

# AVIATION BENEFITS BEYOND BORDERS

GLOBAL SUMMARY



POWERING GLOBAL ECONOMIC GROWTH,  
EMPLOYMENT, TRADE LINKS, TOURISM AND  
SUPPORT FOR SUSTAINABLE DEVELOPMENT  
THROUGH AIR TRANSPORT

JUNE 2016



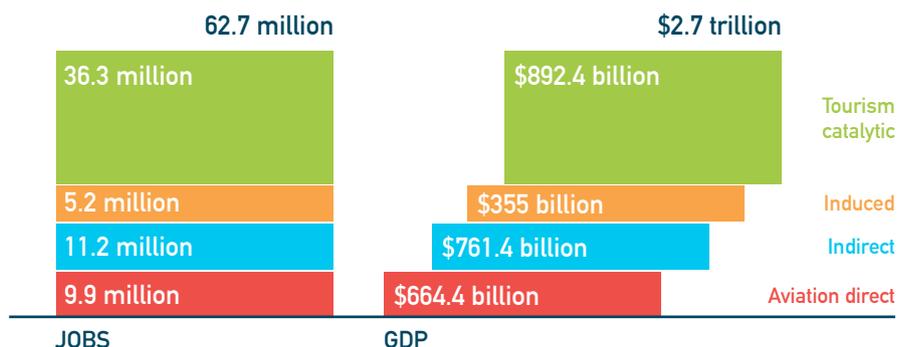
# FAST FACTS

## The world of air transport, 2014

All figures are for 2014, unless otherwise stated, to give a single set of data for one year. Where available, the latest figures are also noted. These should be viewed as a snapshot of the aviation sector in 2014 and not as part of a trend. Although previous *Aviation: Benefits Beyond Borders* reports have used the same economic impact technique, differences in data sources available between years mean many of the annual reports are not directly comparable.

### Beyond the industry

Aviation's global employment and GDP impact, 2014



# 62.7 MILLION

Jobs supported by aviation worldwide

# \$2.7 TRILLION

Aviation's global economic impact (including direct, indirect, induced and tourism catalytic)

# 3.5%

of global GDP supported by aviation

### DIRECT JOBS

## 447,500

**Airport operators**  
(work for the airport operator)

## 5,468,000

**Other on-airport**  
(retail, car rental, government agencies such as customs and immigration, freight forwarders and some catering)

## 2,669,000

**Airline staff**  
(flight and cabin crews, executives, ground services, check-in, training, maintenance staff)

## 1,101,000

**Civil aerospace staff**  
(engineers and designers of civil aircraft, engines and components)

## 224,000

**Air navigation service providers**  
(air traffic controllers, executives)

These figures represent a snapshot of the benefits that aviation activities deliver to the global economy. They do not include other economic benefits of aviation, such as the jobs or economic activity generated when companies or whole industries exist because air travel makes them possible. Neither do they include the intrinsic value that the speed and connectivity of air travel provides, or domestic tourism and trade. Including these would increase the employment and global economic impact numbers several-fold.

# 21st

If aviation were a country, it would rank 21st in size by GDP

# 3.8x

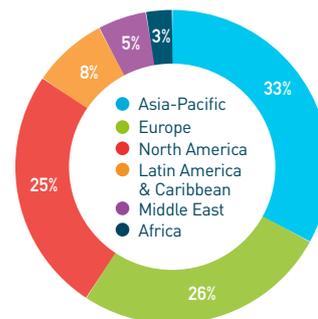
Aviation jobs are, on average, 3.8 times more productive than other jobs. By opening markets, enabling knowledge transfer and other catalytic effects, aviation also makes jobs in other sectors more productive

# 3.3 BILLION

Passengers carried by airlines (in 2015, 3.57 billion passengers were carried)

