Cut European short-haul flights to dramatically reduce emissions, says new research

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New data curated by scientists at The University of Manchester has found that the main culprit for aviation emissions across the connected

continent of Europe is countless short journey flights.

The research, recently published in journal *Transportation Research*, identified that a large number of flights over distances of less than 300 miles between city pairs with existing public transport connections are a key contributor of harmful emissions.

In the month before the significant COP26 conference which is putting the climate crisis at the forefront of world leaders' agendas these findings present a clear opportunity to curb unnecessary pollution on the path toward Net Zero carbon targets.

Lead author of the research, Antonio Filippone, said: "Aviation authorities and airlines have an opportunity to review the frequency of these routes, to reduce emissions, optimize networks, reduce congestion and contribute positively to environmental sustainability."

To create the data models the Manchester researchers used a rapidly expanding data broadcasting system to track worldwide air traffic. Air traffic data was then integrated with aircraft emission models to produce quantitative estimates of engine exhaust emissions of most aircraft types (fuel burn, CO_2, NO_x, CO, UHC, SOx, non-volatile particulate matter).

These emissions can be aggregated by aircraft type, city pairs and routes, flight frequency, flight altitude. The team focussed on the estimation of environmental emissions across the European Continent by considering short-haul flights, or flights less than 300 miles (or 500 km).

Short flights between several city pairs were identified within the United Kingdom, France, Germany and Poland, that operated flights over flat terrain and distances below 200 miles. The most common routes in the data analyzed included Copenhagen-Bromma (Stockholm), Gothenburg-Bromma (Sweden); Fiumicino (Rome)-Linate (Milan), Madrid-Oporto

(Portugal) and a considerable number of domestic routes in Poland, for example Warsaw-Krakow. There are also flights such as, Brussels-Amsterdam (Schipol) where good non-air travel transport links exists and many short flights in central Europe.

The European traffic network was explored with geographical information and allowed the identification of extremely short flights that were operated across Europe before the COVID-19 pandemic virtually halted air traffic. These flight networks have been integrated with advanced simulation methods that estimate engine exhaust emissions from gate-to-gate. We demonstrate that the actual flight range is the biggest discriminator in aviation emissions. Therefore, we highlight the opportunity to re-evaluate the European network when a legitimate transport alternative exists.

The University of Manchester will have a key presence at COP26 and is just one example of how the University's 600+ researchers in energy, climate change and sustainability are catalyzing climate action. The impact of their ongoing work has been recognized in our number one Times Higher Education University Impact ranking.

COP26, which takes place in Glasgow between 1–12 November 2021, will bring together over 30,000 delegates from 197 countries to unite the world in tackling climate change. It comes at a crucial time, following last week's UN's Intergovernmental Panel on Climate Change (IPCC) report which showed that climate change is "widespread, rapid and intensifying."

More information: Antonio Filippone et al, Evaluation of commuter airplane emissions: A European case study, *Transportation Research Part D: Transport and Environment* (2021). DOI: 10.1016/j.trd.2021.102979

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