



AVIATION BENEFITS BEYOND BORDERS

GLOBAL SUMMARY



Powering global economic growth, employment, trade links, tourism and support for sustainable development through **air transport**

OCTOBER 2018

65.5 million

Jobs supported by aviation worldwide

\$2.7 trillion

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

3.6%

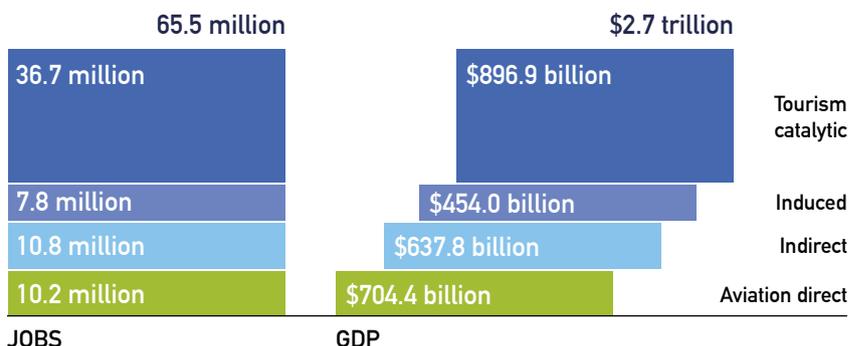
Global GDP supported by aviation

4.4x

Aviation jobs are, on average, 4.4 times more productive than other jobs. By opening markets and enabling knowledge transfer and other catalytic effects, aviation also makes jobs in other sectors more productive. Globally, each aviation job generates \$108,700 in gross value added (GVA).

Beyond the industry

Aviation's global employment and GDP impact



DIRECT JOBS



525,000

Airport operators

(operations, planning, engineering)

5.6 million

Other on-airport

(retail, car rental, government agencies such as customs and immigration, freight forwarders, some catering)

2.7 million

Airlines

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

1.2 million

Civil aerospace

(engineers and designers of civil aircraft, engines and components)

233,000

Air navigation service providers

(air traffic controllers, executives)

20th

If aviation were a country, it would rank 20th in size by GDP (similar to Switzerland or Argentina)

All employment and GDP figures are for 2016, unless otherwise stated, to give a single set of data for one year. Where available, traffic and financial statistics data are for 2017.

These figures represent 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. They also do not 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.

The figures in *Aviation: Benefits Beyond Borders* should be viewed as a snapshot of the aviation sector in 2016-2018 and not as part of a trend. Differences in data sources mean the reports are not directly comparable.

45,091 Routes served globally, 2017

(of these, 20,032 unique city pairs are served)

4.1 billion Passengers carried by airlines, 2017

(in 2018, 4.4 billion passengers are forecast)

41.9 million

Scheduled commercial flights worldwide, 2017

1,303

Commercial airlines

170

Air navigation service providers

3,759

Airports with scheduled commercial flights

(it is estimated there are 41,820 airfields in the world, including military and general aviation aerodromes)

31,717

Commercial aircraft in service

57%

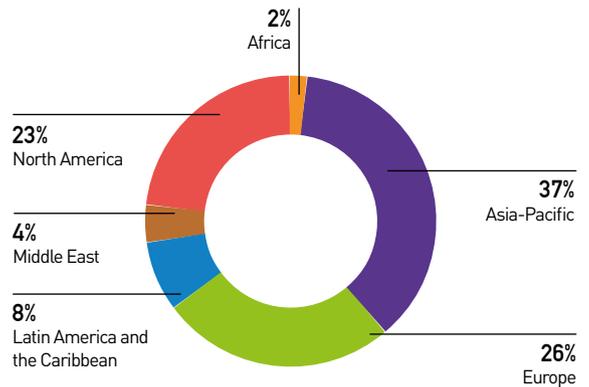
Percentage of international tourists who travel by air, 2017

35%

Air transport carries around 35% of world trade by value and less than 1% by volume

