

Large increase in New Zealand's carbon dioxide emissions from international flights

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Dr Inga Smith and Anna Tarr. Credit: University of Otago

Carbon dioxide emissions from passenger travel to and from New Zealand rose by 60% from 2007 to 2017, a University of Otago study has revealed.

When split into the components from [international visitors](#) and New

Zealand residents, the increases were 48% and 86%, respectively.

Total combined passenger numbers and distance traveled only rose by 46% over this period, so the 60% rise in passenger emissions surprised the researchers because of expectations that airplanes have become more efficient over time.

In the study, published in *Environmental Research Communications*, the researchers used commercially sensitive fuel use, comparing it to data from earlier research, developing an emissions calculation method which can be applied for both passenger and freight emissions to other nations or regions.

New Zealand's emissions factor for short-haul travel has remained relatively constant since 2007, at 0.81 kg CO₂ per t-km, while the long-haul emissions factor increased by 14% to 0.79 kg CO₂ per t-km in 2017.

The country's 2017 international aviation CO₂ emissions were 8.4 Mt CO₂ in total; international visitor travel to and from New Zealand accounted for 4.3 Mt CO₂, New Zealand residents' international travel 2.6 Mt CO₂, exports 0.72 Mt CO₂, and imports 0.89 Mt CO₂. When freight was included, the total CO₂ emissions were estimated to have increased by over 50% since 2007.

The leader of the research team, Dr. Inga Smith of the Department of Physics, says the increase in emissions was more than could be explained by just an increase in the number of travelers, amount of freight, and distances flown.

"The fact that the long-haul emissions factor increased, and the short-haul emissions factor was largely unchanged surprised us because we'd heard that aircraft were getting more efficient over time.

"This apparent decrease in the efficiency of airplanes servicing New Zealand, across 21 airlines, seems to be due to operational factors such as seating density," she says.

Lead author Assistant Research Fellow Anna Tarr says the public is probably not aware of the scale of aviation emissions for New Zealand.

"We are a geographically remote nation, and as COVID-19 has shown, very dependent on international aviation for the movement of people and goods into and out of the country.

"Our estimates of CO₂ alone in 2017 would add approximately an additional 10% to the nation's gross emissions if they were accounted for and attributed to New Zealand," she says.

Knowing the impact burning [fossil fuels](#) has on the climate, Dr. Smith finds it concerning there is not an internationally agreed way to effectively deal with the aviation emissions.

"Globally, aviation accounts for more than 2% of [global emissions](#)—if aviation were a country, it would be one of the top 10 emitters of greenhouse gases—but no country is liable for international aviation emissions.

"The issue is that domestic aviation emissions were subject to Kyoto Protocol liabilities, but international aviation emissions were not, nor are they directly addressed by the Paris Agreement. Global ambitions to limit [climate change](#) rely on quantification of emissions, but it is very challenging to access data to estimate international aviation emissions associated with individual countries."

Tarr says greenhouse gases are having a detrimental impact on the environment.

"I believe that [policy makers](#) and the [aviation](#) industry need to address this data issue, and also implement existing solutions to reduce emissions."

More information: Anna P Tarr et al, Carbon dioxide emissions from international air transport of people and freight: New Zealand as a case study, *Environmental Research Communications* (2022). [DOI: 10.1088/2515-7620/abf15d](#)

Provided by University of Otago

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