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PERSPECTIVE

Can 'Net Zero' still be an instrument of climate justice?

Radhika Khosla[1,2,*], **Javier Lezaun**[2,3], **Alexis McGivern**[1,2] **and Jessica Omukuti**[2,3]

[1] Smith School of Enterprise and the Environment, School of Geography and the Environment, University of Oxford, Oxford, United Kingdom
[2] Oxford Net Zero, University of Oxford, Oxford, United Kingdom
[3] Institute for Science, Innovation and Society (InSIS), School of Anthropology and Museum Ethnography, University of Oxford, Oxford, United Kingdom
[*] Author to whom any correspondence should be addressed.

E-mail: radhika.khosla@smithschool.ox.ac.uk

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1. Introduction

'Net zero' has become a powerful but contested frame of reference to define and judge climate ambition. The concept emerged from a series of scientific breakthroughs that highlighted the determining impact of cumulative emissions of CO_2 on global warming, and has shifted the focus of climate policy towards placing a cap on the total anthropogenic emissions cumulatively released into the atmosphere (Allen *et al* 2022). This understanding of climate dynamics found political expression in Article 4.1 of the Paris Agreement, which stated the need to 'reach global peaking of greenhouse gas emissions as soon as possible' and achieve 'a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century' (UNFCCC 2015). Since then, these objectives have been translated into myriad pledges by state and non-state actors to reach net zero emissions by mid-century. As of February 2023, countries with net zero targets accounted for 92% of global gross domestic product and 88% of greenhouse gas (GHG) emissions (Lang *et al* 2022).

Lost in this 'deluge of targets' (Rogelj 2023, p 1) is the final and crucial section of Article 4.1: the commitment to achieve the global balance of emissions and removals 'on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty' (UNFCCC 2015). This normative horizon is absent from most net zero pledges, and there are hardly any instruments to evaluate whether net zero plans are consistent not only with the goal of limiting global warming to well below 2°C, but with the aspiration of doing so in a manner that advances climate justice.

The neat separation of the numerical and the normative aspects of Article 4.1 has been made possible by the flexibility built into the very concept of net zero. As Armstrong and McLaren (2022, p 509) note, '[t]aken by itself, the net zero target is neutral on which pathway is to be preferred.' It can encompass conflicting understandings of the urgency of 'zero' (i.e. which actors should reduce emissions, and at what pace) and divergent approaches to the integrity of 'net' (i.e. which carbon sinks should be used, how much, and by whom) (Fankhauser *et al* 2022). This ambiguity goes a long way towards explaining the success of this concept, as actors committing to achieve net zero emissions can pursue vastly different futures, very often sidestepping the thorny question of equity. Yet the formal neutrality of net zero also means that the pursuit of climate justice cannot rely on the mere proliferation of targets and commitments. Instead, it requires a constant effort to interpret net zero in ways consistent with the political impetus of the Paris Agreement: a vision of climate action that supports, rather than hinders, the resilience and development of vulnerable countries and marginalised communities, and that addresses loss and damage associated with climate change.

Less than a decade since the formulation of that vision, we can at least gauge how far the reality of net zero has strayed from these normative aspirations. Not only is there a clear disparity between pledges and measurable action (UNEP 2022), but the rapid proliferation of net zero plans has gone hand in hand with the accentuation of structural inequities in the climate policy regime. Part of the problem is that a global frame of reference—for calculating a balance of emissions and removals, and for discussing the distributive dimensions of climate action—has been replaced by a fragmented landscape of state- and organisation-level pledges, with no mechanisms to distribute commitments and responsibilities fairly among actors. In this context, attempts to coax all countries to adopt national net zero targets have been

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seen by many in the developing world as 'anti-equity' and counter to the Paris Agreement (Like-Minded Developing Countries 2021; see also Action Aid *et al* 2020, Mulugetta *et al* 2022).

Is it then time to 'rouse ourselves from the net-zero hangover' (Buck 2021, p 19) and find a better vehicle for climate justice? Or can the scientific and policy mechanisms that net zero has set in motion—and the broader scope of climate ambition they connote—still serve as an effective instrument for those aspirations? Our view is that current initiatives to tighten net zero governance offer a belated but real opportunity to reverse the trends that have de-coupled net zero target-setting from the pursuit of inclusive, climate compatible and sustainable development. We start by identifying those trends, before proposing ways of undoing them.