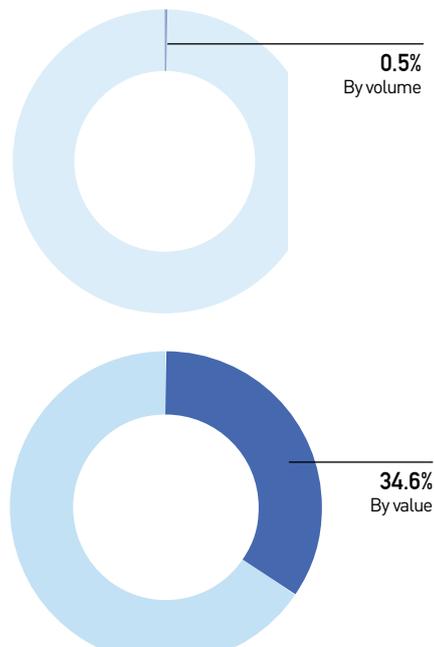
Asia-Pacific in front

Regional passenger traffic split



High value, time sensitive

Proportion of global trade transported by air



859 million

Tonnes of carbon dioxide (CO₂) emitted by airlines, 2017. This is 2% of the global human emissions of around 40 billion tonnes. Around 80% of aviation CO₂ is emitted from flights over 1,500 kilometres in length.

EXECUTIVE SUMMARY

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 63 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, which creates and supports jobs, trade, connectivity, tourism, vital lifelines for many remote communities and rapid disaster response.

EVERY DAY...

12 MILLION PASSENGERS



120,000 FLIGHTS



\$18.8 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 four billion passengers annually, with revenue passenger kilometres totalling nearly eight trillion in 2017.

Air transport facilitates world trade. It helps countries contribute to the global economy by increasing access to international markets and allowing the globalisation of production. Nearly 62 million tonnes of freight were carried by air in 2017.

The total value of goods transported by air, \$6 trillion, represents 35% of all international trade.

Aviation is indispensable for tourism, a major engine of economic growth, particularly in developing economies. Globally, 57% 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 3.6% 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, 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 1,300 airlines operate a total fleet of over 31,000 aircraft. They serve almost 4,000 airports through a route network of several million kilometres managed by 170 air navigation service providers.

Air transport is a major global employer

The air transport industry supports a total of 65.5 million jobs globally.

It provides 10.2 million direct jobs. Airlines, air navigation service providers and airports directly employ nearly 3.5 million people, and the civil aerospace sector, which manufactures aircraft systems, frames and engines, employs 1.2 million people. A further 5.6 million people work in other on-airport positions.

There are 10.8 million indirect jobs generated through the purchases of goods and services from companies in the air transport industry supply chain.

Industry employees support 7.8 million induced jobs through the spending of wages.

Aviation-enabled tourism generates around 36.7 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 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 2016, airports invested nearly \$64 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 facilitate the development of social and economic networks that will have long-lasting effects. This improved flow of people and goods benefits 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. For 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 859 million tonnes of carbon dioxide (CO₂) in 2017, just under 2% of the total human carbon emissions of around 40 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 market-based measures to fill the remaining emissions gap.

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

By 2020, it is expected that a million passenger flights operating partially on sustainable aviation biofuels will have taken place. It is also expected that shifting to alternative aviation fuels could reduce CO₂ as much as 80% compared with traditional jet fuel.

Changes in trade policies will have a dent on future global benefits of aviation

Forecasts suggest that in 2036 aviation could see over 7.7 billion passengers and support 97.8 million jobs and \$5.7 trillion in economic activity.

However, if growth were to slow due to restrictive trade, immigration and political factors, the total number of jobs supported by the air transport sector (including air transport-supported tourism) could be 12 million lower by 2036 than the base forecasts. In this scenario, the contribution of the air transport sector to world GDP would be \$820 billion (2016 prices) lower, with an additional \$390 billion lost through lower tourism activity.

ENVIRONMENTAL PROGRESS

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

- » CO₂ emissions per seat kilometre ▼ 80% since first jet aircraft.
- » Perceived noise ▼ 75% since first jets.
- » Currently surpassing the first goal, with an average annual fuel efficiency of 2.1% achieved across the fleet between 2009 and 2016.
- » Over ten billion tonnes of CO₂ avoided since 1990 through a combination of new technology, operational efficiencies and infrastructural improvements, including airlines spending \$1 trillion on over 12,200 new aircraft since 2009.
- » The industry has invested in new technology, better operations and improved infrastructure.
- » Civil aerospace spends \$15 billion per year on efficiency-related research and development.
- » Deployment of sustainable aviation fuels could reduce CO₂ emissions as much as 80% compared with traditional fuel. It is expected that a million commercial flights will have taken place using a blend of alternative fuel by the end of 2020.
- » Air traffic management modernisation, including the introduction of new technologies and procedures, is increasing capacity, shortening routes, improving efficiency and reducing delays, saving millions of tonnes of CO₂.
- » Following a historic agreement in 2016, the industry is working with governments to implement the world's first sector-wide market-based measure for offsetting the growth in international aviation CO₂ post-2020.