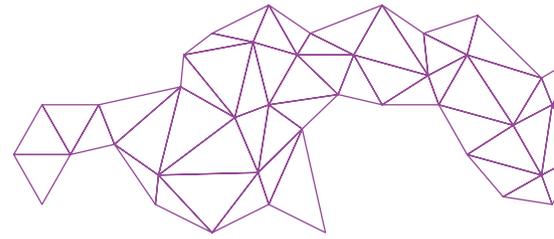
### Asia-Pacific in front

Regional passenger traffic split



# 54%

of international tourists travel by air



# 1,402

Commercial airlines

# 3,883

Airports with scheduled commercial flights

(there are 41,788 airfields in the world, including military and general aviation)

# 173

Air navigation service providers

# 26,065

Commercial aircraft in service

# 51,554

Routes served globally in 2014

(in 2015 the number was 52,964). Of these, 17,370 unique city-pairs are served

# 32.8 MILLION

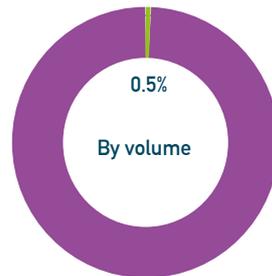
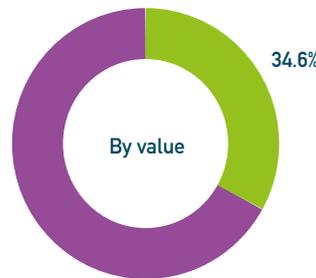
Commercial flights worldwide  
(in 2015, there were 34.8 million flights)

# 35%

Air transport carries around 35% of world trade by value (\$6.4 trillion in 2014) and less than 1% by volume

High value, time sensitive

Proportion of global trade transported by air



# 739 MILLION

Tonnes of carbon dioxide (CO<sub>2</sub>) emitted by airlines

(in 2015, it was 781 million tonnes). This is 2% of the global human emissions of 36 billion tonnes. Around 80% of aviation CO<sub>2</sub> is emitted from flights over 1,500 kilometres in length, for which there is no practical alternative form of transport

## CLIMATE TARGETS

### Improve 1.5%

Aviation will improve its fleet fuel efficiency by an average of 1.5% per annum between 2009 and 2020, a figure the industry is currently exceeding

### Stabilise

From 2020, net carbon emissions from aviation will be capped through carbon-neutral growth

### Reduce 50%

By 2050, net aviation carbon emissions will be half of what they were in 2005

## ENVIRONMENTAL PROGRESS

The air transport industry has made significant progress in reducing its environmental impact:

CO<sub>2</sub> emissions per seat kilometre

▼ 70%+ since first jet aircraft

Perceived noise

▼ 75%+ since first jets

- » Over nine billion tonnes of CO<sub>2</sub> avoided since 1990 through a combination of new technology, operational efficiencies and infrastructural improvements, including airlines spending \$3 trillion on over 25,000 new aircraft
- » The industry has invested in new technology, better operations and infrastructure improvements
- » Civil aerospace spends \$15 billion per year on efficiency-related R&D
- » Sustainable aviation fuels could reduce the sector's CO<sub>2</sub> footprint by as much as 80%. Over 2,200 commercial flights have taken place so far
- » Air traffic management modernisation could save millions of tonnes of CO<sub>2</sub>



# A GLOBAL INDUSTRY

## Aviation's global economic, social and environmental profile in 2014

**THE GLOBAL AIR TRANSPORT INDUSTRY SUPPORTS ALMOST 63 MILLION JOBS WORLDWIDE AND CONTRIBUTES \$2.7 TRILLION TO GLOBAL GDP, EQUIVALENT TO 3.5% OF GDP**

This report provides a global view of a truly global industry. Oxford Economics analysed the economic and social benefits of aviation at a national level in over 50 countries and used the results of that assessment to build the most comprehensive global picture of air transport's many benefits. Working with partners across the industry, the Air Transport Action Group (ATAG) has expanded the analysis to build a unique view of the air transport system that provides jobs, trade, connectivity, tourism, vital lifelines for many remote communities and rapid disaster response.



