

Hon James Shaw

Minister of Climate Change

Associate Minister for the Environment (Biodiversity)



12 June 2023

Warwick Jacques

By email: fyi-request-22884-828a96a3@requests.fyi.org.nz

Tēnā koe Warwick,

Thank you for your email of 22 May regarding CO₂ emissions in the atmosphere.

The science of climate change is explained in several peer-reviewed, publicly available scientific papers. Hundreds of scientists and researchers from around the globe participate in the Intergovernmental Panel on Climate Change (IPCC) working groups, reviewing thousands of these papers.

The IPCC's findings are summarised in its Sixth Assessment Report, which provides a comprehensive summary of the state of scientific, technical, and socio-economic knowledge on climate change, along with the impacts and future risks, and options for adaptation and mitigation. The Sixth Assessment Report is available at: <https://tinyurl.com/yenz8tys>.

The current concentration of CO₂ in the atmosphere, measured by the National Institute for Water and Atmospheric research (NIWA) at Baring Head, Wellington, is 416.4 parts per million (ppm) CO₂.¹

To answer your question regarding minimum CO₂ levels, an experimental estimate demonstrates that most plants need a minimum of 150ppm of CO₂ to grow.² According to the IPCC, "the main human drivers of climate change are increases in the atmospheric concentrations of greenhouse gases and aerosols from burning fossil fuels, land use and other sources".³

Multiple lines of evidence demonstrate that human drivers are the main cause of recent climate change, and show that, without these drivers, global temperatures would have remained similar, or dropped below, global surface temperatures relative to 1850.

In response to your question regarding recent climate events, the IPCC states that "scientists cannot directly answer whether a particular event was caused by climate change, as extremes [in weather] do occur naturally, and any specific weather and climate event is the result of a complex mix of human and natural influences on the magnitude and/or probability of specific extreme weather events."⁴

¹ <https://tinyurl.com/28xs32km>

² <https://www.jstor.org/stable/4220846>

³ FAQ Box 3.1 *How Do We Know Humans Are Responsible for Climate Change?*,

⁴ FAQ Box 11.3 *Did Climate Change Cause That Recent Extreme Event In My Country?*

The attribution study, run by World Weather Attribution for Cyclone Gabrielle, concluded that emissions of greenhouse gases from human activity caused a 20 – 30% increase in rainfall during the cyclone.⁵

Only the emissions from eligible forestry activities are currently counted towards Aotearoa New Zealand's international and domestic emissions reduction targets. This reflects our knowledge of the carbon fluxes that occur in forests and their role in the carbon cycle.

There is greater uncertainty in our understanding of the role of the non-woody vegetation classes, such as pasture grasses, in the carbon cycle. Our ability to estimate their contribution within reasonable levels of confidence is impacted by this, which in turn would impact the integrity of any offsetting claims.

I can assure you that the Government will continue to follow the latest science and show global leadership on what needs to be done to leave a safer planet for future generations.

Nāku noa, nā,



Hon. James Shaw

Minister of Climate Change

⁵ <https://tinyurl.com/2s43th4j>