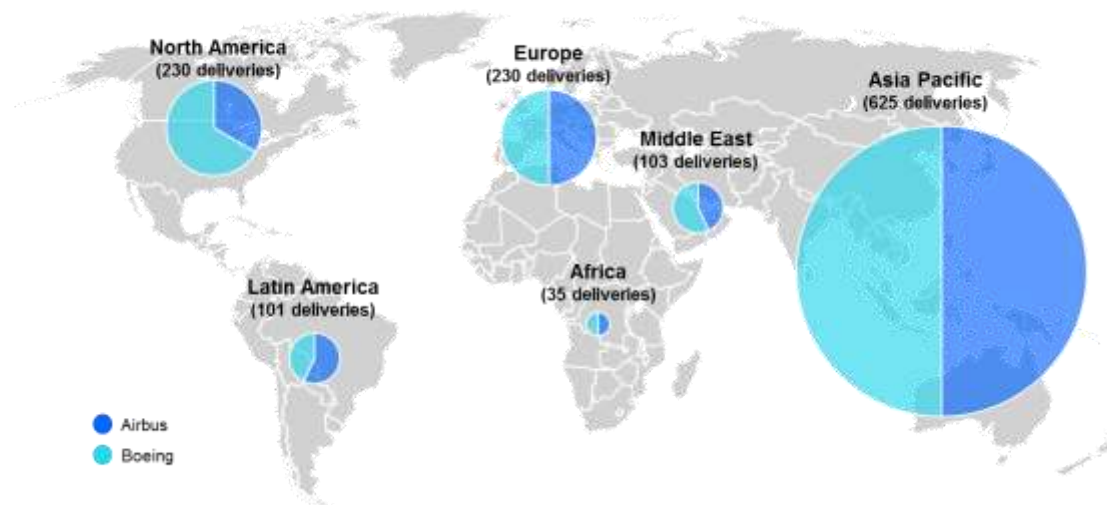
Source: World Airline Census 2015, FlightGlobal Source: Mott MacDonald analysis of CAPA

## Manufacturers

In 2014, Boeing delivered over \$55 billion worth of airliners, some \$14 billion more than Airbus. Significant leads in Asia-Pacific drove the revenues. In all markets, besides Latin America, the American manufacturer managed to generate more revenue than its European rival. In this region, Airbus holds the advantage thanks largely to its strength in the narrow-body sector.

In terms of unit deliveries, the market share between Airbus and Boeing was fairly even in all other markets with exception of North America. Here Boeing delivered almost twice as many aircraft as Airbus. The successful launch of the new wide-body Boeing 777X undoubtedly gave Boeing the boost it needed to overtake Airbus in the order books. Airbus, on the other hand, was forced to endure a large order cancellation from UAE-based Emirates in 2013 following the airline's decision to review its fleet plans.

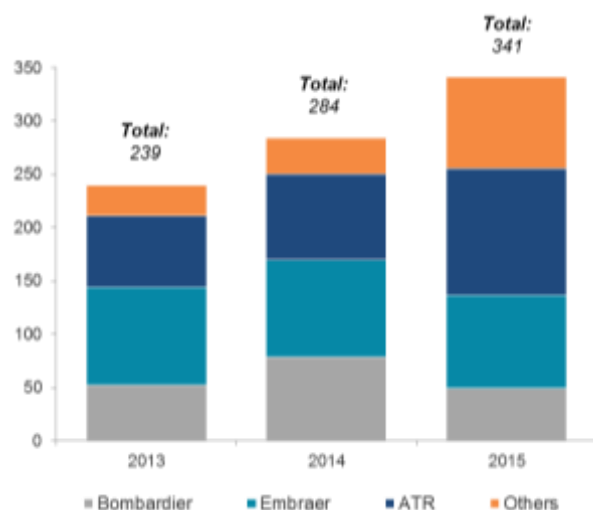
### Aircraft deliveries (Airbus/Boeing) in 2014 and 2015 by major world regions



Source: Mott MacDonald analysis of Aircraft & Engines 2015, Airline Business

For the Regional and Turboprop market, 2014 and 2015 were positive years in terms of deliveries. The number of aircraft delivered increased by 20% in 2015 (341 aircraft delivered in 2015, up from 284 in 2014).

### Regional jets delivered 2013- 2015



Source: Mott MacDonald analysis of CAPA

Detailed regional analysis of market trends, projections, orders and requirements can be found in the relevant chapter. All the manufacturers project the number of airliners likely to be required by region.

## Air Traffic Management

Air Navigation Service (ANS) performance targets are set under the Single European Sky Performance which is organised in Reference Periods. The first Reference Period (RP1) runs for three years from 2012 to 2014, while RP2 will run for 5 years from 2015 to 2019. 2012 was the first year that all SES States/Air Navigation Service Providers (ANSPs) moved away from the full recovery charging mechanism and adopted the “determined costs” method with specific risk-sharing arrangements aimed at incentivising ANSPs’ economic performance. However, the EU-wide actual real en-route unit cost per service unit in 2012 was €58.47, 1.2% higher than the forecast adopted in the National Performance Plans (NPPs).

In terms of safety, 2014 will be remembered for two tragic incidents which will have long term implications for the management of air traffic. The loss of Malaysian Airlines MH370 in March and the subsequent and continuing search has led to a number of initiatives by both ICAO and IATA related to flight surveillance and tracking. The shooting down of Malaysian Airlines MH17 over Ukraine in July 2014 has similarly been followed by reviews of flight planning processes over conflict zones.

In Europe, despite the achievements of SESAR (the technical pillar of the SES programme) during the definition phase and with the launch of the deployment phase in December 2014, the lack of real improvement in performance, cost reduction and, above all, the continued fragmentation of the European airspace remain key issues. These issues, and the lack of progress on SES 2+ legislation, were highlighted at a special high level conference for EU transport ministers on SES held in Rome in November 2014 to coincide with the new European Parliament and Commission.

In the US, the Federal Aviation Administration (FAA) released a report in October 2014 commissioned from the MITRE organisation on the current status of the NEXTGEN programme. This report highlighted the challenges and issues relating to the programme of updates and deployment of new technologies across the US airspace system.

Despite differences between Europe and the US in their respective approaches to the modernisation of ATM systems, with Europe perhaps having aspired to a large scale revolution and the US adopting a more evolutionary, incremental approach, there now appears to be a slow convergence on the detailed harmonisation and interoperability of future systems and the overall rate of progress towards trajectory based operations and satellite based surveillance.

Meanwhile, the development of new concepts and technology, particularly related to ADS-B and satellite based surveillance, offer the means to improve the safety and efficiency of the management of air traffic across many other less developed regions of the world. The next decade, therefore, has the prospect of the delivering on the vision of a safer and more unified, seamless ATM system across the globe. The overall level of aviation safety in Europe remains high. There were no fatal Air Navigation Services (ANS) related accidents in the period 2011-2014 and only one accident with an ANS contribution (Meteorology (MET) related) in 2013. ANS related incidents decreased to the lowest level on record in 2014. Separation minimum infringements and runway incursions remain the largest category of serious ANS incidents.

## Market and Competition Issues

### Mergers – Acquisitions and State Aid Cases

In terms of regulatory and case-law development in terms of competition in the EU, the USA and third world countries, the following are the developments that took place in 2014 and 2015.

On 8 August 2014, Alitalia CAI and Etihad Airways announced a transaction implementation agreement under which Etihad will invest €560 million in Alitalia for a 49% stake. The transaction consists of the creation of a new joint venture, New Alitalia, which will receive Alitalia CAI's aviation business as a going concern. On 14 November 2014, the Commission approved the deal

On 14 July 2015, the European Commission approved the acquisition of Aer Lingus by International Consolidated Airlines Group (IAG).

Recognizing that many regional airports are receiving at this time operating aid, the new Guidelines contain an amnesty for operating aid granted before their entry into force, and organise a ten-year transitional period to give airports enough time to adjust their business model, in order to ensure a smooth transition to a fully competitive market.

After the transitional period running to March 2014, operating aid to an airport will no longer be considered compatible (except aid for Services of General Economic Interests – SGEI).

Due to the precarious financial situation of many flag carriers, particularly in Central, Eastern and South-Eastern Europe (CESE), several cases of approval of State aids were filed in 2013. The underlying reason for this increase in State aid investigations against airlines is the difficulty for carriers in the region to develop a sustainable business models due to limited investment possibilities, strong competitors, divergent interests of the airlines and their governments. In the relevant chapter an overview of the important investigation cases of Malév, CSA, LOT Polish, and airBaltic, Cyprus Airways, Estonian Air and SAS is provided. Many of these cases were concluded in 2014 and 2015, with the detailed summaries in the relevant chapter.

The new Guidelines for State aid to airports and airlines encourage Member States to set up airports investment and operating schemes and start-up schemes. In order to reduce the administrative work for both Member States and the Commission, the new Guidelines suggest that Member States notify these aid schemes, rather than implementing individual decisions based on these schemes.

On the basis of the new Guidelines, the Commission analysed the financial relationships between regional airports and the airlines in recent decisions, in order to verify if they received indirect benefits that would constitute illegal State aid.

This is how in the cases of Aéroports de Pau, Nîmes and Angoulême, the Commission concluded that Ryanair, and, in the case of Pau, Transavia, had received aid incompatible with EU rules.

On 23 January 2012, the Commission opened antitrust proceedings in relation to the establishment of a profit/loss-sharing joint venture between Air France, KLM, Alitalia and Delta, which covers all passenger air transport services operated by the parties on routes between Europe and North America. On the basis of these commitments described in detail in the relevant chapter, the Commission approved the joint venture on 15 May 2015.

## Partnership for Open and Fair Skies Agreement

On 28 January 2015, the three U.S. airlines (American Airlines, Delta Air Lines, and United Airlines) and labour organizations announced the launch of a new coalition, the *Partnership for Open & Fair Skies*, seeking to ensure a level playing field to international air travel. The Partnership presented a white paper to the U.S. government, which details how alleged government subsidies to Qatar Airways, Etihad Airways and Emirates Airline distort the competitive market in direct violation of U.S. Open Skies policy. These claims have been refuted by the Gulf carriers involved, who deny subsidy.

Other air service agreements concluded by the middle east, Qatar, United Arab Emirates and Japan are detailed in the relevant chapter as they relate to bilateral agreements and changes to competition.

## Negotiation of an Open Sky Agreement with Asean

In a Joint Declaration adopted on 12 February 2014, at the end of an EU-ASEAN Aviation Summit, the European Commission and the Association of Southeast Asian Nations (ASEAN) proposed to take aviation cooperation to a new level by negotiating a comprehensive air transport agreement between the EU and ASEAN.

At the meeting's conclusion, Vice-President of the European Commission (EC) and Commissioner for Transport Siim Kallas announced that he would propose to the European Commission to seek authorisation from the Council of the European Union to start negotiations

An EU-ASEAN air transport agreement with unlimited capacity for both regions might be able to recover or reduce the loss of traffic diverted towards the Gulf States and Turkey.

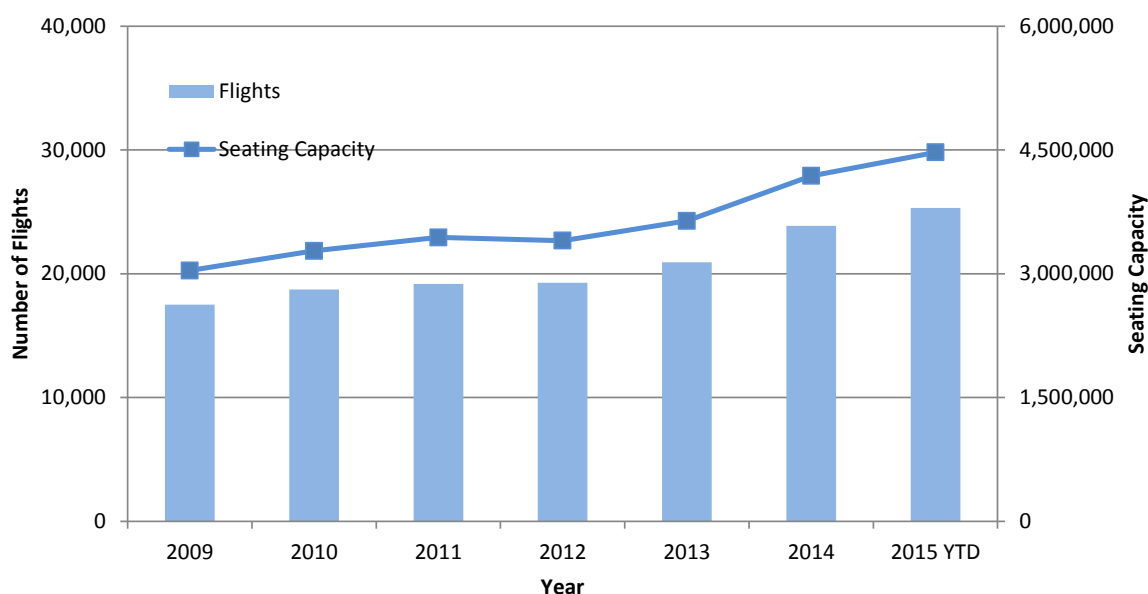
## Impact of Growth on Air Services

Following the European Union and Israel signed a Euro-Mediterranean Aviation Agreement on 10 June 2013; the EU-Israel air transport market will be opened gradually so that by 2018, the market will be fully open with no restrictions on the number of flights.

As can be seen in the figure below, the impact of the agreement is already taking shape, with more carriers offering service to the Israeli market in 2015 compared with the last five years.

The Compound Annual Growth Rate (CAGR) from 2012 to 2015 was an increase of 9.54% for seating capacity and 9.50% for departures.

## EU-Israel scheduled flights and seating capacity 2009-2015



Source: Mott MacDonald, Flight International based on Ascend/Flight Global

## EU Competition Issues

On 20 February 2014, the Commission adopted the new Guidelines for State aid to airports and airlines. These Guidelines, which entered into force on the 4th of April 2014, replace:

- The Community Guidelines on financing airports and start-up aid to airlines departing from regional airports ;
- And the Communication on the application of Articles 92 and 93 of the EC Treaty and Article 61 of the EEA Agreement to State aids in the aviation sector.

These new Guidelines take into account the changing market, both for airports who, although still for the most part in public hands, are faced with an ever more competitive environment, and for airlines whose businesses have been profoundly disrupted over the past ten years by the widespread introduction of the Low Cost model to the market.

## Environment

### Aircraft Noise

Aircraft noise remains the biggest issue affecting people living around airports. The need for airports to be good neighbours is being used as leverage by regulators where airport expansion is an ambition. Although technological and operational improvements continue, the rates of growth in air traffic present ongoing challenges to maintaining environmental performance and safety.

On the 16<sup>th</sup> April 2014, the European Parliament formally adopted new rules on procedures for imposing noise restrictions around airports in the EU. Regulation 598/2014 effectively implements the ICAO principles known as the 'Balanced Approach' to managing noise. The 'balanced approach' concept of aircraft noise management comprises four main elements in assessing options to manage noise:



- reduction of aircraft noise at source;
- land-use planning and management measures;
- noise abatement operational procedures; and,
- operating restrictions.

In December 2014, the UK Government department with responsibility for noise management published the results of the National Noise Attitude Survey 2012. The study was an update to a survey carried out in 2000 and found that there had been a 'strongly statistically significant increase' in the proportion of respondents who were 'bothered, annoyed or disturbed to some extent' by the most common types of noise, which includes aircraft, airport and airfield noise.

## Emissions Trading - Aviation

Emissions from aviation generally fall into two categories, Climate Change and Air Quality. Climate change is caused by CO<sub>2</sub> and other greenhouse gas emissions, and has varied impacts globally. Air quality deterioration is caused by a variety of emissions, in the case of aviation, primarily NO<sub>x</sub> and particulate matter. These emissions are produced by aircraft, airport facilities and ground transportation.

The efficiency and thus CO<sub>2</sub> emissions of aircraft is an area where great improvements have been made. Over time, older less efficient aircraft retire, and new, more efficient aircraft enter service, driving the efficiency of the fleet upwards. During 2014 there have been a number of developments in this area; four examples of these are as follows:

- Airbus delivered its first A350 XWB to Qatar airlines on the 23 of December 2014. This new design delivers an improvement in efficiency of approximately 25% over similar sized aircraft.
- Airbus's E-Fan made its first public flight in April. The aircraft is a demonstration electric aircraft, with the potential to run CO<sub>2</sub> free. The program has the long term goal of producing a hybrid regional airline.
- Solar impulse 2 took its maiden flight. This aircraft is only powered by solar power and is expected to circumnavigate the world in 2015.
- Boeing delivered the first 787-9 to ANA on the 29<sup>th</sup> of July 2014. The 787-9 has a longer range and can carry more passengers than the 787-8 which entered service in 2011; both aircraft are 20% more efficient than aircraft of a similar size.

During 2014 air quality concerns have been raised in relation to airport expansion in the South East of the UK. There are two airports looking for expansion, London Heathrow and London Gatwick. Heathrow functions as the UK's only hub airport. It is to the West of London near two major roads, and a large number of residential receptors. Gatwick is located to the south, further from London, with a quieter nearby road network and fewer residential receptors. The air quality around Heathrow is worse than the air quality around Gatwick. As part of the debate around expansion, air quality has been used to promote London Gatwick.

## Fuel – Use of Alternative Sources

Aviation is predicted to increase in the future, and currently there are no technologies that could replace the jet engine for long-haul journeys. As stated by the ICAO, during 2014 the largest development in alternative aviation fuels has been the approval, by ASTM, of a process called synthetic Iso-paraffin from Fermented Hydroprocessed Sugar (SIP), which was formerly known as Direct-Sugar-to-Hydrocarbon. During 2014 there have also been a number of multi stakeholder

initiatives. These include a group targeting alternative jet fuel for flights to the Tokyo Olympic Games in 2020, an initiative setting up supply chains in the UAE, and an initiative at Oslo airport supplying biofuel. Even with no routine production, there have been over 200 flights using alternative jet fuel during 2014. The most important of these were a flight by Boeing's 787 ecoDemonstrator, which flew on a blend of 15% green diesel, which is widely used in ground transportation, and a 10 hour flight by KLM using an airbus A330-200 using a 20% blend of alternative jet fuel produced from cooking oil.

## Security and Safety

### Safety

Overall, 2014 continued the worldwide trend of a reduction in accidents per million sectors at 1.92 per million sectors, 14% lower than 2013 performance.

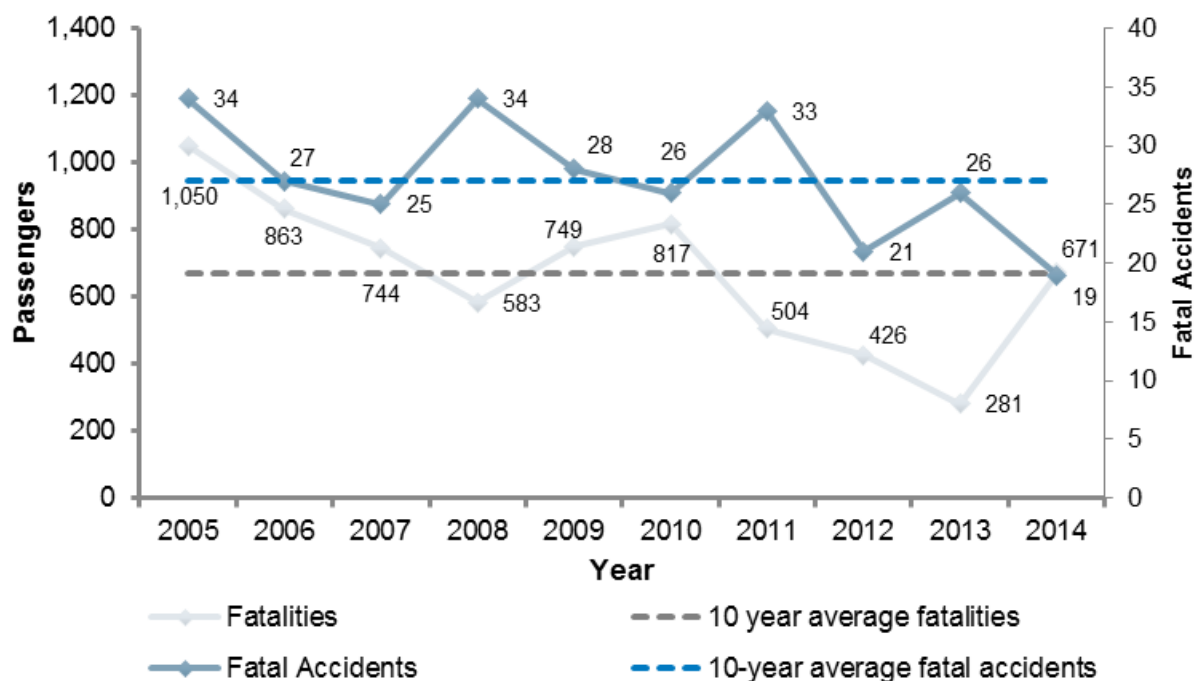
In 2014, commercial aviation safety and security issues were in the public spotlight more prominently than previous years due to a number of high profile aviation accidents. As with previous years, the majority of accidents resulting in aircraft damage are associated with runway incursions.

The disappearance of two commercial passenger flights has led to questions as to the industry's ability to track and communicate with aircraft across territories, land and sea. These aviation accidents/incidents have highlighted challenges as to the regulation of airspace around the world. The disappearance of Malaysian Airlines Flight MH370 over the Malacca Strait has raised the question how, despite a modern aviation system and air traffic management capability, is it possible to 'lose' an aircraft? In July 2014, Malaysian Airlines Flight MH17 was shot down over Ukraine, killing all on board. At the time the Ukraine/Russia crisis was underway, with fighting from both sides in Eastern Ukraine and it is widely accepted that the aircraft was mistaken for a military aircraft. Following the Malaysian Airlines disappearance over the Malacca strait, the International Civil Aviation Organisation (ICAO) has called for a global standard for the tracking of aircraft across airspace

The increase in air rage incidents and the safety risk this poses to passengers was evident in 2014, with numerous high profile incidents being reported during the year. Causal factors have been highlighted as: alcohol, tiredness, lack of legroom, and increased stress levels due to airport processing, particularly security. Over recent years there has been a growing trend in the number of 'air rage' incidents and 'disruptive' passengers on board aircraft. Due to the confined space these occurrences can be a danger to those on-board and generally result in disruption to flights.

In 2014, 19 fatal commercial accidents were reported worldwide causing the deaths of 671 passengers and crew, including passenger and cargo scheduled and charter operations by jets and turboprop aircraft greater than 5,700kg. In terms of the volume of fatalities, 2014 was an increase on 2013, with the number of fatalities increasing 139%. In comparison, 2013 reported 26 fatal accidents and 281 passenger/crew fatalities. The trend over the last 10 years in absolute terms is shown in the graph below.

## World Commercial Airline Fatal Accidents and Fatalities 2005-2014



Source: Mott MacDonald, Flight International based on Ascend/Flight Global.

It is noteworthy from above chart that there were 19 fatal commercial airline accidents in 2014 which was the lowest total in the last ten years, though fatalities from these 19 accidents constituted 671 however it should be noted that these figures do not include the shooting down of the Malaysian Airlines Boeing 777 over Ukraine as this is considered as ‘War’ Risk.

When considering the increase in aviation traffic across the globe and the accident rate per 10 million flights an upward trend in flight safety is witnessed with +70 fatal accidents in 1994 to under 20 fatal accidents in 2014 (Source: EASA Annual Safety Review) as a result of regulatory, technology, process and training developments.

### Congested Airspace

As the demand for air travel increases airspace is becoming congested with regions of large growth, such as the Persian Gulf, facing capacity shortages from years of rapid growth in the sector. Congestion in airspace impacts safety, can cause delays, and impedes growth plans that the airlines/airports.

Overall, national and regional air space will become more congested as the demand for air travel increases. Countries and regions are increasingly likely to be required to deliver integrated airspace management systems so as to ensure continued airspace safety without the risk of pilot or controller overload.

## Montreal Protocol

IATA launched the Montreal Protocol in 2014 which has set out to make important changes to the original Tokyo Convention that came into force in 1969. The Tokyo Convention governs offences and other acts that occur on board aircraft in flight. The Montreal Protocol extends the jurisdiction over the offence to the destination country of the flight in addition to the country of aircraft registration. This closes a loophole which allowed many serious offences to escape legal action.

A total of 22 states will be required to ratify the protocol before it can be implemented.

## Consumer Rights – Air Passengers

### The Impact of the Sturgeon / Nelson Rulings

The Sturgeon judgment suggests that although Regulation (EC) 261/2004 did not explicitly give any right to fixed-rate compensation to passengers whose flights are delayed, the Regulation should be interpreted consistently with the principle in EU law of equal treatment. The Nelson judgement on the other hand reinforces that passengers with a delay of up to three hours or more would be entitled to the same right to compensation as passengers whose flights had been cancelled, potentially leading to many more claims against carriers.

In the UK the interpretation of Regulation (EC) 261/2004 was not able to be legally implemented until September 2013, and was applied successfully for the first time a few weeks later when a couple was awarded £680 jointly after a 22 hour delay to a Thomas Cook flight from Tenerife in 2009. The European Court of Justice officially defined the arrival time of a flight as the minute one of the doors of the aircraft is opened, given that previously, regulation 261/2004 did not define a specific “arrival time”. During the first year of the rulings implementation, the volume of flight delay claims received by the CAA exceeded 23,000, a significant increase from 6,028 claims in the same period the previous year, and between October 2014 and January 2015, the CAA received 2,500 complaints. In other EU member states however the adoption of the rulings has been due to the fact that individual member states are free to regulate how far back a claim can be made by a consumer. Airlines are trying to counteract this by referencing the Montreal and Warsaw conventions, which imply that there is a two year limit on the claim date. Another area of confusion relates to the understanding of what constitutes ‘extraordinary circumstances.’ A draft document prepared by the National Enforcement Bodies and posted on the EC’s website attempts to clarify the meaning of these extraordinary circumstances. The airlines have to prove beyond reasonable doubt that flight delays constituted an extraordinary circumstance in order to rebuke any consumer claim.

Some groups have identified that the impact of the rulings and subsequent regulation has led to safety concerns. Given airlines are now fully aware that they are liable for large pay-outs if passengers experience extensive delays or cancellations due to a technical fault, there exists a question mark over whether some carriers may choose to operate aircraft with seemingly minor faults to avoid any claims being made against them. Moreover, IATA states that not allowing the majority of technical problems to be considered an “extraordinary circumstance” does not sufficiently prioritise safety above all other factors.

### Airline Insolvency – Standalone Tickets

Passenger awareness on airline insolvency protection is generally poor, as revealed by a survey conducted by the Commission, and although some financial products such as travel insurance, credit cards and airline rescue fares are now available across some European member states, they all vary

in length and level of financial protection. As a result of this the Commission issued a Communication encouraging the adoption of a number of measures to strengthen the licensing oversight of EU air carriers under Regulation (EC) 1008/2008.

The Commission addressed issues such as:

- the monitoring of the financial position of air carriers;
- best practice and information sharing between the regulatory authorities of member states;
- the formalisation and promotion of existing voluntary agreements on rescue fares;
- the wider and more systematic availability of SAFI or similar insurance products across the EU;
- the adoption of a service level agreement; and,
- the availability of information about credit card refund schemes or similar products in a member state to allow passengers to protect themselves against the risk of insolvency under national law.

# 1. Air Traffic Trends

## 1.1. Introduction

For the global aviation industry, 2014 was a strong year in terms of traffic growth and improved industry performance, indicating the recovery from a prolonged recession for a number of advanced economies and confirming the sustained growth achieved by emerging economies around the world. Despite differences in economic growth across the globe, overall industry performance was greatly assisted by the reduced fuel prices witnessed for the best part of 2014. According to latest forecasts, the world economy shows potential to grow at or above average rates in the medium term, helped by the lower oil prices and increased consumer confidence, while in the long term structural transformation and policy reforms will be the main drivers of economic growth.

For 2014, global passenger airport throughput was +5.1% higher than in 2013. From a regional perspective passenger growth accelerated in all regions in 2014 except in Asia-Pacific where growth slowed from +8.7% in 2013 to +5.9% in 2014. The Middle East grew fastest at +10.1, European traffic grew at +5.2% in 2014, far outpacing economic growth in the region, while North America, grew slower due to market maturity and airline consolidation in the domestic market.

Airline passenger traffic (measured in RPKs) grew at +6.0% in 2014, compared with global GDP growth of +3.3%. The International Civil Aviation Organisation (ICAO) reported that airlines carried 3.3 billion passengers in 2014, a +5.5% increase on 2013. The global airline industry grew at or above the long-term growth rate for three consecutive years based on sound fundamentals, while productivity continued to increase on historically high airplane utilization and passenger load factors. Specifically, load factors in 2014 improved slightly to 80%, showing that airlines are matching demand without oversupplying capacity.

In 2014 the air cargo market built on the recovery that began in the second quarter of 2013; global traffic volume growth was close to the long-term average for the full year, while cargo operators improved their profitability as the oil prices dropped. Capacity metrics also improved as utilization of large freighters returned to recent highs. Many signals point to global air cargo continuing to sustain on-trend growth. Global trade forecasts indicate an improving market, with trade set to grow at rates of about five% on average over the next several years.

Finally, the latest increased flight activity of business aviation witnessed in the European and US markets, demonstrates the improving economic conditions for business aviation. For 2015, cautious optimism of growth is identified for these two largest business aviation markets, as corporate profitability returns aided by the reduced oil prices.

The purpose of the first section of this report is to:

- Examine the performance of the global and regional commercial aviation activity for the year 2014
- Identify the key drivers of air traffic growth historically, focusing on the past year
- Summarise the projections for air transport growth at a regional and global level, as well as its implications
- Analyse the performance of airlines, airports and manufacturers over the past year.

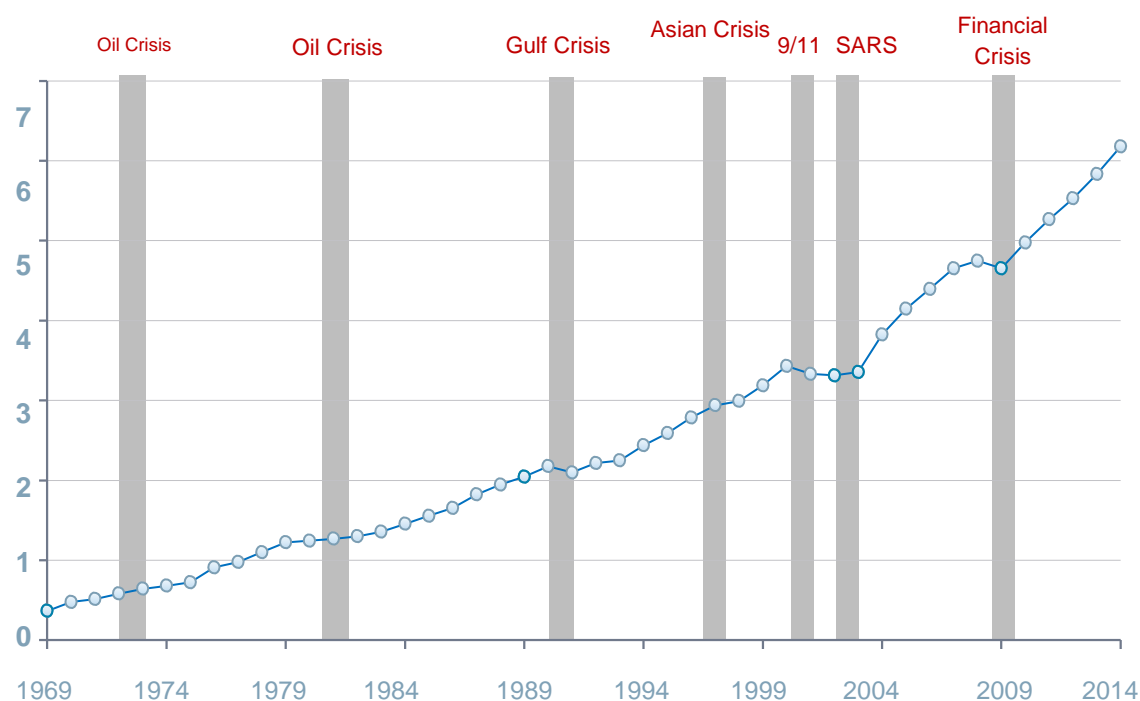
Because of the global nature of the air transport industry, developments in one geographical region can have far-reaching implications in others. In respect of this dynamic, the objective of this section will be to analyse the key air traffic developments and events of 2014 by world region and further analysis at an airport and airline level, placing them into a global context and paying particular attention to the impact on the European air transport market.

## 1.2. Air Traffic Drivers

For the global aviation industry, 2014 was an exceptional year, with strong traffic growth and improved industry performance metrics indicating the recovery from a prolonged recession for a number of advanced economies and confirming the sustained growth achieved by emerging economies around the world. Despite differences in economic growth across the globe, overall industry performance was greatly assisted by the reduced fuel prices witnessed for the best part of 2014.

Passenger traffic as measured by revenue passenger kilometres (RPK) was up by +5.9% in 2014<sup>1</sup>, and capacity was up by +5.8%<sup>2</sup>. These growth rates were achieved despite moderate global economic performance in 2014, where global Gross Domestic Product (GDP) grew by +3%, and follow the above average (+5%) annual air travel growth experienced the last 2 years. This trend reflects how historically air travel growth has proven to be increasingly resilient in the long term, despite of the market cyclicalities due to short term impacts from demand shocks. This behaviour of air travel is evident on Figure 1: where world air travel growth (measured in RPKs) has recovered strongly from the numerous shocks and recession periods that have occurred during the past four decades.

Figure 1: World Annual Traffic Expressed in RPKs



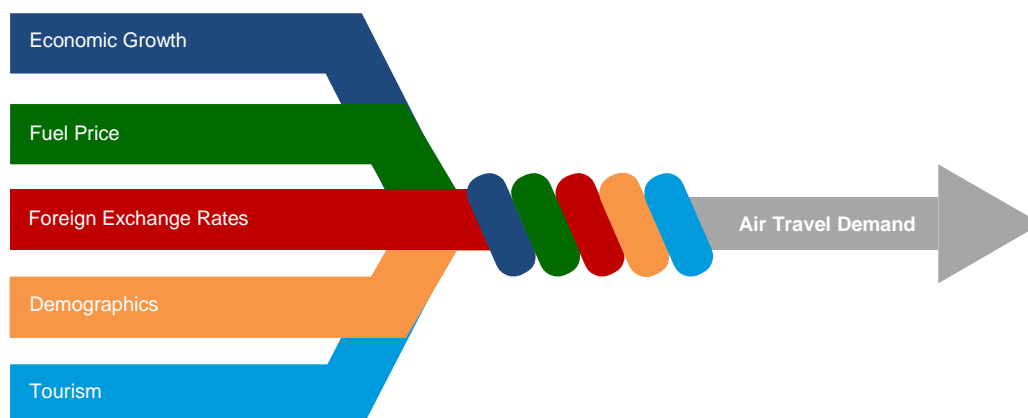
Source: Airbus, ICAO

<sup>1</sup> ICAO

<sup>2</sup> Boeing Current Market Outlook 2015-2034

The key drivers of passenger demand and air traffic growth are illustrated in Figure 2 as: economic and demographic indicators at a country or regional level and global fuel price and exchange rates. These main drivers are the key contributing factors to air travel demand growth and while their individual performance varies during the years, when added together, they form the basis for the historic sustained growth of commercial aviation.

Figure 2: Key Drivers for Air Travel Demand



Source: Mott MacDonald

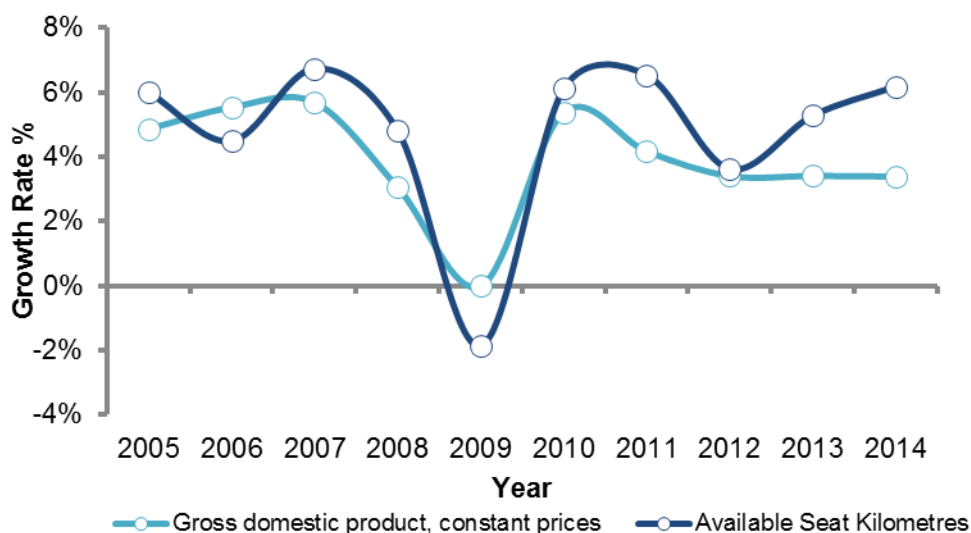
## Economic Growth

### Relationship of GDP Growth to Air Travel

Amongst the drivers of air traffic demand, economic growth is the primary driver of demand, both largely explaining past performance and forming the basis of forecast continued growth. Figure 3 shows the correlation of Gross Domestic Product (GDP) and air traffic growth, measured in Available Seat Kilometre (ASKs) flown. In recent years, air travel has grown significantly more rapidly than growth in GDP.



Figure 3: Relationship of Real GDP and Air Travel

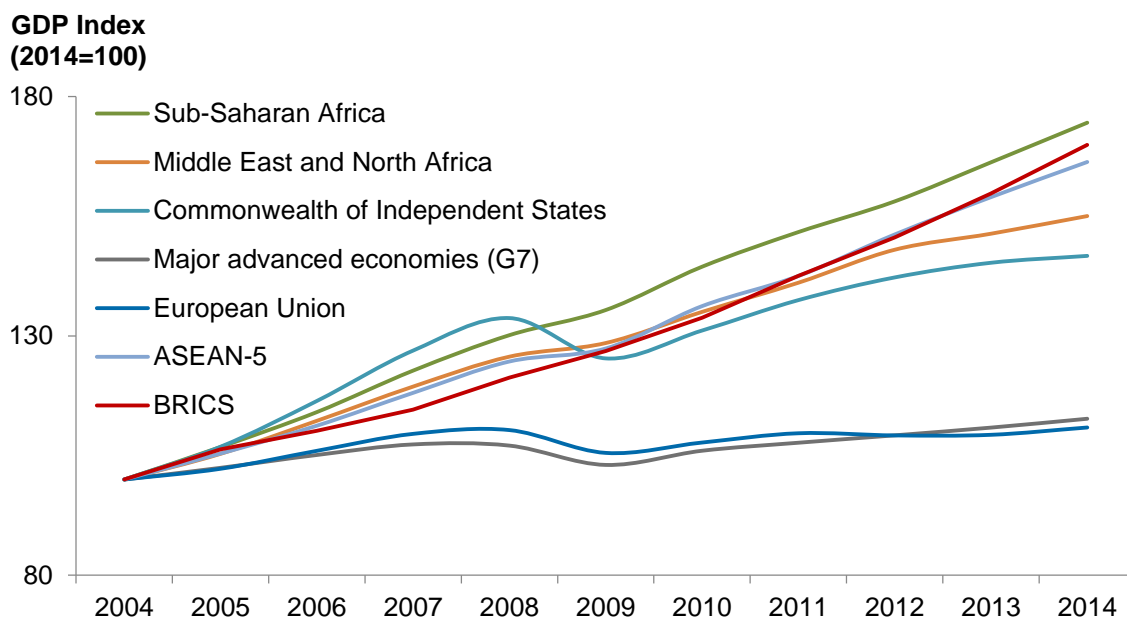


Source: IMF and SRS Analyser

## Historic GDP Performance of Key Countries Groups

Overall, the global economy continues to follow the path to recovery with an estimated growth of 3.3% in 2014 over 2013, according to latest IMF data. Since the global financial crisis of 2008-09, the global economy is recovering with annual rates of above 3%, led by emerging economies around the world, most notably the BRICS country group, which grew by almost 5.5% year on year since 2004. The economies of Asia and Sub-Saharan Africa have also performed strongly, as their economies develop. In contrast, the major developed countries of Europe, North America and Japan have grown markedly more slowly.

Figure 4: Real GDP Indexed Growth of Key Country Groups



Source: IMF

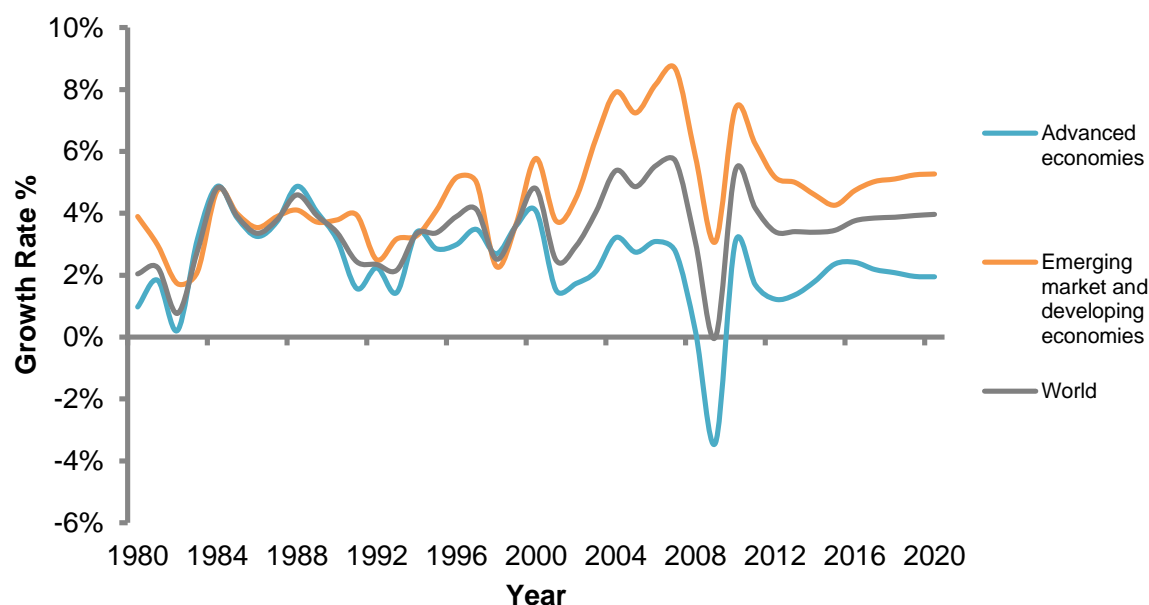
Within this overall trend of economic growth and sustained recovery from the 2008/09 recession, there are notable risks and uncertainties, such as geopolitical risks in Ukraine and the Middle East, the slowdown of the economic outlook of China, fluctuations in oil prices and its impact on oil dependant economies, and the fragile state of the economies of some Euro Zone members.

## GDP Projections – Medium Term

According to latest IMF economic forecasts, the world economy shows potential to grow at or above average rates in the medium term, and is expected to achieve growth rates of around 3.8% per annum for the period 2015 to 2020<sup>3</sup>. Lower oil prices and increased consumer confidence are expected to contribute to this sustained medium term growth.

<sup>3</sup> IMF World Economic Outlook April 2015

Figure 5: Real GDP Growth of Emerging and Advanced Economies



Source: IMF

With income levels rising, consumer spending, particularly in Asia, is expected to grow<sup>4</sup>. The average annual growth rate for emerging markets is projected to be +4.9% per annum to the year 2020<sup>5</sup>, whereas the advanced economies of Europe, North America and Japan are expected to grow more slowly at +2.2% per annum. This is continuation of the historic trend.

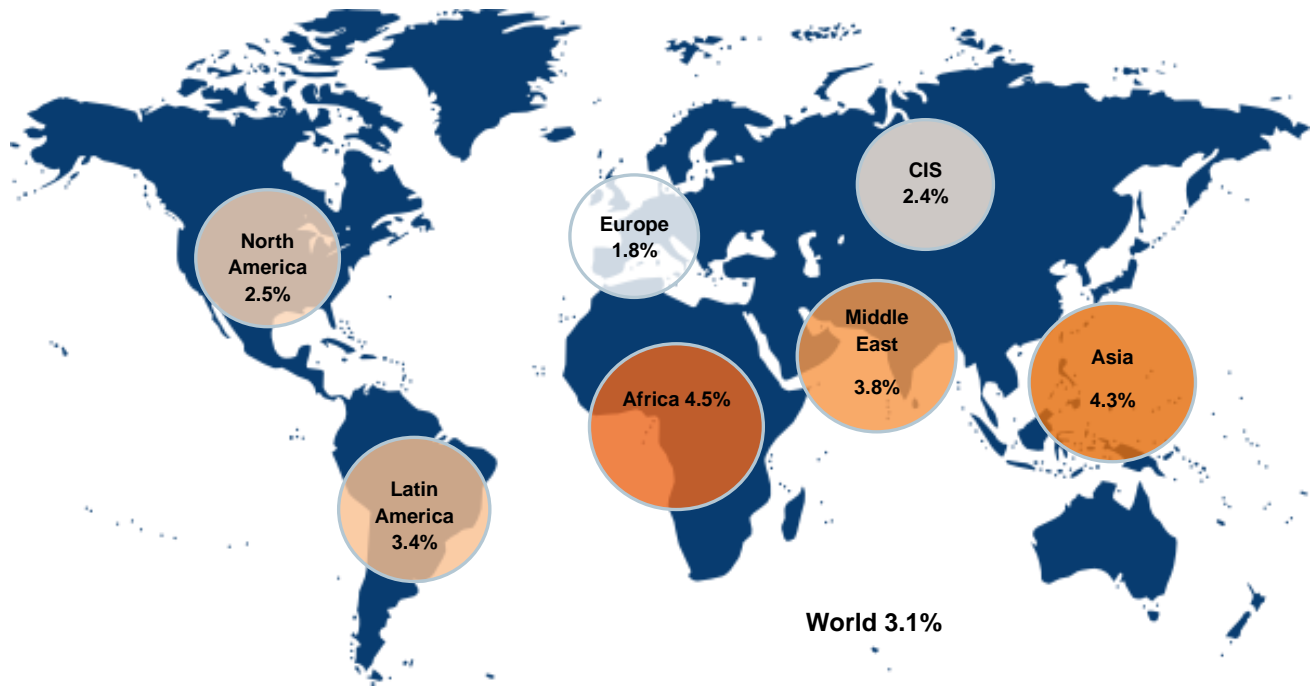
## GDP Projections – Long Term

For the long term economic outlook at a global and regional level, recent forecast agree that structural transformation and policy reforms are the key drivers that will allow for the necessary industrial capacity and global trade that will ensure a sustained economic growth in the long term. IHS Economics (which forms the basis for the Boeing, Airbus, Bombardier and Embraer long term forecasts) and the Japan Aircraft Development Corporation (JADC) in their Worldwide Market Forecast both project global economic growth of 3.1% per annum for the period of 2015-2034 (Figure 6).

<sup>4</sup> Boeing Current Market Outlook

<sup>5</sup> IMF World Economic Outlook April 2015

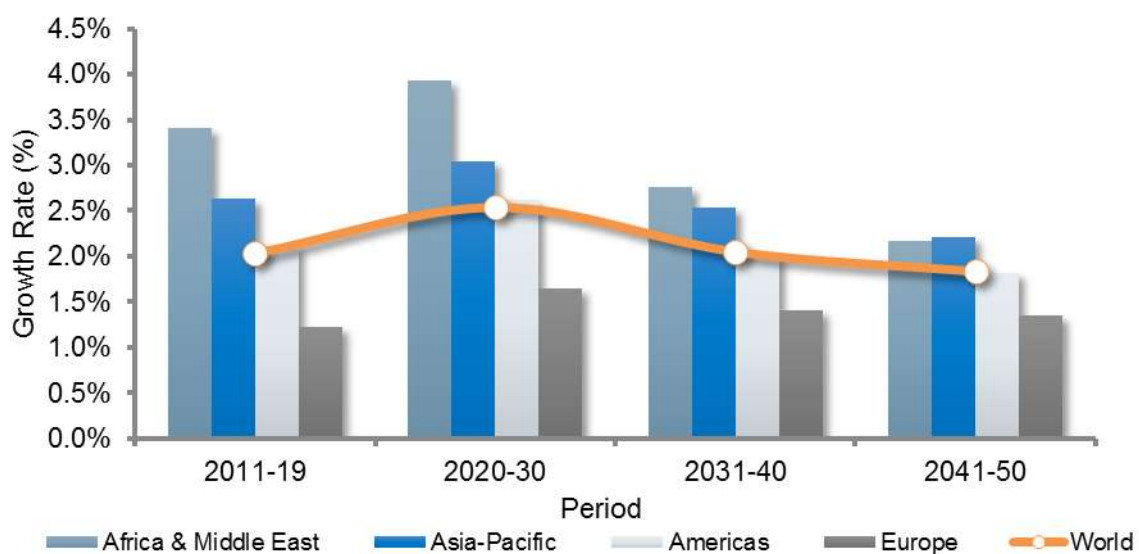
Figure 6: IHS Economics Projections of Real GDP Annual Growth by Region for 2014-34



Source: IHS Economics for Airbus/Boeing/Bombardier

Meanwhile, the Economist Intelligence Unit offers a more conservative projection for economic growth, as presented on Figure 7, with global economy growing at around 2.5% on average for 2020-30, 2.1% for 2030-40 and 1.8% for 2040-50<sup>6</sup>. Particularly strong growth is forecast for the Africa & Middle East region through to 2030, and this region along with Asia is expected to at above average rates throughout the forecast period. The Americas are forecast to grow at about the global average rate, while Europe is expected to grow more slowly in the long term.

Figure 7: Long Term Real GDP Growth Rates by Region



Source: Economist Intelligence Unit

EIU Global Forecasting 2050 – Long-term key trends<sup>6</sup>

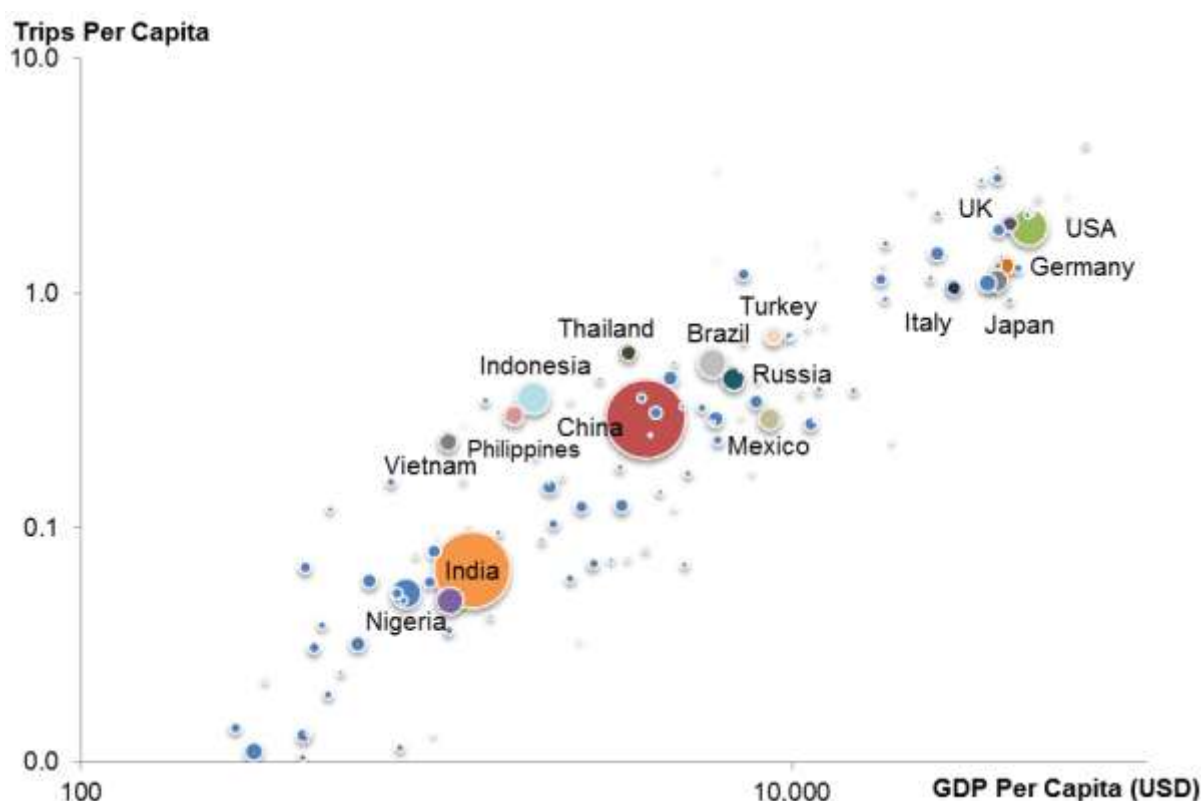
## GDP per Capita

Another useful economic indicator for air travel demand is per capita income, which is a measure of disposable income and correlates strongly with a country population's propensity to fly.

Emerging countries are developing large new middle class populations through increased GDP per capita and wider distribution of wealth. This means that more people in developing countries are reaching the threshold of wealth where discretionary air travel becomes possible.

Demand for air travel continues to increase rapidly when GDP per capita reaches about \$5,000 to \$10,000<sup>7</sup> per annum. Figure 8 shows the relationship of trips per capita to the GDP per capita by country, with bubble size proportionate to the country's population.

Figure 8: Propensity to Fly in 2014



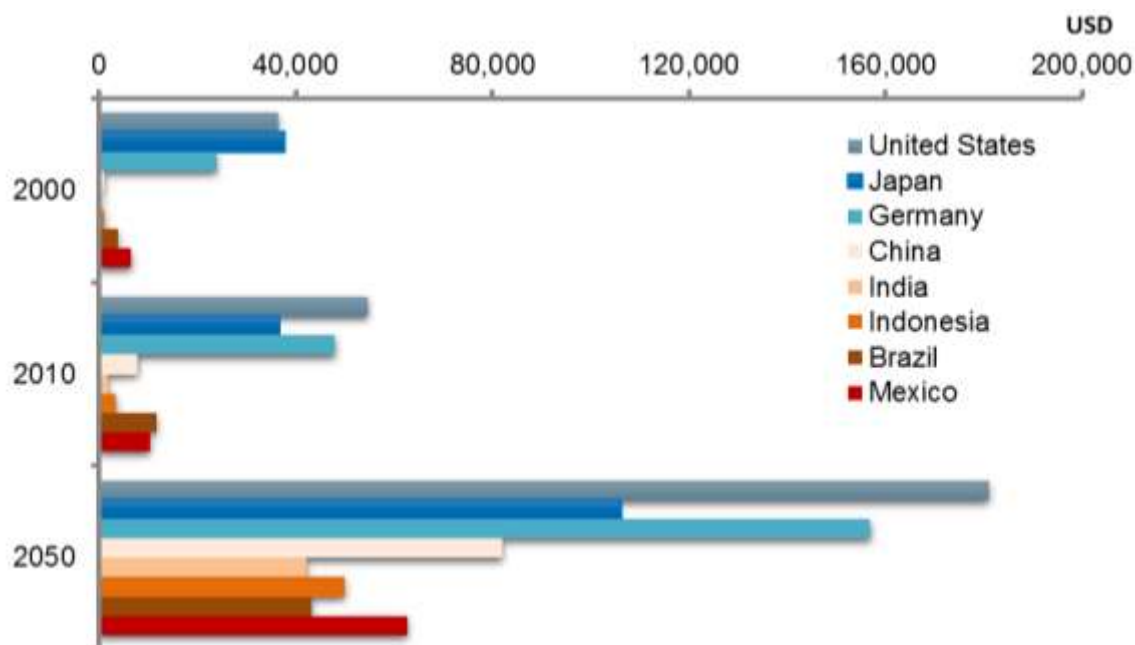
Source: IMF and Sabre ADI

## GDP per Capita Projections

Looking at the nominal GDP per capita for key advanced and emerging economies in Figure 9, it is clear that, although advanced economies will continue to enjoy higher levels of GDP per capita, the relative gap is diminishing due to higher growth rates amongst emerging nations. As a result, growth in air travel in emerging nations is expected to outstrip the growth rates of more mature markets.

<sup>7</sup> JADC Worldwide Market Forecast 2015-2034

Figure 9: Nominal GDP per Capita (USD) for Key Advanced and Emerging Economies



Source: Economist Intelligence Unit

## Fuel Price

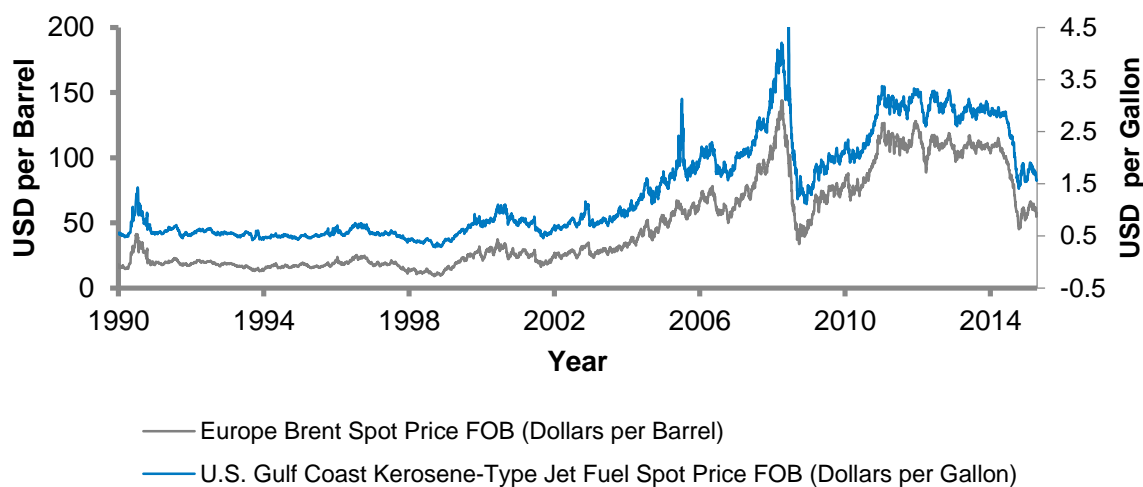
Fuel price is a key component of airline costs, and hence air fares offered. The recent drop in oil prices has, therefore, helped to stimulate growth in air travel. Spot prices of Brent Crude Oil dropped 57% (from \$111.80/barrel in June 2014 to \$47.76/barrel in January 2015<sup>8</sup>), and the price of jet fuel (USA, spot price) also dropped by 48% (from USD2.88/gallon in June of 2014 to USD1.50 in January of 2015<sup>9</sup>). These price falls are due to a combination of the following factors:

- decreased demand in Europe and emerging economies, due to increasing fuel efficiency;
- increased supply from shale oil in the United States that turned the country from an importer to a potential exporter with capacity to cover its domestic needs;
- increased production of crude oil in non-OPEC countries; and,
- deferment of OPEC production quotas in November of 2014.

<sup>8</sup> JADC Worldwide Market Forecast 2015-2034

<sup>9</sup> JADC Worldwide Market Forecast 2015-2034

Figure 10: Historic Relationship of Brent Crude Oil Price and Aviation Jet Fuel Price



Source: U.S. Energy Information Administration

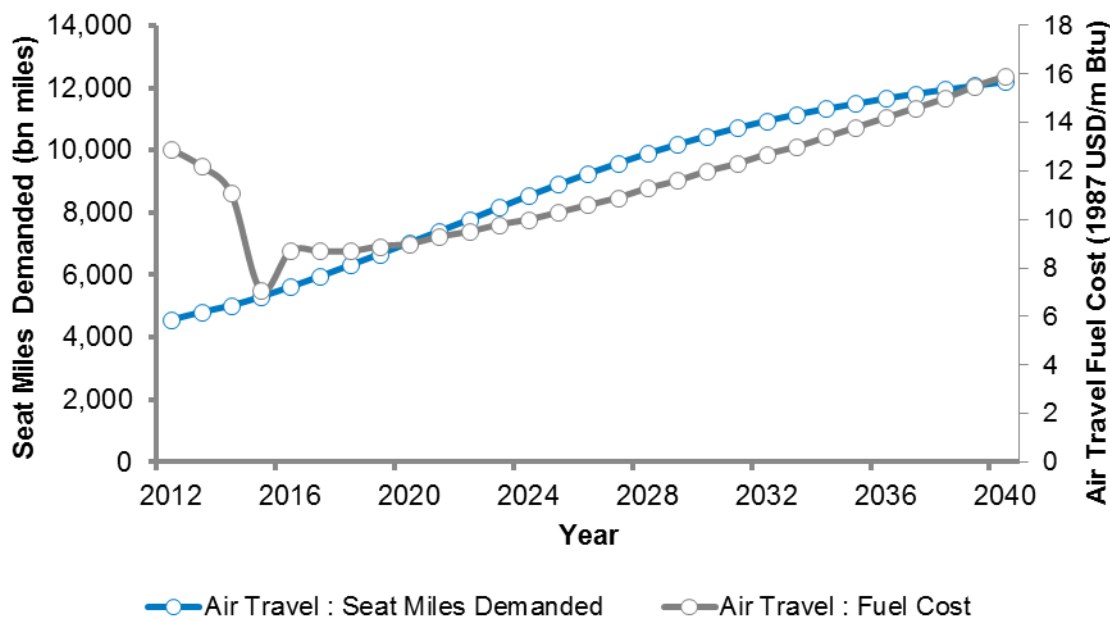
Although effects differ from country to country, lower oil prices represent a net gain for global economic growth as resources are shifted to more efficient economies on average, and consumer spending is stimulated in the world’s largest oil-importing economies<sup>10</sup>. However, although a boon for many commodity-importing countries, low oil prices pose major revenue challenges for the world’s large commodity exporters. As a result, the lower oil price has boosted growth in countries such as the USA and in Europe, but has had a negative impact on growth in oil producing nations such as in the Middle East, Brazil and Russia.

For air travel, lower fuel costs have contributed to increased airline profitability and generally lower fares, stimulating demand. The impact has varied between airlines due to fuel cost hedging, whereby lower spot-market fuel costs have not necessarily immediately fed through to airlines’ cost bases.

It is difficult to predict the trajectory of fuel prices in the future. Long term forecasts of fuel costs, projected by the US Energy Information Administration (Figure 11), indicate a return to higher oil prices, but that air travel demand will continue to grow despite this increase in airline costs.

<sup>10</sup> Boeing Current Market Outlook

Figure 11: Long Term Projections on Seat Miles Demanded and Air Travel Fuel Cost



Source: U.S. Energy Information Administration

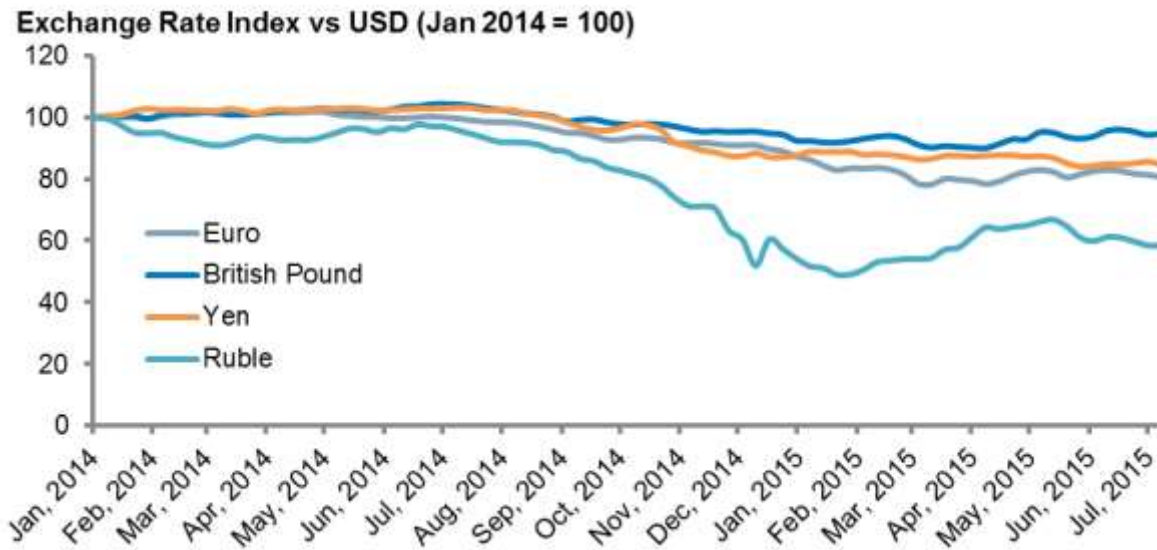
### Market Exchange Rates

There have been significant exchange rate changes in the past year, with most major currencies weakening against the US Dollar due to general economic conditions and the impact of lower oil prices, most notably in Russia. In some regions, this currency volatility tempers the near-term benefit of lower fuel prices on consumer spending, as the cost of visiting destinations with a stronger currency are increased. At the same time, passengers on the opposite travel flow will benefit from this change.

The most notable example of currency fluctuation in 2014 and 2015 is Russia, where the depreciation of the Ruble due to declining oil revenues has significantly reduced the purchasing power of Russian outbound travelers. Russian visitor arrivals is a key source of income for most Southern European and North African leisure destinations, adversely impacting on air travel to these destinations from the Russian market.



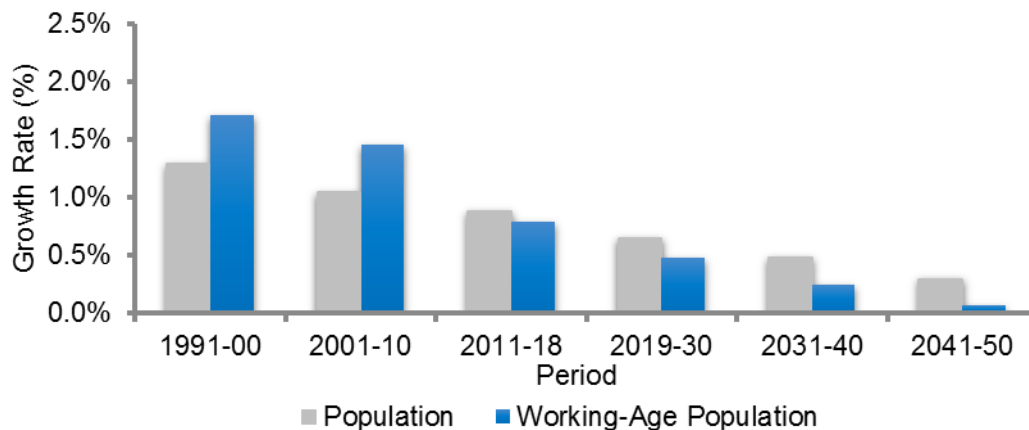
Figure 12: Exchange Rate Indices of Key Currencies to USD



Source: OANDA.com

The Economist Intelligence Unit projects that populations will grow at a gradually decreasing rate through to 2050 (Figure 13)<sup>11</sup>. The decreasing growth rate is more pronounced for working-age populations, reflecting a global trend towards aging populations as already seen in Europe and Japan.

Figure 13: Average Growth Rates of Total and Working-Age Population

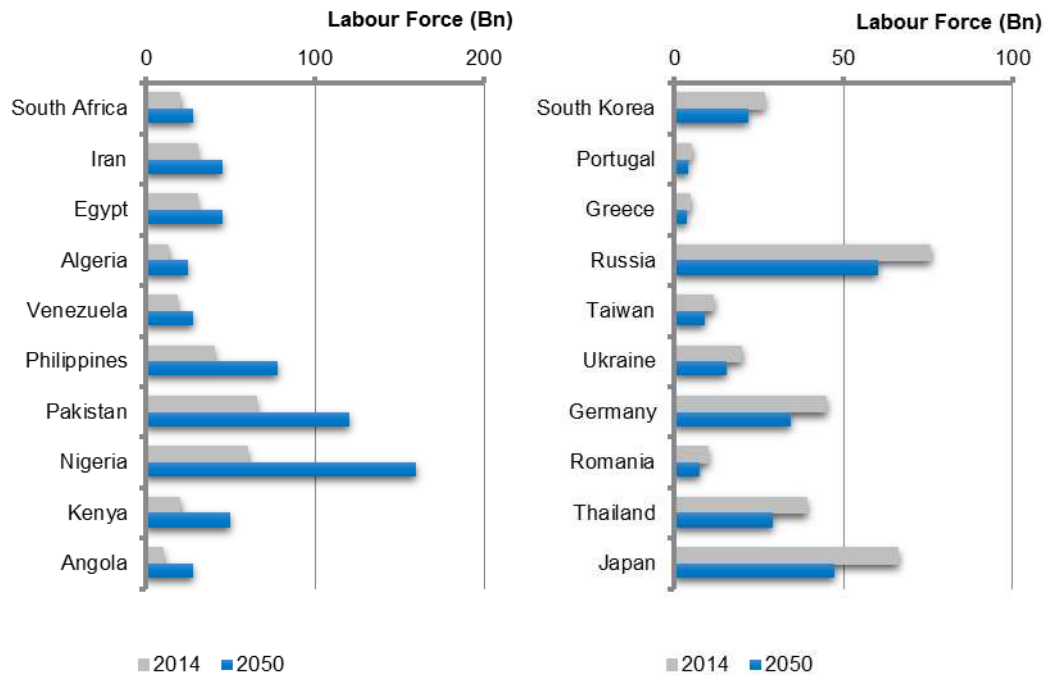


Source: Economist Intelligence Unit

These changes in working age populations are shown in Figure 14 for the countries with the largest increases and decreases in projected labour force. These demographic changes affect both the overall GDP growth rates and growth in demand for air travel.

<sup>11</sup> EIU Global Forecasting 2050 – Long-term key trends<sup>11</sup>

Figure 14: Largest Projected Increase and Decrease of Labour Force



Source: Economist Intelligence Unit

The growth of working age population is expected to have a major impact on the expansion of the middle class population of emerging economies, as is identified by Airbus and Oxford Economics on the following Figure 15.

Figure 15: Middle Class Population's Regional Breakdown and Share of World Population – History and Forecast



Source: Oxford Economics, Airbus GMF 2015

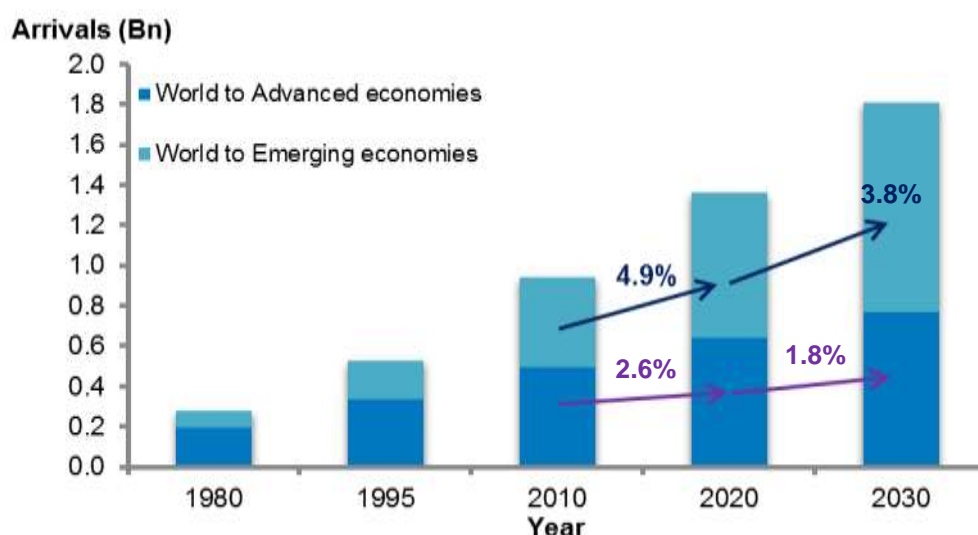
## Tourism

According to the UN World Tourism Organisation (UNWTO), travel for holidays, recreation and other forms of leisure accounted for just over half of all international tourist arrivals (53% or 598 million) in 2014. Some 14% of international tourists travelled for business and professional purposes, while 27% travelled for other reasons such as visiting friends and relatives (VFR), religious reasons and pilgrimages, health treatment, etc. Furthermore, slightly over half of all overnight visitors travelled to their destination by air (54%), while the remainder travelled by surface transport (46%) in 2014, with the share of air transport having gradually increased over time. These figures emphasise the importance of tourism as a key driver of air travel demand and draw attention on how developments in the tourism industry of emerging economies can promote air travel to those regions.

2014 has been a record year for international tourist arrivals as overnight visitors worldwide reached 1133 million, up 4.3% on 2013<sup>12</sup>, and marks the fifth consecutive year of robust growth above the long-term average (+3.3% a year) since the financial crisis of 2009. In 2015 growth is expected to continue at a sustained rate of 3% to 4% worldwide.

This robust performance of international tourist arrivals is set to continue in the following two decades. Most of the growth will be witnessed in the tourist flow into emerging economies, as their tourism product develops and as the income of their middle class population increases, allowing for increased spending on recreational activities. This trend translates into an average annual visitor increase of 4.9% to 2020 and of 3.8% between 2020 and 2030. Advanced economies will also attract additional visitors, albeit at a slower rate, with a 2.6% annual growth on average to 2020 and 1.8% annual growth on average from 2020 to 2030.

Figure 16: History and Projections for International Tourist Arrivals to Advanced and Emerging Economies



Source: UNWTO

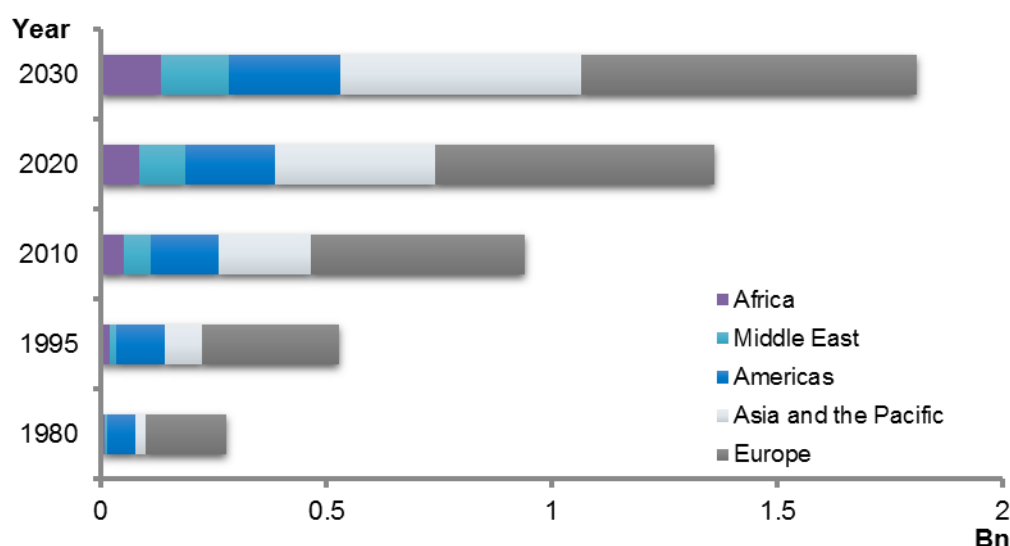
Across the regions, Europe (+3%) led the growth in absolute terms, with 15 million additional international tourists compared to 2013, reaching a total 582 million arrivals. The Americas recorded the fastest year on year growth with a +8% increase in international arrivals to reach 181 million in 2014. Asia-Pacific and the Middle East both grew at +5%, rebounding after two years of decline with

<sup>12</sup> UNWTO Tourism Highlights 2015 Edition

positive performance across most destinations. Finally, Africa’s international tourist numbers grew by an estimated +2% YoY.

Prospects for 2015 are strongest for the Asia/Pacific and the Americas (both +4% to +5%), followed by Europe (+3% to +4%). In Africa (+3% to +5%) and the Middle East (+2% to +5%), prospects are positive but more uncertain and volatile. The same growth trends are expected in the medium to longer term, as the Asia-Pacific and the Americas are forecast to attract passengers at a stronger rate, increasing their individual market shares, while Europe will continue to be the market leader in overall international visitor arrivals.

Figure 17: International Tourist Arrivals History and Projections by Region of Destination



Source: UNWTO

### 1.3. Passenger Traffic Trends

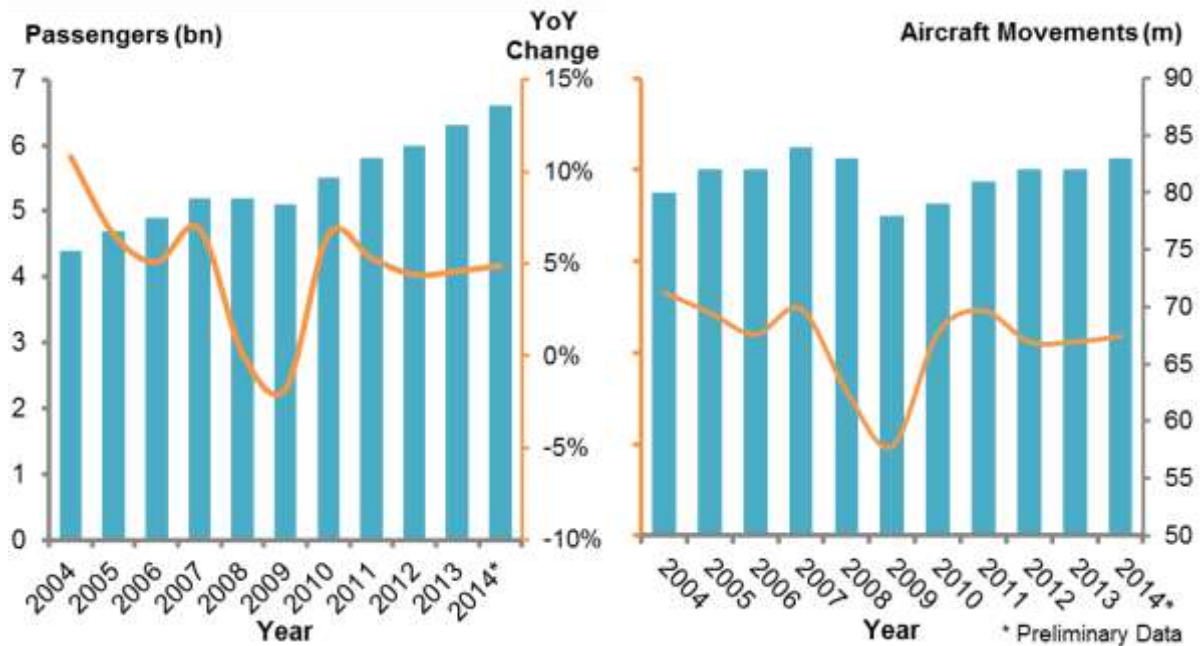
#### Global Passenger Performance

##### Airport Statistics

For 2014, global passenger airport throughput was +5.1% higher than in 2013, climbing from 6.3 billion to 6.6 billion annual passengers. This is an improvement on the growth rate of +4.6% seen in 2013. Meanwhile, total aircraft movements grew by +1% year on year to 83 million in 2014<sup>13</sup>. This performance, as can be observed on Figure 18, continues the trend of growth seen since the global recession of 2008-09, and reflects the resumption of global economic growth discussed above.

<sup>13</sup> ACI, 2014 Airport Economics Report

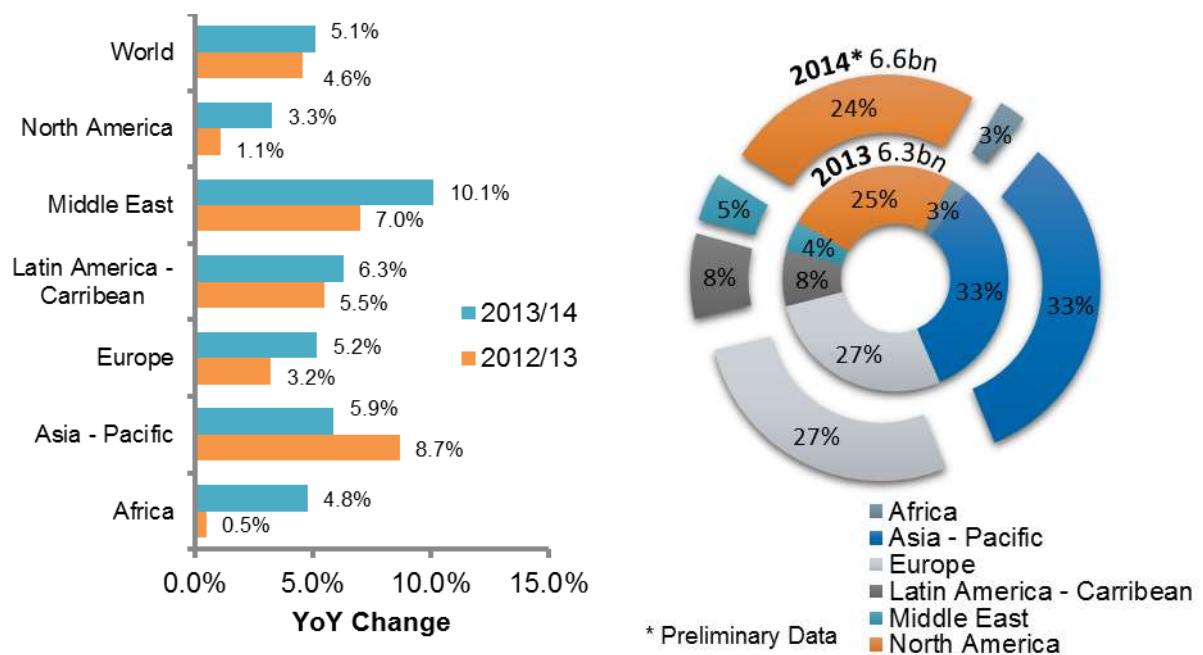
Figure 18: Worldwide Passengers and Aircraft Movements between 2004 and 2014



Source: ACI World Airport Traffic Database (2015)

From a regional perspective (Figure 19), passenger growth accelerated in all regions in 2014 except in Asia-Pacific where growth slowed from +8.7% in 2013 to +5.9% in 2014. The Middle East grew fastest at +10.1 as the three Gulf super-connectors further expand their capacity worldwide. European traffic grew at +5.2% in 2014, far outpacing economic growth in the region, helped by the lower fuel prices and the strong growth of international tourist arrivals. Slowest growth was in North America, due to market maturity and airline consolidation in the domestic market.

Figure 19: Passenger Growth Rate and Traffic Share by Region



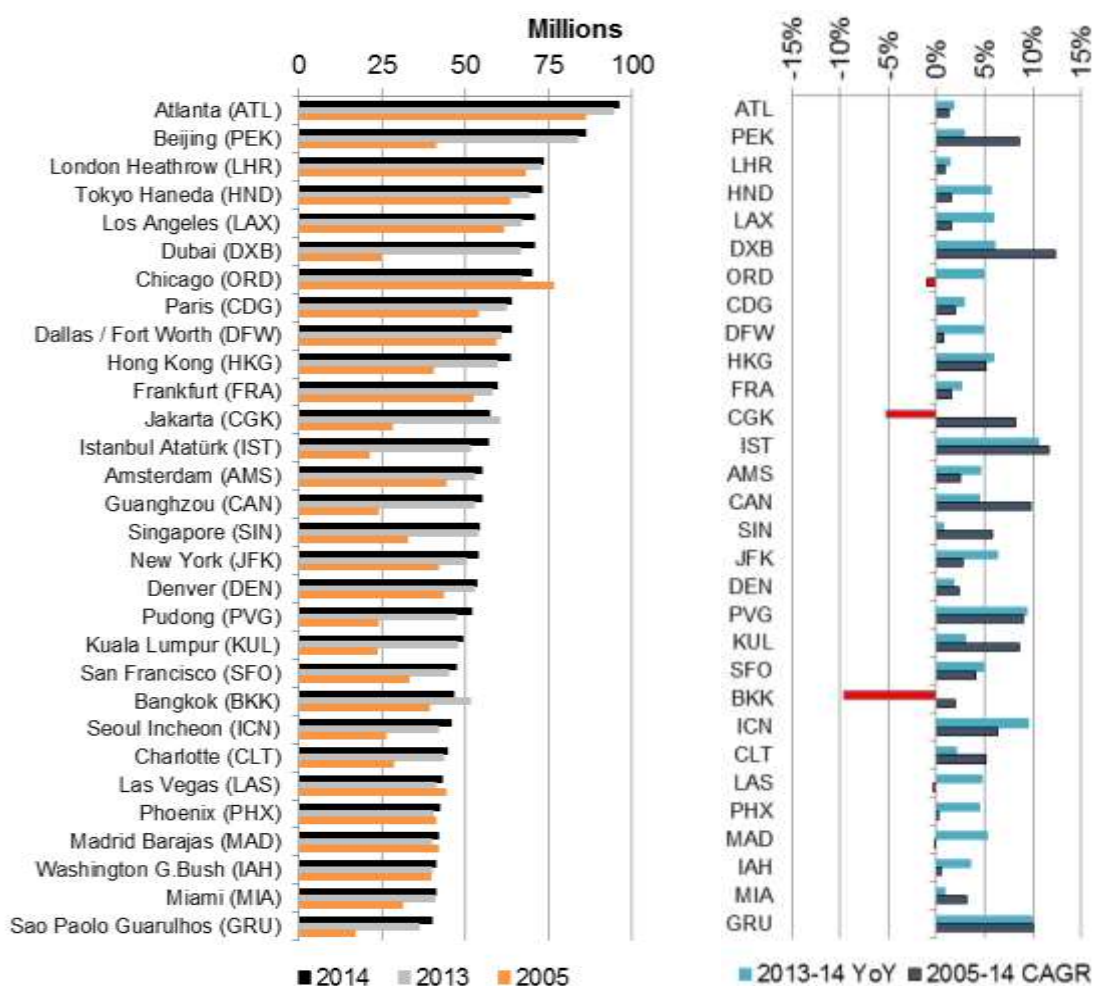
Source: ACI World Airport Traffic Database (2015)

Delving deeper to a more granular level, the passenger performance of the top 30 airports worldwide is shown in Figure 20. Despite the regional fluctuation in traffic performance described above, the world's largest airports have generally been growing strongly in the last 10 years.

