

MCC Press Release

Researchers align IPCC benchmarks on land emissions with national greenhouse gas inventories

Preparing for the global stocktake at COP28 in Dubai. Difference in measuring likely to skew climate targets. Net zero may be needed earlier than previously estimated.

Berlin, 22/11/2023. Effective land management – for agriculture, forests, or settlements – plays a crucial role in addressing the climate crisis. But there is a gap between how the land emissions balance is accounted for in global carbon cycle models and in national greenhouse gas emissions inventories, which are used for reporting in international climate policy. Ahead of the first “global stocktake” of national climate mitigation pledges at the COP28 world climate conference in Dubai, a study aligns the two accounting approaches for the first time. It finds that achieving the Paris Agreement temperature goals will require even more ambitious action than previously estimated. The study, co-authored by the Berlin-based climate research institute MCC (Mercator Research Institute on Global Commons and Climate Change), is published in the renowned journal *Nature*.

Land use strategies to mitigate the climate change include stopping deforestation and enhancing forest management efforts. Governments have recognised the importance of the so-called land use, land-use change and forestry (LULUCF) sector: in the Nationally Determined Contributions, which are at the heart of the Paris Agreement, 118 of 143 countries have included land-based emissions reductions or land-based removals from the atmosphere.

But in national greenhouse gas inventories, the LULUCF fluxes (i.e. emissions and removals) are calculated differently from emissions reductions scenarios. These scenarios are collected and assessed by the Intergovernmental Panel on Climate Change (IPCC) from the scientific literature, and serve as a benchmark for assessing progress in limiting global heating to well below 2 degrees and possibly to 1.5 degrees Celsius. This conceptual difference is due to differing definitions of what qualifies as “managed” land and human-induced removals on that land. This results in a huge gap of around 4 to 7 gigatonnes of CO₂ annually, or at least 10 percent of today’s global total greenhouse gas emissions.

The research team has now aligned IPCC benchmarks on land emissions with national greenhouse gas inventories: they re-analysed emission pathways consistent with Paris Agreement temperature goals, using the LULUCF accounting approach adopted by countries. “The method enables nations to update and refine their benchmarks and targets so that they can report a true net zero — one that is consistent with the IPCC goals of stabilising the climate, but that can be tracked using national greenhouse gas inventory

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conventions” explains [Jan Minx](#), head of the MCC working group Applied Sustainability Science, and a co-author of the study.

The analysis reveals that key mitigation targets become harder to achieve when taking the countries’ reporting conventions into consideration. They would then require both lower emissions overall and a more rapid decline to net zero. For example, under 1.5 degree Celsius scenarios, net-zero emissions may need to be reached one to five years earlier than previously estimated. Global emissions need to be reduced by 3.5 to 6 percent more by 2030, and cumulative emissions until net zero need to be between 15 to 18 percent less – which amounts to a decrease of 55 to 95 gigatonnes. Also, when the 1.5 and 2 degrees scenarios aligned to national inventories, the land-use sector will show rising carbon emissions by mid-century, and including removals could then become a net source of emissions by 2100.

The research team emphasises that results do not conflict with the benchmarks assessed by the IPCC, but rather assess the same kinds of benchmarks using an inventory-based approach. “Our findings show the danger of comparing apples to oranges,” says Matthew Gidden, Senior Researcher at the research institute IASA in Laxenburg near Vienna, and lead author of the study. “To achieve the Paris Agreement, it’s critical that countries aim for the correct target.” If countries would achieve the original model-based benchmarks using inventory-based accounting, they would miss the mark. With regard to the Nationally Determined Contributions, Gidden recommends that “countries bring clarity to their climate ambition by communicating their planned use of the LULUCF sector separately from emissions reductions elsewhere”.

Reference of the cited article:

Gidden, M., Gasser, T., Grassi, G., Forsell, N., Janssens, I., Lamb, W., Minx, J., Nicholls, Z., Steinhauser, J., Riahi, K., 2023, Aligning climate scenarios to emissions inventories shifts global benchmarks, *Nature*
<https://www.nature.com/articles/s41586-023-06724-y>

About MCC

MCC explores and provides solution-oriented policy portfolios for climate mitigation, for governing the global commons in general, and for enhancing the many aspects of human well-being. Our seven working groups are active in fields like economic growth and development, resources and international trade, cities and infrastructure, governance, and scientific policy advice. Co-founded by the Mercator Foundation and the Potsdam Institute for Climate Impact Research. | www.mcc-berlin.net/en | https://twitter.com/MCC_Berlin

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