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 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.

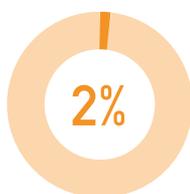
REGIONAL AND GROUP ANALYSIS

AFRICA

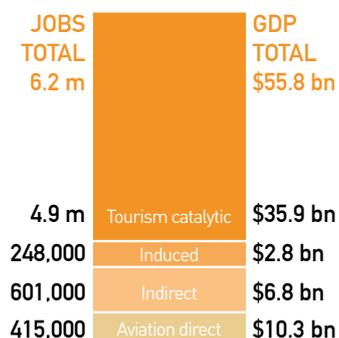


Air transport supports **6.2 million jobs** and **\$55.8 billion** in GDP in Africa

Africa's share of global passenger traffic, 2017



Total jobs and GDP supported by air transport in Africa



ASIA-PACIFIC

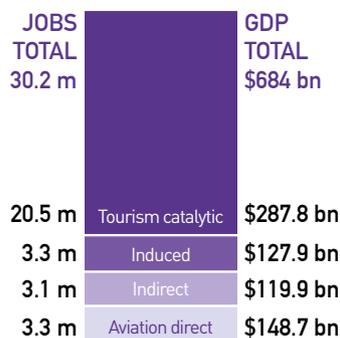


Air transport supports **30.2 million jobs** and **\$684 billion** in GDP in Asia-Pacific

Asia-Pacific's share of global passenger traffic, 2017



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



EUROPE



Air transport supports **12.2 million jobs** and **\$823 billion** in GDP in Europe

Europe's share of global passenger traffic, 2017



Total jobs and GDP supported by air transport in Europe



APEC ECONOMIES

Air transport supports **32.9 million jobs** and **\$1.7 trillion** in GDP in the APEC economies

SMALL ISLAND STATES

Air transport supports **1.8 million jobs** and **\$32.1 billion** in GDP in small island states

OECD COUNTRIES

Air transport supports **24 million jobs** and **\$2.1 trillion** in GDP in OECD countries

EUROPEAN UNION

Air transport supports **9.4 million jobs** and **\$691 (€624) billion** in GDP in the European Union

DEVELOPING COUNTRIES

Air transport supports **46 million jobs** and **\$626 billion** in GDP in developing countries

LEAST-DEVELOPED COUNTRIES

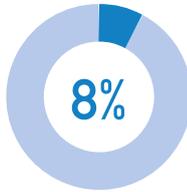
Air transport supports **nearly six million jobs** and **\$31.5 billion** in GDP in least-developed countries

LATIN AMERICA AND THE CARIBBEAN

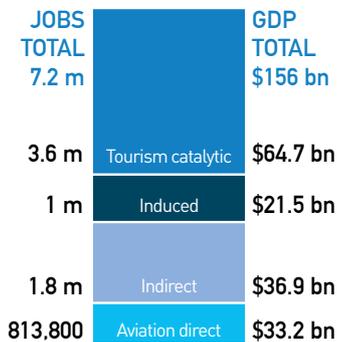


Air transport supports **7.2 million jobs** and **\$156 billion** in GDP in Latin America and the Caribbean

Latin America and the Caribbean's share of global passenger traffic, 2017



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

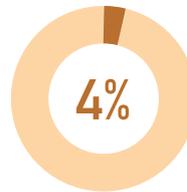


MIDDLE EAST

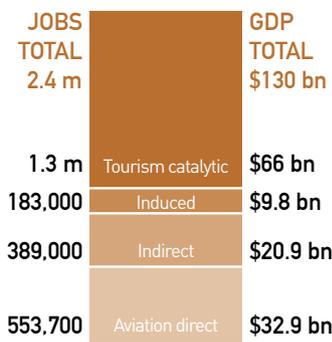


Air transport supports **2.4 million jobs** and **\$130 billion** in GDP in the Middle East

The Middle East's share of global passenger traffic, 2017



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

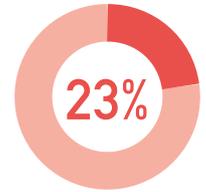


NORTH AMERICA

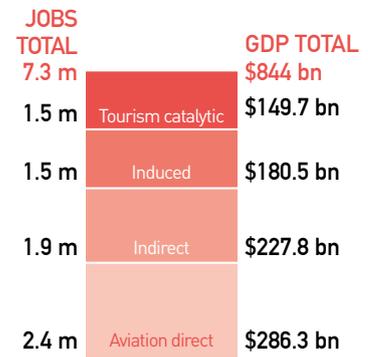


Air transport supports **7.3 million jobs** and **\$844 billion** in GDP in North America