### EVERY DAY...

**9.8 MILLION PASSENGERS**



**104,000 FLIGHTS**



**\$17.5 BILLION WORTH OF GOODS CARRIED**



### Air transport is a major contributor to global economic prosperity

Aviation provides the only rapid worldwide transportation network, which makes it essential for global business and tourism. It plays a vital role in facilitating economic growth, particularly in developing countries.

Airlines transport over three billion passengers annually with revenue passenger kilometres (RPK) totalling over six trillion in 2014.

Over 50 million tonnes of freight were carried by air in 2014, amounting to just under 786 billion freight tonne kilometres (FTK).

Air transport facilitates world trade, helping countries contribute to the global economy by increasing access to international markets and allowing globalisation of production. The total value of goods transported by air represents 35% of all international trade.

Aviation is indispensable for tourism, a major engine of economic growth, particularly in developing economies. Globally, 54% of international tourists travel by air.

Connectivity contributes to improved productivity by encouraging investment and innovation; improving business operations and efficiency; and allowing companies to attract high quality employees.

Aviation's global economic impact (direct, indirect, induced and tourism catalytic) is estimated at \$2.7 trillion, equivalent to 3.5% of world gross domestic product (GDP).

These figures do not include other economic benefits of aviation, such as the jobs or economic activity that occur when companies or industries exist because air travel makes them possible. Neither does it include the intrinsic value that the speed and connectivity of air travel provides, or domestic tourism and trade. Including these would increase the employment and global economic impact numbers several-fold.

Around 1,400 airlines operate a total fleet of over 26,000 aircraft. They serve almost 4,000 airports through a route network of several million kilometres managed by 173 air navigation service providers.

### Air transport is a major global employer

The air transport industry supports a total of 62.7 million jobs globally.

It provides 9.9 million direct jobs: airlines, air navigation service providers and airports directly employ over three million people and the civil aerospace sector (the manufacture of aircraft systems, frames and engines) employs 1.1 million people. A further 5.5 million work in other on-airport positions.

There are 11.2 million indirect jobs generated through purchases of goods and services from companies in its supply chain.

Industry employees support 5.2 million induced jobs through spending of wages.

Aviation-enabled tourism generates around 36.3 million jobs globally.

### Air transport invests substantially in vital infrastructure

Unlike other transport modes, the air transport industry pays for a vast majority of its own infrastructure costs (runways, airport terminals, air traffic control), rather than being financed through taxation and public investment or subsidy (as is typically the case for road and railways).

In 2014, airports invested \$37 billion in construction projects, creating jobs and building new infrastructure.



The benefits to society of research and development spending by the aerospace industry are estimated to be much higher than in manufacturing as a whole. Every \$100 million of spending on research eventually generates additional GDP benefits of \$70 million, year after year.

### Air transport provides significant social benefits

Air transport contributes to sustainable development. By facilitating tourism and trade, it generates economic growth, provides jobs, improves living standards, alleviates poverty and increases revenues from taxes.

The increase in cross-border travel is a reflection of the closer relationships developing between countries, both between individuals and at state level. In the same way, eased restrictions on the movement of goods and people across borders facilitates the development of social and economic networks that will have long-lasting effects. This improved flow of people and goods benefits both the host and the originating countries, encouraging increased social and economic integration.

Air transport offers a vital lifeline to communities that lack adequate road or rail networks. In many remote communities and small islands, access to the rest of the world

and to essential services such as health care is often only possible by air.

Aviation's speed and reliability are perhaps most immediately apparent in the delivery of urgently needed assistance during emergencies caused by natural disaster, famine and war. Air services are particularly important in situations where physical access is problematic.

### Air transport is working to mitigate its environmental impact

Airline operations produced 739 million tonnes of carbon dioxide (CO<sub>2</sub>) in 2014 (and 781 million tonnes in 2015), just under 2% of the total human carbon emissions of over 36 billion tonnes.