The most rapidly growing airports over the past 10 years (2005 to 2014) were: Sao Paulo-Guarulhos (+10% pa), Istanbul-Ataturk (+11.8% pa) and Dubai International (+12.3% pa), as well as the Chinese airports of Beijing (+8.5% pa), Guangzhou (+9.8% pa) and Shanghai-Pudong (+9.0% pa). This reflects sustained growth in these developing markets, as well as the continued development of the connecting hubs in the Middle East and Turkey regions.

US airports represent 13 airports of the top 30 airports globally, but have achieved relative low levels of growth during the past 10 years. Chicago-O'Hare, Las Vegas and Phoenix airports are all below their 2005 levels of passenger traffic, although all three grew at around +5% in 2014 over 2013, giving signs of a reversal of that trend<sup>14</sup>.

Figure 20: Top 30 Airports in 2014 by Passenger Traffic Worldwide



Source: ACI World Traffic Reports

Regarding European airports, four airports are within the top 30 in passengers carried: London Heathrow, Paris Charles de Gaulle, Frankfurt Main and Madrid Barajas airport. Similar to US airports, growth since 2005 has been low at European airports (with Madrid slightly negative, but with +5.3%

<sup>14</sup> ACI World Traffic Reports

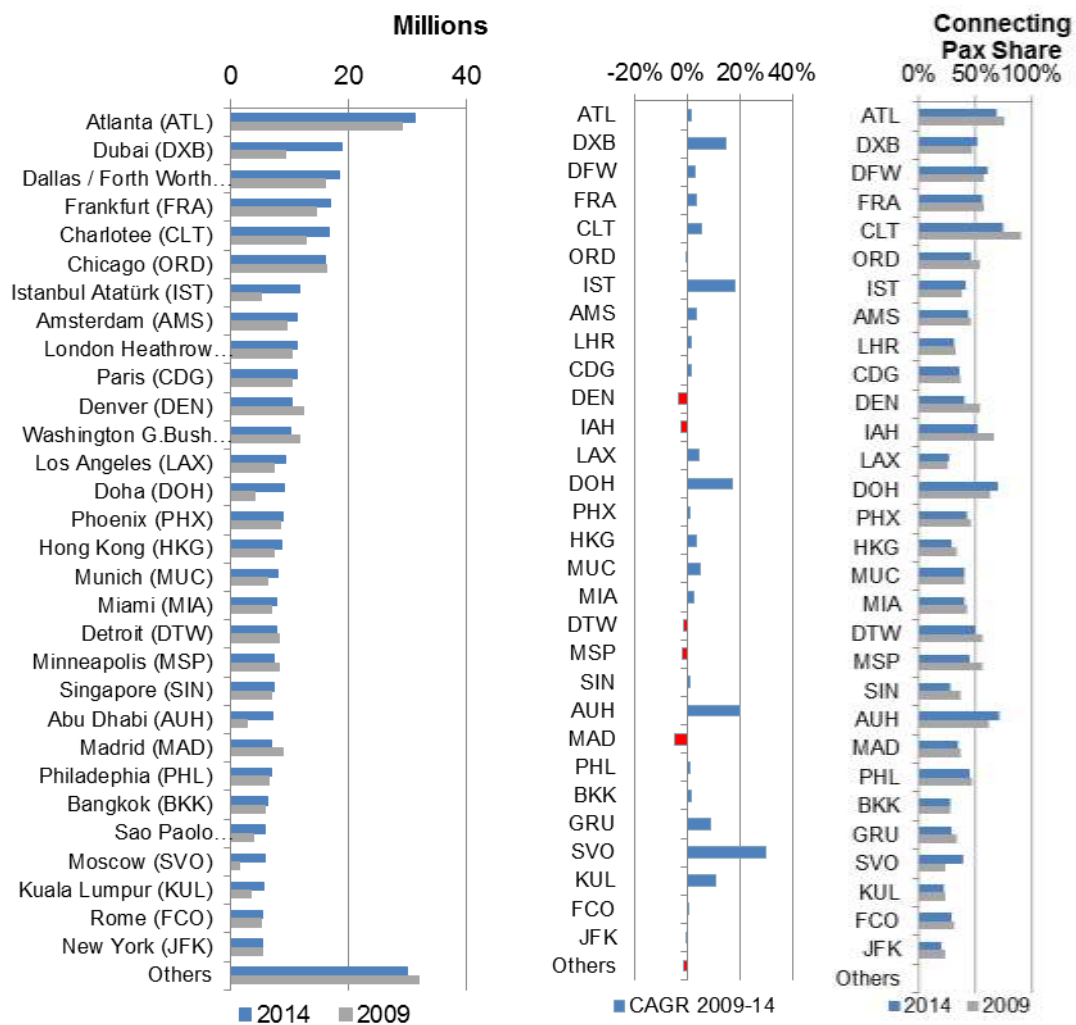
growth in 2014 v 2013). This is a reflection of the lasting effects of the 2008/09 recession and relatively slow Euro Zone recovery, as well as the capacity constraints at Heathrow. Statistical Annex A provides an overview on global passenger and air transport movements.

## Airport Connectivity

One of the themes that are trending in the last five years in air transport is the strengthening of international and domestic hub airports around the world. This phenomenon has been mostly attributed to the consolidation in the airline industry, as witnessed lately in the US domestic market. As airlines merge together to form powerful groups, they are able to consolidate their operations within their main airport hubs. Thus, they are able to offer increased services from those hubs.

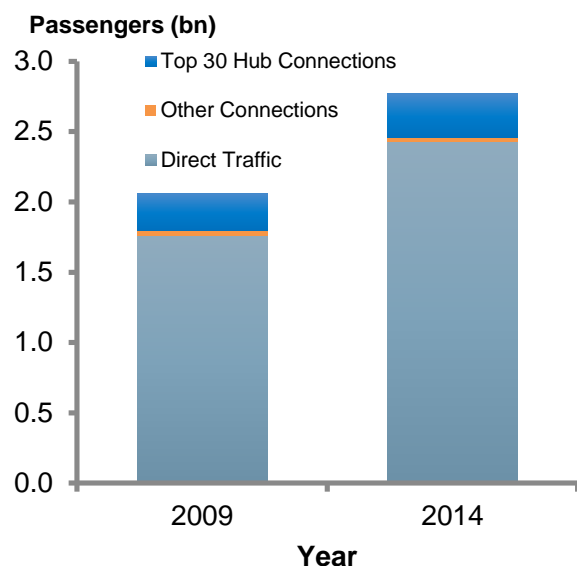
As a result, the significance of connecting passengers has been growing, as airlines and airports target services to passengers choosing the hub as a stopover. The airports with the highest share of connecting passengers for 2014 and the change since 2009 are depicted on Figure 21.

Figure 21: Top 30 Hub Airports in 2014 by Connecting Passengers (One-Way) Worldwide



Source: Sabre ADI

Figure 22: Direct and Connecting Passenger Splits (One-Way)



Source: Sabre ADI

There are two key themes emerging from air traffic growth in the past 5 years: an overall growth in direct air services over connecting flights, and a consolidation of remaining connecting passengers on the world's major hub airports. Between 2009 and 2014, direct passengers grew at a rate of +6.6% pa, while connecting passengers grew at a rate of +3.0% pa. The global connecting share dropped from 14.4% in 2009 to 12.2% in 2014. Over the same period, the share of connecting passengers using the Top 30 hub airports increased from 89% to 91% between 2009 and 2014.

This trend reflects both increased use of 'hub bypass' aircraft types, such as the Boeing 787, and growth of the mega hubs in the Middle East and other markets.

In particular, the rapid expansion of the Middle Eastern hubs in the last decade, and the Istanbul hub more recently, are developments that have an impact on the profile of transfer passengers worldwide and significantly changing the connecting passenger market at European hub airports in particular.

Located in a geographically central position on the crossroads of Europe and Asia and aided by aviation-promoting governmental policies and targeted aviation infrastructure developments, Emirates, Qatar Airways, Etihad Airways and Turkish Airlines have managed to convince the passenger travelling from Europe (and lately North America) to Australia, Far East and South East Asia that their hubs are a competitive alternative to the traditional European hubs, offering a focused, tailored product for connecting passengers, with high quality services on board and at the hub airport that aim for a seamless connecting process.

Transfer passenger behaviour has been outlined on the following four tables where it is evident that the four hub airports have made leaps in growing their transfer passengers, outperforming global average transfer passenger growth and establishing themselves as the major connecting points between East and West. The main focus for the three Gulf super-connectors is and has been the transfer passenger flow from/to Europe to Far East & Australasia, with a strong secondary flow for them being the Near & Middle East to Far East & Australasia.

For the hub at Istanbul, Europe is the key starting or end point for its main connecting passengers flows that end in Near & Middle East, Far East & Australasia or Europe. Those three flows comprise over 60% of the transfer traffic at the airport.



**Table 1: Istanbul Airport (IST) Transfer Flow Shares and Totals (2014vs2009 Change %)**

Region (Origin / Destination)	Africa	Europe	Far East & Australasia	Latin & Central America	North America	Near & Middle East	Grand Total ('000s)
Africa	0.4% (+445.6%)	5.2% (+353%)	0.7% (+231.8%)	0.0% (+217.6%)	0.6% (+628.5%)	1.7% (+87.5%)	<b>980</b> <b>(+256.0%)</b>
Europe	5.2% (+373.7%)	<b>7.5%</b> <b>(+367.4%)</b>	<b>8.8%</b> <b>(+191.3%)</b>	0.2% (+849.3%)	1.8% (+593.7%)	<b>18.7%</b> <b>(+60.5%)</b>	<b>4,794</b> <b>(+139.0%)</b>
Far East & Australasia	0.8% (+230.6%)	<b>8.8%</b> <b>(+199.7%)</b>	0.0% (+100%)	0.1% (+962.9%)	0.8% (+994.7%)	1.8% (+74.1%)	<b>1,412</b> <b>(+185.9%)</b>
Latin & Central America	0.0% (+272.8%)	0.2% (+870.5%)	0.2% (+1,203.9%)	-	0.0% (+29.1%)	0.2% (+262.3%)	<b>70</b> <b>(+463.7%)</b>
North America	0.6% (+804.4%)	1.8% (+586.9%)	0.8% (+1,197.3%)	0.0% (+17.8%)	0.0% (+38.4%)	2.5% (+193.2%)	<b>635</b> <b>(+355.5%)</b>
Near & Middle East	1.7% (+87.1%)	<b>18.9%</b> <b>(+61.3%)</b>	1.6% (+95.0%)	0.2% (+276.7%)	2.5% (+191.4%)	5.7% (+48.2%)	<b>3,472</b> <b>(+68.1%)</b>
<b>Grand Total ('000s)</b>	<b>985</b> <b>(+265.3%)</b>	<b>4,822</b> <b>(+139.7%)</b>	<b>1,366</b> <b>(+191.6%)</b>	<b>68</b> <b>(+453.9%)</b>	<b>642</b> <b>(+345.1%)</b>	<b>3,482</b> <b>(+66.8%)</b>	<b>11,364</b> <b>(+127.6%)</b>

**Key:** 1<sup>st</sup> Largest Flow / 2<sup>nd</sup> Largest Flow / 3<sup>rd</sup> Largest Flow

Source: Sabre ADI

**Table 2: Dubai Airport (DXB) Transfer Flow Shares and Totals (2014vs2009 Change %)**

Region (Origin / Destination)	Africa	Europe	Far East & Australasia	Latin & Central America	North America	Near & Middle East	Grand Total ('000s)
Africa	0.4% (+80.1%)	3.9% (+126.2%)	<b>4.1%</b> <b>(+35.1%)</b>	0.1% (+136.3%)	0.7% (+178.2%)	1.2% (+64.6%)	<b>1,949</b> <b>(+73.2%)</b>
Europe	3.8% (+106.9%)	0.0% (+375.7%)	<b>21.7%</b> <b>(+123%)</b>	0.0% (+1,656.4%)	0.0% (+684.9%)	2.0% (+153.7%)	<b>5,122</b> <b>(+123.1%)</b>
Far East & Australasia	<b>4.1%</b> <b>(+32.5%)</b>	<b>21.4%</b> <b>(+120%)</b>	1.0% (+20.8%)	0.8% (+147.3%)	3.8% (+128.1%)	<b>9.1%</b> <b>(+65.6%)</b>	<b>7,506</b> <b>(+90.2%)</b>
Latin & Central America	0.1% (+131.9%)	0.0% (+1,705.3%)	0.8% (+234.1%)	-	0.0% (- +29.6%)	0.1% (+44.8%)	<b>188</b> <b>(+196.6%)</b>
North America	0.6% (+158.7%)	0.0% (+366.7%)	3.7% (+134.9%)	0.0% (+1,136.8%)	0.0% (+107.8%)	1.1% (+145.1%)	<b>1,010</b> <b>(+139.7%)</b>
Near & Middle East	1.2% (+92.6%)	2.1% (+156.7%)	<b>9.2%</b> <b>(+61.2%)</b>	0.1% (+51.1%)	1.2% (+147.6%)	1.4% (+129.3%)	<b>2,820</b> <b>(+82.7%)</b>
<b>Grand Total ('000s)</b>	<b>1,894</b> <b>(+68.6%)</b>	<b>5,116</b> <b>(+123.7%)</b>	<b>7,546</b> <b>(+91.6%)</b>	<b>189</b> <b>(+137.7%)</b>	<b>1,077</b> <b>(+138.1%)</b>	<b>2,773</b> <b>(+83.1%)</b>	<b>18,595</b> <b>(+97.9%)</b>

**Key:** 1<sup>st</sup> Largest Flow / 2<sup>nd</sup> Largest Flow / 3<sup>rd</sup> Largest Flow

Source: Sabre ADI

**Table 3: Abu Dhabi Airport (AUH) Transfer Flow Shares and Totals (2014vs2009 Change %)**

Region (Origin / Destination)	Africa	Europe	Far East & Australasia	Latin & Central America	North America	Near & Middle East	Grand Total ('000s)
Africa	0.1% (+597.7%)	1.4% (+399.9%)	2.6% (+345.5%)	0.0% (+71,854.3%)	0.2% (+865.3%)	1.7% (+183.9%)	<b>431</b> <b>(+303.7%)</b>
Europe	1.4% (+442.8%)	0.0% (+221%)	<b>19.2%</b> <b>(+172.9%)</b>	0.0% (+80,774.5%)	0.1% (+3,192.5%)	2.6% (+72.7%)	<b>1,638</b> <b>(+164.7%)</b>
Far East & Australasia	2.5% (+316.1%)	<b>19.5%</b> <b>(+166.7%)</b>	0.7% (+133.2%)	0.9% (+9,614.4%)	<b>5.6%</b> <b>(+294.6%)</b>	<b>13.8%</b> <b>(+82.2%)</b>	<b>3,020</b> <b>(+150%)</b>
Latin & Central America	0.0% (+9,530.7%)	0.0% (+53,091.7%)	0.9% (+10,135.7%)	-	-	0.1% (+673.9%)	<b>75</b> <b>(+4,318%)</b>
North America	0.2% (+724.2%)	0.0% (+2,194.3%)	<b>5.5%</b> <b>(+308.9%)</b>	-	0.0% (+104.1%)	1.2% (+166.4%)	<b>482</b> <b>(+280.1%)</b>
Near & Middle East	1.8% (+113.3%)	2.6% (+65.4%)	<b>12.9%</b> <b>(+72%)</b>	0.1% (+710.3%)	1.3% (+213.5%)	1.0% (+1.8%)	<b>1,381</b> <b>(+74.2%)</b>
<b>Grand Total ('000s)</b>	<b>425</b> <b>(+246.7%)</b>	<b>1,658</b> <b>(+157.4%)</b>	<b>2,934</b> <b>(+149.3%)</b>	<b>76</b> <b>(+4,206.5%)</b>	<b>504</b> <b>(+286.4%)</b>	<b>1,430</b> <b>(+83.6%)</b>	<b>7,027</b> <b>(+146.1%)</b>

**Key:** 1<sup>st</sup> Largest Flow / 2<sup>nd</sup> Largest Flow / 3<sup>rd</sup> Largest Flow

Source: Sabre ADI

Table 4: Doha Airport (DOH) Transfer Flow Shares and Totals (2014vs2009 Change %)

Region (Origin / Destination)	Africa	Europe	Far East & Australasia	Latin & Central America	North America	Near & Middle East	Grand Total ('000s)
Africa	0.2% (+84.2%)	1.4% (+73.4%)	4.4% (+72.6%)	0.0% (+1,107.2%)	0.6% (+407.3%)	2.9% (+105.6%)	<b>844</b> <b>(+90.5%)</b>
Europe	1.3% (+72.1%)	0.0% (+588.7%)	18.4% <b>(+164.2%)</b>	0.0% (+50,519.5%)	0.0% (+2,632.3%)	3.4% (+93%)	<b>2,052</b> <b>(+144.1%)</b>
Far East & Australasia	4.5% (+78.3%)	18.6% <b>(+152.4%)</b>	0.4% (+152%)	0.6% (+1,433.6%)	4.4% (+110.4%)	10.4% <b>(+83.5%)</b>	<b>3,455</b> <b>(+118.2%)</b>
Latin & Central America	0.0% (+907.4%)	0.0% (+36,103.5%)	0.7% (+1,428.5%)	-	-	0.1% (+2,275.2%)	<b>73</b> <b>(+1,495.9%)</b>
North America	0.4% (+389.6%)	0.0% (+1,164.2%)	4.2% (+122.9%)	-	0.0% (+188.3%)	1.4% (+306.8%)	<b>530</b> <b>(+160.9%)</b>
Near & Middle East	2.8% (+95.4%)	3.6% (+101.9%)	10.6% <b>(+63.8%)</b>	0.1% (+2,542.2%)	1.6% (+346%)	2.5% (+148.7%)	<b>1,884</b> <b>(+92.1%)</b>
<b>Grand Total ('000s)</b>	<b>824</b> <b>(+87.9%)</b>	<b>2,093</b> <b>(+137.3%)</b>	<b>3,425</b> <b>(+114.2%)</b>	<b>70</b> <b>(+1,542.7%)</b>	<b>593</b> <b>(+158.2%)</b>	<b>1,833</b> <b>(+103.2%)</b>	<b>8,838</b> <b>(+117.9%)</b>

Key: 1<sup>st</sup> Largest Flow / 2<sup>nd</sup> Largest Flow / 3<sup>rd</sup> Largest Flow

Source: Sabre ADI

Statistical Annex B provides an overview on the top hub airports worldwide.

## Airline Statistics

Airline passenger traffic (measured in RPKs) grew at +6.0% in 2014, compared with global GDP growth of +3.3%. The International Civil Aviation Organisation (ICAO) reported that airlines carried 3.3 billion passengers in 2014, a +5.5% increase on 2013. The global airline industry grew at or above the long-term growth rate for three consecutive years based on sound fundamentals, while productivity continued to increase on historically high airplane utilization and passenger load factors. Specifically, load factors in 2014 improved slightly to 80%, showing that airlines are matching demand without oversupplying capacity<sup>15</sup>.

Table 5: Top 200 Airline Key Traffic Figures by Region

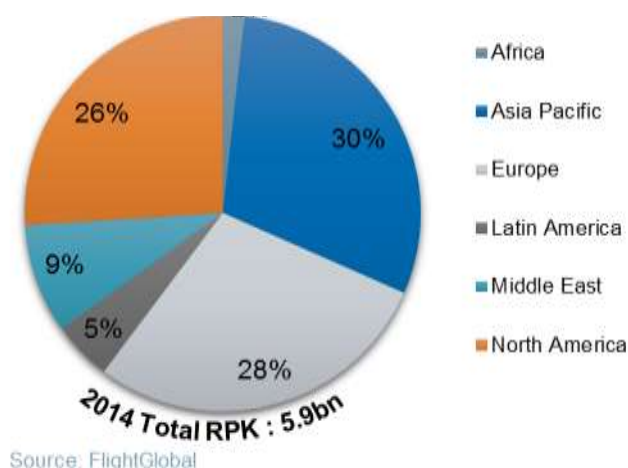
Region	Passenger traffic (RPK)		Load Factors		Passenger numbers	
	million	change %	%	change	million	change %
Africa	104,530	2.0	68.8	-1.5	42	6.3
Asia Pacific	1,765,358	7.0	77.9	-0.4	930	7.4
Europe	1,694,832	6.3	82.3	0.4	830	6.5
Latin America	285,489	5.6	80.0	1.9	202	5.4
Middle East	528,300	11.5	78.2	0.8	147	11.1
North America	1,536,863	3.0	83.4	0.3	813	2.9
<b>Grand Total</b>	<b>5,915,370</b>	<b>6.0</b>	<b>80.5</b>	<b>0.2</b>	<b>2,964</b>	<b>5.9</b>

Comparing traffic performance on a region by region basis, Middle East and Asia Pacific once again led all regions with high year on year traffic growth. Europe traffic grew at +6.3% in 2014, far outpacing economic growth, while North America traffic grew at +3.0%. Carriers in Africa and Latin America saw slower growth in 2014 due to a softer economy compared to prior years.

Source: FlightGlobal, World Airline Rankings 2015

<sup>15</sup> Boeing Current Market Outlook 2015

Figure 23: Top 200 Passenger Airlines Traffic by Region (RPK)

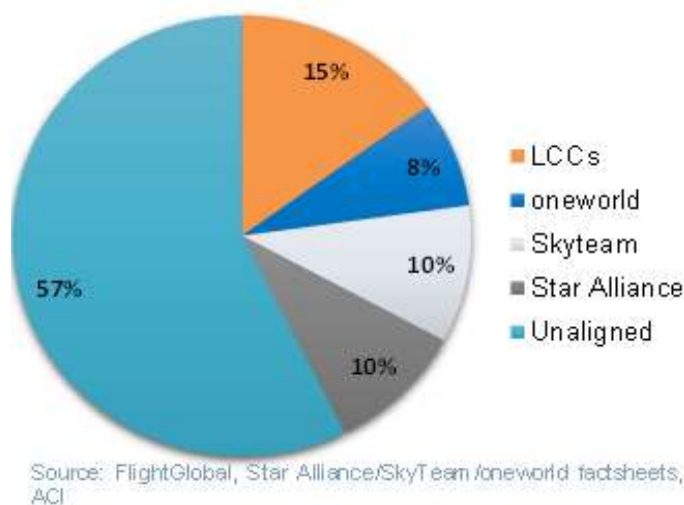


When measured in RPKs, the traffic share for North American, European and Asian Pacific Airlines has been quite evenly split, with those three regions jointly capturing 84% of total RPKs in 2014. Middle Eastern airlines captured 9% of global traffic in 2014 and had the highest rate of growth.

Regarding business models, it is becoming increasingly difficult to discern between full service/mainline and low cost carries, at least on short haul flights where many of the features of the low cost business model have been emulated

by full service operators and vice versa. However, using FlightGlobal groupings, the majority of RPKs flown were by mainline airlines in 2014, which, combined with the lower fuel prices explains the improved profitability of a lot of full service carriers.

Figure 24: Traffic Shares for the Main Airline Groups



Low cost carriers captured less than 20% of the total 2014 RPKs, as low cost carriers mostly operate short haul route networks. Leisure and regional airlines served combined just 5% of the RPKs of 2014, as they tend to operate shorter routes and also because of the large penetration of low cost business models in the markets they have been historically serving.

In terms of Airline Alliance Traffic Share, the numbers have evened in 2014, with both Star Alliance and SkyTeam serving 10% of the total passenger traffic, while oneworld served circa 8%. This slowdown in growth has been identified as a focus on delivering value instead of growing in member, by all three alliances. Finally, over 50% of total passengers were

carried by unaligned airlines.

## Top Airlines by RPK – Worldwide

The following table shows the top 10 airlines in international, domestic and total RPKs flown in 2014. Emirates have continued expansion of their extensive international network, as the largest international airline by a wide margin. Southwest Airlines outperformed the US major full service carriers in domestic RPKs. In total RPKs, following a strong growth in 2013, Delta Airlines continued to expand, maintaining the top spot.

Table 6: Top 10 Airlines by International, Domestic and Total Scheduled Passenger Kilometres Flown

2014 Rank	International Airline	International	Domestic Airline	Domestic	Total (International + Domestic) Airline	Total (International + Domestic) Millions
1	Emirates	230,855	Southwest Airlines	162,445	Delta Air Lines	290,862
2	United Airlines	143,344	Delta Air Lines	158,075	United Airlines	287,547
3	Lufthansa	138,663	United Airlines	144,203	Emirates	230,855
4	British Airways	133,943	China Southern Airlines	130,839	American Airlines	208,046
5	Delta Airlines	132,786	American Airlines	122,010	China Southern Airlines	166,074
6	Air France	126,493	US Airways	75,584	Southwest Airlines	162,445
7	Ryanair	108,173	China Eastern Airlines	71,945	Lufthansa	143,403
8	Cathay Pacific Airways	100,032	Air China	67,103	British Airways	137,204
9	Singapore Airlines	94,664	JetBlue	50,068	Air France	134,528
10	Qatar Airways	91,800	Hainan Airlines	44,158	Air China	112,247

Source: IATA, World Air Transport Statistics (WATS) 2014

## Top Airlines by Passengers – Worldwide

In terms of actual passengers carried, low cost carriers have a higher market share than when measured by RPKs, due to the short haul nature of their networks. Ryanair and easyJet have continued their rapid growth, ranking first and second in international passengers carried, while Southwest ranks first in domestic passengers carried. It is also important to note that in the top 10 rankings by total passengers, there are three Chinese operators, signifying once more the strong growth of air travel in China.

Table 7: Top 10 Airlines by International, Domestic and Total Scheduled Passengers Carried

2014 Rank	International Airline	International (000s)	Domestic Airline	Domestic (000s)	Total (International + Domestic) Airline	Total (International + Domestic) (000s)
1	Ryanair	86,370	Southwest Airlines	129,087	Delta Air Lines	129,433
2	easyJet	56,312	Delta Air Lines	105,190	Southwest Airlines	129,087
3	Lufthansa	48,244	China Southern Airlines	91,729	China Southern Airlines	100,683
4	Emirates	47,278	American Airlines	67,761	United Airlines	90,439
5	British Airways	35,364	United Airlines	64,731	American Airlines	87,830
6	Air France	31,682	China Eastern Airlines	57,986	Ryanair	86,370
7	Turkish Airlines	31,016	US Airways	48,043	China Eastern Airlines	66,174

2014	International		Domestic		Total (International + Domestic)	
Airline	Airline (000s)		Airline (000s)		Airline (000s)	
8	KLM	27,740	Air China	46,466	easyJet	62,309
9	United Airlines	25,708	All Nippon Airways	39,277	Lufthansa	59,850
10	Delta Air Lines	24,243	Gol Airlines	36,311	Air China	54,577

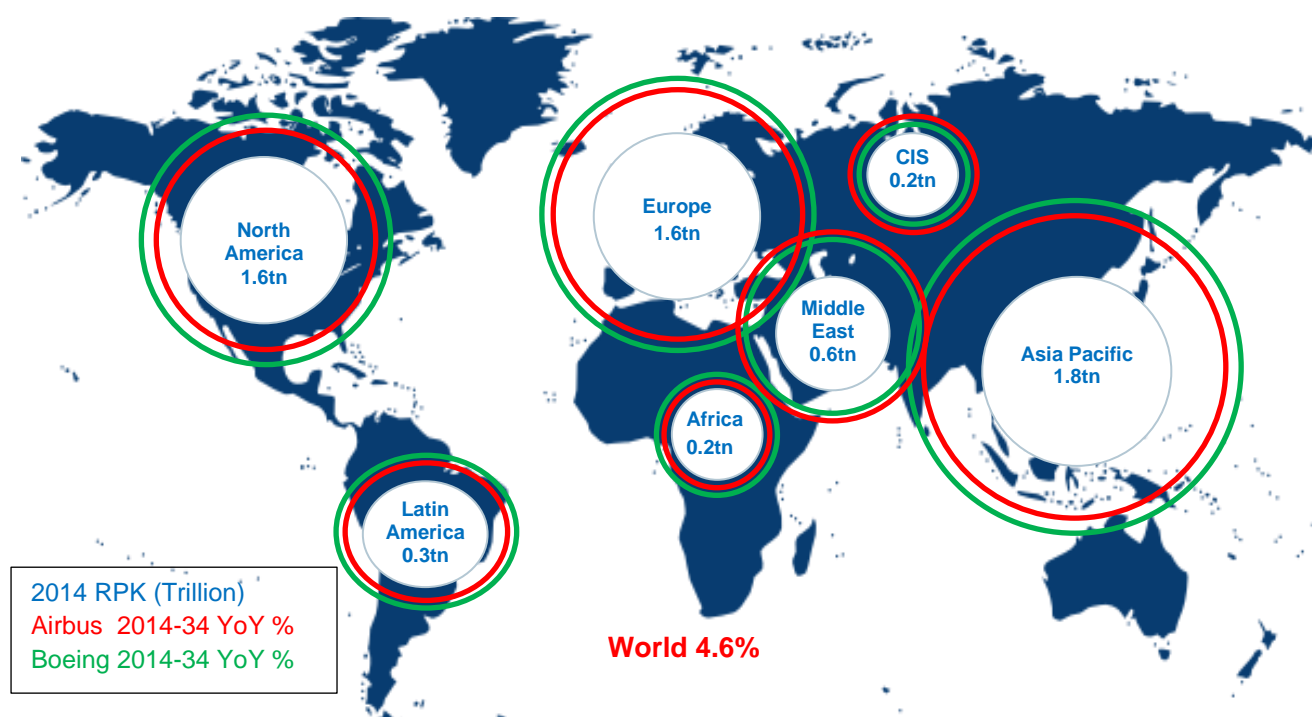
Source: IATA, World Air Transport Statistics (WATS) 2014

Additional information on airlines' traffic statistics for 2014 can be found in Statistical Annexes C & D.

## Long Term Global Outlook

As part of their long term strategic planning, Airbus and Boeing publish their view forecasts of air travel demand for the next 20 years. These two market outlooks provide insights on the manufacturers perceptions of global and regional growth of commercial aviation, based on macroeconomic indicators, aircraft orders and industry expertise. Forecasts are also published by other aircraft manufactures, such as Bombardier, Embraer or the Japanese Aircraft Development Corporation (JADC).

Figure 25: Air Traffic Growth Projections by Region for 2015-2034



Source: Airbus/Boeing

Looking at Figure 25, there are evident differences regarding perception of individual region performance, although the global air traffic growth is projected by both manufactures at 4.5-5%.

Furthermore, both Boeing and Airbus see the Middle East as the region with the highest expected growth rate over the next 20 year period. Overall, the Airbus projections for the Americas, Europe, Africa and Asia-Pacific are slightly more conservative than Boeing, but with higher anticipated growth in the Middle East and CIS countries.

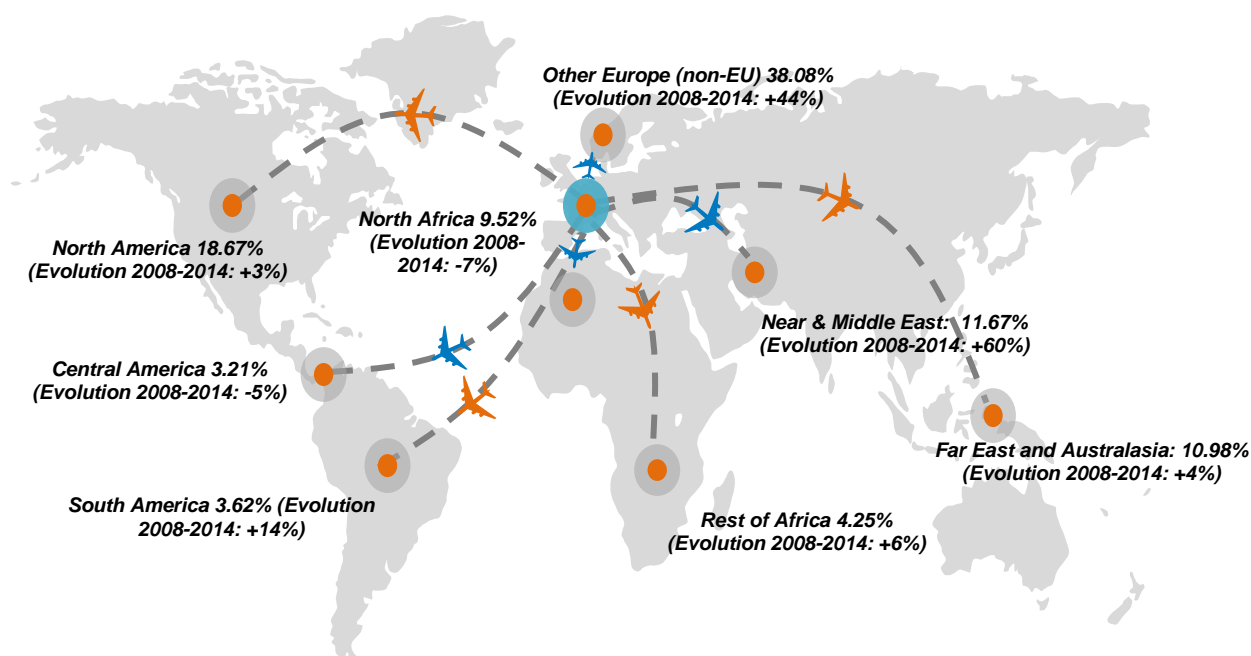
Long term projections from JADC are consistent with the Boeing and Airbus forecasts, predicting an average annual growth rate of 4.7% between 2015 and 2034 for global RPKs. Finally, while emerging aviation markets accounted for 34% of global passenger traffic in 2013, these markets are projected to represent as much as 50% of global passenger traffic by 2031, according to ACI forecasts<sup>16</sup>.

## Passenger Performance by Region: Europe

### Introduction

Europe's air travel market remained strong in 2014 despite significant economic uncertainties. Europe's GDP grew by 1.4% in 2014 and is forecast to grow by 1.8% annually through 2034. As witnessed on Figure 6, the key air passenger flows for 2014 is between EU and non-EU, accounting for almost 40% of the traffic. The strong evolution of this traffic flow (+44% since 2008) can be mostly attributed to the beneficial impact on connectivity between the EU and non-EU Eastern European destinations (e.g., the Balkan states, Russia and Turkey) due to the expansion of low cost carrier services. North America to Europe, traditionally one of the most profitable routes and an area of focus for many full service carriers from either side of the Atlantic captured almost 20% of the total traffic from/to EU, albeit not showing any significant passenger growth since 2008. Finally, passengers to North Africa have decreased since the start of the events of Arab Spring, while Near, Middle and Far East flows maintained the growth momentum built in the past six years.

Figure 26: Air Passenger Flows 2014 Share and Historic Evolution From/To Europe (EU28)



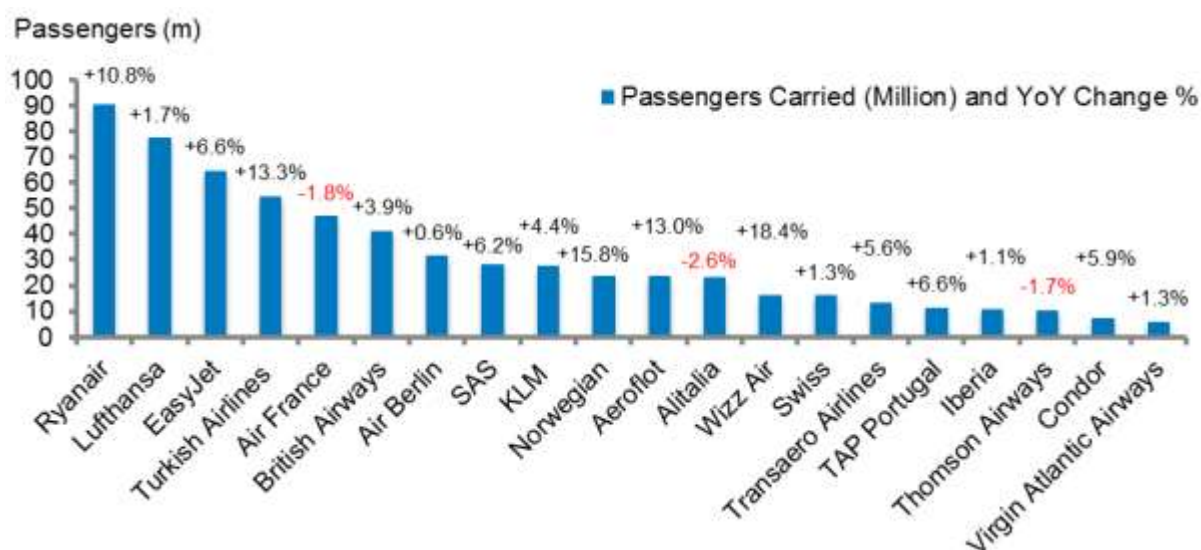
Source: Eurostat

<sup>16</sup> ACI, 2014 Airport Economics Report

## Airline Outlook

The Association of European Airlines reports that member airlines carried 3% more passenger traffic in 2014 than in 2013<sup>17</sup>. Members of the European Low Fares Airline Association reported a 9.3% increase in passengers over 2013<sup>18</sup>. European airlines acquired more than 180 new airplanes in 2014, of which 70% were single aisle<sup>19</sup>. Overall, European airlines experience strong growth in passenger traffic for 2014, with the likes of Wizz Air, Norwegian, Turkish Airlines, Aeroflot and Ryanair achieving a double digit growth rate. There were three European airlines that did not record growth in 2014: Air France, Alitalia and Thomson Airways.

Figure 27: Top 20 Airlines in Passengers Carried in 2014 - Europe



Source: Airline Business

Airline operations in Europe continue to evolve with the launch of new ventures, routes, and business models. The introduction of the Boeing 787 has allowed operators to economically serve long-haul, nonstop markets that have not been served before. European operators have been on the forefront of this trend, with 69 long-haul routes introduced since 2012—the most of any region<sup>20</sup>. The introduction of more efficient aircraft has helped European carriers both to improve their load factors, but also to increase their RPKs and ASKs as they fly routes of longer length.

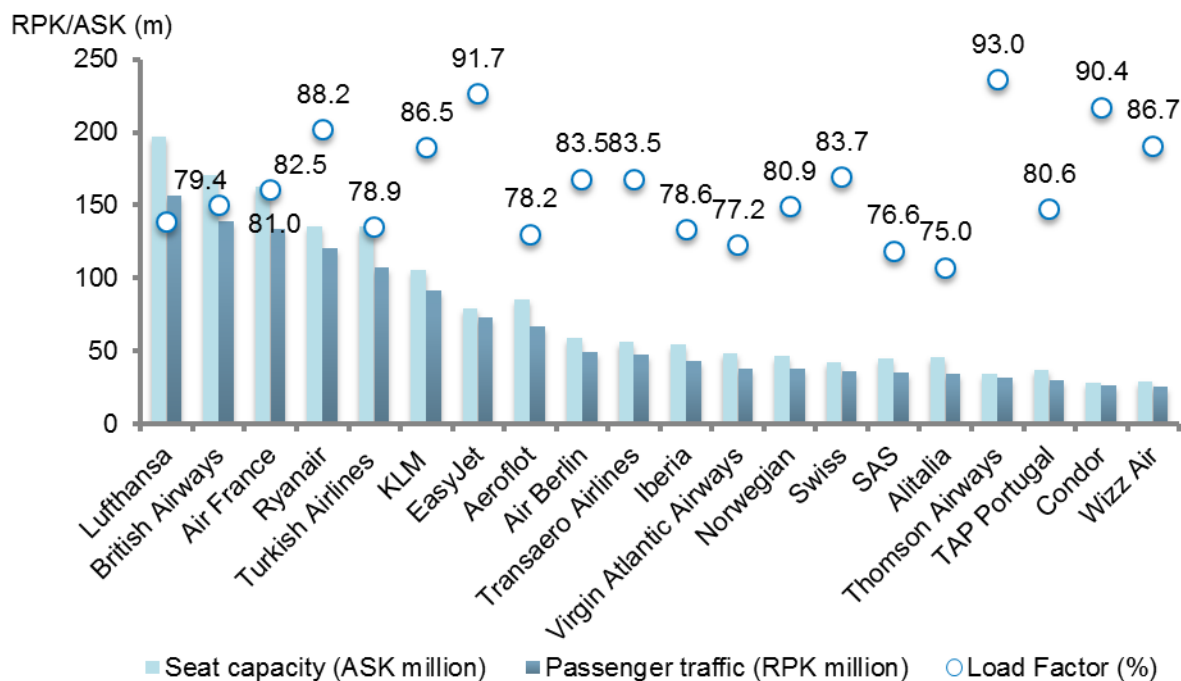
<sup>17</sup> <http://www.aea.be/component/newsletter/newsletter/85.html?tmpl=newsletter>

<sup>18</sup> [http://www.elfaa.com/150305\\_ELFAA\\_PressRelease\\_ELFAA\\_Stats\\_2014.pdf](http://www.elfaa.com/150305_ELFAA_PressRelease_ELFAA_Stats_2014.pdf)

<sup>19</sup> Boeing Current Market Outlook

<sup>20</sup> Boeing Current Market Outlook

Figure 28: Top 20 Passenger Airlines in RPKs for 2014 - Europe



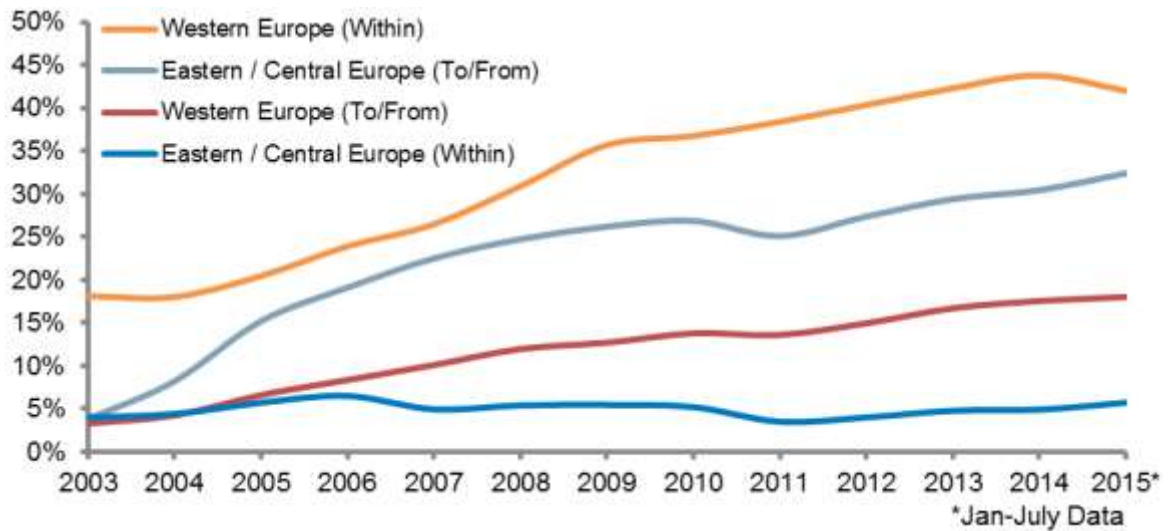
Source: Airline Business

As can be seen on Figure 28, European airlines have managed to match demand with capacity efficiently in 2014, achieving on average high load factors. Thomson Airways recorded the highest load factor of 93%, while second ranked easyJet, with an impressive 91.7% for the second largest European low cost carrier. Low-cost carriers (LCCs) continue to grow short-haul markets, providing 42% of intra-Europe capacity in 2014.

However, LCC penetration in European markets has been historically focused on Western Europe as can be seen on Figure 29. Eastern/Central Europe offers significant opportunities to LCCs. The region's faster-growing, lower-wage economies are relatively under-penetrated by the low cost model and by air travel in general, compared with Western Europe. Furthermore, outside Russia, Turkey and Greece, the region contains very few sizeable legacy airlines and even fewer in strong financial health, as the default of Cyprus Airways in early 2015 demonstrates. Wizz Air and Ryanair are already established as the two leading airlines in Eastern/Central Europe (excl. Russia, Turkey and Greece) and whichever of the two lowest unit cost airlines of Europe can win the fight for cost leadership will likely be the long term winner in Eastern/Central Europe.



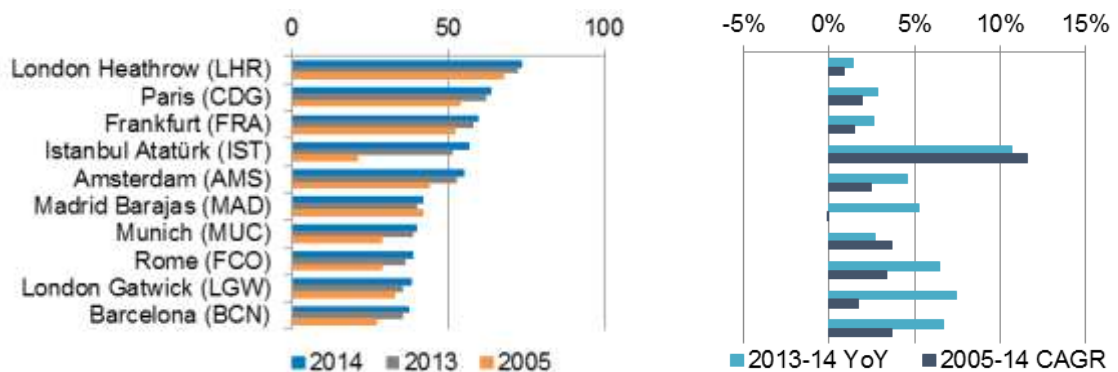
Figure 29: LCC Capacity Share of Total Seats in Western, Eastern & Central Europe



Source: CAPA Centre for Aviation, OAG

## Airport Outlook

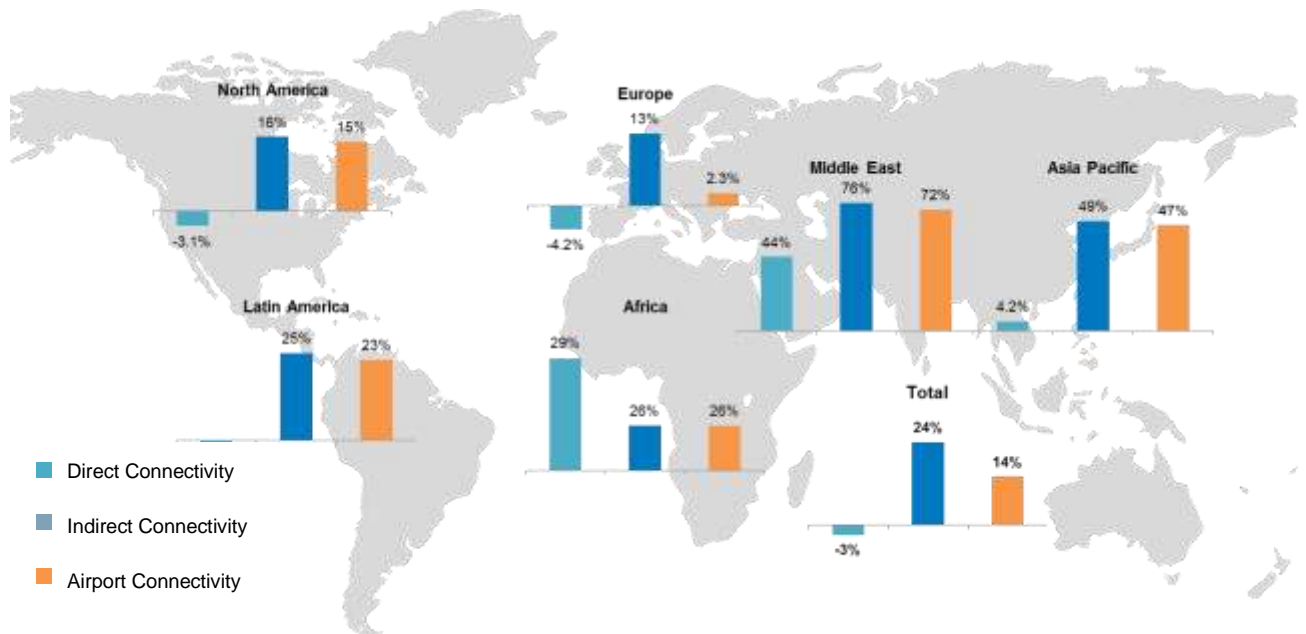
Figure 30: Top 10 Airports in 2014 by Passenger Traffic - Europe



Source: ACI World Traffic Reports

Over the past few years European airlines have generally been more focused on growing yields (unit revenues) rather than adding new capacity into the market and network growth. In practice this means a retrenchment to core routes and larger airport markets as well as less additional caution in launching new routes. This has an impact on the large European hub airports, which have all grown significantly in the last five years, coming at or close to full capacity utilisation. In the top ten traffic rankings, of note is the double digit average annual growth rate of Istanbul Atatürk airport from 2005 to 2014, reflecting the vast expansion of the hub's main carrier, Turkish Airlines worldwide.

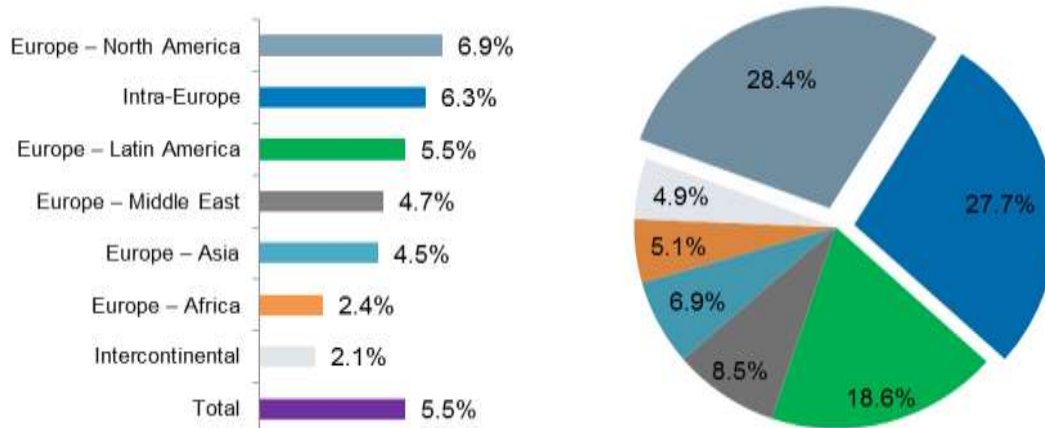
Figure 31: Direct, Indirect & Airport Connectivity from EU Airports by World Region (2015 vs 2008)



Source: ACI EUROPE Airport Industry Connectivity Report 2015

In a recently published report of ACI Europe on European airport connectivity, the key message has been that European airports connectivity has finally surpassed pre 2008 recession levels<sup>21</sup>. On Figure31 the growth of direct, indirect and total airport connectivity from European airports to each world region is depicted. When the findings of Figure31 are combined with those of Figure 23 it is evident air connectivity within Europe and to North America improved significantly, indicating a clear direction of growth towards mature markets. Furthermore, air connectivity growth to the Middle East has substantially outperformed the growth to other World regions since 2008, which leads to both important opportunities and challenges in terms of Europe’s connectivity, in particular with the emerging economies of Asia-Pacific.

Figure 32: Hub Connectivity between Europe and World Regions - 2014/15 Growth and 2015 Share



Source: ACI EUROPE Airport Industry Connectivity Report 2015

<sup>21</sup> ACI EUROPE Airport Industry Connectivity Report 2015

However, this growth in connectivity has been unevenly distributed, with more than 1 out of 3 airports not yet reaching pre 2008 recession levels in total airport connectivity. Additionally, the connectivity growth has been focused on indirect connectivity of EU airports via mainly Middle Eastern hubs to the various world regions, instead of direct connections.

The patterns described above are apparent in the tables below, where the new and cancelled scheduled routes from/to the EU are summarised.

Table 8: New and Cancelled Scheduled Routes from/to the EU in 2014 and 2015 by Region and by Country (20 Most Active Countries)

Destination Continent	Cancelled		Started	
	2014	2015	2014	2015
Africa	134	117	147	88
Asia	42	46	39	39
North America	12	23	42	32
Middle East	30	42	63	43
South America	4	7	9	6
Central America	0	1	0	1

Destination Country	Cancelled		Started	
	2014	2015	2014	2015
Egypt	65	32	22	29
Tunisia	13	23	65	21
Morocco	19	24	27	15
United States	8	17	31	24
Israel	8	16	21	14
Cape Verde	15	13	7	4
United Arab Emirates	7	7	16	8
Russia	8	19	8	2
Lebanon	5	7	7	3
Algeria	2	3	11	4
China	1	3	5	11
Canada	2	4	5	6
Iraq	4	3	5	5
Uzbekistan	13	3	1	0
Brazil	3	4	6	0
Georgia	5	2	3	2
Mexico	2	2	5	2
Libya	2	9	0	0
Armenia	0	4	5	1
Saudi Arabia	0	2	5	1

Source: SRS Analyser

Africa has been the continent where the most changes in scheduled services from/to Europe have occurred, mainly due to leisure seasonal passenger profile that most North Africa countries predominantly serve (e.g. Egypt, Tunisia and Morocco). Security concerns, the low cost airline model and the short sector length are all factors that have resulted in not only the cancellation but also the launch of routes to these countries.

Source: SRS Analyser

Subsequently, North America has also been a region where many scheduled route changes have occurred lately, as a result mainly of the efforts of full service and low cost carriers to capture a share of the Transatlantic market (not always successfully). Finally, Middle East routes to/from the EU have been changing as competition on existing routes increases (driving airlines out of certain markets), partnerships between European airlines and the Gulf carriers are strengthened (opening up more connecting points in Europe) and Gulf carriers' expansion strategy to secondary European airports is further implemented.

## Short and Medium Term Outlook – EUROCONTROL Forecast

The STATFOR (Statistics and Forecasting) section of EUROCONTROL regularly produces short and medium term flight movement forecasts for European airspace.

It should be noted that EUROCONTROL's forecasts produce outputs as measured by air transport movements, or more specifically, IFR movements. Aircraft operating under instrument flight rules (IFR) are those flying in controlled airspace under regulations and procedures which allow the flight crew to navigate solely by reference to cockpit instruments and radio navigation aids.

For the short term, the EUROCONTROL state-level forecast for 2015 has been revised downwards since the September 2014 forecast to 1.5% ( $\pm 1.0pp$ ). This traffic outlook is based on the fragile economic outlook of the Scandinavian countries, the strong deterioration of Russia and the unchanged air fares despite the reduction in oil prices. Those factors offset the solid growth rates expected for 2015 summer in Southern countries. For 2016, a more steady growth of 3% is foreseen, in line with previous projections made in September 2014

Regarding the busiest European States; the forecasts for Germany and France have been revised downwards to 0.9% and 1.3% respectively in 2015 (compared to the previous forecast). On the other hand, the 2015 forecasts for Spain and Italy have been revised upwards to 4.1% and 2%, respectively. UK forecast is stable (compared to the previous forecast) with a growth rate of 1.9% in 2015<sup>22</sup>.

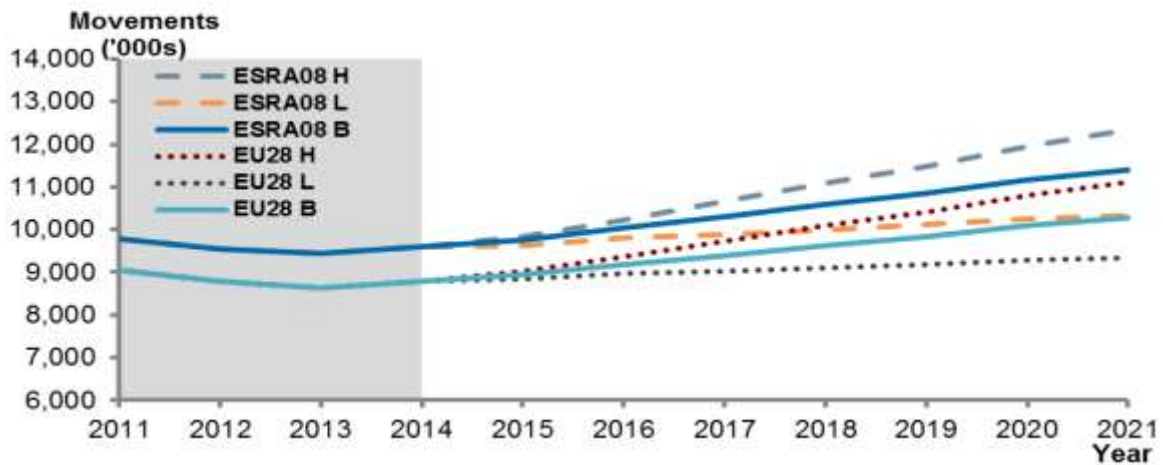
As for the medium term seven year forecast, for the first part of the horizon (2016-2018), annual growth rates will average at 2.8% notably thanks to additional capacity brought by the third airport in Istanbul, Turkey, from end 2017, lifting the constraints on the European network. However, the capacity constraints will weigh again as of 2019 with growth rates levelling off at 2.5%.

The new forecast is for 11.4 million IFR movements ( $\pm 1$  million) in Europe in 2021, accounting for 19% more than in 2014. By 2021, the high-growth scenario has 0.9 million more and low-growth scenario 1 million fewer flights than the base scenario. This forecast assumes no return to "normal" routing will happen by the end of the seven-year horizon (2021). That being said, there is a probability that some flights through Ukraine will be restored, which would result in significant variations in the forecast results.

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<sup>22</sup> EUROCONTROL Seven-Year Forecast February 2015

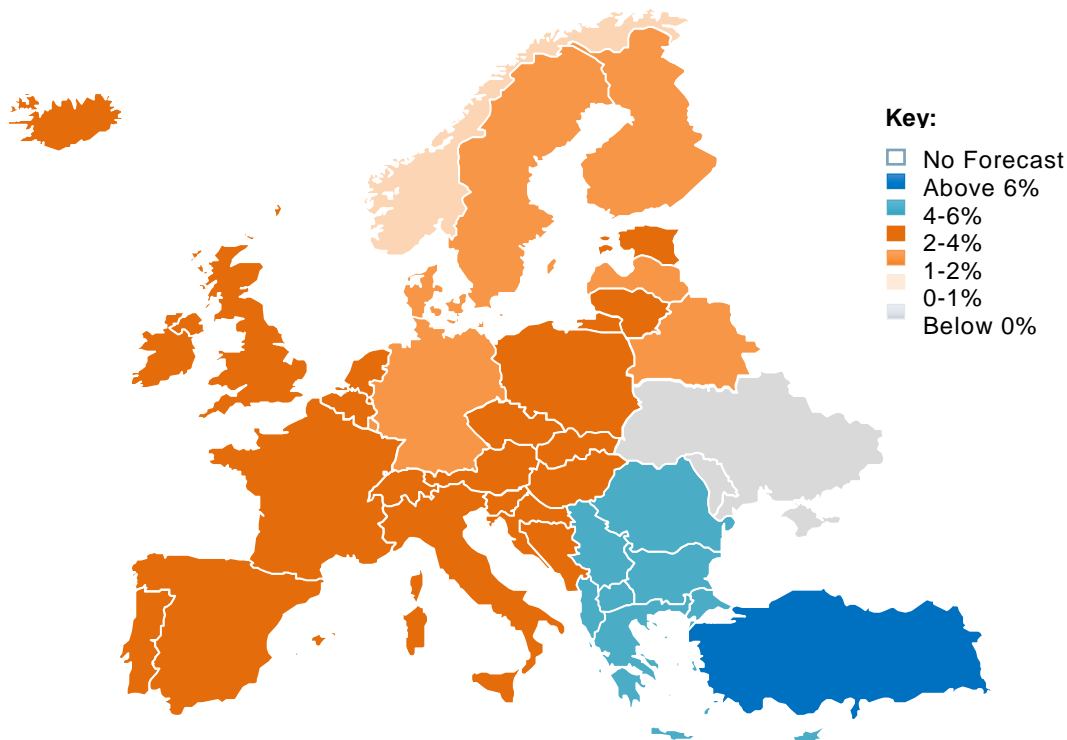
Figure 33: EUROCONTROL IFR Flight Movements Medium Term Forecast Scenarios



Source: Eurocontrol

A breakdown of the projected medium term traffic growth rates for each region is illustrated on Figure 34. The growth is not uniform across Europe. While the growth (in % terms) is much weaker in the more mature markets of Western Europe, it is still the busiest States (France, Germany, Spain followed by UK, Italy and Belgium/Luxembourg) which will see the greatest number of extra flights per day. Turkey will both see the fastest growth rates (6.0% as average annual growth rate over the 7 years) and the highest number of extra flights per day (2,330 additional flights per day in 2021), being the biggest contributor to the growth in Europe<sup>23</sup>.

Figure 34: Medium Term EUROCONTROL Forecast of IFR Flights for 2014-21



Source: Eurocontrol

<sup>23</sup> EUROCONTROL Seven-Year Forecast February 2015

Regarding the constraining factors to air traffic growth identified in Eurocontrol's forecasts, expansion of the high-speed train network reduces flight growth by just 0.6% over 7 years, though the local effects are more significant. By 2021, it is assessed that around 72,000 flights will be removed from the network, which is small figure on the scale of the network as a whole, but overall a larger effect than the one included in the February 2014 forecast<sup>24</sup>.

However, on specific city-pairs, the effect can be quite large, especially at the end of the horizon. As far as the States are concerned, France and Turkey will see the largest impacts in terms of flights: respectively a reduction of nearly 21,200 flights and 22,400 flights lost to train in 2021 which corresponds to 5.5% and 3.8% of their internal traffic<sup>25</sup>

Constraints at airports mean that demand for less than 200 thousand flights cannot be accommodated by 2021, which is a 1.7% reduction in growth over the period. Compared to previous estimates of the impact, the main change is in the forecast volume of traffic not in the capacity values.

In the base scenario, by 2021 around 198,000 flights cannot take place because the departure or arrival airport has reached its capacity. That is 1.7% of demand, so represents about 0.2% per year reduction in flight growth. This assumes that airports are able to deliver the capacity plans that they have, which has not always been the case.

Industry responds to constraints in a number of ways: airlines by up-gauging aircraft, or by growing or moving elsewhere; airports by expanding or enhancing their infrastructure; governments by investing in alternative modes, for example. In practice, this implies that some of these unaccommodated flights may be accommodated by other means that are beyond the scope of the present report to analyse.

## Long Term Outlook

Starting from the base of 1.6tn RPKs in 2014, the European aviation market is expected to grow on average by 3.6% to 3.8% annually for the period of 2015-2034. This growth is not going to occur uniformly across all European aviation markets, as it is also not going to happen only within the borders of the European region. As shows, the projected growths of air traffic flows from/to Europe vary significantly (Additional information can be found in the Statistical Annex E).

Regarding intercontinental flows, network airlines are shifting away from short-haul point-to-point traffic to flowing passengers through their hubs on longer itineraries. Despite the higher growth rates projected for destinations such as South and South East Asia, large Middle East airlines are capturing a significant long-haul share from Europe's network carriers by providing one-stop service from Europe to those destinations due to the geographic advantage of Middle East. In response, Europe's network carriers have shifted long-haul capacity to more profitable markets such as the Americas, where their capacity has grown over 16% since 2009.

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<sup>24</sup> EUROCONTROL Seven-Year Forecast February 2015

<sup>25</sup> EUROCONTROL Seven-Year Forecast February 2015

Figure 35: Air Traffic Flows From/To Europe Growth Projections for 2015-2034



Source: Boeing

Within Europe, 3.3% growth is projected and can be mostly attributed to the expansion of short haul point-to-point traffic, targeted by LCCs. Smaller flag carriers and charter airlines will be challenged to compete in an environment where LCCs dominate short-haul, point-to-point service, and large network carriers and their alliance partners exploit the cost advantages of mega-hubs for long-haul traffic. Overall, within European borders the growth projected is amongst the lowest, reflecting the challenges identified.

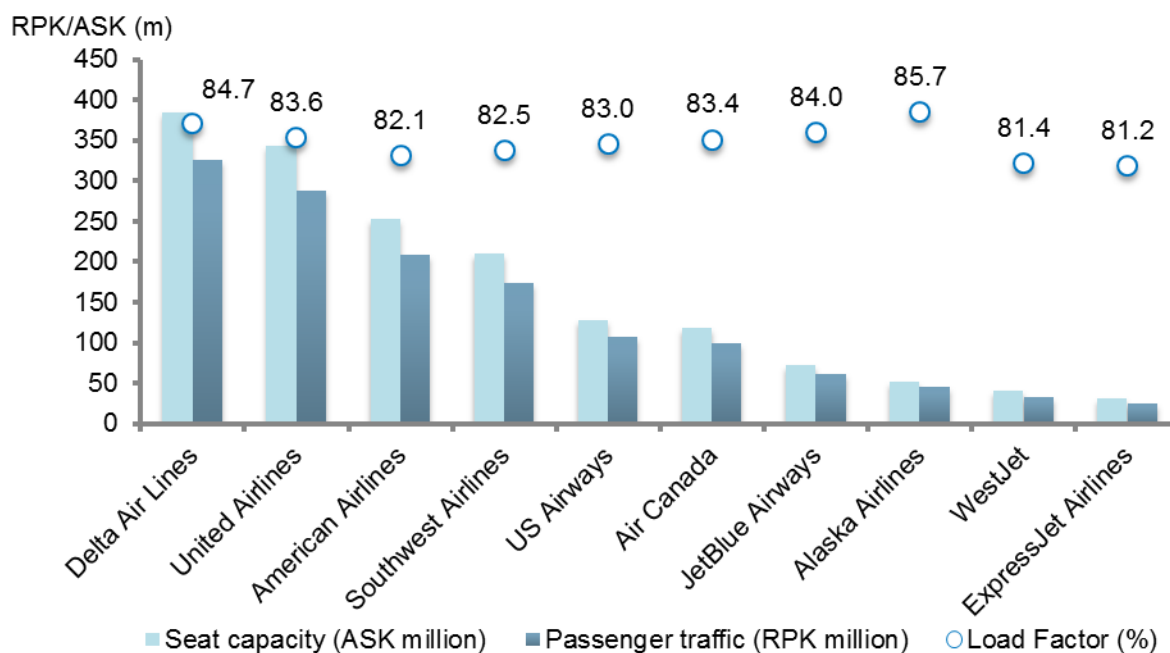
### Passenger Performance by Region: North America

#### Airline Outlook

All the more striking by the fact that it comes after a decade of massive losses, the US airline industry is riding a five-year wave of profitability. The re-emergence of US airlines from the so-called “lost decade” required significant restructuring. Airlines undertook several tactics, including mergers and acquisitions; fleet and network rationalization, capacity discipline, and a strict focus on financial performance. Since 2008, four major airline mergers have occurred in the United States, resulting in the market dominance of those carriers, which now hold at least 85% of all available seat miles.

However, this disciplined approach to network and capacity expansion by the three major US carriers has resulted in Low-cost carriers taking advantage of the flight reductions and backfilling on those routes. It is no surprise that the fastest-growing business segment of the domestic US market in 2014 was LCCs, growing capacity by 3.6% year on year, compared with the 2.5% capacity growth of network carriers versus last year.

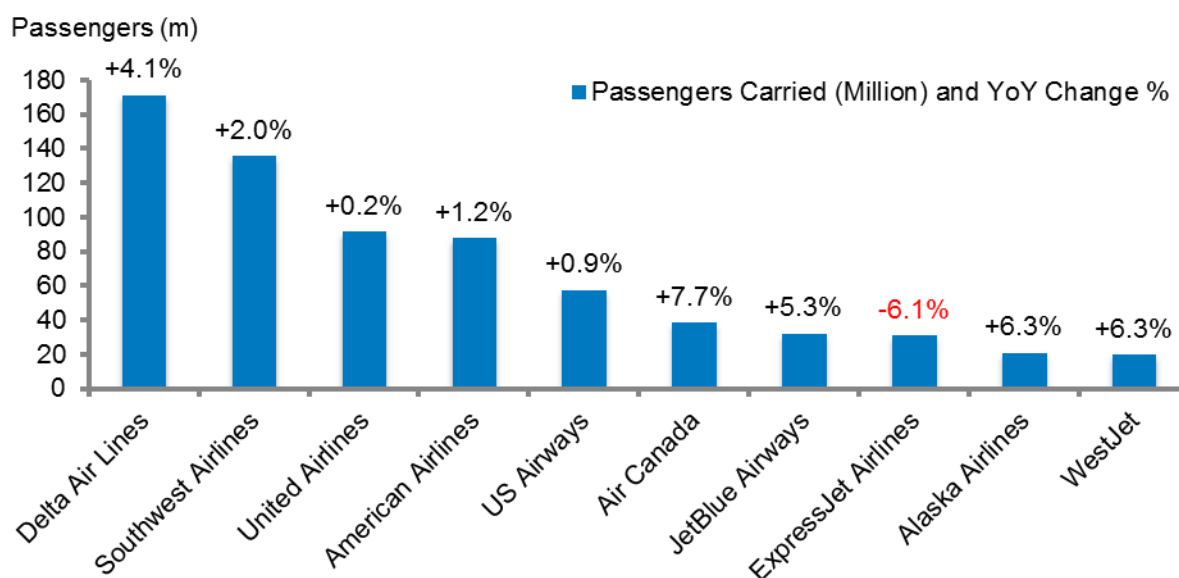
Figure 36: Top 10 Airlines in RPKs for 2014 – North America



Source: Airline Business

Post the 2008 downturn, the introduction of the ultra-low-cost carrier (ULCC) business model in the United States is taking off. Spirit Airlines is the fastest growing domestic airline, recording double-digit growth. Frontier Airlines, which is undergoing a change in strategy, is expected to challenge Spirit in the quest to become the preeminent ULCC in the United States.

Figure 37: Top 10 Airlines in Passengers Carried in 2014 – North America



Source: Airline Business

The expectation is that over time, the industry will further consolidate, with the LCC and smaller network carriers becoming potential consolidation targets. Owing to network carrier capacity

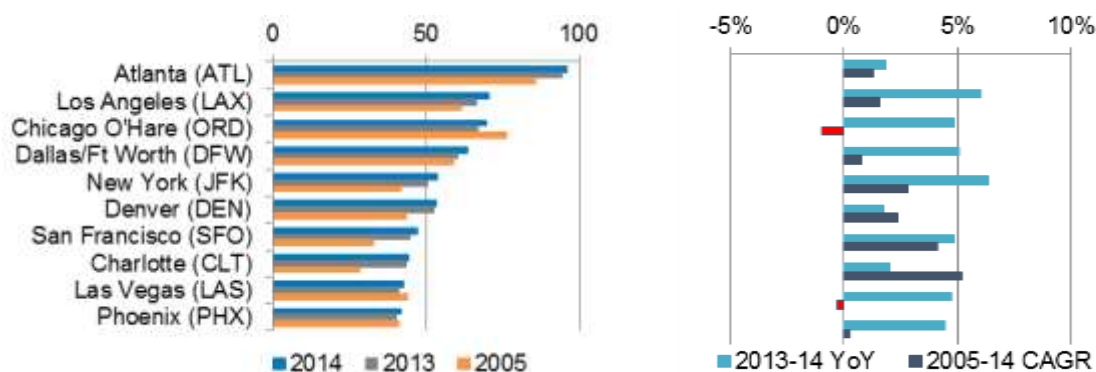


discipline, we think that the domestic US market is ripe for even higher growth than previously forecast. Our revised domestic forecast has traffic growth in the range of 2.5% to 3.0% over the next five years. With a load factor of 83% for 2014 (and average load factors in excess of 80% over the past few years), network carriers may be prompted to further ease their capacity discipline in the face of competitive pressures and continued economic recovery.

## Airport Outlook

Atlanta International airport has served once again the most passengers in North America in 2014. The major hub of Delta Airlines and one of the main hubs of Southwest Airlines has been growing steadily the past ten years. Recently Frontier and Spirit Airlines are increasing their share at the airport, which suggests a further traffic increase in the short term. Los Angeles International airport climbed at the second spot, helped by the strong year that both American and United Airlines have had. Overall, the consolidation of operations of the major three US carriers has emphasised the importance of their major airport hubs as central pieces of their route rationalisation. This can be seen in the growing traffic at those airports year after year, and is expected to continue during 2015 and onwards.

Figure 38: Top 10 Airports in 2014 by Passenger Traffic – North America



Source: ACI World Traffic Reports

## Passenger Performance by Region: Asia Pacific

Asia has become one of the biggest aviation markets in the world with a billion passengers travelling to, from, or within the region each year, while the market is projected to continue to grow by over 100 million new passengers annually. At the same time, airlines and airports in this region are growing strongly, with many of them ranked among the largest in the world. This evolution has been due largely to regional economic growth; liberalization and deregulation; new, efficient airplanes, and new business models. Over the past decade, both the number of the airlines and their jet fleets have almost doubled, while the capacity they provide grows by 7% on average each year.

The low-cost carrier (LCC) business model has proved successful throughout the world but particularly so in Asia Pacific. Over the past 10 years, the region's LCCs have generated an average annual growth rate of 24.5%. By comparison, Europe's LCCs grew 13.4% annually during the same period, and North America's grew a modest 2.2% annually<sup>26</sup>. The countries in Southeast Asia were some of the first in the region to employ the LCC business model, and today, LCCs are flying nearly

<sup>26</sup> Boeing Current Market Outlook

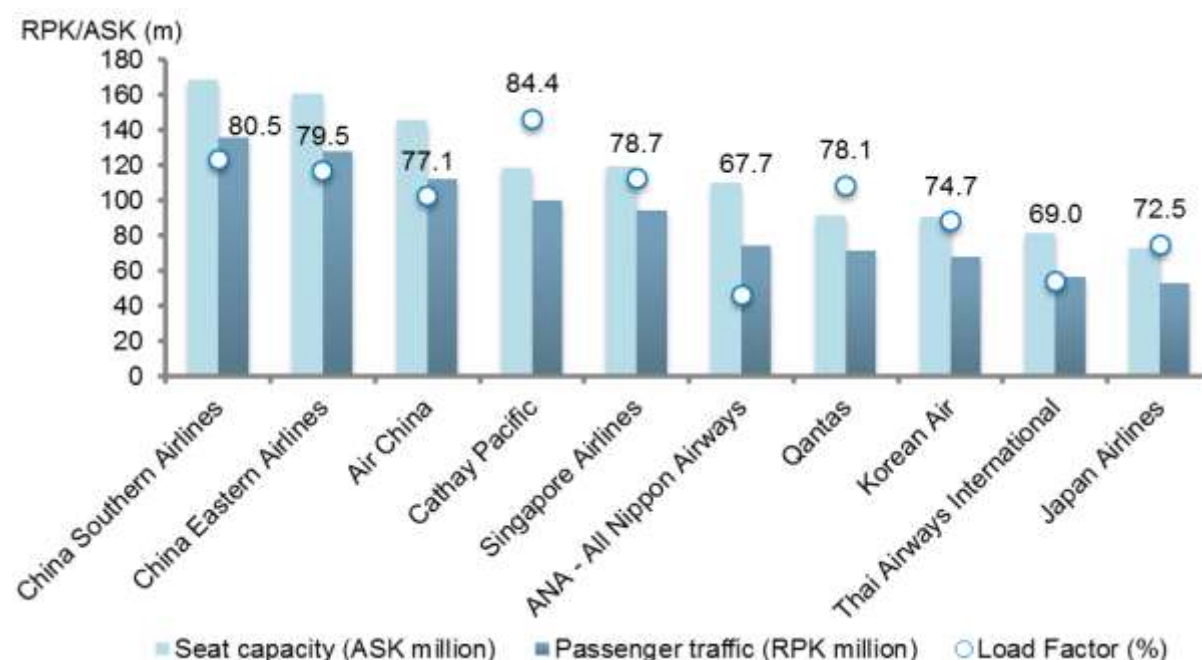
20,000 weekly flights. Northeast Asia, on the other hand, has been slower to see the growth of LCCs, owing in part to the large high-speed rail network in Japan and to an aging population.

China is the latest region to embrace the LCC model, with a large increase in the number of entrants in the past two years. To expand outside their home country, many airlines have created joint-venture subsidiaries to avoid restrictions on foreign ownership. These subsidiaries, which employ the LCC business model, are often cobranded with the parent airline and share its name and livery. Although the vast majority of this activity has been in short-haul markets using single-aisle airplanes, the region is beginning to see joint ventures flying wide-body airplanes on medium-haul operations in response to strong traffic growth.

At the other end of the spectrum, Asia's network carriers include some of the largest, oldest, and most well-regarded airlines in the world, such as Korean Air, Air China, and JAL. However, 2014 was a breakeven year for most of the airlines in Asia Pacific, LCCs and full service carriers alike. As a result, airline restructuring and route rationalisation is likely for a number of airlines, as at the moment the overcapacity observed in many markets of the region has made carriers struggling for profitability, despite their business model.

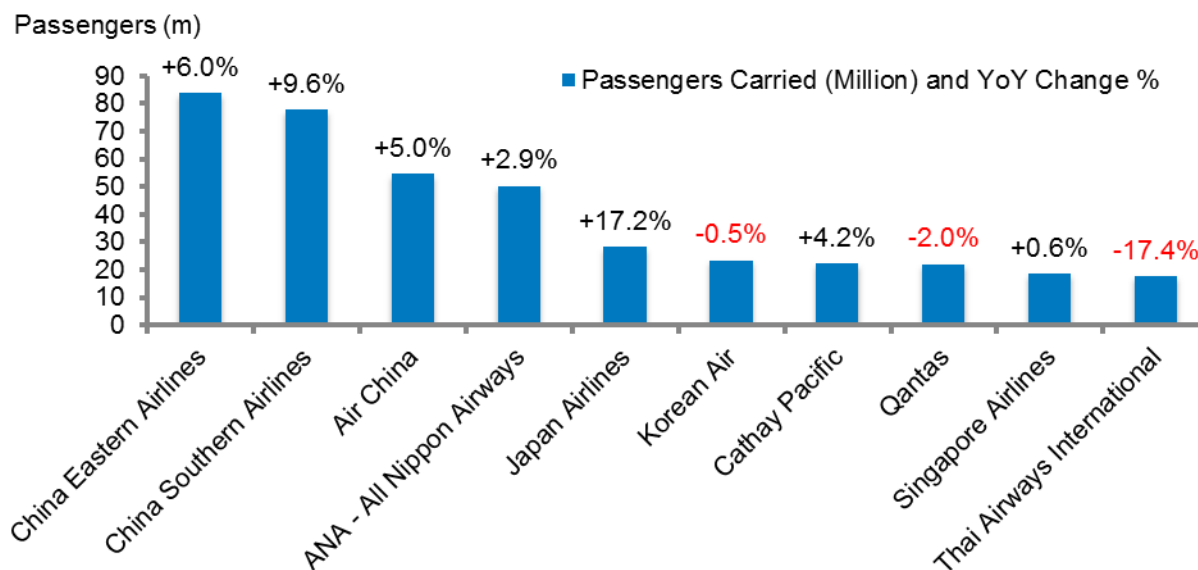
In terms of traffic performance, three Chinese carriers (China Southern, Eastern and Air China) sit at the top of the RPK and ASK ranking, followed by Cathay Pacific and Singapore Airlines. While for the first three, most of these kilometres are within the domestic market, the latter two's performance is fully based on international traffic. Excess capacity is apparent when looking at the average load factor of the top ten carries, with only China Southern and Air China achieving load factors over 80%.

Figure 39: Top 10 Airlines in RPKs for 2014 – Asia Pacific



Source: Airline Business

Figure 40: Top 10 Airlines in Passengers Carried in 2014 – Asia Pacific

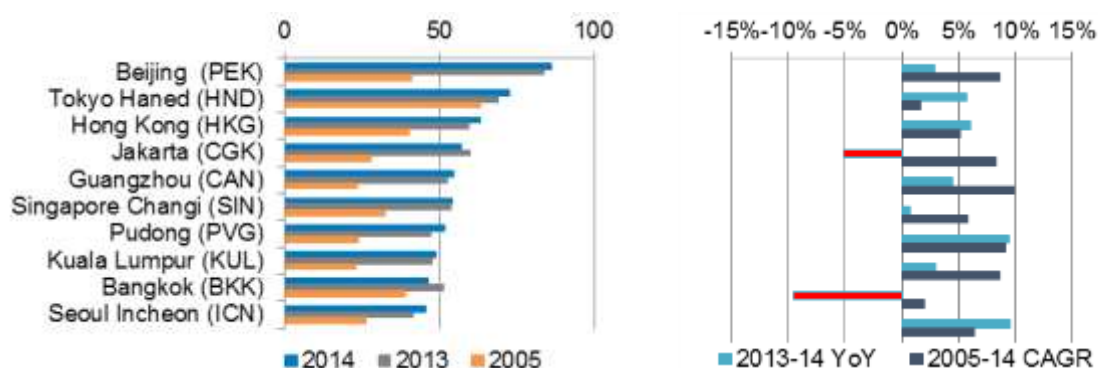


Source: Airline Business

In terms of passengers carried, surely Japan Airlines restructuring is reflected in its traffic performance in 2014, with 17.2% growth year on year. Despite of the strong growth in the Asia Pacific aviation market, 2014 (and 2015) has been marked by safety concerns following a series of unfortunate events involving Asian airlines. As a result, traditional Asia Pacific network carriers are evolving their businesses to address the safety issue and at the same time satisfy passenger needs. They are continually upgrading their fleets for efficiency. Some—such as Qantas, Singapore Airlines, and Thai Airways—have also created their own LCCs to offer products that are similar to what other LCCs offer but without diluting their premium product offerings.

## Airport Outlook

Figure 41: Top 10 Airports in 2014 by Passenger Traffic – Asia Pacific



Source: ACI World Traffic Reports

## Passenger Performance by Region: Middle East

Located at the crossroads between Asia, Africa, and Europe, airlines in the Middle East are well positioned to compete for traffic connecting these regions. About 80% of the world's population lives within an eight-hour flight of the Gulf, allowing carriers in the Middle East to aggregate traffic at their hubs and offer one-stop service between many city pairs that would not otherwise enjoy such direct itineraries.

### Airline Outlook

Partnerships of various kinds also feed Middle East hubs, and between organic growth with selective code sharing, equity stakes in a range of out-of-region carriers and traditional alliance membership, no single strategy has emerged as dominant. Each of these strategies creates opportunities to coordinate schedules across national boundaries, further enhancing the appeal of services connecting the Middle East.

The region's low-cost carriers have also been innovative, reducing short-haul fares, setting up cross-border subsidiaries, and developing mobile booking portals to improve access to air services. The business model is evolving as carriers broaden offerings to include business-class seating and as they expand networks into previously underserved areas, such as the Commonwealth of Independent States.

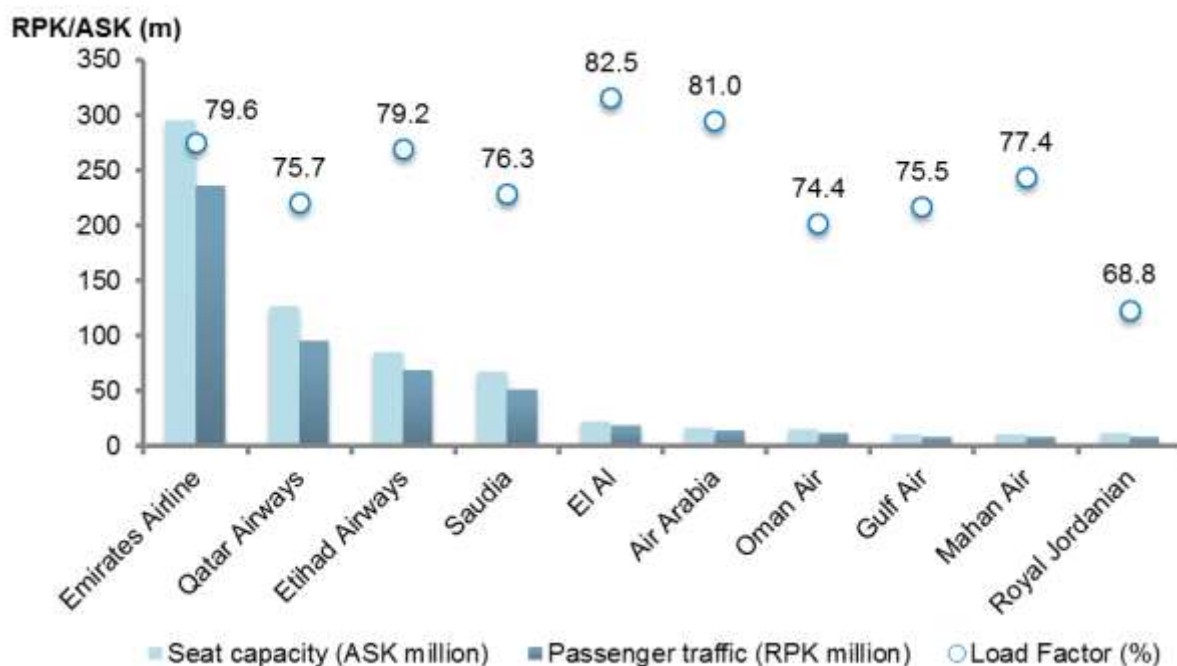
Figure 42: Top 10 Airlines in Passengers Carried in 2014 – Middle East



Source: Airline Business

All the above have resulted in yet another year of strong growth for Middle Eastern airlines, with double digit year on year growth for half of the carriers on Figure 42. Load factors for Middle Eastern airlines are between 75 and 80%, which is a high figure for a business model of long haul connecting traffic.