North America's share of global passenger traffic, 2017



Total jobs and GDP supported by air transport in North America



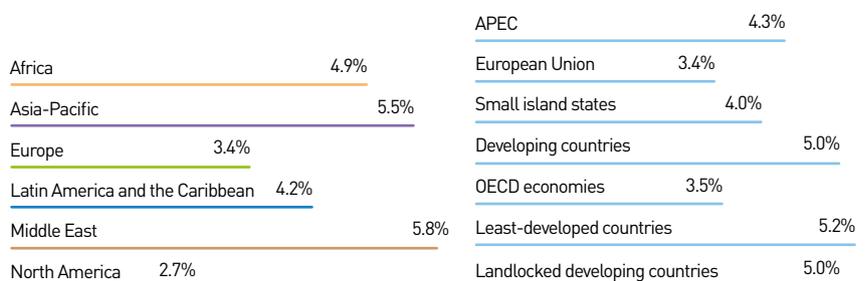
LANDLOCKED DEVELOPING COUNTRIES

Air transport supports **2.7 million jobs** and **\$20.9 billion** in GDP in landlocked developing countries

The full *Aviation: Benefits Beyond Borders* report can be found at www.aviationbenefits.org

Sustaining growth

Projected average annual growth rate for international air traffic by region, 2016–2036



A GROWTH INDUSTRY

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 suggests 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 2036 the air transport industry will contribute:

- » 15.5 million direct jobs and \$1.5 trillion of GDP to the world economy;
- » Including indirect and induced contributions, 46.4 million jobs and \$3.8 trillion in GDP;
- » Once the impacts of global tourism are taken into account, a total of 97.8 million jobs and \$5.7 trillion in GDP.

In a fragmented world

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.

Should moves towards a more protectionist and fragmented world continue, there will likely be an impact on air traffic growth, particularly international travel and air freight. A reduction in the growth of aviation activity could materialise following events such as

- » a significant shift in global trade policy and multilateral, regional and bilateral agreements, with retaliatory tariffs established in response, and a trade slowdown that undermines the global recovery;
- » the exit of countries from existing regional trade and travel facilitation agreements and the reduction in migration due to policy approaches by governments;
- » no further liberalisation in air markets and even more restrictive policies.

If this more pessimistic scenario materialises, then in 2036:

- » Worldwide, there would be 1.9 million fewer direct jobs and \$320 billion less GDP in the air transport sector.

- » Taking into consideration the direct, indirect, and induced impacts, there would be 6.5 million fewer jobs and \$820 billion less GDP supported by air transport.
- » Once the impacts of tourism are included, the air transport sector would support a total of 12 million fewer jobs and \$1.2 trillion less GDP than it otherwise would be.

Developing a sustainable future

While the aviation industry is expected to grow significantly in the coming decades, with more demand from passengers forecast up to 2036 and beyond, the industry is confident that this growth can be reconciled with its environmental responsibilities.

Aviation has adopted the world's first global carbon mechanism for any industrial sector: the ICAO Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). As of publication, 73 nations have signed up to the initial voluntary phases of this scheme, meaning around 80% of the post-2020 growth of international aviation will be offset. From 2027, the scheme becomes mandatory and will help towards achieving the industry's goal of carbon-neutral growth in the mid-term.

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 goal, the sector will need to continue to be a world leader in technological innovation.

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 and sustainable aviation fuels.

These fuels can be up to 80% less carbon intensive over their life cycle, and work is already well underway to commercialise them. One million commercial flights are expected to have taken place on these fuels by 2020, and a number of influential businesses within the industry have shown an encouraging level of commitment to further developing this new energy source. However, more systematic uptake will be needed for these fuels to deliver the CO₂ reductions needed. Governments must prioritise the use of these new forms of energy for long-haul air transport.

A number of technology research organisations are exploring new, disruptive aircraft designs, which will literally change the shape of aviation. Each of these conceptual designs has advantages and feasibility barriers to overcome. As battery technology develops, the scenario becomes possible that regional, jet-sized electric aircraft could be in service by 2030.

For more information on future technology, see www.enviro.aero



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For references to the facts outlined in this summary version of the 2018 *Aviation: Benefits Beyond Borders* report, please refer to the full report at 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.