The science is clear: we need net zero carbon dioxide emissions by 2050

For all intents and purposes, moving towards the phase-out of fossil fuel combustion is necessary to keep the 1.5°C goal of the Paris Agreement within reach. Deploying carbon dioxide removal (CDR) at scale, while being judicious about its limitations and trade-offs, will also be necessary to complement the phase out of fossil fuels, as there will be some residual emissions from hard-to-abate sectors.

As assessed by the IPCC, reaching net zero carbon dioxide emissions by 2050 is required to stand a chance of holding global warming to 1.5°C this century. Net zero means that all anthropogenic carbon dioxide emissions are balanced by anthropogenic carbon dioxide removals. Scenarios consistent with this goal require a complete phase-out of coal by 2050 and rapid phase-down of oil and gas (halved every decade). After 2050 the world needs to rapidly move into net negative emissions, particularly after a number of decades of 1.5°C overshoot.

The most recent assessments of pathways to limit warming at 1.5°C show that by 2050 all unabated use of coal needs to be completely phased-out, while oil and unabated gas need to be phased down by 60-90%.[1] To have a 50% chance of holding the global temperature increase to 1.5°C, we can only emit another 275 Gt of carbon dioxide.[2] At current emissions rates, we will have used up this budget in just 7 years. Over its lifetime, the existing infrastructure for the extraction and use of fossil fuels would emit more than the world's remaining carbon budget. New planned infrastructure and exploration for new fossil fuel reserves would exceed this budget many times over.[3]

All modelling scenarios that limit warming to 1.5°C - with or without a temporary temperature overshoot - rely on carbon dioxide removal (CDR) in order to achieve net zero emissions by 2050 and net negative emissions from 2050 onwards. Current CDR methods amount to about 5% of fossil fuel emissions and rely almost entirely on using nature to enhance carbon storage, but the permanence and scale-up potential of these nature-based CDR methods are uncertain as they are vulnerable to multiple threats including climate change (e.g. due to increases in extremes such as droughts or wildfires). There are also significant trade-offs with food and water security and the protection of biodiversity.

Novel, technology-based, CDR methods currently provide just 0.1% of CDR from the atmosphere[4] (this includes direct air capture and storage, bioenergy with carbon capture and storage). Novel CDR is just now moving from pilot experiments into its scaling phase and while theoretically promising there is no evidence yet that these methods can be deployed at the scale needed. Nor do we know whether these CDR methods will be enough to remove even the difficult-to-abate emissions in a timely manner.

Given the *certainty* about the shrinking carbon budget, and the overwhelming *uncertainty* about the scalability of CDR, the only certain way to curb global warming and reach net zero is to reduce fossil fuel emissions to the unavoidable minimum level - and concurrently invest in CDR to offset the remaining amount of residual fossil fuel emissions. This residual needs to be kept

as low as possible in view of the uncertainties of scale, storage timescale, and trade-offs associated with CDR.

The natural carbon sinks beyond human activity are not included in the net zero equation. The remaining carbon budget already factors in the continued performance of natural land and ocean carbon sinks to remove a significant fraction of anthropogenic emissions (also accounting for their declining efficiency in a warmer world).

The science is clear: there is no room for ambiguity on the required action for achieving net zero carbon dioxide emissions by 2050.

Add your signature

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