Figure 43: Top 10 Airlines in RPKs for 2014 – Middle East



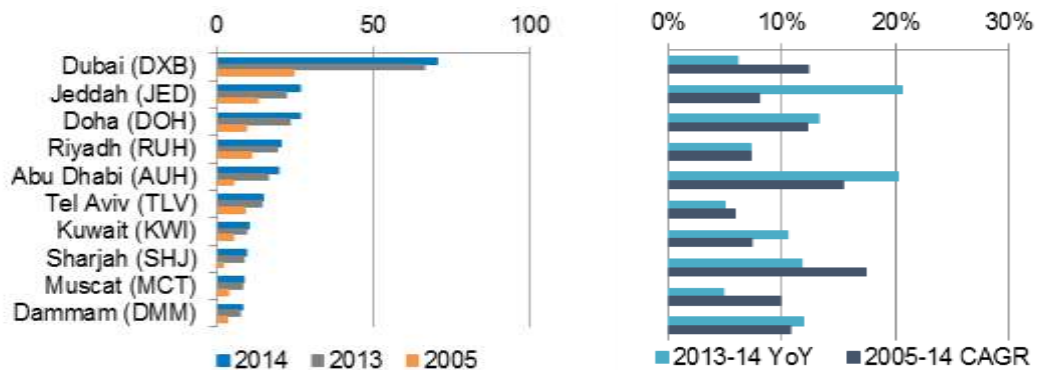
Source: Airline Business

Nevertheless, there are still challenges to be addressed by airlines and governing bodies alike, if they are to continue with similar strong traffic performances. Recent allegations from the US major carriers regarding the operations of Emirates, Qatar and Etihad Airways, as well as subsequent concerns raised from European officials, highlight the possibility of a problematic 2015 for the “super connector” business model of these three airlines.

## Airport Outlook

As the region’s governments have increasingly come to view air transportation as integral to economic development and diversification, investment in airport facilities has followed. Although much of this activity focuses on the region’s main hubs, smaller airports are significantly upgrading, from building new terminals to expanding into international airports. Latest example of those developments is the delayed Hamad International airport at Doha. The home of Qatar Airways was the third in the region for passenger traffic, serving over 25 million passengers in 2014. Of course, the leader in passengers served still remains Dubai International airport, with over 65 million passengers in 2014, and plans to accept over 75 million passengers per annum in the following years.

Figure 44: Top 10 Airports in 2014 by Passenger Traffic – Middle East



Source: ACI World Traffic Reports

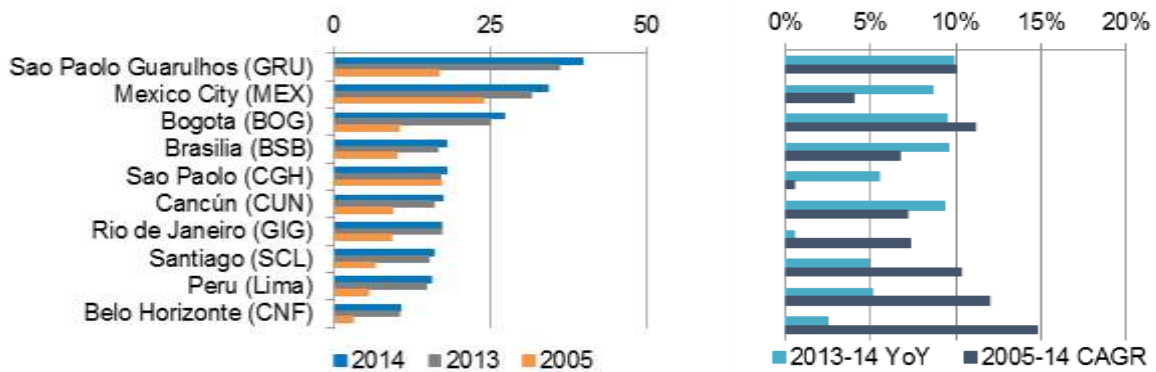
### Passenger Performance by Region: Latin America

It has been a repositioning year for the aviation industry of Latin America, as current difficulties are accepted in order to prepare for the foreseen growth potential of the region. Economic growth in Central America remains strong, led by Panama with growth averaging 5.6% over the next five years. Meanwhile, five-year average growth rates for Brazil and Mexico—the region’s two largest economies—are 3.8% and 2.3%, respectively. Aviation is a key component of this growth dynamic because it facilitates trade, travel, and tourism, while promoting globalization and technology development.

The past several years have seen significant consolidation, including the mergers of LAN with TAM, Avianca with TACA Airlines, GOL with Webjet, and Azul with TRIP, resulting in larger, more stable, and more competitive airlines. Low-cost carriers are a growing presence in the region, expanding services and bringing affordable air travel to more people and more communities. Further liberalization of air service agreements is providing opportunities to expand networks and stimulate traffic. Implementation of the US-Brazil open-skies agreement will begin during the latter part of 2015. An agreement has been reached to further relax the US-Mexico bilateral arrangement. These developments produce new opportunities for cooperation through partnerships and alliances.

Despite a struggle for profitability observed in many airlines operating in the region, airport traffic performance has been particularly strong, with four airports on Figure 45 achieving year on year growth of between 8-10%, while five airports have experienced double digit annual growth for the past ten years. Furthermore, the bloom of Brazilian aviation is apparent on the figure as four of the top ten airports in passengers are located in Brazil.

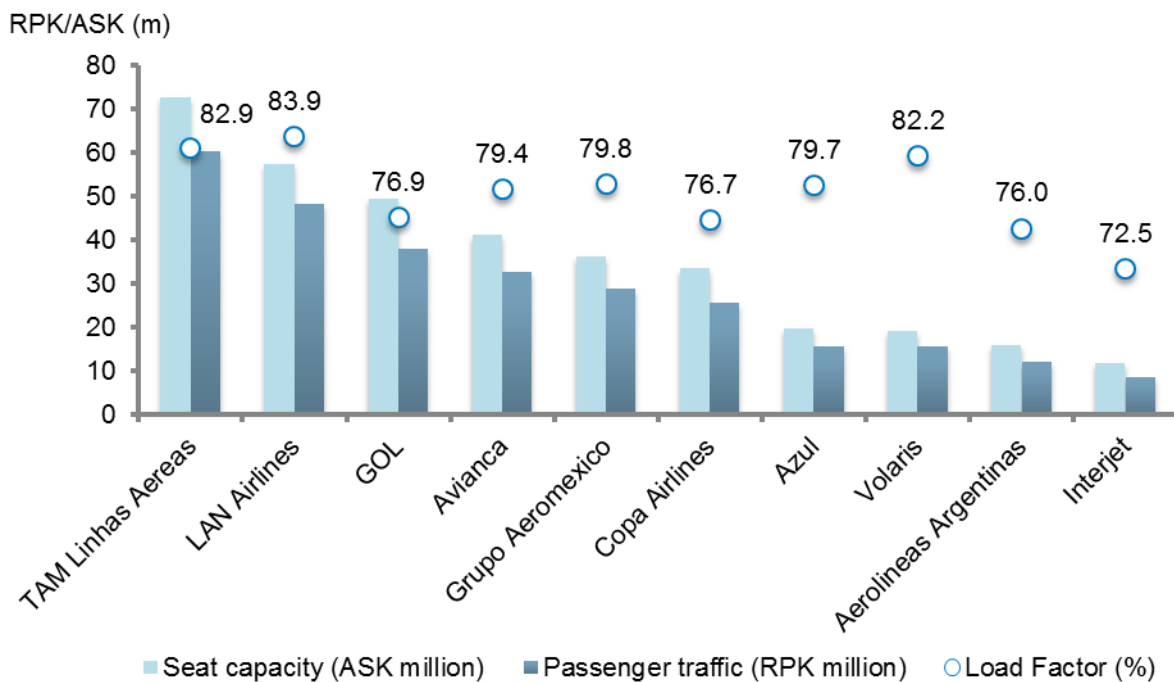
Figure 45: Top 10 Airports in 2014 by Passenger Traffic – Latin America



Source: ACI World Traffic Reports

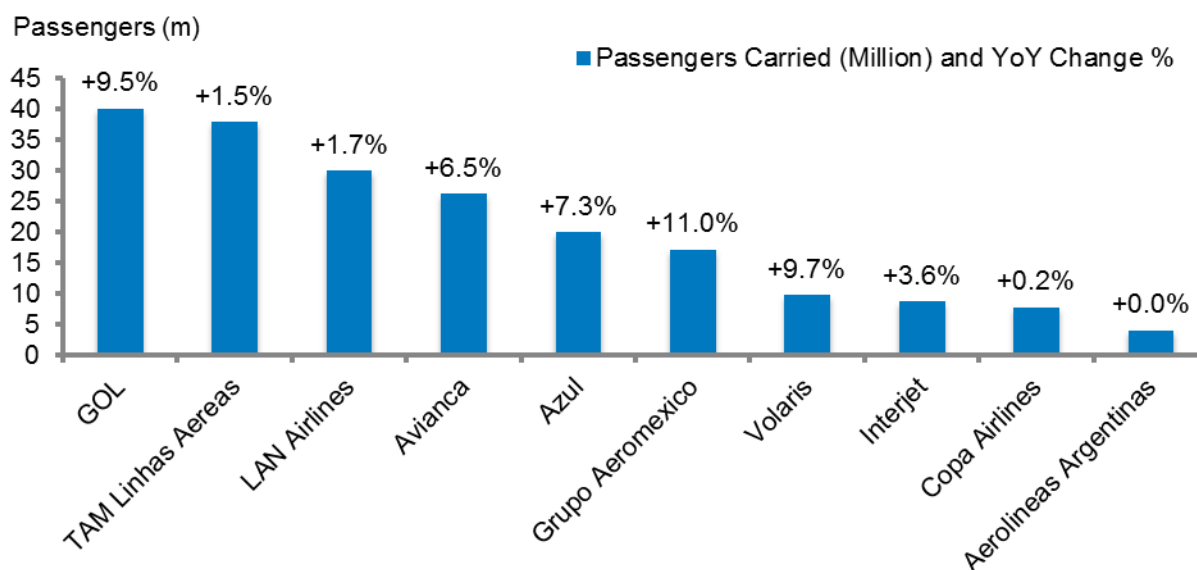
Looking at Figure 46 the dominant share of the LATAM group of total RPK for 2014 is evident. However, both LAN and TAM have grown by only 2% in terms of passengers carried, being surpassed by GOL, which grew by 9.5% year on year, carrying the most passengers in Latin America. Of note are also the growth rates of the two Mexican airlines in the top ten, Grupo Aeromexico and Volaris, indicating the strong growth of the Mexican aviation industry.

Figure 46: Top 10 Airlines in RPKs for 2014 – Latin America



Source: Airline Business

Figure 47: Top 10 Airlines in Passengers Carried in 2014 – Latin America



Source: Airline Business

### Passenger Performance by Region: Africa

Population projections for Africa indicate an annual growth of 3.1% over the next 25 years, with urban growth outpacing the growth of the rural population. The result will be an increase to 50% urbanization, with African cities adding more than 500 million people—twice as many as rural areas over the same period.

Urbanization and economic growth are intricately related as agrarian- based regional economies transition to urban economies centred on industry and services. The increase in urbanization and economic growth, meanwhile, is expected to stimulate demand for air travel to, from, and within the continent.

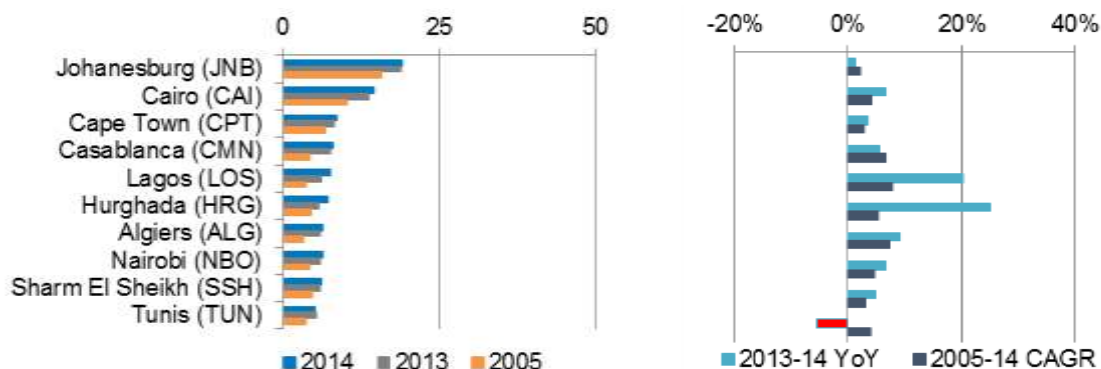
Flights between Africa and Europe account for almost 50% of the region's air travel but is projected to compose a smaller share over the next 20 years as flights between Africa and the Middle East and intra-Africa traffic both gain market share<sup>27</sup>.

Despite the bright economic and demographic outlook, Africa still faces numerous challenges that hinder the integration required between the countries in order to take the most advantages from the growth of the whole region. Aviation is one industry where there is still huge room for efficiencies and improvements that will allow for a strong growing trend across all African countries.

<sup>27</sup> Boeing Current Market Outlook



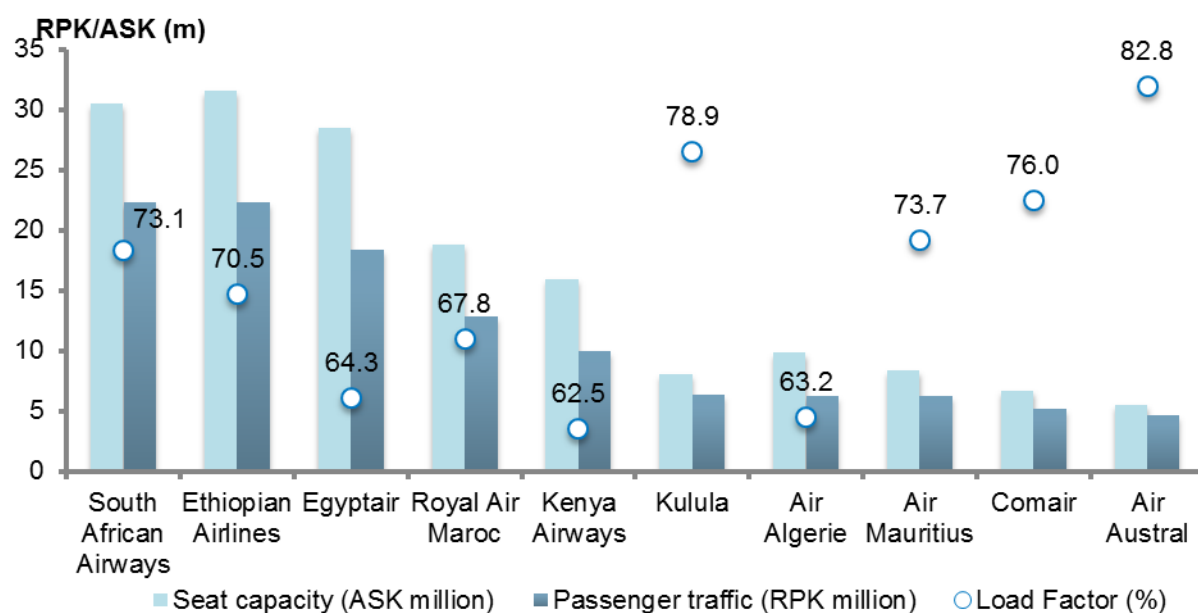
Figure 48: Top 10 Airports in 2014 by Passenger Traffic – Africa



Source: ACI World Traffic Reports

Regarding airport traffic, the highest performing airports fall under two distinct categories. The first category includes all the airports located at country capitals of the African region, like Johannesburg, Lagos Nairobi and Algiers. In the second category lie airports such as Casablanca, Hurghada, Sharm El Sheikh and Cape Town which serve touristic destinations and thus most of their traffic being inbound tourists from other regions (mainly Europe).

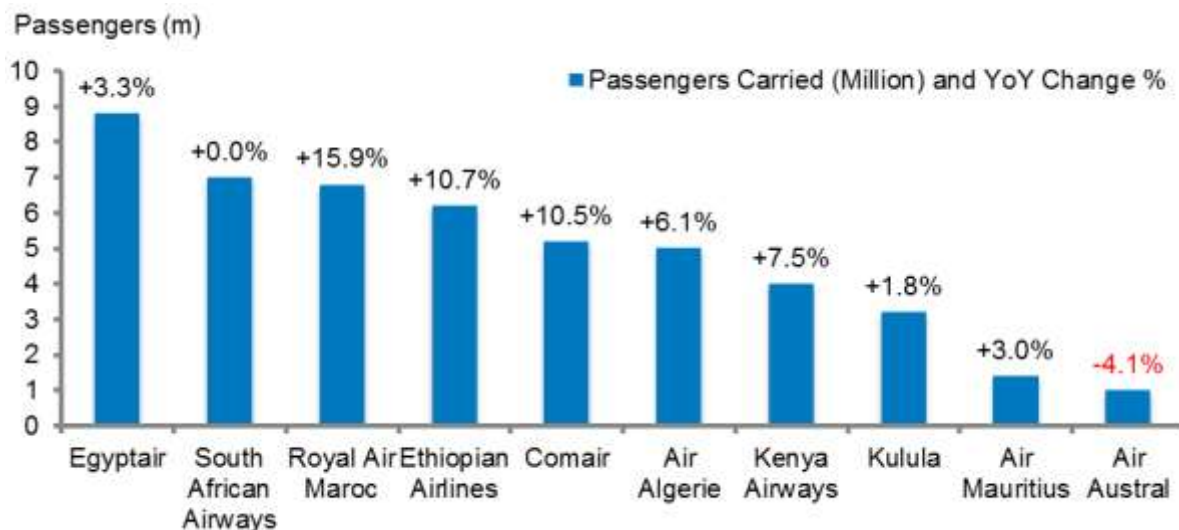
Figure 49: Top 10 Airlines in RPKs for 2014 - Africa



Source: Airline Business

South African Airways, once the major healthy airline of the African region, now faces a prolonged restructuring period that could enable the carrier to grow once more. However the airline still ranks first in RPKs flown, although Ethiopian Airlines now flies the most ASKs of the region. With LCCs penetration still quite low, it is no wonder that the average load factor of the market is in the region of 70% for 2014. Royal Air Maroc and Ethiopian Airlines observed the two strongest growths in the region for 2014, while three of the airlines in the top rankings operate in South Africa, the country with arguably the most advanced aviation industry in Africa.

Figure 50: Top 10 Airlines in Passengers Carried in 2014 - Africa



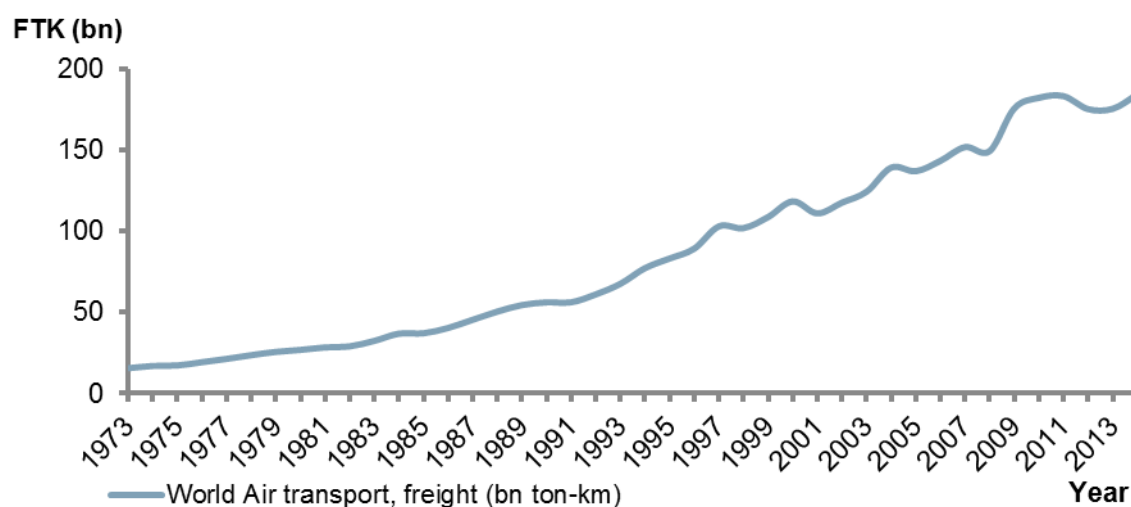
Source: Airline Business

## 1.4. Air Cargo Traffic

### Air Cargo Traffic Outlook

In 2014, the air cargo market built on the recovery that began in the second quarter of 2013; Global traffic volume growth was close to the long-term average for the full year, while cargo operators improved their profitability as the oil prices dropped. Capacity metrics also improved as utilization of large freighters returned to recent highs. Statistical Annex A provides an overview on worldwide cargo volume development.

Figure 51: Global Air Freight Historic Volumes (FTK bn)

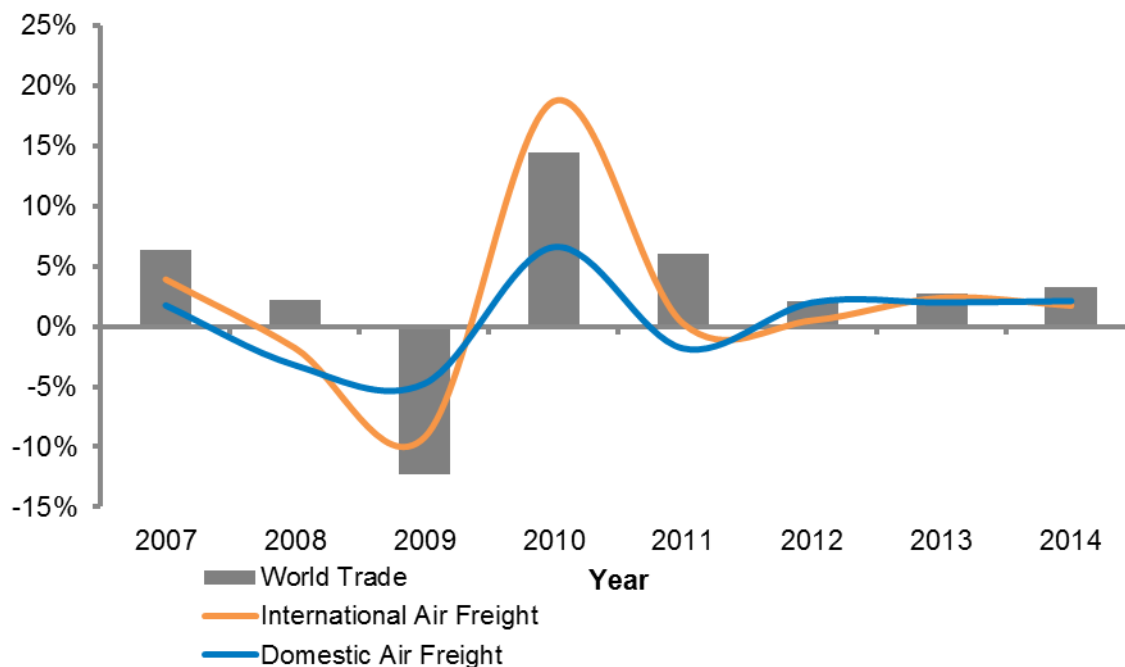


Source: World Development Indicators

Historically, cargo traffic performance has been highly affected by the economic performance of countries, as well as global trade volumes. Specifically, the relationship of global trade with

international and domestic freight can be observed on Figure 52; since the strong growth of 2010 that followed the global recession of 2009, growth has not taken up, with performance being below historic averages.

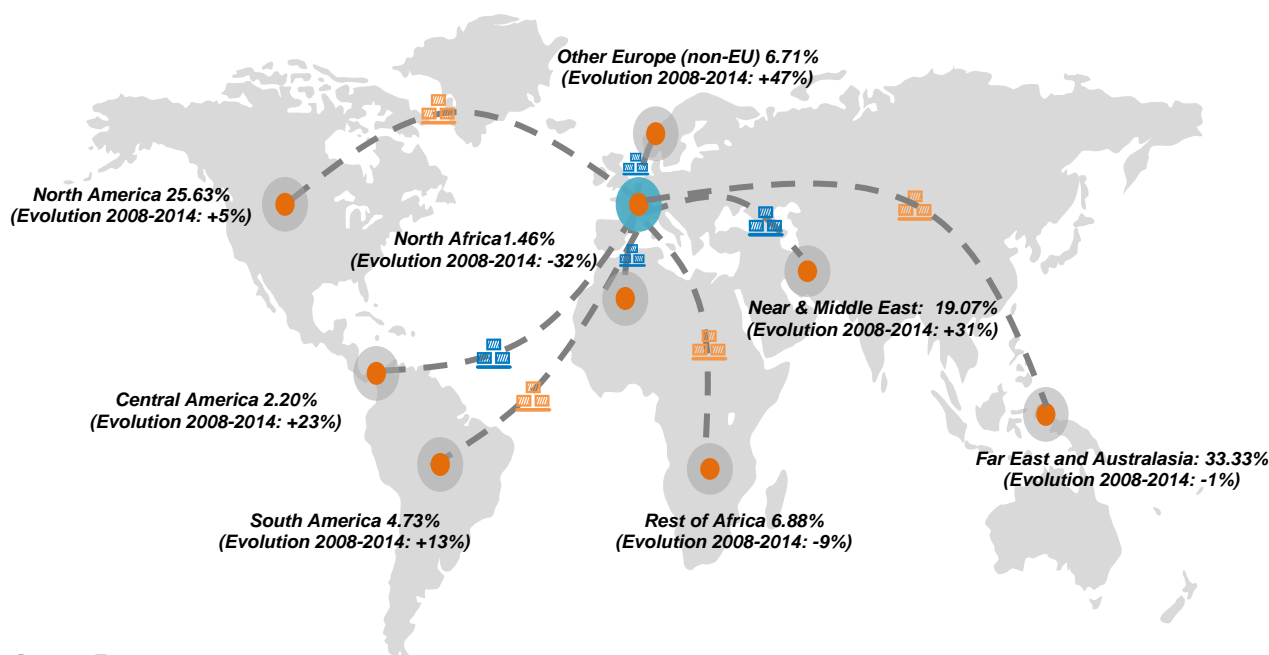
Figure 52: Relationship of Global Trade to International and Domestic Air Freight



Source: ACI World Traffic Reports, CPB World Trade Monitor

For Europe in particular, air freight traffic grew slowly in 2014, as the improved economic performance of European economies still in recovery did not improve business confidence, while the sanctions against Russia had some impact on European cargo. One third of total air cargo volumes from/to the European Union had an endpoint in the Far East and Australasia, while around one fourth was transported from/to North America, reflecting the strong import and export links that Europe maintains with those regions.

Figure 53: Air Freight and Mail 2014 Market Share and Historic Evolution from/to Europe (EU28)



Source: Eurostat

## Air Cargo Airlines and Airports Performance

Despite the recent weak performance of air freight traffic, there are many airlines that, helped by the improved capabilities of passenger aircrafts in providing belly hold cargo capacity, have continued to account air freight as an important segment of their operations. On Table 9, the top 10 ranking airlines in international, domestic and total Freight Ton Kilometres (FTKs) are summarised. The majority of the airlines operate in North America or Asia Pacific, with only Lufthansa and Cargolux operating in Europe and Emirates and Qatar Airways representing the Middle East.

Table 9: Top 10 Airlines by International, Domestic and Total Scheduled Freight Ton Kilometres Flown

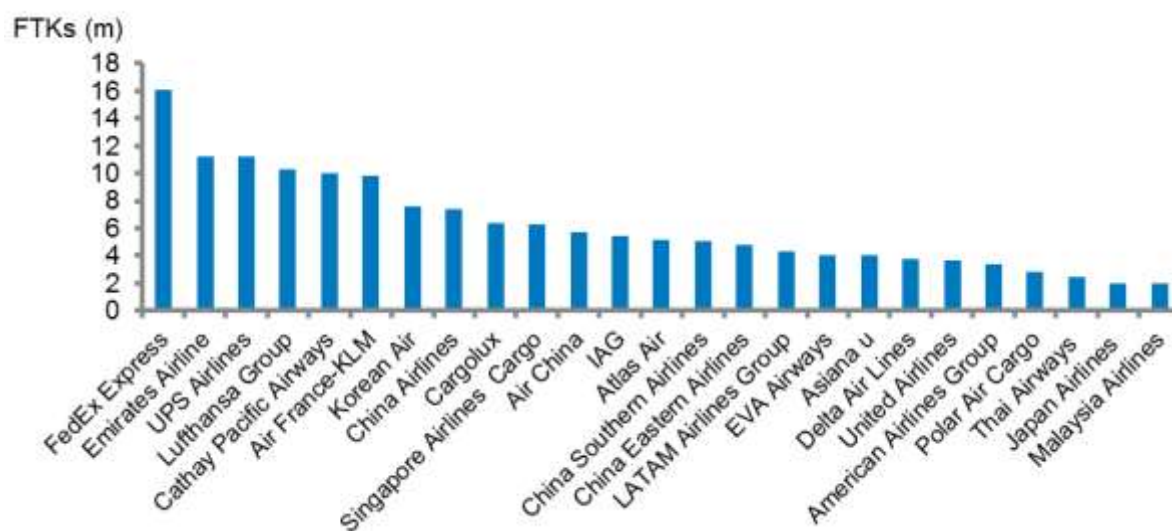
2014 Rank	International Airline (000s)	International (000s)	Domestic Airline (000s)	Domestic (000s)	Total (International + Domestic) Airline (000s)	Total (000s)
1	Emirates	11,240	FedEx	8,485	FedEx	16,020
2	Cathay Pacific Airways	9,464	UPS Airlines	5,282	Emirates	11,240
3	Korean Air	8,046	China Southern Airlines	1,551	UPS Airlines	10,936
4	FedEx	7,535	Air China	1,042	Cathay Pacific Airways	9,464
5	Lufthansa	7,050	China Eastern Airlines	776	Korean Air Lines	8,079
6	Singapore Airlines	6,019	Polar Air Cargo	763	Lufthansa	7,054
7	Qatar Airways	5,997	All Nippon Airways	520	Singapore Airlines	6,019
8	Cargolux	5,753	Hainan Airlines	506	Qatar Airways	5,997

2014 Rank	International Airline (000s)	Domestic Airline (000s)	Total (International + Domestic) Airline (000s)
9	UPS Airlines 5,654	Shenzhen Airlines 376	Cargolux 5,753
10	China Airlines 5,266	Delta Air Lines 360	China Airlines 5,266

Source: IATA, World Air Transport Statistics (WATS) 2014

When reported as airline groups instead of individual carriers, the ranking show a more balanced picture between North America and Europe, dominating the first ranks, while Asian carriers being most populous but carrying lower cargo volumes. In the top 25 airline groups, only LATAM is not based in North America, Europe or Asia Pacific.

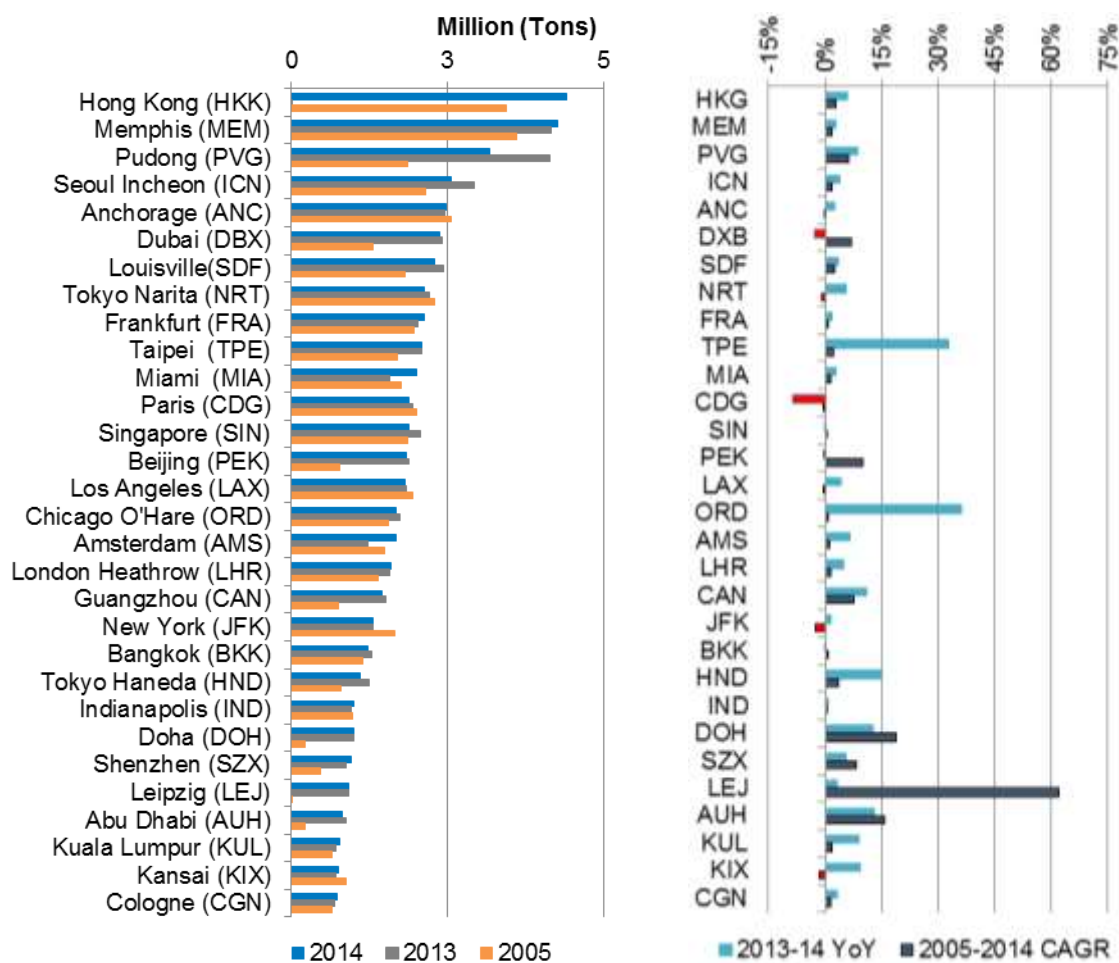
Figure 54: Top 25 Airline Groups in Cargo (FTKs) Worldwide



Source: ATW July 2015

Looking at the top 30 airports in terms of air freight, in the following figure, the picture is similar with North American and Asian airports dominating the rankings, helped by the large domestic markets of individual countries in the regions. However, the major hubs of Europe and Middle East, such as Frankfurt, Paris or Dubai and Doha, do make it to the rankings, as they provide access to a large market of end point consumers and buyers of air freight.

Figure 55: Top 30 Airports Worldwide in Cargo (Tons) for 2014



Source: ACI World Traffic Reports

### Air Cargo Long Term Projections

As noted above, the two primary indicators of future traffic are the trends in world economies and international trade. Both are forecast to continue growing strongly and lead to a return to capacity balance and profitable yields. Industries that require transport of time-sensitive and high-value commodities such as perishables, consumer electronics, high-fashion apparel, pharmaceuticals, industrial machinery, and automobile parts recognise the unparalleled speed and reliability that air freight offers. These customers see the value of air freight, which will continue to play a significant role in their shipping decisions.

Many signals point to global air cargo continuing to sustain on-trend growth. Global trade forecasts indicate an improving market, with trade set to grow at rates of about five% on average over the next several years. In addition, the outlook for improving global economic growth supports stronger air cargo growth. Accelerated growth in economies with a higher proportion of consumer spending, such as the United States, points to higher demand for air cargo as well. Core demand for air cargo in the longer term remains strong owing to continuing product innovation, global interdependence, and the imperative for reliability and speed.

Passenger airplanes and dedicated freighters both carry air cargo. However, dedicated freight services offer shippers a combination of reliability, predictability, and control over timing and routing

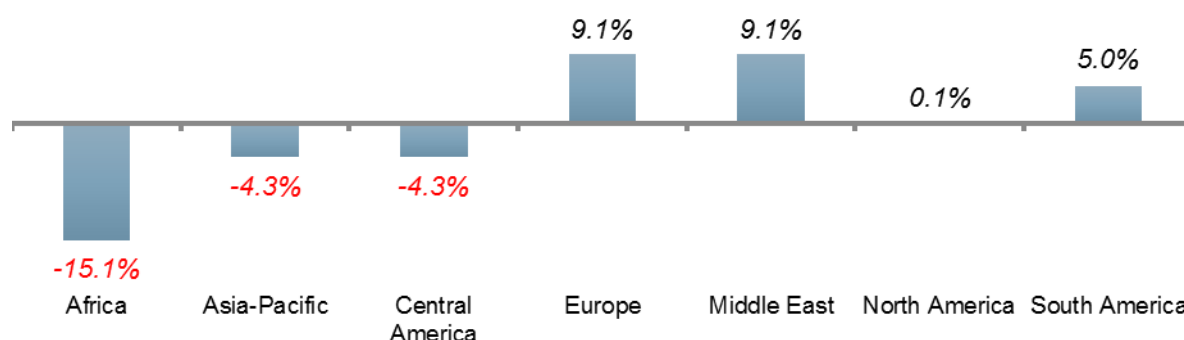
that is often superior to that of passenger operators. As a result, freighters are expected to continue carrying more than half of global air cargo traffic to satisfy the demanding requirements of that market. Air cargo traffic growth continues at longer-term rates. As global GDP and world trade growth accelerate, air cargo traffic, measured in revenue tonne-kilometres, is projected to grow an average 4.7% per year over the next 20 years. This rate, in spite of exogenous shocks arising from economic and political events and natural disasters, is only slightly below the 5% average annual rate of the past three decades.

## 1.5. Business Aviation Traffic

Business aviation is defined as the use of any general aviation aircraft for business aviation purposes<sup>28</sup>. The main indicators that measure the performance of this industry are the business jet transaction prices and sales activity, as well as the hours or segments flown by business jets. The present section will focus on the later metric of traffic performance, while a brief overview of the business jet transaction activity and demand forecast can be found in the MRO section.

According to the Jet Support Services Inc. (JSSI), the latest increased flight activity of business aviation demonstrates the improving economic conditions of the business aviation markets around the globe. While the overall growth of the total flight hours was 1.2% in 2014 compared to the previous year, regional performance was uneven, with Europe and Middle East accounting for most of the growth achieved (Figure 56)<sup>29</sup>.

Figure 56: 2014 JSSI Business Aviation Index of Business Aviation Flight Hours by Region Year on Year Change



Source: JSSI Index Outlook 2014

Additionally, business aviation performance varied between the industries, with aviation and real estate and healthcare being responsible for the growth in hours flown, while the manufacturing and construction industries saw declines directly related to the fragile state those industries were in during the year (Figure 57)<sup>30</sup>.

<sup>28</sup> National Business Aviation Association (NBAA), [www.nbaa.org/business-aviation](http://www.nbaa.org/business-aviation)

<sup>29</sup> JSSI, <http://www.jetsupport.com/jssiglobal-business-indicator-business-aviation-picks-up-in-2014/>

<sup>30</sup> JSSI, <http://www.jetsupport.com/jssiglobal-business-indicator-business-aviation-picks-up-in-2014/>

Figure 57: 2014 JSSI Business Aviation Index by Industry Year on Year Change



Source: JSSI Index Outlook 2014

The two most important markets for business aviation are the United States and Europe, accounting for 80% of the business jet fleet in 2014<sup>31</sup>. As business activity is the most important factor for business aviation traffic, both regions are cautiously optimistic for 2015, as their economies are on a recovery path, while corporate profitability is aided by the falling oil prices. However, European traffic performance could be impacted by the sanctions to Russia, which are likely to hinder the business activity of Europe with the country<sup>32</sup>.

Indeed, Table 10 indicates that the business jet operations in the United States in the full year to May 2015 have improved by 2.8% compared to the previous year, with domestic operations comprising the majority of the overall cycles. Furthermore IFR business flights in US and Canada for July 2015 increased by 5.6% year on year, as reported by ARGUS<sup>33</sup>.

Table 10: FAA Business Jet Operations for the 12 months to May 2015

	12 months to May 2015		
	Total	Domestic	International
Number of Cycles	4,256,074	3,557,364	698,810
Change Versus Prior Year	2.8%	3.2%	0.6%
Change Versus 24 months ago	6.6%	7.1%	4.0%

Source: AvBuyer

Regarding European business aviation activity, in the decade ending in 2014, the industry has seen a growth in departures equal to 12% or on average 1.2% annually<sup>34</sup>. However, 2014 performance was below average, with only 0.7% growth year on year for the sector. Furthermore individual airport performance is highlighted below, where it is obvious that although some airports are on a growing path, the majority are performing worse on average compared to 2013 and 2012 (Figure 58).

<sup>31</sup> AvBuyer, How is Business Aviation doing in 2015

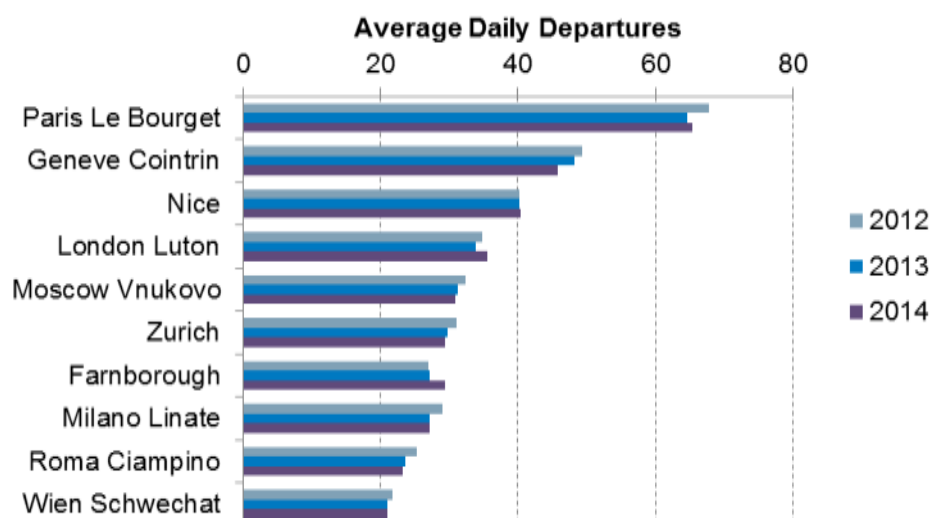
<sup>32</sup> AvBuyer, How is Business Aviation doing in 2015

<sup>33</sup> ARGUS International Inc, <https://www.aviationresearch.com/Press/PressReleaseDetail.aspx?id=272>

<sup>34</sup> European Business Aviation Association (EBAA), Annual Review 2014 - 15



Figure 58: Top 10 European Airports in Business Aviation Traffic



Source: EBAA Annual Review 2014 -15

First indicators for 2015 suggest that traffic will follow last year's performance of limited growth, as in the period from January to July business aviation departures are just +0.3% year on year<sup>35</sup>. However, the second quarter of 2015 was better than the first, with solid growth registered by Europe's largest markets, as the peripheral ones like Turkey and especially Russia and Ukraine fall behind. It is also encouraging that in terms of operation cycles reported by EUROCONTROL, both business jet and turboprop operations were up by 1,9% and 6.7% respectively for the full year to May 2015, suggesting a return to higher growth levels if this performance can be sustained<sup>36</sup>,

Table 11: EUROCONTROL Business Jet and Turboprop Operations for the 12 months to May 2015

	12 months to May 2015		
	Total	Business Jets	Turboprop
Number of Cycles	672,591	511,683	160,908
Change Versus Prior Year	3.0%	1.9%	6.7%
Change Versus 24 months ago	1.0%	0.8%	1.4%

Source: Eurocontrol

<sup>35</sup> WINGX Business Aviation Monitor July 2015

<sup>36</sup> AvBuyer, How is Business Aviation doing in 2015

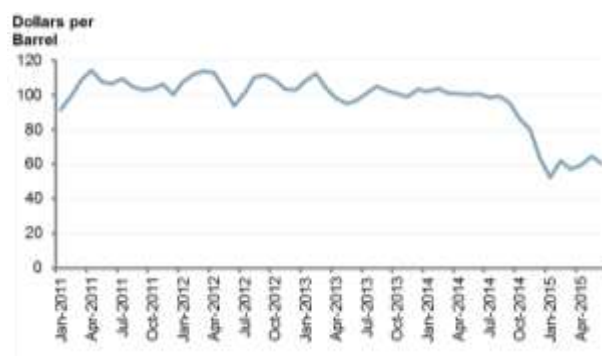
## 2. Airlines

This chapter provides an overview of performance of the airline industry during 2014 and the first half of 2015. The chapter highlights the most important global trends (such as the economic drivers and airline strategy), analyses the airline industry financial metrics, and summarises regional performance of the airline industry. Statistical Annex F lists the top 200 airlines worldwide and provides an overview on their key performance indicators for 2014. World airline financial results can also be found in the Statistical Annex K.

### 2.1. Global Trends

#### Economic Drivers

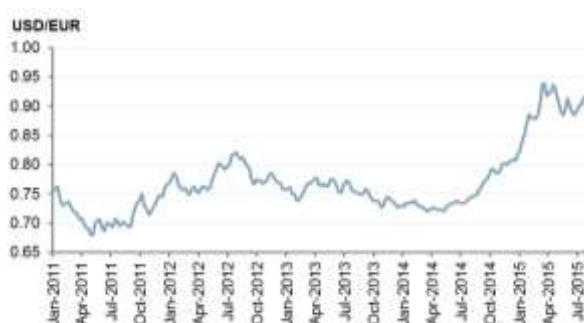
Figure 59: Fuel Jet Price



The recent decline in oil prices was the most significant event impacting on the financial performance of the airline industry during 2014. The price dropped from over USD110 per barrel in June 2014 to below USD 50 by the end of 2014. Fuel prices are highly volatile and unpredictable, but by mid-2015 jet fuel prices were still around USD60 per barrel, well below average of around USD100 per barrel seen in previous years, as shown in Figure 59: Fuel Jet Price.

Source: US Energy Information Administration<sup>37</sup>

Figure 60: Historical Exchange Rate (USD vs. EUR)



Source: OANDA.com<sup>38</sup>

At the same time as fuel prices dropped in late 2014, the US dollar strengthened against many currencies such as the Euro, as shown in Figure 60. As the world oil market is priced in US dollars, the combined effects of the fuel price and exchange rate changes impacted airlines in different ways. Airlines with US dollar cost bases (e.g., US and Gulf carriers), and those that were relatively un-hedged at previous higher fuel cost levels, experienced the full benefit of fuel cost savings. Airlines with cost bases in depreciating currencies (e.g., the Euro) did not see such significant local-currency cost savings.

<sup>37</sup> U.S. Gulf Coast Kerosene-Type Jet Fuel Spot Price FOB, U.S. Energy Information Administration. [online] Available at: <[http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER\\_EPJK\\_PF4\\_RGC\\_DPG&f=D](http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPJK_PF4_RGC_DPG&f=D)> [Accessed 14 July 2015]

The global economy showed moderate growth during 2014 and the first half of 2015. Advanced economies picked up in growth while emerging and developing markets slowed down relatively to previous years. April 2015 IMF projections show a 3.3% global growth in 2015, marginally lower than 2014. Mid-2015 events in Europe (Grexit risks) and China (stock market uncertainty) have created uncertainty in the economic outlook.

In general, the economic drivers have been favourable to the global airline industry since mid-2014. While passenger demand grew during the period, changes in fuel costs allowed airlines to reduce costs and made 2014 one of the most profitable years for the airline industry in recent times.

## Airline Strategy

2014 was also characterised by the impact of the consolidation of the major US airlines and hybridisation and the continuing differentiation of the products offered by global carriers. The balance between long and short haul operations, and outsourcing strategies were two other important factors in the restructuring programmes of the main global carriers.

Consolidation of the US major airlines, which concluded with the American Airlines and US Airways merger in 2015, led to the formation of three major US airline groups instead of the original 6. Following this consolidation, the North America region achieved profits equivalent to 68% of the worldwide airline industry<sup>39</sup>. However, the structure of the airline industry in the majority of other regions remains fragmented.

Driven by this strategy (as well as the economic drivers discussed above) the three big American airline groups, American Airlines Group, Delta Air Lines and United Continental Holdings were the top 3 airlines in terms of operating revenues during 2014. The European airline groupings Lufthansa Group Air and Air France-KLM were ranked in fourth and fifth places respectively.

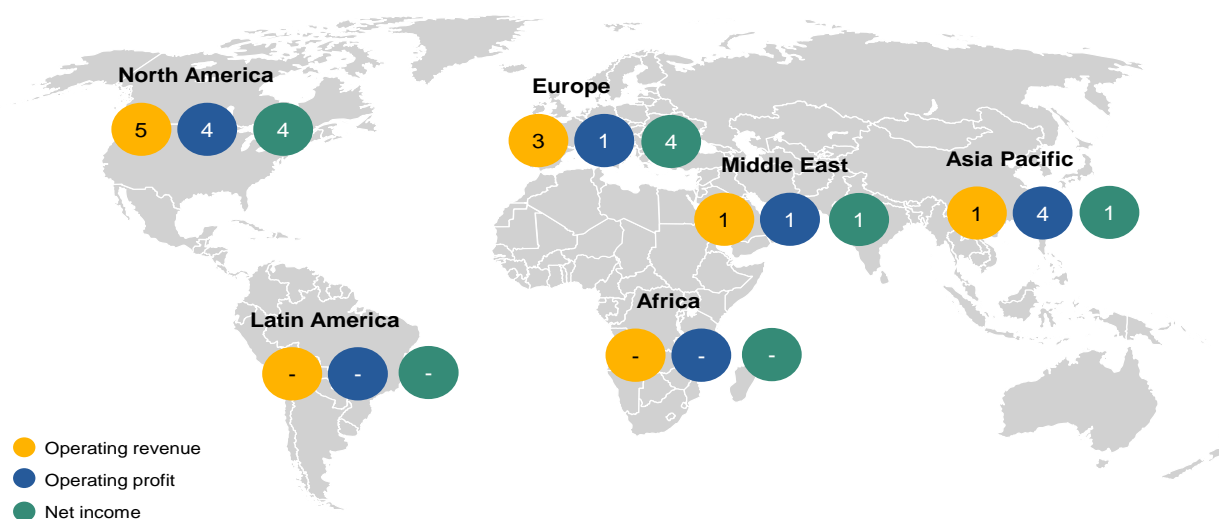
In relation to operating profit, four North American airlines (American Airlines Group, United Continental Holdings, Southwest Airlines and Delta Air Lines) were in the top 5 ranking of most profitable carriers during 2014. China Southern Airlines improved to second place as the airline with most profitable operation. For further details, the World Airline Financial Results 2014 ranking published by Air Transport World magazine is presented in the Statistical Annexes of this report.

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<sup>38</sup> Historical Exchange Rates. OANDA. [online] Available at <<http://www.oanda.com/currency/historical-rates/>> [Accessed 14 July 2015]

<sup>39</sup> <https://www.iata.org/pressroom/speeches/Pages/2015-06-08-01.aspx>

Figure 61: Distribution of Top 10 Airlines by Operating Revenue, Profit and Net Income in 2014



Source: Mott MacDonald analysis of ATW40

Table 12: Top 10 Airlines by Operating Revenue, Profit and Net Income in 2014

Rank	Airline	Operating revenue (\$,000)	Airline	Operating profit (\$,000)	Airline	Net income (\$,000)
1	America Airlines Group Inc.	42,650,000	America Airlines Group Inc.	4,429,000	America Airlines Group Inc.	2,882,000
2	Delta Air Lines, Inc.	40,362,000	China Southern Airlines	2,836,280	Emirates Group	1,486,580
3	United Continental Holdings	38,901,000	United Continental Holdings	2,373,000	JAL Group	1,245,360
4	Lufthansa Group	36,477,800	Southwest Airlines	2,225,000	Southwest Airlines	1,136,000
5	Air France-KLM	30,302,000	Delta Air Lines, Inc.	2,206,000	United Continental Holdings	1,132,000
6	FedEx Express	27,121,000	Emirates Group	1,877,760	IAG	1,055,000
7	Emirates Group	26,257,600	IAG	1,689,500	Ryanair	940,378
8	IAG	24,516,200	China Eastern Airlines	1,643,000	Turkish Airlines	845,000
9	Southwest Airlines	18,605,000	JAL Group	1,501,120	easyJet	730,746
10	China Southern Airlines	17,645,900	Hainan Airlines	1,355,330	Delta Air Lines, Inc.	659,000

Source: Mott MacDonald analysis of ATW41

<sup>40</sup> Air Transport World, July 2015. World Airline Report, [online] Available at: <<http://atwonline.com>> [Accessed 14 July 2015]

<sup>41</sup> Air Transport World, July 2015. World Airline Report, [online] Available at: <<http://atwonline.com>> [Accessed 14 July 2015]

In Europe, airlines adopted a number of business improvement initiatives. For instance, Air France-KLM implemented an 'operational transformation', restructuring short and medium-haul networks and reducing point-to-point capacity on key routes (as the accelerated development of the LCC subsidiary Transavia shows), while the rollout of new long haul product is backing up an upscaling strategy that includes equipping aircraft with new cabins<sup>42</sup>.

The IAG airline group has also restructured its network airline business while seeking growth opportunities through lower cost point-to-point operations. IAG's British Airways, recorded a solid improvement in its operational profit, built on performance of its long-haul operation network. At the same time, the LCC subsidiary of the group, Vueling, delivered a positive performance with rapid expansion into new markets, becoming IAG's most profitable and fastest growing business during 2014. In addition, IAG's Iberia presented positive indicators, being the leading airline on the South Atlantic market. The acquisition of Aer Lingus in 2015 will also open new opportunities in the UK and Ireland for this European airline group.

In January 2014, the North Atlantic market saw the formation of a joint venture between Delta Air Lines and Virgin Atlantic. The trans-Atlantic deal proved to be a chance for cost synergies as the latest network developments show, with the airlines planning to expanding markets outside the initial and more competitive routes of London Heathrow to New York and Los Angeles in 2015.

In the Middle East, Etihad Airways continued to acquire stakes in airlines around the world. After acquiring a 24% stake in Jet Airways in 2013, during 2014 the Gulf carrier became shareholder of 49% in Air Serbia and Alitalia and increased its share from 30% to 49.9% in Air Berlin. Etihad has also steadily increased its stake in Virgin Australia since taking an initial tranche of shares in 2012. In addition, the carrier announced the formation of Etihad Airways Partners, binding its associated companies closer together through coordinated schedules and reciprocal frequent flyer benefits into a mini global alliance.

Another key trend of the market observed during 2014 was the hybridisation of airlines. There has been convergence in the business models of both low cost carriers (LCCs) and full service airlines. LCCs such as EasyJet and Ryanair have increased operations at main city airports and introduced elements of full service carrier products such as assigned seating. Full service carriers have similarly adopted elements of the LCC model such as 'hand baggage only' fares and phasing out of free refreshments on some routes. As a consequence, there is a blurring of distinction between LCCs and full service carriers. LCCs have continued to grow their share of the market, and for the first time represented more than 40% of total market share within the European region in 2014.

2014 also experienced a continuation in differentiation in product and service performance offered by airlines. Airlines are investing increasing profits in improving services for the highest revenue customers, while segmenting services (e.g. the second small handbag allowance and business fare products offered by Ryanair) at the low end of the market to capture more price-sensitive travellers.

To reduce unit costs, airlines also looked at the possibility of outsourcing operations. The IAG Group was one of the airlines to following that route, with IT Operations being outsourced during 2014. End user computing, networks and service operations were some of the areas outsourced to third parties, accounting for savings over €20 million.

Other important operating change was experienced in the European LCC market. The recent years have shown how hard it is for these carriers to build sufficient scale to operate profitable services. Air France-KLM appeared to recognise it when in September 2014 it announced plans to establish

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<sup>42</sup> [Air France – KLM Full Year 2014 Results](#)

Transavia Europe (by merging the operation of its Transavia and Transavia France brands) in bases outside the Netherlands and France. These plans were put on hold in the face of opposition from its pilots although latter the company renewed its plan to develop this Pan European LCC during 2015. In August 2014, Monarch chief executive also revealed that after 47 years operations as a leisure carrier, it planned to cease charter flights for good in 2015 and focus entirely on scheduled low-cost operations. The tough operating conditions, overcapacity in short-haul markets and competitions from LCCs and online rivals will keep forcing leisure carriers to rethink their strategies entirely.

The airline business demands for creativeness and tight cost control to generate profit. New ways to attract and retain passengers are necessary in the competitive environment. This has been the path followed by the most profitable carriers during 2014.

### **Airline Employment**

Labour is the second-largest operating expense for airlines after fuel and the availability of key labour skills is seen by airline CEOs as the second-largest business threat to growth<sup>43</sup>.

Airlines have generally been effective in holding down labour costs and improving productivity in 2014, aided by the underlying growth in traffic. This trend is continuing into 2015.

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<sup>43</sup> [http://www.pwc.com/en\\_US/us/industrial-products/publications/assets/pwc-tailwinds-rising-passenger-demand.pdf](http://www.pwc.com/en_US/us/industrial-products/publications/assets/pwc-tailwinds-rising-passenger-demand.pdf)

Table 13: Labour

	2013	2014E	2015F
Labour costs, \$ billion	135	142	150
% change over year	4.2%	5.1%	5.7%
Employment, million	2.35	2.42	2.5
% change over year	2.1%	3.2%	3.1%
Productivity, ATK/employee	461,517	471,389	485,371
% change over year	2.1%	2.7%	3.2%
Unit labour cost, \$/ATK	0.125	0.125	0.124
% change over year	0.5%	-0.2%	-0.5%
GVA/employee, \$	93,730	94,227	96,753
% change over year	1.6%	0.5%	2.7%

Source: IATA

Overall employment growth accelerated during 2014. IATA projected a 3.2% increase in employees in the airline industry between 2013 and 2014, while labour costs increased by 5.1% in the same period.

These increases were offset by traffic growth, so that productivity, unit labour costs and Gross Value Added (GVA) per employee all improved in 2015 and are projected to continue to improve in 2015<sup>44</sup>.

## 2.2. Airline Financial Performance

The financial performance of airlines in 2014 was marked by improvements in profitability and Return on Invested Capital (ROIC) on a worldwide basis, aided by reductions in fuel costs and control of non-fuel related expenses.

Industry wide net profits of \$16.4 billion were \$5.8 billion higher (+55%) than in 2013, and net profit per departing passenger increased +44% to \$4.98. Revenues increased by 2.2% while expenses, driven by the reduction in oil price, increased by only 1%. Operating profit was up +34% to \$33.9 billion, generating an operation margin of 4.6%.

The outlook for 2015 looks also positive. Although revenues are expected to decrease by 0.7%, lower fuel costs are expected to improve net profits by +78%, to a record \$29.9 billion. Net profit per departing passenger is projected to reach \$8.27.

In 2015, the expected return on invested capital (ROIC) is 7.5%. For the first time, the industry-level average ROIC will be in excess of its cost of capital, which has fallen to 6.8% largely due to a lower bond yields<sup>45</sup>.

<sup>44</sup> <https://www.iata.org/pressroom/pr/Pages/2015-06-08-03.aspx>

<sup>45</sup> <http://airlines.iata.org/news/airline-profitability-strengthens>

Table 14: Economic Performance of Airline Industry

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014E	2015F
<b>REVENUES, \$ billion</b>	379.0	413.0	465.0	510.0	570.0	476.0	564.0	642.0	706.0	717.0	733.0	727.0
% change	17.7	9.1	12.5	9.6	11.7	-16.5	18.4	14.0	9.8	1.7	2.2	-0.7
Passenger, \$ billion	294.0	323.0	365.0	399.0	444.0	374.0	445.0	500.0	541.0	555.0	563.0	556.0
Cargo, \$ billion	47.0	48.0	53.0	59.0	63.0	48.0	66.0	67.0	64.0	61.0	63.0	62.0
Traffic volumes												
Passenger growth, rpk, %	14.9	8.9	6.9	8.0	2.4	-1.2	8.0	6.3	5.3	5.7	6.0	6.7
Sched passenger numbers, millions	2078.0	2225.0	2350.0	2556.0	2594.0	2479.0	2681.0	2858.0	2989.0	3143.0	3327.0	3542.0
Cargo growth, ftk, %	11.6	2.5	6.4	4.7	-0.7	-8.8	19.4	0.4	-0.9	0.6	5.8	5.5
Freight tonnes, millions	36.2	37.1	39.4	41.9	40.5	40.2	47.9	48.9	48.2	49.3	51.5	54.2
World economic growth, %	4.0	3.5	4.0	4.0	1.5	-2.0	4.1	2.9	2.4	2.5	2.6	2.9
Passenger yield, %	2.8	1.7	6.6	1.7	8.2	-13.7	9.6	5.0	2.9	-3.0	-4.2	-7.5
Cargo yield %	3.9	0.3	4.4	5.6	7.0	-15.2	14.3	0.8	-4.2	-4.9	-2.0	-7.0
<b>EXPENSES, \$ billion</b>	376.0	409.0	450.0	490.0	571.0	474.0	536.0	623.0	687.0	692.0	699.0	677.0
% change	16.2	8.9	10.1	8.8	16.5	-16.9	13.1	16.2	10.4	0.7	1.0	-3.1
Fuel, \$ billion	65.0	91.0	127.0	146.0	205.0	135.0	152.0	192.0	227.0	228.0	226.0	191.0
% of expenses	17.0	22.0	28.0	30.0	36.0	28.0	28.0	31.0	33.0	33.0	32.0	28.0
Crude oil price, Brent, \$/b	38.3	54.5	65.1	73.0	99.0	62.0	79.4	111.2	111.8	108.8	101.4	65.0
Jet kerosene price, \$/b	49.7	71.0	81.9	90.0	126.7	71.1	91.4	127.5	129.6	124.5	116.6	78.0
Fuel consumption, billion gallons	66.0	68.0	69.0	71.0	70.0	67.0	70.0	72.0	73.0	74.0	77.0	80.0
CO2 emissions, million tonnes	620.0	644.0	651.0	667.0	664.0	629.0	658.0	678.0	683.0	694.0	724.0	757.0
Non-fuel, \$ billion	311.0	318.0	323.0	344.0	366.0	339.0	384.0	431.0	460.0	464.0	473.0	487.0
cents per atk (non-fuel unit cost)	39.1	37.9	36.7	36.6	38.0	36.7	40.1	42.4	44.0	42.8	41.4	40.2
% change	1.0	-3.0	-3.0	-0.3	3.6	-3.3	9.3	5.8	3.7	-2.7	-3.1	-3.1
Capacity growth, atk, %	10.1	5.7	4.8	6.6	2.7	-4.2	3.7	6.0	3.0	3.6	5.4	6.2
Flights, million	23.8	24.9	25.5	26.7	26.5	25.9	27.8	30.1	31.2	32.0	33.6	35.4
Break-even weight load factor, %	60.9	61.2	60.7	60.3	62.2	61.8	63.5	64.1	64.7	64.5	64.1	62.7
Weight load factor achieved, %	61.5	61.8	62.7	62.7	62.1	62.0	66.8	66.1	66.4	66.9	67.2	67.3
Passenger load factor achieved, %	73.5	74.9	76.0	77.0	76.0	76.1	78.6	78.4	79.3	79.7	79.8	80.2
<b>OPERATING PROFIT, \$ billion</b>	3.3	4.4	15.0	19.9	-1.1	1.9	27.6	19.8	18.4	25.3	33.9	50.1
% margin	0.9	1.1	3.2	3.9	-0.2	0.4	4.9	3.1	2.6	3.5	4.6	6.9
<b>NET PROFIT, \$ billion</b>	-5.6	-4.1	5.0	14.7	-26.1	-4.6	17.3	8.3	6.1	10.6	16.4	29.3
% margin	-1.5	-1.0	1.1	2.9	-4.6	-1.0	3.1	1.3	0.9	1.5	2.2	4.0
per departing passenger, \$	-2.7	-1.9	2.1	5.8	-10.1	-1.9	6.5	2.9	2.0	3.4	4.9	8.3
<b>RETURN ON INVESTED CAPITAL, %</b>	2.9	3.0	4.6	5.5	1.4	2.0	6.3	4.7	4.3	4.9	5.7	7.5

Source: IATA Central forecast

Globally, airline operational efficiencies are increasing. Traffic, in terms of Revenue Passenger Kilometres (RPKs), are growing faster than capacity, in terms of Available Seat Kilometres (ASKs), leading to an improvement in load factors to 79.8% in 2014, and expected to be over 80% in 2015. Breakeven load factors are decreasing to 64.1% in 2014 and 62.7% in 2015, with consequent improvements in operating margins.

This trend in improving load factors is seen in most regions, although the Asia-Pacific and African regions experienced reduced load factors in 2014 as capacity (in ASKs) grew more quickly than passenger demand (in RPKs), as shown in Table 15.

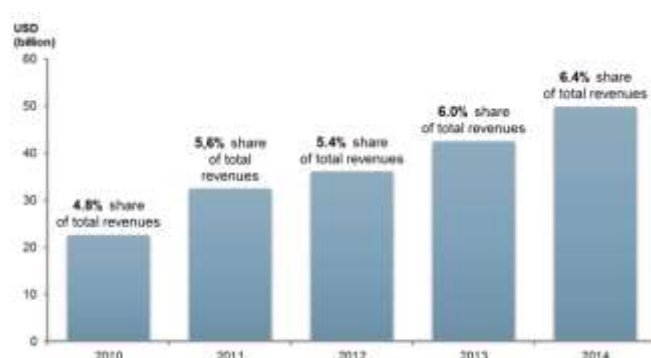


Table 15: Passenger Traffic and Capacity by Region

	Passenger traffic (RPK), % change over year						Passenger capacity (ASK) % change over year					
	2010	2011	2012	2013	2014	2015	2010	2011	2012	2013	2014E	2015F
<b>Global</b>	8.0	6.3	5.3	5.7	6.0	6.7	4.5	6.6	4.0	5.2	5.8	6.2
<b>Regions</b>												
North America	4.5	2.9	1.0	2.3	2.7	3.0	2.3	2.8	-	2.0	2.5	3.1
Europe	4.3	8.4	4.6	3.9	5.8	6.8	1.7	8.9	2.6	2.7	5.2	6.5
Asia-Pacific	11.8	6.6	6.1	7.2	6.9	8.1	6.3	7.0	5.3	7.1	7.4	7.7
Middle East	17.6	10.0	14.7	11.6	12.6	12.9	13.3	9.8	12.0	12.3	11.5	12.9
Latin America	12.4	11.3	9.4	6.3	6.9	5.1	6.8	9.3	7.3	4.5	4.6	5.0
Africa	12.3	1.6	7.5	4.6	0.3	3.2	9.3	3.2	6.3	4.0	2.5	3.3

Source: IATA Central forecast

Figure 62: Worldwide Estimate of Ancillary Revenues in the Airline Industry



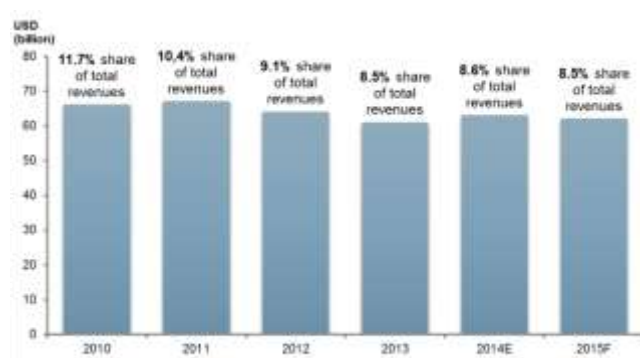
Source: IdeaWorks

Ancillary revenues (revenues generated by activities and services other than air fares) generated a higher income to airlines during 2014 as well as an increasing share of the total revenues. Ancillaries represented 6.4% of total revenues, with an estimated value of \$49.9 billion.

This reflects how hybridisation and differentiation in the product offered by the carriers is changing the way airlines generate revenues from their services.

With regards to cargo revenues, air traffic freight in 2014 performed well due to an upturn in the economic cycle and growth in demand for airfreight. Indeed, 2014 saw the strongest growth in airfreight volumes (+5.8%) since the 2010 recovery in world trade<sup>46</sup>.

Figure 63: Worldwide Estimate of Cargo Revenues in the Airline Industry



Source: IATA central forecast

Air cargo had a volatile start in 2015 but in Q2 it appeared to be back to 2014 levels. However, some weakness in emerging markets and scope for potential spill over from the slowing of the Chinese economy introduces downside risks for the outlook in 2015. Cargo yields were down -2.0% in 2014 and are projected to decline by a further 7% in 2015.

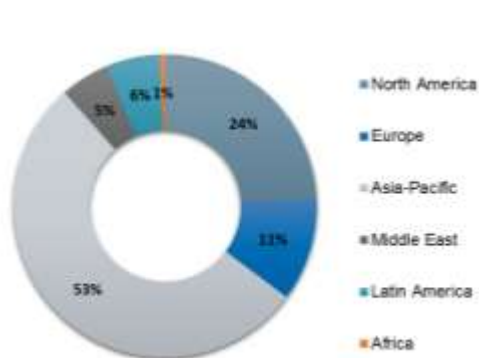
Although the overall performance was very positive, mainly in improved profitability in 2014, there were regional differences.

<sup>46</sup> Cargo-chartbook-Q2-2015, <http://www.iata.org/publications/economics/Pages/caarchives.aspx>

At a regional level, North American airlines performed strongly in 2014 (68% of the global net profits). Driven by low fuel prices, strong dollar and successful airline strategy, 2014 net profit of commercial airlines was higher than the combined profit of all other regions. European carriers also performed well, generating solid growth (20% of global net profits).

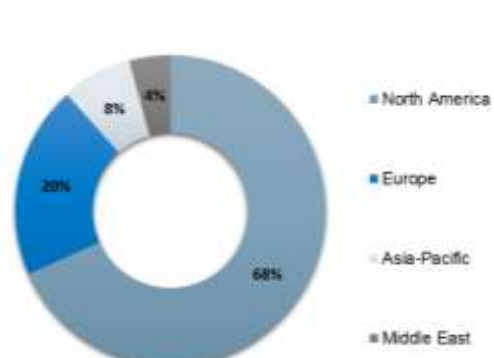
On the other hand, although Africa and Latin America experienced improved profitability in 2014, they are still operating close to breakeven.

Figure 64: Net Profits by Region, 2010



Source: IATA

Figure 65: Net Profits by Region, 2014 Estimate



Source: IATA

### 2.3. Market Entrances and Exits

Much of the activity among start-up airlines during 2014 has been driven by low-cost subsidiaries from both budget and network carriers. In total, the year closed with 83 airlines starting activities in 2014.

In Europe, network carrier's low-cost offshoots have driven market entry, as it has been common in the most recent years. It has been the example with Iberia Express and Vueling within IAG, Transavia and Hop within Air France-KLM and Germanwings, and most recently with Eurowings, within Lufthansa Group. Nonetheless, the results have been a mix of success and disappointment.

The Russian operator Aeroflot was responsible for one of the most notable low-cost start-ups in Europe in 2014, introducing Pobeda, after the failure of its previous low-cost subsidiary Dobrolet. Pobeda started operations focused on low cost operations in the growing Russian domestic market. Worth of mention is also the development leading to the new airline owned by Finnair, Norra (Nordic Regional Airlines). In January 2015 Finnair signed a MoU to take ownership of the 60% stake in Flybe Nordic, an airline created in 2011 when Flybe and Finnair purchased Finnish Commuter Airlines. The regional Finnish airline operates now with 26 aircraft to destinations in the Finnish domestic, Nordic and Baltic regional markets.

In the opposite end of the spectrum, the French carrier La Compagnie launched transatlantic premium operations between Paris Charles de Gaulle and Newark. The airline has also outlined its intention to serve Newark from London in the future.

In Asia, the main driver for new entrants has been the lack of open skies. In order to expand to new markets, airlines have been starting joint-venture partnerships. It has been the case with AirAsia, continuing its expansion with the start of new operations in 2014, launching AirAsia India and the new long-haul unit Thai Air Asia X.

Also when looking at the relatively low number of high-profile airline exits during the year, it is possible to see that Russian carriers had a challenging period in 2014 with the combined effects of the Ruble devaluation, an economic slowdown linked to falling oil prices, and sanctions following the Crimean crisis. Indeed, since the start of 2014 and besides the previously mentioned Dobrolet, other Russian airlines have been showing signs of financial weakness. Moskovia also ceased operation in 2014 while during 2015 one of Russia's largest airlines, Transaero, also declared bankruptcy.

In Europe, a number of small carriers ceased operations, including the flag carrier of Cyprus - Cyprus Airways, and an Italian leisure operator Livingston. Among the oldest airlines to cease operation in 2014 was the US carrier World Airways that filed for Chapter 11 bankruptcy in November 2014.

## 2.4. Airline Performance by Region

### Europe

In 2014 low cost carriers were performing well while legacy carriers still face restructuring challenges.

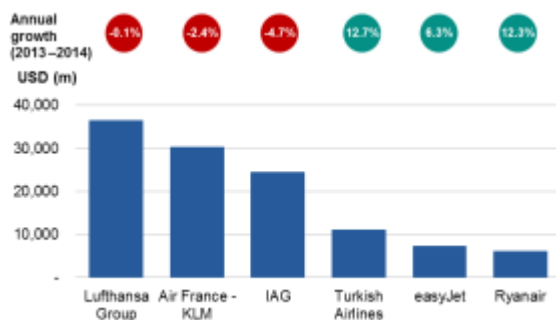
Table 16: European Airlines Performance

	2013	2014E	2015F
Net post-tax profit, \$billion	1.0	3.3	5.8
Per passenger, \$	1.21	3.82	6.30
% revenue	0.5%	1.6%	2.8%
RPK growth, %	3.9%	5.8%	6.8%
ASK growth, %	2.7%	5.2%	6.5%
Load factor, % ATK	66.7%	66.7%	66.6%
Breakeven load factor, % ATK	65.4%	64.7%	63.3%

Between 2013 and 2014, European airlines experienced an increase in profitability, driven by the decrease in oil prices and other cost controls, which allowed a decrease of the breakeven load factor. IATA's expects a continuation of this trend in 2015 with the Net post-tax profit per passenger projected to increase from \$3.82 to \$6.30. Margins remain slim, however, at only 1.6% in 2014.

Source: Mid-year 2015 Report, IATA

Figure 66: 2014 Top European Airline Performance in Operating Revenue

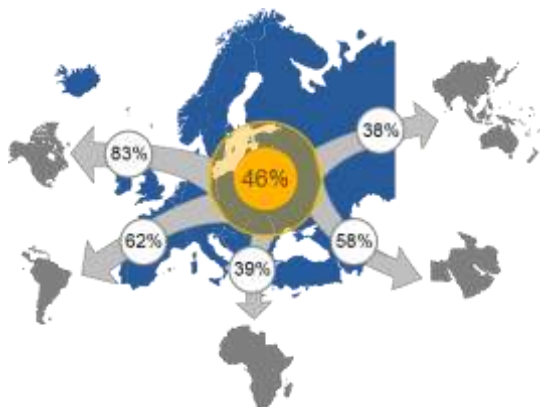


Source: ATW Magazine

All big three European groups (IAG, Air France-KLM and Lufthansa group) experienced negative growth in operating revenue between 2013 and 2014. The carriers are still undergoing a process cost reduction and maximising use of their low-cost vehicles.

On the other hand, Turkish Airlines (THY) and easyJet presented a strong performance. THY returned to profitability in 3Q2014 after a year of year-on-year declines. The low cost easyJet, as well as the other big European LCC Ryanair, kept being profitable while increasing capacity. easyJet reported a 90.8% load factor in 2014.

Figure 67: European Market Consolidation: Capacity Share (%) of top-5 Airlines



Source: Mott MacDonald analysis of SRS Analyser

The European airline market showed continued consolidation in 2014. The Top 5 airlines by seat capacity were responsible for 46% of capacity offered during the year. These arrangements allow airlines to consolidate passenger flows and achieve economies of density, improving returns and cutting costs. Nonetheless, the European market is much less consolidated than the North American market, where the Top 5 carriers have a 76% market share.

In routes outside Europe, the results of the Joint Ventures on the North Atlantic have allowed airlines to consolidate passenger flows and achieve economies of density (83% of seat capacity offered on these routes is made up of the Top 5 airlines or JVs). All other routes remain relatively fragmented.

Figure 68: LCC Capacity Share(%) of Total Seats



Source: CAPA with data provided by OAG

LCCs continued to increase market share in Europe in 2014. The share of intra-European seat capacity provided by LCCs grew to over 40% for the first time in 2014.

A sign of the strength of these airlines is that for 2014 five out of the top six highest operating margins in the European airline industry were from LCCs, led by Ryanair.

European regional airlines carried over 72.5 million passengers in 2014, a 3.2% growth compared to 2013. During 2014 Europe remained the second largest regional market, after North America.

Table 17: Top 5 Regional European Airlines

Airline	Country	Pax (000s)	Top 100 rank
Hop	France	13,000	5
Lufthansa CityLine	Germany	8,559	10
Flybe	UK	7,178	13
KLM cityhopper	Netherlands	7,000	14
Air Nostrum	Spain	3,772	22

Source: Airline Business

During 2014, the Air France-KLM regional subsidiary Hop replaced Lufthansa CityLine as top regional airline in Europe with 13 million passengers carried during the year.

## North America

Consolidation of US airlines positively impacts on profitability. Reductions in fuel costs and strengthen of US Dollar projects a strong financial performance outcome for 2015.

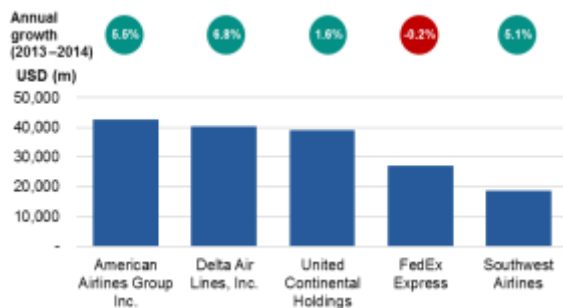
Table 18: N. American Airlines Performance

	2013	2014E	2015F
Net post-tax profit, \$billion	7.4	11.2	15.7
Per passenger, \$	9.0	13.3	18.1
% revenue	3.5%	5.2%	7.5%
RPK growth, %	2.3%	2.7%	3.0%
ASK growth, %	2.0%	2.5%	3.1%
Load factor, % ATK	64.3%	64.3%	64.2%
Breakeven load factor, % ATK	59.9%	58.1%	56.4%

Source: Mid-year 2015 Report, IATA

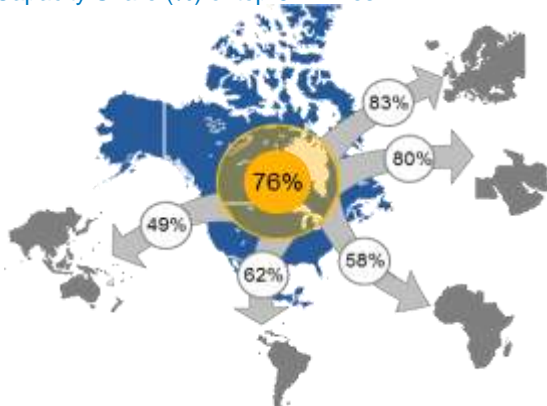
Airlines in North America showed the strongest financial performance in the world. Net post-tax profits were the highest in 2014 and are projected to reach \$15.7 billion in 2015. This represents a net profit of \$18.12 per passenger, and net margin of 7.5%. Although load factors have held steady at 64%, breakeven load factors have decreased due to the decrease in fuel and other costs.

Figure 69: 2014 Top North American Airline Performance in Operating Revenue



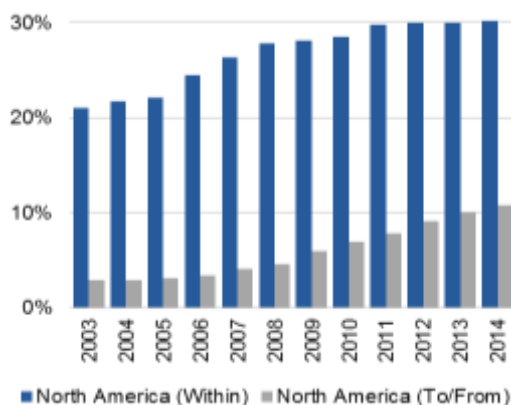
Source: ATW Magazine

Figure 70: North America Market Consolidation: Capacity Share (%) of top-5 Airlines



Source: Mott MacDonald analysis of SRS Analyser

Figure 71: North American LCC Capacity Share (%) of Total Seats



Source: CAPA with data provided by OAG

Following the merger of American Airlines and US Airways, the America Airlines Group became the most profitable airline in the world, earning net income of \$2.88 billion, \$1.3 billion higher than the second placed Emirates Group. However, the impact in hedging strategies was clear for Delta Air Lines, which, although performing above \$40 billion in revenue, was far below American Airlines in earning a net profit \$659 million. The United Airlines group earned a net profit of \$1.132 billion.

American, Delta and United are expanding capacity in an efficient manner. The big three American carriers were responsible for the biggest share of the 76% capacity share offered by the Top 5 airlines in the intra-North American market. Carriers stopped operating less profitable routes and different strategies are being followed. American is expanding its hubs in Miami and Chicago, while United is implementing a network optimisation plan to respond more effectively to seasonal demand.

With regards international routes, the North Atlantic still ranks as the largest source of international revenue, although Latin America become the second largest market, overtaking the Trans-Pacific. Nonetheless, international revenues are still a relatively small proportion of activities for North American carriers compared with domestic operations. In Canada, Air Canada also performed well in 2014. The carrier and its pilots signed a 10-year labour contract that will lead to long-term stability as long as Air Canada meets growth benchmarks.

The market share of low cost carriers within North America kept stable during 2014. For 2015 the US low-cost/hybrid airlines are mostly planning to add capacity at a higher level. Alaska plans 8% growth, JetBlue is aiming for 6% to 8% growth, while Southwest plans capacity growth close to 6%.

There is although a continuous upwards trend in traffic to/from North America captured by the low-cost carriers. This trend is expected to continue in 2015.

For the ultra-low-cost carriers the opportunity for expansion seems also to have arrived as with the consolidation from the major and with earlier LCCs moving more to the centre of the market they have now the opportunity to expand actively close to low price sensitive demand.

Table 19: Top 5 regional N. American airlines

Airline	Country	Pax (000s)	Top 100 rank
ExpressJet Airlines	USA	30,950	1
SkyWest Airlines	USA	27,786	2
Envoy	USA	16,128	3
Republic Airlines	USA	13,293	4
Endeavor Air	USA	12,070	6

Source: Airline Business

North American regional airlines carried over 166.3 million passengers in 2014, a 1.1% reduction compared to 2013. Nonetheless, North America remained as the number one regional aviation market worldwide.

4 out of the top 5 largest global regional airlines are USA based. The American ExpressJet Airlines kept 2013's first place as global largest regional airline, even though reporting a 6.1% decrease in passenger numbers between 2013 and 2014.

## Asia-Pacific

Asia-Pacific airlines saw an improvement in financial performance in 2014. The largest Chinese and Australian airlines are back in profit while Indian carriers also saw improvements in profitability. Low cost carriers' financial performance faces challenges, however.

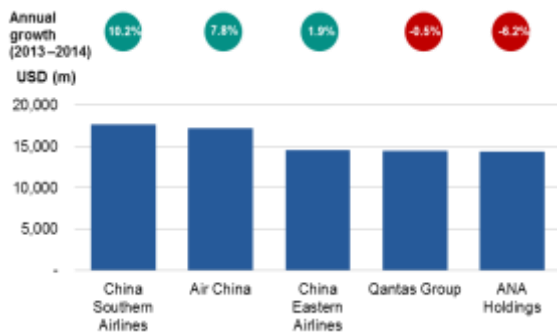
Table 20: Asia-Pacific Airlines Performance

	2013	2014E	2015F
Net post-tax profit, \$billion	1.9	1.2	5.1
Per passenger, \$	1.8	1.1	4.2
% revenue	0.9%	0.6%	2.5%
RPK growth, %	7.2%	6.9%	8.1%
ASK growth, %	7.1%	7.4%	7.7%
Load factor, % ATK	66.9%	66.9%	67.0%
Breakeven load factor, % ATK	65.0%	65.2%	62.8%

Source: Mid-year 2015 Report, IATA

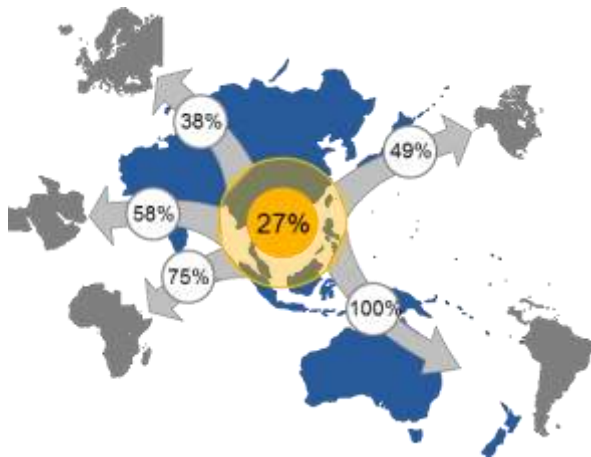
During 2014, Asian-Pacific airlines had very diverse performances. However, prospects for 2015 look better. Net profits were down to \$1.2 billion in 2014, but backed up by lower fuel costs and stronger cargo markets, are expected to improve to \$5.1 billion in 2015. This represents a net post-tax profit per passenger of \$4.28 and improvement in net margin from near breakeven to 2.5%. The breakeven load factor held steady at 65% in 2014, but is expected to reduce to 62.8% in 2015 on the back of cost savings. The region also recorded the highest ATK load factor in 2014 of any region at 66.9%.