The aviation industry agreed in 2008 to the world's first set of sector-specific climate change targets. The industry is already delivering on the first target to continue to improve fleet fuel efficiency by 1.5% per year until 2020. From 2020, aviation will cap its net carbon emissions while continuing to grow to meet the needs of passengers and economies. By 2050, the industry has committed to reduce its net carbon footprint to half of what it was in 2005.

Companies across the sector are collaborating to reduce emissions using a four-pillar

strategy of new technology, efficient operations, improved infrastructure and a global market-based measure to fill the remaining emissions gap.

Modern jet aircraft are 75% quieter than the models that first entered into service and each new generation of aircraft continues this downward trend.

Over 2,200 passenger flights operating partially on sustainable biofuels have taken place so far. It is expected that shifting to alternative aviation fuels could reduce CO<sub>2</sub> by as much as 80%, compared with traditional jet fuel.

### Air transport will continue to provide jobs

Forecasts suggest that, in 2034, there will be over 5.8 billion passengers and aviation will support 99 million jobs and \$5.9 trillion in economic activity (a 122% increase on 2014 figures).

However, if growth were to slow by just 1%, the total number of jobs supported by the air transport sector (including air transport supported tourism) would be more than 10.5 million lower than the base forecasts and the contribution of the air transport sector to world GDP would be \$690 billion (2014 prices) lower, with an additional \$350 billion lost through lower tourism activity.



# REGIONAL AND GROUP ANALYSIS

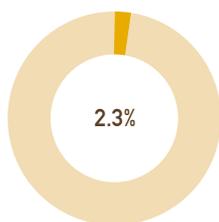
## Aviation benefits around the world

### AFRICA

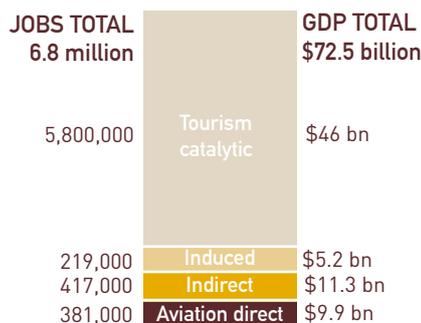


Air transport supports 6.8 million jobs and \$72.5 billion in GDP in Africa

Africa's share of global passenger traffic, 2014



Total jobs and GDP supported by air transport in Africa, 2014

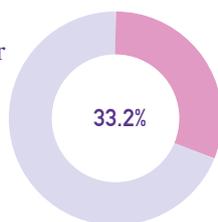


### ASIA-PACIFIC

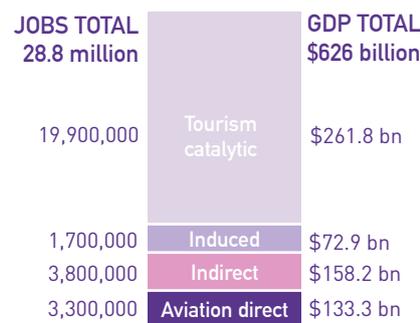


Air transport supports 28.8 million jobs and \$626 billion in GDP in Asia-Pacific

Asia-Pacific share of global passenger traffic, 2014



Total jobs and GDP supported by air transport in Asia-Pacific, 2014

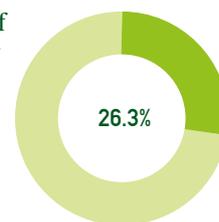


### EUROPE



Air transport supports 11.9 million jobs and \$860 (€707.5) billion in GDP in Europe

Europe's share of global passenger traffic, 2014



Total jobs and GDP supported by air transport in Europe, 2014



*\*Due to rounding, some totals may not equal the sum of the parts*

### APEC ECONOMIES

Air transport supports 29.1 million jobs and \$1.5 trillion in GDP in the APEC economies

### SMALL ISLAND STATES

Air transport supports 1.4 million jobs and \$25.3 billion in GDP in small island states

