

Aviation's contribution to cutting climate change likely to be small

Although the emissions targets for aviation are in line with the overall goals of the Paris Agreement, there is a high likelihood that the climate impact of aviation will not meet these goals, according to a new study.

Aviation is an important contributor to the global economy, but contributes to climate change by creating carbon dioxide as well as non-CO₂ effects such as forming nitrogen oxides, ozone and contrail cirrus clouds, which all contribute to global warming.

Researchers believe that, as long as the industry stages a recovery, the restrictions placed on global air travel in response to Covid-19 lockdown will only have a temporary effect on the overall climate impact of aviation.

Publishing their findings on 21 June in *Nature Communications*, an international research team including experts from the University of Birmingham believes that non-CO₂ effects will continue to make a major contribution to aviation's climate impact over the coming years.

Flightpath 2050

However, these effects are not included in the ICAO goal of climate neutral growth and only partly addressed in Flightpath 2050 – the European Commission's vision for aviation.

Although Flightpath 2050 emissions goals are likely to stabilise aviation's climate impact and ICAO's carbon offsetting scheme [CORSIA](#) will surpass the climate target set to support the Paris Agreement's 1.5° C goal between 2025 and 2064, the researchers warn that an increasing aviation-induced global warming effect is likely despite the implementation of a range of mitigation options within the sector.

Study co-author Dr Simon Blakey, Senior Lecturer in Mechanical Engineering, at the University of Birmingham, commented: *'Technological improvements to engines and airframes and operations won't be enough to sufficiently reduce the impact of aviation on climate change. We must explore all mitigation options in parallel – including the increased use of sustainable fuels and market based measures in order to limit aviation's impact on the environment.*

'Accounting for sustainable fuels must include the impact of non-CO₂ emissions in use as well as the CO₂ emissions in fuel production. If we base all our calculations on CO₂ alone, we miss the large improvements in non-CO₂

emissions that these fuels can offer, particularly in reducing particulate matter emissions which contribute to an increased warming effect at cruise conditions.

There is currently significant interest in policies, regulations and research aiming to reduce aviation's climate impact. The researchers modelled the effect of these measures on global warming, analysing potential technical improvements and challenging assumptions of sector targets with a number of scenarios up to 2100.

Their assessment also covered several Covid-19 recovery scenarios, including changes in travel behaviour, as well as including feasible technological advancements and the availability of sustainable aviation fuels.

In order to better understand the possible implications of the pandemic on the climate impact of aviation, the researchers assessed three different pathways for the international recovery from the lock-down of nation states and the associated dramatic reduction in air travel.

They took into account a fast recovery of three years, a slow recovery of 15 years and a change in habits due to experiences during the lock-down, for example, a shift towards web conferences instead of face-to-face meetings.

About Birmingham University

The University of Birmingham is ranked amongst the world's top 100 institutions, its work brings people from across the world to Birmingham, including researchers and teachers and more than 6,500 international students from over 150 countries.

'Evaluating the climate impact of aviation emission scenarios towards the Paris agreement including Covid-19 effects' by Volker Grewe, Arvind Gangoli Rao, Tomas Grönstedt, Carlos Xisto, Florian Linke, Joris Melkert, Jan Middel, Barbara Ohlenforst, Simon Blakey, Simon Christie, Sigrun Matthes and Katrin Dahlmann is published in *Nature Communications*.

Partner institutions include:

Deutsches Zentrum für Luft- und Raumfahrt (DLR), Oberpfaffenhofen, Germany;

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