2. Current trends in net zero accentuate climate injustices

Several dynamics that exacerbate climate injustices have accompanied the rise of net zero. Many predate the Paris Agreement, but their compatibility with a world of proliferating net zero plans raises questions about whether the concept, as currently understood, can anchor climate action in a normative orientation to climate justice.

The first trend is the continuing reduction of climate action to numerical target setting. Net zero focuses our attention on atmospheric concentrations of GHGs, and provides a conceptually elegant solution in the form of a quantifiable matching of GHG emissions and removals as a means towards climate stabilisation. This framing, though scientifically precise, reinforces the trend to abstract climate change from broader socio-ecological considerations. For instance, it is indifferent to the dimensions of injustice that are present in the continuation or expansion of extractive fossil fuel regimes (McLaren 2020, Buck 2021). With its in-built predisposition to numerical targets, net zero framings facilitate a neat separation of the quantifiable and the normative elements of Article 4.1, requiring the ex-post integration of equity and justice principles into accounting methods, rather than considering these from the start.

The second trend is a shift in the temporal focus of climate action towards mid-century timelines, often to the detriment of necessary near-term emissions reduction efforts (Rogelj *et al* 2021, Day *et al* 2022). For example, of the 702 of companies on the Forbes 2000 list with a net zero target, only half have some type of interim GHG reduction target (Hans *et al* 2022). This deferral of targets to mid-century timelines, combined with the use of dubious offsets and lack of clarity on what types of emissions ought to qualify as 'residual,' severely limits the accountability of net zero pledges and risks putting the goal of keeping global warming well below 2C beyond reach (Buck *et al* 2023).

The third trend is a growing reliance, actively or by default, on the future availability of carbon dioxide removal (CDR) technologies and infrastructures, without due consideration to how the risks and benefits they will inevitably bring with them will be distributed. Existing assumptions about different CDR technologies are grounded in modelled pathways and speculative scenarios, most of which are driven by considerations of cost-effectiveness (Anderson and Peters 2016, Smith *et al* 2023). Resource constraints in a world in which large-scale removals are a central component of climate stabilisation are rarely considered in detail, or in relation to their impact on vulnerable communities. Land represents the most obvious example: the total amount of land required for planned CDRs in current net zero commitments is roughly 1.2 billion hectares, equivalent to total global cropland (Dooley *et al* 2022).

A fourth trend is the further marginalisation of adaptation in climate action. Most net zero plans do not include any reference to adaptation, and adaptation metrics are hardly ever used to assess their quality or integrity. Certainly net zero is not the culprit here—adaptation has long been the poor relation in climate policy, including in the Paris Agreement itself (Sharma 2017)—but it has exacerbated the segregation of mitigation and adaptation actions to the detriment of the latter. It is telling that some advocates of robust adaptation strategies speak now of 'Net Zero Plus', signalling that adaptation has no natural home within net zero as currently conceptualised (Bevan 2021). Similarly, net zero strategies generally exclude loss and damage from their scope, even though this remains a central issue in climate negotiations.

These trends, we argue, exacerbate inequities in international climate policy. While net zero is not at the root of these dynamics, it facilitates their entrenchment by offering an ideal of 'balance' that abstracts emissions and removals from the specific economic and ecological contexts that determine their social cost (Aldy *et al* 2021). 'Net zero' thereby displaces questions of equity and justice beyond the quantifiable core of climate change mitigation.

Perhaps the clearest marker of this displacement is the lessened attention given to historical emissions (McLaren 2016). Very few net zero pledges account for historical emissions, which is remarkable, considering that the concept of net zero emerges precisely from the realisation that it is the historical accumulation of GHGs that determines the rate of global warming. 'Net zero,' in other words, is perfectly compatible with a full accounting of past emissions. That it does not serve this purpose speaks to the limited role that actors and institutions in the Global South, who have been strong advocates for historical

responsibility, have played in shaping the concept and its interpretation.

3. Towards a definition of equitable net zero

It would be naive to assume that these trends can be reversed simply by operationalizing 'net zero' differently. They reflect deep power inequalities that will continue to manifest themselves in climate policy. Yet, current efforts to improve the governance of net zero offer an opportunity to change this direction of travel, or at least resist it. Initiatives like the Science Based Targets initiative (SBTi) Net Zero Standard, the International Standards Organisation's Net Zero Guidelines, or the work of the UN High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities, mark a transition towards more discriminating definitions of acceptable net zero (ISO 2022, UNHLEG 2022).