### OECD COUNTRIES

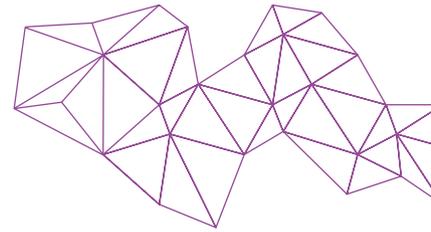
Air transport supports 21.9 million jobs and \$1.9 trillion in GDP in the OECD

### EUROPEAN UNION

Air transport supports 8.8 million jobs and \$708 billion (€621 billion) in GDP in the EU28

### DEVELOPING COUNTRIES

Air transport supports 38 million jobs and \$561 billion in GDP in developing countries

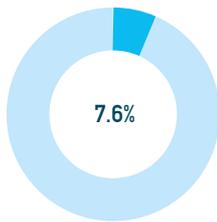


## LATIN AMERICA AND THE CARIBBEAN



Air transport supports 5.2 million jobs and \$167 billion in GDP in Latin America and the Caribbean

Latin America and Caribbean's share of global passenger traffic, 2014



Total jobs and GDP supported by air transport in Latin America and the Caribbean, 2014

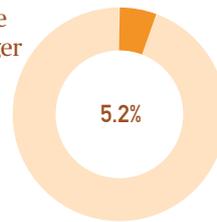
JOB TOTAL		GDP TOTAL
5.2 million		\$167 billion
3,000,000	Tourism catalytic	\$60 bn
408,000	Induced	\$21.3 bn
941,000	Indirect	\$45.9 bn
806,000	Aviation direct	\$40 bn

## MIDDLE EAST



Air transport supports 2.4 million jobs and \$157.2 billion in GDP in the Middle East

Middle East share of global passenger traffic, 2014



Total jobs and GDP supported by air transport in the Middle East, 2014

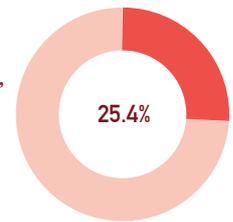
JOB TOTAL		GDP TOTAL
2.4 million		\$157.2 billion
1,200,000	Tourism catalytic	\$59.7 bn
225,000	Induced	\$19.2 bn
472,000	Indirect	\$41.5 bn
427,000	Aviation direct	\$36.8 bn

## NORTH AMERICA



Air transport supports 7.6 million jobs and \$791 billion in GDP in North America

North America's share of global passenger traffic, 2014



Total jobs and GDP supported by air transport, 2014

JOB TOTAL		GDP TOTAL
7.6 million		\$791 billion
1,400,000	Tourism catalytic	\$136.8 bn
1,200,000	Induced	\$131 bn
2,500,000	Indirect	\$271.1 bn
2,400,000	Aviation direct	\$252 bn

## Forecast growth

Projected annual growth rate for international traffic by region, 2014 - 2034

AFRICA	5.4%
ASIA-PACIFIC	5.1%
EUROPE	3.6%
LATIN AMERICA & CARIBBEAN	4.7%
MIDDLE EAST	6.0%
NORTH AMERICA	2.7%
APEC	3.9%
EUROPEAN UNION	3.6%
SMALL ISLANDS STATES	4.9%
DEVELOPING COUNTRIES	5.0%
OECD	3.5%
WORLD	4.3%





# A GROWTH INDUSTRY

## Air transport is forecast to support 99.1 million jobs by 2034

### The contribution of the air transport industry in 20 years' time

Several of the world's largest aircraft manufacturers, including Airbus, Boeing, Bombardier and Embraer, use 'revenue passenger kilometres' (i.e. one RPK unit equals one kilometre travelled by a revenue-paying passenger) to calculate the future demand for air transport. A conservative analysis of the most recent estimates suggest that demand for air transport will increase by an average of 4.3% per annum over the next 20 years. That implies that demand for air travel will increase by factor of 2.3 over the period.

If this growth path is achieved, then in 2034 the air transport industry will contribute:

- » 14.9 million direct jobs and \$1.5 trillion of GDP to the world economy;
- » Including indirect and induced contributions, 39.6 million jobs and \$3.9 trillion in GDP;
- » Once the impacts of global tourism are taken into account, a total of 99.1 million jobs and \$5.9 trillion in GDP.