Figure 72: 2014 Top Asian-Pacific Airline Performance in Operating Revenue



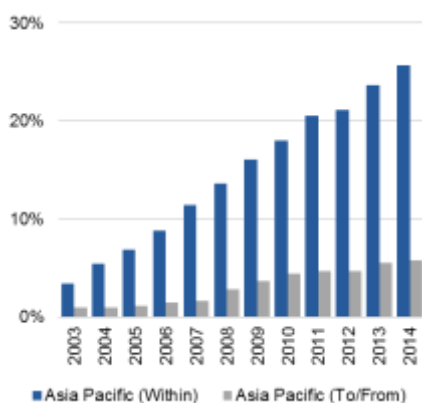
Source: ATW Magazine

Figure 73: Asian-Pacific Market Consolidation: Capacity Share (%) of top-5 Airlines



Source: Mott MacDonald analysis of SRS Analyser

Figure 74: LCC Capacity Share (%) of Total Seats



Source: CAPA with data provided by OAG

Chinese largest airlines were back in profit during 2014. Combined, the four largest domestic airlines (China Southern, Air China, China Eastern and Hainan Airline) reported a profit of \$2 billion. This positive trend continued in the beginning of 2015.

Other airlines in the region struggled, having the majority of airlines operating at close to breakeven in 2014. Japan Airlines benefit from the reduction in operating expenses to present the highest net-income profit outside China. In the Pacific region, the Australian carrier Qantas is expected to see a return to profit during 2015.

One of the challenges faced by Asian-Pacific carriers is over-capacity that leads to low yields. Some airlines are undergoing restructuring (e.g., Malaysia Airlines) and major carriers are starting to reduce capacity and adjust new aircraft deliveries – Southeast Asia is the only region in the world that has as many aircraft on order as active aircrafts in the fleet.

The market is also expected to experience some consolidation.

Asian Pacific carriers are expanding their intra-regional and intercontinental partnerships. In 2014 there was the strengthening of partnerships including Cathay-Qatar Airways, EVA – Singapore Airlines, China Eastern – Qantas, and Air China is planning joint ventures with Star Alliance partners Air Canada, Air New Zealand and the Lufthansa Group.

In addition, the Australia and New Zealand markets are among the most open in the world, with significant sixth freedom foreign airline operations, notably by the Gulf carriers.

There are large variations in LCC penetration in different parts of the Asia-Pacific region. For instance, LCCs represents 60% of seat capacity within the Southeast Asia while in the Northeast region they are responsible for only 12% of capacity within the region. However, overall LCCs continue to grow strongly within the Asia-Pacific region.



Table 21: Top 5 Regional Asian-Pacific Airlines

Airline	Country	Pax (000s)	Top 100 rank
Tianjin Airlines	China	9,941	7
QantasLink	Australia	5,538	18
Bangkok Airways	Thailand	4,790	19
SilkAir	Singapore	3,495	24
Wings Air	Indonesia	3,425	25

Source: Airline Business

The Asia-Pacific region presented the highest year-on-year growth in number of regional passengers, with almost 66.5 million passengers carried in 2014, which represented a 9.9% increase compared to 2013.

The Chinese carrier Tianjin Airlines experienced a 23.4% growth between years, being globally ranked as the 7th largest regional airline.

## Middle East

Major Gulf carriers keep growing rapidly, but are faced with allegations of subsidies from some US and European carriers.

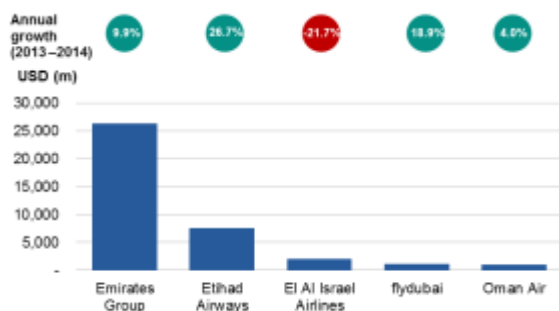
Table 22: Middle Eastern Airlines Performance

	2013	2014E	2015F
Net post-tax profit, \$billion	0.3	0.7	1.8
Per passenger, \$	1.9	3.9	9.6
% revenue	0.6%	1.2%	3.1%
RPK growth, %	11.6%	12.6%	12.9%
ASK growth, %	12.3%	11.5%	12.9%
Load factor, % ATK	60.1%	60.1%	60.2%
Breakeven load factor, % ATK	59.5%	59.1%	58.0%

Source: Mid-year 2015 Report, IATA

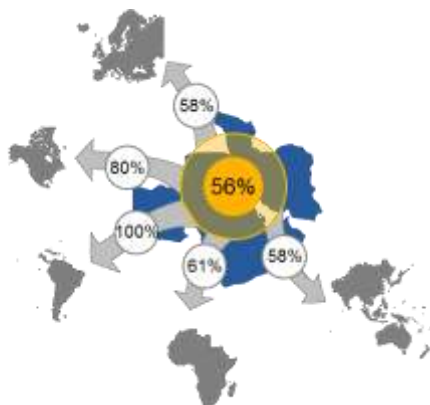
Middle Eastern airlines managed to more than double net post-tax profit between 2013 and 2014. 2015 is projected to follow the same trend. Net profits were of \$700 million in 2014 and are forecasted to be \$1.8 billion in 2015. The load factor is the second lowest globally but on the other hand, the region manages to have low unit costs, partly driven by the strength of capacity growth. Middle Eastern airlines project a net post-tax profit per passenger of \$9.6 in 2015, the second highest in the world after North America.

Table 23: 2014 Top Middle East Airline Performance in Operating Revenue



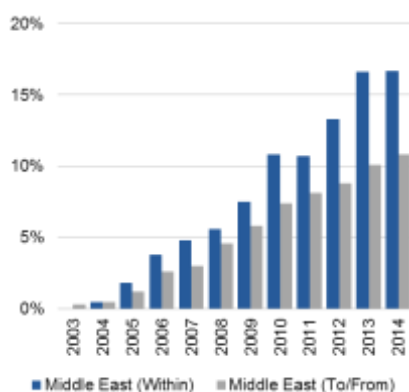
Source: ATW Magazine

Figure 75: Middle East Market Consolidation: Capacity Share (%) of Top-5 Airlines



Source: Mott MacDonald analysis of SRS Analyser

Figure 76: Middle East LCC Capacity Share (%) of Total Seats



Source: CAPA with data provided by OAG

Gulf carriers are being accused by some US and European carriers of being subsidised by their state owners, allowing them to expand capacity unfairly under existing Open Skies agreements.

Emirates Group was the carrier with highest operating revenue in the region, and achieved 10% growth in 2014. Etihad Airways and El Al Israel Airlines followed in second and third place with revenues far more modest. Qatar Airways revenue was up to USD 8.7 billion (+11,5%).

In terms of net income Emirates performed above regional competitors, reporting a value close to \$1.5 billion in 2014, an increase of 34% compared with 2013.

Emirates, Etihad and Qatar saw during 2014 the delivery of Next Generation aircraft that allowed them to expand their networks and secure a stronger service positioning. Gulf carriers are still growing strongly, both in their own operations and, in the case of Etihad, through acquisitions of stakes in other carriers such as Alitalia in the beginning of 2014.

Although dominated by the Big 3 Gulf Carriers (Emirates, Etihad and Qatar, which account for 38% of the region's seat capacity), the Middle East regional is home to a range of carriers with ambitions for growth such as Saudia, Oman Air and Gulf Air, which is now focusing on intra-regional traffic.

Middle Eastern LCCs have a different profile from other low cost carriers worldwide, tending to operate hybrid business models offering free checked baggage and business class products (e.g., flyDubai), and compete on many destinations served by the Big 3.

LCC capacity offered within the Middle East is above 15% and over 10% on route to/from the region. Overall LCC penetration is still lower than in most world regions, but growing strongly.

Middle East only has 3 regional airlines in the world's top 100, with the largest being Iran Asesman, with about 3.5 million passengers carried in 2014.

Table 24: Top 3 regional Middle East Airlines

Airline	Country	Pax (thousands)	Top 100 rank
Iran Aseman Airlines	Iran	3,500	23
Arkia	Israel	1,250	60
Israir	Israel	650	86

Source: Airline Business

The airline experienced an 8.8% decrease in carried passengers between 2013 and 2014. The remaining two regional Middle Eastern airlines that made to the world's top 100 in 2014 are the Israeli carriers Arkia and Israir.

## Latin America

Latin American airlines faced challenges in 2014 but continued to build bases for the future.

Table 25: LATAM airlines performance

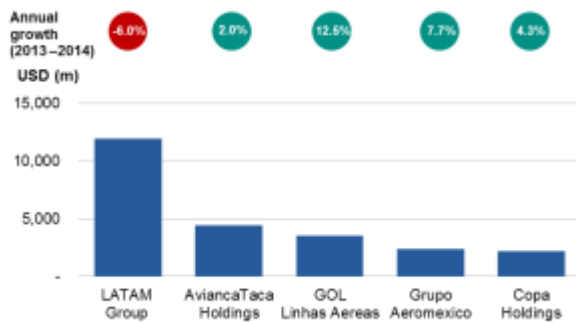
	2013	2014E	2015F
Net post-tax profit, \$billion	0.2	0.0	0.6
Per passenger, \$	0.8	0.1	2.3
% revenue	0.6%	0.0%	1.8%
RPK growth, %	6.3%	6.9%	5.1%
ASK growth, %	4.5%	4.6%	5.0%
Load factor, % ATK	61.2%	61.2%	61.2%
Breakeven load factor, % ATK	59.9%	60.1%	58.8%

Source: Mid-year 2015 Report, IATA

Airlines in Latin America faced some challenges in 2014. It can be seen on the financial performance were the net post-tax profit in 2014 was close to breakeven. For 2015 net profits are expected to be of \$0.6 billion, which represents \$2.3 per passenger and a margin of 1.8%.

The breakeven load factor in the region is also expected to decrease from 60.1% in 2014 to 58.8% in 2015.

Figure 77: 2014 Top Latin America Airline Performance in Operating Revenue



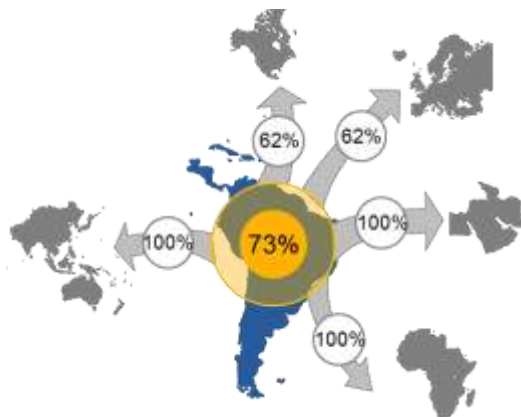
Source: ATW Magazine

The LATAM Group (parent of LAN and TAM airlines) accounted for the highest operating revenue in the region at \$12 billion in 2014. Although presenting a net income loss of \$110, the carrier improved from a \$281 million net loss in 2013.

Copa Airlines was the most profitable carrier in Latin America during 2014, with recorded profits of \$371 million. It was followed by Avianca with \$120.5 million of net profit. Nonetheless, this represents a 50% drop in profits from 2013's operation for the Colombian based airline.

The Brazilian airline GOL faced a challenging year during 2014, reporting a net loss of \$415.8 million.

Figure 78: Latin America Market Consolidation: Capacity Share (%) of Top-5 Airlines



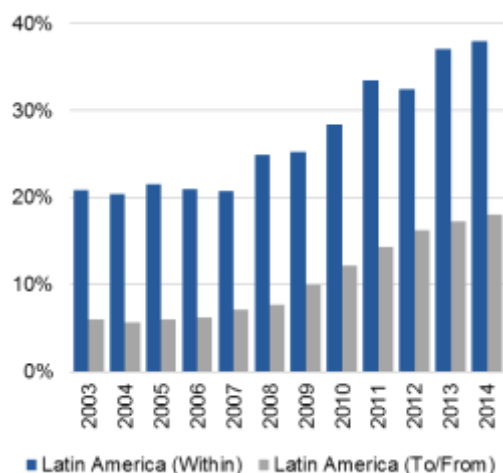
Source: Mott MacDonald analysis of SRS Analyser

The region faced difficulties during 2014 but prospects for 2015 are generally more positive.

Latin American airlines continue to plan for the projected growth in air travel for the region. The region's three largest airlines plan to take delivery of new aircraft and are placing major aircraft orders, generally looking to capitalise the additional capacity in the strongest markets, rather than countries that are more volatile political and economically.

The Top 5 airlines represent 73% of total seat capacity and it is the second most consolidated market after North America.

Figure 79: LCC Capacity Share(%) of Total Seats



Source: CAPA with data provided by OAG

Table 26: Top 5 Regional Latin American airlines

Airline	Country	Pax (thousands)	Top 100 rank
Aeromexico Connect	Mexico	7,496	11
Austral Lineas Aereas	Argentina	2,900	31
Sky Airline	Chile	2,746	34
Avianca Peru	Peru	2,241	44
Aserca Airlines	Venezuela	1,600	52

Source: Airline Business

The Latin American LCC capacity share within the region is close to 40% and has grown rapidly in recent years (although LCCs accounted for only 20% of Latin America total fleet). This share is expected to increase as nearly half of the region's aircraft orders were made by LCCs.

Latin American LCCs are adopting somewhat different strategies. While Colombia's VivaColombia focused on domestic expansion in 2014, Brazil's Azul started operating long-haul intercontinental low-cost operations. The chairman of Azul has also formed a consortium to buy a 61% share in TAP Portugal and achieve efficiencies between the airlines' operations.

Latin America has currently only 6 regional low cost carriers operating in three different countries. This represents a significantly underpenetrated market.

Latin America was the 4th largest regional market for regional aviation in 2014, with about 25 million passengers carried in the region. This represented a 5.8% growth compared to 2013.

Aeromexico Connect remained as the most important regional airline in Latin America, being also placed as the 11th largest global regional carrier, after experienced a 13.6% increase in the number of passengers carried between 2013 and 2014.

## Africa<sup>47</sup>

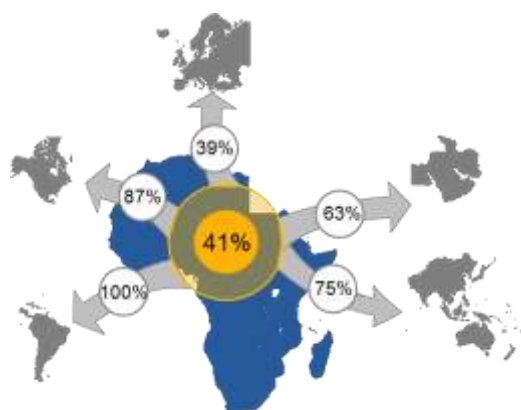
Africa's airlines still face challenges in operating on a profitable basis. There are although nice examples on how to do it.

Table 27: African Airlines Performance

	2013	2014E	2015F
Net post-tax profit, \$billion	-0.1	0.0	0.1
Per passenger, \$	-1.6	0.0	1.6
% revenue	-0.8%	0.0%	0.8%
RPK growth, %	4.6%	0.3%	3.2%
ASK growth, %	4.0%	2.5%	3.3%
Load factor, % ATK	56.1%	56.1%	56.0%
Breakeven load factor, % ATK	56.3%	56.0%	55.4%

Source: Mid-year 2015 Report, IATA

Figure 80: African market consolidation: capacity share (%) of top-5 airlines



Source: Mott MacDonald analysis of SRS

On average, African airlines financial performance was worse than other regions' airlines during 2014. The region presented low profits in 2014 and for 2015 only a small improvement is projected.

While yields are a little higher than average and costs are lower, load factors (56.1% in 2014) and breakeven load factors (56% in 2014) are the lowest of all world regions. Both are projected to experience small improvements in 2015.

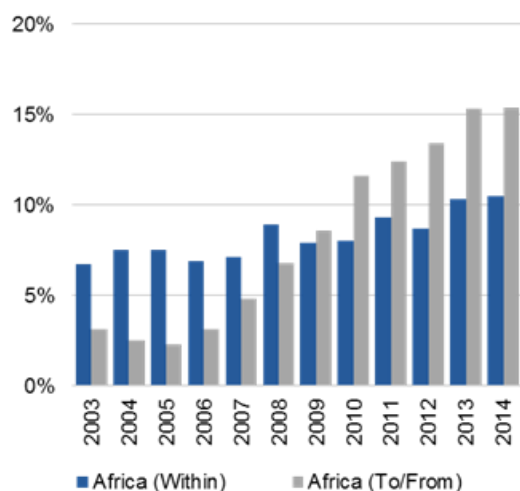
The African market has a very fragmented profile as can be seen by the small share of capacity provided by the Top 5 airlines in the region.

In 2014 South African Airways, the former African market leader, appointed its 5th CEO in the last two years. The company went through a 90-Days action plan that was set to attract a strategic equity.

The market also saw Ethiopian Airlines continuing on its positive track, after forming a successful partnership with ASKY and Malawian Airlines. For 2015, this seems to be the strategy the carrier wishes to follow, and it is now looking for further partnerships in the region.

<sup>47</sup> No African Airlines managed to reach the Top 25 ranking during 2014.

Figure 81: LCC capacity share(%) of total seats



Source: CAPA with data provided by OAG

Table 28: Top 4 Regional African Airlines

Airline	Country	Pax (thousands)	Top 100 rank
SA Express	South Africa	1,400	57
Airlink	South Africa	1,100	65
Precision Air	Tanzania	700	83
RwandAir	Rwanda	600	91

Source: Airline Business

A majority of Africa's LCC capacity is concentrated on international routes to Europe and the Middle East or in the domestic South African market that counts for about one-third of total LCC capacity in Africa.

There are currently only 8 low cost carriers based in Africa. LCC growth in the region has been slow because of little progress made on the intra-African Open Skies agreement approved in 1999 (the Yamoussoukro agreement).

There are however a few LCCs emerging in the market that have ambition to change this paradigm. Carriers such as fastjet, Flyafrica and Flysafair added capacity to the market in 2014 and other existing carriers plan to expand operations in 2015. Undoubtedly, once the open skies agreement is successfully implemented, the LCC share of the market capacity has scope to grow significantly.

Only 4 African regional airlines reached to top 100 global ranking. The South African regional airlines SA Express and Airlink experienced both a positive performance between 2013 and 2014 with traffic growing respectively 3.4% and 10%.

## 3. Airports

### 3.1. Airport Business and Investment Trends

Airports recorded strong financial results in 2013, showing increased profitability. Expectations are for 2014 financial performance to continue the same trend, as traffic growth was higher than historic averages. Statistical Annex A provides an overview on passenger volumes at airports worldwide. While there are differences in the financial performance of airports by region, a trend towards reduced dependency on aeronautical revenue is apparent. Non aeronautical revenue accounts for almost 50% of total airport revenue while, for airports in each region, different sources of non-aeronautical revenue have increased in importance. Aeronautical revenue deriving from the charges set at each airport can also vary significantly, not only by region but also by airport size.

Despite the overall profitability of the airport sector, it is clear that only a small minority of large airports is actually profitable and able to offset the losses that the majority of the smallest airports incur. The capital extensive structure of airport costs requires a passenger numbers of over 1 million per annum in order to allow for the airport owner to operate profitably.

Of course, the growing demand for air travel, both current and projected requires investments in airport infrastructure across the globe. There were 267 airport projects completed in the year to July 2015 around the world, with investments being higher and most populous in Asia Pacific. There are currently 346 new airport projects under construction, as countries plan to accommodate growing passenger demand and also offer increased air connectivity in order to gain the economic benefits.

However, the drop of oil price might prove to be harmful for the future of the many big airport investments by oil producing countries. This challenge may be another argument supporting the already growing trend of airport privatisation and in particular airport PPP projects. This trend has been evident in Europe, Latin America and Asia Pacific, where many airport concessions have been confirmed or are in progress; Middle East, North America and Africa on the other hand, do not see much privatisation activity for different reasons, although all three regions offer their own airport privatisation opportunities in the near term.

### 3.2. Airport Financial Performance

#### Introduction

Despite the unavailability of complete data on airport financial performance for the financial year of 2014, the recent publication of the 2014 ACI Airports Economic Report helps identify the latest trends in airport revenues and costs around globe in 2013.

#### Aeronautical Revenue

Looking at Table 29, it is apparent that the industry has performed strongly despite the economic and political challenges, registering a 5.5% annual growth of revenues at a global level. However this growth has been unevenly distributed amongst the regions, with airports in Asia Pacific and the Middle East performing far better than the rest, with a double digit growth year on year. In contrast,



revenues at European airports grew only by 2.2%, emphasizing the fragile situation of a number of European economies since the 2008-09 recession. Despite the slow growth, globally European airports still boast the highest revenue share, generating over one third of the total revenue for the year.

Table 29: 2013 Estimated Airport Total and Aeronautical Revenues by Region

Region	Total Revenue (USD m)	2013/12 % Change	Aeronautical Revenue (USD m)*	2013/12 % Change	Aeronautical Revenue Share of Total Revenue
Africa	2,900	3.9%	2,100	12.5%	72.4%
Asia-Pacific	37,000	11.8%	18,800	13.1%	50.8%
Europe	49,800	2.2%	30,100	6.2%	60.4%
Latin America & Caribbean	7,000	6.5%	4,400	5.4%	62.9%
Middle East	8,700	11.6%	4,400	5.8%	50.6%
North America	25,500	4.4%	13,900	0.6%	54.5%
<b>World</b>	<b>130,900</b>	<b>5.5%</b>	<b>73,700</b>	<b>6.0%</b>	<b>56.3%</b>

\*Aeronautical revenue includes ground-handling charges

Source: ACI Airport Economics Report 2014

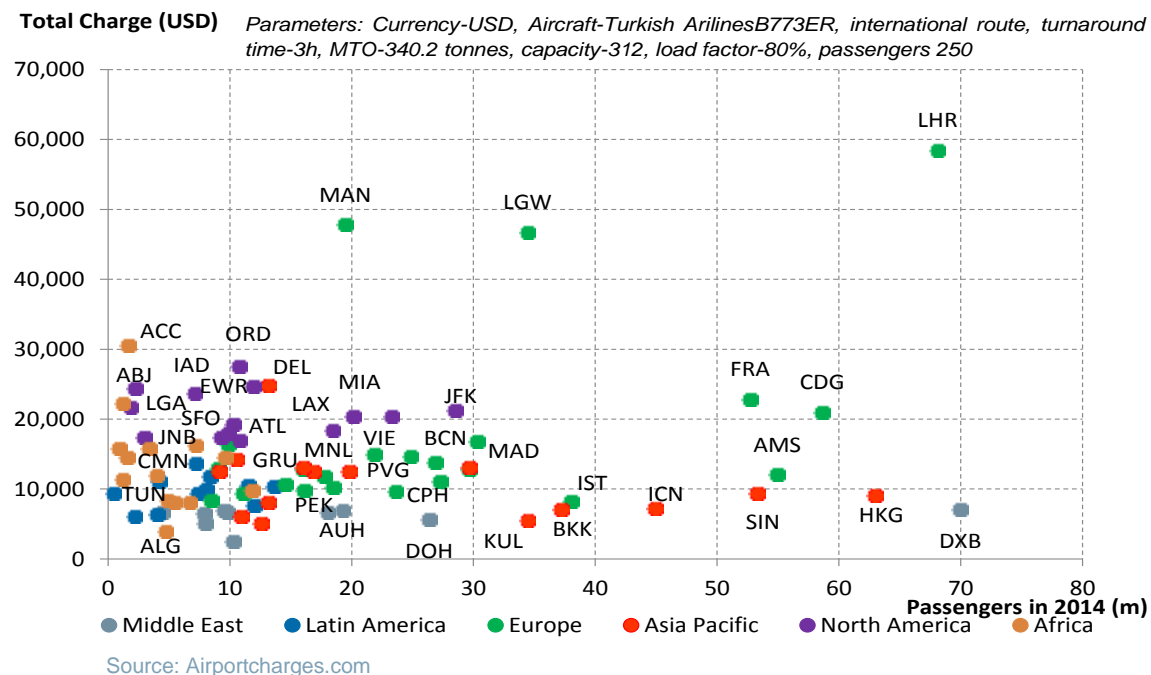
There are two main revenue streams for airport revenues: aeronautical and non-aeronautical revenue. Aeronautical revenue is formed by the charges levied by the airport operator on entities that perform commercial aviation related activities, such as airlines or ground handlers. The main components of aeronautical charges for the airport are landing and passenger charges. Table 29 also illustrates dependency of airports on non-aeronautical revenues, with the global average share of aeronautical revenue to total revenue being around 44%, but approaching 50% for the Asia-Pacific and Middle East region. With the exception of Africa where over 70% of total airport revenue derives from aeronautical revenue, all the other regions are close to the global average. This is a result of the change in perception for airports being not merely a public-sector infrastructure provider, but rather commercial entities that can provide value via their services to their end users and their operators alike.

## Airport Charges Benchmarking

This section compares the airport charges at a number of airports of various sizes and locations, illustrating trends in aeronautical revenues. The complete analysis can be found in the Statistical Annex G where the breakdown of each airport's total charges is provided.

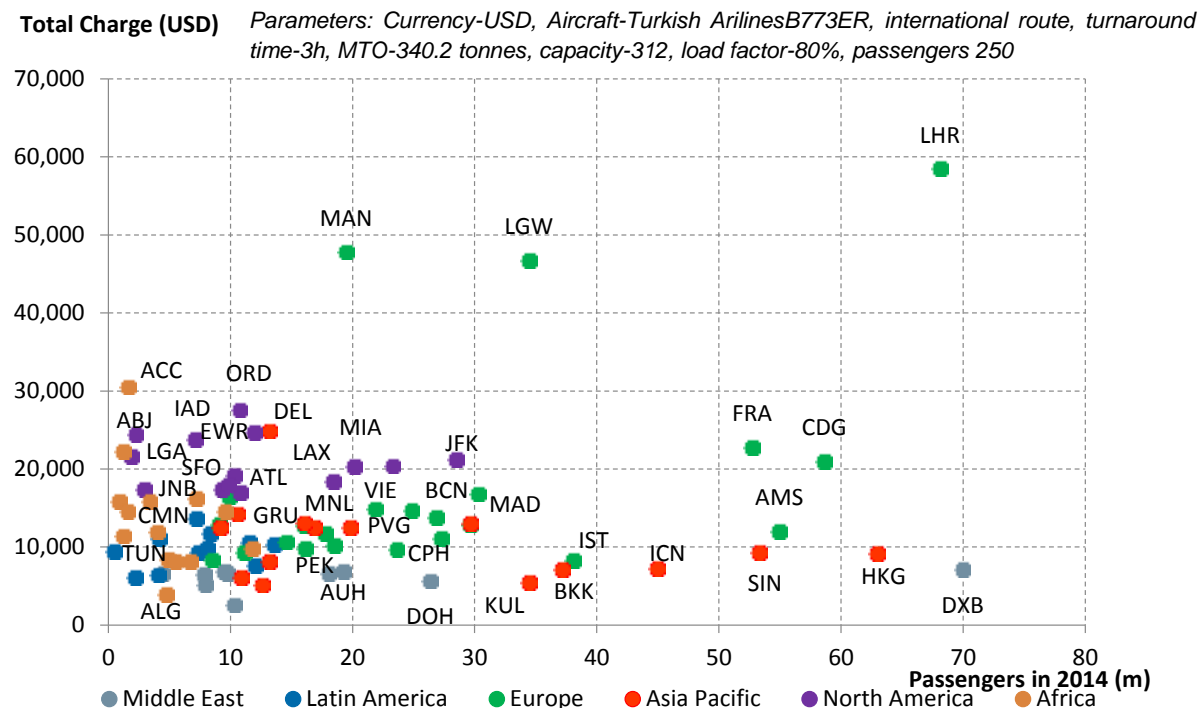
The summary of the analysis for airport charges for narrow-body aircraft (based on a Boeing 737-800) is depicted on Figure 82. The graph highlights the relationship of airport charges for international flights to the total international traffic at the airports, broken down by region. For airports that served up to 30 million international passengers in 2014 most airport charges lie in the range of USD5,000 to USD15,000, irrespective of the region. In addition airport charges in Latin America are on average lower than in North America, for airports serving similar volumes of international passengers.

Figure 82: Narrow Body Aircraft Airport Charges at Selected Airports by Region



The same trends can be observed for airport charges for wide-body aircraft (based on a Boeing 777-300ER). Furthermore, it is evident that airports in the Middle East levy on average the lowest charges amongst their peer airports of comparable international traffic volumes. Airports in the Asia-Pacific tend to offer low charges compared to European or North American airports, while airports in the African region levy a broad range of charges depending on the airport, despite serving the lowest international passenger volumes on average.

Figure 83: Wide Body Aircraft Airport Charges at Selected Airports by Region



Source: Airportcharges.com

Finally, the outliers of the two figures fall under three categories; expanding hubs in emerging markets, congested hubs mainly in Europe and airports that publish their charges in GBP and thus have been affected by the latest changes in the USD/GBP exchange rates. London Heathrow, the airport with the highest charges in both figures, is included in the last two categories. The first group of outliers have high traffic volumes but as they are located in growing aviation markets, airport charges are relatively low to promote growth (e.g., Dubai and Hong Kong). The second group of outliers includes airports in mature aviation markets like London, Paris, Frankfurt and Amsterdam, where the regulators have permitted higher charges.

### Non-Aeronautical Revenue

The key sources of airport non-aeronautical revenue include rents to various concessionaires, car parking, retail, advertising and car rental facilities. For the last financial year that data is available, along with aeronautical revenues, airports around the world have managed to improve their non-aeronautical revenue streams by 4.9% year on year for 2013. The exception to this improved performance is Europe, where airports saw their non-aeronautical revenues decrease by -3.2%, as struggling economies of this region have made passengers more price sensitive for ancillary expenses during their air travel.

Table 30: 2013 Estimated Airport Non- Aeronautical Revenues by Region

Region	Non - Aeronautical Revenue* (USD m)	2013/12 % Change
Africa	800	6.8%
Asia-Pacific	18,200	10.7%
Europe	19,700	-3.2%
Latin America & Caribbean	2,600	9.3%
Middle East	4,300	18.4%
North America	11,600	9.6%
<b>World</b>	<b>57,200</b>	<b>4.9%</b>

\*Includes Non-Operating Income

Source: ACI Airport Economics Report 2014

In contrast non-aeronautical revenues of airports in the Middle East grew by almost 20% compared to last year. The rapid growth of non –aeronautical revenues of airports in the Middle East can be traced back to the continuous investment in airport infrastructure there, targeting to create large hub airports, providing extensive amenities for connecting passengers. In that way, specific care for non-aeronautical facilities has been taken, with almost half of the total non-aeronautical revenue deriving from retail concessions (Table 31).

Table 31: Distribution of Non-Aeronautical Income by Region in 2013

Region	Africa	Asia-Pacific	Europe	Latin America & Caribbean	Middle East	North America	World
Retail Concessions	44.0%	33.0%	35.0%	25.0%	49.0%	8.0%	27.0%
Car Parking*	15.0%	8.0%	15.0%	9.0%	8.0%	39.0%	20.0%
Real Estate Income or Rent	18.0%	23.0%	19.0%	14.0%	11.0%	13.0%	18.0%
Rental Car Concession	4.0%	1.0%	2.0%	3.0%	2.0%	17.0%	6.0%
Food & Beverage	1.0%	3.0%	5.0%	6.0%	5.0%	7.0%	5.0%
Advertising	8.0%	4.0%	2.0%	5.0%	3.0%	6.0%	4.0%
Utility Recharges	3.7%	3.4%	5.6%	1.7%	2.7%	0.0%	3.0%
Fuel & Oil	1.3%	1.4%	0.8%	3.5%	7.0%	0.0%	1.0%
Aviation Catering Service	0.3%	0.4%	0.3%	0.5%	1.4%	0.0%	0.3%
Other	5.0%	22.0%	16.0%	33.0%	12.0%	9.0%	16.0%

Source: ACI Airport Economics Survey 2014

Airports in the Asia Pacific region saw the second largest growth in non-aeronautical revenue year on year and, if the trend continues, they will soon surpass European airports in non- aeronautical revenue volumes. Again, retail concessions comprise the largest share of this revenue stream.

Looking at the distribution of non-aeronautical revenue of airports around the world, retail concessions remain the leading revenue source, with car parking and real estate income following. Car parking and rental car revenues are much higher in North America compared to other regions, due to generally lower reliance on public transport for airport access.

## Operating and Capital Costs

The main airport costs comprise of personnel costs (such as staff salaries), operating expenses (such as contracted services or utility bills) and capital costs (such as depreciation/amortisation of airport infrastructure assets). Overall for 2013, total airport costs grew by 1.9%, compared to +5.5% growth in revenues in the same period. This however is not the case across all the regions, with Latin American & Caribbean airport costs growing faster than revenues, mainly due to increased capital costs<sup>48</sup>.

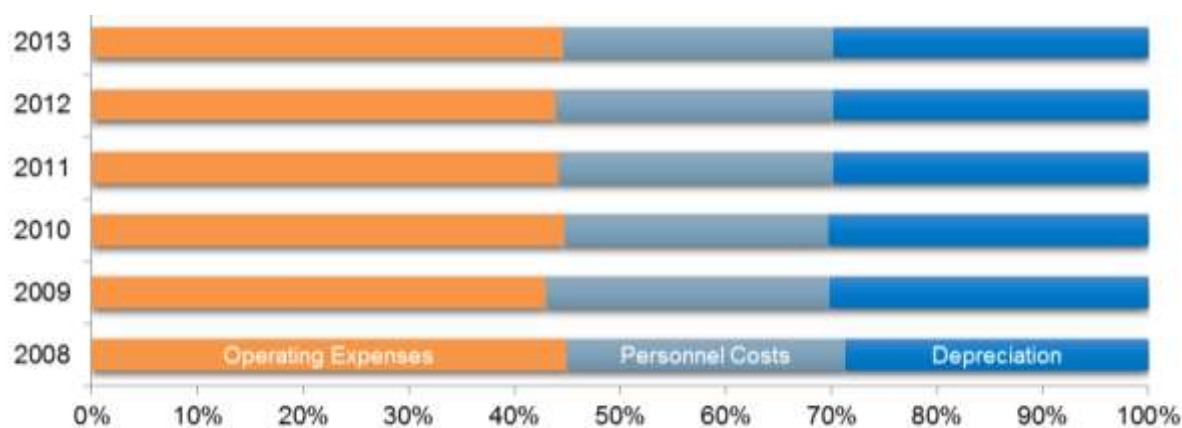
Table 32: 2013 Estimated Airport Costs by Region

Region	Total Costs (Operating + Capital)	2013/12 % Change
Africa	2,100	-3.9%
Asia-Pacific	25,800	6.2%
Europe	42,100	-2.5%
Latin America & Caribbean	5,100	11.4%
Middle East	7,400	6.4%
North America	22,700	4.2%
<b>World</b>	<b>106,500</b>	<b>1.9%</b>

Source: ACI Airport Economics Survey 2014

During the same period, airports in Europe and Africa saw their total costs fall by 2.5% and 3.9% respectively, helping to improve the profitability of airports in this region<sup>48</sup>.

Figure 84: Evolution of Airport Costs per Passenger



Source: ACI Airport Economics Survey 2014

Finally, as can be observed on Figure 84 the relationship between the various airport cost components has remained fairly static, with operating costs forming about 45% of the total costs, while the share of capital/depreciation costs is close to 30% and personnel costs are around 25% of the total costs.

<sup>48</sup> 2014 ACI Airport Economics Report

## Profitability

### Definition and Key Performance Indicators

In accounting terms, the net profit of an airport is defined as the difference between its total revenues and its total costs, often presented on a per passenger basis for comparison purposes. Total revenues include both aero and non-aeronautical revenues, while total costs include operating expenses, capital costs and taxes.

The process of measuring airport profitability is not straight forward due to the diversity in capital structure, ownership model and regulatory controls at different airports. From government owned aviation infrastructure providers to fully privatised businesses, airports around the world have different profitability targets and as such measurements for their profitability are best assessed at a disaggregate granular level, in terms of airport size, region or economic grouping.

ACI in its latest publication of the 2014 Airport Economics Report has identified the key ways that airport profitability is most commonly measured. While their interpretation or methodology of calculation might vary, their general attributes are briefly described below:

- Net Profit Margin: Difference between total revenue and total cost, measured on a per passenger basis.
- Return on Invested Capital (ROIC): This indicator measures not only the effective management of total revenues and profits but also the amount of capital invested at the airport. It is the ratio of net profits before interest to the net assets plus any long-term debt.
- Return on Assets (ROA): This indicator measures the performance of net profits in respect to the total assets.
- Return on Capital Employed (ROCE): The return on earnings before interest, taxes, depreciation and amortisation (EBIDTA) is measured with this ratio. The denominator is the net assets of the airport (total assets minus current liabilities)
- Weighted Average Cost of Capital (WACC): This is the benchmark for comparison for the ROIC of an airport, and it indicates the opportunity cost of an alternative investment with a similar risk profile; if ROIC is higher than the WACC, the airport project is creating value to its shareholders.

While extensive analysis on the performance of airports in the abovementioned measurements is not available for the year 2014, there are some useful takeaways from the 2013 financial year that are described further on.

### Airport Profitability Trends

For 2013, ROA for airports was 2.8% on average globally, while ROCE was 10.5% and ROIC was 6.3%<sup>49</sup>. The median WACC for the same period of time is just below the ROIC. Of course, as noted previously, not all airports operate targeting to generate maximum profits, with the majority being operated as public entities; regional socio economic benefits are considered for these cases in order to more accurately assess the success of the airport's operation.

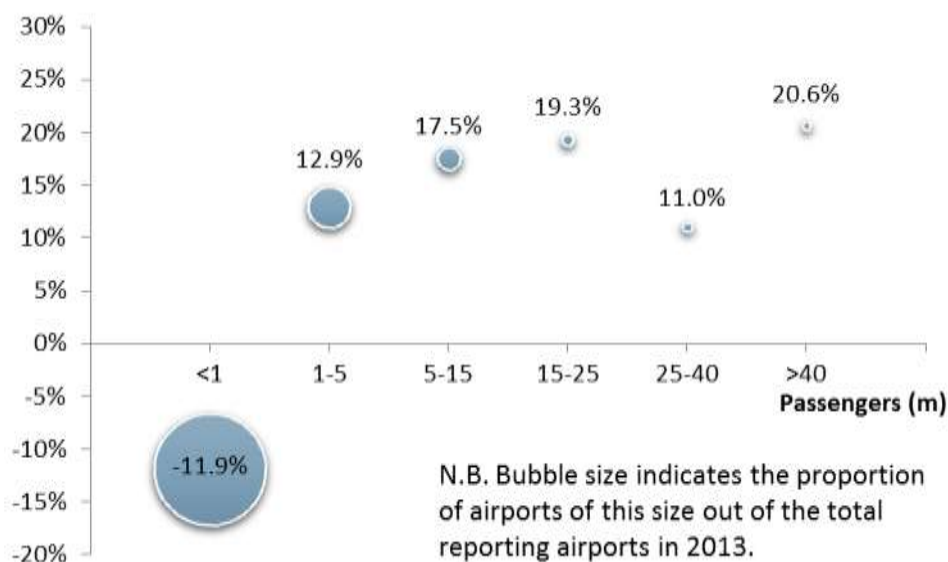
The summary above indicates that the financial performance of airports is a positive one. However, as can be observed on Figure 85, small airports (less than 1 million passengers per annum) are

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<sup>49</sup> 2014 ACI Airport Economics Report

generally not profitable, while larger airports having achieved this critical size can be operated as successful commercial enterprises.

Figure 85: 2013 Net Profit Margin by Airport Size



Source: Adapted from 2014 ACI Economics Report

Over 80% of airports reporting figures to ACI serve less than 1 million passengers annually, with a net loss margin of -11.9% on average. As the airport size grows, so does the profitability of the airport, with the few airports serving above 40m passengers enjoying a net profit margin on average over 20%.

The same can be concluded at a regional level as well, specifically for European airports. As Figure 86 indicates, while 60% of airports in the region are loss making, none of the airports serving over 25 million annual passengers reported losses for 2013. This pattern of loss making small airports is seen in other global regions outside of Europe.

The main structural reason behind the unprofitability of the smaller airports is diseconomies of scale. Airports below a certain size are unable to cover their capital intensive and mostly fixed asset costs. As a result, they cannot sustainably generate high returns on investment, as their high capital costs are not spread over high enough traffic figures to generate sufficient aeronautical and non-aeronautical revenue for the airport<sup>50</sup>.

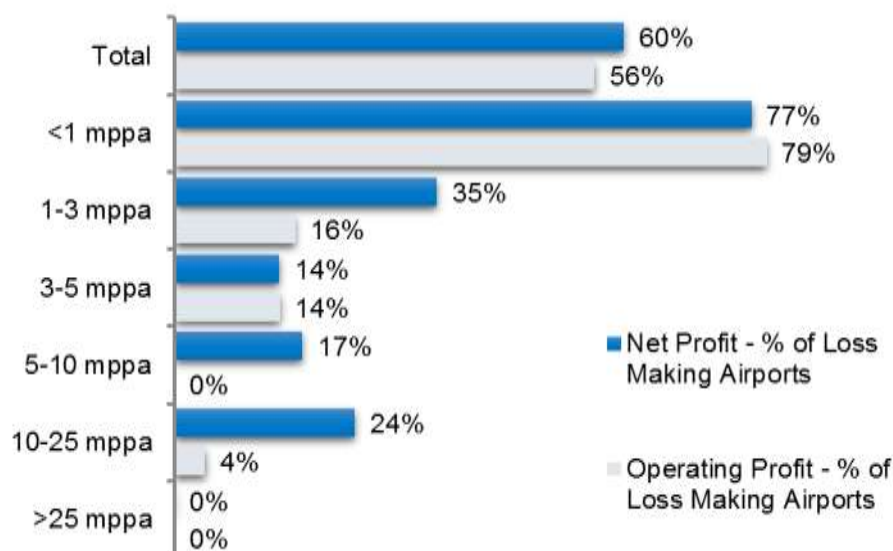
The lower profitability of mid-sized airports serving 10-25 million annual arises as this is usually the threshold when an airport has to invest in additional terminal and runway capacity to meet demand. The lumpy nature of this capital investment results in a high proportion of such mid-sized airports making net losses or only small net profits, even if they achieve operating profits.

In summary, for an airport to be considered a financially sustainable business, there must be adequate passengers, over the 1m threshold, in order to bear the high fixed costs required for its operation. As the airports grow, they take advantage of the economies of scale, increasing their profitability and providing an adequate return on investment. For this reason, many small airports are

<sup>50</sup> ACI Europe Economics Report 2014

operated as part of a larger airport group, benefiting from cross subsidies from the larger airports in the group.

Figure 86: Percentage of Loss Making Airports in Europe by Size for 2013



Source: ACI Europe Economics Report 2014

## Regulatory Till

It is important to consider the airport regulatory environment when discussing airport financial performance, and specifically airport profitability. In most cases, airport managers must comply with economic regulations governing the pricing policy of their airport services.

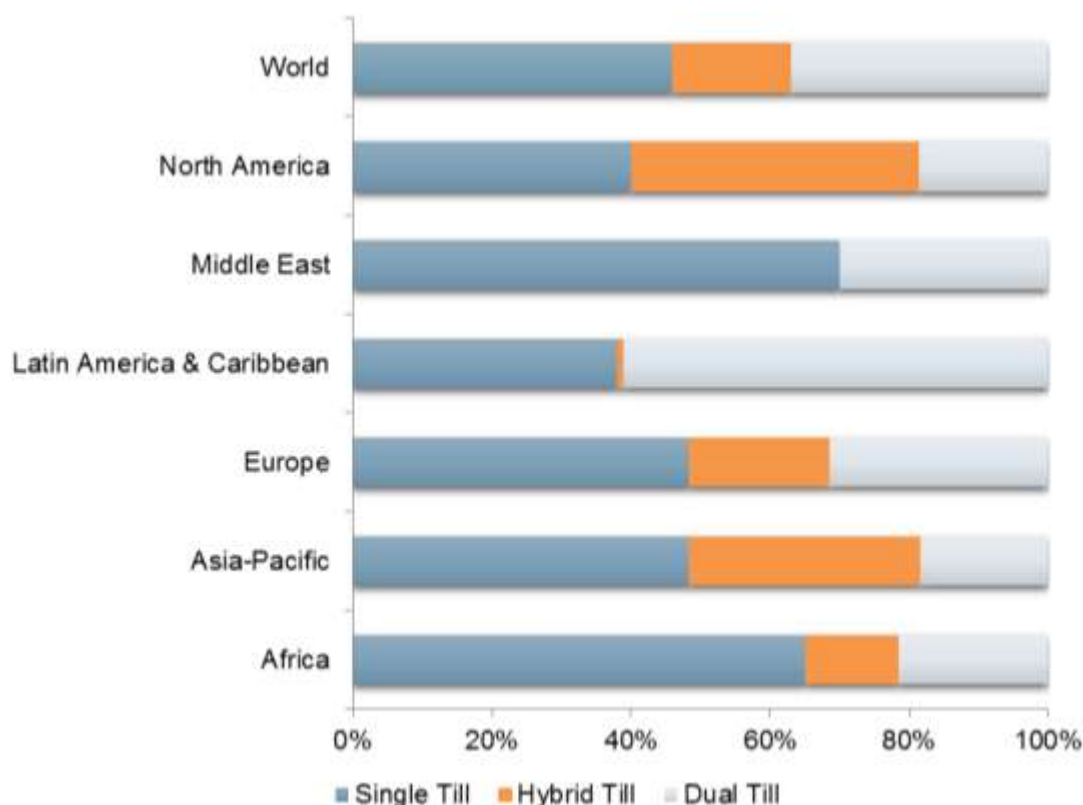
There are three approaches in regulatory models used for airports and they revolve around the treatment of non-aeronautical revenues. The first is the 'single till', which takes account of both aeronautical and non-aeronautical revenues in regulating aeronautical charges at a level to provide adequate returns on investment. This means that non-aeronautical revenues serve to subsidise the airport charges levied on airlines and other airport users. The second approach is the 'dual till', where aeronautical and non-aeronautical revenues and costs are considered separately, with airport charges set to cover costs associated with the provision of aeronautical services. The third approach is the 'hybrid till', which permits partial subsidization of aeronautical costs by non-aeronautical revenues. For example, a single till approach may be adopted for landing fees while terminal costs and revenues are determined on a dual till basis,

These three regulatory approaches can have a significant impact on the business model and the profitability of an airport, as the dual till system may allow an airport to achieve higher levels of profitability as aeronautical and non-aeronautical activities are treated separately.

Figure 87 shows what the trend is in each region regarding regulatory tills. It is evident that the single till system is the most common, adopted at 46% of regulated airport operators globally, with only Latin America & the Caribbean regulators making extensive use of the dual till system. Furthermore, the hybrid system is mostly used in North America and Asia-Pacific, with over 40% of airport operators using this system to partially subsidise aeronautical expenses. In the Middle East, there is a clear emphasis on single till system.



Figure 87: Proportion of Airports by Regulatory Till by Region for 2013



Source: ACI Economics Report 2014

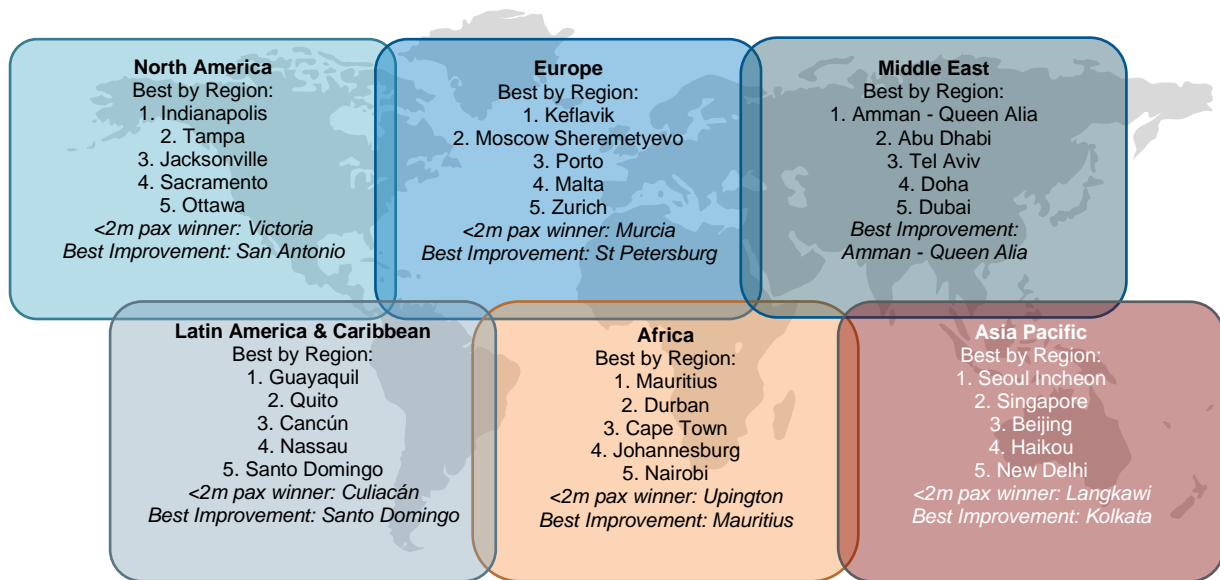
### Customer Service Awards

Customer satisfaction plays an important role in the sustained profitability and financial performance of airport businesses. By enhancing passenger experience, airports can help to attract customers and grow their businesses.

However, within the airport industry there are various ways of increasing passenger satisfaction and not all of them are suitable for every airport. Differences in airport facilities, market segments served and regulatory environment can have a significant impact on the tools available to an airport operator to achieve customer satisfaction.

The airports recognised for delivering excellent customer service in the 2014 Airport Service Quality (ASQ) Awards are summarised in the figures below. It is notable that although many of the high-scoring airports have relatively new facilities, such as Seoul Incheon and Beijing, most are well managed, established airports. It is also notable that all of the top performing airports over 5 million passengers per year are from the Asia-Pacific region (Figure 88).

Figure 88: 2014 ASQ Award Winners by Region



Source: Airport World, Volume 2 Issue 20

Figure 89: 2014 ASQ Awards by Airport Size



Source: Airport World, Volume 2 Issue 20

### 3.3. Airport Infrastructure Investments

#### General Overview

Air connectivity is of critical importance to the development of a modern economy. This requires continuous improvements in existing airport infrastructure, for the development of new airport infrastructure, to meet passenger demand and customer service expectations. There is a growing body of research that highlights the importance of air connectivity for trade and investment. According to recent publication of the Independent Transport Commission aiming to highlight the necessity of good air connectivity for the UK, evidence suggests that<sup>51</sup>:

- The impact of having direct flights between any two cities on average compensates for around 10% of the negative effects associated with the average international border.

<sup>51</sup> Independent Transport Commission, Time to act: The economic consequences of failing to expand airport capacity

- The impact on demand for each day a good spends in transit is equivalent to an ad valorem tariff of 0.6% to 2.3% and that the most time-sensitive trade flows are those involving the parts and components trade, meaning air connectivity plays an important role in global supply chains.
- A 10% increase in the number of intercontinental flights leads to a 4% increase in the number of headquarters located in the corresponding urban area.
- The introduction of a new airline route between two Metropolitan Statistical Areas (MSA) leads to a 4.6% increase in total venture capital investments, a 2.5% increase in the likelihood of venture capital activity between the two MSAs, and a significant improvement in the likelihood that an investment will be successful.

In other words, good air connectivity is associated with significant benefits for investment flows and for the firms engaged in international activity, and will therefore have a positive impact on productivity and growth through its impact on allocative efficiency.

Arguably, the benefits of improved air connectivity are less for landlocked countries or regions compared to island countries like the UK. However, expanded air services and modern airport facilities are amongst important indicators for a region to be considered an advanced trading and economic destination. Furthermore, it is not just the firms engaged directly in international activity that benefit. Even for firms that do not trade directly, good air connectivity will help by making it more likely that they will benefit from being part of global supply chains.

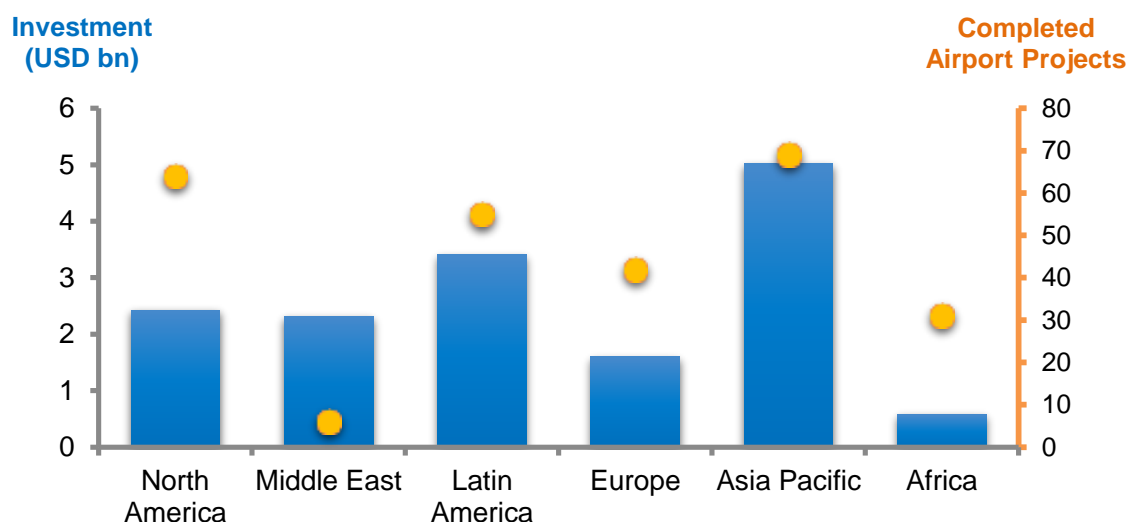
### **Airport Investment and Construction**

A current snapshot of airport investments by region shows the scale of airport investment worldwide. In line with the patterns of growth in air travel demand, there are high levels of airport infrastructure investment in Asia-Pacific, Latin America and the Middle East. The Middle East region is characterised by a relatively small number of mega projects. In North America, and especially Europe, investment is less relative to the number of airports in these regions. This is largely a reflection of the lower future growth rates expected in these more mature markets<sup>52</sup>.

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<sup>52</sup> CAPA Centre For Aviation, Airport construction mid-year review 2015

Figure 90: July 2015 Year to Date Airport Infrastructure Investment Snapshot



Source: CAPA Centre for Aviation

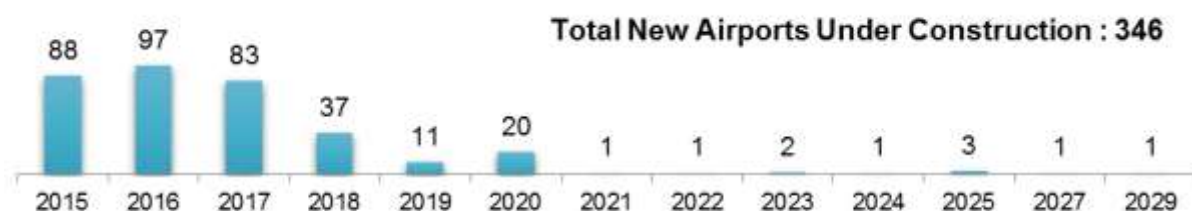
Table 33 summarises the global airport investment plans over the next 5 years up to 2020. There is a marked increase in investment recorded from 2016. The apparent tapering in investment from 2019 is a function of how far ahead planned investments are confirmed rather than necessarily a real decrease in investment. Between 2015 and 2018, 77% of investment is in improvements to existing airports, and 23% in the development of new airports. The investment in existing airports is broken down into terminal and runways development (both new facilities and improvements to existing).

Table 33: Global Airport Investments (millions USD), Current and Predicted

	2015	2016	2017	2018	2019	2020
<b>Global Investment Total</b>	<b>59,028</b>	<b>95,351</b>	<b>73,379</b>	<b>97,134</b>	<b>62,465</b>	<b>3,565</b>
New Airports	10,265	19,830	17,265	26,511	37,145	233
Existing Airports	48,763	75,520	56,113	70,623	25,320	3,332
Terminals	20,085	25,504	16,240	16,061	16,987	0
Runways	8,674	29,641	16,252	9,995	5,404	2,997
Other	20,004	20,375	23,621	44,567	2,929	335

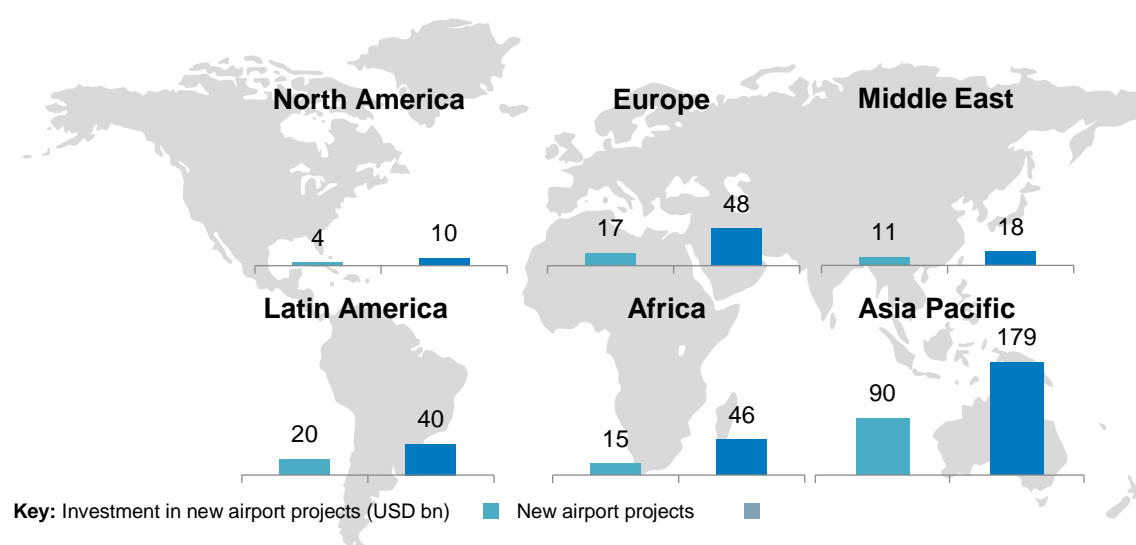
Source: CAPA Centre for Aviation

Figure 91: Timeline of New Airport Actual or Estimated Opening Date as of July 2015



Source: CAPA Centre for Aviation

Figure 92: Investment Amount and Number of New Airport Projects under Construction by Region



Source: CAPA Centre for Aviation

There are currently 346 new airports under construction worldwide, with over 300 new airports due to open by 2018 (Figure 91). Figure 92 shows the regional distribution of new airport developments, with over half being developed in the Asia Pacific region. Africa matches Europe in projects and investment in new airports, which might be surprising at first glance, but emphasises the trend of European authorities favouring low scale projects, mostly situated in the central and eastern regions. Large new airports are difficult to develop in Europe and even the additional runways are often the subject of years of debate, as witnessed in the ongoing deliberations regarding additional runway capacity in the London airports system<sup>53</sup>.

Supported by favourable financial terms by the Chinese government China is partly contributing to the abovementioned development on Africa's investments. Chinese infrastructure investment in Africa has mainly been on roads and railways but is turning to airports, with Chinese companies having constructed airports in countries including Kenya, Mali, Mauritius, Mozambique, Nigeria, the Republic of Congo and Togo.

<sup>53</sup> CAPA Centre For Aviation, The World's Biggest Airport Construction Projects 2015

China accounts for 54 of the 179 new airport projects in the Asia Pacific region. The new Beijing and Chengdu airports are among these, with total investment expenditure expected to reach almost USD 80 billion.

Indonesia is also actively developing its airports network. According to CAPA, there are 30 new airport projects, including the new airport for Jakarta Karawang– which will serve as an alternative to Soekarno-Hatta airport<sup>53</sup>. On a smaller scale, Vietnam, Philippines and Thailand are all investing significantly in airports, and the overall investment for airport projects in ASEAN countries is USD 25 billion.

Table 34 summarises the Top 30 airport development projects worldwide, as of July 2015. Dubai is investing over USD 40 billion on the development of the new DWC Al Maktoum Airport as well as improvements to the existing Dubai International Airport. Furthermore, a focus on upgrading the airport infrastructure of the fast growing Middle Eastern aviation markets is identified. The recently completed Hamad International airport in Doha will be followed by large investments in Muscat, Jeddah, Riyadh, Abu Dhabi, Kuwait and Bahrain, the latest to be completed by 2021.

Meanwhile, Chicago and Atlanta international airports, ranked first worldwide in ATMs and passengers respectively, have both planned upgrades worth over USD 20 billion by 2018, in order to retain and expand their traffic levels. These investments are amongst a series of airport infrastructure upgrades in most hub airports in the United States.

Finally, it is important to mention investments at London Heathrow airport, which are currently budgeted at around USD 13 billion according to the 5-year infrastructure plan currently in place at the airport. However, this amount is expected to increase substantially, following the recommendation of the UK Airports Commission for a new runway at Heathrow. Subject to government and planning approvals, a third Heathrow runway could be operational by 2025<sup>54</sup>. However, the government is not expected to reach a decision on whether to follow the Airport Commission's recommendation before the end of 2015. There remains significant political and environmental opposition to the Heathrow runway proposals.

In conclusion, airport construction and associated capital expenditure continues in a fashion that suggests a return of confidence in the industry globally.

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<sup>54</sup> CAPA Centre For Aviation, UK Airports Commission recommends Heathrow Airport for an additional runway. The Game goes on...,2015

Table 34: Largest Airport Projects in Pipeline by Investment Amount (also in the Statistical Annex J)

Rank	Project Name	Region	Investment (USD bn)	Target Completion
1	Dubai World Central (Al Maktoum Airport)	Middle East	32.3	2027
2	Hong Kong International Airport	Asia Pacific	19.3	2023
3	Chicago O'Hare International Airport	North America	15.0	2018
4	London Heathrow Airport	Europe	13.0	2019
5	Cairo International Airport	Africa	13.0	2035
6	Frankfurt Airport	Europe	10.0	2022
7	Atlanta Hartsfield-Jackson International Airport	North America	9.0	2018
8	Ordos Airport	Asia Pacific	8.0	2016
9	Melbourne Tullamarine Airport	Asia Pacific	7.8	2024
10	Muscat Seeb International Airport	Middle East	7.8	2016
11	Dubai International Airport	Middle East	7.8	2015
12	Philadelphia International Airport	North America	7.5	2017
13	Jeddah King Abdulaziz International Airport	Middle East	7.2	2016
14	Los Angeles International Airport	North America	6.8	2018
15	Abu Dhabi International Airport	Middle East	6.8	2017
16	Wuhan Airport	Asia Pacific	6.4	2016
17	Berlin Brandenburg International Airport	Europe	6.2	2017
18	Seoul Incheon International Airport	Asia Pacific	5.0	2017
19	Kuwait International Airport	Middle East	4.8	2020
20	Bahrain International Airport	Middle East	4.8	2016
21	Chongqing Jiangbei International Airport	Asia Pacific	4.7	2015
22	Washington Dulles International Airport	North America	4.6	2016
23	Riyadh King Khaled International Airport	Middle East	4.4	2021
24	San Francisco International Airport	North America	4.4	2023
25	Dalian Airport	Asia Pacific	4.3	2018
26	Tampa International Airport	North America	4.2	2023
27	New York LaGuardia Airport	North America	4.0	2021
28	Moscow Domodedovo Airport	Europe	3.9	2023
29	Orlando International Airport	North America	3.8	2019
30	Brisbane Airport	Asia Pacific	3.6	2034

Source: CAPA Centre for Aviation

## Oil Price Impact on Airport Investments

While the falling oil price can have a positive impact for air travellers in terms of reduced air fares, so far its effect can be mostly observed on the improved balance sheets of most airlines. However, not all parts of the air transport supply side have benefited from the reduced oil prices. In fact some

countries that are highly dependent on oil revenues are already in a challenging position with the current airport construction projects they have in the pipeline.

Figure 93: Marginal Breakeven Cost of Oil Production (USD/Barrel)



Source: Deutsche Bank, IMF

According to Figure 93 there are a number of countries where the current oil price of around USD 50 per barrel is below their breakeven cost of production. The impact of the low oil price on these oil producing nations' public finances may affect their ability to fund planned infrastructure investments, including in airports.

Table 35: Largest Airport Projects Investment Amounts in Oil Producing Countries (also in Statistical Annex I)

Oil Production Rank	Country	Airport Investment USD bn
8	UAE	50
3	USA	41
4	China	24
19	UK	16
28	Egypt	12
30	Australia	10
10	Mexico	9
2	Saudi Arabia	7
23	India	7
12	Brazil	6
5	Canada	6
1	Russia	5
11	Kuwait	5
25	Oman	5
18	Qatar	3
6	Iran	3
14	Norway	2
22	Indonesia	2

On Table 35, the investment amounts for airport construction projects can be seen for each of the major oil producing countries around the world. Amongst them a total of about USD 213 billion in airport investments has been committed, with United Arab Emirates, United States and China holding the first three spots.

Of course, most economies of the table do not rely solely on oil revenues, but it will be challenging for some of them to allocate funding only from public funding for these investments, without the help of the private sector.

Source: CAPA Centre for Aviation



## Airport Privatisation

Restricted access to public funding for airport infrastructure developments can be observed not only in Europe, but in every region across the globe. A common solution to this problem, which has become increasingly popular in recent years, is the concession of the new or the existing airport to a private entity for a specified period of time, whereby a private entity is responsible for providing the capacity and managing the operation of the airport, while being monitored by the public authority's regulating bodies. This form of project finance is known as Public-Private Partnership (PPP), with the participation of both the private and the public sector under a joint partnership.

Table 36: Top 15 Airport Investors by Number of Airports Invested in as of 2015 (also in the Statistical Annex H)

Regarding the entities that are interested in airport privatisation deals, the financing of airports is increasingly dominated by large international funds. In general, there is still diversity amongst investors and operators but there is a constant shift globally towards funds; specifically infrastructure, pension, sovereign wealth, hedge funds and private equity. There is also a trend for strategic investments in infrastructure assets in emerging markets, where the demand is expected to grow faster than Western Europe or North America<sup>55</sup>.

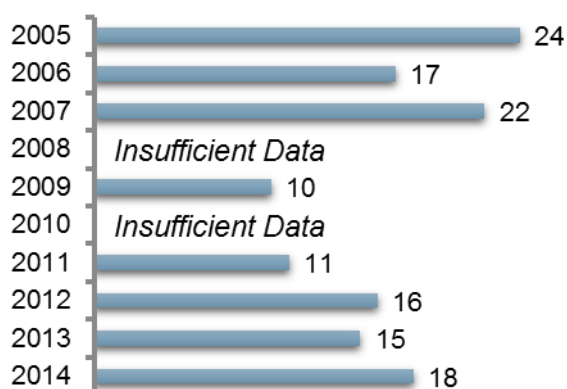
But before delving into individual regions, it should be noted that airport transactions have been on the rise lately, especially after a number of recent successful deals. A useful metric for the attractiveness of airport privatisations is the Enterprise Value / EBITDA multiple. This metric indicates what the average price for airport transactions is, as a multiple of the value they can generate through their business operations.

Rank	Investor Name	Number of Airports Invested In
1	Airports Authority of India	125
2	Infraero & InfraeroPar	66
3	Grupo Ferrovial Aeropuertos	49
4	Children's Investment Fund (TCI)	45
5	Corporación Financiera Alba (Grupo March)	45
6	AENA Aeropuertos S.A. (ENAIRE)	45
7	Avinor	42
8	Aeropuertos Argentina 2000 (AA 2000) / Corporación América consortium	28
9	Fraport	28
10	Cedcor SA	27
11	Vinci Airports (Vinci Concessions)	22
12	Federal Airports Authority of Nigeria	22
13	Airports and Auxiliary Services (ASA)	17
14	Copelouzos Group	16
15	Xinjiang Airport Group	15

Source: CAPA Airport Investor Database

<sup>55</sup> CAPA Centre For Aviation, Global Airport Finance and Privatisation: 2014 Review

Figure 94: Historic Weighted Average EV/EBITDA Multiples in Airport Transactions



Source: Airport World, Volume 20 Issue 1

Multiples in 2014 continued their upward trend, while still below the values reached during 2005 and 2007. However, available data shows that recent transactions, which involved some primary airport deals, had an average EV/EBITDA of 18x, well above the nadir of 11x following the 2008 economic crisis<sup>56</sup>. CAPA has also noted that an average level of 15-16 times EV/EBITDA seems to be maintained in airport transactions at present.

## Europe

Airport transactions in Europe are on the rise, with a number of recently completed deals paving the way for another series of concessions in the near term.

Headlining recent transactions is the much delayed partial privatisation of AENA Aeropuertos, the largest airport operator in passenger volumes (over 200m passengers in 2014) with 46 airports in its portfolio. AENA was split into three distinct stakes, with the government retaining 51%, Ferrovial Aeropuertos, Children's Investment Fund acquiring 21% and the remaining 28% offered on an IPO. The transaction was completed with an EV/EBITDA multiple of around 11-12, which is higher than originally projected.

Other significant privatisation deals in Europe include the privatisation of the Greek regional airports, with the winning consortium of Fraport/Copelouzos Group still waiting for the Greek government to ratify the agreement; the privatisation of Toulouse airport whose 49.9% stake was acquired by Hong Kong and Chinese investors although French companies AdP and Vinci expressed their interest for it; the acquisition of a majority stake of 70% of Ljubljana airport by Fraport; and the purchase of Southampton, Aberdeen and Glasgow airports by the consortium of Ferrovial and Macquarie infrastructure fund.

In terms of potential privatisation future tenders in Europe, the main focus of investment activities lies in Eastern Europe. Air travel growth in Eastern Europe has outpaced its Western counterparts, with a bright demand outlook for the next years, as low cost airlines increase their penetration in these markets, especially growing their capacity on routes from/to Western Europe. The biggest prospects in the region are anticipated concessions for the operation and development of Belgrade airport in

<sup>56</sup> Airport World, Volume 20 Issue 1

Serbia, Sofia and 3 regional airports in Bulgaria and the three main airports in Lithuania; government authorities in all those cases intend to keep the ownership of the assets<sup>57</sup>.

## Asia Pacific

Despite of the increased activity in airport infrastructure investments in the Asia Pacific region, no significant airport transaction agreements took place in the last year, with the exception of the 25-year concession of Mactan-Cebu international airport, the second busiest airport in the Philippines and the 30-year concession for the operation of Mandalay international airport in Myanmar.

However, many countries in the Asia Pacific are keen to privatise their airport infrastructure, with a number of tenders currently in progress or planned to go ahead in the near term in India, Japan, Indonesia, Vietnam, Philippines, Thailand, Myanmar, Australia and Fiji. China is also in the process of raising airport infrastructure funding from private sector sources, although it will likely derive from domestic investors as foreign ownership controls are stricter than in other Asia Pacific countries, limiting the foreign investment activities.

## Latin America

There was significant privatisation activity during the past year in Latin America. Brazil has been attracting the spotlights with the ongoing restructuring of Infrared, but there are a number of agreements completed or in process in neighbouring countries.

To begin with, private investors are gearing up for the imminent concessions being prepared for Manaus, Porto Alegre and Salvador airports in Brazil. These follow the recently completed deals for Rio De Janeiro and Belo Horizonte airports, where Infrared still retain a 49% stake.

In February 2015, a consortium of AdP, VINCI and Astaldi was successful in acquiring the concession for the management and development of Santiago airport in Chile, while in late 2014 Kuntur Wasi signed a concession for the 40-year construction and operation of Cusco airport in Peru. Colombia is also in the process of privatising four regional airports, with interest remaining low at the moment, while Paraguay is setting in motion its plans to privatise Asuncion airport.

Despite this wave of airport privatisation projects around Latin America, it is of particular interest that the Mexican government has not followed this trend and instead will be financing the New Mexico City airport via public funding, retaining the project under state ownership and operation once it is completed.

## North America

Airport privatisation is a trend that does not seem able to catch up in the United States, where only 2 of the 10 privatisation 'slots' of the Federal Airport Privatisation Pilot Programme (active since 1996) are occupied as of 2014. The only successful airport lease was at San Juan in Puerto Rico, while the little current activity is focused in and around the mid-West.

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<sup>57</sup> CAPA Centre For Aviation, Airport investment in Easter Europe: Opportunities abound but caution needed amid changing markets, 2015

However there are growing opportunities for PPPs and especially in terminal construction, renovation and operation of new terminals at major airports, if the emphasis shifts away from airlines owning and operating terminals at primary airports<sup>58</sup>. As the country has not been successful in delivering modern air travel facilities for its growing passengers, PPP projects can help to provide a solution to this problem.

## Middle East and CIS

While there is high construction activity in the Middle East, only a few privatisation deals are taking place. The main exception is Saudi Arabia, with Oman and Iran also interested in developing national strategic plans to attract private investments for airport infrastructure projects.

Increased interest for privatisation agreements for potentially up to 30 airports is identified in the Russian Federation. Following the decision of the Economic Development Ministry, concessions for the operation and management will be offered for Moscow's airports, while two of them, Sheremetyevo and Vnukovo are close to finalising their merger under a new common ownership structure.

## Africa

There is a need for airport infrastructure investment in Africa, although the ability of African states to fund it remains in most cases limited. As a result, many of the under construction or on tender projects are directly or indirectly supported by the World Bank and/or regional development banks. Furthermore, a number of governments are keen to attract private investors to fund their airport infrastructure projects, although this is not an easy task. However, there are a small number of privately owned airports in South Africa, while Lagos international airport's Terminal 2 is operated under a PPP. There are some prospects for PPPs in Ghana, Nigeria, Kenya and South Africa, although investor interest signs are not encouraging at this moment due to mainly safety, security and most recently health concerns.

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<sup>58</sup> CAPA Centre For Aviation, Global Airport Finance and Privatisation: 2014 Review

## 4. Aircraft Manufacturing and MRO

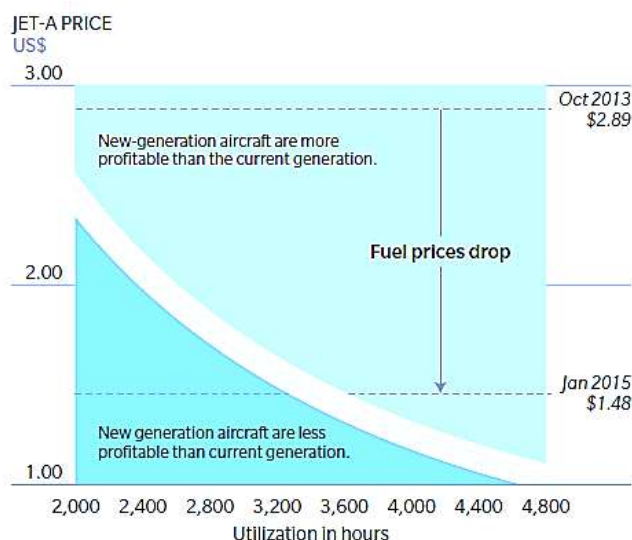
The purpose of this chapter is to provide an overview of the performance of civil aircraft manufacturing and Maintenance, Repair and Overhaul (MRO) industries during 2014 and the first half of 2015. The chapter highlights the most important global trends, analyses the composition of the current global fleet, aircraft orders and projections from the main manufacturers and summarises regional performance of the industry.

### 4.1. Global Trends

#### **New Aircraft Competitiveness vs. Lower Fuel Costs**

The reduction in fuel costs was the key trend impacting every sector of the aviation industry since mid-2014. This event also had an impact in the number of airliners retiring (or made inactive), as the lower costs of fuel reduced the economic benefits of using only new planes and engines (Figure 95).

Figure 95: Aircraft Generational Profitability Curve:



Source: As Oil Prices Fall, Oliver Wyman

A key driver of airline orders of new aircraft has been reduced operating costs due to better fuel efficiency of more modern aircraft, based on oil prices that had reached historical highs. However, as airlines waited to receive new aircraft types – such as Airbus A320neo and A350, Boeing 737MAX and 787 - fuel prices started declining.

This reduction in fuel costs has decreased the short-term advantage that new aircraft hold over older models in terms of operational costs, although more modern aircraft also bring other benefits such as reduction in emissions or noise.

The situation is reflected in the number of aircraft retired during 2014, which fell from over 700 aircraft in 2013 to just over 500 in 2014.

Figure 96 Global Fleet Retirements



Source: Ascend

The uncertainty of future fuel costs means that it is difficult to predict how the market will react over the next few years. Given the record level order books for new civil aircraft from both Boeing and Airbus, deferring the retirement of older aircraft could lead to overcapacity, falling yields, and poorer airline profitability. Alternatively, sustained low oil prices may lead to a slowdown in new aircraft deliveries as airlines maintain capacity discipline. The third scenario is that oil prices will recover and retirement rates of older aircraft will increase again. It is too early to assess which of these scenarios will play out at this stage.<sup>59</sup>

## Maintenance Operations

Airlines' approaches to aircraft maintenance have been evolving as operators seek to maximise aircraft utilisation and minimise overall maintenance costs. Whether aircraft are maintained in-house or by third party MROs (or hybrid approaches), there is a trend towards greater flexibility and optimisation. There is a trade-off between undertaking frequent, short maintenance periods and grouping maintenance tasks into longer but less frequent maintenance periods. Lufthansa's analysis indicates that maintenance costs rise when work is performed in more frequent checks, and that frequent checks increase maintenance-induced errors. Lufthansa has an approach where

<sup>59</sup> As Oil Prices Fall, New Aircraft Lose Competitive Edge; Oliver Wyman; available in [www.oliverwyman.com](http://www.oliverwyman.com)

maintenance tasks are grouped and performed in the quieter winter season, while quicker maintenance procedures are allocated to fit gaps in operation schedule. From the MRO provider's point of view, longer checks are more practical and efficient, and allow time to accommodate modifications.

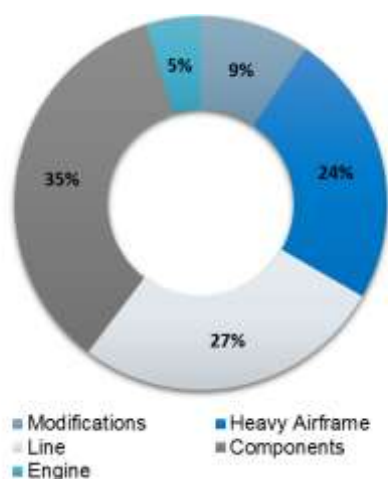
However, with the need to operate profitably with high aircraft utilisation and maintain tight flight schedules, many airlines are scheduling shorter checks, for example during night periods. This pattern of maintenance is more suitable to short haul operations with down-time at night than for long-haul operations where aircraft utilisation is more continuous.

Finding the right balance between traditional, cheaper longer maintenance periods against shorter but more regular checks is a challenge for each airline to optimise, and for the maintenance providers to provide flexible approaches.<sup>60</sup>

### Global MRO Activity

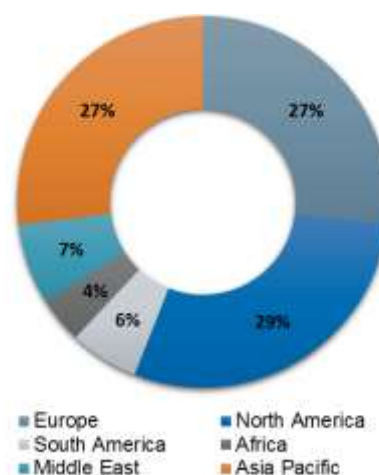
The global civil MRO spent in 2014 was USD \$62.1 billion, up 2.3% compared to the USD \$60.7 billion spent in 2013. The strongest driver of this value is the Engine market, accounting for 40% of total market<sup>61</sup>. With the continuous growth of aircraft deliveries and the possibility of deferring older aircraft retirements, the medium term prospects for this activity are also positive.

Figure 97: Global MRO activity by category 2014



Source: CAVOK

Figure 98: Global MRO Market Share 2014



Source: CAVOK

Looking at global market share by region, North America claimed the largest share in MRO activity. Europe and Asia Pacific were both responsible for 27% of the market. Based on current aircraft orders, it is expected to see Asia Pacific share increase to become the largest global region for the MRO activity in the coming years.

<sup>60</sup> Airline Business, Special Report: Maintenance 2014; December 2014

<sup>61</sup> ICF International, MRO Market Forecast and Key Trends – January 2015

## Aerospace Industry Merges and Acquisitions

Revenues for the Top 20 aerospace companies grew by +2.7% during 2014 (Table 37), but within this there was strong +7.7% growth in civil aerospace offsetting a -1.3% decline in the defence market in the nine months ending in September 2014<sup>62</sup>.

The global commercial aerospace sector is expected to sustain its revenues and earnings growth in 2015, while continued declines are expected in the defence sector. The decrease has been partially driven by U.S. defence budget cuts as a result of the cessation of a prolonged period of armed conflict in Iraq and Afghanistan.

Table 37: Commercial versus Defence Financial Performance: Top 20 global A&D Companies

Top global A&D companies	Nine months ending September 2014	Nine months ending September 2013	Percentage change
<b>Revenues (US\$ billion)</b>			
Commercial aerospace	\$171.6	\$159.4	7.7%
Defence	\$199.1	\$201.6	-1.3%
<b>Operating profit (US\$ billion)</b>			
Commercial aerospace	\$17.5	\$15.4	13.6%
Defence	\$20.6	\$19.9	3.5%

Source: 2015 Global aerospace and defence industry outlook, Deloitte

These changes are leading to greater consolidation in the aerospace industry. The total value of M&A activity in 2014 was \$22.3 billion, slightly above the ten-year rolling average of \$21.2 billion. Also the number of megadeals (transactions above \$1 billion or greater) doubled from 2013. As an example, 2014 saw British defence specialist Cobham's acquiring its US competitor Aeroflex for \$143 billion. As a matter of fact, the M&A activity in the sector showed a supply chain consolidation trend that seems to be gaining momentum. This consolidation has allowed profits to be maintained or improved despite falling revenues.

Table 38: Megadeals in 2014

Target	Acquirer	Status	Value of transaction in US\$ bn	Category
Firth Rixson Ltd (nat: UK)	Alcoa Inc. (nat: USA)	Completed	300	Aerospace
Aerospace Inc.-Distribution, Logistics, Technical Services Business (nat: USA)	Shareholders	Completed	224	Aerospace
Shenyang Aircraft Industrial(Group) Co Ltd (nat: China)	Sichuan Chengfei Integration Technology Corp Ltd (nat: China)	Completed	219	Defence
Orbital Sciences Corp. (nat: USA)	Alliant Techsystems Inc (nat: USA)	Completed	187	Defence
Aeroflex Holding Corp (nat: USA)	Cobham PLC (nat: UK)	Completed	143	Defence
TASC Inc. (nat: USA)	Engility Holdings Inc. (nat: USA)	Pending	130	Defence

Source: Aerospace & defence – 2014 year in review and 2015 forecast, PWC

In short term, the commercial aerospace sector is expected to sustain its significant revenues and earnings, as the need to travel and bring people all over the world closer will continue. As regards to the global defence sector, declines in revenues are expected. If technology innovation will not generate key advancements to the industry, consolidation may be the path to follow.

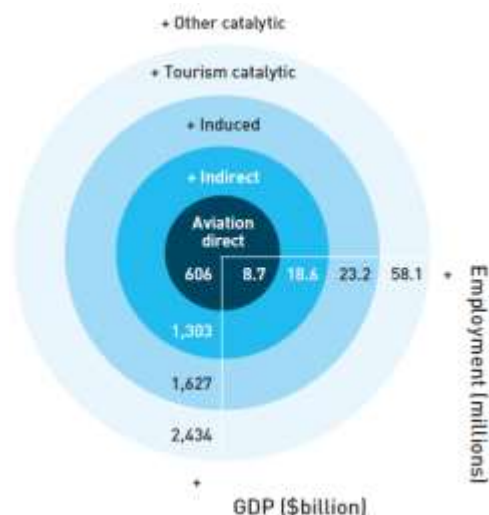
<sup>62</sup> 2015 Global aerospace and defence industry outlook, Deloitte; 2015



## 4.2. Aviation - A Global Industry

Aviation is the only worldwide transportation network, making it essential for global business and tourism. It connects passengers and freight almost anywhere in the world and connectivity is a key facilitator of economic growth. The world's airlines have a fleet now connecting 16,485 city-pairs (2014) which is nearly double the number in 1994.

Figure 99: Aviation's Global Employment and GDP impact (2012 figures, latest report)



Air transport is a major global employer. The Air Transport Action Group (ATAG) reports that the air transport industry generates more than 58.1 million jobs globally.

