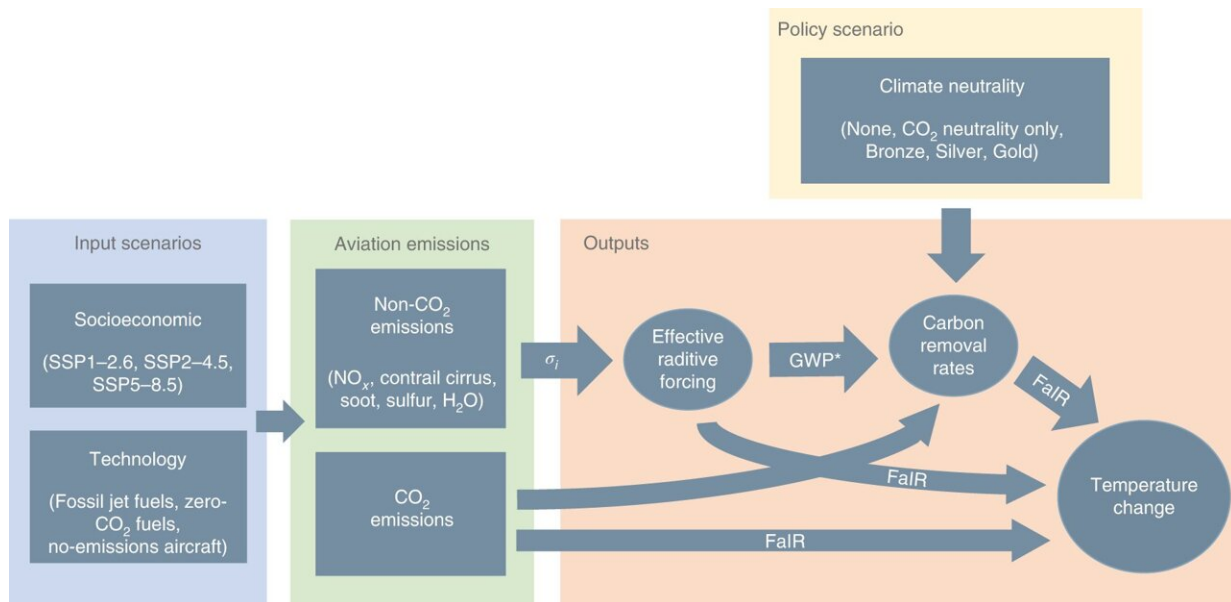


# Net-zero carbon emissions for aircraft overlooks non-CO2 climate impact

July 26 2022, by Bob Yirka



Modeling approach used in this study. First, we explore different scenarios of future aviation, taking into consideration future technologies and demand changes following different socioeconomic pathways. These scenarios result in different pathways of future aviation emissions and indirect effects (Supplementary Methods 1.1). Then, we use the sensitivity parameters,  $\sigma_i$ , to calculate the effective radiative forcing of the different aviation species and its uncertainty. We then apply different definitions of climate neutrality (Gold, Silver and Bronze) and calculate the needed carbon-removal rates, using the GWP\* metric to establish a relationship between aviation non-CO<sub>2</sub> forcing and CO<sub>2</sub> removal. Finally, we input CO<sub>2</sub> emissions and removal rates and non-CO<sub>2</sub> effective radiative forcing in a reduced-complexity model (FaIR) to calculate the temperature outcomes of the different scenarios of climate neutrality. Credit: *Nature Climate Change* (2022). DOI:

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A trio of researchers, two with the Swiss Federal Institute of Technology's Department of Environmental Systems and the other with Climate Service Center Germany, Helmholtz-Zentrum Hereon, say that reducing CO<sub>2</sub> emissions from aircraft will not fully solve the problem of their negative climate contributions. In their paper published in the journal *Nature Climate Change*, Nicoletta Brazzola, Anthony Patt and Jan Wohland note that other emissions from aircraft also contribute to climate change.

As [climate change](#) progresses and governments around the world fail to enact measures to eliminate [greenhouse gas emissions](#), scientists continue to look for ways to address the problem. In this new effort, the researchers are pointing out to both the science community and governmental officials that forcing aircraft makers to reduce or eliminate CO<sub>2</sub> emissions from the planes will not eliminate their [carbon footprint](#). In addition to CO<sub>2</sub>, the researchers note, jet airplanes have an indirect impact on the climate—they create contrail cirrus, which contain aerosols, soot and [water vapor](#) that incite changes in O<sub>3</sub>, CH<sub>4</sub> and water levels in the stratosphere due to NO<sub>x</sub> emissions. Together, these emissions account for enough warming to heat the planet by an additional 0.4° C in the coming years.

The researchers note that emissions besides CO<sub>2</sub> from aircraft are not currently being discussed as part of global warming mitigation efforts to reach the goals set by the Paris climate agreement—and failure to do so will likely perpetuate the negative indirect impact of aircraft on global warming. They suggest including plans for reducing or removing harmful elements from the contrails left behind by jet aircraft flying in the stratosphere.

The researchers also created a model to better illustrate their point that showed that failing to address the airline industry's non- CO<sub>2</sub> climate impact would preserve approximately 90% of the negative impact that airplanes have on climate change. They note also that scenarios that involve attempting to make air travel carbon neutral by planting forests would involve covering a piece of land the size of Germany with nothing but trees.

**More information:** Nicoletta Brazzola et al, Definitions and implications of climate-neutral aviation, *Nature Climate Change* (2022). [DOI: 10.1038/s41558-022-01404-7](https://doi.org/10.1038/s41558-022-01404-7)

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