Reintegrating net zero within the normative horizon expressed in the Paris Agreement starts with creating additional regulatory mechanisms to front-load emissions reductions, particularly in historically high-emitting countries and sectors, to reduce the burden that is passed on to developing countries or future generations (Mohan *et al* 2021, Armstrong and McLaren 2022).

Further, even as we work to increase the integrity, transparency and accountability of net zero pledges, we need to pay closer attention to the false equivalences that slip into net zero when the concept is understood in purely numerical terms. Each ton of carbon dioxide emitted, not emitted, or removed has a distinct set of equity implications, depending on when and where it is produced, and whose prosperity it advances (Shue 1993, 2022, Carton *et al* 2021). Frameworks for net zero governance thus need to embed quantitative metrics within explicit criteria of fairness.

A key component of fairness is giving due consideration to historical emissions. Ignoring historical emission, and historically differentiated capacities to reduce emissions, erodes political support for net zero, particularly in poor and developing countries. Historical considerations should also be included in proposed carbon take-back obligations, so that these incorporate long legacies of atmospheric contamination (Jenkins *et al* 2022).

Such obligations should be a component of a progressive governance framework for CDR. The scale of removals implied by most global net zero scenarios—several billion tCO_2e per year—will require colossal infrastructures with profound implications for local, regional and national development. Discussions of justice in this context often focus on how to distribute the global removals burden equitably between countries, but establishing a set of national 'quotas' is a very high-level formulation of climate justice obligations, and is likely to suffer from the limitations of other 'burden-sharing' mechanisms in climate policy (Averchenkova *et al* 2014). Crucially, such an approach still fails to consider how the specific risks and benefits associated with the deployment of CDR technologies will be distributed. A first step is to create inclusive governance processes capable of assessing the local, context-specific implications of CDR projects, and of planning their design and development towards broadly shared economic goals (Morrow *et al* 2020).

A more ambitious step is to create mechanisms for the redistribution of benefits from net zero transitions. These benefits will be unevenly distributed—they are likely to accrue to first movers, often those with the financial and technological resources to decarbonise faster and more deeply. An equitable and just approach to net zero should ensure a redistribution of benefits from these transitions, for example by requiring that developed countries provide financial support for accelerating the relevant changes in Global South countries. Additionally, even if the world were reach net zero emissions by mid-century, poor countries will be disproportionally affected by the impact of past, current and future warming, meaning that the need for adaptation and resilience, loss and damage reparations and sustainable development will remain (Nay *et al* 2022).

A final change concerns the definition of net zero-compatible financial flows and investments. This definition has been remarkably loose—in some governance frameworks, further investments to expand fossil fuel extraction still qualify as compatible with net zero targets. Fully integrating International Energy Agency Net Zero scenarios into the plans and portfolios of financial institutions will provide a more restrictive definition of net-zero-compatible finance. Financial strategies, moreover, should also recognise differential responsibilities and capacities, and address how investment decisions affect the prospects of developing regions or marginalised communities. In least developed countries, where growth is a political priority, the assessment of whether investments are compatible with net zero should be informed by principles of just transitions based on need and capacity.

In sum, as pledges to reach net zero emissions continue to serve as a proxy for climate ambition, it is imperative that pursuing a global balance of emissions and removals does not serve to reverse the commitment to sustainable development and poverty eradication that underpins robust international consensus on climate action. At its core, climate justice recognises that climate change affects people differently and inequitably, and seeks to redress these

injustices fairly (Sultana 2022). Applying this lens to net zero means examining carefully who takes responsibility, who benefits, and who loses out from climate change mitigation and adaptation efforts, as well as whose vulnerabilities will be exacerbated in a 1.5°C and 2°C world (Okereke 2010). It is not too late to align 'net zero' with these principles, we believe, but doing so requires a radical repurposing of the concept, using it to weave together the scientific and ethical dimensions of our predicament.

Data availability statement

No new data were created or analysed in this study.

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ORCID iDs

Radhika Khosla https://orcid.org/0000-0002-7730-8041
Javier Lezaun https://orcid.org/0000-0002-5483-3628

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