



DECARBONISING AVIATION FROM THE GROUND UP

From infrastructure to aircraft, embarking on a comprehensive path to achieve net-zero emissions

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Planning for the future of aviation is a multilayered endeavour that must include decarbonisation at the heart of all decisions.

Before the pandemic, aviation was responsible for about 2 percent of carbon emissions (and 3.5 percent of the drivers of climate change).¹ Interestingly, in comparison, the carbon emissions associated with the internet comes to 3.7 percent of greenhouse gas emissions.² The sector has increasingly recognised the importance of reducing greenhouse gas (GHG) emissions and has already taken notable mitigating steps. Moving forward, to do its part in limiting the global temperature rise to not more than 1.5 °C above pre-industrial levels by 2050,³ the aviation sector must embark on a comprehensive path to achieve net-zero emissions.

The cornerstones to reduce aircraft emissions fall into four main categories:

- Improved aircraft and engine design – to improve fuel efficiency
- Improved airspace management – to minimise fuel consumption per journey
- Low-carbon power⁴

- Market-based mechanisms – to offset carbon emissions

Research continues to improve the viability of hybrid-electric and electric aircraft. These alternative technologies, while not poised to power large aircraft imminently, hold promise to increasingly power short- and medium-haul flights over the next decade and beyond. In light of this reality, continued concerted efforts are needed to bring about policies that will enable the commercialization of SAFs to reduce the impact of long-haul flights. Government backing will be vital to encourage and support the development of green technologies. Indeed, mandatory minimums quantities of SAFs look likely as the change is actively encouraged. Airlines and airports can lead the development of SAFs through purchase agreements with suppliers and/or investments in SAF supply, and reduced landing fees. Such steps can help SAFs become affordable alternatives to traditional fossil-based fuels.

Taking hybrid to an even greener level, hybrid-electric planes should be designed to be SAF compatible, especially as the aviation sector continues to ramp up the utilisation of these newer technologies. Considering the typical aircraft service life of 30 years, there will be a multiyear transition period as existing aircraft co-

¹ [Air Transport Action Group \(ATAG\), Facts & Figures](#); in addition, according to a [Manchester Metropolitan University-led international study](#): when the non-CO₂ impacts were factored in, aviation's part was calculated to be 3.5 percent of all human activities that drive climate change.

² [Climate Care, April 22, 2021](#)

³ [Sustainable Development Goals, Partnerships Platform, Business Ambition for 1.5°](#)

⁴ Considers the impact of production/manufacture—low carbon but not zero

exist with new, making it critical to develop SAFs for the present-day fleets, not just the new aircraft.



Collective Action

For more than 10 years, the airport industry has embraced the global Airport Carbon Accreditation (ACA) programme, which provides a certification framework for airport carbon emissions management and reduction. This voluntary initiative was co-developed by Airports Council International (ACI) Europe and WSP,⁵ and has become the international global standard for managing airport carbon emissions to support a climate-smart future. It has grown to include more than 390 airports, collectively located in more than 70 countries.

ACA delivers carbon-emissions improvements, as a combination of reductions and offsets, exceeding 1 million tonnes every year, and already has more than 70 airports certified as carbon neutral. In 2019, the ACI Europe Resolution committed Europe's airports to be net-zero carbon by 2050 for emissions directly under their control. More recently, in 2020, ACA introduced two new accreditation levels, *Transformation and Transition*, which commit

airports to an emissions-reduction trajectory consistent with keeping a global temperature increase to less than 2°C.

Aviation's continued commitment to address emissions from aircraft—the main source of sector emissions—is well represented by CORSIA, the Carbon Offsetting and Reduction Scheme for International Aviation developed by the International Civil Aviation Organization (ICAO), a United Nations agency. CORSIA, an international sector-based approach to carbon-emissions reduction and offsetting emissions from airlines, completed its pilot phase (2019 – 2021) and is now underway in its monitoring, reporting and offsetting phase.

Whilst offsetting has a very important role to play in the transition to zero-carbon aviation, ultimately aircraft will need low- and zero-carbon fuels and radically different propulsion technologies, as outlined in IATA's Aircraft Technology Roadmap.⁶

Designing the Path to 2050

Whilst the recovery in global passenger traffic post-pandemic is likely to take some time, (the consensus being mid-2020s for the industry to return to the 2019 levels⁷), over the longer term the number of people flying is still expected to increase significantly, potentially reaching 10 billion in 2050 from 4.4 billion in 2018.⁸ More aircraft and more ground infrastructure will be needed to support this significant growth.

People's propensity to fly—to explore the world, to visit family and friends—coupled with international trade means that traffic is expected to outpace the gains made in reducing aircraft

⁵ The ACA programme has been administered by WSP since its launch in 2009

⁶ IATA, Aircraft Technology Roadmap to 2050

⁷ "The Impact of COVID-19 on the airport business and the path to recovery," Advisory Bulletins, Airports Council International (ACI), March 25, 2021

⁸ IATA projections

emissions through efficiency measures and technological advances over the next 20 to 30 years.

In recognition of this projection, the initiatives launched by ICAO, IATA, and ACI in recent years, demonstrate that meaningful and responsible progress is achievable—through close attention to each impact point in the emissions chain. Aviation is a sector renowned for innovation and collaboration; the UK’s Sustainable Aviation⁹ is a world-first strategy bringing together; airports, airlines, manufacturers, air navigation service providers and other key business partners, all committed to achieving net zero by 2050.

While airports’ ground operations and construction of airport infrastructure account for a relatively small proportion of the total global greenhouse gas emissions from aviation today, they are likely to attract escalating levels of scrutiny as the aviation sector takes an all-inclusive view of emissions sources, not just those generated by aircraft. This perspective also includes the carbon impact of putting new infrastructure in place as airports expand to handle the anticipated growth in air traffic demand; the sector is already developing low-carbon steel and concrete for airport applications.¹⁰

The path to cut emissions involves a host of measures, including increased use of electric vehicles; decarbonising national power generation; a heightened focus on energy efficiency and low-carbon technologies; a wholesale shift to renewable energy sources; partnerships to support the introduction of new aircraft technologies; and more efficient use of airspace. Airports will need to take a closer look at the emissions sources they control directly and actively develop an encompassing plan to

reduce them to zero. They will also need to look hard at how to work with others to reduce the indirect emissions from assets and processes that the airport does not control, but can influence—in particular, companies operating on the airport site and passengers and staff travelling to and from the airport. Decarbonising surface access is key to the whole net-zero-carbon journey.

Global Collaboration

Tackling one of the most pressing global challenges requires strong measures from business sectors and societies worldwide. Aviation, today one of many sectors contributing to the global GHG emissions problem and arguably the most difficult to decarbonise, must lead by example if it wants to maintain its social license to operate and grow. Meaningful progress depends on the collective will and commitment demonstrated by diverse stakeholders as well as a supportive environment established by government—concerning policy, regulation and innovation. Innovative thinking and collaborative efforts are integral to the advancement of cleaner global aviation within countries and across continents as the world continues its journey to the pivotal mid-century destination of net-zero emissions. Aviation has to take bold steps now so that the numerous benefits of flying are not restricted in the future. We must remember that *carbon* is the enemy, not aviation.

⁹ [Sustainable Aviation](#)

¹⁰ In 2020, WSP in the UK committed to halving the carbon emissions of our designs and advice by 2030.

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