Directly, the industry employs: over 470,000 work for airport operators, over 4,602,000 work for other on-airport businesses (retail, car rental, freight forward, etc.), close to 2,500,000 are employed by airlines (up 3.1% on 2014) and over 1,400,000 work in civil aerospace and for air navigation service providers.

The air transport industry impact (including direct, indirect, induced and catalytic) is estimated of over \$2.4 trillion, equivalent to 3.4% of world Gross Domestic Product (GDP)<sup>63</sup>.

Source: Aviation Benefits Beyond Borders, ATAG

<sup>63</sup> Aviation benefits beyond borders, ATAG, 2014. Indicative numbers referent to 2012

### 4.3. Manufacturers

In this chapter, the global aircraft fleet will be analysed. First, the actual aircraft fleet (including 2014 and 2015 deliveries) is analysed. Next, the 2014 new orders and the market projections of the major aircraft manufacturers are reviewed. Finally, a review of the business aircraft market is provided.

#### Global Fleet

2014 was a year of records for the aviation industry, both in terms of production rates and aircraft deliveries and new orders. The Statistical Annexes L and M provide an overview on worldwide fleet orders.

Figure 100: Airliners in Service by World Region (July 2015)



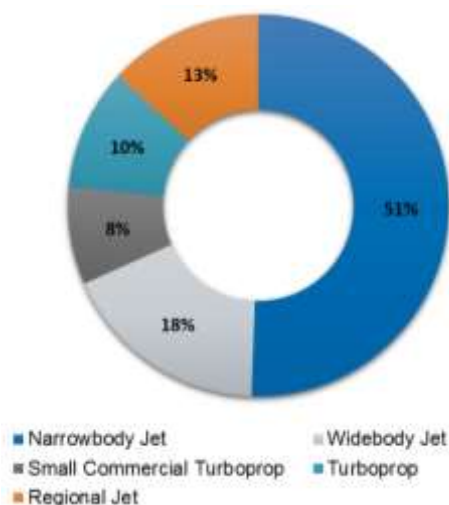
Between 2014 and 2015 a small but significant change in the distribution of airliners in the major world aviation regions occurred.

Asia emerged as the second biggest major aviation region, as its market share accounted for 27% of total number of commercial units in service around the world. This represented a 2% point increase compared to 2014.

In contrast, both North America and Europe experienced a 1% point decrease between 2015 and 2014. North America continues to be the aviation largest market while Europe's share dropped to 24%, representing now the third largest aviation region in the world by commercial airliners in service.

Source: World Airline Census 2015, FlightGlobal

Figure 101: Airliners in Service by Segment Type (August 2015)



Worldwide, narrow-bodies continue to be the most popular aircraft. This aircraft segment accounted for 51% of total aircraft in operation in August 2015. These units are more popular in regions such as Europe or Asia-Pacific, where they represented 57% and 58% of total units in service in each region, respectively

Widebodies represent 18% of the aircrafts in service around the world. This segment is mostly popular in the Middle-East, where these airliners hold 49% share of total fleet in the region.

Smaller aircrafts represent the remaining share of airliners. These aircraft are mostly popular in North America, Latin America and Africa, where they accounted respectively for 42%, 45% and 51% of the total number of aircrafts operating in each region.

Source: Mott MacDonald analysis of CAPA

In 2014, the number of current-generation A320s and B737s in service rose, respectively by 8% and 9%. For 2015, there were more than 6,000 Airbus A320s family jets in service and more than 5,100 Boeing's B737s in operation.

Table 39: Top 10 Fleets – Mainline Aircraft

Manufacturer and aircraft family	2015	2014	Change
Airbus A320 family	6,052	5,609	7.9%
Boeing 737-600/700/800/900	5,102	4,678	9.1%
Boeing 777	1,265	1,187	6.6%
Airbus A330	1,095	1,015	7.9%
Boeing 737-200/300/400/500	1,033	1,058	-2.4%
Boeing 767	765	788	-2.9%
Boeing 757	738	808	-8.7%
Boeing 717/MD-80/MD-90/DC-9	666	738	-9.8%
Boeing 747	571	581	-1.7%
Boeing 787	286	162	76.5%
TOTAL	17,573	16,624	5.7%

Source: World Airline Census 2015, FlightGlobal

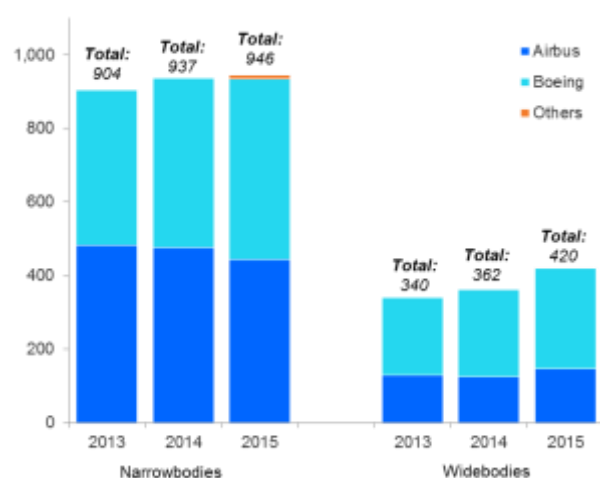
Table 40: Top 10 Fleets – Regional Aircraft

Manufacturer and aircraft family	2015	2014	Change
Embraer 170/175/190/195	1,102	1,002	10.0%
Bombardier CRJ700/900/1000	696	647	7.6%
ATR 72	644	579	11.2%
Embraer ERJ-135/140/145	620	669	-7.3%
Bombardier CRJ100/200	563	650	-13.4%
Bombardier Dash 8 Q400	454	422	7.6%
Bombardier Dash 8-100/200/300	428	441	-2.9%
Beechcraft 1900	341	353	-3.4%
De Havilland Canada Twin Otter	267	263	1.5%
ATR 42	250	252	-0.8%
TOTAL	5,365	5,278	1.6%

Source: World Airline Census 2015, FlightGlobal

## Global Deliveries

Figure 102: Narrow-body and Wide-body Aircraft Delivered in 2014 and 2015



Source: Mott MacDonald analysis of CAPA

During 2014, the CAPA aircraft database shows that 1,299 narrow-body and wide-body were delivered. These numbers represented a 4.4% increase compared to 2013. Boeing delivered led the increase, delivering 697 in 2014 against 633 in 2013. The European manufacturer Airbus delivered 611 aircrafts, 9 less than in 2013. Narrow-body deliveries increased by 4%, and widebodies deliveries increased by 6%.

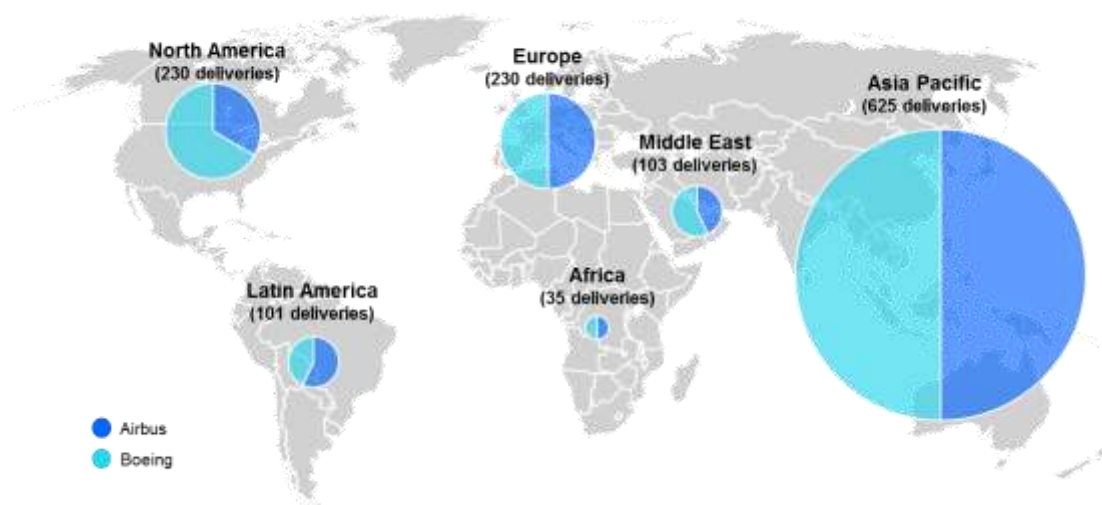
For 2015 the same database shows expected deliveries of 1366 aircraft. It will represent a 5% increase in total aircraft deliveries, with a 16% increase in narrow-body and 1% increase in wide-body aircraft. Boeing again led the aircraft deliveries, with 764 aircraft projected for 2015. In 2015, Airbus is expected to experience, for the second year in a row, a decrease in aircrafts delivered to 590.

## Deliveries by Manufacturer

In 2014, Boeing shipped over \$55 billion worth of airliners some \$14 billion more than Airbus. Significant leads in Asia-Pacific drove the revenues. In all markets, besides Latin America, the American manufacturer managed to generate more revenue than its European rival. In this region, Airbus holds the advantage thanks largely to its strength in the narrow-body sector.

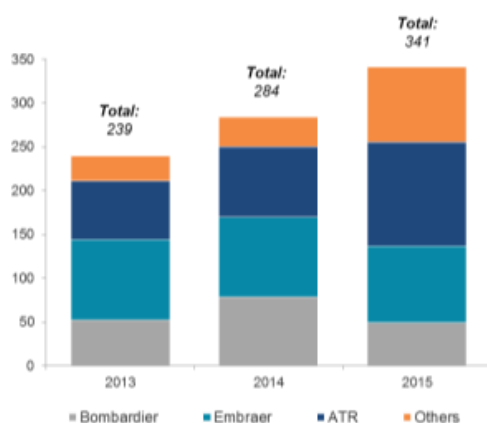
In terms of unit deliveries, the market share between Airbus and Boeing was fairly even in all other markets with exception of North America. Here Boeing shipped almost twice as many aircraft as Airbus.<sup>64</sup>

Figure 103: Aircraft Deliveries (Airbus/Boeing) in 2014 and 2015 by Major World Regions



Source: Mott MacDonald analysis of Aircraft & Engines 2015, Airline Business

Figure 104: Regional jets delivered in 2014 and 2015



For the Regional and Turboprop market, 2014 was also a positive year. The number of aircraft delivered increased by 19% during 2014 (284 aircraft delivered in 2014, 45 more than in 2013) and is expected to increase by 20% in 2015, with 341 new aircraft deliveries.

Embraer, ATR and Bombardier were the biggest manufacturers in 2014, with the Brazilian manufacturer (Embraer) delivering 91 aircraft, ATR 81 and Bombardier 78. For 2015, ATR is expecting to deliver 119 aircrafts, increasing its aircraft deliveries by 47%.

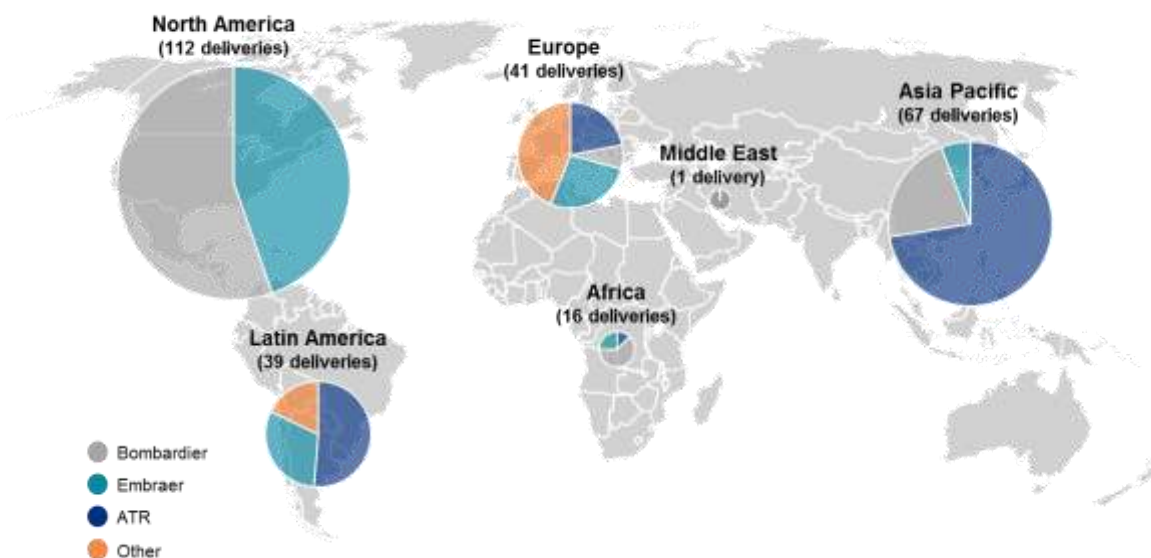
Source: Mott MacDonald analysis of CAPA

Other manufacturers are also active in the regional aircraft market. Sukhoi of Russia is responsible for a significant number of deliveries of the Superjet 100 in the European (mainly Russia and CIS area) and South American markets. Other market changes are also expected to occur, as new

<sup>64</sup> Aircraft & Engines, Market Analysis 2015, Airline Business

manufacturers enter the market. Mitsubishi presented a programme for the new MRJ regional jet that is planned to see its first-flight on Q2 2015. Other new player in Asia is Comac of China, which is expecting first delivery of the 70-100 seater ARJ21 in 2016 and will be commencing flight testing of the 150 seat C919 in the second half of 2015.

Figure 105: Aircraft Deliveries (other than Airbus/Boeing) in 2014 and 2015 by Major World Regions

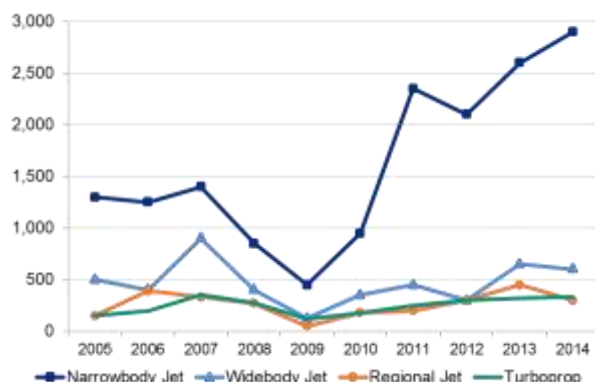


Source: Mott MacDonald analysis of Aircraft & Engines 2015, Airline Business

### Manufacturer's Orders in 2014

Not only in deliveries but also in orders, 2014 was a record year. FlightGlobal reports 4,020 new aircraft ordered, with Airbus taking 1,784 new orders and Boeing 1,538. ATR received 160 new orders, Bombardier 145 and Embraer 143 (Figure 106).

Figure 106: Airliner Orders in 2014



Source: FlightGlobal

Note: Order figures include swaps and do not include cancellations

The Airbus A320neo recorded 1,107 orders, accounting for a major share of 2,789 narrow-body orders. The A320neo's biggest rival from Boeing, the B737 MAX, achieved 886 orders. The Bombardier CSeries received 61 orders. With regards to widebodies, Boeing received 350 orders while Airbus recorded 244. There were also orders for 241 regional units and 306 turboprop aircrafts.

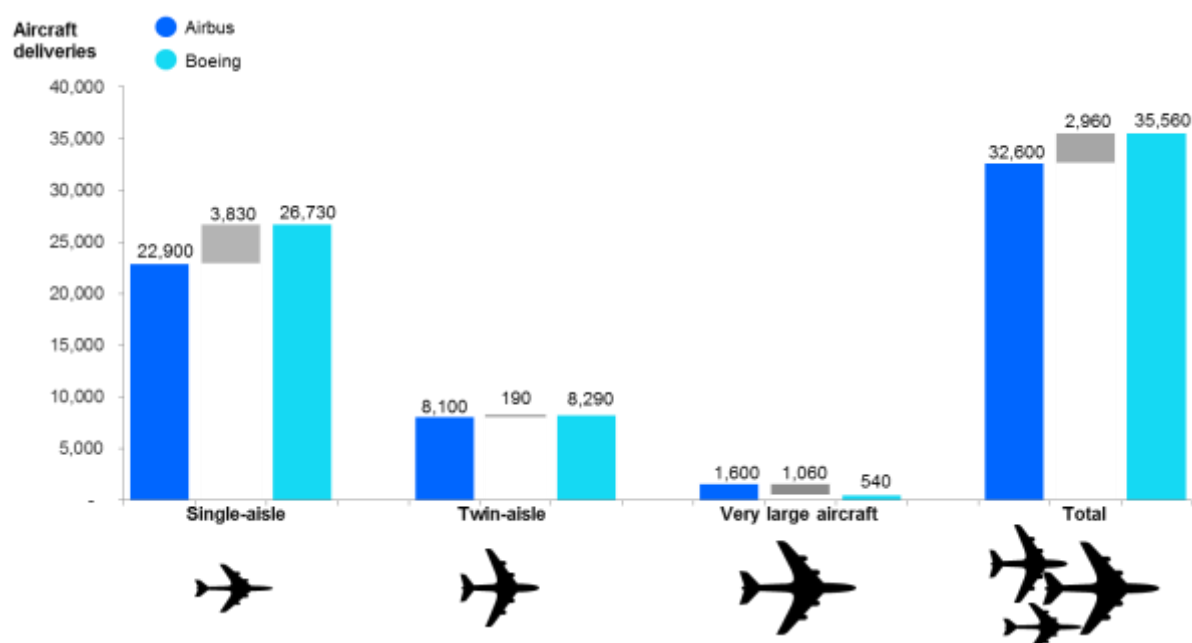
## Manufacturer's Projections

Demand for commercial airliners is growing. In emerging markets, demand for air travel is growing with increasing GDP and expanding middle class. If, for now, lower oil prices may permit airlines to delay the replacement or retirement of less efficient aircraft types, in the long-term fuel efficiency will remain a key driver of airline fleet decisions. Economic and technological obsolescence, are expected to drive aircraft retirements<sup>65</sup> and make the number of aircraft deliveries increase year over year.

Therefore, it is interesting to compare manufactures projections. Mainly, how different competitors treat each other's products.

In their 2015 Market Forecast and Outlook, Airbus and Boeing presented somewhat different long term projections. Boeing expects 35,560 new airplanes (excluding regional jets) to be delivered between 2015 and 2034, compared with 32,600 expected by Airbus. The two manufactures have similar forecasts of twin-aisle aircraft, but Boeing forecasts 16% more narrow-body aircraft deliveries over the period, and only one-third of the number of very large aircraft (i.e., A380 class). This arises from a longstanding difference in outlook between Boeing and Airbus. Boeing emphasises the development of more direct long-haul services with modern twin-jets such as the B787 and A350, whereas Airbus continues to see a significant role for its A380, and to place greater emphasis on airport capacity constraints as a driver for larger aircraft.

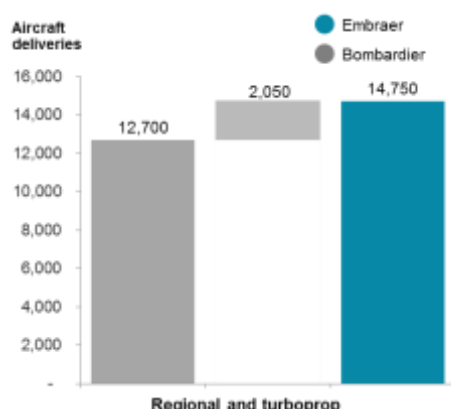
Figure 107: Airbus and Boeing 2015-2034 Forecasts Comparison



Source: Mott MacDonald analysis of Airbus's Global Market Forecast 2015-2034 and Boeing's Current Market Outlook 2015

<sup>65</sup> Bombardier commercial aircraft – market forecast 2015-234

Figure 108: Embraer and Bombardier 2015-2034 Forecasts Comparison



In the regional and turboprop jet markets, we can also analyse two of the main manufacturer's projections, Embraer and Bombardier.

The Brazilian manufacturer Embraer expects this market segment to deliver 14,750 aircrafts during the next 20 years. For the same period, the Canadian Bombardier projects 12,700 deliveries.

For both manufacturers, both Asia-Pacific and North America are the regions showing growth opportunity and where they expect the main number of orders to come.

Source: Mott MacDonald analysis of Bombardier's Market Forecast 2015-2034 & Embraer Market Outlook 2015-2034

## Business Aviation

In 2014, business jet deliveries were up 8.7% according to the General Aviation Manufacturers Association (GAMA). There were 2,452 new units entering in service in 2014, against 2,256 in 2013.

North America, the birthplace of business aviation, remains the largest market for business aircraft (approximately 10,090 aircrafts in operation in 2014). GAMA reported 1,801 new business jets delivered in this market during 2014, a 1.9% growth compared to 2013. Europe remained the second largest market for business aircrafts in 2014, with growth of 44.8% in business jet aircraft deliveries compared to previous year. South America, in contrast, saw its fleet increase by 71 units, which represented a 18.4% decrease in aircraft deliveries compared to 2013.

Table 41: Business Aviation

Target	Fleet in service 2014	Market share 2014	Total deliveries 2014	Total deliveries 2013	Annual growth	Deliveries by market 2014
North America	10,090	64.1%	1,801	1,766	1.9%	53.9%
South America	1,925	12.2%	71	87	-18.4%	14.8%
Europe	1,990	12.6%	524	362	44.8%	13.8%
Rest of World	1,730	11.0%	56	41	36.6%	11.2%
<b>Grand Total</b>	<b>15,735</b>		<b>2,452</b>	<b>2,256</b>	<b>8.7%</b>	<b>6.3%</b>

Source: Business Aircraft 2015-2024 Market Forecast, Bombardier; 2014 Year End Aircraft Shipments, GAMA

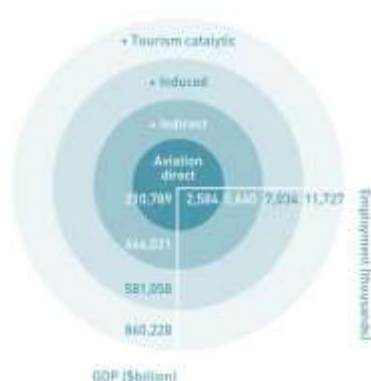
With the market shift towards larger business jets it is expected to see Bombardier, Gulfstream and Dassault increasing their market share, with new mid-size aircraft helping Cessna and Embraer.<sup>66</sup>

<sup>66</sup> <http://aviationweek.com/business-aviation/large-cabin-aircraft-dominate-business-jet-sales>

#### 4.4. Air Transport Industry Performance by Region

##### Europe

Figure 109: Total Jobs and GDP Generated by air Transport Industry (2012)



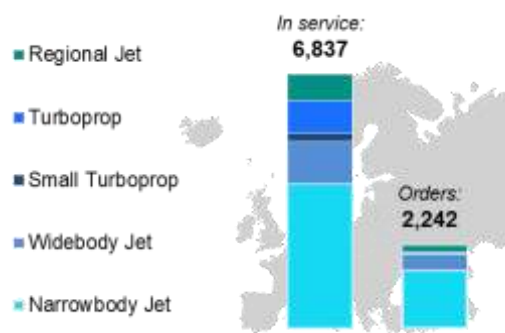
Source: Benefits beyond borders 2014, ATAG

Table 42: 2014 Deliveries: Top 5 Airlines by Value

Rank	Airline	Value (\$m)	Units
1	British Airways	2,553	20
2	Lufthansa	2,068	19
3	Aeroflot Russian Airlines	2,032	28
4	Turkish Airlines	1,799	20
5	Norwegian	1,124	18

Source: FlightGlobal

Figure 110: European Fleet: Units in Service and in Order by Aircraft Size



Source: Mott MacDonald analysis of CAPA Fleet Analytics

The air transport industry in Europe directly generated an estimated 2.6 million jobs in 2012. This number was mainly driven by on-site in jobs at airports (airport management, security, retail and hotels) at 55% of the total, and 22% employed by airlines or handling agents.

The total impacts mean the air transport sector supported over 7 million jobs (1.9% of economy-wide employment) and contributed to \$581 billion (€ 470 billion) to GDP in Europe (2.8% of economy-wide GDP).

Worldwide, including the tourism impacts, Europe accounts for 20% of the jobs and 35% of the GDP supported by the air transport industry.

During 2014, over 230 new mainline airliners entered in service with commercial operators in Europe, with a value of over \$17 billion.

British Airways and Lufthansa had the largest fleet acquisitions in 2014 by value (\$2,553m and \$2,063m, respectively) adding both Airbus and Boeing aircrafts to their fleets. Aeroflot was the airline acquiring the highest number of total units (28), adding a mix of Airbus, Boeing and Sukhoi airliners to its fleet.

Europe dropped from 2nd to 3rd largest world region in terms of airliners in service during 2014 (25% of global market in 2013, 24% in 2014).

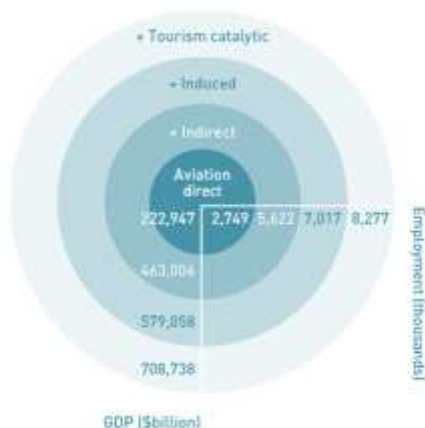
More than half of the world's aircraft in service are narrow-body jets. This is also true for Europe. The region's fleet is mainly made from narrow-body jets (57%) followed by wide-body (17%).

The dominance of single-aisle aircraft types in the region will increase in short-term, as close to 70% of the confirmed orders are for this aircraft segment. Turboprop aircraft have a declining share and make up only 2% of aircraft orders.



## North America

Figure 111: Total Jobs and GDP Generated by Air Transport Industry (2012)



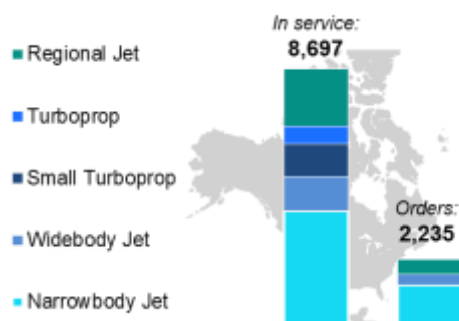
Source: Benefits beyond borders 2014, ATAG

Table 43: 2014 Deliveries: Top 5 Airlines by Value

Rank	Airline	Value (\$m)	Units
1	American Airlines	3,719	61
2	United Airlines	2,236	35
3	Southwest Airlines	1,538	33
4	US Airways	1,221	21
5	Delta Air Lines	975	19

Source: FlightGlobal

Figure 112: North American Fleet: Units in Service and in Order by Aircraft Size



Source: Mott MacDonald analysis of CAPA Fleet Analytics

The air transport industry in North America directly generated an estimated 2.7 million jobs in 2012. This number was mainly driven by on-site jobs at airport (52%) and jobs for airlines or handling agents (25%).

The total impacts mean the air transport sector supported 7 million jobs (4.4% of economy-wide employment) and contributed to \$579 billion to GDP in North America (3.2% of economy-wide GDP).

Worldwide, including tourism impacts, North America accounts for 14% of the jobs and 29% of the GDP supported by the air transport industry.

During 2014, over 230 new mainline airliners entered in service with commercial operators within North America. This was worth over \$13 billion.

American Airlines and United Airlines had the largest fleet acquisitions in 2014 by value. American spent over \$3,719 million in 61 combined Boeing and Airbus aircraft while United spent \$2,236 million adding 35 new Boeing aircraft to its fleet.

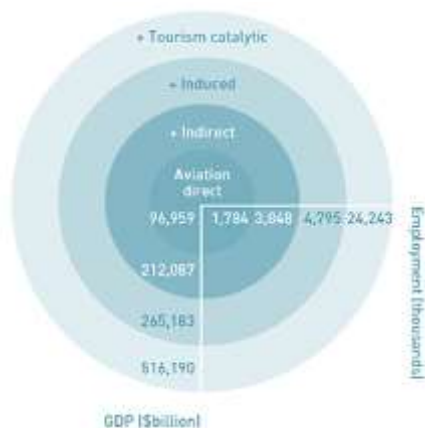
North America leads as the major aviation region by number of airliners in service. The region was responsible for 31% of the total airliner fleet in 2014.

44% of the North-American fleet is made of narrow-body aircraft, while wide-body made up 13% of the total number of units in the market. Regional jets represent 22% of the market, the highest share for this segment from all the major aviation regions.

There are 2,235 confirmed orders for commercial airliners in North America. From these, 61% are for narrow-body, 15% for wide-body and 23% for regional jets.

## Asia-Pacific

Figure 113: Total Jobs and GDP Generated by Air Transport Industry (2012)



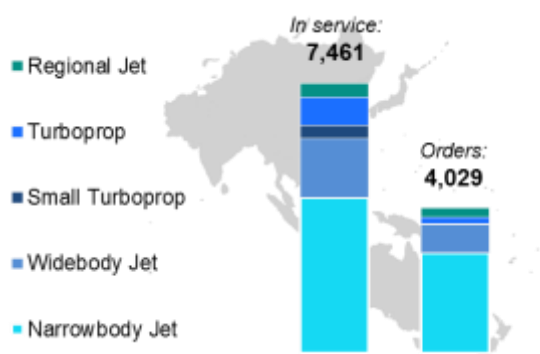
Source: Benefits beyond borders 2014, ATAG

Table 44: 2014 Deliveries: Top 5 Airlines by Value

Rank	Airline	Value (\$m)	Units
1	China Eastern Airlines	3,877	65
2	Air China	3,560	43
3	China Southern Airlines	3,441	51
4	Cathay Pacific	2,058	14
5	ANA - All Nippon Airways	1,616	17

Source: FlightGlobal

Figure 114: Asian-Pacific Fleet: Units in Service and in Order by Aircraft Size (2015)



Source: Mott MacDonald analysis of CAPA Fleet Analytics

The air transport industry in Asia-Pacific directly generated an estimated 1.8 million jobs in 2012. This number was mainly driven by on-site in jobs at airports (50%) and from jobs for airlines or handling agents (33%).

The total impacts mean the air transport sector supported over 4.8 million jobs (0.3% of economy-wide employment) and contributed to \$265 billion to GDP in Asia-Pacific (1.2% of economy-wide GDP).

Worldwide, including the tourism impacts, Asia accounts for 42% of the jobs and 21% of the GDP supported by the air transport industry.

During 2014, 625 new airliners entered in service with commercial operators in Asia-Pacific. This was equivalent to over \$44 billion.

China Eastern Airlines was the region and world's top airline by number of units delivered (65). Two other Chinese airlines reached the regional top 3: Air China (43) and China Southern Airlines (51). Cathay Pacific order aircraft of over \$2 billion in value.

Asia-Pacific became the second largest aviation world region in 2014 by number of aircraft in service. During 2014, 7,461 commercial airliners were in service in the region.

58% of the region's fleet is made of narrow-body jets, the largest share of this aircraft segment among all other major aviation regions. This share is expected to increase as 69% of existing orders for the market are made for narrow-body units. Widebodies account for 22% of the region's fleet. The share of regional aircrafts accounts only for 20% of the existing fleet and this number is expected to decrease (in the medium term) as only 12% of existing regional requests are made for aircraft unit.

## Latin America

Figure 115: Total Jobs and GDP Generated by Air Transport Industry (2012)



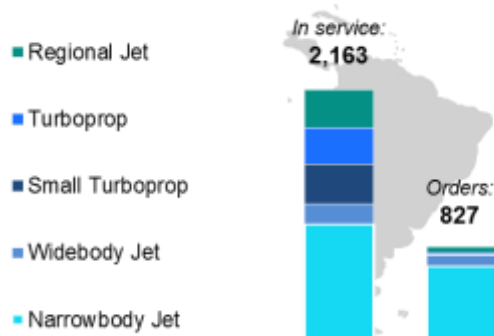
Source: Benefits beyond borders 2014, ATAG

Table 45: 2014 Deliveries: Top 5 Airlines by Value

Rank	Airline	Value (\$m)	Units
1	LAN Airlines	1,082	15
2	Avianca Brazil	726	11
3	Avianca	704	8
4	Aeromexico	680	10
5	TAM Linhas Aereas	578	11

Source: FlightGlobal

Figure 116: South-American Fleet: Units in Service and in Order by Aircraft Size (2015)



Source: Mott MacDonald analysis of CAPA Fleet Analytics

The air transport industry in Latin America directly generated an estimated 840,000 jobs in 2012. This number was mainly driven by on-site in jobs at airports (54%) and from jobs for airlines or handling agents (21%).

The total impacts mean the air transport sector supported over 2.2 million jobs (0.8% of economy-wide employment) and contributed to \$101 billion to GDP in Latin America (1.8% of economy-wide GDP).

Worldwide, including the tourism impacts, Latin America accounts for 8% of the jobs and 6% of the GDP supported by the air transport industry.

During 2014, 101 new airliners entered in service in Latin America. It represented the second lowest number of unit deliveries by major aviation regions.

LAN Airlines, with 15 new airliners (from Airbus and Boeing), delivered was the only airline exceeding \$1 billion in business value. Avianca Brazil and Avianca completed the top three with respectively 11 and 8 deliveries new aircraft added to its fleets.

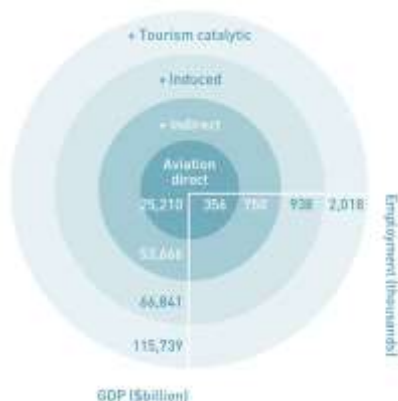
Latin America represents the fourth largest world aviation region by aircraft units. Latin America was responsible for 8% of total aircraft in service around the world.

The Latin America fleet has a strong presence of regional and turboprop aircraft in service. Combined this segment represented 45% of total units in service in the region during 2014. Narrow-body jets, responsible for 47% of total airliners in service, are the only segment that exceeds the regional aircraft share.

The important share of regional aircraft is expected to decrease as, from the 827 orders registered in 2015, only 8% are for this aircraft segment. The biggest share (80%) is made for narrow-body jets while 94 (8%) widebodies are expected to be delivered in the next years.

## Middle East

Figure 117: Total Jobs and GDP Generated by Air Transport Industry (2012)

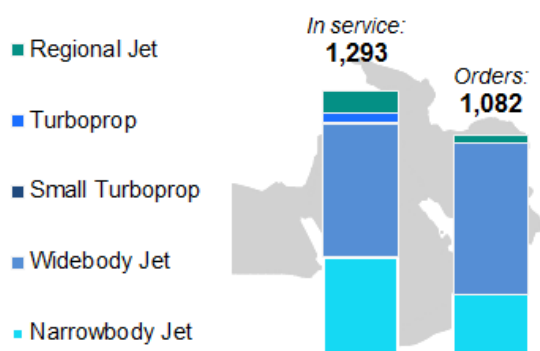


Source: Benefits beyond borders 2014, ATAG

Table 46: 2014 deliveries: top 5 airlines by value

Rank	Airline	Value (\$m)	Units
1	Emirates Airline	5,212	27
2	Qatar Airways	3,325	22
3	Etihad Airways	1,131	12
4	Royal Jordanian	589	5
5	Oman Air	459	7

Figure 118: Middle-Eastern Fleet: Units in Service and in Order by Aircraft Size (2015)



Source: Mott MacDonald analysis of CAPA Fleet Analytics

The air transport industry in Middle East directly generated an estimated 356,000 jobs in 2012. This number was mainly driven by on-site jobs at airports (50%) and from jobs for airlines or handling agents (42%).

The total impacts mean the air transport sector supported over 938,000 and jobs (1.4% of economy-wide employment) and contributed to \$66.8 billion to GDP in Middle East (2.6% of economy-wide GDP).

Worldwide, including the tourism impacts, the Middle East accounts for 3% of the jobs and 4.5% of the GDP supported by the air transport industry.

Emirates were the global leader in aircraft deliveries by units and value in 2014. The Dubai-based airline added 27 units to its fleet, which represented over \$5,212 million in order value. This was the highest value of aircraft deliveries of any airline worldwide.

Qatar Airways was the second largest Middle East airline by aircraft orders, 22 aircraft delivered, followed by Etihad with 12 new units added to its fleet.

Source: FlightGlobal

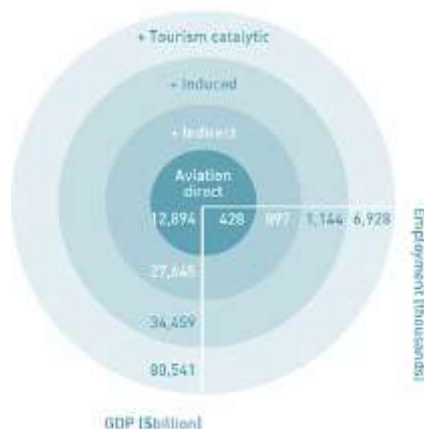
The Middle East has almost the same number of orders as the number of aircraft in service in 2014 (1,293 in service and 1,082 orders).

The regions fleet has a strong presence of wide-body jets (49%) which is by far the biggest share for a major aviation region (in Asia-Pacific, the second largest region by wide-body market share, widebodies account for 22% of the units in service). The importance of this segment for the market is expected to continue as 67% of the existing 1,082 orders are wide-body aircraft.

The share of regional jets is the smallest of all major aviation regions, representing only 13% of the aircraft fleet in service and accounting only for 4% of existing orders.

## Africa

Figure 119: Total Jobs and GDP Generated by Air Transport Industry (2012)



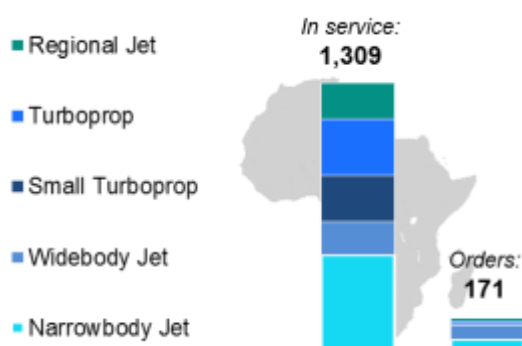
Source: Benefits beyond borders 2014, ATAG

Table 47: 2014 Deliveries: Top 5 Airlines by Value

Rank	Airline	Value (\$m)	Units
1	Ethiopian Airlines	1,194	10
2	Kenya Airways	1,135	10
3	South African Airways	268	6
4	Afriqiyah Airways	221	2
5	TAAG Angola	167	1

Source: FlightGlobal

Figure 120: African fleet: units in service and in order by aircraft size



Source: Mott MacDonald analysis of CAPA Fleet Analytics

The air transport industry in Africa directly generated an estimated 428,000 jobs in 2012. This number was mainly driven by on-site in jobs at airports (52%) and from jobs for airlines or handling agents (27%).

The total impacts mean the air transport sector supported over 1.1 million jobs (0.4% of economy-wide employment) and contributed to \$34.5 billion to GDP in Africa (2.6% of economy-wide GDP).

Worldwide, including the tourism impacts, Africa accounts for 12% of the jobs and 3% of the GDP supported by the air transport industry.

Africa was the region responsible for the lowest number of aircraft deliveries in 2014. In total only 35 units were delivered. This generated \$3,386 million for aircraft manufacturers.

Ethiopian and Kenya airlines were responsible for more than 50% of the region's total acquisitions, both with 10 aircraft added to their fleets.

African airlines account for 5% of total aircraft in service worldwide. The region's fleet presents a very diverse fleet mix, where regional aircraft represent the biggest share of units in service, 51% of the total fleet, which also represent the highest presence of the segment among all the major aviation regions. Narrow-body and wide-body account for 26% and 12% of the existing fleet, respectively.

The number of orders is the lowest in the world, with only 171 units expected to be delivered in the short term.

There are 71 narrow-body and 68 wide-body ordered. The importance of regional aircraft is expected to slightly decrease as only 19% (the remaining 32 units order) of total orders are made for this aircraft segment.

## 5. Air Traffic Management

### 5.1. Introduction

Air Navigation Service Providers (ANSPs) in both Europe and other regions continued to see a modest return to growth in flights handled in 2014 and this continues into 2015. However, 2014 will be remembered for two tragic incidents which will have long term implications for the management of air traffic. The loss of Malaysian Airlines MH370 in March and the subsequent and continuing search has led to a number of initiatives by both ICAO and IATA related to flight surveillance and tracking. The shooting down of Malaysian Airlines MH17 over Ukraine in July 2014 has similarly been followed by reviews of flight planning processes over conflict zones.

Following the latest revision of the ICAO Global Air Navigation Plan (GANP), progress continues worldwide on the development of air traffic management systems in line with the ICAO Aviation System Block Upgrade (ASBU) programme. This sets out a regional and global framework for the systematic and coordinated upgrade of air traffic management systems of individual States over three 5-year periods through to 2028. This programme is based on the achievements over the last decade of the European Single European Sky (SES) project and the US NEXTGEN initiative. In 2015 there has been increasing criticism from airspace users on both sides of the Atlantic on the lack of progress on both of these programmes.

In Europe, despite the achievements of SESAR (the technical pillar of the SES programme) during the definition phase and with the launch of the deployment phase in December 2014, the lack of real improvement in performance, cost reduction and, above all, the continued fragmentation of the European airspace remain key issues. These issues, and the lack of progress on SES 2+ legislation, were highlighted at a special high level conference for EU transport ministers on SES held in Rome in November 2014 to coincide with the new European Parliament and Commission.

In the US, the Federal Aviation Administration (FAA) released a report in October 2014 commissioned from the MITRE organisation on the current status of the NEXTGEN programme. This report highlighted the challenges and issues relating to the programme of updates and deployment of new technologies across the US airspace system.

Despite differences between Europe and the US in their respective approaches to the modernisation of ATM systems, with Europe perhaps having aspired to a large scale revolution and the US adopting a more evolutionary, incremental approach, there now appears to be a slow convergence on the detailed harmonisation and interoperability of future systems and the overall rate of progress towards trajectory based operations and satellite based surveillance.

Meanwhile, the development of new concepts and technology, particularly related to ADS-B and satellite based surveillance, offer the means to improve the safety and efficiency of the management of air traffic across many other less developed regions of the world. The next decade, therefore, has the prospect of the delivering on the vision of a safer and more unified, seamless ATM system across the globe.

## 5.2. Global ATM

### Introduction

2014 and 2015 saw a continuation of moves to harmonise the development of air traffic management systems across world regions and states. Visualisations of the global air transport network based on reported air transport movements illustrated as below show very clearly the density of flights within North America, Europe and the Far East, now including mainland China, together with the significant intercontinental flows which pass over oceans and many land areas without traditional primary and secondary radar surveillance.

Figure 121: Global Air Transport Movement Flows 2013



Source: ICAO GIS

The disappearance of Malaysian Airlines flight 370 in March 2014 highlighted the gaps in surveillance in such areas and the role of new technologies such as automatic dependent surveillance-broadcast (ADS-B) that are already available, together with capabilities that will become available with the advent of global satellite surveillance within the next few years. As the International Civil Aviation Organisation (ICAO) and International Air Transport Association worked to improve flight tracking procedures in the wake of the incident, air traffic management system providers began to demonstrate a variety of tracking solutions that provide real time views of global air traffic flows, integrating existing radar data with synthetic traffic flow management system (TFMS) data and adding in existing ground station ADS-B data together with direct aircraft communication, addressing and reporting system (ACARS) data and that available from ADS-C (contract) and other datalinks that are already utilised in air traffic management in Future Air Navigation System (FANS/1) in some ocean areas. An example of these displays is shown in the next page.

Figure 122: Global Air Transport – Real Time View



Source: Rockwell Collins ARINCMultilink Display

### ICAO Global Air Navigation Plan and Block Upgrade Programme

Following the ICAO 12<sup>th</sup> Air Navigation Conference in 2012, the latest revision to the GANP<sup>67</sup> was published in 2013 with the ambition of increasing the performance of air navigation and the overall efficiency of the global aviation system. The cornerstone of this plan is a further refinement of the Aviation System Block Upgrade (ASBU) programme, which is a rolling 15 year plan set out in 5-year increments to 2028. This indicates the functionalities which each state needs to achieve to upgrade ATM systems in conjunction with ANSPs, airspace users, operators and equipment manufacturers to achieve the goals of safe and sustained growth with increased efficiency and responsible environmental stewardship.

The ASBU programme is essentially a system engineering approach with each module designed to support global interoperability. Individual States map their investment planning onto the block upgrade modules, B0 through B3. These are grouped into four performance areas:

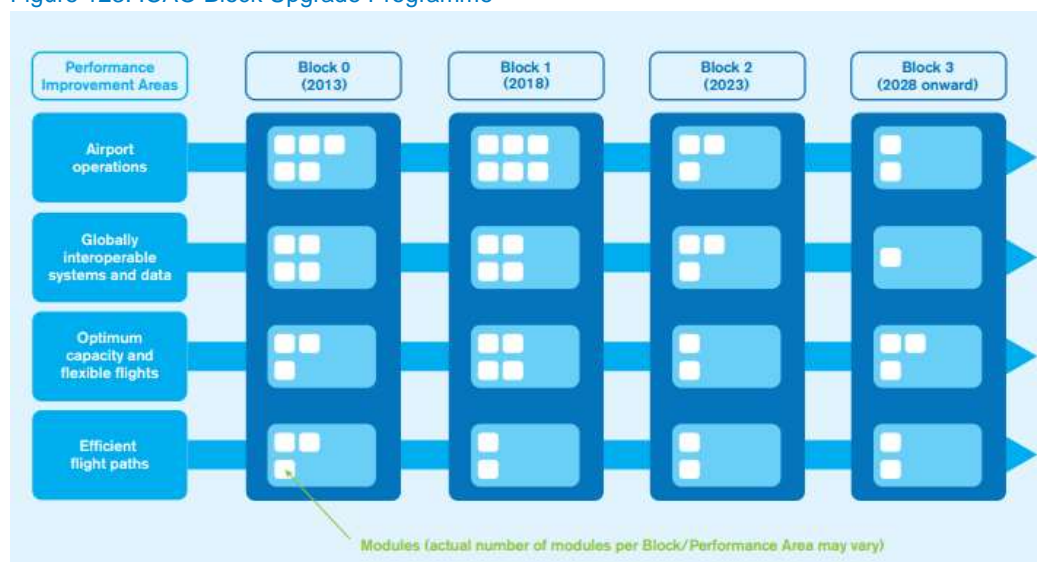
- airport operations
- globally interoperable systems and data
- optimal capacity and flexible flight
- efficient flight paths

<sup>67</sup> ICAO Global Air Navigation Plan 2013



The plan highlights the success that the Performance Based Navigation (PBN) concept has had across many states. It provides more detailed near term implementation of PBN/Required Navigation Performance (RNP) approaches and the incorporation of Satellite based augmentation systems (SBAS) and Barometric vertical navigation (Baro VNAV) augmentations in terminal areas during the B0 phase. With the emphasis on achieving environmental benefits, prominence is also being given to achieving continuous climb and descent profiles within a more general move to the effective optimisation of performance.

Figure 123: ICAO Block Upgrade Programme



Source: ICAO GANP 2013-2028

## Flight Tracking

Following the disappearance of Malaysia Airlines flight MH370 on 8 March 2014, and the subsequent search that still continues, ICAO convened a two day special meeting in May 2014 to discuss the tracking of airline flights across the world. This followed the realisation in this incident that transponders on the aircraft had been turned off, rendering it invisible to secondary radar and that tracking over the ocean beyond the range of the primary radar, which depends on ACARS messaging. Only sophisticated analysis of satellite allowed the development of a broad 'arc of potential trajectories' for the aircraft, which was the sole determinant of an area of search for the missing airliner. The ICAO meeting was a first attempt to assess the existing situation and review what capabilities should be developed to allow a global tracking solution. There was general public disbelief that an airliner could simply disappear from radar screens and vanish. The incident highlighted the gaps and vulnerabilities of current systems as well as the process difference between tracking and surveillance. This was emphasised by the similarities and differences with the loss of the Air France flight AF447 in the South Atlantic in 2009.

In addition to, and coordinated with, the ICAO initiative, IATA set up an expert task force, reporting at the end of 2014, to consider tracking issues in relation to implementation, investment, time and complexity. The ICAO meeting concluded with a decision to develop near, mid and long term initiatives, incorporating the IATA work. The mid-term focus would be the development of performance requirements rather than mandates. IATA held meetings from June through the autumn 2014 to finalise a report for ICAO. Much of the industry work focused on technological solutions related to radar, ADS-B, ADS-C and how the emerging satellite surveillance systems due to be implemented later in the decade could be deployed to provide a global tracking solution. A key issue

is the lack of consistency in the systems as applied across states. Key drivers in these initiatives are collaboration and harmonisation, so another focus of the ICAO work in the medium term is the development of a concept of operations and protocols that would apply globally.

Following the earlier Air France loss, ICAO had already been working with stakeholders on the improvement of surveillance in oceanic and remote areas. An initial step, implemented in November 2014, was the better use of controller pilot downlink communication (CPDLC) and ADS-C technologies to maintain communication between aircraft systems and the ground. This had actually occurred with the Air France loss but ICAO is keen to exploit the existing technology available for airlines to track flights and report any deviations quickly to provide remedies that were illustrated in the Malaysian loss. A consultation during the year on tracking solutions highlighted that many solutions are available, but that they would result in significant costs for airlines to amend aircraft equipage. It was therefore not surprising that airlines questioned the cost of such investment against the operational benefits, and the value of vast streams of data beyond that which is already being used for routine aircraft performance monitoring. ICAO's long term goal could be the creation of an aviation data 'cloud' generated from existing and future satellite surveillance technology, and that this database could be interrogated for both detailed operational surveillance and overall tracking information.

### **Conflict Zones**

Following the shooting down of the Malaysia Airlines flight MH17 over Ukraine in July 2014, ICAO quickly convened another high level meeting with IATA, ACI and CANSO to discuss action to mitigate potential risks to civil aviation from conflict zones. In Ukraine, the airspace above eastern Ukraine was the subject of a notice to airmen (NOTAM), but it appeared that airlines had made different interpretations of the NOTAM, and that conflict zone was being overflown by some airlines and avoided by others. ICAO also took the opportunity to issue a State letter reminding all signatory States of their responsibilities with regard to the safety and security of civil aircraft operating in conflict airspace, primarily to ensure clarity and consistency. It also highlighted the issues and consequences of congestion in other areas when large numbers of civil aircraft divert on to other routes to avoid conflict airspace, which became a significant issue for the Eurocontrol Network Manager in the peak summer period following the Ukraine incident.

Following the meeting in July 2014, a task force was set up and agreed work would be carried out on two projects. The first would explore how the existing NOTAM system could be improved to convey urgent and critical conflict zone risk information. The second would be the development of a centralised system for sharing risk information. The task force reported to the ICAO Council in October 2014 on its progress. It was made clear that these initiatives were not designed to disrupt existing ICAO rules but to ensure best practice and to optimise information sharing and risk assessment. Responsibility for airspace safety remains with individual states and airlines have final responsibility for flight planning and operation. The aim is to enhance decision making with timely and appropriate information.

### 5.3. United States

The Federal Aviation Administration (FAA) continues the implementation of improvements to the National Airspace System (NAS) in an incremental rather than revolutionary process. Many of these programmes have been characterised as laying the foundations for the Next Generation NEXTGEN ATM programme. It is increasingly recognised that progress on NEXTGEN is now being achieved by moving from the overall planning of new technology to the implementation of key enablers such as En Route Automation (ERAM), ADS-B and PBN

#### **ERAM**

Following a troubled development and initial deployment phase, FAA announced in early 2015 that all 20 US en-route air traffic centres had now been equipped with the en-route automation technology which provides a very significant increase in capability over the 40year old legacy system. This upgrade is seen as a major foundation for implementing NEXTGEN technologies, allowing 1900 aircraft rather than 1100 aircraft to be handled at one time and provides much enhanced flight data processing, a platform for advanced controller tools and, perhaps crucially, the ability to communicate and handle data between neighbouring centres far more efficiently. This will enable aircraft to be handled much more seamlessly across the country and provide contingency should there be system outages at an individual centre.

#### **ADS-B**

In April 2014, the FAA completed a nationwide ADS-B ground station rollout enabling controllers to track aircraft with greater accuracy and reliability and providing more information to pilots. This is a key enabler for the future NEXTGEN system. The ADS-B radio network supports a satellite-based surveillance system, providing more accurate aircraft location information and visibility in certain places than is currently available with radar. The system is already being used to separate aircraft at a number of air traffic centres and will be rolled out to all centres by 2019, ahead of a mandate for all aircraft operating in US controlled airspace to be ADS-B equipped by 2020. It will also be an enabler for more accurate airport ground movement surveillance and new surveillance procedures for mountainous regions and over-water areas.

#### **PBN**

The FAA delivered several PBN projects during 2014. In May, the Houston Metroplex NEXTGEN airspace redesign project was implemented, reducing delays, fuel burn and CO2 emissions with more efficient arrival and departure routes. This demonstration of NEXTGEN satellite technology application was an expedited infrastructure project which began in 2012. Key features developed in conjunction with the major airline users include:

- creation of Optimised Profile Descent (OPD) into major Houston airports;
- creating more efficient routes in the Houston and the Dallas/Fort Worth Metroplex corridor;
- developing efficient alternative bad weather routes;
- utilizing parallel arrival routes into Houston George Bush airport; and,
- developing high performance departure routes.

This was followed in November with the successful implementation of the North Texas Metroplex NEXTGEN project with similar benefits for aircraft arriving and departing from airports in the Dallas Metroplex area. A further NEXTGEN initiative was the deployment of three parallel OPDs for aircraft arriving at the Washington area's three major airports: Washington National, Washington Dulles and Baltimore Washington airports. High performance departure routes are also being rolled out.

## NEXTGEN

In March 2014, it became clear that the 2015 budget request would impose a cut of almost 20% from proposed NEXTGEN funding, a reduction of some US\$65 million that would risk delivery on key aspects of the NEXTGEN program by 2018. The emphasis in NextGen is on an incremental approach, firstly near-term 1-3 year projects, then mid-term 2018-2020, and then the years thereafter. The focus in the near term is on:

- data communication - transition to digital, controller cockpit airline operation centres;
- PBN in Northern California, Atlanta and Charlotte;
- surface movements - improve efficiency; and
- multiple runway operations at 36 airports, increasing efficiency, reducing delays.

The FAA published its latest update of milestones and metrics in October 2014<sup>68</sup>, highlighting the key programmes that are underpinning NextGen at present:

- Automatic Dependent Surveillance–Broadcast (ADS-B);
- Data Communications (Data Comm);
- En Route Automation Modernization (ERAM);
- Terminal Automation Modernization and Replacement (TAMR);
- NAS Voice System (NVS); and,
- System Wide Information Management (SWIM)

At the same time, the report<sup>69</sup> from MITRE that the FAA commissioned to take stock of the current NEXTGEN situation was also published in October 2014. This recommended ways to refine plans and expectations, and also reviewed the trade-offs and prioritisation of projects that would assist implementation and delivery of benefits to airspace users. Looking at the period to 2020, MITRE first carried out a gap analysis between what FAA has documented to deliver, and what can be reasonably achieved. These gaps relate to operational transition, user adoption and technical maturity. These challenges follow from issues related to transitional planning, user equipment and turning concepts into deployable technology within realistic timescales.

On a wider front, the report also defines six areas of focus that should provide the basis of further development of NEXTGEN technologies into the next decade. These are:

- deployment of transformational and foundational systems;
- maximisation of operational use of available aircraft and ground capabilities;
- permitting initial procedural operations of new airspace entrants (i.e. unmanned aircraft systems (UAS) and Commercial Space Vehicles [(CSVs)] leveraging existing policy, and introducing new rules to enable their evolving operations;
- eliminating surplus capabilities and services to promote transition to new NextGen services and reduce costs;
- integrating NAS-wide operations and performance management to deliver expected end-to-end service; and,
- integrating advanced aircraft-centric operations to coincide with the next major forward fit of the fleet.

An important recommendation made was that the FAA should defer development and implementation activities for Trajectory-Based Operations with integrated avionics until the concept is mature and implementation plans are aligned with fleet forward fit. This is in-line with the view that the FAA's focus must broaden from one of deploying infrastructure to one of transitioning the new and enhanced capabilities into effective operational use. This does not detract from the fact that the FAA and

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<sup>68</sup> FAA NEXTGEN Priorities Joint Implementation Plan Report to Congress October 2014

<sup>69</sup> NEXTGEN Independent assessment and recommendations MITRE October 2014

airspace users have achieved significant operational benefits from technology delivered so far, but that these recommendations should be seen in the context of the significant expenditures required in the short term to deliver programme out to 2020.

A report<sup>70</sup> from the National Research Council in May 2015 highlighted the need for the FAA to adopt system architecture techniques in the development of new systems.

### **Unmanned Aircraft Systems (UAS)/ Remotely Piloted Aircraft Systems (RPAS)**

The FAA issued solicitations for a Centre of Excellence (CofE) for unmanned aircraft systems (UAS), allowing the study of technical issues critical to the safe and successful integration of UAS into the nation’s airspace. This will include evaluating detect-and-avoid technology, control and communications, compatibility with air traffic control operations, and training and certification of UAS pilots and other crew members. There will also be a linkage with the UAS test sites announced by FAA in 2013.

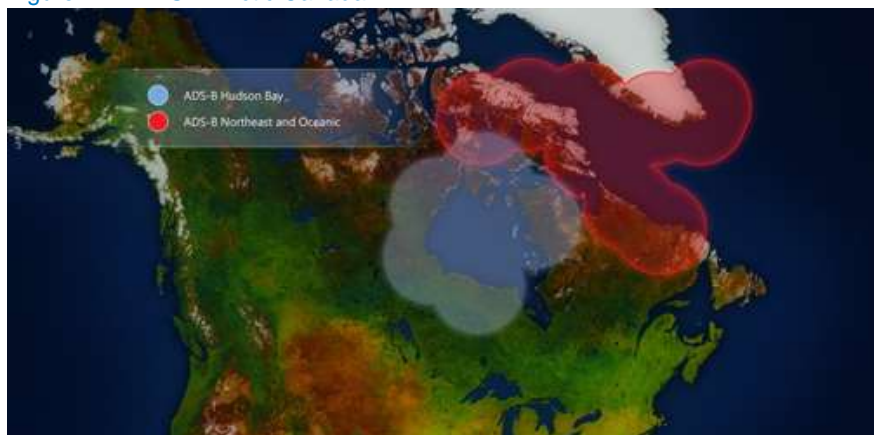
#### **5.4. Canada**

NAVCanada continue to be in the forefront of the deployment of advanced surveillance initiatives as well as their partnership with Iridium Corporation in the Aireon satellite surveillance joint venture. Many of these projects are delivering significant environmental benefits in terms of reduced CO2 emissions resulting from shorter and more efficient flight paths.

#### **ADS-B Surveillance on Polar Routes**

NAVCanada has had a programme to deploy ground based ADS-B across Northern Canada since 2008, illustrated at Figure 124. Deployment and use of this technology which covers the airspace used by Europe-North America and North America- Asia flights over the high arctic/ polar regions has allowed the elimination of the procedural organised track structure in December 2013 and its replacement by user preferred routes (UPRs) which have enabled NAVCanada Edmonton Centre and the airlines to develop more efficient routes under ADS-B surveillance and generate the consequent fuel savings.

Figure 124: ADS-B Arctic Canada



Source: NAVCanada

<sup>70</sup> A review of the next generation air transportation system National Academies Press May 2015

## Arrival Management

NAVCanada is also looking at improving efficiency at the interface between the en-route and airport terminal domains as envisaged in Block 2 of the ICAO upgrade plan which relates to airport arrivals and departures. NAVCanada has signed contracts for the delivery of arrival management systems at Montreal, Vancouver, Toronto and Calgary, the four largest Canadian airports. This will optimise arrival sequencing into airport terminal areas consistent with the airport operational constraints, improving predictability, lowering costs and providing environmental gains.

### 5.5. Brazil

#### Technology Upgrades

Brazil has the busiest airspace in South America. DECEA, the Brazilian Air Navigation Service Provider, is overseeing an upgrade programme for the Brazilian airspace system, required not only for modernisation but also to meet the higher level of demands that have occurred to meet the World Cup in 2014 and that anticipated for the Olympics in 2016. Comissão de Implantação do Sistema de Controle do Espaço Aéreo (CISCEA) is the agency responsible for the development and implementation of new ATM technology and has contracted with a number of suppliers to upgrade systems. The major focus of this is communications and in particular, datalink technologies. In addition, upgrades to monitor and control systems are being implemented together with enhancements to ATC centre radars and communications. Although some PBN procedures have been rolled out at airports at Sao Paulo and Rio de Janeiro, wider scale application of PBN and ADS-B surveillance is yet to be fully deployed as envisaged by the SIRIUS programme, below at Figure 125, which is designed help meet ICAO upgrade targets. As a result, there has not been any significant reduction in flight track distances and spacing criteria which is reflected in continuing air traffic delays.

Figure 125: Brazil SIRIUS Upgrade Programme



Source: DECEA

## 5.6. North Atlantic

### GAATS+ Gander Automated Air Traffic System

In December 2014, NATS and NAV CANADA implemented a significant upgrade to the Gander Automated Air Traffic System (GAATS+) air traffic control system at NATS Prestwick Centre. This latest development is the result of the continued close cooperation between the two ANSPs responsible for North Atlantic air traffic management. The enhanced functionality includes advanced messaging and provides the framework for new functionalities such as SWIM, incorporation of ground based ADS-B, and a platform for the satellite-based ADS-B services which Aireon will deliver by 2018.

The GAATS+ system features increased automation of data exchange with other air traffic facilities and integrates a series of safety net tools such as conflict prediction and conflict alert. It also provides controllers with a snapshot of current and planned traffic as well as available route profiles, allowing the controller to easily identify an aircraft's preferred route and provide a conflict-free clearance. Further collaborative North Atlantic initiatives by NAV CANADA and NATS, such as Reduced Lateral Separation Minima (RLatSM), see below, will also be implemented on the common Oceanic control system, providing airspace users with efficiency benefits for transatlantic flights. The present track structure at 1 degree latitude separation is illustrated at Figure 126.

The success of the original agreement between NATS and NAV CANADA and the implementation of GAATS+ across the North Atlantic have also provided a foundation to broaden the scope of collaboration. A new program called COAST (Collaboration on Oceanic Airspace Systems and Tools) will focus on continued long-term collaboration opportunities for improved safety, service, value and environmental benefits for customers who fly the North Atlantic.

Figure 126: Existing Latitudinal Separation on North Atlantic Track Structure



Source: NATS

## RLatSM Reduced Lateral Separation Minima

Following the long term strategy of the ICAO EUR/NAT planning group, it is anticipated that a trial will commence in November 2015 of reduced lateral separation of aircraft across the North Atlantic. This will ultimately lead to valuable new capacity being available within the procedural ATC environment across the ocean. As shown in Figure 127, the initial trial will be confined to the two core tracks within the daily organised track structure each day and will effectively allow the development of an additional track ½ degree of latitude spacing between the two busiest one degree separated tracks.

Figure 127: North Atlantic RLatSM Configuration



Source: NATS

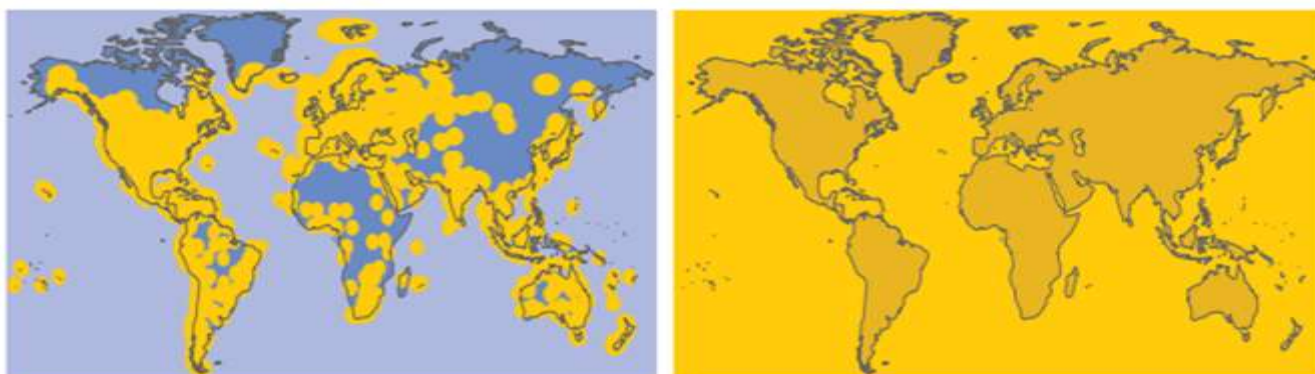
## Aireon Initiative

Aireon is a space-based global aircraft surveillance project, a joint venture between Iridium Communications and NavCanada. Further initial investment has been made by three ANSPs; IAA (Ireland), ENAV (Italy) and Naviar (Denmark). The objective is to provide global ADS-B tracking and surveillance from 2018 using satellite based technology, providing coverage in the large areas of the world where there is no radar or surface ADS-B surveillance, as shown in Figure 128 below. In particular, Aireon will provide systematic surveillance across the oceans, where the busy traffic flows across the Atlantic and Pacific rely at present on procedural air traffic control.

Figure 128: Potential Impact of Aireon Satellite Surveillance Initiative

Significant areas without surveillance

100% global surveillance



Source: Aireon



The efficiencies afforded by the Aireon initiative are described in Figure 129 below. It is clear from recent announcements that the concepts have the potential to assist many other ANSPs in the development of their surveillance capability, e.g., India & African states

Figure 129: Aireon Surveillance Capability

Flight efficiencies	Current	With Aireon <sup>SM</sup>
Flight planning	Limited (ADS-C) or no direct surveillance Structured North Atlantic flight tracks—fixed levels and speed	Total surveillance Increased number of North Atlantic flight tracks—dynamic to optimize use/avoidance of winds Allow weather deviation
Flight trajectory climbs	Current longitudinal separation minimum—10 minutes Procedural separation limits number of aircraft that can obtain a better flight level	Reduced separation minima up to 15 NM increases opportunity for aircraft to obtain better flight levels \$6-8 billion in fuel savings 2017-2030* Decreased greenhouse gas (GHG) emissions
Flight routing & capacity (North Atlantic)	North Atlantic Tracks set twice per day Current lateral separation minimum 30 NM Limits number of aircraft on preferred wind track	More aircraft can take advantage of better wind tracks Reduced lateral separation minimum down to 15 NM Reduced lateral separation minimum \$6-8 billion in fuel savings airlines 2017-2030*
Aircraft to ground position updates	ADS-C equipped aircrafts use 4 minute update rate	Position and other data updates every 15 seconds

Source: Aireon

## 5.7. Europe

### Performance

2014 was the final year of RP1, the first 3-year period of application of the Performance Scheme and associated performance indicators in the areas of safety, environment, capacity and cost efficiency. Detailed data is available in the Performance Review Body (PRB) reports on RP1 monitoring<sup>71</sup>. In March 2014, following extensive work and consultation by the Performance Review Body (PRB), the Commission published the targets for RP2, the period 2015 to 2019 in Implementing Decision (2014/132/EU).<sup>72</sup>

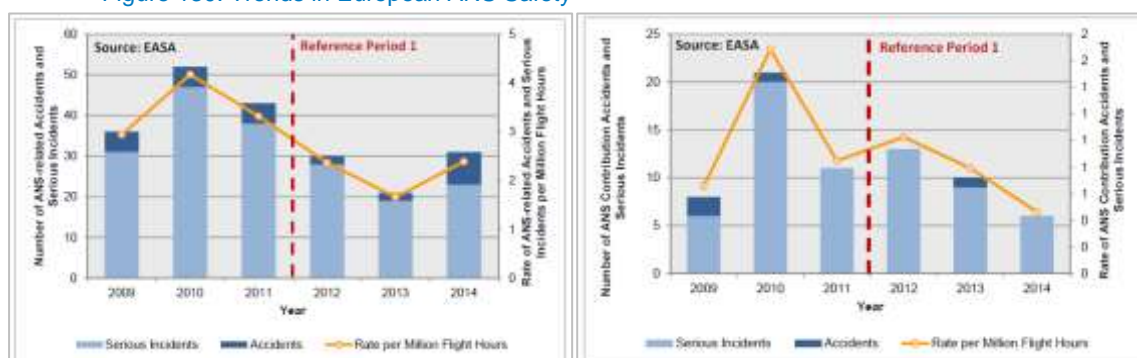
### Safety

The overall level of aviation safety in Europe remains high. There were no fatal Air Navigation Services (ANS) related accidents (Figure 130 left) in the 2011-2014 period and only one accident with an ANS contribution (Meteorology (MET) related) in 2013. ANS related incidents (Figure 130 right) decreased to the lowest level on record in 2014. Separation minimum infringements and runway incursions remain the largest category of serious ANS incidents.

<sup>71</sup> Volume 1: EU-wide overview, Volume 2: National level and Volume 3: Safety overview are available online from: <http://www.eusinglesky.eu/prb-report-library.html>

<sup>72</sup> Commission Implementing Decision 11 March 2014 2014/132/EU

Figure 130: Trends in European ANS Safety



Source: PRB reports

No Union-wide targets were introduced in RP1. However, the monitoring of safety measurement during RP1 reinforced the view of SRC, European Aviation Safety Agency (EASA) and others that there are general concerns as to the quality, consistency and regularity of reporting across States. This is the focus of the Union-wide targets and key performance indicators included in the performance scheme for RP2 related to the effectiveness of safety management and ATM severity classifications using the Risk Analysis Tool for ‘ATM Overall’ and ‘ATM Ground’ severity for separation minimum and runway incursions in the reporting by both state National Supervisory Authorities (NSAs) and ANSPs. The scheme includes additional indicators for local target setting and monitoring, such as the level of presence of Just Culture, application of automates safety data recording systems, level of occurrence reporting and actual reporting of, as a minimum, separation minima infringements, runway incursions, airspace infringements and ATM-specific occurrences.

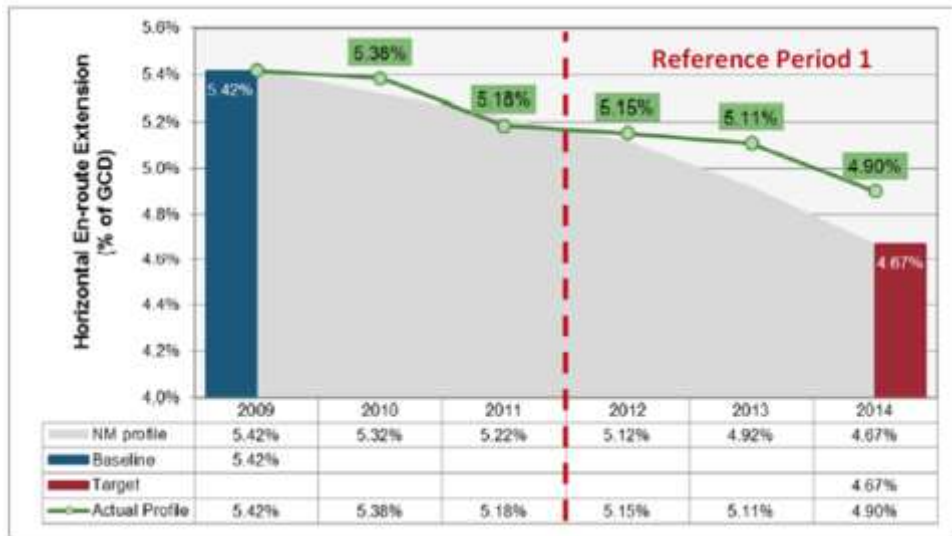
Regulation (EU) No 376/2014<sup>73</sup> on the reporting, analysis and follow up of safety occurrences in civil aviation was adopted in April 2014. This Regulation allows the gathering and exchange of incident information by all participants in aviation. By identifying trends from extensive analysis, EASA, will be able to recommend action on an informed basis, allowing a more proactive and evidence-based safety system, and the development of performance indicators across a wider range of safety matters. Despite these developments, there is still opaqueness in the monitoring of safety and a variation in standards of reporting and analysis of safety between States.

## Environment

The accepted measure of flight efficiency, which is a proxy for fuel and carbon emissions savings, is the horizontal flight distance. The horizontal flight efficiency indicator compares the length of the planned and actual flown flight trajectory with the actual Great Circle distances. Figure 131 shows the improving trend of inefficiency in flight plan routings during RP1. This trend reflects the work done by Eurocontrol Network Manager Operational Planning and individual ANSPs and military working together on route improvement plans, free route airspace and flexible use of civil/military airspace.

<sup>73</sup> Regulation (EU) No 376/2014 of the European Parliament and Council 3 April 2014

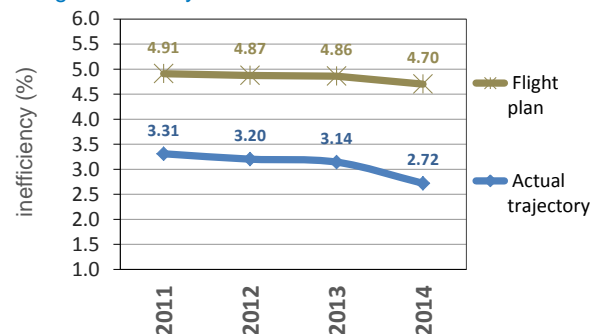
Figure 131: Overall Trends in European Flight Efficiency



Source: PRB reports

Figure 132 also shows the evolution of the decreasing inefficiency in both flight plan routings and actual routings for the wider EUROCONTROL Member States area<sup>74</sup>. Under the SES Performance Scheme, SES States<sup>75</sup> have binding targets to reduce flight inefficiency further to 4.1% for planned trajectories and 2.6% for actual trajectories by 2019.

Figure 132: Horizontal en-route Flight Efficiency for 2011 to 2014 for EUROCONTROL Member States



Source: Performance Review Report 2014 (PRR2014)

## Capacity

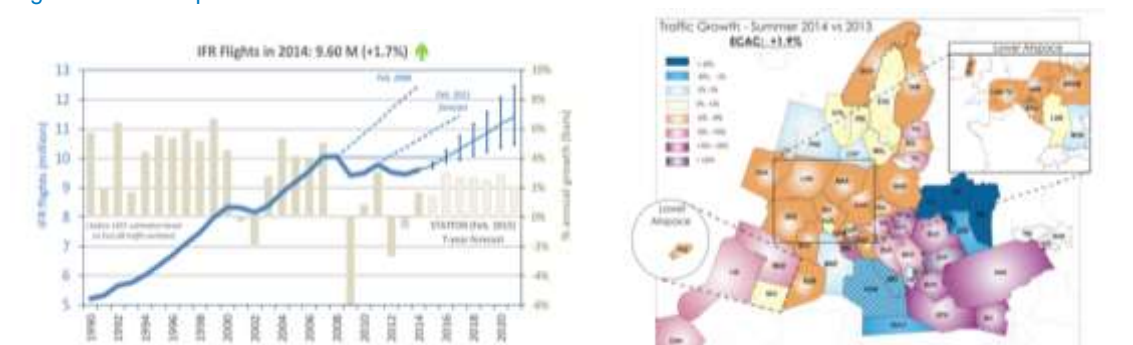
The number of flights handled across Europe started to move ahead of previous years in summer 2014 but activity still remained below that of the summers of 2007 and 2008 before the economic downturn. As shown in Figure 133, overall annual flight growth in 2014 was up 1.7% but this masked a very large variation across the region with large increases in south west and south east Europe associated with a return to growth in flights in Spain and the continued rapid growth in Turkey. From July 2014, altered flight paths following the MH17 incident in Ukraine changed the volume of

<sup>74</sup> 41 EUROCONTROL Member States

<sup>75</sup> 28 EU Member States + Norway and Switzerland

overflights handled in several European states. There was continued diversion of flight routes resulting from restrictions over Libyan airspace.

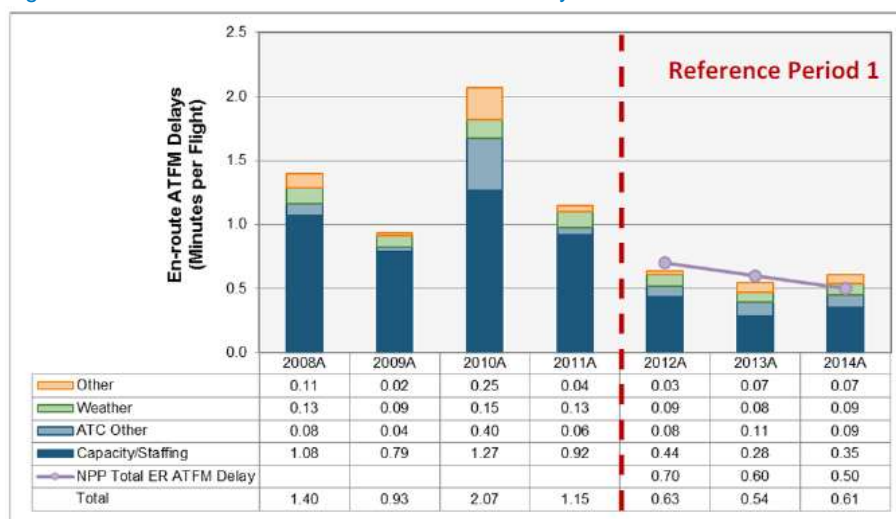
Figure 133: European Traffic Growth and Variation



Source: PRR2014/NOR2014

As shown in Figure 134, en-route delay in 2014 increased slightly to 0.61 minutes/flight, above the RP1 target of 0.5 minutes/flight, reflecting a range of difficulties experienced by ANSPs across Europe. Although capacity and staffing issues caused some delay, continued industrial action at several control centres over various periods had a significant impact. Weather, system upgrades and equipment failures also contributed to delays, highlighting the fact that capacity alone is not the sole factor in determining whether the performance target is achieved. The PRB monitoring report identifies the ATC centres which are considered to have constrained capacity, but it is clear that achieving the annual en-route delay target of 0.5 minutes/flight each year through RP2 will depend very much on these other factors, not with-standing the additional capacity and system upgrades being planned by ANSPs over the period.

Figure 134: Evolution and Causes of en-route Delay 2008 - 2014



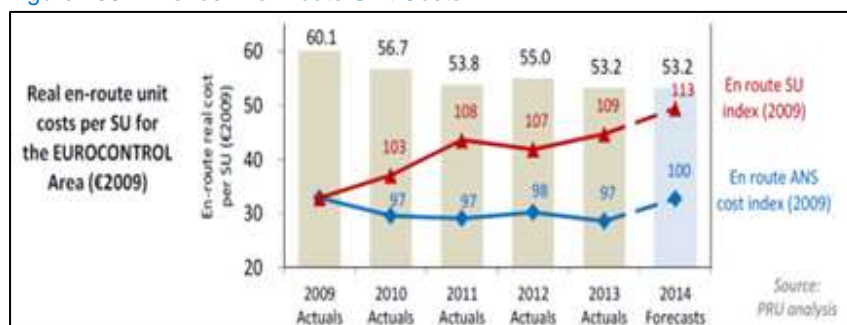
Source: PRB reports

In the wider context of SESAR, the downturn in traffic over the last 7 years and the revised forecasts indicate the original capacity challenge of meeting growth has now changed to a more complex and subtle focus on network efficiency and harmonisation across Europe.

## Cost Efficiency

From the analysis provided in the PRB monitoring report, en-route ANS costs decreased by 1.3% in 2013 v 2012 and service units increased by 2.1%, leading to a decrease in the en-route unit cost per service unit indicator of 3.3% in 2013 v 2012. As in Figure 135, the forecast increase in service units for 2014 is +3.4% but costs are projected to increase by +3.3%, implying no decrease in en-route costs per service unit in 2014. Actual ANS costs for 2014 are not available until later in 2015. Most of the cost decrease is driven by reductions in staff costs across many of the ANSPs.

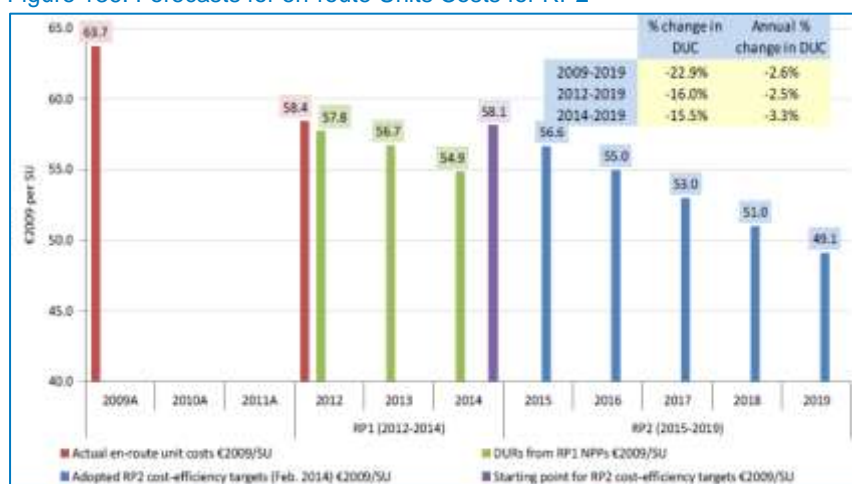
Figure 135: Trends in en-route Unit Costs



Source: PRR2014

Costs are expected to increase again in 2015 and then remain stable through the RP2 period. Forecast increases in service units each year will drive a continuing decrease in the en-route cost per service unit indicator. The RP2 en-route cost efficiency targets are measured in terms of determined unit costs, the costs relating to the provision of air navigation services pre-determined by each National Supervisory Authority (NSA) and adopted by each Member State prior to the start of the regulatory period. Figure 136 shows the targets each year in the context of RP1 outcomes (all expressed in constant 2009 Euros).

Figure 136: Forecasts for en-route Units Costs for RP2

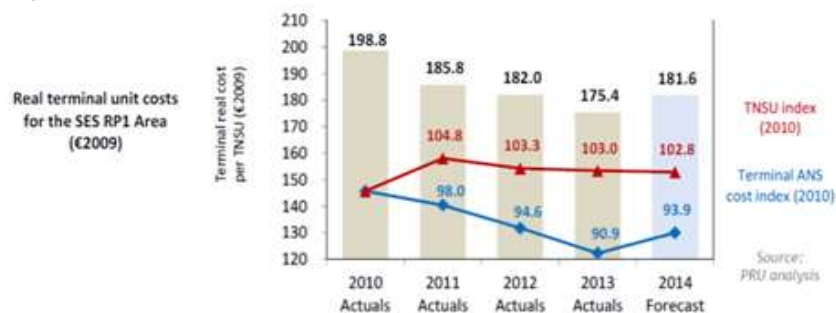


Source: DGMove from PRU

Although this is an improving cost trend and the RP2 efficiency targets may be met, overall structural costs of ANS provision in Europe continue to be relatively high, in the view of the Eurocontrol Performance Review Unit (PRU), despite reductions in staff and other costs.

Terminal ANS cost data is less comprehensive than en-route cost data, but as shown at Figure 137, similar patterns of cost reduction (-3.9% 2013 v 2012) exist, driven by staff cost savings. The volume of terminal service units dropped by 0.3%, however, so did the reduction in the terminal unit cost per terminal service unit which was -3.6% in 2013. The forecasts for 2014 show an increase of 3.3% in costs, while service units decrease by -0.2%, resulting in an increase in terminal unit cost per terminal service unit of +3.5%, reversing the trend of improved cost efficiency.

Figure 137: Trends in terminal ANS costs



Source: PRR 2014

## Performance Plans

All States were required to submit performance plans for RP2 for each Functional Airspace Block (FAB) at the end of June 2014. These were then reviewed by the PRB which issued assessment reports in October 2014.<sup>76</sup> In March 2015, the European Commission then deemed each target contained in the performance plans consistent or inconsistent with respect to each of the Union-wide performance targets. These assessments are summarised in Figure 138. Only nine States were considered to be consistent in all four areas.

Figure 138: Consistency of State NPPs with RP2 Performance Targets

EU Member State	Safety	Environment	Capacity	Cost-Efficiency
Austria	✓	✓		
Belgium	✓	✓		
Bulgaria	✓	✓		✓
Croatia	✓	✓		✓
Cyprus	✓	✓		
Czech Republic	✓	✓		✓
Denmark	✓	✓	✓	✓
Estonia	✓	✓	✓	✓
Finland	✓	✓	✓	✓
France	✓	✓		
Germany	✓	✓		
Greece	✓	✓		✓
Hungary	✓	✓		✓
Ireland	✓	✓	✓	✓
Italy	✓	✓		
Latvia	✓	✓	✓	✓
Lithuania	✓	✓	✓	✓
Luxembourg	✓	✓		
Malta	✓	✓		✓
Netherlands	✓	✓		
Poland	✓	✓	✓	✓
Portugal	✓	✓		✓
Romania	✓	✓		✓
Slovakia	✓	✓		
Slovenia	✓	✓		✓
Spain	✓	✓		✓
Sweden	✓	✓	✓	✓
UK	✓	✓	✓	✓

Source: ICB

<sup>76</sup> Assessment Report of RP2 FAB Performance Plans Vol 1 Union-wide assessment report EC PRB October 2014

## US-Europe Comparison

In early 2013 the Commission and the Federal Aviation Agency (FAA) signed an Annex to the Memorandum of Cooperation between the US and the EU relating to collaboration on ATM performance measurement. The June 2014 comparison of ATM operational performance in the US and Europe<sup>77</sup> highlighted the issues relating to provision of ATC in Europe. The study makes the most appropriate comparison between the two continents, recognising that the continental US is some 10% smaller in area. This comparison focuses on operational indicators and highlights the different ways that en-route and airport delay interact. These differences make interpretation of the changes in ATFM delay and other flight efficiency metrics difficult. Under the US system most arrival airport capacity issues are absorbed as departure airport delays, and most ATFM delays are due to en-route weather (primarily convective activity and winter weather). In Europe, ATFM delays also reflect the demand/capacity balance of en-route sectors and at arrival airports.

