

OPINION

Diversifying knowledge for climate change mitigation: Illuminating the common good and desirable futures

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With the increasingly tangible and prominent ramifications of human-induced climate change, reckoning with the type of knowledge that is required to shape what desirable futures and common good humanity should aspire to is ever more pressing. Until now, studies on climate mitigation—or sustainability transition—pathways have primarily emphasized the need for technological innovations to meet emission reduction targets, such as ramping up renewable technologies, increasing energy efficiency measures, and more recently developing negative emission technologies (NETs), notably through top-down approaches and financial incentives [1]. The Intergovernmental Panel on Climate Change (IPCC), and in particular its third Working Group (WGIII), has played a central role in this effort.

Hence, there is a prominence of technocratic and techno-economic knowledge that is used to address climate change and guide humanity towards sustainability. This type of knowledge is however devoid of conceptions of human experience as well as past and present injustices. We contend in this opinion piece that the social sciences and humanities have a key role to play not only to foster systemic changes [2, 3], but also to illuminate the power of imagination in a broad and inclusive way. Such knowledge provides an opportunity to go beyond mainstream techno-optimism (and its opposite, doomism), by bringing forward nuance and additional substance to how knowledge on climate change is shaped and providing new insights for mitigation pathways.

Climate change and sustainability transition debates have, arguably, been primarily driven by knowledge generated by quantitative modelling approaches applied in the fields of natural sciences, economics and engineering. Models are powerful tools that generate quantitative, systemic and prospective projections of future climate change and transition pathways [4]. However, the practice of modelling reduces ‘real-world’ dynamics to a set of quantifiable variables (future technological innovation, economic growth, demographic change, energy use, etc.) [5]. Consequentially, climate change mitigation strategies and policies primarily rely on technical innovations, improving market and economic conditions to enable sustainable innovations to emerge, and incentivizing individuals toward sustainable alternatives. The prominence of technocratic and techno-economic knowledge has contributed in part to simplified narratives of societal transformations, suggesting that more natural scientific and technical facts are key to fostering the necessary changes to deal with climate change. It also tends to assume that a lack of political will is to blame for inaction rather than sustained strategies of avoidance and obstruction.

Reducing climate change and sustainability transitions to technocratic and techno-economic challenges fails to appreciate their complexity, which involves cultural, social, political,



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economic, and technological changes. With the growing sense of climate emergency, there is a risk of locking in technocratic and techno-economic approaches and shaping futures that are devoid of conceptions of justice, power, and human-nature relationships. In our view, what is increasingly required is to appreciate what common good and desirable futures societies should strive towards and, in turn, which strategies support those ambitions.

The social sciences and humanities can address these challenges and enrich the knowledge on climate change mitigation: First, these disciplines can improve our understanding of human experience in the context of climate change, by engaging with questions of values, morals, judgements and interpretations, and how they define human-nature relationships. Illuminating these relationships has practical implications for climate action as the way societies understand their environment shapes how they seek to govern it. Second, the humanities and social sciences may bring attention to power dynamics and injustices, and how they affect sustainability transition processes. These disciplines provide more depth to our understanding of what constitutes a just transition in light of historical and contemporary developments—notably between the so-called Global North and South—and the risks of perpetuating and reinvigorating neo-colonial structures and mindsets. Finally, the social sciences and humanities can illuminate how political, cultural, and socio-economic structures are enmeshed into material realities [6], providing new avenues to unveil more fair, equitable, and inclusive climate policies in modelling exercises.

To illustrate some of these ideas, we focus on two emerging technological innovations for climate mitigation pathways: renewable energy technologies and NETs. A growing body of literature has sought to analyse socio-technical dynamics of transitions and the scaling up of these technologies at large scale [7, 8]. These emerging technologies are often framed using the same imaginaries associated to existing technologies, such as fossil fuels and nuclear power, which elevate assumptions of individual freedom, abundance, reliability and economic viability, and have shaped political power and geopolitics in unjust and often brutal ways [9, 10]. Further, these energies have been developed and expanded as a result of centralized, top-down dynamics and techno-economic rationalities.

Renewables have often been (unconsciously) framed in a similar vein and have been promoted through mostly financial incentives. Albeit renewables have widely diffused in recent years, they have also encountered opposition and resistance in different places (see e.g., [11]), and current deployment efforts fail to convincingly appreciate questions of justice, power dynamics, and human experience in the face of the climate transition. Exploring different framings of renewables (e.g., the reappropriation of the means of productions and consumption of energy by citizens or a means towards more deliberative democracy) and how the sourcing and use of materials necessary for the development of renewables (and mostly found in the Global South) can be done in a just way that enables the countries and communities involved in their extraction to benefit from these developments. Similar concerns have been raised about NETs, and in particular afforestation and Bioenergy with carbon capture and storage (BECCS). Advocates of NETs argue that they should be deployed substantially within the next ten years if societies want to reach global net zero and avoid climate overshoot [12]. This is notwithstanding questions of social acceptability, the potential impacts of NETs (especially land-based ones) on biodiversity and livelihoods, and the dangers of mitigation deterrence—the idea that NETs might act as an excuse for avoiding the need to cut emissions today. Finally, under least cost scenarios, the Global South is generally projected to host these projects, raising the spectre of neo-colonialism. These examples demonstrate the dearth of understanding of how emerging technologies are framed and interact with socio-material realities [6], and how they risk perpetuating or leading to new social and environmental injustices or

opposition [13] if social, political, cultural and economic contextual dimensions are not considered.

To conclude, there is a need to expand our knowledge on climate change to engage more readily with what constitutes the common good and desirable futures, and thus shed new light on climate mitigation pathways. In this context, interdisciplinary studies are paramount to find ways to better emphasize the human dimensions that complement techno-oriented approaches. This could help overcome the sterile divide between techno-optimism and doomism that pervades current thinking on climate change by providing a richer assessment of the broad aims that humanity can aspire toward and provide a more hopeful, yet informed, view of the future. Appreciating what constitutes desirable futures and the common good could encourage context-specific ways of addressing climate change (rather than only technological) that weave together futures that are just and desirable for all. This is a normative endeavour, but the current thinking—futures betting on least cost and top-down technological change devoid of redistributive policies—is no less normative.

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