### "What if...": a sensitivity analysis

These forecasts are based on the air transport sector growing at the predicted rate. However, looking ahead 20 years is naturally fraught with uncertainty and unexpected political and economic events could throw these predictions off course. The question is how could the economic contribution of air transport be impacted if demand, for one reason or another, is reduced? To account for unforeseen fluctuations in activity, Oxford Economics undertook a sensitivity analysis. By changing key assumptions driving the results, a sensitivity analysis can assess a range of potential alternative economic outcomes.

For example, if the average annual growth in passenger numbers for each region covered in this report turns out to be one percentage point lower than currently expected between 2014 and 2034, then in 2034:

- » Worldwide, there would be 1.4 million fewer direct jobs in the air transport sector.
- » Taking into consideration the direct, indirect, and induced impacts, there would be 3.8 million fewer jobs supported by air transport.
- » Once the impacts of tourism are included, the air transport sector would support a total of 10.5 million fewer jobs than would otherwise be the case under the baseline scenario.
- » Worldwide, the direct, indirect, and induced GDP for air transport would be \$690 billion (2014 prices) lower than it otherwise would be.
- » An additional \$350 billion would be lost because of a reduction in tourism activity.

### Developing technology: a sustainable future

While the aviation industry is expected to grow significantly in the coming decades, with more demand from passengers forecast up to 2034 and beyond, the industry is confident that this growth can be reconciled with its environmental responsibilities. The goal of capping carbon emissions at 2020 levels is due to be addressed at the 2016 ICAO Assembly, where a global market-based measure for aviation emissions is expected to be agreed.

However, it is the industry's long term goal of cutting overall emissions by 2050 to half

of what they were in 2005, that remains the major focus. To achieve this, the sector will need to continue to be a world leader in technological innovation.

One of the main methods by which aviation is expected to drastically cut overall carbon emissions is the development of sustainable alternative fuels. These fuels can be up to 80% less carbon intensive over their lifecycle and work is already well underway to commercialise them. Over 2,200 commercial flights have taken place on these fuels already and a number of influential members of the industry have shown an encouraging level of commitment to further developing this new energy source.

Operational and infrastructural improvements can also yield significant gains, and have already done so, but the most significant savings in emissions will be achieved through new aircraft technology. Research on new technology is being undertaken by a range of research organisations, in partnership with industry and governments.

In Europe, for example, the Clean Sky project, which is partially funded by the European Commission, brings together partners from the aerospace sector and is charged with researching and developing new technologies to significantly increase the environmental performances of aircraft. In the US, NASA has also been working on new aeronautical technology including a 'morphing wing' design, which changes shape in response to the flow of air over the wings.

For more information on future technology, see another ATAG publication, *Climate Action Takes Flight* at [www.enviro.aero](http://www.enviro.aero)



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[www.aviationbenefits.org](http://www.aviationbenefits.org)  
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For references to the facts outlined in this summary version of the 2016 *Aviation: Benefits Beyond Borders* report, please refer to the full report at [www.aviationbenefits.org](http://www.aviationbenefits.org)

The air transport industry is the global network of commercial aircraft operators, airports, air navigation service providers and the manufacturers of aircraft and their components. It is responsible for connecting the global economy, providing millions of jobs and making modern quality of life possible. The Air Transport Action Group (ATAG), based in Geneva, Switzerland, represents the full spectrum of this global business. ATAG brings the industry together to form a strategic perspective on commercial aviation's sustainable development and the role that air transport can play in supporting the sustainability of other sectors of the economy. Representatives on ATAG's Board of Directors include: Airports Council International (ACI), Airbus, ATR, Boeing, Bombardier, Civil Air Navigation Services Organisation (CANSO), CFM International, Embraer, GE Aviation, Honeywell Aerospace, International Air Transport Association (IATA), Pratt & Whitney, Rolls-Royce and Safran.