However, a significant and over-riding issue is that the US operates as one system with more integrated traffic flow management. This drives the wider differences between Europe and US related to the costs and lack of harmonisation incurred by the highly fragmented European airspace, which has implications for airspace users and for the deployment of future technologies. Figure 139 incorporates a table that is included in the November 2013 update of similar comparison of ANS cost-efficiency trends.<sup>78</sup> The often quoted headline numbers are that the continental US has 20 air traffic control centres operated as one system handling nearly 60% more flights than Europe in a more dense airspace. In comparison, in Europe there are 63 control centres operated by 37 en route ANSPs.

Figure 139: Europe – US ATM Comparison Key Parameters

Calendar Year 2011	USA	Europe (37 ANSPs)	SES Area (EU27+2 States)
Geographic Area (million km <sup>2</sup> )	10.4	11.5	9.4
Number of civil en-route ANS Providers	1	37	29
Number of Air Traffic Controllers (ATCOs in OPS)	13 300	17 200	14 600
Total staff	35 500	58 000	43 700
Flight-hours controlled (million)	23.7	14.5	12.7
Controlled flights (IFR) (million)	16.0	9.8	9.4
Relative density (flight-hours per km <sup>2</sup> )	2.3	1.3	1.4
Number of en route centres	21	63	50
Number of APP units (Europe) and terminal facilities (USA)	162	260	200
Number of airports with ATC services	511	433	339
ATM/CNS provision costs (in billion €2011 for Europe and billion US\$2011 for the USA)	10.7	7.8	7.1
ATM/CNS provision costs (in billion €2011)	8.4	7.8	7.1
Source	FAA/ATO	Eurocontrol	

Source: PRC

<sup>77</sup> Comparison of Air Traffic Management-Related Operational Performance: US/Europe 2013. European Commission/Eurocontrol/Federal Aviation Administration Jun 2014

<sup>78</sup> US-Europe continental comparison of ANS cost-efficiency trends 2002-2011 Eurocontrol PRC November 2013

## SES 2+

Proposals to recast the Single European Sky legislation (SESII), known as SES 2+, were first drawn up in 2013. A draft single regulation was proposed by the Commission describing the intention of speeding up the modernisation of European air traffic management and air navigation services. The key elements of the proposed regulation are:

- ensuring the independence and full separation of NSAs from ANSPs
- making the Network Manager (which performs some network level services and is run by Eurocontrol) more an industry led organisation than an intergovernmental organisation and readied for new centralised services.
- making FABs more flexible and industry-driven to motivate respective ANSPs to work together to increase capacity and improve efficiency. This will be supported by industrial partnerships designed to maximise their performance
- introducing more dynamism and flexibility into the process of setting EU wide and local performance plans and their implementation. Revisions to the performance plans and targets will be achieved through a stronger dialogue between stakeholders and a faster decision-making mechanism.
- opening support services (e.g. communication, navigation and meteorological) to tendering in line with normal public procurement rules.
- agreeing on the respective roles of Commission, EASA and Eurocontrol to avoid overlaps and waste of resources.

During 2014 they were reviewed by the European Parliament and Council, with intensive discussion taking place before adoption of a first reading position by the Parliament in March 2014 and a general approach by the European Council in December 2014.

At the same time, the Council agreed compromise wording on EASA rules related to the Single European Sky, bringing it into line with SES legislation and including SES interoperability concepts. Whilst the Parliament was largely on the same lines as the Commission – apart from making separation of support services voluntary - the Council proposed a number of amendments, going beyond just voluntariness of support services tendering by introducing also a lesser requirement on independence of national oversight authorities and strengthening the role of States both in FABs and in the performance scheme, as compared to the Commission proposal.

Currently the two regulations are still awaiting a compromise and approval of the Council and the European Parliament. With the change of Commission in autumn 2014, a high level meeting of transport ministers was held in Rome in November ahead of the Council meeting in December 2014. As RP2 started and ANSPs prepared to start handling Summer 2015 traffic, the Commission convened a stakeholder meeting in May 2015 to reconsider the SES vision against a background of no general agreement on the way forward for SES2+, a general recognition that costs continue to be too high, FABs were not yet delivering anticipated benefits, and, despite the efforts of Eurocontrol as Network Manager, European airspace remains highly fragmented and inefficient.

At the May 2015 stakeholder meeting, DGMOVE stated that, although the SES initiative has produced many achievements over the last ten years, the European ATM system is still characterised by:

- opaqueness in safety
- institutional, legal and decision making issues
- fragmentation of ANS
- high ANS unit costs
- lack of flexibility in labour intensive industry
- monopolies and little competition



These issues also have to be seen in the future context: RP2 concludes at the end of 2019, SESAR is now moving towards the deployment of new technologies, the role of Network Manager is evolving with new concepts emerging, and changes are required and being demanded for safety and economic regulation. Recent industrial disputes and related events highlight that workforce and social aspects are as big issues in developing the Single European Sky as the deployment of new technology.

## Development

This section provides a summary overview of some of the initiatives designed to improve current European ATM performance within the existing framework and application of the current Single European Sky regulations.

## FABs - Functional Airspace Blocks

As shown in Figure 140, FABs have been established across most EU and some neighbouring airspace. However, these FABs are not currently delivering the benefits envisaged in the original Single European Sky concept and legislation and progress on making them work on an operationally functional basis has been slow, holding back progress on wider implementation of the Single European Sky. In 2013, the Commission formally requested five different FABs out of six to work harder to improve the way in which they manage common airspace. Today, the Commission notes some positive improvements from Danube and Baltic FABs and request other FAB to maintain their efforts to achieve the optimisation of airspace in all components.

Figure 140: Disposition of European Functional Airspace Blocks



Image Source: Eurocontrol

## Free Route Airspace

Eurocontrol has been working on the concept of Free Route Airspace (FRA) since 2008 and large increases in the area of European airspace where free routing applies were implemented in 2014, taking its application to around 25% of the upper airspace area of Eurocontrol Member States, with its adoption by 30 of the 64 European air traffic control centres. FRA offers considerable mitigation to

some of the efficiency, capacity and environmental challenges of the existing organisation of airspace, reducing flight distances with consequent fuel savings and reduced emissions

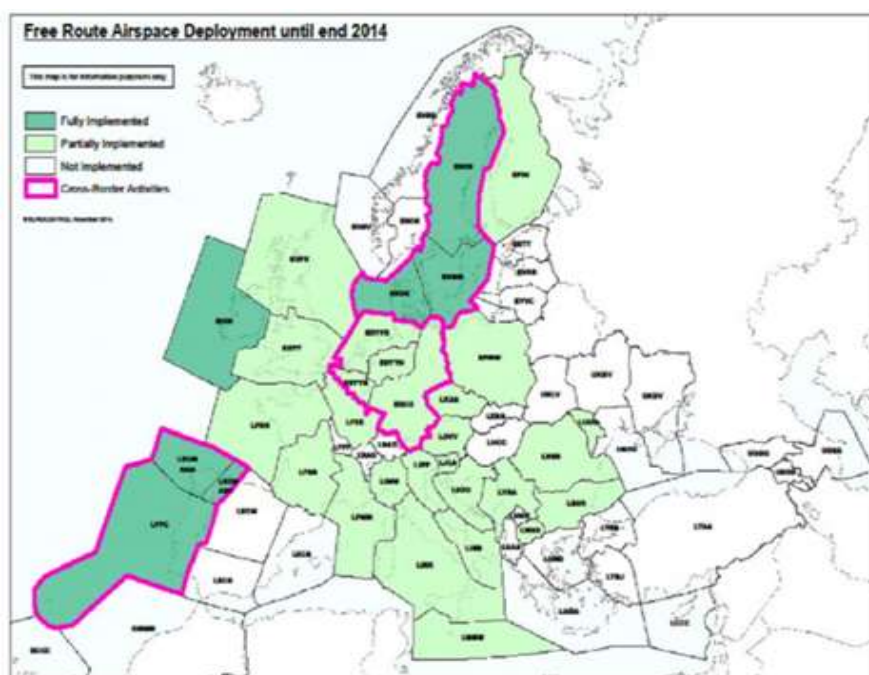
These gains are not won easily as the adoption of free routing by the states or FABs requires extensive civil/military cooperation in its design, partnerships with neighbouring ANSPs and their airspace users and in turn, the providers of flight planning services. The ultimate goal of free routes across all European upper airspace is a pre-requisite for the deployment of the SESAR vision of 4D business flight trajectories.

As can be seen from the map at Figure 141 below, the major free route areas implemented surround the European core area, where the Irish and Portugal implementations allow much greater flexibility for transatlantic flights. Similarly the implementations in Scandinavia and Eastern Europe greatly increase route flexibility. Recent implementations by Scottish (Prestwick) ACC and in Germany (Karlsruhe), for example, are extending the contiguous free route areas, allowing more efficient flight planning with the consequent benefits outlined above.

The extension of FRA is part of the European Route Network Improvement Plan (ERNIP) which is itself part of the scope of the network regulation. The free route concept of operations must also meet the following implementation criteria:

- meet safety objectives
- be compatible with existing operations
- be sustainable through further development

Figure 141: European Free Route Airspace 2014



Source: Eurocontrol

## Flight Efficiency Initiative

As the designated Network Manager, Eurocontrol launched the Flight Efficiency Initiative in February 2014 to support airspace users, establishing coordination and consultation processes between aircraft operators, computer flight plan service providers (CFSPs), ANSPs and the Network Manager. This will

help meet environmental and flight efficiency targets at the network level and to support users in exploiting more efficient routes. The Network Manager has accurate and detailed knowledge of the route network capacity, with access to the latest weather, updates on the ATFCM situation, including results from military activities, and last-minute route openings and closure. These can be assessed with knowledge of aircraft operators' flight planning policies and operating procedures. Such dynamic use of the network will allow routing proposals with the potential to realise significant environmental benefits from operational enhancements and fuel savings.

## Centralised Services

In March 2014, Eurocontrol issued 14 Calls for Interest for Centralised Services. This market concept, designed to reduce overall ATM costs and the fragmented nature of service provision, has proved controversial. By identifying what it considers to be non-core services that all ANSPs require, Eurocontrol is encouraging consortia and/or special purpose companies composed of European ANSPs, relevant ATM manufacturing industry, communications service providers, IT industry, and other parties to respond ahead of a tender process that then commenced in autumn 2014. In addition to allowing such suppliers to demonstrate capability to deliver some ATM associated solutions that would enable European ANSPs to meet performance targets set out for RP2, commonly provided support services are line with SESII+ objectives and could provide part of the framework from which SESAR technology could be deployed across each Member State and at the network level. However, as the updated SES II+ proposal indicates, the prospect of limited competition in the provision of non-core ANSP services is not universally accepted. Following the Eurocontrol call for interest, Calls for Tenders have now been released on some of the services.

## SESAR

The end of 2014 saw the start of the deployment phase of SESAR with the creation of the deployment manager in December and the publication of the draft first Deployment Plan in March 2015. The development phase continues with the extension of the SESAR Joint Undertaking (JU) through to 2025 and, in a sense, the definition phase is being revisited with a revision to the European ATM Master Plan which was also announced in December 2014.

## European ATM Master Plan

In December 2014, SESAR JU members organised a high level conference to commence the process of updating the European ATM Master Plan. They will have responsibility for the work on the revision which continued through to early July 2015, with the delivery of a draft master plan. The focus of the plan is likely to evolve from one based on the overwhelming need to meet high traffic growth to be a plan that drives change and performance improvement in safety, costs, environment and capacity and the deployment of SESAR technologies that will enhance harmonisation, interoperability and standardisation across the European air transport network. It will also need to embrace the airspace integration of emerging Remotely Piloted Aircraft Systems (RPAS) and with an increasing focus on cyber security issues. All this will also have to be aligned with the steps outlined in the ICAO Block Upgrade Programme and provide input for the next update of the Global Air Navigation Plan (GANP) which will emerge from the next ICAO Assembly in 2016.

## PCP Pilot Common Project

In June 2014, the Commission adopted a Regulation<sup>79</sup> for the implementation of the Pilot Common Project (PCP). This is the first set of ATM functionalities that have been identified for wide scale coordinated deployment and will ensure that they are deployed in a timely, coordinated and synchronised way, bringing important performance and benefits for European ATM.

The PCP consists of the following ATM functionalities resulting from SESAR Research & Development:

- **Extended Arrival Management and Performance Based Navigation in the High Density Terminal Manoeuvring Areas** – to improve the precision of approach trajectories and facilitate early traffic sequencing, allowing a reduction in fuel consumption and environmental impact in descent/arrival phases.
- **Airport Integration and Throughput** – to improve runway safety and throughput, improve fuel consumption, reduce delay and enhance airport and airspace capacity;
- **Flexible Airspace Management and Free Route** – to enable a more efficient use of airspace with fuel consumption and delay reduction benefits
- **Network Collaborative Management** – to improve the quality of network information sharing by all ATM stakeholders, delivering ANS Air Navigation Service productivity gains and delay cost savings
- **Initial System Wide Information Management** - to enable the delivery and use of services through an IP-based network by SWIM enabled systems, allowing ground-to-ground integration and aeronautical data management and sharing, which will enable significant benefits to ANS productivity;
- **Initial Trajectory Information Sharing** - to move air-to-ground integration towards initial four dimensional (i4D) trajectories with enhanced Flight Data Processing performance, improving predictability of aircraft trajectories to reduce tactical intervention and improved de-confliction. Again this will improve ANS productivity, save fuel and reduce delay variability.

The Common Projects are defined in the Regulation<sup>80</sup> defining the SESAR Deployment Governance, including also the establishment of the Deployment Manager which will coordinate those (Pilot) Common Project and manage SESAR deployment activities.

## SESAR 2020 Programme

In April 2014, the European Parliament and Council voted in favour of the extension of the SESAR JU until 2024.<sup>81</sup> The SESAR JU is preparing the SESAR 2020 programme. Funding of €1,585 billion will be provided by the public-private partnership between the European Union, Eurocontrol and industry partners, each providing €500 million (in cash or in kind). A further €85 million will be provided by the Union's Horizon 2020 budget to specifically support and fund at 100% exploratory ATM research within the SESAR 2020 programme.

The SESAR 2020 programme includes a focus on the Very Large Scale Demonstrations to further demonstrate at larger scale, closer to the industrialisation, the viability of the technological and operational "SESAR solutions" building on top of the first SESAR R&D programme (2007-2016) and from those stemming from SESAR 2020 in the operational environments ahead of the deployment phase of SESAR. The pipeline of these research streams is shown at Figure 142. Priority projects for innovation are: integrated aircraft operations, high capacity airport operations, advanced airspace management and services, optimised network service performance and shared ATM infrastructure of

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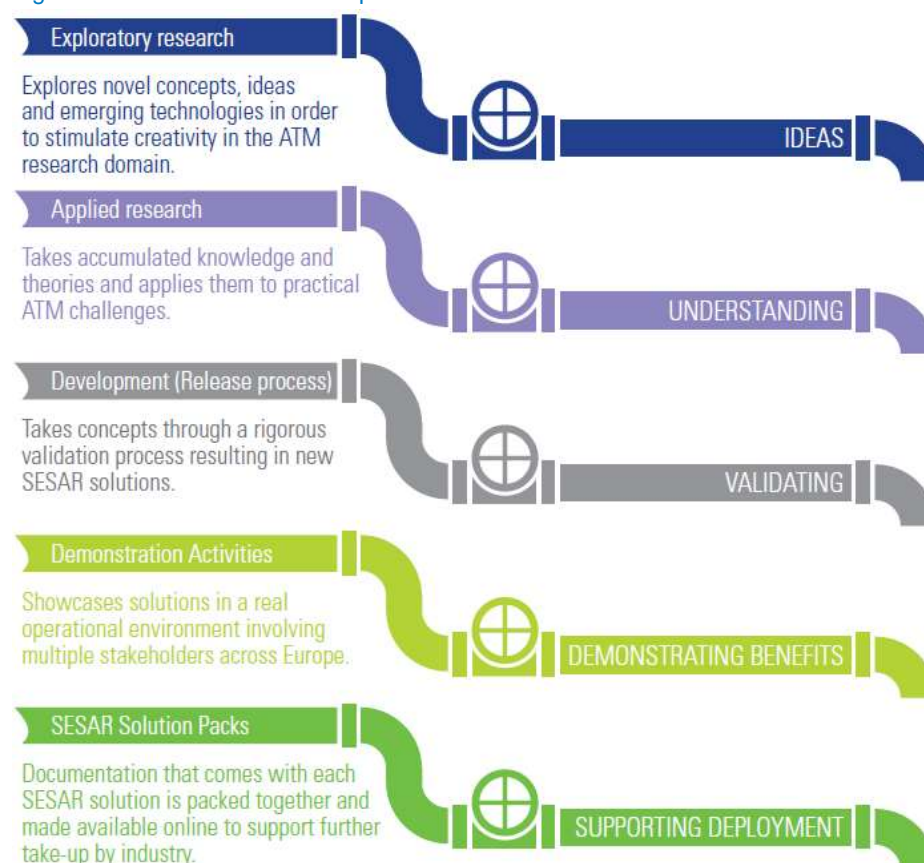
<sup>79</sup> Commission Implementing Regulation (EU) No 716/2014 27 June 2014

<sup>80</sup> Commission Implementing Regulation (EU) No 409/2013 3 May 2013

<sup>81</sup> Council Regulation (EU) No 721/2014 16 June 2014

operations systems and services. The SESAR JU, with the same founding members (the European Union and Eurocontrol), will renew its membership during the call for the programme SESAR 2020. It is expected that all existing members will continue with additional new members.

Figure 142: SESAR Research Pipelines



Source: SESAR

## SESAR JU Release 5

The annual SESAR release process allows the monitoring and reporting of the validation of concepts across a variety of ATM domains through development and integration testing within existing systems to ensure they can become viable solutions. The SESAR JU issued Release 5 in February 2015. This will be the last of this annual release series that commenced in 2011. A significant number of the SESAR Solutions addressed in Release 5, for final validation in 2015 and 2016, are featured in the Pilot Common Projects. The majority of these relate to change in network/traffic management and airport integration. In total, 38 exercises will incorporate 33 of the potential SESAR solutions across the six key features that the existing European ATM master plan uses to capture the operational improvements and technical enablers that SESAR will ultimately deliver. They are further grouped by the 13 essential operational changes used in the SESAR project, known as Operational Focus Areas (OFAs).

## SESAR Demonstration Activities

These activities are intended to showcase solutions in real operational environments. Some of the high profile projects, particularly related to network management and Demand Capacity Balancing (DCB) are described in summary below.

### *i4D*

successful flight trial demonstrated four dimension trajectory management (i4D), i.e., managing the trajectory of flights in 3 spatial dimensions and time. The trial showed that i4D offers increased flight predictability which helps overall network efficiency as well as providing safety and environmental gains.

### *Topflight*

Two phases of this project took place in 2013 and 2014, in the first, transatlantic flights were optimised using SESAR techniques involving the participation of airlines, airports, ANSPs and state NSAs. These flights demonstrated significant improvements in a number of oceanic flight processes. In the second, the focus was on data, information flows and messaging to enable over 20,000 flights to be included with the focus on arrival/extended arrival manager AMAN (XMAN) for the handling of inbound flows into London Heathrow. This formed the basis of the extended AMAN (XMAN) project now being operationally trialled at Heathrow by NATS, Irish Aviation Authority and Functional Airspace Block Europe Central (FABEC) partners to reduce arrival holding.

### *Fairstream*

These demonstration exercises at a number of major FABEC airports and airlines used Target Time of Arrival (TTA) instead of Calculated Take off Time (CTOT) as a DCB measure to contribute to traffic sequencing and i4D (extended AMAN and i4D/ Controlled Time of Arrivals (CTA)).

### *STAM Trial*

In the first two weeks of October 2014, an important live trial was organised across a large part of core European airspace to validate the feasibility and benefits offered by a wider and more harmonised application of Short-Term Air Traffic Flow Control Management (ATFCM) Measures (STAMs). These entail the much later and flexible application of network management measures to alleviate overload situations in the network than using the existing system of sector regulations and application of CTOT for departing aircraft.

### *Future ATM Demonstration Projects*

In October 2014 the SESAR JU selected 15 large scale demonstration projects aimed at showcasing the benefits that advanced air traffic management solutions can bring in a variety of real operational environments. Co-funded by the SESAR JU, the projects are divided into two categories:

Category one are those paving the way for the implementation of the PCP, the first set of functionalities that have been identified for wide scale coordinated deployment.

Category two are those focused on small and medium airports and including business and general aviation, with a focus on remote tower Services and satellite-based navigation procedures.

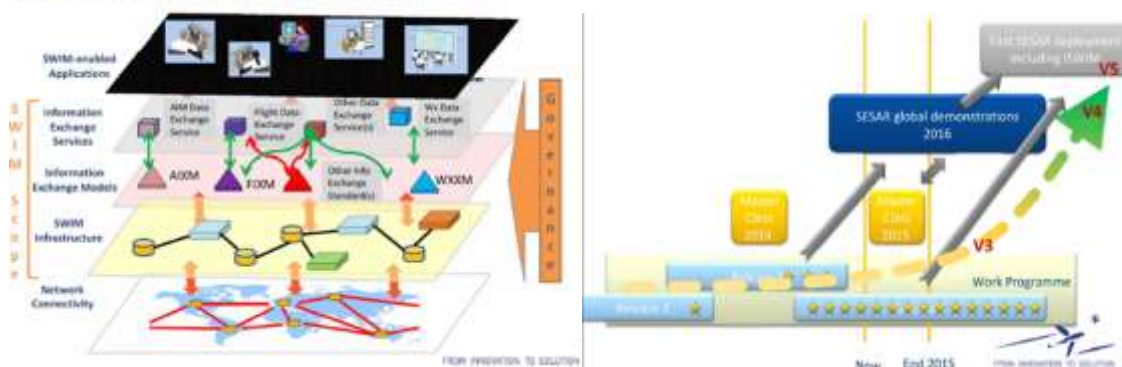
## SWIM

Even before System Wide Information Management emerged as a key work package within the SESAR development phase, the existing ATM Master Plan identified the need for the latest communication and information technology to act as a key enabler in the development of future ATM services. SWIM is an enabler of interoperability across the network. The key focus is on standards and to this extent SWIM is already a reality for some functions, namely aeronautical information (AIXM) and emerging for weather (WXXM) and flight information (FIXM). Having identified these initial services the next step is to develop standards. From free standing industry developments, these initiatives are now being incorporated in SESAR and also on a worldwide basis through ICAO processes as described Figure 143.

SESAR has been holding SWIM Master Classes on a yearly basis to provide an impetus for several SWIM initiatives to achieve initial maturity. These are now forming the basis of various demonstration activities which will allow relevant standards and methods of governance to be developed. They will also allow the development of appropriate infrastructure within each of the services. The Information Panel at the last ICAO Assembly directed states to work towards a global interoperability framework and the various European initiatives including SESAR are working towards this goal, particularly with regard towards the development of open standards. Increasingly, issues related to cyber security are being addressed in the development of SWIM concepts. These initial work streams show that SWIM is already a reality and an indication of the benefits that will be realised as the concepts are adopted over an ever increasing range of services

Figure 143: SWIM Concepts

Agreed SWIM definition and ICAO SWIM concept paper



Source: SESAR

## Datalink

Progress on this key enabler of SESAR trajectory concepts slowed very significantly in 2014 as major technical problems emerged on the use of the Aeronautical Telecommunication Network (ATN) Controller Pilot Data Link Communications (CPDLC). Communication volume between the various independently developed systems increased with the number of aircraft complying with the equipage mandate and, on several occasions, communications have cut out because of issues relating to the implementation of communication protocols. Overloads and interference have ensued. Critics have suggested that this should have been foreseen and the result is now a delay to 2018 in the implementation for the mandate for CPDLC itself and therefore a setback for one of the enablers of 4D trajectories.

SESAR will now be responsible for developing tested solutions in the next few years. Many airspace users have invested in the required avionics and these will be continued to be utilised in trials of CPDLC over this period. Although it was recognised during the formulation of the regulations that the development of these

air and ground systems was very complex, the absence of a large scale demonstration project and comprehensive monitoring ahead of implementation have been the subject of criticism.

The A6 team of ANSPs are now looking at the issue within the framework of common service provision, specifically:

- the next generation of Pan-European network services enabling the exchange of air traffic information (PENS2)
- the data link services improving the communication between the pilot and the control tower with digitalised computer messages (DLS)

## SESAR Deployment

In December the European Commission signed a framework partnership agreement with a consortium of major ANSPs (A6), airlines (A4) and airports (SDAG) named the SESAR Deployment Alliance (SDA). SDA was appointed as the "SESAR Deployment Manager" (SDM)<sup>82</sup> who is tasked to synchronise, coordinate and monitor projects implementing ATM functionalities resulting from the SESAR R&D phase and that are included in "Common Projects"<sup>83</sup> that will modernise and enhance the performance of the European ATM system, allowing the management of higher traffic volumes, increasing safety, reducing costs and environmental impacts. The EU has planned to invest up to EUR 2.5 billion by 2020 in order to support the implementation of Common Projects.

The first Common Project, the "Pilot Common Project" (PCP), now enables the deployment of essential ATM functionalities through a number implementation projects. These projects are based on solutions developed and validated by the SESAR JU over the last eight years in the context of the European ATM Master Plan. They are identified and organised in the "Deployment Programme" developed by the SDM. Following consultation with stakeholders, the SDM delivered a draft of the first version of the Deployment Programme at the end of June 2015.

EU Funding will be channelled through the Connecting Europe Facility (CEF) established by the European Commission. The first annual call for proposals under CEF emerged in September 2014 for over EUR 300 million, 80% of which was indicatively allocated to the PCP for SESAR deployment and 20% to other projects making a significant contribution to ATM performance. Priority is given to cost effective cross-border projects involving several stakeholders enhancing systems' improvement, civil-military cooperation and de-fragmentation. In early July the Commission announced that it had ultimately awarded EUR 329 million from CEF to PCP implementation projects. This will allow the Deployment Manager to coordinate and monitor the realisation of the selected projects.

## RPAS - Remotely Piloted Aircraft Systems

Following the preparation of the roadmap and the call for demonstration projects in 2013, significant progress has been made in integrating civil RPAS R&D within SESAR. Following an unsuccessful call for tender in February 2014, the SESAR JU initiated a collaborative work on the definition phase of RPAS R&D and, in preparation, held the first of three workshops to bring together key stakeholders involved in RPAS R&D activities. A follow up workshop was held in November 2014 with a final workshop in January 2015. The key aim is to integrate this activity fully into the SESAR 2020 programme, ensuring that RPAS are fully accounted for in SESAR concepts and reflected into the 2015 European ATM Master Plan update. There is strong recognition that the full potential of civil RPAS will only be obtained if it can meet existing requirements for manned aviation within the overall SES framework.

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<sup>82</sup> Commission Implementing Regulation No (EU) 409/2013

<sup>83</sup> Commission Implementing Regulation No (EU) 409/2013



The definition phase identified the following key R+D areas:

- Detect and Avoid.
- Command and Control.
- Contingency procedures.
- Airspace access and airport integration.
- Human Factors.
- Security and cyber resilient RPAS.

There is a clear recognition that safety must be maintained. A report from EASA<sup>84</sup> in January 2014 highlighted the risks that increased RPAS activity would have on the overall aviation accident rates if their present accident rate continued. From an ATM perspective, the objective is to avoid an increase in controller workload, ensuring that complexity resulting from different speed and manoeuvrability in comparison with manned flights can be resolved with prior assessment and analysis. It is also recognised that the present differences in regulation of RPAS across European NSAs must be eliminated. Bringing in the experience already gained by military use is also crucial during the R&D phase.

Civil RPAS activity in Europe at present continues to be mainly the use of small vehicles operating at low altitudes on a range of private and commercial activity. This is largely outside controlled airspace. The R&D activity will focus on both, small RPAS and the integration of larger, faster, higher-flying RPAS and how they can adapt to operating seamlessly within the future ATM system. The upcoming SESAR market study will be paramount for prioritisation of future work. The proposals for the future deployment of digital aeronautical communication should be a major enabler towards this integration.

## **Airports**

### A-CDM – Airport Collaborative Decision Making

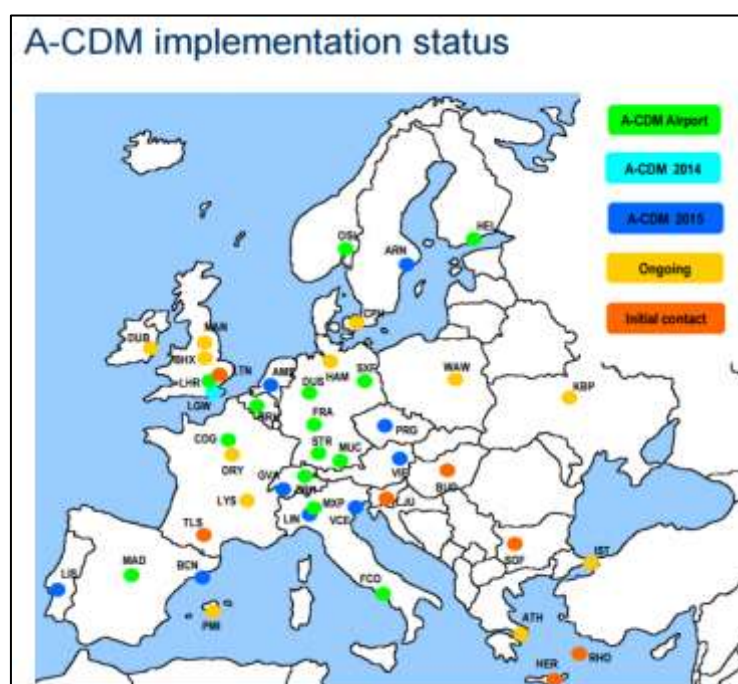
The key enabler ahead of SESAR deployment at European airports has been the increased use of Airport Collaborative Decision Making (A-CDM) techniques. This is now fully implemented at 16 European airports, handling approximately 30% of overall European flight activity. The focus of A-CDM is the real-time sharing of operational data and information between airport stakeholders which creates common situational awareness and improved interaction. This then allows better use of airport capacity, improving punctuality and reducing emissions. A-CDM is now proving to be an enabler that ties the airports into the ATM network with enhanced airport data flowing to and from the Network Manager. This local data provides increases in predictability and capacity that have impacts across the network and allow airports to be part of the dynamic management and decision making process.

However, as deployment of some SESAR concepts approaches, it is vital that the number of airports adopting A-CDM increases, allowing a consistent level of data to be provided across the network. The 16 airports that have fully adopted A-CDM are: Berlin Schönefeld, Brussels, Düsseldorf, Frankfurt, Helsinki, London Gatwick, London Heathrow, Madrid, Milan Malpensa, Munich, Paris CDG, Oslo, Rome Fiumicino, Stuttgart, Venice, and Zurich. Additional airports across Europe are currently in the process of implementing A-CDM.

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<sup>84</sup> Remotely Piloted Aircraft Systems Safety Assessment Scoping Paper EASA January 2014 Joint Authorities for Rulemaking of Unmanned Systems

Figure 144: European Airport A-CDM Implementation



Source: Eurocontrol

## Airport Innovations

As SESAR concepts increasingly tie in airports as nodes to the ATM network, many of the innovations being developed solely in the airport domain are being extended to amplify this integration process with the aim of increasing airport capacity, particularly at constrained airports. Examples are the review of wake turbulence criteria, through the Re-categorisation of the ICAO Wake Turbulence Separation Minima (RECAT) methodology, and the introduction of Time Based Separation (TBS) on approach at London Heathrow by UK NATS. Similarly, the existing focus on continuous descent approach (CDA) operations, driven by environmental issues, is now being complemented by work on optimal descents, moving potential interventions back into the terminal transition zone to improve and create seamless trajectories between the en-route and airport approach phase. Remote tower concepts are also featuring in several SESAR demonstration projects, being seen as an enabler of maintaining or enhancing safety levels whilst reducing the costs of service provision at smaller less busy airports.

## Green Airport Initiative

In late 2014, recognising the fact that, at many airport locations, noise and emissions represent a constraining factor, Eurocontrol developed a specification<sup>85</sup> relating to the environmental aspects of airport operations. This followed extensive consultation with stakeholders. It formalises the collaboration between the airport stakeholders, sets out generic high-level requirements and recommends practices in pursuit of a higher level of sustainable airport operations to minimise the environmental impact of airport operations as capacity increases.

### 5.8. Russian Federation

It has been recognised for some time that there has been a need to upgrade the outdated ATM system across the Russian Federation and produce a unified system on a par with states within the European

<sup>85</sup> Collaborative Environmental Management for Airports Eurocontrol November 2014

Union. The present system is still largely operated by the military and is a constraint on the future growth of civil aviation. The key focus will be on integrating airports and enhancing ATM infrastructure. There is a particular need to improve the capacity of trans-continental and polar routes, where overflight charge revenue could continue to increase if more flights could be handled.

In line with the ICAO upgrade programme out to 2025, improvement is required both from the application of new technology and common standards. Additionally, improvements in meteorological services and aerospace search and rescue are required to be available across the whole state. Overall targets for this programme through to 2020 are an 80% increase in capacity, reducing delays by up to 45%, a 50% improvement in safety and a potential 5% improvement in emissions.

Key enablers to increase capacity will be the wider adoption of Reduced Vertical Separation (RVSM) to increase the number of flight levels and the deployment of ADS-B both within the airport and en-route domains. Utilisation of the GLONASS satellite constellation is also envisaged as the platform for satellite based enhancements to communication, navigation and surveillance in remote areas where radar and ADS-B cannot reach.

Better information systems will allow a large increase in controller productivity, reducing the need for airport controllers at small airports and a focus on 13 en-route centres, improving English proficiency.

## 5.9. Middle East

### Gulf Capacity

The growth of the Gulf carriers, all with operating bases situated relatively close to each other has put increasing pressure on the region's airspace, as illustrated in Figure 145. Analogous to Europe, the impact of each Gulf state having its own ANSP responsible for a relatively small portion of airspace contributes to congestion and a lack of harmonisation. The United Arab Emirates General Civil Aviation Authority (GCAA) is leading the way in trying to foster a higher degree of cooperation and coordinated deployment of collaborative and effective solutions. Although part of this can be achieved through the work of the ICAO Middle East Region Airspace Enhancement Programme (MAEP), which encourages the partnering of neighbouring countries in the region, a greater degree of cooperation is now needed to ensure the airport and airspace capacity gains that will result from investment in the latest technology to handle the expected growth in traffic.

The UAE GCAA identified a large number of potential improvements to terminal and en-route airspace following a study in 2012/13. Many of these derive from a comprehensive airspace redesign that will allow optimal handling of increased flight activity and fulfil capabilities required for the ICAO Block Upgrade programme, particularly with the near term transition to a PBN environment.

Figure 145: Middle East Airspace



Source: NATS

## 5.10. Africa

The modernisation of ATM infrastructure in Africa requires a roadmap consistent with both the ICAO block upgrades and what is achievable by the ANSPs across the continent. This is dependent on the air transport industry to improve communication and connectivity to help generate economic growth, but is subject to competition for funds for infrastructure. New technology and system enhancements are required to improve safety and provide the basis for a more efficient airline operation, but this deployment will require co-operation between States and industry partners.

An example of this is the agreement announced in February 2015 between Agence pour la Securite de la Navigation Aerienne (ASECNA) and Aireon, which will allow collaboration on the requirements and benefits of a space-based ADS-B services for the ASECNA airspace, including the key Dakar FIR airspace used by aircraft on key south Atlantic routes and coverage for remote terrestrial routes including to/from Niamey(Niger), Ndjamena(Chad) and Brazzaville(Congo), and also airspace on Indian ocean routes to/from Madagascar. When deployed, space-based surveillance will offer a cost effective and efficient ATM solution for these remote and oceanic routes. In parallel, ASECNA and partners are advancing the wider application of satellite technology to African air transport with the March 2015 opening of a programme office for the EGNOS-Africa Satellite Navigation services for African Region (SAFIR) project which will ultimately enhance safety and increase capacity across the region.

## 5.11. India

Airports Authority of India (AAI) has now achieved advanced ADS-B surveillance across the sub-continent, parts of the Bay of Bengal and the Arabian Sea. This allows much improved safety and efficient coverage of aircraft in areas where there is restricted or no radar coverage, in addition to supplementing conventional radar coverage. With an annual growth in flights greater than 4% pa, this deployment will provide long-range en-route surveillance even into the Himalayan region as well as improvements for airport approach and take-off procedures. In the next two years, AAI will also implement an air traffic flow management (ATFM) system, integrating airline flight plan data, airport and weather information, strategic planning of flights, and tactical control of daily operations. This will improve situational awareness, save fuel and improve flight punctuality. The system also provides for airport and en-route CDM. AAI is also deploying Advanced Surface Movement Guidance and Control System A-SMGCS at five airports in India, Ahmedabad, Amritsar, Guwahati, Jaipur, and Lucknow. This will enhance situational awareness and runway safety as the number of flights grows.

## 5.12. China

Nearly 70,000 flights operate in mainland China every week, which is about 10% of the worldwide total. Rapid and continuing growth of more than 8% pa presents a major challenge to maintain the existing very high standard of safety in a complex mix of civil and military traffic. Delays are already significant and future traffic growth will require increased capacity and a more efficient airspace. In April 2015, IATA highlighted five priority areas for airspace improvement. These were:

- allow international flights to use domestic air routes
- reduce restrictions on entry/exit points and simplify re-routing requests, allowing airspace users to make best use of meteorological conditions for more efficient flights
- introduce air traffic flow management, improving flight predictability
- maximise civil-military cooperation through flexible use of airspace, more advance notice of opening of conditional routes and notification of alternative routes when closed
- maximise the potential to be gained from PBN investment for route restructuring and more direct routes

The Hong Kong Civil Aviation Department (HKCAD) has also deployed ADS-B to enhance its surveillance and monitoring of ADS-B equipped aircraft.

### **5.13. Singapore**

The Civil Aviation Authority of Singapore (CAAS) has indicated that it envisages the use of the Aireon satellite complex to extend surveillance with existing ground based ADS-B facilities and will allow sharing of data with neighbouring ANSPs with the prospect of sharing costs. Similarly, IATA is attempting to improve Asia Pacific regional collaboration in air traffic flow management with a project in conjunction with regional ANSPs to develop a common understanding of cross-border ATFM implementation issues through the production of an implementation plan that will lead to an integrated and seamless approach to ATFM at a time that traffic is expected to increase by around an average 6% per annum for the next 10 years.

### **5.14. Japan**

Japan anticipates around a 50% growth in flights in the next 12 years, a growth rate of about 4-5% pa and the prospect of several major airports reaching saturation. The ATM upgrade programme, Collaborative Action for Renovation of Air Transport Systems (CARATS), has the familiar objectives of a move towards time based trajectory operations, removing sectorisation and introducing user preferred flexible routes within a performance-based operational environment, based on satellite based navigational concepts. Given the high density of airspace and location of large airports within close proximity, the role of collaborative decision making will be essential, bringing the ANSP, airspace users and airports together. The research project, Distributed/ Revolutionarily Efficient Air-traffic Management System (DREAMS) sponsored by the Japanese aviation research agency JAXA, had just concluded a 4 year research programme to validate concepts in the areas of weather information technology, noise abatement, satellite navigation, trajectory control and aircraft operations in disaster relief situations.

### **5.15. Australia and New Zealand**

Australia and New Zealand are responsible for a significant proportion of the world's total airspace. Australia is now developing the OneSKY Australia programme which is bringing new technology to a combined civil and military control system by 2020. The system will make use of 4D trajectory techniques, incorporate medium and long term conflict detection tools and integrate the already extensive ADS-B surveillance capability across Australian airspace and beyond. Australia is also implementing a Global Navigation Satellite System (GNSS) navigation mandate from February 2016, making satellite navigation mandatory for all IFR traffic. This will allow the early removal of about half of the ground based air navigational infrastructure, contributing to the wider cost and efficiency savings that will eventually follow from the implementation of OneSky. In January 2015, Airservices Australia initiated an ADS-C aircraft tracking trial involving Qantas and Virgin Australia aircraft, sending position information every 15 minutes. This will allow evaluation of data in the context of developing long-term viable tracking solutions following the loss of the Malaysian Airlines flight MH370 aircraft over the Indian Ocean.

In New Zealand, the small domestic airspace contrasts with the vast Auckland oceanic airspace which reaches to the South Pole. Airways New Zealand is in the forefront of developing advanced Required Navigation Performance (RNP) approach procedures for difficult airports (e.g., Queenstown) and is now rolling out PBN routes to other airports. The updated Vision for 2025 also highlights advances in flow and trajectory management and roadmaps to the deployment of ADS-B and satellite surveillance in line with global ICAO recommendations.

## 6. Market and Competition Issues

### 6.1. EU External Aviation Policy

#### **Negotiation of an Open Sky Agreement with ASEAN**

In a Joint Declaration adopted on 12 February 2014, at the end of an EU-ASEAN Aviation Summit, the European Commission and the Association of Southeast Asian Nations (ASEAN) proposed to take aviation cooperation to a new level by negotiating a comprehensive air transport agreement between the EU and ASEAN.

At the meeting's conclusion, Vice-President of the European Commission (EC) and Commissioner for Transport Siim KALLAS announced that he would propose to the European Commission to seek authorisation from the Council of the European Union to start negotiations<sup>86</sup>.

#### Importance of an EU-ASEAN Comprehensive Air Transport Agreement

The strategic and economic importance of an “open skies” agreement between EU and ASEAN is obvious:

- Combining respectively 28 and 10 state members<sup>87</sup>, the EU-ASEAN air transport market serves a combined population of over 1.1 billion ;
- Air traffic between the two regions nearly doubled over the last 15 years to reach more than 10 million passengers in 2012;
- Passenger Air traffic between EU and ASEAN is expected to grow by an average rate of 5% per year over the next 20 years, partly due to increased tourism;
- Half of the global traffic that will be added during next 20 years is likely to be to, from or within the Asia-Pacific region, reaching a global market share of almost 40% by 2030<sup>88</sup>.

However, direct EU-ASEAN air traffic has only grown with a compound annual growth rate of 1.1% between 2007 and 2012<sup>89</sup>. The main reasons for this relatively low growth is that a significant amount of traffic in the EU-ASEAN market has been captured by airlines from third countries, especially Emirates, Etihad, Qatar Airways and Turkish Airlines, who route the traffic between the EU and ASEAN via hubs in the Gulf (Dubai, Doha, Abu Dhabi) and Istanbul.

An EU-ASEAN air transport agreement with unlimited capacity for both regions might be able to recover or reduce the loss of traffic diverted towards the Gulf States and Turkey.

#### State of Play of EU-ASEAN Relations

To date, regarding the EU designation clause, the EU has concluded horizontal air transport Agreements with 4 out of the 10 ASEAN states: Singapore (2006), Malaysia (2007), Vietnam (2010) and Indonesia

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<sup>86</sup> EC Press Release, 12.02.2014, Aviation: EU-ASEAN Aviation Summit proposes open skies agreement, [http://europa.eu/rapid/press-release\\_IP-14-133\\_en.htm](http://europa.eu/rapid/press-release_IP-14-133_en.htm)

<sup>87</sup> Namely Brunei, Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam.

<sup>88</sup> EC Memo, 10.02.2014, EU-ASEAN Aviation Summit – Towards stronger relations in aviation, [http://europa.eu/rapid/press-release\\_MEMO-14-95\\_en.htm](http://europa.eu/rapid/press-release_MEMO-14-95_en.htm)

<sup>89</sup> See footnote 88

(2011). Other ASEAN member states – Brunei, Cambodia, the Philippines and Thailand – have agreed to EU designation through amendments of bilateral agreements with individual EU member states. Laos and Myanmar have not yet entered into any agreement for EU designation.

Table 48: Status of EU Designation

	Bilateral ASA amended by horizontal agreement		Bilateral ASA amended bilaterally with EU MS
<b>Singapore</b>	22	Thailand	7
<b>Malaysia</b>	19	Philippines	4
<b>Indonesia</b>	19	Brunei	2
<b>Vietnam</b>	17	Cambodia	1

Source: European Commission<sup>90</sup>

Air transport remains regulated by bilateral agreements between EU and ASEAN Member states. When they are limited, the EU carriers will have to share those limited capacities following EU Regulation 847/2004<sup>91</sup>.

The conclusion of a comprehensive EU-ASEAN agreement will resolve these issues with European carrier designations, limitations, and sharing capacities.

In parallel, the EU is funding a technical cooperation and assistance project which is supporting the creation by 2015 of a safe, secure and sustainable ASEAN Single Aviation Market, the ASEAN Air Transport Integration Project (AATIP), implemented in close cooperation with the European Aviation Safety Agency (EASA).

The AATIP Steering committee met in Yangon on 5 May 2014, 26 September 2014 and 9 May 2015, to take stock of the progress of the work and activities of the AATIP project which was directed primarily at the development of harmonised frameworks in aviation safety, security and air traffic management.

## Latest Developments

On 18 May 2015, the High Representative of the EU for foreign affairs and security policy and the European Commission adopted a joint communication to the European Parliament and the Council, entitled : “*The EU and ASEAN: a partnership with a strategic purpose*”.

Regarding the transportation sector, this joint communication notes that:

*« ASEAN’s progress in setting up an internal aviation market also prepares the ground for closer cooperation at region-to-region level. The EU-ASEAN Aviation Summit in February 2014 and the subsequent work of a dedicated EU-ASEAN aviation working group have been instrumental in this respect. Specific initiatives in this area will include: strengthening the dialogue on aviation, including with a view to starting formal negotiations on a region-to-region civil aviation agreement »<sup>92</sup>*

<sup>90</sup> Bilateral ASA brought into legal conformity since ECJ judgments on 5 November 2002, [http://ec.europa.eu/transport/modes/air/international\\_aviation/external\\_aviation\\_policy/doc/table\\_-\\_asa\\_brought\\_into\\_legal\\_conformity\\_since\\_ecj\\_judgments- january\\_2013.pdf](http://ec.europa.eu/transport/modes/air/international_aviation/external_aviation_policy/doc/table_-_asa_brought_into_legal_conformity_since_ecj_judgments- january_2013.pdf)

<sup>91</sup> Règlement (CE) no 847/2004 du Parlement européen et du Conseil du 29 avril 2004 concernant la négociation et la mise en œuvre d’accords relatifs à des services aériens entre les États membres et les pays tiers, Journal officiel n° L 157 du 30/04/2004 p. 0007 – 0017, <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32004R0847&from=EN>

<sup>92</sup> Joint Communication to the European Parliament and the Council, *The EU and ASEAN: a partnership with a strategic purpose*,

In this context, the Council reiterated on 22 May 2015 “the EU’s interest in cooperating more closely with ASEAN on transport and civil aviation, including in the perspective of a region-to-region civil aviation agreements”<sup>93</sup>.

## Analysis

Next to the EU-US Open Aviation Area agreement, the developments between the EU and ASEAN is a priority given the growth potential of the ASEAN Member States economically and the recognised need within most ASEAN states that an intra-regional co-operation like the EU should be contemplated. Should a similar Single Aviation Market emerge in ASEAN as we have witnessed in the European Union, this could well prove to become catalyst for further growth within the region and improved and simplified regulatory alignment between ASEAN and the EU.

To date, most ASEAN countries have shown hesitancy to accept transferring sovereignty to a “supra-national” power as a means of centrally supervising the implementation of commonly applicable rules, relying instead on a series of multi-lateral agreements, which, in their combination facilitate market access, without, however, opening markets to full cabotage or foreseeing common rules which supersede national ones. Similarly, in the field of safety, so far the ASEAN Member States feel more at ease with an intensified co-operation like the JAA, as opposed to uniform certification like EASA. Further communication and workshops in diverse forms, already used in the context of the AATIP program, should be envisaged to further deepen a shared understanding of the benefits of further facilitating trade between the ASEAN states by harmonising regulatory provisions and envisaging uniform monitoring of their implementation.

### European Common Aviation Area

The creation of a Common Aviation Area with the neighbouring countries is one of the pillars of the EU external aviation policy, defined in 2005 in a Road Map developed by the Council and the European Commission<sup>94</sup>.

The implementation of a Common Aviation Area between the EU and neighbouring countries is based on a gradual opening up of market access, on the basis of the convergence of legislation and effective implementation of the European standards and requirements, particularly in terms of security.

The first agreement implemented in a Common Aviation Area was concluded in December 2005 with eight South-East European partners (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the former Yugoslav Republic of Macedonia, Romania, Serbia and Montenegro and the U.N. Mission in Kosovo)<sup>95</sup>.

On the basis of the 2005 roadmap, the Commission pursued the conclusion of implementation agreements for a Common Aviation Area with Morocco (2006), Georgia (2010), Jordan (2010), Moldova (2012), and Israel (2013).

The signing of the EU-Ukraine Common Aviation Area Agreement, which had been initialled in the margins of the Vilnius Summit in 2013, is pending a decision by the EU Council<sup>96</sup>.

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Brussels, 18.5.2015, <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=JOIN:2015:22:FIN&from=EN>

<sup>93</sup> Council Press Release, Council conclusions on EU-ASEAN relations, 22.06.2015, <http://www.consilium.europa.eu/en/press/press-releases/2015/06/22-fac-asean-conclusions/>

<sup>94</sup> Communication from the Commission - Developing the agenda for the Community’s external aviation policy, COM/2005/0079 final, <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52005DC0079>

<sup>95</sup> Decision of the Council and of the Representatives of the Member States of the European Union meeting within the Council of 9 June 2006 on the signature and provisional application of the Multilateral Agreement between the European Community and its Member States, the Republic of Albania, Bosnia and Herzegovina, the Republic of Bulgaria, the Republic of Croatia, the former Yugoslav Republic of Macedonia, the Republic of Iceland, the Republic of Montenegro, the Kingdom of Norway, Romania, the Republic of Serbia and the United Nations Interim Administration Mission in Kosovo on the Establishment of a European Common Aviation Area (ECAA); OJ L285 of 16/10/2006, p. 1, <http://ec.europa.eu/world/agreements/prepareCreateTreatiesWorkspace/treatiesGeneralData.do?step=0&redirect=true&treatyId=2661>

<sup>96</sup> Proposal for a COUNCIL DECISION on the conclusion of a Common Aviation Area Agreement between the European Union and its

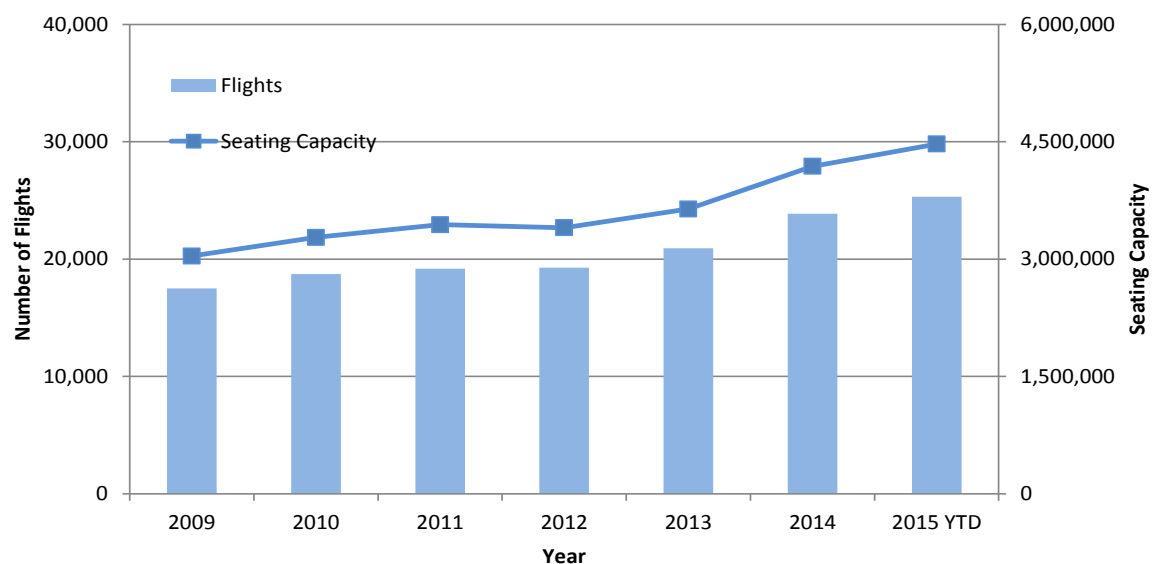


## Impact of EU-Israel Euro-Mediterranean Aviation Agreement

### Impact on Growth of Air Services

On 10 June 2013, the European Union and Israel signed a Euro-Mediterranean Aviation Agreement. With this comprehensive agreement, the EU-Israel air transport market will be opened gradually so that by 2018, the market will be fully open with no restrictions on the number of flights.

Figure 146: EU-Israel Scheduled Flights and Seating Capacity



Source: SRS Analyser

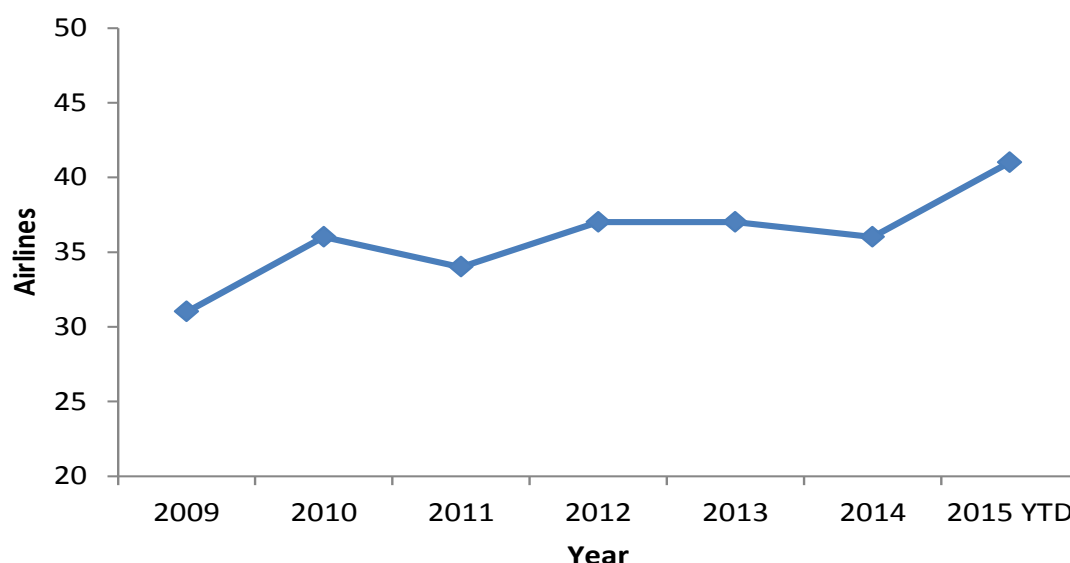
The above figure displays an analysis of the changes in one-way transportation services following the conclusion of the Euro-Mediterranean Aviation Agreement between the European Union and Israel.

Reviewing the data it is possible to conclude that:

- The Compound Annual Growth Rate (CAGR) from 2009 to 2012 was an increase of 3.81% for seating capacity and 3.29% for departures
- The CAGR significantly increased after 2012, with the increases at 9.54% and 9.50% from 2012 to 2015 respectively for seats and departures, highlighting the positive impact of the agreement on air travel between the regions

## Impact on Level of Competition

Figure 147: Number of Scheduled Airlines Operating EU-Israel Routes



Source: SRS Analyser

Figure 147 highlights the number of carriers who serve the EU-Israeli markets by year. Following changes in the industry, consolidation and right-sizing of airlines to markets, the number of carriers fluctuated between 2009 and 2011. Starting in 2012, as the world mostly recovered from the recession of 2008, the number of carriers serving the three Israeli markets flattened. Finnair and Transavia commenced service in 2013, while Transavia France and Volotea began flying in 2014. Data for 2015 has been included to highlight the entrance of some new carriers to the markets including Monarch Airlines, Ryanair, Germania, and Air Europa. Notable absentees include Jet2 and Olympic who ceased service in 2013 and Malev who ceased operating completely in 2012.

## 6.2. International Developments

### USA

#### New Open Skies Agreements

The United States concluded five open sky agreements during the period concerned.

Table 49: Open Skies Agreements Concluded by the United States 2014-2015

Partner	Application	Date
Equatorial Guinea	In force	07/08/2014
Burundi	C&R*	12/11/2014
Togo	In force	07/04/2015
Serbia	C&R*	12/05/2015
Ukraine	N/A	14/07/2015

\*C&R: Applied on the basis of comity and reciprocity

Source: US Department of States

The most recent one was concluded with Ukraine<sup>97</sup>. Once the ratification processes for the agreement are finalised by both countries, this open skies agreement will replace the previous agreement concluded between the parties on 5 June 2000.

The signing of this agreement was the opportunity for the Ukrainian authorities to note their desire to have an agreement to establishing a Common Aviation Area between Ukraine and European Union finalised as soon as possible.

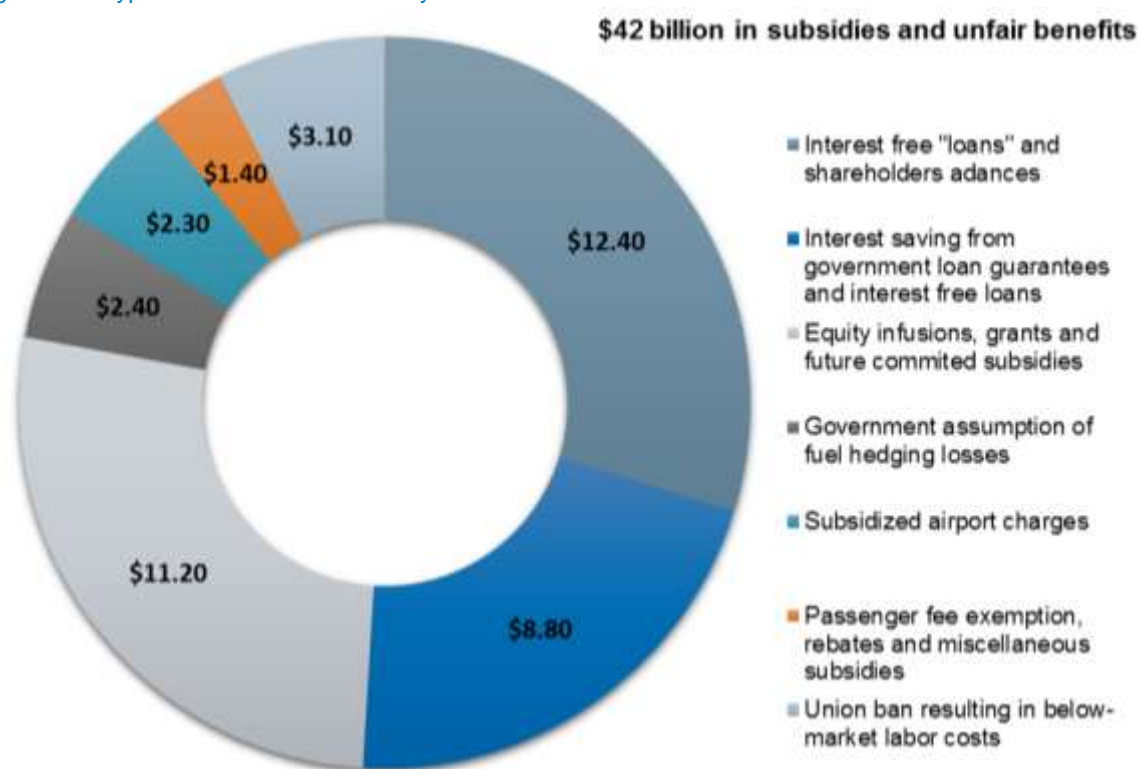
## Partnership for Open & Fair Skies

On 28 January 2015, the three U.S. airlines (American Airlines, Delta Air Lines, and United Airlines) and labour organizations announced the launch of a new coalition, the Partnership for Open & Fair Skies, dedicated to restoring a level playing field to international air travel.

The Partnership presented a newly released 55-page white paper to the U.S. government, which details how unprecedented government subsidies to Qatar Airways, Etihad Airways and Emirates Airline distort the competitive market in direct violation of U.S. Open Skies policy.

In this study, the three major U.S. airlines say the Gulf carriers have received \$ 42 billion in subsidies since 2004. They call on the Obama Administration to freeze new flights from Gulf carriers and review open skies agreements with the United Arab Emirates and Qatar.

Figure 148: Type of Subsidies Received by the Gulf Carriers



Source: [openandfairskies.com](http://openandfairskies.com)

The Obama administration has said in statements that it takes the competition concerns of the U.S. airlines seriously, but “remains committed to the open-skies policy which has greatly benefited the traveling public,

<sup>97</sup> U.S.-Ukraine Air Transport Agreement of July 14, 2015, <http://www.state.gov/documents/organization/245195.pdf>

*the U.S. aviation industry, American cities and the broader U.S. economy through increased travel and trade, and job growth.*<sup>98</sup>

The Gulf carriers have also responded by contesting the subsidy allegations made against them by the three U.S. Carriers. It is against this background, that on 31 May 2015, Etihad Airways sent an official response<sup>99</sup> to the Obama administration, accompanied by three independent reports showing that:

- Delta, United and American Airlines have received over \$70 billion from the U.S. government and judicial process and mechanisms available only in the United States (the Risk Advisory Group report);
- The air routes between the United States and the Indian Subcontinent, on which over 65% of Etihad Airways' U.S. passengers fly, are highly competitive (the Edgeworth Economics report);
- In 2015, Etihad Airways will contribute \$2.9 billion to U.S. economy and will employ, or contribute to the employment of over 23,000 Americans (the Oxford Economics report).

Emirates Airlines and Qatar Airways have also submitted a response to the United States Government which fully refutes the subsidy allegations, respectively on 29 June 2015<sup>100</sup> and 30 July 2015<sup>101</sup>

## The Middle East

The civil aviation authorities of Qatar and the United Arab Emirates have conducted numerous negotiations to conclude agreements, or increase the flight frequency under agreements that have already been concluded.

During the 2014-2015 period concerned, these negotiations resulted in the following agreements:

## Qatar

Table 50: Air Services Agreements Concluded by Qatar in 2014-2015

Date	Parties	Object
20/02/2014	Qatar - Pakistan	Increase traffic rights. Unlimited flights to Gwadar, Pakistan. 5th freedom rights.
2014	Qatar - Cyprus	Update of the existing ASA with: Fifth-freedom rights - Code-share agreements
2014	Qatar - Côte d'Ivoire	Update of the existing ASA with: Third, Fourth and Fifth freedom rights
20/10/2014	Qatar - Belgium	Update of the existing ASA with: more cargo and passenger rights for the national carrier
27/01/2015	Qatar - Guinea	Open skies agreement
04/03/2015	Qatar - Kyrgyz Republic	Open skies agreement
17/03/2015	Qatar - Irak	Increase the number of passenger and cargo flights
22/03/2015	Qatar - UK	Air Transport Memorandum of Understanding: open the skies
01/06/2015	Qatar - Philippines	Increase traffic rights Doha-Manila, open skies between Doha and the remaining cities.

Source: Qatar civil aviation authority

<sup>98</sup> Brian Farber, spokesman for the Transportation Department, "Open-skies agreements challenged", Feb. 6, 2015, The New-York Times, [http://www.nytimes.com/2015/02/07/business/us-airlines-challenge-open-skies-agreements.html?\\_r=0](http://www.nytimes.com/2015/02/07/business/us-airlines-challenge-open-skies-agreements.html?_r=0)

<sup>99</sup> Etihad Airways response to claims raised about state-owned airlines in Qatar and the United Arab Emirates, <https://www.etihad.com/Documents/keep-the-air-fair/pdf/Etihad-Response-to-US-Carrier-Allegations-Cover-Letter-v2.pdf>, and <https://www.etihad.com/Documents/keep-the-air-fair/pdf/Etihad-Response-to-US-Carrier-Allegations.pdf>

<sup>100</sup> Emirates' response, [http://content.emirates.com/downloads/ek/pdfs/openskies\\_rebuttal/EK\\_Response\\_Main.pdf](http://content.emirates.com/downloads/ek/pdfs/openskies_rebuttal/EK_Response_Main.pdf)

<sup>101</sup> Qatar Airways' response, [http://www.qatarairways.com/us/en/press-release.page?pr\\_id=pressrelease\\_300715\\_openskies](http://www.qatarairways.com/us/en/press-release.page?pr_id=pressrelease_300715_openskies)

## United Arab Emirates

Table 51: Air Services Agreements Concluded by UAE in 2014-2015

Date	Parties	Object
27/05/2014	UAE - Cuba	Open skies agreement
27/10/2014	UAE - Sierra Leone	Open skies agreement
19/12/2014	UAE - Vietnam	Open skies agreement
15/01/2015	UAE - Iran	Agreement to strengthen air transport and aviation safety
07/03/2015	UAE - Burkina Faso	Open skies agreement
18/06/2015	UAE - South Sudan	Open skies agreement

Source: UAEinteract

### Japan

On 14 and 16 January 2015, Japan signed bilateral Air Services Agreements with Cambodia and the Lao People's Democratic Republic respectively.

These Agreements mutually grant both sides the right to operate scheduled flights and prescribes matters such as the exemption of customs duties, basic principles for determining capacity, procedures for deciding tariffs, and ensuring aviation safety and security measures.

On 5 February 2014, Japan also signed an Open skies agreement with Switzerland that will allow airlines to freely set flight routes and determine the number of services. All airports in Japan and Switzerland are subject to the deal, except Haneda airport in Tokyo.<sup>102</sup>

### 6.3. EU Competition Issues

#### The New Guidelines on State Aid to Airports and Airlines

On 20 February 2014, the Commission adopted new Guidelines for State aid to airports and airlines.<sup>103</sup> These Guidelines, which entered into force on the 4<sup>th</sup> of April 2014, replace:

- The Community Guidelines on financing airports and start-up aid to airlines departing from regional airports<sup>104</sup>, from 2005; and
- The Communication on the application of Articles 92 and 93 of the EC Treaty and Article 61 of the EEA Agreement to State aids in the aviation sector<sup>105</sup>, from 1994.

These new Guidelines take into account the changing market conditions, both for airports and airlines. Airports although still for the most part in public hands, especially the regional ones - are increasingly competing against one another at European level to attract airlines and passengers. Therefore, public funding to an airport may have significant distortive effects, especially because it may allow the airport to attract airlines' capacity more than it could without the aid, boosting air traffic, growth and employment in the region where the airport is located, to the detriment of air traffic, growth and employment in other airports and regions where that capacity would be otherwise allocated. This calls for tighter control of State aid to airports, in contrast to the situation prevailing in the past, where airports were often viewed as non-economic activities, as a result of which public funding to airports was generally considered falling outside

<sup>102</sup> Ministry of Foreign affairs of Japan, <http://www.mofa.go.jp>

<sup>103</sup> Communication from the Commission Guidelines on State aid to airports and airlines, OJ C 99, 4.4.2014, p. 3.

<sup>104</sup> Communication from the Commission - Community guidelines on financing of airports and start-up aid to airlines departing from regional airports, OJ C 312, 9.12.2005, p. 1-14, <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52005XC1209%2803%29&from=EN>

<sup>105</sup> Communication on the application of Articles 92 and 93 of the EC Treaty and Article 61 of the EEA Agreement to State aids in the aviation sector, OJ C 350, 10. 12. 1994, p. 5, [http://ec.europa.eu/competition/sectors/transport/1994\\_guidelines\\_aviation/en.pdf](http://ec.europa.eu/competition/sectors/transport/1994_guidelines_aviation/en.pdf)

the ambit of State aid control. At the same time, many airports provide useful contribution to the accessibility of the regions where they are located, the mobility of its inhabitants, and sometimes the decongestion of major hubs. Certain types of State aid are thus allowed, where their positive contribution to the attainment of objectives of common interest for the Union, notably mobility and accessibility, outweighs their negative effects on competition.

At the level of airlines, the competitive landscape has been profoundly transformed in recent years following the gradual completion of the internal air transport market within the Union, which gave the right to any Union airline to operate on any intra Union route without any limitation, save where public service obligations have been established. This legal framework gave rise to more vivid competition among Union airlines, which directly benefitted European consumers through lower fares, many more routes and a broader array of services. This in turn has allowed the industry to expand as never before, and has contributed to economic growth and job creation. This has also paved the way for the emergence of low-cost carriers, operating a new business model based on quick turn-around times, efficient fleet use and more limited services to customers. Low cost carriers now compete head to head with flag carriers. Given the truly pan European and highly competitive environment in which Union carriers operate, any State aid granted to an airline may have direct and significant effects on competitors. Consequently, State aid to airlines is only allowed in a limited number of well-defined circumstances.

The new Guidelines translate those core ideas into “compatibility criteria”, namely criteria that State aid to airports and airlines must fulfil in order to be authorised by the Commission, as well as guiding principles for the Commission’s assessment of such aid. The Guidelines also provide detailed elements as to the conditions under which certain measures or transactions involving airports or airlines may constitute State aid or not. This is notably the case for arrangements for airports and airlines relating in particular to airport charges, incentive schemes offered by airports to airlines to increase traffic (for instance volume-based discounts to airport charges) as well as marketing agreements whereby airlines are remunerated for advertising the airport and its region. In the Guidelines, the Commission has also explained the conditions under which public funding granted to an airport to finance so-called public policy remit activities carried out at the airport (such as aircraft fire fighting and rescue, air traffic control, police and customs missions) falls outside the definition of State aid.

## Investment Aid to Airports

If an airport receives public funding for its investments and if that funding qualifies as State aid, the Guidelines provide that such aid may be authorised provided that the Member State demonstrates that:

- The investment aid pursues an objective of common interest (such as increasing mobility of European citizens, combating air traffic congestion at major hubs or facilitating regional development).

To avoid the duplication of unprofitable or under-utilised airports, the Commission will be particularly attentive to investment aid in favour of an airport located in the same catchment area (defined as around 100km or around 60 minutes travelling time by car, bus or train) of another airport with spare capacity.

Although the previous State aid guidelines on aviation, from 2005, did not explicitly address the issue of duplication of unprofitable or under-utilised airports, it provided that State aid to support an investment project at an airport could not be allowed if the project did not contribute to the furtherance of an objective of common interest for the Union. Investment aid resulting in a mere duplication of infrastructure could hardly be seen as contributing to an objective of common interest and could therefore also be prohibited under the 2005 Guidelines. This is what the Commission did in its decision

concerning the conversion of the military airport in Gdynia-Kosakowo<sup>106</sup>, adopted in February 2014, shortly before the entry into force of the new guidelines.

- If an investment project contributes to an objective of common interest, the aid must be granted only if it is necessary to the implementation of the project, and provided it is limited to the minimum level necessary to the implementation of the project; this implies in particular that the investment aid has an incentive effect, in the sense that the airport concerned would not have carried out the projected investment without the support in question.
- It must be limited to the extra costs or funding gap of the project, namely the net present value of the investment and operating costs associated with the project, netted of the revenues associated with the project, calculated by reference to an appropriate “counterfactual scenario”, that is to say a hypothetical situation where the project would not be carried out. Moreover, the Commission has set maximum aid intensities, i.e. a maximum %age of the investments costs eligible for aid that the aid amount may not exceed. The larger the airport, the lower the aid intensity. In this way, small airports (with annual passenger traffic of less than 1 million) can receive investment aid up to 75% of the eligible investment costs<sup>107</sup>, while large airports (annual passengers of more than 5 millions) cannot receive any investment aid (save in exceptional circumstance).
- The negative effects of investment aid on competition and trade may not outweigh the positive contribution of the aid to the objectives of common interest.

## Operating Aid

Recognising that many regional airports are today receiving operating aid, the new Guidelines contain detailed provisions allowing the Commission to clear such aid if certain conditions are met. This is an important difference with the previous guidelines, which only referred to a general ban of operating aid to airports.

In the new Guidelines, the Commission has introduced different criteria for “past operating aid” (namely, operating aid granted without the required Commission clearance before 4 April 2014, the date of entry into force of the Guidelines, which the Commission is led to assess after that date) and “future operating aid”, essentially aid granted or notified after 4 April 2014. The criteria are less demanding for “past operating aid” than for “future operating aid”.

Since airports above 3 million passengers are in principle able to cover operating costs through their own resources without aid, no operating aid may be granted to such airports after 4 April 2014.

After 4 April 2014, a transitional period during which operating aid may be granted is foreseen for airports between 700,000 and 3 million passengers per year, so as to give airports enough time to adjust their business model, in order to ensure a smooth transition to viability without continuous financial support. For airports below 700,000 passengers per year, operating aid may be granted over the period 2014-2019 under certain conditions. The Commission will reassess the situation of that category of airports by 2018 in order to decide whether and for how long they may receive further operating aid.

During the transitional period, operating aid to airports below 3 million passengers per year cannot be approved unless it meets certain conditions (relating in particular to the contribution of the aid to the furtherance of an objective of common interest for the Union, the size of the airport, compliance with a

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<sup>106</sup> EC Decision on 11.02.2014, on the measure SA.35388 (2013/C) (ex 2013/NN and ex 2012/N) – Poland - Setting up the Gdynia-Kosakowo airport, [http://ec.europa.eu/competition/state\\_aid/cases/249231/249231\\_1546151\\_152\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/249231/249231_1546151_152_2.pdf)

<sup>107</sup> Costs relating to the investments in airport infrastructure (runaway, taxiway, terminal..) excluding costs relating to non-aeronautical activities (e.g. parking, hotels, restaurants and offices).

maximum allowable aid intensity, specific requirements if another airport is located in the same catchment area).

## Start-up Aid to Airlines

The new guidelines maintain the faculty for Member States to grant start-up aid and simplify the compatibility criteria applicable to such aid, which were widely regarded as exceedingly complex:

- Start-up aid can only be granted for new routes, and no longer for increasing the frequency of an existing route, as was the case under the 2005 Guidelines;
- Start-up aid can only be granted for routes linking an airport with less than 3 million passengers to another airport within the ECAA (except for airports located in remote regions);
- An ex ante business plan prepared by the airline must show that the new route has prospects of becoming profitable for the airline without public funding after 3 years. In the absence of such a business plan, the airline must commit to operating on the route for a period at least equal to the period during which it received start-up aid.
- Start-up aid must have an incentive effect, in the sense that it must be shown that without this aid, it is highly unlikely that the company would open the new route;
- Start-up aid must be limited to 50% of airport charges in connection with this route for a maximum period of three years as of the launch of the route;
- The route concerned should not already be served by a high-speed rail service or by another airport in the same catchment area.

## Enforcement of the 2014 Guidelines

The European Commission focuses its efforts on ensuring that any new aid to airports and airlines granted as of the entry into application of the new guidelines comply with them. Moreover, in 2014, in the wake of the adoption of the new guidelines, the Commission closed a number of pending State aid aviation cases, applying in particular the specific provisions of the new guidelines on past operating aid. Shortly before the entry into force of the new guidelines, the Commission had also adopted a series of State aid decisions where it applied in anticipation the approach set out in the new guidelines as to the interpretation of the notion of State aid in the aviation sector.

In total, the Commission has closed 32 State aid cases in the aviation sector since 1 January 2014, including 19 in-depth investigations (so-called formal investigation procedures). Moreover, the Commission open or extended 6 in-depth investigations in the aviation sector over the same period. This large number of decisions adopted in the year when the guidelines were adopted already provides Member States and companies with useful indications as to the way in which the Commission interprets and applies the guidelines in practice.

### Key DG COMP Decisions on State Aid to Airlines

Table 52: DG COMP in-depth Investigation

	Opening date	Closing date
Air Baltic	20.11.12	09.07.14
Adria Airways	20.11.12	09.07.14
Cyprus Airways	06.03.13	09.01.15
Estonian Air	20.02.13	06.11.15
LOT Polish Airline	06.11.13	29.07.14

Source: EC Decision



## Air Baltic

On 20 November 2012, the Commission opened an in-depth investigation to verify whether various public support measures provided by Latvia in favour of airBaltic are in line with EU state aid rules<sup>108</sup>.

These measures included:

1. A LVL 16 million loan (approx. EUR 22.65 million) granted by Latvia in October 2011;
2. The acquisition by Latvia and BAS of 0%-coupon bonds issued by airBaltic in 2010;
3. The payment of EUR 2.8 million by Latvijas Krājbanka to airBaltic in November 2011;
4. A second loan granted by Latvia - the first tranche of LVL 41.6 million (approx. EUR 58.89 million) was made available to airBaltic in December 2011; the second tranche of LVL 25.4 million (approx. EUR 35.96 million) in December 2012;
5. A capital increase agreed in December 2011 by Latvia and BAS, a former private majority shareholder of airBaltic, through loan conversion and a cash contribution from BAS, but in which BAS in the end did not participate;
6. A transfer to airBaltic of a EUR 5 million claim held by Latvia in exchange of just LVL 1.

On 9 July 2014, the Commission concluded<sup>109</sup> that:

- The measures 1 and 2 were carried out on market terms, the measure 3 was not imputable to the State, therefore they do not involve any state aid within the meaning of EU rules;
- The three others measures, which involve state aid, are compatible with the Commissions' 2004 Guidelines on state aid for rescue and restructuring of companies in difficulty, taking into account the restructuring plan submitted by Latvia.

This restructuring plan was approved by the Commission, taking into consideration:

- A 5 year restructuring period (2011-2016) and a return to profitability in 2016 ;
- A reduction in capacity from 8% in terms of ASK ;
- An own contribution of approximately EUR 112 million, namely 49% of the restructuring costs.

## Adria Airways

On 20 November 2012, the Commission opened an in-depth investigation whether a number of public support measures in favour of the Slovenian airline Adria Airways are in line with EU state aid rules<sup>110</sup>.

These measures included:

1. Three public capital injections in 2007, 2009 and 2010, amounting to around EUR 15.3 million in total;
2. The sale of Adria Airways' subsidiary Adria Airways Tehnika (AAT);
3. A EUR 50 million capital injection carried out in 2011 by Slovenia and the state-owned holding Posebna Družba za Podjetnisko svetovanje d.d. (PDP).

On 9 July 2014, the Commission concluded<sup>111</sup> that:

108 SA.34191 (2012/C) (ex 2012/NN), Latvia Alleged aid to airBaltic, EC, 20.11.2012, C(2012) 8256 final, JOCE C/69/2013 , [http://ec.europa.eu/competition/state\\_aid/cases/246722/246722\\_1401154\\_69\\_3.pdf](http://ec.europa.eu/competition/state_aid/cases/246722/246722_1401154_69_3.pdf)

109 Commission decision of 9 July 2014 on the measures SA.34191 (2012/C) (ex 2012/NN) (ex 2012/CP) implemented by Latvia for A/S Air Baltic Corporation (airBaltic), C(2014) 4552 final, [http://ec.europa.eu/competition/state\\_aid/cases/246722/246722\\_1601269\\_447\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/246722/246722_1601269_447_2.pdf)

110 State aid SA.32715 (2012/C) (ex 2012/NN), Slovenia, Alleged aid to Adria Airways, C(2012) 8231 final, [http://ec.europa.eu/competition/state\\_aid/cases/246721/246721\\_1403670\\_54\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/246721/246721_1403670_54_2.pdf)

- The measures 1 and 2 were carried out on market terms, provided no undue advantage to Adria Airways and do not constitute state aid within the meaning of EU rules;
- The third measure, which constitutes state aid, is compatible with the Commission's 2004 Guidelines on state aid for rescue and restructuring of companies in difficulty, taking into account the restructuring plan submitted by Slovenia.

This restructuring plan was approved by the Commission, taking into consideration:

- A restructuring period of less than 5 years and a return to profitability in 2014-2015 ;
- A reduction in capacity from 7.2% in terms of ASK;
- An own contribution accounting for 46.5% of the restructuring costs.

## Cyprus Airways

On 6 March 2013, the European Commission opened an in-depth investigation<sup>112</sup> into a number of public support measures provided by Cyprus in favour of Cyprus Airways, including:

1. A capital increase to which the Cypriot State has contributed EUR 31.3 million ("Measure 1");
2. A rescue aid loan of EUR 73 million notified in December 2012, of which EUR 34.5 million was actually granted ("Measure 2");
3. An *ex gratia* compensation provided by the Cypriot State to redundant personnel of Cyprus Airways ("Measure 3").

On 4 February 2014, the Commission opened a second in-depth investigation<sup>113</sup> to verify whether:

1. Cyprus' plans (notified on 23 October 2013) to support the restructuring of Cyprus Airways with EUR 103 million ("Measure 4"), consisting of the capital increase of EUR 31.3 million (Measure 1), conversion of EUR 34.5 million of the rescue loan to equity (part of Measure 2), conversion of additional EUR 28.5 million debt to equity and contribution of EUR. 8.6 million to cover the deficit of the company's Provident Fund and
2. Training aid of EUR 0.3 million granted by the State in 2010-2011 ("Measure 5") are in line with EU state aid rules.

On 9 January 2015, the Commission concluded<sup>114</sup> that:

- The measures 1, 2, 4 and 5 constitute State aid, which is not compatible with the Commission's 2004 Guidelines on state aid for rescue and restructuring of companies in difficulty;
- The formal investigation in respect of the measure 3 became devoid of purpose, as the measure had not been implemented.

Consequently, the Commission ordered Cyprus Airways to recover EUR 66.1 million, corresponding to the amount of aid received.

On 10 January 2015, Cyprus Airways announced it was ceasing operations.

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111 Commission Decision (EU) 2015/494 of 9 July 2014 on the measures SA.32715 (2012/C) (ex 2012/NN) (ex 2011/CP) implemented by Slovenia for Adria Airways d.d. (notified under document C(2014) 4543), <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015D0494&from=EN>

112 State aid SA.35888 (2013/C) (2013/NN) – Cyprus – Rescue aid for Cyprus Airways (Public) Ltd, C (2013)1163 final, [http://ec.europa.eu/competition/state\\_aid/cases/247909/247909\\_1418834\\_24\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/247909/247909_1418834_24_2.pdf)

113 State aid SA.37220 (2014/C) (ex 2013/NN) – Cyprus – Restructuring aid for Cyprus Airways (Public) Ltd and SA.38225 (2014/C) (ex 2014/NN) Training aid for Cyprus Airways (Public) Ltd, C(2014) 470 final, [http://ec.europa.eu/competition/state\\_aid/cases/251734/251734\\_1523566\\_55\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/251734/251734_1523566_55_2.pdf)

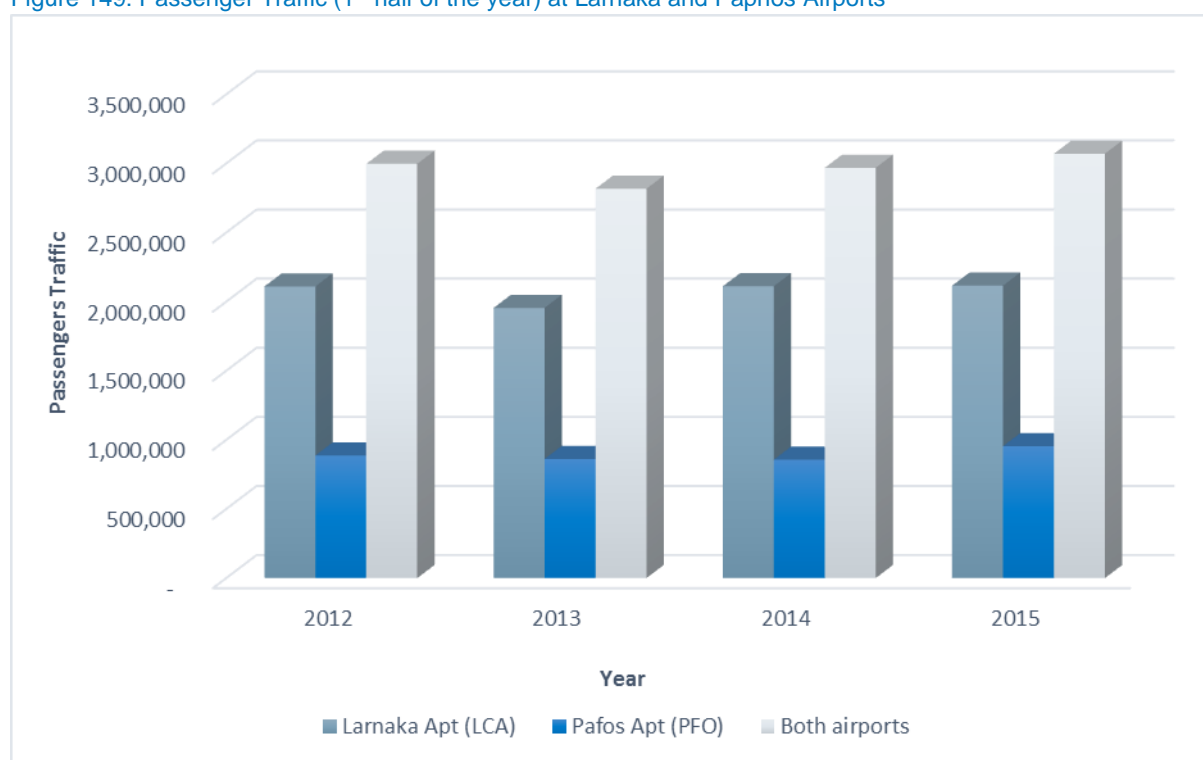
114 Commission Decision of 09.01.2015 on the state aid SA.35888 (2013/C) (ex 2013/NN)- SA.37220 (2014/C) (ex 2013/NN)- SA.38225 (2014/C) (ex 2013/NN) implemented by Cyprus for Cyprus Airways (Public) Ltd, C(2014) 9362 final, [http://ec.europa.eu/competition/state\\_aid/cases/251734/251734\\_1631242\\_230\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/251734/251734_1631242_230_2.pdf)

## Impact on Passenger Traffic

Passenger traffic to the Cypriot airports of Larnaka and Paphos rose to 2.1 million and 950,000 passengers respectively during the 1<sup>st</sup> half of 2015. When compared to the 1<sup>st</sup> half of 2014, these numbers represent an increase of 0.2% for the Larnaka airport and 11.4 % for the Paphos airport.

