

LETTER TO THE EDITOR

Time is of the essence when it comes to forest bioenergy

Debate continues in this journal on the climate impacts of burning woody biomass from forests. A recent review by Cowie et al. (2021, *GCB Bioenergy*, 13(8), 1210–1231) addressed what it called ‘misconceptions’ in papers by us and other authors that examined issues of carbon debt and when burning forest biomass for energy could have a net climate benefit. This letter re-emphasizes the critical importance of the time dimension in assessing impacts, and takes particular issue with Cowie et al.’s lack of concern over substantial delays in reducing emissions and increasing the risks of crossing climate tipping points.

Cowie et al. (2021) provide an interpretation of the science to support the status quo whereby forest biomass is treated generically as climate-friendly renewable energy, thereby attracting substantial subsidies from renewable energy budgets. Their review pays particular attention to the undersigned authors’ papers but draws different policy conclusions than those in our original papers, generally rejecting calls for tighter restrictions on the use of forest bioenergy in electricity generation.

Since the Cowie et al. review was an output of the IEA Bioenergy Technology Collaboration Programme, which claims a ‘rich and excellent history of encouraging and perpetuating the use of biomass as an energy source’ (IEA Bioenergy, 2021), these conclusions are unsurprising. We do not dispute that there is room for scientific debate—especially on the timescales over which initial increases in emissions from biomass relative to fossil fuels can be compensated by absorption from forest regrowth, how to quantify this, and the climate implications of different lengths of carbon payback periods. These aspects have been explored in our cited papers and follow-up debates (see, e.g. EASAC, 2020; Raven et al., 2021). Rather than repeat these arguments here, we wish to point to recent events that are relevant to two key arguments in Cowie et al. (2021).

The first relates to the carbon payback period (the time until a bioenergy project delivers a net reduction

in emissions compared to fossil fuels). The paper noted that ‘the IPCC report did not determine that individual mitigation measures must meet specific payback times’ implying that the multidecadal payback times typical of burning forest wood for energy are acceptable from a climate perspective. It appears to us contorted logic to ignore the increased risk of overshooting Paris agreement targets on the grounds that, at some point in the future, bioenergy may show net emission reductions compared to a fossil fuel counterfactual. Indeed, Article 4(1) of the Paris Agreement calls on parties to: ‘aim to reach global peaking of greenhouse gas emissions as soon as possible’. The latest IPCC report (IPCC, 2021) reinforces a sense of urgency concluding that ‘unless there are immediate, rapid and large-scale reductions in greenhouse gas emissions, limiting warming to close to 1.5°C or even 2°C will be beyond reach’. We argue this strengthens the case for limiting subsidies to bioenergy projects with short payback periods, a conclusion that Cowie et al. (2021) specifically reject.

On a second issue, Cowie et al. (2021) downplay risks of crossing tipping points, as in the following ‘Risks related to climate tipping points are sometimes raised in relation to the timing of GHG savings: crossing thresholds, for example, associated with forest dieback or thaw of permafrost, could lead to large, irreversible changes in the global climate system. A recent study found a low probability of crossing a tipping point in the global climate system if warming does not exceed 2°C. Also, critical threshold values and irreversibility of specific tipping points are uncertain’. Other authors take a different view. Lenton et al. (2019) regard climate tipping points as ‘too risky to bet against’, while others have shown interconnectivity between individual tipping points that increases risks (Rocha et al., 2018; Wunderling et al., 2021), and the seriousness of underlying linear trends such as increasing life-threatening combinations of heat and humidity (Suarez-Gutierrez et al., 2020). EASAC (2021) reviewed the current status of tipping points and found that there are already irreversible trends associated with dangerous climate change. Melting of the cryosphere and associated sea-level rise are well characterized, but tipping points for the Amazon, ocean circulation, the stability of the

permafrost and deep ocean GHG stores are also at risk. Such trends underline the need to achieve the 'immediate, rapid and large-scale' reductions in GHG emissions called for by the IPCC.

We thus remain concerned that the interpretation of the science offered by Cowie et al. (2021) significantly underestimates the climate risks of forest biomass. Governments have limited funds to support renewable energy, and biomass has attracted a large proportion of these in some countries, potentially misdirecting funds from more effective emission-reduction technologies. Yet concerningly, we are not aware of any attempt to evaluate whether the billions in subsidies allocated to burning wood for energy are actually delivering any net reductions in atmospheric levels of CO₂, while current policies continue to rely on the ability to treat combustion emissions as zero when reporting national emissions. Policymakers urgently need a more transparent and objective accounting and reporting system to allow them to prioritize their renewable energy subsidies according to their actual effectiveness in climate change mitigation.

DATA AVAILABILITY STATEMENT


Data sharing not applicable—no new data generated.

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