

## Summary review of draft report and code

I have reviewed both the draft report and the code that was used to derive the illustrative New Zealand methane scenarios and many of the figures in the draft. Generally I find both to be in good order. I have made comments on the PDF of the report draft and have separately communicated feedback on the code to William Collins and David Frame (the major points on the code and figures also apply to the report, so are included here). The major comments are summarized below, and there are additional editorial comments in the draft.

The elephant in the room is that it is going to be very difficult to achieve significant reductions in New Zealand's methane emissions without reducing production of lamb and especially beef; this is not mentioned in the report. How does New Zealand plan to reconcile this conflict?

I also did not see reference to the Global Methane Pledge, to which New Zealand is a signatory. Does NZ have a target that differs from the global 30% reduction effort in 2030 relative to 2020? New Zealand's domestic 24-47% reduction target in 2050 relative to 2017 should be put in this context.

In several places it is mentioned that New Zealand's methane emissions have been declining. In figures such as figure 6a, I would argue that the decline has been very modest and that NZ's methane emissions are essentially stable.

I claim that a no additional warming target should be a lower bound for ambition for New Zealand's agricultural emissions. The combination of no additional warming from methane with a net zero target for CO<sub>2</sub> and N<sub>2</sub>O puts the country on a zero-warming pathway in 2050 relative to 2017 (with adjustments for other GHGs and short-lived forcers, which we will disregard for this argument). To get close to 1.5°C, developed countries should be aiming for net negative warming impacts in 2050 to provide space for developing countries to grow their economies.

Methane emissions in the report are quoted as 374.2 MtCH<sub>4</sub> in 2023. Where is this number from? Does it include the biomass burning component from GFED? This could be why the black dot is a little below all the scenarios except ssp119 and ssp126 (I was surprised by this; figure 12 top right; also might be useful to label subplots (a), (b), ...). Note that these scenarios do include biomass burning, so may push your totals a little higher if you were to include this source. The global total biomass burning for 2023 was 22.2 MtCH<sub>4</sub>. This data is at [https://github.com/ClimateIndicator/forcing-timeseries/blob/main/output/gfed4.1s\\_1997-2023.csv](https://github.com/ClimateIndicator/forcing-timeseries/blob/main/output/gfed4.1s_1997-2023.csv) and is the processed global annual total emissions from GFED4.1s (<https://www.geo.vu.nl/~gwerf/GFED/GFED4/>).

Furthermore, in the report the CO<sub>2</sub> emissions are given as around 36 GtCO<sub>2</sub> – this is the fossil fuel component only so this should be made clearer. The total CO<sub>2</sub> emissions including land use are more like 40 GtCO<sub>2</sub>. The latest Global Carbon Budget data will have the precise update for 2023.

I would recommend using the IPCC colours to denote SSP scenarios (see [https://pyam-iamc.readthedocs.io/en/stable/tutorials/ipcc\\_colors.html](https://pyam-iamc.readthedocs.io/en/stable/tutorials/ipcc_colors.html)). This will improve recognition across reports, and make scenarios easier to tell apart (figure 13 is very difficult to determine for instance).

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