At this stage, the exit of Cyprus Airways does not seem to have had any significant impact on the volume of traffic at the main Cypriot airports.

Figure 149: Passenger Traffic (1<sup>st</sup> half of the year) at Larnaka and Paphos Airports



Sources: Hermes Airports, Anna.aero, European Airport Traffic Trends 2015/14

## Estonian Air

On 20 February 2013, the European Commission opened an in-depth investigation<sup>115</sup> to verify whether a capital injection by the State ("Measure 1"), the sale of the ground handling section of Estonian Air to the State-owned Tallinn Airport ("Measure 2"), two other capital injections by the State ("Measures 3 and 4") in the total amount of EUR 51.9 million as well as Estonia's plan to grant a rescue loan ("Measure 5") of EUR 8.3 million, later increased by EUR 28.7 million, are in line with EU state aid rules.

On 4 February 2014, the Commission opened a second in-depth investigation<sup>116</sup> to verify whether the plan of Estonia (notified in June 2013) to grant EUR 40.7 million State aid for the restructuring of Estonian Air ("Measure 6") is in line with EU state aid rules.

On 6 November 2015, the Commission concluded<sup>117</sup> that:

115 State aid SA.35956 (2013/C) (ex 2013/NN) (ex 2012/N) – Estonia – Rescue aid to Estonian Air, C (2013) 775 final, [http://ec.europa.eu/competition/state\\_aid/cases/247780/247780\\_1426512\\_104\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/247780/247780_1426512_104_2.pdf)

116 State aid SA.36868 (2014/C)(ex 2013/N) – Estonia – Restructuring aid to Estonian Air, C (2014) 459 final, [http://ec.europa.eu/competition/state\\_aid/cases/251732/251732\\_1535769\\_42\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/251732/251732_1535769_42_2.pdf)

- Measures 1 and 2 do not constitute aid
- Measures 3-6 constitute aid, which is incompatible with the internal market.

Consequently, the Commission ordered Estonia to recover the received incompatible aid.

## LOT Polish Airline

On 6 November 2013, the European Commission opened an in-depth investigation<sup>118</sup> to assess whether a PLN 804 million (around EUR 200 million) restructuring aid for LOT Polish Airlines (notified on 20 June 2013) is in line with EU state aid rules.

On 29 July 2014, the Commission concluded<sup>119</sup> that the measure, which constitutes state aid, is compatible with the Commission's 2004 Guidelines on state aid for rescue and restructuring of companies in difficulty, taking into account the restructuring plan submitted by Poland.

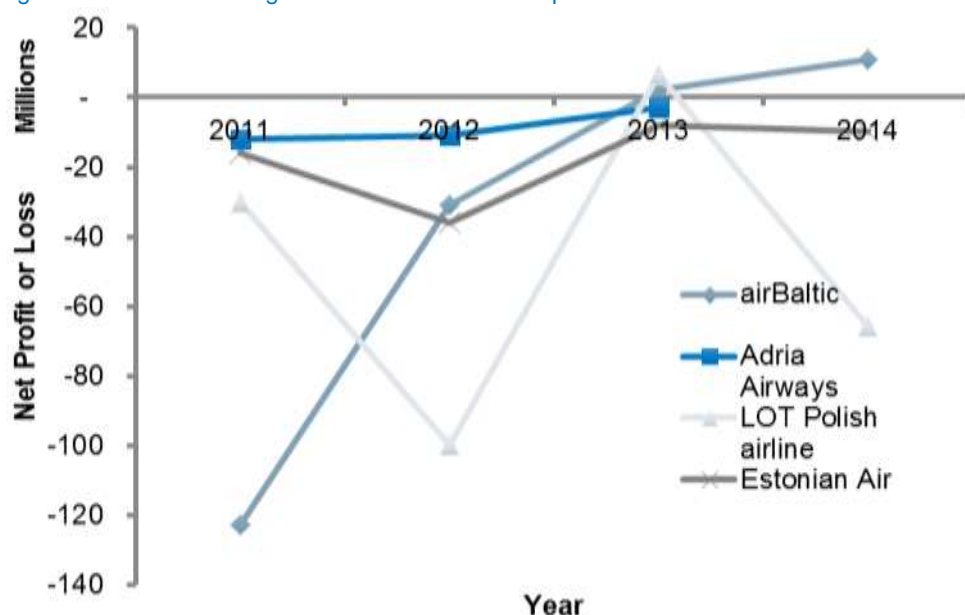
This restructuring plan was approved by the Commission, taking into consideration:

- A restructuring period of 3.25 years and a return to viability in 2015;
- A reduction in capacity by 15% in terms of ASK ;
- An own contribution of LOT Polish Airline's accounting for 66% of the restructuring costs.

## Return to Viability?

The following figure shows the financial progress of the companies who received State aid during previous years.

Figure 150: Financial Progress of Restructured Companies



Source: Airlines Financial Result

<sup>117</sup> Commission Decision of 6 November 2015 on the measures SA.35956 (2013/C) (ex 2013/NN) (ex 2012/N) and SA.36868 (2014/C)(ex 2013/N), C(2015) 7470 final, not yet published.

<sup>118</sup> State aid SA.36874 (2013/C) (ex 2013/N) – Poland - Restructuring aid for LOT Polish Airlines S.A, C(2013) 7044 final, [http://ec.europa.eu/competition/state\\_aid/cases/250550/250550\\_1505256\\_73\\_4.pdf](http://ec.europa.eu/competition/state_aid/cases/250550/250550_1505256_73_4.pdf)

<sup>119</sup> Commission Decision of 29.07.2014 on the State Aid SA.36874 - 2013/C (ex 2013/N), which Poland is planning to implement for LOT Polish Airlines S.A. and on the measure SA.36752 - 2014/NN (ex 2013/CP) implemented by Poland for LOT Polish Airlines S.A, C(2014) 5429 final, [http://ec.europa.eu/competition/state\\_aid/cases/250550/250550\\_1605555\\_368\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/250550/250550_1605555_368_2.pdf)

## LOT 2014 Net Result

Taking into account the one-offs and accounting effects, related to the increase of currency exchanging rates, a minus appears at the net result at the level of PLN 263.4 million. This is only an artificial accounting record having no effect on the actual financial health of the company. It is because the relationship between LOT's earnings and spending in foreign currencies is fairly in balance. Therefore, no currency is in fact exchanged, but only the amounts are booked in PLN according to the valid standards. The normalised net profit, i.e. without one-offs and accounting effects, is also positive and amounts nearly to PLN 36 million<sup>120</sup>.

### Key DG COMP Decisions on State Aid to Airports

#### Support Scheme for Aid to Regional Airport Notified to EC

The new Guidelines for State aid to airports and airlines encourage Member States to set up airports investment and operating schemes and start-up schemes. In order to reduce the administrative work for both Member States and the Commission, the new Guidelines suggest that Member States notify these aid schemes, rather than implementing individual decisions based on these schemes.

Several Member States are already using this ability.

Table 53: Support Scheme for Aid to Regional Airports Notified to EC

Case	Country	Parties	Notif.	Closing	Dec.
SA.38936	France	Régime d'aide à l'exploitation des petits et moyens aéroports	20/06/2014	08/04/2015	NRO*
SA.38937	France	Régime d'aide à l'investissement des petits et moyens aéroports	20/06/2014	08/04/2015	NRO*
SA.38938	France	Régime d'aide au démarrage des compagnies aériennes	20/06/2014	08/04/2015	NRO*
SA.39466	UK	Start-up aid to airlines operating in the United Kingdom	05/09/2014	31/07/2015	NRO*
SA.39757	Ireland	Ireland support scheme for aid for regional airports	05/11/2014	31/07/2015	NRO*
SA.37121	Spain	Programme de développement des vols sur le territoire de la région ultrapériphérique des Canaries	23/07/2013	09/04/2014	NRO*

\* NRO = Decision not to raise objections

Source: EC Decisions

The three French schemes cover a 10 year period, running from 1<sup>st</sup> January 2015 to 31 December 2024. The British and Irish schemes will span more limited periods, running until 31 March and 31 December 2019 respectively.

#### Individual In-depth Investigations

Table 54: Procedures for State Aid to Airports Processed from 2014-2015

Case	Country	Parties	Opening	Closing	Decision
SA.22932	France	Aéroport de Marseille	13/07/2011	20/02/2014	Dec. does not constitute aid (NCA)
C27/2007	Germany	Berlin-Schönefeld GmbH	10/07/2007	20/02/2014	Dec. does not constitute aid (NCA)
C5/2008	Denmark	Aarhus Airport Ltd	30/01/2008	20/02/2014	Dec. does not constitute aid (NCA)

<sup>120</sup> PRNewswire, April 15, 2015, <http://www.prnewswire.com/news-releases/lot-polish-airlines-announces-2014-profit-on-core-business-300066431.html>

Case	Country	Parties	Opening	Closing	Decision
NN43/2009	Netherlands	Groningen Airport Eelde		09/04/2014	Dec. not to raise objections (NRO)
SA.38346	Italy	Aeroporto di Verona		09/04/2014	Dec. not to raise objections (NRO)
C20/2010	Italy	Aéroport de Stretto	20/07/2010	11/06/2014	NCA & Positive decision (PD)
SA.30743	Germany	Leipzig-Halle Airport	15/06/2011	23/07/2014	NCA & Positive decision (PD)
SA.29404	Germany	Dortmund Airport - NEO	21/03/2012	23/07/2014	NCA & Positive decision (PD)
C26/2007	Germany	Dortmund airport	10/07/2007	23/07/2014	NCA & Positive decision (PD)
SA. 21121	Germany	Frankfurt-Hahn airport	17/06/2008	01/10/2014	NCA & Positive decision (PD)
SA.23098	Italy	Aeroporto di Alghero	12/09/2007	01/10/2014	NCA & PD & Negative dec. (ND)
SA.38105	Belgium	Bruxelles-National Airport	01/10/2014	Ongoing	
SA.14093	Belgium	Brussels South Charleroi	11/12/2002	01/10/2014	NCA & PD & Negative dec. (ND)
SA.32833	Germany	Frankfurt-Hahn airport	13/07/2011	01/10/2014	NCA & Positive decision (PD)
SA.18857	Sweden	Västerås Airport	25/01/2012	01/10/2014	NCA & Positive decision (PD)
SA.26500	Germany	Aéroport d'Altenburg Nobitz	25/01/2012	15/10/2014	NCA & PD & Negative dec. (ND)
SA.37582	France	Aéroport de La Réunion		10/12/2014	Dec. not to raise objections (NRO)
SA.27339	Germany	Zweibrücken Airport	22/02/2012	01/10/2014	NCA & Negative dec. (ND)
SA.35388	Poland	Gdynia-Kosakowo Airport	02/07/2013	26/02/2015	Negative dec. (ND)
SA.26190	Germany	Saarbrücken Airport	22/02/2012	01/10/2014	NCA & Positive decision (PD)
SA.19880	Germany	Niederrhein-Weeze airport	25/01/2012	23/07/2014	NCA & Positive decision (PD)
SA.32576	Germany	Flughafen Niederrhein	25/01/2012	23/07/2014	NCA & Positive decision (PD)
SA.22614	France	Aéroport Pau Pyrénées	28/11/2007	23/07/2014	PD & Negative dec. (ND)
SA.33961	France	Aéroport de Nimes	25/04/2012	23/07/2014	NCA & PD & Negative dec. (ND)
SA.33963	France	Aéroport d'Angoulême	21/03/2012	23/07/2014	PD & Negative dec. (ND)
SA.32963	Romania	Cluj-Napoca Airport	31/07/2015	Ongoing	
SA.33769	Romania	Târgu Mureş Airport	31/07/2015	Ongoing	
SA.37121	Spain	Programme de développement des vols sur le territoire de la région ultrapériphérique des Canaries	23/07/2013	09/04/2014	Dec. not to raise objections (NRO)
SA.39987	France	Modification of a social aid scheme for the benefit of certain French overseas territory residents	28.11.2014	12.02.2015	Dec. not to raise objections (NRO)
SA. 38441	United Kingdom	Regional development CORNWALL AND ISLES OF SCILLY	07.03.2014	07/05/2014	Dec. does not constitute aid Dec. not to raise objections (NRO)
SA.21420	Italy	Aid to SEA Handling / Setting-up of Airport Handling	09.07.2014	19.12.2012	Negative decision with recovery
SA.38168	Croatia	Dubrovnik Airport Development	14.01.2014	11.02.2014	Decision not to raise objections
SA.35847	Czech Republic	Airport Ostrava, paved surfaces	06.12.2012	20.02.2014	Decision not to raise objections
SA.24221	Austria	Klagenfurt Airport - Ryanair and other airlines	22.02.2012	Ongoing	
SA.29064	Ireland	Unlawful State aid by Ireland to Aer Lingus, Aer Arann and Dublin Airport	22.07.2009	13.07.2011	Decision does not constitute aid Decision to initiate the formal investigation procedure
				25.07.2012	Negative decision with recovery

Source: EC Decisions

## Decisions Regarding the Financial Relationships between Airports & Airlines

On the basis of the new Guidelines, the Commission analysed the arrangements between regional airports and the airlines (relating in particular to airport charges, volume-based discounts to airport charges and marketing services) in recent decisions, in order to verify if such arrangements constituted State aid to the airlines concerned.

The Commission identified such aid, and found it incompatible, in the cases of Aéroports de Pau<sup>121</sup>, Nîmes<sup>122</sup> and Angoulême<sup>123</sup>, the Commission concluded that Ryanair, and, in the case of Pau, Transavia, had received aid incompatible with EU rules.

In these cases, the Commission had, in fact, been able to show that these airlines paid less than the additional costs linked to their presence in the airport. As a consequence, the Commission ordered France to recover the aid that was illegally granted as a result of EUR 0.87 million for Angoulême (from Ryanair), EUR 2.8 million for PAU (EUR 2.39 million from Ryanair and EUR 0.43 million from Transavia) and EUR 6.3 million for Nîmes.

Ryanair has appealed two out of the three decisions (Angoulême and Pau); these cases are pending before the European General Court of Justice<sup>124</sup>.

This is the same reason that led the Commission to require that Germany and Italy recover the illegally granted aid, after observing that certain agreements concluded by the managers of Zweibrücken and Alghero airports<sup>125</sup> procured the beneficiary airlines an undue economic advantage which they need to pay back.

The airlines concerned are TUIFly, Germanwings and Ryanair in the case of Zweibrücken airport, and Meridiana and Germanwings in the case of Alghero airport. Germanwings appealed the decision regarding the Zweibrücken airport before the European General Court<sup>126</sup>.

In the case of the airport of Altenburg-Nobitz<sup>127</sup>, the Commission ruled that the public measures granted to the manager of the airport were state aids, but granted in accordance with the EU state aid rules. The reasoning given was that they were in line with the Guidelines, did not unduly distort competition and enhanced connectivity for the region. Of the arrangements concluded between the manager of this airport and with the beneficiary airline, the airport service agreements had been concluded on market terms, but two marketing agreements between the airport manager and Ryanair/AMS granted the beneficiary airline an economic advantage which could not be construed to be justifiable under the state aid rules.

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<sup>121</sup> Décision de la Commission du 23.7.2014 concernant l'aide d'Etat SA.22614 (C53/2007), mise à exécution par la France en faveur de la chambre de commerce et d'industrie de Pau, Béarn, Ryanair, Airport Marketing Services et Transavia, [http://ec.europa.eu/competition/state\\_aid/cases/223036/223036\\_1614098\\_1194\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/223036/223036_1614098_1194_2.pdf)

<sup>122</sup> State aid — France — State aid No SA.33961 2012/C — Nîmes airport — Invitation to submit comments pursuant to Article 108(2) of the Treaty on the Functioning of the European Union, [http://ec.europa.eu/competition/state\\_aid/cases/244514/244514\\_1345084\\_132\\_5.pdf](http://ec.europa.eu/competition/state_aid/cases/244514/244514_1345084_132_5.pdf)

<sup>123</sup> Commission Decision (EU) 2015/1226 of 23 July 2014 on State aid SA.33963 (2012/C) (ex 2012/NN) implemented by France in favour of Angoulême Chamber of Commerce and Industry, SNC-Lavalin, Ryanair and Airport Marketing Services, [http://ec.europa.eu/competition/state\\_aid/cases/244154/244154\\_1603693\\_425\\_2.pdf](http://ec.europa.eu/competition/state_aid/cases/244154/244154_1603693_425_2.pdf)

<sup>124</sup> Case T-165/15 - Ryanair and Airport Marketing Services v Commission, <http://curia.europa.eu/juris/liste.jsf?language=en&num=T-165/15> ; Case T-111/15 - Ryanair and Airport Marketing Services v Commission, <http://curia.europa.eu/juris/liste.jsf?language=en&num=T-111/15>

<sup>125</sup> EC Press Release, "State aid: Commission adopts a package of decisions regarding public support to airports and airlines in Belgium, Germany, Italy and Sweden", 01.10.14, [http://europa.eu/rapid/press-release\\_IP-14-1065\\_en.htm](http://europa.eu/rapid/press-release_IP-14-1065_en.htm)

<sup>126</sup> Case T-375/15 - Germanwings v Commission, <http://curia.europa.eu/juris/liste.jsf?language=en&num=T-375/15>

<sup>127</sup> SA 26500

## Decisions Regarding Airports Located in the Catchment Area of an Existing Airport

The idea of "catchment area of an airport" is at the heart of the new Guidelines, which define it as follows:

*"The "catchment area of an airport" means a geographic market boundary that is normally set at around 100 kilometres or around 60 minutes travelling time by car, bus, train or high-speed train; however, the catchment area of a given airport may be different and needs to take into account the specificities of each particular airport. The size and shape of the catchment area varies from airport to airport, and depends on various characteristics of the airport, including its business model, location and the destinations it serves"<sup>128</sup>.*

Following the new Guidelines, the Commission considers that the duplication of unprofitable or unused airports does not contribute to any objective of common interest.

As a result investment or operating aid that benefits an airport located in the same catchment area of another airport that has excess capacity, should no longer be declared in line with EU law. The same would apply to start-up aid granted to open a new route already operated by another airport in the same catchment area.

The Commission already applied these principles in 2014, to the cases of Gdynia-Kosakowo Airport<sup>129</sup> and Zweibrücken Airport<sup>130</sup>.

In the case of Gdynia-Kosakowo Airport, the Commission found that the aid granted for the recent conversion of the former military airport into a civilian airport, and for the operation of the new airport did not contribute to any objective of common interest in particular since the Gdansk Airport is located less than 25km away and that airport was not congested, as it was currently using less 60% of its capacity. Such aid could thus only divert traffic away from the neighbouring airport to the subsidised one without any overall welfare benefit.

The Commission then ordered Poland to recover PLN 91.7 million (around EUR. 21.8 million) illegally granted by the municipalities of Gdynia and Kosakowo to Gdynia airport.

The interested parties filed an appeal for substantive and interim proceedings against this decision before the General Court<sup>131</sup>. By a decision on 20 August 2014, the General Court rejected the request to suspend the decision of the Commission drafted as summary judgment by the interested parties<sup>132</sup>. The case on the substance is pending.

In the case of Zweibrücken Airport, the Commission found that the aid granted to the airport administrator since 2000 was incompatible with the Single Market, insofar as Zweibrücken Airport is located less than 40km by road from Saarbrücken, and insofar as this airport was not operating at full capacity and was loss-making, when Zweibrücken Airport entered the market.

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<sup>128</sup> 2014 Guidelines for State aid to airports and airlines, Article 2.2 Definitions, p. 25, (12)

<sup>129</sup> See footnote 131

<sup>130</sup> See footnote 131

<sup>131</sup> Case T-215/14 - Gmina Miasto Gdynia and Port Lotniczy Gdynia Kosakowo v Commission, <http://curia.europa.eu/juris/liste.jsf?language=en&num=T-215/14>

<sup>132</sup> Ordonnance du Président du Tribunal, 20 août 2014, in the case T-215/14, <http://curia.europa.eu/juris/document/document.jsf?text=&docid=156881&pageIndex=0&doclang=FR&mode=lst&dir=&occ=first&part=1&cid=302730>



Germanwings filed an appeal against this decision before the European General Court <sup>133</sup>.

In another case include in a package of decisions taken in October 2014, the Commission evaluated the impact of aid granted to the airport of Charleroi<sup>134</sup> in Belgium since 2002. It concluded that the economic development of the Walloon region had generally benefited from the measures; but the airport itself had benefitted in a manner which constituted considerable economic advantages and distorted competition. The distortive effects increased to the degree that traffic increased. The Commission sought to balance the positive and negative impacts of the aids and ruled that only a part of the aid could be considered compatible with the state aid rules and issued a recovery order for the remaining sum of approx. €6m which the Charleroi airport was instructed to pay back; furthermore, the concession fee to be paid by the airport manager to operate the airport infrastructure was to be increased to reflect fair market price levels.

### **Airline Transatlantic Joint Venture (Air France/KLM - Alitalia – Delta)**

On 23 January 2012, the Commission opened antitrust proceedings<sup>135</sup> in relation to the establishment of a profit/loss-sharing joint venture between Air France, KLM, Alitalia and Delta, which covers all passenger air transport services operated by the parties on routes between Europe and North America<sup>136</sup>.

The Commission felt that this Transatlantic joint venture agreement could have the effect of appreciably reducing competition on the Paris-New York route in relation to premium passengers and on the Amsterdam-New York and Rome-New York routes in relations to premium and non-premium passengers.

To address the competition concerns set out by the Commission, the parties offered:

- To make arrival and departure slots pairs available at Amsterdam airport and/or New York JFK/Newark Liberty airports, as well as at Rome airports and/or New York JFK/Newark Liberty airports;
- To enter into fare combinability agreements with competitors;
- To enter into special prorata agreements with competitors;
- To open their frequent flyer programs to a competitor.

On the basis of these commitments, on 12 May 2015 the Commission adopted a decision that renders legally binding the commitments offered by the parties<sup>137</sup>.

### **Airline Mergers and Acquisitions**

**Table 55: Procedure for Airline Mergers and Acquisitions handled in 2014–2015**

Case	Parties	Notif.	Dec. Date	Decision
M.7056	USS /BA /EASYJET /MONARCH /CROWN /NATS	11/02/2014	18/03/2014	Non opposition
M.7238	AMERICAN EXPRESS / QATAR HOLDING / GBT	20/05/2014	20/06/2014	Non opposition
M.7270	CESKY AEROHOLDING / TRAVEL SERVICE	14/11/2014	18/12/2014	Non opposition

<sup>133</sup> See footnote 126

<sup>134</sup> SA 14093

<sup>135</sup> Case 39.964, antitrust proceedings - AF-KL/DL/AZ, within the meaning of Article 11(6) of Council Regulation No 1/2003 and Article 2(1) of Commission Regulation No 773/2004, [http://ec.europa.eu/competition/elojade/isef/case\\_details.cfm?proc\\_code=1\\_39964](http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=1_39964)

<sup>136</sup> The joint venture represents 25% of total capacity between Europe and North America and generates revenue of 13 billion dollars in 2013. The joint venture is for an indefinite period of time. After a period of ten years, the agreement may be terminated with a notice period of three years. The joint venture is a result from a process which began in 1997: 29 September 1997: Northwest and KLM sign the first ever joint venture agreement in the air transport industry. 17 October 2007: Air France and Delta set up a joint venture, implemented on 1 April 2008, on all routes between their hubs, as well as on departure from and to London Heathrow. 20 May 2009: Air France KLM and Delta sign a joint venture agreement involving joint operations and the sharing of revenues and costs on their transatlantic routes. 5 July 2010: Alitalia joined this joint venture, opening up the joint venture to the Italian market, and providing a new hub at Rome-Fiumicino. (Source: Air France-KLM Website).

<sup>137</sup> Commission Decision of 12.5.2015 relating to proceedings under Article 101 of the Treaty on the Functioning of the European Union, Case AT.39964 - Air France/KLM/Alitalia/Delta, [http://ec.europa.eu/competition/antitrust/cases/dec\\_docs/39964/39964\\_1755\\_5.pdf](http://ec.europa.eu/competition/antitrust/cases/dec_docs/39964/39964_1755_5.pdf)

Case	Parties	Notif.	Dec. Date	Decision
M.7333	ALITALIA / ETIHAD	29/09/2014	14/11/2014	With conditions
M.7541	IAG / AER LINGUS	27/05/2015	14/07/2015	With conditions

Source: EC Decisions

## Alitalia – Etihad (case M. 7333) <sup>138</sup>

On 29 September 2014, Alitalia Compagnia Aerea Italiana S.p.A. ("Alitalia", Italy) and Etihad Airways PJSC ("Etihad", the United Arab Emirates) informed the Commission that they intended to create a new joint venture, New Alitalia, which would receive "Old Alitalia's" aviation business as a going concern. On 14 November 2014, the Commission approved the deal subject to certain conditions on the Rome-Belgrade route, where the transaction would lead to a monopoly. On this route, Alitalia CAI and Etihad have committed themselves:

- To release up to two daily slot pairs at Rome-Fiumicino and Belgrade airports to a competitor;
- To provide further incentive, such as the possibility for a new entrant to acquire grandfathering rights;
- And to offer a special prorated agreement, a fare combinability, an interline agreement, and access to their frequent flyer programme to new entrants.

Key issues for merger control related to (i) whether specific types of codeshare agreements (unilateral free-flow code-shares<sup>139</sup>) would lead to a material competition constraint of the marketing carrier and the operating carrier on the route (a constraint which would be removed because of the transaction), and (ii) the degree of competition between Alitalia and Etihad's equity partners (i, e.g. Air Berlin, Darwin airlines, Jet Airways and Air Serbia) post-transaction.

## IAG – Aer Lingus (case M. 7541) <sup>140</sup>

On 27 May 2015, the Commission received a notification of a proposed concentration whereby International Consolidated Airlines Group ("IAG") acquires control of the whole of Aer Lingus Group plc ("Aer Lingus"), by way of public offer pursuant to Irish takeover rules.

IAG is the holding company of each British Airways, Iberia and Vueling. The IAG airlines fly to around 200 destinations with approximately a further 200 destinations served under various code-sharing relationships. Both British Airways and Iberia are members of the oneworld alliance.

Aer Lingus is a publicly listed Irish-based carrier. It serves more than 75 destinations, primarily in the EEA and North America.

The Commission found that the concentration, as initially notified, would have led to high market shares on three direct-direct overlap routes: Dublin–London, Belfast–London and Dublin–Chicago, where the merged entity would have faced insufficient competitive constraints from the remaining players which could ultimately lead to higher prices. The Commission's assessment relating to the two direct-direct overlap routes out of London is based on the finding that all six London airports (i.e. Heathrow, Gatwick, City, Stansted, Luton and Southend) belong to the same market, which is differentiated. Therefore, the degree

<sup>138</sup>Case COMP/M.7333 - ALITALIA / ETIHAD, Regulation (EC) No 139/2004, Merger Procedure, [http://ec.europa.eu/competition/mergers/cases/decisions/m7333\\_20141114\\_20212\\_4073450\\_EN.pdf](http://ec.europa.eu/competition/mergers/cases/decisions/m7333_20141114_20212_4073450_EN.pdf)

<sup>139</sup> In a "free-flow unilateral" codeshare only one of the codeshare partners operates aircraft and the other carrier, the marketing carrier, can sell tickets as long as there are seats available.

<sup>140</sup> European Commission - Press release, Brussels, 14 July 2015, Mergers: Commission approves acquisition of Aer Lingus by IAG, subject to conditions, [http://europa.eu/rapid/press-release\\_IP-15-5371\\_en.htm](http://europa.eu/rapid/press-release_IP-15-5371_en.htm)

of competition between the six London airports may significantly vary according to, among others, the passengers' needs, the level of service offered by airlines as well as the characteristics of each route. In that respect, the Commission acknowledged that over the last few years, airlines' business model in short-haul routes have tended to converge: full-service carriers have tended to reduce the cost base and the level of service, whereas low-cost carriers have tended to improve their offering. With this move to the middle, both full-service and low-cost carriers aim at enlarging their product offerings to appeal to business price-conscious passengers. As a result, on the two routes of concerns out of London, the Commission found that the merged entity's operations at Heathrow would be constrained to a certain extent by those of competitors at London Gatwick and City, also with respect to more time sensitive passengers. This constraint has however been considered as being insufficient to remove the anti-competitive effects of the merger on these two routes.

The Commission also found that there was a risk that IAG would prevent passengers flying on Aer Lingus' short-haul flights, from Dublin, Cork, Shannon, Knock and Belfast, from connecting with long-haul flights operated by competing airlines out of other European airports, including Heathrow, Gatwick, Manchester, Dublin and Amsterdam. On 14 July 2015, the European Commission approved the merger subject to the following commitments by IAG and Aer Lingus:

- The release of five daily slot pairs at London-Gatwick airport to facilitate the entry of competing airlines on routes to both Dublin and Belfast; and
- Aer Lingus continuing to carry connecting passengers to use the long-haul flights of competing airlines on route of London-Heathrow, London-Gatwick, Manchester, Amsterdam, Shannon and Dublin.

On 24 July 2015, the Commission approved the appointment of AdVolis SA as Monitoring Trustee to monitor compliance by the merged entity with the commitments.<sup>141</sup> As regards the slot commitments, the slot release process for the IATA Summer Season 2016 is on-going.

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<sup>141</sup> Monitoring Trustee in case M. 7541 – IAG/Aer Lingus,  
[http://ec.europa.eu/competition/elojade/isef/case\\_details.cfm?proc\\_code=2\\_M\\_7541](http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=2_M_7541)

## 7. Environment and Sustainable Development

### 7.1. Introduction

As air travel continues to increase, so does public awareness of the environmental and sustainability impacts of the industry. Demonstrating that environmental issues are being taken seriously by the industry is critical and there are many good examples. The challenges are sharing the best practice widely, generating the maximum environmental benefit and implementing good ideas quickly. Obtaining and maintaining a 'social licence to operate' is not just an issue for airports, but one in which the whole industry has a role to play.

This Chapter provides an overview of the main environmental and sustainability issues starting with an overview of global initiatives and activities. This is followed by a summary of some of the key environmental themes such as emissions, climate change, noise and fuels. The Chapter also highlights the increasing focus on public health and quality of life; in terms of the developing evidence base and how these issues are being taken into account in policy and airport expansion decisions.



### 7.2. Institutions, Initiatives and Programmes

#### International Civil Aviation Organisation

Within the context of a projected doubling of global air transport capacity by 2030, ICAO has set out five Strategic Objectives for the period 2014-2016. These are set out in the table below.

Table 56: ICAO Strategic Objectives 2014-2016

Strategic Objective	Description
Safety:	Enhance global civil aviation safety. This Strategic Objective is focused primarily on the State's regulatory oversight capabilities. The Global Aviation Safety Plan (GASP) outlines the key activities for the triennium.
Air Navigation Capacity and Efficiency:	Increase the capacity and improve the efficiency of the global civil aviation system. Although functionally and organizationally interdependent with Safety, this Strategic Objective is focused primarily on upgrading the air navigation and aerodrome infrastructure and developing new procedures to optimise aviation system performance. The Global Air Navigation Capacity and Efficiency Plan (Global Plan) outlines the key activities for the triennium.

Strategic Objective	Description
Security & Facilitation:	Enhance global civil aviation security and facilitation. This Strategic Objective reflects the need for ICAO's leadership in aviation security, facilitation and related border security matters.
Economic Development of Air Transport:	Foster the development of a sound and economically-viable civil aviation system. This Strategic Objective reflects the need for ICAO's leadership in harmonizing the air transport framework focused on economic policies and supporting activities.
Environmental Protection	Minimise the adverse environmental effects of civil aviation activities. This Strategic Objective fosters ICAO's leadership in all aviation-related environmental activities and is consistent with the ICAO and UN system environmental protection policies and practices.

Source: <http://www.icao.int/about-icao/pages/strategic-objectives.aspx><sup>142</sup>

## State Action Plans

ICAO continues to build capacity in member states to develop action plans setting out ways to reduce CO<sub>2</sub> emissions from international aviation. ICAO developed an action plan template and a web interface for national action plans, to provide a step-by-step approach to develop action plans. By the end of 2014, 82 states had submitted action plans. During 2014, regional training seminars were delivered in Mexico, Peru, Cameroon, Kenya and Malaysia.

For states submitting revised action plans, ICAO have recommended that these are based on data that is robust enough to contribute to ICAO report on global international CO<sub>2</sub> emissions reduction and setting out the environmental benefits of implementation measures. The measures in the action plans cover:

- Aircraft-related technology development
- Alternative fuels
- Improved air traffic management and infrastructure use
- More efficient operations
- Economic or market-based measures
- Regulatory measures

## The Atlantic Interoperability Initiative to Reduce Emissions

The AIRE initiative was launched in 2007 by the European Commission and the US Federal Aviation Administration. The initiative's aim is to improve aircraft's energy efficiency and lower emissions and noise through ATM solutions. The core focus areas for AIRE are:

- Development and implementation of fuel efficient and low noise departure and arrival procedures
- Implementation of optimised departure and arrival management tools and supporting procedures
- Lateral, vertical and longitudinal optimization for En-Route and Oceanic Operations

<sup>142</sup> ICAO, "<http://www.icao.int/about-icao/pages/strategic-objectives.aspx>," [Online].



The programme is managed by SESAR Joint Undertaking and the report 'Seeing is Believing' provides a summary of the 18 demonstration activities undertaken between 2012 and 2014, amounting to over 30,000 flight trials. The 18 projects covered three categories: Terminal Manoeuvring Area, Oceanic/en-route and Gate-to-Gate trials.

Sesarju (2015). Seeing is Believing: A summary of SESAR Demonstration Activities 2012-2014

## The Asia and Pacific Initiative to Reduce Emissions

The Asia and Pacific Initiative to Reduce Emissions (ASPIRE) was developed to respond to the need to reduce the environmental impact of aviation through collaboration among air navigation service providers in the region.



Initiatives reported in the ASPIRE Annual Report in 2014<sup>143</sup> include:

- The continued success of the ASPIRE Daily City Pairs programme which delivers gate-to-gate environmental best practices to airlines operating throughout the region. This includes User-Preferred Routes, Departure Optimisation, Time-based arrivals management and reduced Oceanic separation. New City Pairs have been added during 2014, bringing the total to 22.
- Airservices Australia continue to roll out the Metron-Harmony ground delay system which minimises airborne delays, thus helping to save fuel and emissions. In addition, the Airport Capacity Enhancement programme seeks to improve runway efficiency at Australia's four major airports through maximising aircraft movement rates.
- JCAB have been implementing the Required Navigation Performance, Authorisation Required (RNP AR) approach at 11 airports in Japan as part of arrival optimization initiatives. The system is better suited to Japan's geography and has resulted in reduced flight time and shortened flight paths which have reduced fuel consumption and CO<sub>2</sub> emissions.

## European Framework

The EU Single European Sky (SES) initiative sets the architecture for air traffic management. As part of the modernisation of Europe's ATM system, performance targets for the Reference Period 2015-2019 were

<sup>143</sup> A. - A. a. P. I. t. R. Emissions, "Annual Report 2014," 2015

adopted in February 2014<sup>144</sup>. The four key performance areas remained the same as the previous period: Safety, Environment, Capacity and Cost-efficiency. The Environment performance focuses on the average horizontal en-route flight efficiency (for filed flight plan trajectory and actual trajectory), which is expected to deliver emissions savings.

EUROCONTROL's Collaborative Environmental Management (CEM) Specification was published in September 2014. "The CEM Specification describes a collaborative process through which core operational stakeholders can increase their awareness and understanding of the interdependencies and constraints of each other's businesses. In turn, this can facilitate the development of shared environmental solutions, on which they will then collaborate through joint planning and implementation." <sup>145</sup>

### 7.3. Aviation Emissions

Emissions from aviation generally fall into two categories, which will be discussed in greater depth below, climate change and air quality. Climate change is caused by CO<sub>2</sub> and other greenhouse gas emissions, and has varied impacts globally. Air quality deterioration is caused by a variety of emissions, in the case of aviation, primarily NO<sub>x</sub> and particulate matter. These emissions are produced by aircraft, airport facilities and ground transportation.

#### Climate Change

Aviation is a source of CO<sub>2</sub> emissions and is responsible for approximately 2% of global emissions<sup>146</sup>. These emissions are sometimes cited as a challenge to Government targets in terms of emissions growth. This is for three reasons, firstly aviation is predicted to grow significantly, secondly, aircraft in the upper atmosphere cause non-CO<sub>2</sub> climate change impacts (which are normally accounted for as CO<sub>2</sub>e<sup>147</sup>), and finally there is no practical alternative to kerosene fuelled jet engines currently on the horizon. As other sectors reduce emissions aviation is therefore likely to become responsible for a far larger proportion of global climate change emissions.

CO<sub>2</sub> emissions from the aviation sector are one of the fastest growing sources of CO<sub>2</sub> emissions<sup>148</sup>. To tackle the increases in emissions from aviation the EU included aviation within the EU ETS (European Union Emissions Trading Scheme) through the Aviation Directive 2008. This meant that from 2012, companies operating aircraft to European destinations had to surrender allowances for the CO<sub>2</sub> emitted by each flight. In April of 2013 a 'stop the clock' decision was taken to suspend obligations for international flights to be included within the EU ETS. Following this, an agreement was reached in October of 2013 by the ICAO on a road map for developing a market based mechanism (MBM). Following this agreement, the ETS directive was amended to cover aviation emissions occurring within the European Economic Area (EEA), with the expectation that any future MBM would merge with this. This came into force on the 16<sup>th</sup> of April 2014 placing all aviation within the EU under the EU ETS. Compliance has been high, with 99% of emissions covered, including those from over 100 non-European carriers<sup>149</sup>.

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<sup>144</sup> EUROCONTROL, "Performance Review Body Assessment Report of RP2FAB Performance Plans," European Union, 2014

<sup>145</sup> EUROCONTROL, "<https://www.eurocontrol.int/news/cem-specification-shortlisted-ihs-jane-s-award>," 2015. [Online]

<sup>146</sup> Air Transport Action Group (ATAG), "Facts and Figures," April 2014. [Online]. Available: <http://www.atag.org/facts-and-figures.html>. [Accessed 20 August 2015]

<sup>147</sup> CO<sub>2</sub>e represents carbon dioxide equivalent. Climate change is caused by gasses and other factors trapping heat in the atmosphere and forcing temperatures upwards. CO<sub>2</sub> is the most common greenhouse gas and therefore, CO<sub>2</sub>e has been chosen as the standard unit for impact on the climate. For instance CH<sub>4</sub> has approximately 21 times the impact on the climate of CO<sub>2</sub>. When CH<sub>4</sub> is reported it's reported in CO<sub>2</sub>e, and if one tonne of CH<sub>4</sub> had been emitted it would be reported as 21tCO<sub>2</sub>e.

<sup>148</sup> European Commissions, "Reducing emissions from transport," 07 August 2015. [Online]. Available: [http://ec.europa.eu/clima/policies/transport/index\\_en.htm](http://ec.europa.eu/clima/policies/transport/index_en.htm). [Accessed 20 August 2015]

<sup>149</sup> European Commission, "Emissions trading: 2014 data shows emissions reduction," 18 May 2015. [Online]. Available:

Air Traffic management can help reduce emissions by optimising aircraft routing. To improve air traffic management within the EU the European Commission launched the Single European Sky (SES) initiative in 2004. The initiative will be delivered by the SESAR (Single European Sky Air Traffic Management Research) program, which will deliver the next generation of air traffic management within Europe by consolidating and developing new systems. The program has three phases:

- The first phase (2004-2008) has delivered a master plan for air traffic management setting out content, development and deployment plans for the Single European Sky.
- The second phase (2008-2013) produced a new generation of technological systems, components and operational procedures. Because of the large number of stakeholders in SESAR and the scope of financial resources and technical expertise required, the SESAR Joint Undertaking has been set up to oversee fund management which will need to be extended.
- The third phase is the deployment phase (2014- 2020) in which the harmonised and interoperable components of the Single European Sky will be implemented.

In 2014 the program entered the deployment stage. On the 5<sup>th</sup> of December 2014 the European Commission made 3 billion Euros available to fund the deployment of the program<sup>150</sup>, which will enable more efficient air traffic management and therefore lower CO<sub>2</sub> emissions.

The efficiency and thus CO<sub>2</sub> emissions of aircraft is an area where great improvements have been made. Over time, older less efficient aircraft retire, and new, more efficient aircraft enter service, driving the efficiency of the fleet upwards. During 2014 there have been a number of developments in this area; four examples of these are as follows:

- Airbus delivered its first A350 XWB to Qatar airlines on the 23<sup>rd</sup> of December 2014. This new design delivers an improvement in efficiency of approximately 25%<sup>151</sup> over similar sized aircraft.
- Airbus's E-Fan made its first public flight in April. The aircraft is a demonstration electric aircraft, with the potential to run CO<sub>2</sub> free<sup>152</sup>. The program has the long term goal of producing a hybrid regional airliner<sup>153</sup>.
- Solar impulse 2 took its maiden flight. This aircraft is only powered by solar power and is expected to circumnavigate the world in 2015<sup>154</sup>.
- Boeing delivered the first 787-9 to ANA on the 29<sup>th</sup> of July 2014. The 787-9 has a longer range and can carry more passengers than the 787-8 which entered service in 2011; both aircraft are 20% more efficient<sup>155</sup> than aircraft of a similar size.

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[http://europa.eu/rapid/press-release\\_IP-15-4987\\_en.htm](http://europa.eu/rapid/press-release_IP-15-4987_en.htm). [Accessed 20 August 2015].

<sup>150</sup> European Commission, "Aviation: EU makes €3 bn available to deliver the Single European Sky," 05 December 2014. [Online]. Available: [http://europa.eu/rapid/press-release\\_IP-14-2400\\_en.htm](http://europa.eu/rapid/press-release_IP-14-2400_en.htm). [Accessed 20 August 2015].

<sup>151</sup> Airbus, "A350 XWB," 2015. [Online]. Available: <http://www.airbus.com/aircraftfamilies/passengeraircraft/a350xwbfamily/>. [Accessed 20 August 2015]

<sup>152</sup> Airbus, "E-Fan: the all-electric plane A revolution in air travel," 2015. [Online]. Available: <http://www.airbusgroup.com/int/en/innovation-citizenship/airbus-e-fan-the-future-of-electric-aircraft/Programme.html>. [Accessed 20 August 2015].

<sup>153</sup> Airbus, "Electric aircraft roadmap Toward silent, CO<sub>2</sub>-free flight," 2015. [Online]. Available: <http://www.airbusgroup.com/int/en/innovation-citizenship/airbus-e-fan-the-future-of-electric-aircraft/e-aircraft-roadmap.html>. [Accessed 20 August 2015].

<sup>154</sup> Solar Impulse, "FirstFlight of Solar Impulse 2," 02 June 2014. [Online]. Available: <http://info.solarimpulse.com/en/solar-flights/first-flight-solar-impulse-2/#.VdcW8NLbKmR>. [Accessed 20 August 2015].

<sup>155</sup> Boeing, "Boeing Delivers ANA's First 787-9 Dreamliner," 29 July 2014. [Online]. Available: <http://boeing.mediaroom.com/2014-07-29-Boeing-Delivers-ANAs-First-787-9-Dreamliner>. [Accessed 20 August 2015].



The IPCC initiated the preparation of the Fifth Assessment Report (AR5), which was completed in 2014. ICAO participated in the IPCC process to ensure that issues related to scientific understanding of aviation's impacts on global climate were covered in the AR5.

CO<sub>2</sub> emissions from ground based transport are not within the direct control of the aviation industry. However, ground based emissions are important, particularly as road vehicles often emit more CO<sub>2</sub> per km than aircraft per passenger. Airports are involved in promoting a modal shift from car transportation to public transportation as a means of accessing airports<sup>156</sup>.

CO<sub>2</sub> emitted from airport facilities is discussed in Section 7.7.

## Air Quality

Aviation air quality concerns are principally related to the areas on and around airports. Furthermore, for most airports the most significant air quality related emissions presently come from ground transportation. However, because of factors such as growth in demand, more public transport access to airports, and the long service life of aircraft, it is widely expected that aircraft will eventually become the dominant air quality related pollution source for many airports.

Airports can be sources of number of air pollutants. For example, aircraft jet engines emit pollutants including oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), oxides of sulphur (SO<sub>x</sub>), particulate matter, hydrocarbons from partially combusted fuel, and other trace compounds. There are also pollutant emissions from the airside vehicles and from the large number of road vehicles travelling to and from the airport each day<sup>157</sup>.

The International Civil Aviation Organization (ICAO) sets international standards for smoke and certain gaseous pollutants for newly-produced large jet engines; it also restricts the venting of raw fuels. The latest standards came into effect in 2013 and apply to engine types certified after this date. Reductions in emissions from aircraft engines have generally been lower in recent years than in other sectors, where technologies such as selective catalytic reduction and exhaust gas recirculation have been employed. There are also increasing numbers of larger aircraft movements, which have disproportionately higher emissions than smaller aircraft.

During 2014 air quality concerns have been raised in relation to airport expansion in the South East of the UK. There are two airports looking for expansion, London Heathrow and London Gatwick. Heathrow functions as the UK's only hub airport. It is to the West of London near two major roads, and a large number of residential receptors. Gatwick is located to the south, further from London, with a quieter nearby road network and fewer residential receptors. The air quality around Heathrow is worse than the air quality around Gatwick. As part of the debate around expansion, air quality has been used to promote London Gatwick<sup>158 159 160 161 162</sup>.

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<sup>156</sup> Schiphol Group, "Schiphol Group Annual Report 2014," Schiphol Group, Schiphol, 2014.

<sup>157</sup> Ricardo-AEA, "Air Quality at Heathrow Airport – Annual Report for 2013," Heathrow Airport Ltd, London, 2014.

<sup>158</sup> Heathrow Airport, "Airports Commission's Air Quality Local Assessment - Consultation," Heathrow Airport Limited, London, 2015.

<sup>159</sup> Matt Gorman, "The business case for a low emission airport Clean Vehicles Partnership 17 October 2014," Heathrow Airport, London, 2014.

<sup>160</sup> Heathrow Airport, "Heathrow's North-West Runway Air Quality Assessment," Heathrow Airport, London, 2014.

<sup>161</sup> Gatwick Airport, "A Second Runway for Gatwick Appendix A9 Air Quality," Gatwick Airport Ltd, London, 2014.

<sup>162</sup> London Gatwick Obviously, "Over the limit: Why Heathrow's expansion plans are bad news for London's air pollution," London Gatwick Obviously, London, 2014.

During 2014 the French aviation authority made progress towards improving air quality in the regions of Ile-De-France and Rhone-Alpes. On the 17<sup>th</sup> of March the national action plan for dealing with prolonged peaks in pollution was launched for the first time. This prohibited certain air traffic circuits, increased control over APUs and limited engine trials<sup>163</sup>.

#### 7.4. Climate Change (Adaptation and Resilience)

Climate change will have an increasing impact on the aviation industry. The industry has started to respond to the risks a changing climate poses. In general climate change in Europe is likely to cause a change in temperatures, fewer days of snow and frost, changes to quantities of precipitation, sea level rise, changes to the jet stream, increased convective weather and decreased fog days. These changes are not distributed evenly throughout Europe, and their impact on aviation will vary. Table 57 below summarises the effects of climate change and their effects on aviation and shows that climate change is likely to have a significant and varied impact upon the aviation sector.

Table 57: Climate Change Impacts on Aviation

Potential Effect	Primary Climate Change Effects	Confidence/Likelihood	Possible Aviation Impacts
Temperature change	<ul style="list-style-type: none"> <li>Higher mean temperatures, especially in winter for N. Europe and summer for S. Europe.</li> <li>Higher, colder tropopause</li> </ul>	<p><b>High:</b> Long observational record of temperature increases, all studies considered concur on further increases and in patterns of regional and seasonal change.</p>	<ul style="list-style-type: none"> <li>Demand re-distribution (geographical)</li> <li>Demand peak redistribution (seasonal)</li> <li>Runway demand mismatch</li> <li>Airspace demand mismatch</li> <li>Cruise altitude changes</li> <li>Airspace design changes</li> <li>Flow management issues</li> <li>Aircraft performance changes</li> <li>Runway length issues</li> <li>Yield and range issues</li> <li>Increase in noise contours</li> </ul>
Snow & frozen ground	<ul style="list-style-type: none"> <li>Fewer days of snow/frost (especially Alpine, Scandinavia, N. Baltic)</li> </ul>	<p><b>High – Medium:</b> All regional models considered showed same broad level response, but are driven by the same global model. Regional model projections concur with independent studies.</p>	<ul style="list-style-type: none"> <li>Demand re-distribution (e.g. winter sports)</li> <li>Changed de-icing and snow clearance requirements (+/-)</li> </ul>
Precipitation & water supply	<ul style="list-style-type: none"> <li>Increased precipitation in N. Europe: winter flooding</li> <li>Increased freezing rain in N. Europe</li> <li>Decreased precipitation in S. Europe: summer water shortages</li> </ul>	<p><b>High – Medium:</b> All studies considered agree on large scale regional and seasonal patterns of precipitation change but not on exact magnitude. All studies considered indicate future increases in intensity and frequency of droughts for Southern Europe. Magnitude of change is uncertain.</p>	<ul style="list-style-type: none"> <li>Demand re distribution</li> <li>Airport and runway demand mismatch</li> <li>Loss of Airport availability and hence perturbation and delay</li> <li>Reduced ability to meet demand due water shortages</li> </ul>
Sea level	<ul style="list-style-type: none"> <li>Higher mean sea level</li> <li>Increased impacts of storm surges and flooding</li> </ul>	<p><b>High – Medium:</b> All studies considered concur that European sea levels will continue to rise. Questions remain over exact local extent of sea level rise due to regional influences such as El Niño. Confidence in changes to extreme water levels is lower than that for sea level projections due to fewer studies and the dependence on changes in the storm track, which are uncertain.</p>	<ul style="list-style-type: none"> <li>Demand re-distribution</li> <li>Loss of Airport availability (over 30 potentially at risk in ECAC)</li> <li>Loss of ground access to airports</li> <li>Major economic costs from events and from providing protection</li> <li>May require public economic support for ground transport</li> <li>infrastructure protection</li> <li>Delay and perturbation</li> <li>Some airports may become less viable</li> <li>New airports or infrastructure required.</li> <li>Knock-on impacts for diversion airports</li> </ul>
Jet stream	<ul style="list-style-type: none"> <li>Jet stream changes: movement pole-ward and upward</li> </ul>	<p><b>Medium – Low:</b> 11 of the 15 models considered agree on continued pole-ward movement of storm tracks. Exact changes in storm frequency and intensity remain uncertain due to uncertainties in the detailed model physics needed to represent these changes accurately.</p>	<ul style="list-style-type: none"> <li>Changes to storm tracks and hence location of possible weather disruption</li> <li>Wind strength and direction changes at surface</li> <li>Possible flow management and airspace design changes</li> <li>Potential increased fuel costs (and CO2 emissions) due to decrease in eastbound transatlantic wind assistance</li> </ul>
Convective	<ul style="list-style-type: none"> <li>Increased intensity of precipitation</li> </ul>	<p><b>Medium – Low:</b></p>	<ul style="list-style-type: none"> <li>Changes to storm tracks and hence location</li> </ul>

<sup>163</sup> French Civil Aviation Authority, “2014 Environmental Report,” French Civil Aviation Authority, Paris, 2014.

Potential Effect	Primary Climate Change Effects	Confidence/Likelihood	Possible Aviation Impacts
weather	events, lightning, hail and thunderstorms	Severe convection results derived from changes in occurrence of related phenomena, such as intense precipitation events. Uncertainty surrounding modelling of convection, and limited studies, give low confidence in exact magnitude of change.	<ul style="list-style-type: none"> <li>of possible weather disruption</li> <li>Wind strength and direction changes at surface</li> <li>Possible flow management and airspace design changes</li> <li>Potential increased fuel costs (and CO2 emissions) due to decrease in eastbound transatlantic wind assistance</li> </ul>
Visibility	<ul style="list-style-type: none"> <li>Decrease in winter days affected by fog</li> </ul>	<p><b>Low:</b> Fog and haze are boundary layer features not well represented by climate models due to their coarse resolution. There are no studies outside those of the Met Office Hadley Centre so although results from a single model study are plausible they are not necessarily reliable and should not be generalised.</p>	<ul style="list-style-type: none"> <li>Fewer capacity restrictions due to reduced visibility</li> <li>Reduced business case for low-visibility related technologies</li> </ul>

Source: EUROCONTROL (2013) Challenges of Growth 2013: Task 8 climate change risk and resilience [22]

included reports from the European Environment Agency into adaptation in Europe<sup>164</sup>, adaptation of the European transport sector<sup>165</sup>, and Spanish transport infrastructure<sup>166</sup>. EUROCONTROL also released a very compressive document assessing climate change risk and resilience<sup>167</sup>. Within the ICAO's 2013 environmental report, there was an in-depth analysis of likely climate change impacts on aviation globally<sup>168</sup>. Finally, in 2014 the EEA released a report into adaptation of transport to climate change in Europe<sup>169</sup>.



EUROCONTROL started in the operational evaluation of a natural hazard and weather-risk assessment tool in April 2014

An interesting European example of climate adaptation in the aviation industry was published by EUROCONTROL in their external magazine 'Skyway'<sup>170</sup>. Avinor, which operated 46 airports and associated infrastructure, most of which are spread along the Norwegian coast, conducted a climate change risk assessment. Climate change is likely to create warmer temperatures in Norway, leading to more time where the temperature is around zero degrees. This causes wet snow and freezing rain, which can result in low friction conditions that are hard to deal with. It is likely that there will also be an increase in precipitation, and storminess. This may cause delays to service and damage to infrastructure, and when combined with sea level rise, potential inundation.

<sup>164</sup> European Environment Agency, "Adaptation in Europe Addressing risks and opportunities from climate change in the context of socio-economic developments," EEA, Brussels, 2013.

<sup>165</sup> European Environment Agency, "Support to transport and environment assessments Adaptation to Climate Change in the Transport Sector," EEA, Brussels, 2013.

<sup>166</sup> European Environment Agency, "Climate change adaptation needs of the core network of transport infrastructure in Spain," EEA, Brussels, 2013.

<sup>167</sup> EUROCONTROL, "Challenges of Growth 2013: Task 8: Climate Change Risk and Resilience," EUROCONTROL, 2013.

<sup>168</sup> International Civil Aviation Organization, "2013 Environment Report," ICAO, Montreal, 2013.

<sup>169</sup> European Environment Agency, "Adaptation of transport to climate change in Europe," EEA, Brussels, 2014.

<sup>170</sup> EUROCONTROL, "Warmer, Wetter, Wilder Weather Will Impact ANS Service Provision," Skyway, 2014.

Runways in Norway are required to have safety areas at the sides and ends. To implement this, areas needed to be reclaimed from the sea, because of the location of some of the runways. The construction of these areas required future climate impacts to be taken into consideration, so that the infrastructure could withstand storms and resist inundation. Some sensitive infrastructure such as IT systems was in some cases found to be at risk of flooding, and in others of overheating due to climate change. To deal with this some systems were moved and additional cooling is being considered for others. During the expansion of the terminal at Oslo airport it was found that there needed to be 50% more drainage capacity to deal with expected increases in precipitation.

## 7.5. Aircraft Noise

Aircraft noise remains one of the biggest environmental issues associated with aviation, particularly for those living around airports.

On the 16<sup>th</sup> April 2014, the European Parliament formally adopted new rules on procedures for imposing noise restrictions around airports in the EU. Regulation 598/2014 effectively implements the ICAO principles known as the 'Balanced Approach' to managing noise. The 'balanced approach' concept of aircraft noise management comprises four main elements in assessing options to manage noise:

- reduction of aircraft noise at source;
- land-use planning and management measures;
- noise abatement operational procedures; and,
- operating restrictions.

The 'balanced approach' is already a general requirement in the existing Directive, this Regulation details the procedural steps that have to be followed by competent authorities, including the obligations to consult stakeholders and to evaluate all available measures before introducing operating restrictions.

Efforts continue to be made to make use of techniques to manage airspace and many EU countries are anticipating the need to implement airspace changes as a result of implementing the Single European Sky initiative. Airspace changes and flight paths can result in reduced noise for communities as well as fuel efficiencies with consequent reduction in emissions.

Policy aims to limit the number of people significantly affected are common in countries with airports near populated areas. However, concentrating adverse effects on a small proportion of the population can raise issues of equity of impact from those communities. Airport operators (in conjunction with airspace managers) can often face the decision of concentrating flight paths and affecting a smaller number of people or widening / alternating flight paths to distribute the effects of noise more evenly across communities and therefore affecting a larger number of people. Consultation with communities can help inform these decisions, and raise particular concerns or suggestions, for example the value placed by local communities on having predictable periods of respite from aircraft noise.

In December 2014, the UK Government department with responsibility for noise management published the results of the National Noise Attitude Survey 2012<sup>171</sup>. The study was an update to a survey carried out in 2000 and found that there had been a 'strongly statistically significant increase' in the proportion of respondents who were 'bothered, annoyed or disturbed to some extent' by the most common types of noise, which includes aircraft, airport and airfield noise.

An increasing requirement for airport operators and airspace managers to engage with local stakeholders and communities, coupled with an increase in sensitivity of those communities to noise disturbance, means that the focus on managing the noise impacts – from airplane design, air traffic management, airport

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<sup>171</sup> U. G. D. f. E. & R. Affairs, "National Noise Attitude Survey 2012: Summary Report," Defra, 2015.

operations and mitigation and compensation – are all likely to remain a major focus for the aviation industry.

## 7.6. Society and Health

The interaction between aviation and public health is rising up the agenda for stakeholders. The table below is extracted from the European Environment Agency’s report ‘Noise in Europe 2014’<sup>172</sup>. The table shows the health and well-being effects for which an exposure–response relation based on a pooled analysis or a meta-analysis of several studies is available, for transport sources, including aircraft noise.

**Table 58: Core Characteristics of the Applied Exposure-Response Relations**

Health and well-being effect	Population	Reference
(Severe) annoyance	Adults	Road traffic and railways: Miedema and Oudshoorn, 2001; industry: Miedema and Vos, 2004; aircraft: Janssen and Vos, 2009
(Severe) sleep disturbance	Adults	Road traffic, railways and industry: Miedema and Vos, 2007; aircraft: Janssen and Vos, 2009
Reading impairment	7 to 17-year olds	Only aircraft: adapted from Clark et al., 2006
Hypertension	Total population	Road traffic, railways and industry: Van Kempen and Babisch, 2012; aircraft: Babisch and Van Kamp, 2009
Coronary heart disease (mortality and morbidity)	Total population	All sources: Vinneau et al., 2013
Stroke (mortality and morbidity)	Total population	All sources: ad hoc meta-analysis based on 6 studies (Huss et al., 2010; Sorensen et al., 2011; Hansell et al., 2013; Correia et al., 2013; Floud et al., 2013; de Kluizenaar et al., 2013)

There are an increasing number of studies that are looking at the relationships between health and aircraft noise. A paper presented at the 11<sup>th</sup> International Congress on Noise as a Public Health Problem (OCBEN) in Japan in 2014, explored ‘The economic and social value of aircraft noise effects: A critical review of the state of the art’<sup>173</sup>. The paper usefully explores the strength of evidence for dose-response relationships between aircraft noise and health effects as well as approaches for economic valuation of aircraft noise effects.

In the UK, a the Government appointed Airports Commission set out a Sustainability Framework<sup>174</sup> for evaluating the options for expanding airport capacity in England. The Framework included specific consideration of Quality of Life; considering the aspects of wellbeing that are influenced by the activities associated with airports. In addition, the Framework also required airport developers to monetise the health impacts associated with air quality and noise. For noise, this included health impacts associated with annoyance and sleep disturbance<sup>175</sup>.

## 7.7. Airports

Airports throughout the EU are engaged in reducing their environmental impacts. It is not within the scope of this review to examine all of these initiatives. Instead, a range of initiatives undertaken by the largest airports in the EU are detailed below:

- Airports are encouraging staff to commute via public transport to improve air quality and reduce CO<sub>2</sub> emissions.
- Airports are working with airlines to reduce the use of APUs, which will improve air quality and reduce CO<sub>2</sub> emissions.

<sup>172</sup> E. E. Agency, “Noise in Europe 2014,” 2014.

<sup>173</sup> D. B. Berry, “The economic and social value of aircraft noise effects: A critical review of the state of the art,” in 11th International Congress on Noise as a Public Health Problem (ICBEN), Nara, Japan, 2015.

<sup>174</sup> A. Commission, “Airports Commission: Appraisal Framework,” 2014.

<sup>175</sup> E. R. a. C. Department, “Proposed methodology for estimating the cost of sleep disturbance from aircraft noise,” Civil Aviation Authority, 2013.

- Electric vehicles have been implemented on site, which improve air quality and reduce CO<sub>2</sub> emissions.
- Improved systems, such as the Ground Based Augmentation System (GBAS), have been trialed to enable more precise, low noise approaches, reducing noise and CO<sub>2</sub> emissions.
- Renewable energy has been increasingly deployed to reduce CO<sub>2</sub> emissions.
- LED lighting has been implemented to reduce CO<sub>2</sub> emissions.
- Airports have encouraged airlines to sort waste in-flight, to help improve recycling rates.

## **Airport CO<sub>2</sub> Accreditation**

The Airport Carbon Accreditation program ran for its fifth year in 2014. The program was set up in 2009 by ACI Europe (the European section of the Airports Council International), the organisation representing airports in Europe. Airport carbon accreditation is overseen by an independent advisory board including representatives from ICAO (International Civil Aviation Organisation), UNEP (United Nations Environmental Programme), the European Commission, ECAC (European Civil Aviation Conference), EUROCONTROL and Manchester Metropolitan University. The aim of the program is to encourage and support airports around the world to reduce their carbon emissions. This is achieved through a 4 step process as detailed below:

- Level 1 Mapping - Airports at the first stage go through a process of CO<sub>2</sub> emissions assessment and produce a CO<sub>2</sub> Footprint Report in line with the GHG Protocol or ISO1464 standards.
- Level 2 Reduction - After the mapping process, airports are required to setup a CO<sub>2</sub> management plan, showing procedures for checking the CO<sub>2</sub> footprint, and produce targets for reduced CO<sub>2</sub> emissions.
- Level 3 Optimisation - Following the reduction phase, participating airports move into the optimization process where they are required to engage third parties including airlines, and various service providers to further reduce the overall airport CO<sub>2</sub> footprint. These services may include independent ground handlers, catering companies, air traffic control and others working on the airport site.
- Level 3+ Neutrality - Having progressed through the previous three stages, airports use internationally recognised CO<sub>2</sub> offsetting as necessary to achieve CO<sub>2</sub> neutrality.

This process corresponds with carbon management best practice. Airports can choose what level of commitment to make, from measuring their emissions to full carbon neutrality.

During the 2013/14 period the program has continued to grow. This includes growth at the more demanding levels 3 and 3+. In Europe the program now covers 85 airports, which is 63% of European air traffic<sup>176</sup>.

Also during 2013/14 the following airports entered the Scheme:

- Level 1: Bucharest, Ljubljana, Treviso, Madeira, Porto Santo, Groningen Eelde and Naples
- Level 2: Venice Marco Polo, London Stansted, Bergen
- Level 3: Copenhagen

No airports were downgraded; however the following airports achieved upgrades:

- To Level 2: Izmir, Zagreb, Lyon, London City and Rome Ciampino
- To Level 3: Hamburg, Athens and Farnborough
- To Level 3+: Eindhoven and Amsterdam Schiphol

Figure 151 below shows reported emissions in absolute terms and per passenger by scope 1&2 (direct) and scope 3 (indirect). Emissions reductions and the amount of emissions offset, for Europe from 2012/13 and 2013/14. Reported scope 1 and 2 emissions have fallen from 2.75kg CO<sub>2</sub> per passenger to 2.01kgCO<sub>2</sub> per passenger, and scope 3 emissions reductions have increased from 30,155tCO<sub>2</sub> to 223,905tCO<sub>2</sub>.

<sup>176</sup> Airport Carbon Accreditation, "Annual Report 2013-2014," Airport Carbon Accreditation, 2014.

Figure 151: Summary of European Emissions Covered by the Program Comparing 2012/13 (Yr 4) with 2013/14 (Yr 5)

Variable	Year 4		Year 5	
	Emissions	Number of airports	Emissions	Number of airports
<b>TOTAL SCOPE 1 &amp; 2 EMISSIONS</b>				
Aggregate carbon footprint for 'Year 0' <sup>1</sup> for emissions under airports' direct control (all airports)	2,553,869 tCO <sub>2</sub>	75	2,044,683 tCO <sub>2</sub>	85
Carbon footprint per passenger	2.75 kgCO <sub>2</sub>		2.01 kgCO <sub>2</sub>	
<b>SCOPE 1 &amp; 2 EMISSIONS REDUCTION<sup>2</sup></b>				
Aggregate reduction in emissions from sources under airports' direct control (Level 2 and above)	158,544 tCO <sub>2</sub>	43	87,449 tCO <sub>2</sub>	56
Carbon footprint reduction per passenger	0.22 kgCO <sub>2</sub>		0.11 kgCO <sub>2</sub>	
<b>TOTAL SCOPE 3 EMISSIONS<sup>3</sup></b>				
Total carbon footprint for 'Year 0' for emissions sources which an airport may guide or influence (Level 3 and above)	12,176,083 tCO <sub>2</sub>	26	12,777,994 tCO <sub>2</sub>	31
<b>SCOPE 3 EMISSIONS REDUCTION</b>				
Aggregate reductions from emissions sources which an airport may guide or influence	30,155 tCO <sub>2</sub>	26	223,905 tCO <sub>2</sub>	31
<b>TOTAL EMISSIONS OFFSET</b>				
Total emissions offset (Level 3+)	66,724 tCO <sub>2</sub>	15	181,496 tCO <sub>2</sub>	16

Source: Airport Carbon Accreditation (2014) Annual Report 2013 -2014 <sup>210</sup>

The program also has 16 participants in the Asia-Pacific region, which is up seven on last year. Seven of these are accredited to Level 1, four to level 2 and five to level 3. There are no airports accredited to level 3+. The program has one participant accredited to level 1 in Africa. In total the program covered 23% of global aviation emissions in 2013/14.

## 7.8. Fuels

Aviation is predicted to increase in the future, and currently there are no technologies that could replace the jet engine for long-haul journeys. As discussed above, one of the main ways carbon emissions have been reduced has been through improved aircraft efficiency. However, another possibility is to use bio-fuels to supplement kerosene. In the short term this has become less economically viable as the price of oil fell by 47% over 2014<sup>177</sup>. However, most aviation biofuels are still in the development phase. It's predicted that bio-fuels will make up 2.5% of aviation fuel, and cut emissions by 5% by 2050<sup>178 179</sup>. Given this medium-long time horizon, and the volatility of oil markets, the short term impacts of a low oil price should have a limited effect on the use of more expensive alternative fuels in the future.

As stated by the ICAO, during 2014 the largest development in alternative aviation fuels has been the approval, by ASTM, of a process called synthetic Iso-paraffin from Fermented Hydroprocessed Sugar (SIP), which was formerly known as Direct-Sugar-to-Hydrocarbon. It is expected that this process will be improved further to help improve blending ratios. The process is already used at initial commercial scale in Brazil. However, as of 2014 there has still been no routine production of alternative jet fuel<sup>180</sup>. However, since 2009 there have been 21 agreements between airlines and producers. During 2014 there have also been a number of multi stakeholder initiatives. These include a group targeting alternative jet fuel for flights to the Tokyo Olympic Games in 2020, an initiative setting up supply chains in the UAE, and an initiative at Oslo airport supplying biofuel.

Even with no routine production, there have been over 200 flights using alternative jet fuel during 2014<sup>214</sup>. The most important of these were a flight by Boeing's 787 ecoDemonstrator, which flew on a blend of 15% green diesel, which is widely used in ground transportation<sup>181</sup>, and a 10 hour flight by KLM using an airbus A330-200 using a 20% blend of alternative jet fuel produced from cooking oil. The Airbus flight is the first of 20 long haul flights using alternative jet fuel under the EU initiative Towards Sustainable Kerosene for Aviation<sup>182</sup>.

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<sup>177</sup> Financial Times, "ICE Brent Crude Oil Front Month," 2015. [Online]. Available: <http://markets.ft.com/research/Markets/Tearsheets/Summary?s=IB.1:IEU>. [Accessed 20 August 2015].

<sup>178</sup> D. Lee, L. Lim and B. Owen, "Bridging the aviation CO2 emissions gap: why emissions trading is needed".

<sup>179</sup> Department for Transport, "UK Aviation Forecasts," Crown, London, 2013.

<sup>180</sup> ICAO, "Overview of Alternative Jet Fuels in 2014," ICAO, 2015.

<sup>181</sup> Boeing, "Boeing Conducts World's First Flight with 'Green Diesel' as Aviation Biofuel," 03 December 2014. [Online]. Available: <http://boeing.mediaroom.com/2014-12-03-Boeing-Conducts-Worlds-First-Flight-with-Green-Diesel-as-Aviation-Biofuel>. [Accessed 20 August 2015].

<sup>182</sup> Airbus, "Airbus performs its longest flight using sustainable jet fuel with KLM," 16 May 2014. [Online]. Available: <http://www.airbus.com/presscentre/pressreleases/press-release-detail/detail/airbus-performs-its-longest-flight-using-sustainable-jet-fuel-with-klm/>. [Accessed 20 August 2015].



## 8. Safety and Security

### 8.1. Introduction

Overall, 2014 continued the worldwide trend of a reduction in accidents per million sectors at 1.92 per million sectors, 14% lower than 2013 performance. Africa, Commonwealth of Independent States (CIS) and North Africa & Middle East continue to have the largest jet hull rate losses, although the safety statistics have improved over the last 5 years.

Within the statistics, three major accidents involving western built jets led to widespread attention on the causes behind the accidents and a requirement for further action and research into why these occurred as well as what can be done to prevent them in the future.

The disappearance of Malaysian Airlines Flight MH370 over the Malacca Strait has raised the question how, despite a modern aviation system and air traffic management capability, is it possible to 'lose' an aircraft? Questions and theories still remain over the cause of the disappearance, but to date no significant wreckage has been located and so these questions remain unanswered. Work on developing and using a Global Positioning System which would provide coverage over both land and sea and potentially address this issue, is ongoing. However, the installation of the required equipment to aircraft and for ATC would be expensive, and so a Cost/Benefit analysis would need to be undertaken before such an approach could be advanced much further.

In July 2014, Malaysian Airlines Flight MH17 was shot down over Ukraine, killing all on board. At the time the Ukraine/Russia crisis was underway, with fighting from both sides in Eastern Ukraine and it is widely accepted that the aircraft was mistaken for a military aircraft. Although arguments rose as to which militant group was ultimately responsible, questions have also arisen as to why a commercial airliner was flying over airspace with a known war risk. Previously the height at which civil jet liners cruise has always been considered high enough to mitigate the risk of any ground based military action but, in this instance, a missile still managed to reach the jet. This was a tragic event and has made the industry look at their procedures for flights close to conflict zones and any 'safe altitude' recommendations.

With regard to congested airspace, particularly in areas which have seen massive growth in operations, such as the Gulf States, South East Asia, and China, the authorities in the regions concerned are looking at how best to address the issue. For the Gulf and South East Asian regions mentioned above, the likely approach is to look to develop their own version of common airspace similar to that in Europe to co-ordinate the various authorities with respect to regulation and air traffic management. The opening up of some military airspace to use by civilian aircraft is also seen as key for the Asian airspace particularly.

The increase in air rage incidents and the safety risk this poses to passengers was evident in 2014, with numerous high profile incidents being reported during the year. Causal factors have been highlighted as alcohol; tiredness; lack of legroom; and increased stress levels due to airport processing, particularly security. Work is being undertaken to address these areas, but the international authorities are also looking to develop, through the Montreal Protocol, a more effective deterrent for unacceptable behaviour on board an aircraft.

One of the largest proportions of accidents to airframes is still runway excursions, including over-runs. Work is being progressed independently by Airbus and the US FAA, including "real time" assessments of

runway length required against runway available during flight, with an aim to reduce these events, which continue to be the most frequent runway accident type over the last 4 years.

In 2014, commercial aviation safety and security issues were in the public spotlight more prominently than previous years due to a number of high profile aviation accidents. This was despite 2014 continuing the year-on-year improvement in commercial aviation safety, with lower fatalities per 10 million flights compared to 2013. Of the global accidents and incidents, the greatest cause of aircraft damage is believed to be “runway incursion” and so work is underway in the industry to see how such events can be minimised.

The disappearance of two commercial passenger flights has led to questions as to the industry’s ability to track and communicate with aircraft across territories, land and sea. These two accidents, and a third in Algeria, also highlighted the role of human factors and its significance in aviation accidents. A fourth major incident involved a Boeing 777 aircraft being shot down over Ukraine during the Crimea Crises, leading to an examination of corporate and regulatory policy in conflict zones.

These aviation accidents/incidents have highlighted challenges as to the regulation of airspace around the world. With year on year growth in the aviation market, and with more flights and destinations, airspace is becoming constrained in places raising challenges for future capacity considerations. In addition, ‘grey areas’ in the coverage and integration of airspace territories has affected the ability for air traffic controllers to track aircraft, identifying gaps between the handover from one territory to another. This will be discussed further within this section, highlighting what authorities, territories and airlines are undertaking to overcome the challenges and mitigate the risks associated with airspace management. The prevalence of incidents in Asian airspace has also raised concerns in the industry, and this is the subject of work to assess where improvements could be made.

With the current pressure on airport processes and capacity, modern day flying can be a stressful experience for passengers, whether they are with families; travelling on business; or individuals flying for leisure. Over recent years there has been a growing trend in the number of ‘air rage’ incidents and ‘disruptive’ passengers on board aircraft. Due to the confined space these occurrences can be a danger to those on-board and generally result in disruption to flights. A high profile incident in December 2014 at New York, involving an airline executive’s daughter, underlined the problems facing the industry with disruptive passengers.

This chapter will provide an overview on the safety statistics for 2014 and the key safety and security issues as outlined above that have arisen over the course of the year.

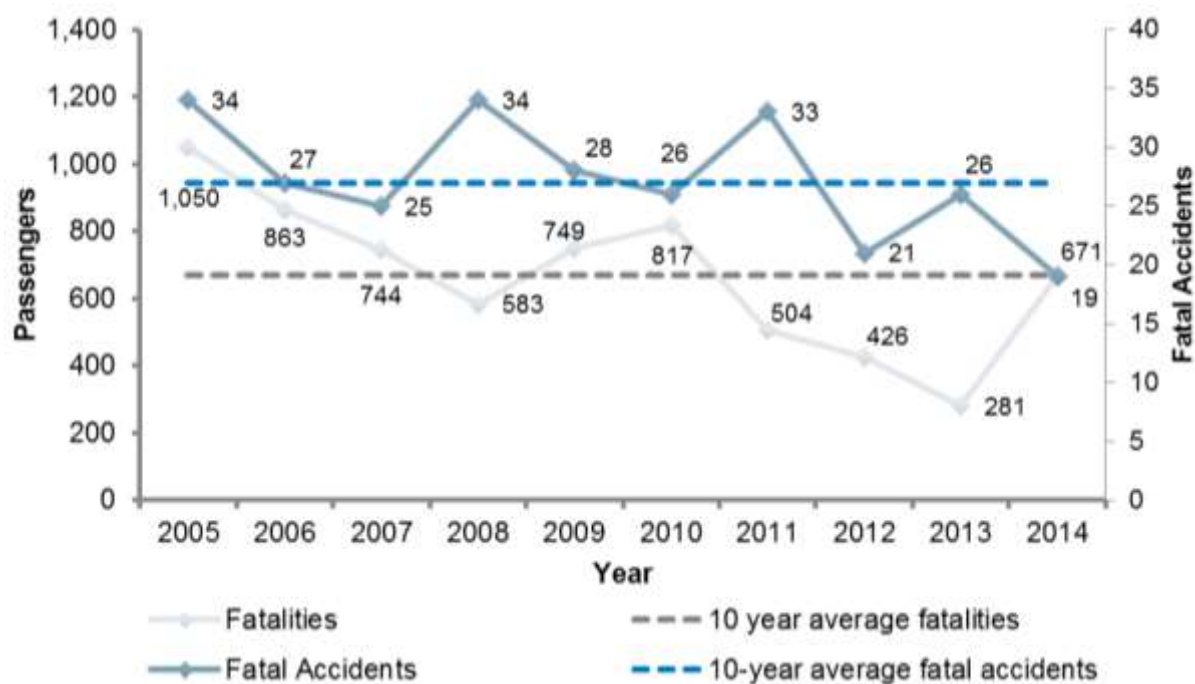
## **8.2. 2014 Safety Review**

### **2014 Performance**

In 2014, there were 671 fatalities from 19 commercial passenger jet accidents. This represented the safest year on record in terms of the number of fatal accidents, although the number of fatalities was the highest it has been since 2010. Overall, a continuing downward trend in the number of accidents can be seen. It should be noted that these statistics do not include the shooting down of the Malaysian Airlines Boeing 777 over Ukraine as this is considered as ‘War’ Risk. This incident is described further within this report.

The graph below shows the historical commercial airliner passenger fatalities and how this compares to 2014. Table 59 provides further detail to the major accidents which occurred in 2014.

Figure 152: World Commercial Airline Fatal Accidents and Fatalities 2005 to 2014



Source: Mott MacDonald Analysis of FlightGlobal Data

Table 59: Fatal Accidents 2014

Date	Operation	Operator	A/c Type	Location	Fatalities	Phase
08-Mar	S.P	Malaysian Airlines	B777	Malacca Strait	239	ER
24-Jul	S.P	Air Algerie	MD-83	Mali	116	ER
28-Dec	S.P	AirAsia Indonesia	A320	Java Sea	162	ER
16-Feb	R&C	Nepal Airlines	DHC Twin Otter	Nepal	18	ER
23-Jul	R&C	TransAsia Airways	ATR 72	Taiwan	48	RA
10-Aug	R&C	Sepahan Airlines	HESA IrAn-140	Iran	48	C
20-Sep	R&C	Hevilift	DHC Twin Otter	Papua New Guinea	4	AA
18-Jan	N.P	Trans Guyana Airways	Cessna Grand Caravan	Guyana	2	ER
17-Feb	N.P	Global Air Connection	BAE 748	South Sudan	1	L
08-Apr	N.P	Hageland Aviation Services	Cessna Grand Caravan	USA	2	ER
08-May	N.P	Aliansa	DC-3	Columbia	5	ER
02-Jul	N.P	Skyward International Aviation	Fokker 50	Kenya	4	C
23-Aug	N.P	Doren Air Congo	Let L410	DR Congo	2	ER
30-Aug	N.P	Ukraine Air Alliance	Antonov AN-12	Algeria	7	C
31-Aug	N.P	Safari Express Cargo	Fokker F27	Tanzania	3	ER

Date	Operation	Operator	A/c Type	Location	Fatalities	Phase
29-Oct	N.P	Skyway Enterprises	Bombardier Short 360	Netherlands Antilles	2	C
14-Nov	N.P	Global Air Connection	BAE systems HS748	South Sudan	2	L
28-Dec	N.P	Air Services	BN Islander	Guyana	?	ER
28-Dec	N.P	Unconfirmed	Antonov AN-12	DR Congo	6	ER

S.P= Scheduled Passenger, R&C= Regional and Commuter, N.P= Non Passenger,

ER=en-route, L=Landing, C=Climb, RA=Runway/Final Approach

The figure below shows the regional distribution of the airliner hull loss rates. Africa, CIS and Middle East/North Africa regions still continue to have the highest hull loss rates per million sectors despite improvements over the previous 5 years.

Figure 153: Total Jet Aircraft Hull Loss Rate by IATA Region



The above statistics include the 3 high profile accidents which involved large passenger aircraft, and account for 77% of the fatalities recorded.

Although all aircraft incidents or accidents are investigated to find contributory factors with an aim to minimise/eliminate future occurrences, these high profile events have highlighted key risks which have potentially not been considered before, and have forced the industry to investigate these under the wider gaze of the general public.

## High Profile Incidents

### Malaysian Airlines Flight MH370

On the 8<sup>th</sup> March 2014, Malaysian Airlines flight MH370 disappeared over the Malacca Strait between Malaysia and Vietnam whilst the flight transferred between the Air Traffic Control (ATC) centres of the two

territories. The Boeing 777 aircraft had on board 227 passengers and 12 crew that are presumed dead<sup>183</sup> and the main issues arising from this accident include Human Factors; failings in aircraft tracking; and airspace management. One theory in some areas of the industry is that the captain and/or co-pilot are believed to have played a key role in the disappearance of the aircraft, with suicide considered as a possibility as part of the investigators “rogue pilot” theory. However the reason for the disappearance of the aircraft is still a mystery as no significant wreckage<sup>184</sup> has been found. Investigators have established that the aircraft ceased communication 40 minutes into the flight when the aircraft transponder stopped communicating. At this point the aircraft would have “disappeared” as a “known aircraft” from ATC screens. Military radar did pick up signals believed to be from the aircraft using primary radar, and these showed the aircraft veering sharply off the flight plan.

The lack of “traceability” of the aircraft renewed calls for improvements to be made in aircraft tracking given its similarity to an incident five years earlier. In 2009, an Air France A330 (Flight AF447) crashed in the Atlantic Ocean. Although wreckage was found within days, it took investigators nearly two years to locate the black boxes due to an inability to precisely locate where the aircraft crashed. This accident had similar challenges to that of MH370 which went missing in-between airspace handovers. Aircraft communications and airspace management is analysed later in this section.

## AirAsia Indonesia Flight QZ8501

On the 28th December 2014, an AirAsia Indonesia Airbus A320, bound for Singapore, crashed into the Java Sea after the aircraft encountered bad weather on its departure from Surabaya- Indonesia, with a total of 162 passenger and crew losing their lives. Subsequent investigations indicted that the aircraft executed an abnormally steep climb on departure which caused the aircraft to go into a stall and crash into the sea. The hunt for a cause has focused on human error and/or aircraft malfunction looking at whether there was a conscious decision to climb at the abnormal rate, potentially to avoid adverse weather, or whether there was a malfunction of the Flight Augmentation Computer (FAC) which provides inputs to the aircraft control surfaces as part of the Airbus fly-by-wire system. A final report is expected in the latter half of 2015.

## Air Algerie Flight 5017

An Air Algérie flight operated by a MD-83 aircraft from Spanish charter carrier Swiftair crashed in Mali with the loss of 116 lives whilst en-route from Ouagadougou in Burkina Faso to Algiers. Similar to that of AirAsia Indonesia flight QZ8501, bad weather, human factors and aircraft malfunction are thought to be the contributing factors. The air crash investigators – the French Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile (BEA) which is providing technical assistance to the Malian authorities has established that icing in the pressure sensor within the engine caused erroneous values with regard to airspeed and thrust to be provided to the engine management system. This inaccurate information caused the system to limit thrust in the engine to a lower level than that necessary to maintain airspeed and stability. This caused the aircraft to stall. Flight Data Recorder (FDR) data showed that the crew did not undertake any ‘stall-recover manoeuvres’, possibly due to lack of training, or the crew not realising that there instruments were providing false readings.

## Malaysian Airlines Flight MH17

On the 17th of July, a Malaysian Airlines Boeing 777 en-route to Kuala Lumpur from Amsterdam was shot down over Ukraine during the Ukraine/Russia crisis, killing 298 passengers and crew. It is believed that the

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<sup>183</sup> Flight International 13-19<sup>th</sup> January 2015 Edition

<sup>184</sup> On 5<sup>th</sup> August 2015 it was announced that an aircraft flap found on a beach on Reunion island, in the Pacific, was from Malaysian Airlines Flight MH370

flight was mistaken for a military aircraft, and that the commercial airliner had not been deliberately targeted by any Ukraine/Russian fighting groups. Questions were raised by the airline industry and authorities as to why the aircraft was flying through Ukrainian airspace after previous warnings to pilots to avoid this area due to the conflict<sup>185</sup>.

Ukraine had restrictions in place over its territorial airspace, providing an effective “no fly zone” up to 32,000 ft. However, the Malaysian aircraft was flying at 33,000ft, above the zone’s upper limit, but unfortunately still in range of modern day missile technology.

Typically, operators can fly at high attitudes whilst flying over conflict zones with the altitude mitigating the risk of potential consequences from a conflict such as a missile attack. However, this incident has shown that modern day missile technology has the capability to reach the high flight levels flown by commercial jet liners.

It must be noted that the instructions to not overfly the Ukraine were only recommendations by the Federal Aviation Administration and Eurocontrol, and that airspace management is the responsibility of the territory and therefore international action is limited to such recommendations issued by regulatory authorities.

### **8.3. Airspace Management and Communications**

In 2014, there were 2 major accidents that involved airspace management and communication failures – the shooting down of Malaysian Airlines Flight MH17 over the Ukraine; and the disappearance of Malaysian Airlines Flight MH370 over the Malacca Strait (Both described in Section 8.2). The Malacca Strait incident was reminiscent of the loss of Air France AF447 in 2009 when the Airbus A330 crashed over the Atlantic but an inability to accurately pinpoint the location of the wreckage resulted in a 2 year search to locate the black boxes.

These incidents have raised concerns that, despite modern technology and globalisation of the aviation industry, it is still possible to ‘lose’ aircraft. With increases in the number flights and destinations, in addition to aircraft with longer ranges, it is becoming more important that the air traffic management system is able to know where an aircraft is at any one time around the globe. In 2014, industry representatives, associations, organisations and manufacturers undertook a holistic approach to address this issue.

Outside of these high profile incidents it is also evident that airspace around the world is getting congested. This is a subject of concern for the aviation industry and is looking to be addressed.

## **Global Tracking Systems**

Following the Malaysian Airlines disappearance over the Malacca strait, the International Civil Aviation Organisation (ICAO) has called for a global standard for the tracking of aircraft across airspace<sup>186</sup>. In May 2014, ICAO held a special meeting on ‘Global Flight Tracking of Aircraft’ to achieve consensus amongst member states to ensure priority is given to track airline flights no matter what their location or destination is. A framework was also established for medium to longer term efforts.

ICAO’s initiative has been supported by the International Air Transport Association (IATA) through their Aircraft Tracking Task Force (ATTF) consisting of Airlines for America, Association of Asia-Pacific Airlines, the Civil Air Navigation Services Organization, Flight Safety Foundation, International Coordinating Council

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<sup>185</sup> Business Insider “Pilots Continued Flying Over Ukrainian War Zone Because It Was The Fastest And Cheapest Route, July 18th 2014

<sup>186</sup> International Civil Aviation Organisation, Newsroom > ICAO Delivers Agreement Between States, Industry Groups on Global Airline Flight Tracking Capability

of Aerospace Industries Associations, International Federation of Air Line Pilots Associations, Boeing, Airbus, Bombardier and Embraer. The ATTF is looking at current technology, services and products to determine how these can be used more effectively to implement global flight tracking<sup>187</sup>.

One of the challenges facing the world's airspace management systems is that it is principally based on land radar technology which detects and measures an approximate position for an aircraft. The nature of radar technology means the coverage stops approximately 240km from land. In order to receive additional data and coverage from aircraft flying overseas, secondary radar coverage is required. This is dependent on aircraft having a transmitting transponder, which produces a response when it receives a radio-frequency (the transponder on Malaysian Flight 370 was switched off or failed) and high frequency radio communication.

Modern aircraft are now usually fitted with Global Positioning Systems (GPS), but the data provided to pilots is not commonly provided to air traffic control, which still uses the radar system to determine an aircraft's location. The industry is close to introducing an Automatic Dependent Surveillance Broadcast (ADS-B) system which will locate aircraft using GPS and relay the aircraft's position back to the ground and other planes<sup>188</sup>. However, this new system will not provide ocean coverage which has been one of the 'black spots' of the current system.

A GPS based system would provide tracking of aircraft across land and sea that would enable air traffic controllers to identify an aircraft's location without reliance on proximity to land. However, the costs of implementing this system would be significant as it would require an overhaul of the world's current air traffic management system which is based on radar technology. Using GPS systems on modern day aircraft to 'up link' data to satellite tracking services would be a step forward if all aircraft were to be fitted with GPS. However, handling large volumes of data is costly and the aviation industry would need to decide if the reduction of this particular risk justifies the investment.

## Congested Airspace

As the demand for air travel increases airspace is becoming congested with regions of large growth, such as the Persian Gulf, facing capacity shortages from years of rapid growth in the sector. The rise of the global hub carriers such as Emirates (UAE), Qatar Airways (Qatar) and Etihad (UAE) has resulted in a large concentration of traffic in a relatively small geographical area. Other countries are also facing similar issues.

Congestion in airspace impacts safety; can cause delays; and impedes growth plans that the airlines/airports. In the Persian Gulf the Gulf Cooperation Council (GCC) consisting of 6 member states – Saudi Arabia, Oman, UAE, Qatar, Bahrain and Kuwait - expect to be handling over 400 million passengers per year by 2020<sup>189</sup>, with their airlines having hundreds of aircraft on order and their airports expanding rapidly. To meet this expected demand and to ensure commercial aviation safety in the air, the airspace structure is required to change. The member states are researching the potential solutions to the problem and how best to alleviate the future pressures on the airspace.

The current thinking is to look at introducing a common airspace similar to that in Europe and that planned for South East Asia in order to overcome the challenge. It is hoped that by having a seamless integration of airspace, with harmonised systems and procedures, this will meet the expected demand without compromising aircraft and passenger safety. One element of the proposed solutions to the problem is to

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<sup>187</sup> International Air Transport Association – Aircraft Tracking Task Force Frequently Asked Questions

<sup>188</sup> BBC News- How do you track a plane? 17<sup>th</sup> March 2014

<sup>189</sup> BqDoha, 'Unified Gulf airspace essential'. January 1<sup>st</sup> 2015

open up military airspace across the region for civilian use as the military airspace accounts for 40-60% of the regions total airspace<sup>190</sup>. This is also seen as one of the major challenges.

China is another region with a rapidly growing air travel market, especially the internal domestic market, and this too is facing capacity constraints. China has launched new air traffic corridors for commercial airliners to use in a bid to reduce congestion but, as with the Gulf States, one reason for congestion is the prevalence of military airspace which accounts for 80% of airspace, with only 20% being available for commercial use<sup>191</sup>.

## Technology

Airspace congestion, with a requirement for multiple handovers and the number of physical aircraft to manage, increases the workload of both pilots and controllers. This creates a risk to safety as it leads to a higher chance of a mid-air collision. This therefore also needs a greater reliance on technology and automation to cope with such increases.

Reliance on automated air traffic management systems reduces the ability to move to manual modes if and when systems fail. For example, on 12<sup>th</sup> December 2014 a computer malfunction within the UK control system led to a major disruption in London airspace. This resulted in manual methods of air traffic management having to be adopted, but these do not have the same level of capacity as automated tools. All departures therefore had to be stopped at 3pm on the day with normal operating procedures in place an hour later<sup>192</sup>. Disruption and knock-on effects were however still experienced the following day.

## Summary

Overall, national and regional air space will become more congested as the demand for air travel increases. Countries and regions are increasingly likely to be required to deliver integrated airspace management systems so as to ensure continued airspace safety without the risk of pilot or controller overload. The trade-off for improving capacity, however, is a greater reliance being put onto automated systems with the risks associated with malfunctions or failures having to be assessed, as manual methods and the human capability will not be able to safely manage the volume of aircraft in the skies.

### 8.4. Disruptive Passengers and Air Rage

During 2014 a number of high profile “air rage” occurrences underlined the upward trend in such events witnessed across the industry.

The most high profile incident occurred on a Korean Air flight departing New York JFK Airport in December 2014. An executive of the airline, and heiress to the business, had an argument with a steward and demanded that the aircraft return to the gate. The seriousness of the incident resulted in the executive being jailed for one year for obstructing aviation safety<sup>193</sup>.

Similar incidents in Asia have also been recorded with hot water being thrown over a flight attendant; a passenger opening an emergency exit door on landing; and a brawl on board an aircraft over a crying baby<sup>194</sup>. These incidents resulted in authorities issuing large fines to the passengers in question.

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<sup>190</sup> The National, GCC airspace proves growing worry, December 10<sup>th</sup> 2014.

<sup>191</sup> U.S.-China Economic and Security Review Commission Staff Report, China's Airspace Management Challenge, Kimberly Hsu

<sup>192</sup> CAA, NATS System Failure 12 December 2014 – Final Report Independent Enquiry 13 May 2015

<sup>193</sup> BBC News- “Korean Air executive jailed in ‘nut rage’ case, 12<sup>th</sup> February 2015

<sup>194</sup> CNN- Air rage and emergency exits: Two stormy weeks in Chinese aviation, December 19<sup>th</sup> 2014



In Europe a study conducted by the UK's Civil Aviation Authority identified that the number of 'air-rage' incidents in UK airspace, including assaults on passengers and crew, have almost trebled between 2011 and 2013,

Authorities are quick to react to such air rage incidents and hand out large fines/ prison sentences for any passenger found guilty of obstructing aviation safety. However, there is now a move to investigate the causes of air rage so as to try and prevent/minimise such incidents taking place in the future.

Such causal factors are understood to include alcohol; tiredness; lack of legroom; and pre-boarding security checks at the airport<sup>195</sup>. On the last point, greater security measures implemented at airports over the last few years, particularly since 2011, have increased stress levels amongst passengers before they board their flight. Work is therefore being done to assess how such stress could be alleviated. For the other causal factors some of the ways that these are being addressed are:

Alcohol - airports have been urged to limit the sale of alcohol to passengers after numerous incidents involving intoxicated passengers. Despite carriers having strict rules on alcohol consumption on-board, as it is an offence for a person to be drunk on-board an aircraft, passengers are responsible for their own behaviour whilst in the airport terminal. Some airlines have now banned the on-board carriage of or sale of alcohol on some routes with a history of disruptive passengers<sup>196</sup>.

Legroom - One British airline, Monarch, removed reclining seats on board aircraft in 2014 to reduce 'air rage' amongst passengers who objected to losing leg room when the seat in front was reclined, whilst at the same time increasing space for passengers<sup>197</sup>.

In 2014, Dispax World held the 2<sup>nd</sup> International Conference on Disruptive Airline Passenger Behaviour at Heathrow Airport<sup>198</sup>. Representatives from IATA, Association of Asia Pacific Airlines (AAPA) and the European Cockpit Association congregated to identify:

- Causes of disruptive behaviour
- Responses available to such behaviour
- Legal implications for carriers and states

Discussions were held amongst airlines, security agencies, security academics, behavioural academics and front line airline staff.

After a series of air rage incidents in China, the Civil Aviation Administration of China considered creating a 'blacklist' for passengers that have caused disruption on flights and for these passengers to be on 'no-fly lists' similar to that of the USA with those passengers linked to potential terrorism activity. In addition, the authorities stated that unruly passengers could also face legal sanctions but did not specify what those would be<sup>199</sup>.

## Montreal Protocol

IATA launched the Montreal Protocol in 2014 which has set out to make important changes to the original Tokyo Convention that came into force in 1969. The Tokyo Convention governs offences and other acts that occur on board aircraft inflight. The Montreal Protocol extends the jurisdiction over the offence to the

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<sup>195</sup> BBC News - Fighting the rise of 'air rage', 30<sup>th</sup> April 2009

<sup>196</sup> <http://www.telegraph.co.uk/travel/travelnews/ryanair/11760341/Ryanair-bans-duty-free-booze-from-Ibiza-flight.html>

<sup>197</sup> Huffington post, The Airline that is saying goodbye to reclining seats, 2<sup>nd</sup> June 2015

<sup>198</sup> Dispax World 2014

<sup>199</sup> The Times, China cracks down on air rage travellers, 27<sup>th</sup> 2014

destination country of the flight in addition to the country of aircraft registration<sup>200</sup>. This closes a loophole which allowed many serious offences to escape legal action. There are also new provisions to deal with the recovery of significant costs arising from unruly behaviour, such as expenses associated with an aircraft divert which include compensation costs to passengers; airport charges at the divert airport; and any fuel dumping costs that are incurred. It is hoped that the protocol will provide greater clarity to the definition of unruly behaviour and be of benefit to crews and passengers alike to provide a more effective deterrent for unacceptable behaviour on board an aircraft.

A total of 22 states will be required to ratify the protocol before it can be implemented.

## Summary

Overall, as more and more passengers take to the skies it is likely that air rage incidents will increase in the future. Pressure on infrastructure and lengthy security procedures will continue to create a more 'stressful' environment for passengers that can contribute to air rage, but this is something that can be reviewed. Air rage is not only costly to airlines, it is also disruptive to passengers and causes safety and security risk for passengers' on-board. IATA's response to the rise in air rage incidents, and the major legal systems taking strong action against such behaviour, should act as a deterrent and message to travellers that disruptive behaviour will be dealt with firmly by the courts and industry.

### 8.5. Safety and Security – Asia Pacific Region

Over the course of 2014, some of the major accidents recorded such as the Malaysian Airways and Air Asia flights have put a spotlight on the safety and security of Asia Pacific commercial aviation.

The member airlines of the Association of Asia Pacific Airlines (AAPA) recorded a doubling of passenger numbers between 2003 and 2012<sup>201</sup>. Growth in the region is expected to continue to grow from 4.8 trillion Revenue Passenger Kilometres (RPKs) in 2010 to 12.3 trillion RPKs in 2030, representing a third of worldwide RPKs<sup>202</sup>. The region is the world's largest aviation market with 37% of all orders for aircraft for the period 2014-2033<sup>203</sup> originating from the region.

There are concerns that this rapid rate of growth has outpaced the development in safety procedures and regulatory oversight. With intense competition and profit margins low, at \$6 dollars a passenger<sup>204</sup>, questions have been raised as to the standards of safety, particularly in aircraft maintenance. In 2008, the Asian hull loss rate was approximately 0.2 per million flights from 2008-2010. However, between 2012 & 2014, this increased to 0.4 despite the worldwide hull loss rate remaining at 0.2 per million flights. An ICAO report found that between 2008 – 2012, 33% of accidents in the Asia Pacific Region involved deficiencies in regulatory oversight and 27% included deficiencies in safety management<sup>205</sup>.

The European Union has a 'blacklist' of airlines that are not allowed to operate in the EU due to their safety performance not meeting the necessary internationally recognised safety standards. All but 5 airlines (of a

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<sup>200</sup> IATA – Policy – Unruly Passengers [www.iata.org/policy/pages/tokyo-convention.aspx](http://www.iata.org/policy/pages/tokyo-convention.aspx)

<sup>201</sup> Source: CAPA – Centre for Aviation and AAPA, <http://centreforaviation.com/analysis/asian-carriers-post-solid-traffic--load-factor-increases-in-2012-but-cargo-remains-a-headache-aapa-96761>

<sup>202</sup> Association of Asia Pacific Airlines (AAPA), Industry Overview and Regulatory Challenges, Presentation by Andrew Herdman, Director General of AAPA

<sup>203</sup> Boeing, Current Market Outlook 2014-2033

<sup>204</sup> Association of Asia Pacific Airlines (AAPA), Growth Dynamics and Competitive Challenges, Presentation by Andrew Herdman

<sup>205</sup> Japan Times: In wake of accidents, safety issues challenge fast-growing Asian aviation market, April 7th 2015., [www.japantimes.co.jp/news/2015/04/07/business/wake-accidents-safety-issues-challenge-fast-growing-asian-aviation-market/#.VZvZ\\_2fbKUI](http://www.japantimes.co.jp/news/2015/04/07/business/wake-accidents-safety-issues-challenge-fast-growing-asian-aviation-market/#.VZvZ_2fbKUI)

total of 73) in Indonesia are included within the 'Blacklist' which shows the extent of the concerns that the wider industry has on the safety of Asia Pacific Airlines and the regulatory environment for safety in certain countries.

One of the challenges facing the region is the growth rate of commercial air travel compared to that of North American and European markets which are considered "mature". The liberalisation of the aviation market and the growing middle classes within Asia has exerted pressure on the region's Infrastructure, airspace, regulatory procedures and qualified work force.

The intense competition and rise of the low cost carriers in region is putting pressure of airlines to save costs whilst ensuring they have enough qualified staff to meet demand. It is estimated that for every new aircraft addition to a fleet, an additional 30 staff are required; finding qualified staff, or having the ability to train staff, is challenging, particularly for smaller airlines.

The Association of Asia Pacific Airlines is calling for greater regulatory oversight of aviation safety in the region. There are concerns that air operator licences (AOCs) are being issued without the proper screening and greater regulatory monitoring should be applicable to those carriers that have just received AOCs<sup>206</sup>. Authorities and regulatory bodies from across the world are advocating for greater knowledge and data sharing amongst countries to improve safety.

One of the biggest issues is simply that the number of countries within the Asia Pacific region creates a patchwork of regulatory oversight areas and a fragmented safety regime. The Association of Southeast Asian Nations (ASEAN) does not have a singular/regional agency that oversees aviation or coordinated air traffic management, and this creates inconsistency amongst country safety standards and in air traffic management. Organisations similar to Eurocontrol and the European Aviation Safety Agency (EASA), which would provide a regional oversight structure for aviation and air traffic management safety, have yet to be developed for the region. The ASEAN single aviation market is due to come into effect on 1<sup>st</sup> January 2015 which will create a single unified transport market for the ten members (Brunei, Cambodia, Indonesia, Lao, Malaysia, Myanmar, Philippines, Singapore, and Vietnam). However, it is unlikely that the development and implementation of 'common rules' framework would be established with a common set of ASEAN-wide aviation safety rules<sup>207</sup> prior to 2020 due to the sovereignty of airspace which is major barrier for such initiatives.

## 8.6. Runway Overruns

Runway excursions remain the primary source of hull losses or damages in commercial aviation. In 2014, the following principle runway excursions occurred:

Table 60: Runway excursions occurred in 2014

Operator	Aircraft	Country	Fatalities	Notes
Global Air Connection	Bae 748	South Sudan	1	Veered off runway
Nature Air	Bombardier Dash 6	Costa Rica	-	overran runway
Aeronaves/	MD DC-9F	Mexico	-	veered off runway
Air Greenland	DHC Dash 8	Greenland	-	landing gear failure, veered off runway
East Air	Airbus A320	Tajikistan	-	overran runway into deep snow

<sup>206</sup> Aviation Week, Asia – Pacific Airlines Seek More Safety Oversight, April 27<sup>th</sup> 2015.

<sup>207</sup> Implementation Framework Of The ASEAN Single Aviation Market, ICAO

Operator	Aircraft	Country	Fatalities	Notes
Ariana Afghan Airlines	Boeing 737	Afghanistan	-	overran runway
Air Asia	Boeing 737	Brunei	-	overran runway

Source: Flight Global data

Runway overruns causes the largest proportion of fatalities than any other runway incident. The NTSB recorded 680 fatalities between 1995 and 2007 as a result of runway overruns. Such incidents also cause significant damage/write off to aircraft as excursions and overruns are the primary causes of civil airliner hull losses<sup>208</sup>. It is estimated by ICAO that there are 2 runway excursions each week worldwide – a number which has not reduced over the last 20 years<sup>209</sup>.

Aircraft Manufacturers are introducing technology to reduce the risk of these events. Airbus has developed a Runway Overrun Prevention System (ROPS) which computes minimum realistic in-flight landing and on-ground stopping distances, comparing them to available landing distances in real time. Factors considered include runway topography; runway condition; aircraft weight and configuration; and wind and temperature. During 2014, Airbus launched ROPS on its A330 wide body aircraft and delivered the first new A350 aircraft with ROPS installed.

In June 2014, the American Federal Aviation Administration (FAA) launched a National Runway Safety Plan 2015-2017. The Plan provides strategic guidance to the aviation community about current and planned FAA runway safety activities, organisational alignment, stakeholder engagement, and success metrics. The Plan is a single, overall national strategy to ensure that organisations with runway safety responsibilities understand these responsibilities and work together<sup>210</sup>. This is designed to reduce the risk of runway excursions.

Work can therefore be seen to be ongoing to reduce the number of events, increasing aviation safety.

<sup>208</sup> Airbus Press Release, Airbus' Runway Overrun Prevention System (ROPS) certified on A320ceo Family, 01 August 2013

<sup>209</sup> Civil Aviation Authority of Singapore, ATSC - Air Traffic Services Information Circular Aerodrome and ANS Regulation Division, Number 01/2013

<sup>210</sup> National Runway Safety Plan 2015 – 2017, FAA, June 2014

## 9. Consumer Issues

### 9.1. Introduction

Passenger rights and consumer issues within Europe have continued to evolve over the past twelve months. The introduction and proposed revision to EC Regulation 261/2004 alongside recent changes to package holiday regulation have all played a critical role in this development and, today, airlines and airports across the Continent are now expected to perform to a certain standard or face paying the consequences.

As further detailed later in the chapter, the regional punctuality and reliability league tables see Europe taking second best place, just behind Latin America, with a top on-time performance rating of 90.58%. Furthermore, European carrier KLM took the title as the most punctual global airline for 2014 suggesting that when compared to the rest of the world, Europe generally performs well.

The UK CAA cites<sup>211</sup> a notable improvement in airline punctuality following the Sturgeon Ruling in 2009, suggesting European legislation is at least meeting basic expectations by encouraging airlines to actively improve upon their service. However, whilst Europe may set an example to countries across the globe which is yet to introduce passenger rights legislation at all, court cases over the years suggest that Europe's legislation on air passenger rights is not without its faults. Airlines' interpretation of the regulation has continually differed from the way in which passengers interpret the rules leading to lengthy court cases and constant re-affirming and re-defining of terms.

The International Air Transport Association (IATA) continues to reinforce the fact that differing legislation around the world has allowed for "patchwork regulation". Core Principles on Consumer Protection were drawn up by IATA in 2013 in response to this issue and, one year later, the International Civil Aviation Organisation (ICAO)<sup>212</sup> Air Transport Regulatory Panel met and agreed their own core principles on consumer protection in a step towards greater convergence and compatibility. Both IATA and ICAO continually encourage Governments across the world to work together in creating a harmonised, simple set of rules which allow for adequate consumer protection without overburdening the airlines themselves.

Europe should certainly take pride in the fact that on-time performances of both airports and airlines are some of the best that the world has to offer but the efforts put into ensuring this continues will all be in vain if regulatory issues are not addressed. A constant re-defining of terms is not the way forward for the industry and primary focus should be put upon removing the ambiguity that still exists in European regulation today. The European Commission's proposal<sup>213</sup> to amend the Regulation aims to provide greater clarity and better application of passenger rights whilst ensuring that the obligations of air carriers remain financially realistic. Despite still being caught up in the legislative process, Regulation which adheres to the needs of both the passenger and the air carrier at least represents a step forward in the right direction.

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<sup>211</sup> <http://www.bottonline.co.uk/flight-compensation-latest-news/rise-in-claims-leads-to-best-ever-airline-punctuality> (Accessed: June 2015)

<sup>212</sup> "The constitution of ICAO is the Convention on International Civil Aviation, drawn up by a conference in Chicago in November and December 1944, and to which each ICAO Contracting State is a party. (This Convention is also known as the Chicago Convention). In October 1947, ICAO became a specialised agency of the newly-established United Nations." – Skybrary, December 2015.

<sup>213</sup> <http://www.aviationlaw.eu/wp/wp-content/uploads/2013/09/Proposed-Revision-of-Regulation-261-2004.pdf> (Accessed: January 2016)

This chapter aims to look at various developments and issues within European passenger rights and legislation, focussing initially on airport and airline punctuality and delay statistics and the changes made to legislation since the beginning of 2014. In addition, developments from across the world are presented later in the section, including the response from IATA to the varying issues apparent today.

## 9.2. Airports' Punctuality & Delays

Airport and airline punctuality statistics continue to play an important role when it comes to changes to passenger rights legislation. Today, airlines and airports are under pressure by consumers and regulators alike to perform to a certain standard or risk having to compensate for the consequences of not doing so. Airport punctuality is of particular importance as this can have an effect on passengers' perception of an airline, even though it may not have been the fault of the carrier itself.

Using EUROCONTROL statistics, the following sub-section provides an assessment of European airport delay statistics across the European Union and the causes of these delays. In addition, the Sturgeon Ruling prompting changes to European-wide legislation is detailed and an assessment is made into its impact on the number of claims made against the airlines since the Ruling came into effect.

### Central Office of Delay Analysis (CODA)

The EUROCONTROL Central Office for Delay Analysis (CODA) reports the varying performances of airports across the region using delay information provided directly by the airlines. In order to accurately measure delays at European airports, EUROCONTROL produces an annual report known as the "CODA Digest". The CODA Digest Delay Groupings can be found at the end of this chapter in the Consumer Issues Annex B.

Table 61, below, lists the top 20 European airports affected by delays in 2014 and compares these figures to the previous two years. It should be noted that a flight is considered delayed if it departs more than 5 minutes after scheduled time of departure.

Table 61: Top 20 Airports Affected by Delays in 2014 (Ranked by Average Delay per Departure)<sup>214</sup>

Rank 2014	Departure Airport	Country	Average Delay per Departure 2014	Average Departure per Delayed Departure 2014	% Delayed Departures 2014	Average Delay per Departure 2013*	Rank 2013	Average Delay per Departure 2012*	Rank 2012
1	Lisboa	Portugal	18.2	32.6	55.8%	14.6	1	16.4	1
2	London/Gatwick	UK	14.6	28.4	51.4%	12.8	3	12.0	5
3	Rome Fiumicino	Italy	13.8	24.4	56.6%	12.6	4	10.2	11
4	London/Luton	UK	12.8	28.3	45.3%	10.8	9	11.7	6
5	Porto	Portugal	12.6	30.3	41.6%	n/a*	n/a*	n/a*	n/a*
6	London/Heathrow	UK	12.3	25.7	47.7%	13.1	2	12.5	4
7	Istanbul-Ataturk	Turkey	12.2	23.1	52.8%	n/a*	n/a*	13.8	2
8	Venezia Tessera	Italy	12.1	29.4	41.3%	11.3	8	9.8	13

<sup>214</sup> All figures in this table refer to EUROCONTROL CODA Digest (2012, 2013 & 2014).  
\*airport was not present in that year's top 20 affected departure airports.

Rank 2014	Departure Airport	Country	Average Delay per Departure 2014	Average Departure per Delayed Departure 2014	% Delayed Departures 2014	Average Delay per Departure 2013*	Rank 2013	Average Delay per Departure 2012*	Rank 2012
9	Manchester	UK	12.0	27.5	43.5%	12.6	5	13.7	3
10	Milano Malpensa	Italy	11.5	28.5	40.4%	10.3	12	9.5	20
11	Paris CDG	France	11.4	24.1	47.3%	12.2	6		8
12	Nice	France	11.2	26.9	41.4%	10.2	14	9.8	14
13	Palma de Mallorca	Spain	10.8	28.9	37.4%	10.5	10	10.7	10
14	Birmingham	UK	10.7	26.0	41.3%	10.2	13	9.6	17
15	Brussels National	Belgium	10.7	23.5	45.8%	9.8	17	n/a*	n/a*
16	Alicante	Spain	10.5	27.4	38.4%	10.4	11	n/a*	n/a*
17	Malaga	Spain	10.4	27.5	37.8%	9.5	20	11.4	7
18	Schiphol Amsterdam	Netherlands	10.3	22.9	45.2%	n/a*	-	9.5	19
19	Paris Orly	France	10.3	22.6	45.7%	11.5	7	9.6	16
20	Zurich	Switzerland	10.2	19.6	52.1%	9.8	16	10.0	12

Overall, the top 20 list consists of a mixture of large hub, leisure and regional airports. A total of 9 airports, roughly half, saw an improvement to their position compared to 2013.

For the third year running, in 2014, Lisboa topped the list as the airport which experienced the longest average delay per departure, reaching 18.2 minutes. Similarly, the airport's "average delay per **delayed** departure" ranked highest at 32.6 minutes. London's Gatwick and Heathrow airports have taken 2nd and 6th place respectively, reflecting the growing airport capacity issues across the south-east of England. In spite of weather delays throughout the year, London Heathrow still managed to improve upon its 2nd place position in 2013. London Gatwick, however, finds itself just below Lisboa with an average delay per delayed departing flight of 28.4 minutes mainly due to a high number of flights experiencing airline related delays.

In an attempt to ease the delays and congestion at London Heathrow, the airport introduced "Time-Based Separation" (TBS) in April 2015 which aims to use wind to reduce the separation distances between air traffic. Air traffic controllers at Heathrow would normally land around 42 aircraft per hour but this figure drops significantly in a strong headwind when aircraft fly more slowly over the ground. The implementation of TBS reduces the amount of delays by reducing separation between aircraft and maintaining the normal landing rate.

In France, both Paris airports saw a noticeable improvement in their performance in 2014 when compared to the two years previous. In spite of the French air traffic control and Air France pilot strikes in September 2014, Paris CDG improved by five places to 11th position with its average delay per delayed departure dropping to 11.4 minutes. Similarly, Paris Orly saw an improvement to its punctuality across the twelve months of 2014 with its average delay per departure decreasing to 10.3 minutes.

## Causes of Delays

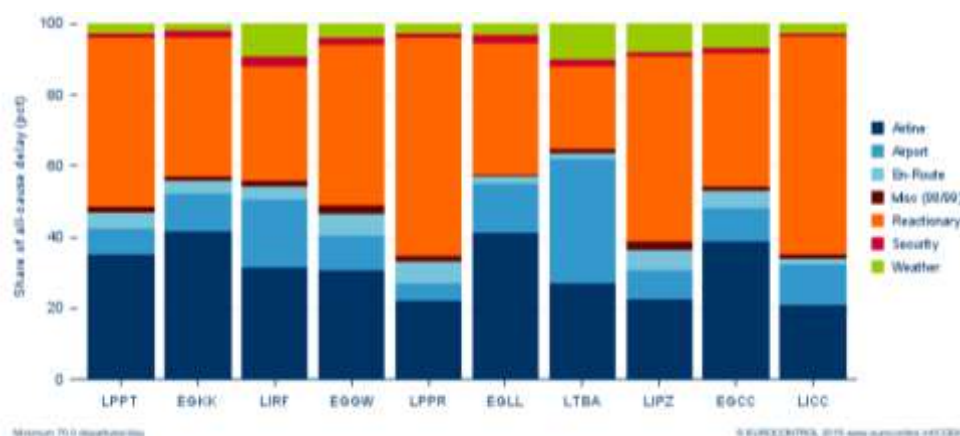
In order to accurately assess punctuality, it is important to identify the reasons for delay. The following section analyses the causes of delays at the top 10 airports for arrival and departure delays in 2014.

EUROCONTROL categorises “causes of delays” into seven major categories; these are: Airline; Airport; En-route; Governmental; Weather; Miscellaneous and Reactionary. Definitions of each can be found in the Appendices to this report.

## Departure Delays

Across the board in 2014, the most common cause of departure delay at Europe’s top 10 airports (in terms of length of delay) was “Reactionary” meaning a late arrival of an aircraft from its previous flight, closely followed by “Airline” causes. “Airport” specific issues appear to be the third most common cause of delays in all cases aside from Istanbul-Ataturk airport.

Figure 154: Causes of departure delays at the 10 airports with heaviest departure delays (2014)



LPPT – Lisboa; EGKK – London Gatwick; LIRF – Rome Fiumicino; EGGW – London Luton; LPPR – Porto; EGLL – London Heathrow; LTBA – Istanbul-Ataturk; LIPZ – Venezia-Tessera; EGCC – Manchester; LICC – Catania-Fontanarossa  
Please note: All definitions provided can be found in the appendices of this report.

Source: EUROCONTROL

Istanbul-Ataturk Airport has a large amount of delays attributable to the airport’s capacity constraints. The airport is running at near full capacity. Total passengers travelling through the airport have tripled in just ten years – a consequence of the continued rapid expansion of Turkish airlines.

In an attempt to alleviate some of the pressure on the current infrastructure, the airport opened 26 additional aircraft parking spaces in 2014. Moreover, a brand new airport expected to handle 150 million passengers per year is also scheduled to open in Istanbul in 2018.

At Lisbon, the proportion of delays caused by “Airline” problems has risen since 2013. Portuguese carrier TAP Air Portugal experienced a number of technical issues with aircraft in the year 2014 alone leaving hundreds of passengers subject to, in some cases, delays of over 24 hours.<sup>215</sup> The planned privatisation of the airline has also triggered a number of strikes by airline personnel over the last twelve months. Most recently, pilots from TAP Portugal and its associated subsidiary “Portugalia” protested against the

<sup>215</sup> <http://portugalresident.com/hundreds-of-tap-passengers-stranded-in-7th-%E2%80%9Cincident%E2%80%9D-in-six-weeks> (Accessed: June 2015)



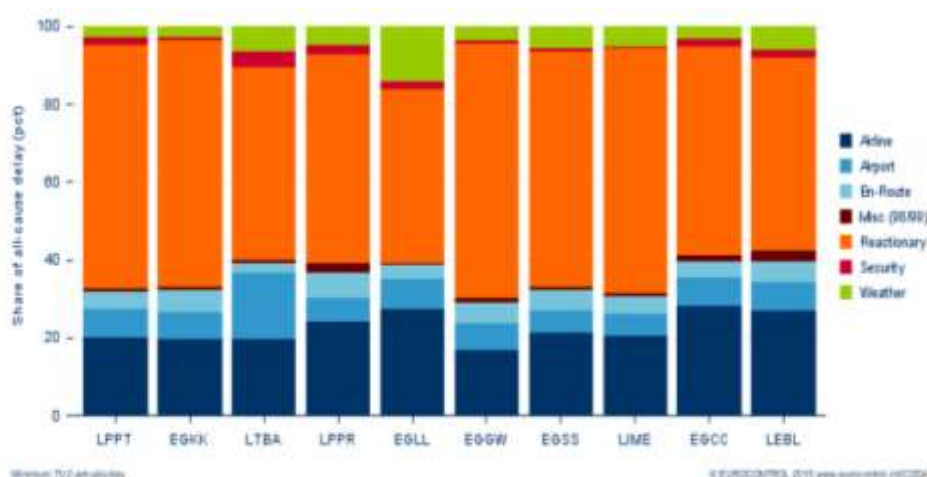
privatisation of the airline in May 2015 leading to a strike spanning a total of 10 days.<sup>216</sup> The various bouts of industrial action forced the airline to cancel and delay several flights affecting some 300,000 passengers.<sup>217</sup>

Despite the airline-specific issues, delays attributable to “Airport” specific problems at Lisbon have, in fact, dropped since 2013. These are issues such as lack of or underperforming facilities, Air Traffic Flow Management (ATFM) or runway closures. The airport opened a new international and transit terminal in the summer of 2013 designed to optimise capacity and sustain business growth. Amongst other changes, the expansion included a 77% increase in terminal size, new disembarkation gates from aircraft parked in remote positions and an additional five baggage belts.<sup>218</sup>

## Arrival Delays

In terms of arrival delays, “Reactionary” was the most common cause of arrival delays in 2014, far outweighing all other reasons listed in the CODA Digest report. With the infrastructure at the airport struggling to cope with current traffic levels, Istanbul-Ataturk Airport experienced in 2014 an equally high level of arrival as well as departure delays attributable to the airport’s [lack of] facilities.

Figure 155: Causes of arrival delays at the 10 airports with heaviest arrival delays (2014)



LPPT – Porto; EGKK – London Gatwick; LTBA – Istanbul-Ataturk; LPPR – Porto; EGLL – London Heathrow; EGGW – London Luton; EGSS – London Stansted; LIME – Bergamo/Orio Alserio; EGCC – Manchester; LEBL – Barcelona  
Please note: All definitions provided can be found in the appendices of this report.

Source: EUROCONTROL

London Heathrow airport’s weather delays in 2014 reach approximately 15% for arriving flights, far higher than any other airport within the top 10. This represents a decrease since 2013 where around a quarter of arrival delays were as a result of bad weather. With the airport currently operating at 98% capacity, Heathrow has extremely limited ability to improve upon weather delays during its operating hours.

<sup>216</sup> <http://atwonline.com/labor/tap-portugal-pilots-end-10-day-strike> (Accessed: June 2015)

<sup>217</sup> <http://www.euronews.com/2015/05/02/tap-pilots-strike-grounds-25-percent-of-saturdays-flights-in-portugal/> (Accessed: June 2015)

<sup>218</sup> <http://centreforaviation.com/news/lisbon-airport-completes-terminal-expansion-and-new-transit-area-247298> (Accessed: June 2015)

### 9.3. Airline Punctuality & Delays

Airport punctuality is closely linked to the performances of the airlines themselves. In this section, we assess the on-time performances of European carriers compared with airlines from across the world. The Statistical Annex N provides a global and regional ranking on airline on-time performance.

#### On-Time Performance by Alliance

A consistent airport operation is a pre-requisite for any airline to do well in the On-Time Performance league tables. In China, rapid growth in the region is leading to a number of airport capacity issues and a result, flights are being delayed and airline punctuality is being affected. In this section, we assess on-time performance from a wider perspective by grouping airlines into their respective alliances.

Each alliance varies slightly in size but, as can be seen from Table 62 and Figure 156, the performances of each alliance appear fairly equal. However, there is a significant difference in the worst performing carrier in each alliance:

Table 62: On-Time Arrival Performances of Airline Alliances (2014)<sup>219</sup>

Alliance	Total no. of flights	Highest on-time performance	Lowest on-time performance	Average on-time performance <sup>220</sup>
oneworld	3,715,684	90.58%	70.17%	80.00%
SkyTeam	4,925,233	88.63%	40.42%	75.01%
Star Alliance	5,602,513	91.58%	47.29%	77.22%

Source: FlightStats

Statistical Annex O provides a more detailed list of airline alliance on-time performance.

Of course, punctuality by alliance is heavily influenced by its respective member airlines and relative size within airline grouping. This is of particular importance when assessing the results given above. For example, Star Alliance appears to have the highest on-time performance but it should be noted that the carrier within the alliance achieving the best on-time performance is Slovenia's Adria Airways – an airline which only operated some 16,000 flights in 2014, accounting for less than 0.3% of total Star Alliance flights.

Figure 156 further suggests that on average, the on-time performance is comparable across the three airline alliance groups with a handful of outliers highlighted in the two boxes. The grey box highlights carriers which operated the highest number of flights and at the same time achieved a strong on-time performance (SkyTeam's Delta Airlines, 82.83%; oneworld's American Airlines, 74.99%; and Star Alliance's United Airlines, 74.18%). These are all scheduled carriers who despite their size they achieved similar strong performance to their alliance group performance.

The carriers with both the lowest on-time performance and lowest number of flights are highlighted by the blue box in Figure 156, and they are all Chinese-based airlines (SkyTeam's Xiamen Airlines, 40.42%; Star Alliance's Shenzhen Airlines, 47.29%; and SkyTeam's Xiamen Airlines, 58.75%).

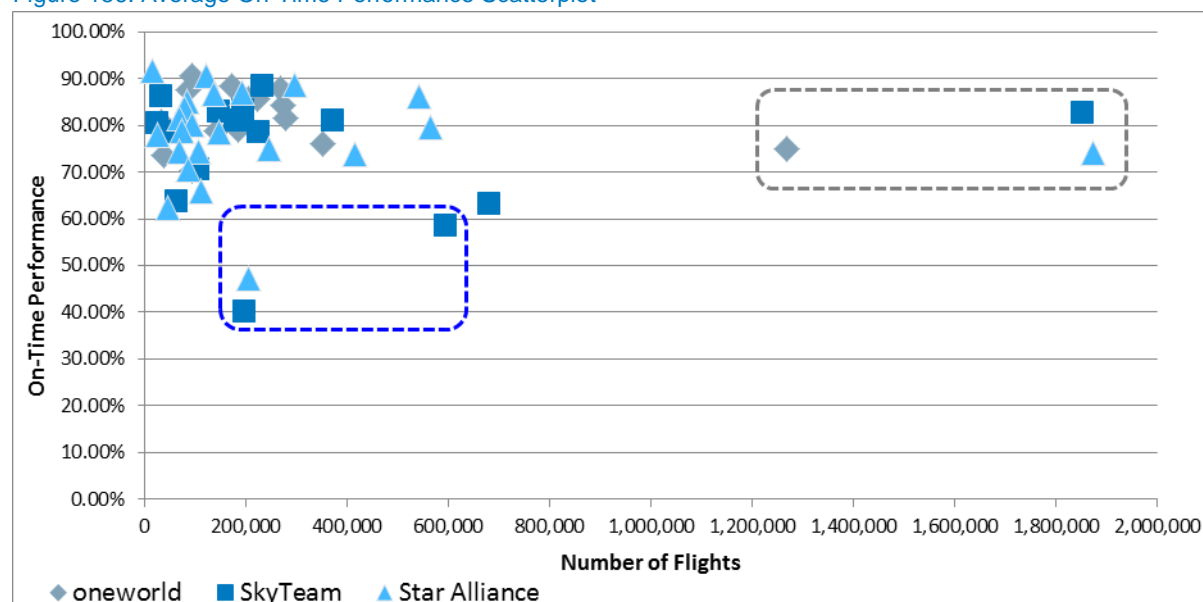
Within each of the alliance groups, the Chinese carriers form the worst performers for punctuality, which can be attributed to the infrastructural impacts of increasing demand for air travel to both carriers and

<sup>219</sup> A full breakdown of the number of flights operated by each individual carrier and their respective on-time performance can be found in the appendices of this report.

<sup>220</sup> Weighted average on-time performance

airports in the region<sup>221</sup>. According to a report published by the Civil Aviation Administration of China<sup>222</sup>, almost 50% of reasons impacting punctuality performance for Chinese carriers relate to “airline companies’ operations, traffic and weather”, whilst airport management, passenger behaviour, unrealistic scheduling and public safety were also causes of delays.

Figure 156: Average On-Time Performance Scatterplot



The Chinese-based carriers of Skyteam China Airlines, China Southern Airlines, China Eastern Airlines and Xiamen represent a 27% share of total SkyTeam flights (1.5 million) in 2014, the greatest share of Chinese carriers within any of the three alliances. The four carriers only managed to achieve a maximum OTP in 2014 of 64.06% (China Airlines) and their average on-time performance ranged from 40.42% to 64.06%.

Similarly, Shenzhen Airlines and EVA Air, a Taiwan-based carrier, represent the lowest on-time performances within Star Alliance.

The Chinese-based carriers are relatively smaller in size (flights operated in 2014) compared to their counter-parts within each of the alliances, and their performance does not significantly impact the alliance overall performance.

The airline punctuality league table for 2014 has changed quite significantly since 2013 with low cost and regional carriers (Air Berlin, easyJet, Norwegian Air Shuttle, Aegean Airlines and Aer Lingus) making it to the top ten European airlines list for on-time arrival performance. Overall, it appears that airline performance has improved since 2013. Interestingly, it should be noted that the carrier in tenth place this year achieved an on-time arrival performance of 82.33% compared to last year’s 71.56%.

This is particularly poignant in the case of British Airways which is no longer listed in the top ten but nevertheless saw its on-time arrival performance increase to 75.98% in 2014 from 71.56% in 2013.

<sup>221</sup> [http://www.chinadaily.com.cn/china/2015-03/23/content\\_19885444.htm](http://www.chinadaily.com.cn/china/2015-03/23/content_19885444.htm) (Accessed August 2015)

<sup>222</sup> <http://en.people.cn/n/2015/0616/c90882-8907317.html> (Accessed August 2015)

Table 63: Top 10 On-Time Arrival Performances (2014)

Airline Name	On-Time Arrival Performance 2014	Airline Name	On-Time Arrival Performance 2013
Finnair	90.58%	KLM	88.03%
KLM	88.66%	Iberia	86.03%
SAS	88.62%	SAS	85.83%
Iberia	88.46%	Lufthansa	84.18%
Lufthansa	86.21%	Aeroflot	82.71%
Air Berlin	85.70%	Alitalia	82.67%
easyJet	85.12%	SWISS	79.73%
Norwegian Air Shuttle	84.91%	Air France	79.21%
Aegean Airlines	83.81%	Condor Flugdienst	76.67%
Aer Lingus	82.33%	British Airways	71.56%

Source: FlightStats

Looking at results from a global perspective, on-time performances of individual regions across 2014 appear varied. Table 64 lists the best performance of each region, along with the carrier responsible, for both 2013 and 2014. Figures in red represent a decrease in the region's best on-time arrival performance and figures in green represent an increase in the region's on-time arrival performance relative to the previous year:

Table 64: Year-on-Year Airline Performance by Category

Category	2014		2013	
	Best Carrier	On-Time Performance	Best Carrier	On-Time Performance
Top 10 Global Airlines	KLM	88.66%	JAL	88.94%
Top 10 North American Airlines	Alaska Airlines	87.80%	Alaska Airlines	87.08%
Top 10 Latin American Airlines	Copa Airlines	90.66%	Copa Airlines	89.83%
Top 10 Asia Pacific Airlines	JAL	87.78%	JAL	88.94%
Top 10 European Airlines	Finnair	90.58%	KLM	88.03%
Top 10 Middle East Airlines	Saudia	87.76%	Gulf Air	90.73%
Top 10 Low-Cost Carriers	Iberia Express	93.84%	Thai Air Asia	90.85%

Source: FlightStats

It is worth noting that in 2014, on the international front, European carrier KLM overtook Japan Airlines to win the OPS Award<sup>223</sup> for the Top Major International Airline.

KLM saw slight improvement to its on-time performance in 2014, despite being taken over by Finnair as Europe's most punctual carrier. In 2013, KLM achieved an OTP of 88.03% increasing to 88.66% in 2014. Saudia Arabian Airlines saw 87.8% of its total flights arrive within 15 minutes of their scheduled arrival time and overtook GulfAir as the top airline in Africa & the Middle East.

<sup>223</sup> On-time Performance Service Awards

## 9.4. Air Passenger Rights: Recent Developments from within the EU

Following on from the previous section’s analysis of delays themselves, in this section, we consider any recent developments within the field of passenger rights and the effect these changes may have had upon the industry itself.

### Summary of Regulation EC 261/2004

(EC) Regulation 261/2004 is designed to establish common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation. The regulation applies to the following:

- passengers departing from an airport located in the territory of a Member State to which the EC Treaty applies; and,
- passengers departing from an airport located in a third country to an airport situated in the Member State to which the EC Treaty applies unless they received benefits or compensation and were given assistance in that third country, if the operating air carrier of the flight concerned is a Community carrier.

The above applies on condition that the passengers have a confirmed reservation on the flight concerned and, except in the case of cancellation, present themselves for check-in at the time indicated in advance or, if no time is indicated, not later than 45 minutes before the published departure time.

In addition to an event of denied boarding or cancellation, passengers who experience a delay of more than two hours are also entitled to care and assistance by the airline (telephone call, refreshments, meal, and accommodation). Moreover, for delays of three hours or more, the passenger may be entitled to identical compensation to that offered when their flight is cancelled, unless the airline can prove the delay was caused by an “extraordinary circumstance”<sup>224</sup>.

Table 65: Flight Delay Compensation Entitlement<sup>225</sup>

	Compensation Category	Compensation Amount
<b>Within the EU</b>		
	1,500km or less	€250
	Over 1,500km	€400
<b>Between EU Airport and Non-EU Airport</b>		
	1,500km or less	€250
	1,500 – 3,500km	€400
	Over 3,500km	€600

Source: europa.eu

Current European legislation, particularly following the Sturgeon Ruling, is exemplary considering there are countries across the world which is yet to introduce passenger rights regulation at all. However, flaws are still very much present in European legislation which is granting airlines the opportunity to avoid paying out compensation. One of the loopholes airlines have continued to exploit over the past twelve months is the true definition of “extraordinary circumstances” and, indeed, whether or not technical faults should fall under this umbrella. The following section explores this issue, highlighting recent cases throughout.

<sup>224</sup> [http://europa.eu/rapid/press-release\\_MEMO-10-281\\_en.htm](http://europa.eu/rapid/press-release_MEMO-10-281_en.htm) (Accessed: 7<sup>th</sup> July 2015)

<sup>225</sup> [http://europa.eu/youreurope/citizens/travel/passenger-rights/air/index\\_en.htm](http://europa.eu/youreurope/citizens/travel/passenger-rights/air/index_en.htm)

## The Sturgeon Ruling

The Sturgeon Ruling of 2009 represents one of the most pivotal cases from a passenger rights standpoint as it re-defined the criteria that consumers are required to meet in order to claim compensation. In this section, we assess the changes to legislation as a result of the Sturgeon Ruling and further assess any subsequent impact on the number of claims made against the airlines today.

The Sturgeon Ruling came as a result of a joined case of passengers against airlines Condor and Air France. Regulation at the time of the ruling dictated that those passengers who experience a flight delay of more than two hours were entitled to care and assistance but not monetary compensation – like in the case of denied boarding or cancellation. As a result of the Sturgeon vs Condor case, it was ruled that all air passengers travelling within Europe who experience delays of more than three hours as well as those who experience a cancellation qualify for monetary compensation. The only exception to the rule is if the delay is due to “extraordinary circumstances”, which could not have been avoided even if all reasonable measures had been taken, such as bad weather or crew strikes. It should also be noted that delays of between two and three hours qualify for care and assistance but not, necessarily, compensation.

Most notably, latest CAA UK figures reveal that whilst the number of claims against airline delays may have risen since the Sturgeon Ruling, airline punctuality at least in the UK has also improved. Scheduled flights landing “on-time” at UK airports, alone, stood at 84% at the end of the first quarter<sup>226</sup> of 2014, an increase of 6% points from the same period in 2013<sup>227</sup> suggesting that the changes to EU flight delay regulation as a result of the Sturgeon Ruling have been successful in improving airlines’ service to their customers.

Our analysis revealed that there does not appear to be much information published by each individual member state within the EU with regards to airline punctuality. Unlike the U.S. or Australia, there is no single database or common reporting across member countries. Instead, this is left up to the responsibility of the member states themselves.

## Technical Faults

Despite whether or not passengers are able to prove they meet the criteria as listed in Section 9.4, an operating air carrier shall not be obliged to pay compensation if it can prove that the delay or cancellation is caused by “extraordinary circumstances which could not have been avoided even if all measures had been taken”. Such “extraordinary circumstances” are defined under (EC) Regulation 261/2004 as “where the impact of an air traffic management decision in relation to a particular aircraft on a particular day gives rise to a long delay, an overnight delay, or the cancellation of one or more flights by that aircraft, even though all reasonable measures had been taken by the air carrier concerned to avoid the delays or cancellations.”<sup>228</sup> However, since the implementation of (EC) 261 in February 2005, airlines have been known to reject claims for compensation on the grounds that the delay was attributable to a technical fault and thus of an extraordinary circumstance and no compensation should be paid.

A case between Alitalia and Mrs Friederike Wallentin-Hermann in June 2009 centred around this issue. In this instance, Wallentin-Hermann arrived at her scheduled destination four hours late after being told her Alitalia flight to Rome had been cancelled not more than five minutes before scheduled time of departure. Wallentin-Hermann reached out to her local commercial court to claim for compensation but Alitalia

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<sup>226</sup> January to March

<sup>227</sup> <http://www.bottonline.co.uk/flight-compensation-latest-news/rise-in-claims-leads-to-best-ever-airline-punctuality> (Accessed: June 2015)

<sup>228</sup> [http://eur-lex.europa.eu/resource.html?uri=cellar:439cd3a7-fd3c-4da7-8bf4-b0f60600c1d6.0004.02/DOC\\_1&format=PDF](http://eur-lex.europa.eu/resource.html?uri=cellar:439cd3a7-fd3c-4da7-8bf4-b0f60600c1d6.0004.02/DOC_1&format=PDF) (Accessed: January 2016)

refused to pay out on the grounds that the “complex” turbine engine failure was an example of an extraordinary circumstance and appealed to the European Court of Justice (ECJ).

The ECJ recognised that airlines invariably face technical problems but the checking for, and fixing of these, is an inherent part of their business and ruled that routine technical faults are not to be considered as “exceptional”.<sup>229</sup> It should be noted that the judgement did not go so far as to rule that mechanical defects could never amount to an exceptional circumstance as a case of terrorist sabotage or a last minute manufacturer warning could well be treated differently.

Unsurprisingly, however, some airlines have continued to reject compensation on the grounds that the delay or cancellation was due to extraordinary circumstances. Most recently, a Ms Sandy Siewert took German leisure airline Condor Flugdienst to court for a delay due to structural damage to the wing.

### **Condor Flugdienst v Sandy Siewart**

In October 2011, Sandy Siewert was scheduled to fly Condor from Antalya, Turkey to Frankfurt, Germany. The day before the flight, a set of mobile boarding stairs collided with the aircraft on which the family was scheduled to fly the next day causing severe damage to the wing. The aircraft then needed to be replaced, resulting in a delay of more than six hours. The claimants then requested the carrier to pay the compensation for the long delay in line with Regulation 261. Condor claimed the long delay was due to an example of an “extraordinary circumstance” which should therefore render the carrier exempt from paying out compensation.

The Court of Justice of the European Union firstly highlighted that a technical problem which leads to the delay or cancellation of a flight is not covered under the phrase “extraordinary circumstance” unless that problem stems from events which, by their nature or origin, are not inherent in the normal exercise of the activity of the air carrier concerned and are beyond its actual control.<sup>230</sup> The Court further noted that nothing suggested the damage to the aircraft was as a result of an act outside the category of “normal operation”, such as an act of sabotage or terrorism.

As a consequence, the Court ruled that the collision between mobile stairs and an aircraft does not qualify as being an extraordinary circumstance and, therefore, ruled in favour of Siewert and ordered the carrier to pay the claimant monetary compensation.

IATA and the UK CAA both highlight the issue surrounding the true definition of an extraordinary circumstance and have since responded, as discussed in the following section.

### **CAA UK Response**

The CAA UK state that their understanding of the judgements relating to technical issues is “for a technical problem to constitute an extraordinary circumstance, the circumstances must be out of the ordinary and not part of the normal everyday activity.” Reiterating the Supreme Court, this means that the vast majority of technical faults will no longer be considered extraordinary and therefore passengers will be entitled to make a claim against the airline.

Despite making their stance quite clear, in March 2015, the UK CAA launched legal action against three major European airlines for breaching consumer law. Aer Lingus, Jet2 (example at the end of this chapter in the Consumer Issues Appendix C) and Wizz Air failed to make the required changes hence the CAA’s

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<sup>229</sup> <http://www.theguardian.com/money/2009/mar/21/airline-ticket-justice-compensation> (Accessed: December 2015)

<sup>230</sup> <http://www.kennedyslaw.com/casereview/mobilestairs/>

decision to commence the legal phase of its enforcement process against the airlines. They are each now required to make the necessary changes as set out by the regulator or face the prospect of a court order.

The specific issues uncovered by the UK CAA can be found at the end of this chapter in the Consumer Issues Annex D.

## **IATA Response**

The International Air Transport Association (IATA) which actively represents airlines from around the world has since responded to the primary issue surrounding what constitutes an “extraordinary circumstance”. It states, “the rulings highlight the need for a total revision of EU 261 because the ambiguous existing European Regulation 261/2004 is continually evolving through interpretations by the courts across the member states or the European Court of Justice”<sup>231</sup>. IATA is in full support of the European Council Aviation Working Party (ECAWP) to have a binding but non-exhaustive list of incidents that are considered to be extraordinary and to define technical problems separately.<sup>232</sup>

Some airlines continue to use the term as a way of avoiding compensation pay outs and each claim is subsequently treated on a case-by-case basis. It seems, then, that whilst European legislation surrounding passenger rights could be seen as an example to many other global regions, there are still loopholes in the system that airlines endeavour to exploit.

## Safety Concerns

The ruling following the Huzar and Dawson cases may have been welcomed by passengers, but some feel it raises significant safety concerns. Given airlines are now fully aware that they are liable for large payouts if passengers experience extensive delays or cancellations due to a technical fault, there exists a question mark over whether some carriers may choose to operate aircraft with seemingly minor faults to avoid any claims being made against them. Moreover, IATA states that not allowing the majority of technical problems to be considered an “extraordinary circumstance” does not sufficiently prioritise safety above all other factors.<sup>233</sup> The European Commission continually works closely with the European Aviation Safety Agency (EASA) as well as National Aviation Authorities across the Continent to ensure any updates to rules and regulations do not infringe upon the safety of passengers.

### **“Arrival Time”**

The definition of “arrival time” is another term used within EC Regulation 261/2004 which has recently provided for some confusion. In September 2014, a case was brought to the European Court of Justice involving Germany’s budget carrier, Germanwings. The airline had previously operated a flight from Salzburg to Cologne/Bonn with a take-off delay of three hours and 10 minutes. However, the aircraft touched down on the tarmac at Cologne/Bonn with a delay of two hours and 58 minutes. By the time the aircraft reached its parking position, the delay was three hours and three minutes. The doors were opened shortly afterwards. A passenger on board this flight maintained that the final destination was reached with a delay of three hours or more and he could therefore claim compensation of EUR 250, in line with EC Regulation 261/2004. Germanwings disagreed and maintained that the actual arrival time is the time at which the plane touched down at the airport, meaning no compensation is payable. The European Court of Justice specified that the arrival time of a flight should be defined as the time at which at least one of the doors of the aircraft is opened. Thus, in this case, Germanwings was ordered to pay compensation due to

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<sup>231</sup> <https://www.iata.org/policy/consumer-protection/pages/index.aspx> (Accessed: July 2015)

<sup>232</sup> <https://www.iata.org/policy/consumer-protection/pages/index.aspx>

<sup>233</sup> <https://www.iata.org/policy/consumer-protection/pages/index.aspx> (Accessed: July 2015)



the delay exceeding the minimum three hours needed to qualify for compensation. The decision is expected to have a profound effect considering the time from touchdown to when aircraft doors are open can frequently exceed 15 minutes.

Of particular interest here is that, previous to the ruling, no specific definition of “arrival time” was listed under EC Regulation 261/2004. It is unlikely this was an isolated case meaning we will likely continue to see further cases of passengers and airlines interpreting regulation in differing ways until a court decides on a definition.

## **9.5. Recent Developments to Online Bookings Regulation**

According to a recent GfK survey<sup>234</sup>, around 90% of travel bookings in 2014 were made online, representing a significant rise of 40%age points since 2006. Of course, as the internet becomes more prominent, the pressure is on to ensure consumers who utilise these facilities are as protected as those who choose to use a more traditional method, such as high-street travel agents. Since the beginning of 2014, both Europe and the U.S. have experienced some form of development in terms of protecting passengers who choose to book flights and holidays online. The following section discusses these in more detail.

### **Package Holidays (Europe)**

European holidaymakers have benefited from the protections provided by Council Directive 90/314/EEC of 13 June 1990 on package travel, package holidays and package tours (Package Travel Directive (PTD)) for over 20 years<sup>235</sup>. In July 2013, the European Commission issued a new Directive aimed at addressing certain systemic issues present in the package holiday regulation at the time. These issues primarily revolved around whether or not online buyers of package holidays had the same protection as those buying from traditional travel agents. On 5<sup>th</sup> May 2015, the European Council reached a political agreement on new rules that are hoped to bring protection for package holidays up to speed.<sup>236</sup> In an attempt to better clarify protection for package holiday customers, the new rules are intended to achieve the following:

- A broadening concept of “package” – the new rules clearly include customised combinations of travel arrangements (as well as those carried out in a traditional travel agents);
- Clearer information to travellers on the sort of travel product they are buying and the corresponding level of protection;
- A new concept of ‘linked travel arrangements’ applying to looser combinations of travel services.

The key theme here is strengthening the protection of those passengers who choose to book holidays online and the new rules come just as the U.S. reacts to issues within its own online booking process through a recent proposal for a Consumer Rule Part III.

### **U.S. Consumer Rule Part III**

The U.S. Department of Transport (DoT) has put forward a Notice of Proposed Rulemaking (NPRM) in response to growing complaints from passengers who feel the full cost of travel is not always clear when booking through “non-carrier channels” online. Among a number of provisions, the proposed “Consumer

<sup>234</sup>

[http://hotelmarketing.com/index.php/content/article/around\\_90\\_percent\\_of\\_travel\\_bookings\\_today\\_involves\\_going\\_online\\_compared\\_t?\\_sm\\_a\\_u\\_=i0V15jrkQJ2rQZ64](http://hotelmarketing.com/index.php/content/article/around_90_percent_of_travel_bookings_today_involves_going_online_compared_t?_sm_a_u_=i0V15jrkQJ2rQZ64) (Accessed: July 2015)

<sup>235</sup> CAA UK

<sup>236</sup> <http://www.europarl.europa.eu/news/en/news-room/content/20150511STO54549/html/Package-holidays-Holidaymakers'-rights-will-be-strengthened-significantly> (Accessed: July 2015)

Rule Part III” will require websites to state the specific amount of fees based on information the consumer has entered into the search. These fees would have to appear on the first web page on which a fare is displayed in response to a consumer’s specific flight itinerary search and be listed adjacent to the fare information.

Similar to the issues seen in Europe with package holidays, the primary reason behind introducing a new Consumer Rule Part III is to allow passengers a greater awareness of differing costs associated with travel booking. Under current U.S. regulation, carriers are required to disclose the applicability of baggage fees on the first webpage and then provide a link to a list of the customer’s specific baggage fee breakdown. The DoT now proposes to expand the scope of required fee disclosure to include first and second checked bags, carry-on baggage, and advance seat assignments, all of which must be displayed directly on the webpage or, at a minimum, by link or rollover.

Most notably, the DoT proposes to require fee information is provided on either an itinerary-specific or passenger-specific basis. For example, if the passenger enters as part of the itinerary search information that may affect the applicable baggage fee (e.g., frequent flyer status, method of payment, cabin class), then the carrier would be required to display a passenger-specific baggage fee on the first page in response to the consumer’s search. Similarly, if no personal information is entered, then the baggage-fee must be itinerary-specific (e.g. based on routing, travel dates, ticketed fare etc.).

The proposed changes to the regulation have raised concerns amongst industry experts. IATA warns that the NPRM is an active attempt to re-regulate airline distribution mechanisms and claims that the airline industry has fundamentally changed since the regulation was first called for. In addition to this, IATA states that the DoT has failed to demonstrate that the benefits of such regulation outweigh the costs. Other industry experts back this claim up by stating that a thorough and robust cost-benefit analysis is yet to have been completed. Carriers may have to restructure their entire reservation systems and websites to provide the information the DoT may potentially require – a daunting undertaking that will bare significant costs, especially if required to share these data with third parties.<sup>237</sup>

European Regulation has already adopted a rule which promotes full transparency of pricing. Article 23 of EC Regulation No. 1008/2008 dictates that the final price to be paid shall, at all times, be indicated and any taxes or other charges should also be clearly specified. However, Consumer Rule Part III is not yet adopted under U.S. regulation and it is unclear as to when this may happen at this early stage.

## 9.6. The International Response

This chapter has so far focussed on national and regional issues and developments in the field of passenger rights. In the following section, developments across the international platform are assessed, with emphasis put upon the past year’s movements of IATA and ICAO in response to the various issues with passenger rights regulation.

### ICAO

ICAO is a specialised agency of the United Nations representing 191 Member States from across the international platform. ICAO works with its Member States and industry groups to reach consensus on international civil aviation Standards and Recommended Practices (SARPs)<sup>238</sup>.

Consumer rights were discussed in detail at the twelfth meeting of the Air Transport Regulation Panel (ATRP/12) held at ICAO headquarters in Montreal in May 2014. Panel members from across the world

<sup>237</sup> “DoT’s Rulemaking Is a Step Toward Reregulation” <http://www.hklaw.com/files/Publication/19fb5ffa-e81f-4eb7-97d2-2f7e92e97bfb/Presentation/PublicationAttachment/2e756fac-0548-470c-b829-3b122f8117e1/1009DOTRulemaking.pdf>

<sup>238</sup> <http://www.icao.int/about-icao/Pages/default.aspx> (Accessed: December 2015)

presented a set of core principles based on their respective countries' own experience which they invited the ATRP to consider. Following discussion, a small representative group from among the participants developed a version of the principles which was accepted by the panel as the recommended set of core principles endorsed by ICAO. An exhaustive list of these principles can be found at the end of this chapter in the Consumer Issues Annex A.

Most notably, with respect to the introduction of U.S. Consumer Rule Part III as detailed earlier in this report, ICAO recommended that passengers should have clear, transparent access to all pertinent information regarding the characteristics of the product being sought, prior to purchasing the ticket. The Organisation also recommended that passengers who experience a service disruption should receive "due attention" which could be in the form of rerouting, refund, care and/or compensation where provided by relevant regulation. Moreover, "mechanisms" should be planned in advance by all concerned stakeholders in situations of massive disruption.

## IATA

IATA represents 258 airline members from across the world, supporting several areas of aviation activity and aiding in the formulation of industry policy and regulation. Representing 83% of total traffic (Available Seat Kilometres)<sup>239</sup>, IATA attempts to actively provide an international perspective and puts a great deal of focus on emerging industry issues. Given that IATA leads and serves the airline industry, it takes great interest in the efforts being made to harmonise consumer rights in order to benefit both its 258 members and their thousands of passengers.

Whilst Europe continues its attempts to unify legislation across the Continent, IATA is continually working closely with ICAO to push for a set of common standards which span across the international platform. These efforts are an active attempt to rid of "patchwork regulation" that both organisations feel exist within the industry today.<sup>240</sup> They feel a lack of coordinating between Governments is the primary catalyst behind the differing rules and regulations across different regions sparking confusion among passengers and airlines alike. Despite over 60 countries in the world now implementing some form of passenger rights legislation, it still remains difficult for both passengers and airlines themselves to understand what rules apply.<sup>241</sup>

## Resolution to IATA Core Principles on Consumer Protection

At the 69th IATA Annual General Meeting in June 2015, IATA members unanimously agreed to a resolution on baseline passenger rights. Calling upon the Core Principles on Consumer Protection, the resolution principally urges ICAO as the agency set up to develop international standards to use the following principles as the basis for any ongoing initiatives on consumer protection:

- **AFFIRMING** member airlines' commitment to the safety and comfort of passengers and to the provision of quality service;
- **RECOGNIZING** that, in accordance with the contract of carriage, airlines strive to get passengers to their destinations on time and are highly incentivised, from a reputational and financial standpoint, to do so;
- **EXPRESSING CONCERN** regarding the proliferation of passenger rights regimes across the globe, with around 40 regimes coming into effect in the last decade;
- **ACKNOWLEDGING** that the resulting overlapping web of passenger rights regimes creates difficulties for airlines and confusion for customers due to a lack of certainty as to which particular regime applies and the potential application of more than one regime in a given situation;

<sup>239</sup> [http://www.iata.org/pressroom/facts\\_figures/fact\\_sheets/Documents/fact-sheet-iata.pdf](http://www.iata.org/pressroom/facts_figures/fact_sheets/Documents/fact-sheet-iata.pdf) (Accessed: July 2015)

<sup>240</sup> <http://www.travelweekly.co.uk/Articles/2015/06/10/54510/iata+chief+hits+out+at+patchwork+consumer+rights.html>

<sup>241</sup> <https://www.iata.org/policy/consumer-protection/Pages/keeping-it-simple.aspx> (Accessed: July 2015)

- **UNDERLINING** the unintended consequences of certain existing regimes, such as increasing consumer costs, reducing connectivity and increasing cancelled flights by instituting penalties and the obligation to pay compensation to passengers for delays;
- **NOTING** the existence of an international air carrier liability regime established by the Warsaw Convention 1929 and its amending protocols (the Warsaw system) and the Montréal Convention 1999, which was adopted with a view to replacing the Warsaw system;
- **SEEKING** a united government and industry approach to passenger rights that works for a global business and strikes a balance between ensuring adequate consumer protection and overburdening the industry and its customers with the costs of excessive regulatory compliance.

## A Unified Approach

The outcome of the 69th AGM exemplifies IATA and ICAO's efforts to promote a unified, holistic approach to passenger rights legislation – harmonising standards across the world in an active attempt to rid of all confusion.

It is important to also note that IATA aims to actively represent the airlines. It therefore continually stresses the importance of adopting an approach which not only aligns international regulation but also provides a balance between sustainable air transport and reasonable consumer protection. This is particularly notable for the last point listed in section 0 where IATA promotes a “united government and industry approach to passenger rights” that allows for adequate consumer protection without overburdening the airlines themselves.

Moreover, IATA states that reregulation such as the U.S. Department of Transportation proposed Consumer Rule Part III is a step back for the industry. This is not only because it implements rules and regulations which differ from international standards, thus further enhancing “patchwork regulation”, but it also puts an unnecessary amount of pressure on airlines which already struggle to keep up in such a competitive marketplace.

## Postcards

In an attempt to further address uncoordinated passenger rights legislation which IATA feels is the primary cause of confusion among passengers, the Association has since created a set of three “postcards” exploring the issues of airline punctuality, mishandled baggage and confusing consumer protection regulation. In keeping with the theme that regulation should be simple; these postcards are extremely succinct and centre around the idea that passenger rights should be as “easy as boiling an egg”.

Given these postcards were published externally in June of 2015 it is still too early to assess how the industry has reacted.

## Consumer Issues from Outside the European Union

### New Zealand

Any air passenger service operating inside New Zealand must comply with several consumer protection laws including the Civil Aviation Act of 1990. Part B of this act states that all air passengers must be compensated for delays that are caused by overbooking and not then caused by a factor outside the control of the carrier. The same applies to those passengers who experience a cancellation due to internal

issues, such as mechanical problems and/or rostering. At present,<sup>242</sup> the Act requires the carrier to compensate passengers up to 10 times the price of their ticket, or the actual cost of the passenger's delay, whichever is lower.

The New Zealand government is currently undergoing a review of the Civil Aviation Act 1990 which includes proposed changes to consumer rights legislation. One of the issues identified with current legislation, for example, is that the government is not aware of **any** passenger seeking compensation under section 9B (Domestic carriage by Air). It is thought this maybe because consumers are not well informed of these provisions and as a result need further educational measures to be put in place. This could include a "Know Your Rights" pamphlet or further, clearer information to be displayed online.

A revision to the domestic liability limit for damages caused by delay has also been proposed. Given the current liability limit was first set in 1967 – when the cost of air travel was significantly different from today – the government is in the process of gathering public opinion on whether 10 times the sum paid for domestic air carriage is still fair.

The Civil Aviation Act review underwent a three-month public consultation between August and October 2014 whereby a mere total of 31 responses were received. The Ministry of Transport claimed that recommendations were to be drawn up by the middle of 2015, but as of December 2015, there have been no updates or proposed list of recommendations. Any further updates will be detailed in next year's report.

## 9.7. Consumer Issues Annexes

### Annex A: ICAO Core Principles on Consumer Protection

#### 1. Preamble

1.1 Recognizing that passengers can benefit from a competitive air transport sector, which offers more choice in fare-service trade-offs and which may encourage carriers to improve their offerings, passengers, including those with disabilities, can also benefit from consumer protection regimes.

1.2 Government authorities should have the flexibility to develop consumer protection regimes which strike an appropriate balance between protection of consumers and industry competitiveness and which take into account States' different social, political, and economic characteristics, without prejudice to the security and safety of aviation. National and regional consumer protection regimes should i) reflect the principle of proportionality ii) allow for the consideration of the impact of massive disruptions, iii) be consistent with the international treaty regimes on air carrier liability established by the Convention for the Unification of Certain Rules Relating to International Carriage by Air (Warsaw, 1929) and its amending instruments, and the Convention for the Unification of Certain Rules Relating to International Carriage by Air (Montréal, 1999).

#### 2. Before the travel

2.1 Recognizing the variety of air transport products in the market, passengers should have access to information on their rights and clear guidance on which legal or other protections apply in their specific situation, including the assistance expected, for example in case of service disruption. To help air passengers make informed choices among different price and service offerings, consumer education efforts could be considered to increase awareness of passengers consumer rights and the available avenues for recourse should disputes arise. Efforts should also be made to increase awareness by passengers of airline products available in the market, different airline policies and contractual rights.

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<sup>242</sup> December 2015

2.2 Passengers should have clear, transparent access to all pertinent information regarding the characteristics of the air transport product that is being sought, prior to purchasing the ticket, including the following:

- a) total price, including the applicable air fare, taxes, charges, surcharges and fees;
- b) general conditions applying to the fare; and
- c) identity of the airline actually operating the flight, and advice on any change occurring after the purchase as soon as possible.

### **3. During the travel**

3.1 Passengers should be kept regularly informed throughout their journey on any special circumstances affecting their flight, particularly in the event of a service disruption.

3.2 Passengers should receive due attention in cases of a service disruption, whether they result in the passenger not boarding the flight or in arriving at the destination significantly later than scheduled. This could include rerouting, refund, care and/or compensation where provided by relevant regulations or otherwise.

3.3 Considering that passengers may find themselves in a vulnerable position in situations of massive disruptions, mechanisms should be planned in advance by airlines, airport operators, and all concerned stakeholders, including government authorities to ensure that passengers receive adequate attention and assistance. Massive disruptions could include situations resulting from circumstances outside of the operator's control that are of a magnitude such that they result in multiple cancellations and/or delays of flights leading to a considerable number of passengers stranded at the airport. Such circumstances could include, for example, events such as meteorological or natural phenomena of a large scale including hurricanes, volcanic eruptions, earthquakes, floods, political instability or similar events and result in large numbers of passengers being stranded away from their home.

3.4 Persons with disabilities should, without derogating from aviation safety, have access to air transport in a non-discriminatory manner and to appropriate assistance. To this end, they are encouraged to provide pre-notification of their needs.

### **4. After the travel**

4.1 Passengers should be able to rely on efficient complaint handling procedures that are clearly communicated to them.

## Annex B: EUROCONTROL CODA Digest Delay Groupings

	CODA CAUSE	Description
Primary Delay Causes	Airline	Passenger and Baggage
		Cargo and Mail
		Aircraft and Ramp Handling
		Technical and Aircraft Equipment
		Damage to Aircraft & EDP/Automated Equipment Failure
		Flight Operations and Crewing
	Other Airline Related Causes	
	Airport	ATFM due to Restriction at Destination Airport
		Airport Facilities
		Restrictions at Airport of Destination
	En-Route	Restrictions at Airport of Departure
		ATFM due to ATC En-Route Demand / Capacity
	Weather	ATFM due to ATC Staff / Equipment En-Route
Security and Immigration		
Miscellaneous	Weather (other than ATFM)	
Reactionary	ATFM due to Weather at Destination	
	Miscellaneous	
	Reactionary	Late Arrival of Aircraft, Crew, Passengers or Load

## Annex C: Case of Jet2.com vs Huzar

### Jet2.com vs. Huzar

Ronald Huzar took Jet2.com to the English Court of Appeal in June 2014 and won his case against the carrier which initially refused to issue compensation for a 27-hour delay due to a technical fault. Jet2.com had previously claimed that Huzar's delay was an example of an "ordinary technical problem that should not be considered an extraordinary circumstance".<sup>243</sup> However, the Supreme Court found in favour of Huzar and ruled that from June 2014 onwards, all technical faults found during routine maintenance are inherent to the normal activity of the airline and under no circumstance should they be regarded as "beyond the direct control of the air carrier". The only minor exception to the rule is if technical issues are caused by "extraneous acts of third parties". This means that, following the Huzar case, the vast majority of technical faults will no longer be considered an extraordinary circumstance. Jet2.com appealed against the ruling in November 2014 but the Supreme Court denied the appeal.

### The Effect of the Jet2 vs. Huzar Case

It is apparent that the definition of "extraordinary circumstance" still needs some work but aside from this issue, of particular interest when studying the Jet2 vs Huzar case is questioning whether or not the number of claims across Europe has risen. Following the public declaration by the Supreme Court that technical faults do not constitute an extraordinary circumstance, it would be reasonable to suggest that eligible passengers who were not previously entitled to compensation may now come forward and make a claim.

The UK Civil Aviation Authority received 2,500 complaints between October 2014 and January 2015 and UK-based solicitor, Bott & Co., also reported a "significant jump" in claims since the ruling with 14,000 claims currently on hold.<sup>244</sup> From a European perspective, EU claim, an organisation which aids passengers with compensation cases in return for a fee, reported its caseload had quadrupled in the four months following the ruling.<sup>245</sup> As mentioned above, individual country laws will determine how far back claims can go as European-wide regulation 261/2004 does not set a time limit.

Despite the significant rise in claims reported by soliciting bodies such as EU claim, such a rise does not necessarily mean a greater amount of delays in recent months given the likelihood that some claims could reflect flights dating back a number of years. It does, however, suggest that the Huzar ruling has at least sparked a rise in the number of claims being made against the airlines.

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<sup>243</sup> <http://www.caa.co.uk/application.aspx?appid=7&mode=detail&nid=2398> (Accessed: June 2015)

<sup>244</sup> <http://www.legalfutures.co.uk/latest-news/flight-compensation-claims-rise-will-passengers-use-law-firms> (Accessed: June 2015)

<sup>245</sup> <http://www.thisismoney.co.uk/money/holidays/article-2918943/Airlines-new-excuses-reject-compensation-claims-flight-delays-4-budget-carriers-ask-consumer-claims-hold-ahead-crucial-European-court-decision.html> (Accessed: June 2015)



#### **Annex D: UK CAA Response to Technical Faults**

- Despite the Court of Appeal on the Jet2 vs Huzar case clarifying that airlines must compensate for disruption caused by technical faults, both Jet2 and Wizz Air failed to satisfy the CAA that they are consistently paying compensation.
- Both Jet2 and Wizz Air are imposing two-year time limits for passengers to take compensation claims to court, despite the Court of Appeal (Dawson vs Thomson) ruling that passengers should have up to six years to take a claim to court.
- Jet2 and Aer Lingus have failed to give satisfactory evidence that they proactively provide passengers with information about their rights, during disruption, in line with the requirements set out in regulation EC261.

Jet2 responded to the above by claiming that the CAA's ruling was "materially inaccurate"<sup>246</sup> but as of June 2015, the case is yet to develop. In spite of the various efforts to re-define terms and provide a sense of clarity thus far, the CAA case highlights the need for further work to be done to European regulation to ensure full protection of passengers.

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<sup>246</sup> <http://www.bbc.co.uk/news/uk-31998530> (Accessed: June 2015)

# Glossary

<b>AAG</b>	American Airlines Group
<b>AAHK</b>	Airport Authority of Hong Kong
<b>AAI</b>	Airport Authority of India
<b>AAPA</b>	Association of Asia Pacific Airlines
<b>A-CDM</b>	Airport Collaborative Decision Making
<b>ACI</b>	Airports Council International
<b>AdP</b>	Aéroports de Paris
<b>AEA</b>	Association of European Airlines
<b>AIAA</b>	American Institute of Aeronautics and Astronomy
<b>ALPA</b>	Airline Pilots Association
<b>ANA</b>	All Nippon Airways
<b>ANS</b>	Air Navigation Service
<b>ANSP</b>	Air Navigation Services Provider
<b>ASA</b>	Air Services Agreement
<b>ASEAN</b>	Association of Southeast Asian Nations
<b>ASECNA</b>	Agence pour la Sécurité de la Navigation Aérienne
<b>ASKs</b>	Available Seat Kilometres
<b>ATAG</b>	Air Transport Action Group
<b>ATC</b>	Air Traffic Control
<b>ATFCM</b>	Air Traffic Flow and Capacity Management
<b>ATK</b>	Available Tonne Kilometres
<b>ATM</b>	Air Traffic Movements
<b>ATOL</b>	Air Travel Organiser's Licensing
<b>ATRP</b>	Air Transport Regulation Panel (ICAO)
<b>AWAGG</b>	Airworthiness Assurance Working Group
<b>BAE</b>	British Aerospace
<b>BRICs</b>	Brazil, Russia, India, China
<b>BSP</b>	Billing Settlement Plan
<b>CAA</b>	Civil Aviation Authority
<b>CAAC</b>	China Airports Construction Corporation
<b>CAGR</b>	Compound Annual Growth Rate
<b>CARC</b>	Civil Aviation Regulatory Commission
<b>CAT</b>	Commercial Air Transport
<b>CDA</b>	Continuous Descent Approach
<b>CEF</b>	Connecting Europe Facility
<b>CESE</b>	Central, Eastern and South-Eastern Europe
<b>CFSPs</b>	Computer Flight Plan Service Providers
<b>CIS</b>	Commonwealth of Independent States
<b>CISCEA</b>	Comissão de Implantação do Sistema de Controle do Espaço Aéreo
<b>CODA</b>	Central Office of Delay Analysis
<b>COMAC</b>	Commercial Aircraft Corporation of China
<b>CSV</b>	Commercial Space Vehicles
<b>CTA</b>	Controlled Time of Arrivals
<b>CTOT</b>	Calculated Take off Time
<b>DGCA</b>	Directorate General of Civil Aviation
<b>DLS</b>	Data Link Services
<b>DoT</b>	Department of Transport
<b>EAA</b>	European Agency for Aviation
<b>EAAWG</b>	European Ageing Aircraft Working Group

<b>EADS</b>	European Aeronautical Defence and Space Company
<b>EASA</b>	European Aviation Safety Agency
<b>EBAA</b>	European Business Aviation Association
<b>EBIT</b>	Earnings before Interest and Tax
<b>ECAA</b>	European Common Aviation Area
<b>ECAC</b>	European Civil Aviation Conference
<b>EEA</b>	European Economic Area
<b>EIA</b>	Environmental Impact Assessment
<b>ELFAA</b>	European Low Fares Airline Association
<b>ENISA</b>	European Network and Information Security Agency
<b>ENP</b>	European Neighbourhood Policy
<b>EP</b>	European Parliament
<b>ERAM</b>	En-Route Automation
<b>EU</b>	European Union
<b>EUCCAP</b>	European China Civil Aviation Project
<b>EUR</b>	Euro (Currency)
<b>FAA</b>	Federal Aviation Authority
<b>FAB</b>	Functional Airspace Blocks
<b>FABEC</b>	Functional Airspace Block European Central
<b>FDR</b>	Flight Data Recorder
<b>FRMS</b>	Fatigue Risk Management Systems
<b>FTK</b>	Freight Tonne Kilometres
<b>FTL</b>	Flight Time Limitations
<b>GAATS</b>	Gander Automated Air Traffic System
<b>GAMA</b>	General Aviation Manufacturers Association
<b>GANP</b>	Global Air Navigation Plan
<b>GCC</b>	Gulf Cooperation Council
<b>GDP</b>	Gross Domestic Product
<b>IAC</b>	Interstate Aviation Committee
<b>IAG</b>	International Airlines Group
<b>IATA</b>	International Air Transport Association
<b>ICAO</b>	International Civil Aviation Organisation
<b>IFR</b>	Instrument Flight Rules
<b>IPO</b>	Initial Public Offering
<b>JADC</b>	Japan Aircraft Development Corporation
<b>JAL</b>	Japan Airlines
<b>JCAB</b>	Japanese Civil Aviation Bureau
<b>KPA</b>	Key Performance Areas
<b>KPIs</b>	Key Performance Indicators
<b>LAGs</b>	Liquids, Aerosols and Gels
<b>LATAM</b>	Latin America
<b>LCA</b>	Large Civil Aircraft
<b>LLCs</b>	Low Cost Carriers
<b>LVL</b>	Latvian Lat
<b>M&amp;A</b>	Mergers & Acquisitions
<b>MAEP</b>	Middle East Region Airspace Enhancement Programme
<b>MoU</b>	Memorandum of Understanding
<b>MPPA</b>	Million Passengers per Annum
<b>MRO</b>	Maintenance, Repair and Overhaul
<b>MTOW</b>	Maximum Take-off Weight
<b>NAS</b>	National Airspace System
<b>NEO</b>	New Engine Option
<b>NG</b>	Next Generation
<b>NOP</b>	Network Operations Plan
<b>NPPs</b>	National Performance Plans

<b>NPRM</b>	Notice of Proposed Rulemaking
<b>NSA</b>	National Supervisory Authorities
<b>NVS</b>	NAS Voice System
<b>OFA</b>	Operational Focus Areas
<b>OPEC</b>	Organization of the Petroleum Exporting Countries
<b>PA</b>	Per annum
<b>PCP</b>	Pilot Common Approach
<b>PKP</b>	Passenger Kilometres Performed
<b>PLF</b>	Passenger Load Factors
<b>PPP</b>	Public-Private Partnership
<b>PR</b>	Reference Period
<b>PRB</b>	Performance Review Body
<b>PRC</b>	People's Republic of China
<b>PSO</b>	Public Service Obligation
<b>PTD</b>	Package Travel Directive
<b>R&amp;D</b>	Research and Development
<b>ROA</b>	Return on Assets
<b>ROCE</b>	Return on Capital Employed
<b>ROIC</b>	Return on Invested Capital
<b>RP</b>	Reference Period
<b>RPAS</b>	Remotely Piloted Aircraft Systems
<b>RPAS</b>	Remotely Piloted Aircraft Systems
<b>RPK</b>	Revenue Passenger Kilometres
<b>SES</b>	Single European Sky
<b>SESAR</b>	Single European Sky ATM Research
<b>SGEI</b>	Services of General Economic Interests
<b>SIP</b>	Synthetic Iso-Paraffin
<b>SOC</b>	Security Operation Centres
<b>STCA</b>	Short Term Conflict Area
<b>STEB's</b>	Security Tamper Evident Bags
<b>SWIM</b>	System Wide Information Management
<b>TAMR</b>	Terminal Automation Modernization and Replacement
<b>THY</b>	Turkish Airlines
<b>TMA</b>	Terminal Manoeuvring Area
<b>TTA</b>	Target Time of Arrival
<b>UAS</b>	Unmanned Aircraft Systems
<b>UK</b>	United Kingdom
<b>ULCC</b>	Ultra-Low Cost Carriers
<b>UNWTO</b>	UN World Tourism Organisation
<b>UPS</b>	United Postal Service
<b>USA</b>	United States of America
<b>USD</b>	United States Dollar
<b>VFR</b>	Visiting Friends and Family
<b>WACC</b>	Weighted Average Cost of Capital
<b>WCAG</b>	Website Content Accessibility Guidelines
<b>YOY</b>	Year-on-Year

