



Speed and Justice in a Renewable Energy Transition

Daniel Steel, Andrea Vásquez-Fernández, Brynmor Crookall, Rachel Cripps, C. Tyler DesRoches & Kian Mintz-Woo

To cite this article: Daniel Steel, Andrea Vásquez-Fernández, Brynmor Crookall, Rachel Cripps, C. Tyler DesRoches & Kian Mintz-Woo (30 Jan 2026): Speed and Justice in a Renewable Energy Transition, *Ethics, Policy & Environment*, DOI: [10.1080/21550085.2026.2614931](https://doi.org/10.1080/21550085.2026.2614931)

To link to this article: <https://doi.org/10.1080/21550085.2026.2614931>



© 2026 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 30 Jan 2026.



Submit your article to this journal



Article views: 54



View related articles



CrossMark

View Crossmark data

Speed and Justice in a Renewable Energy Transition

Daniel Steel  ^a, Andrea Vásquez-Fernández  ^a, Brynmor Crookall  ^a, Rachel Cripps  ^a, C. Tyler DesRoches  ^b and Kian Mintz-Woo  ^{c,d}

^aThe W. Maurice Young Centre for Applied Ethics, University of British Columbia, Vancouver, British Columbia, Canada; ^bSchool of Sustainability and School of Historical, Philosophical and Religious Studies, Arizona State University, Tempe, AZ, USA; ^cDepartment of Philosophy, Sustainability Institute, University College Cork, Cork, Ireland; ^dEquity and Justice Group, International Institute for Applied Systems Analysis, Laxenburg, Austria

ABSTRACT

A just transition from fossil fuels to renewable energy has been associated with a variety of duties, including climate change mitigation and promoting procedural, distributive, and recognitional justice. Several authors have discussed transitional justice tensions between the need for rapid greenhouse gas emissions reductions and other aspects of a just transition, such as fair inclusion of stakeholders. We make the case that such trade-offs are often uncertain, and that this has important moral implications tied to inductive risks. Inductive risks arise when decision-making requires accepting or rejecting an uncertain statement, where the moral harms of errors may be asymmetrical. This line of reasoning suggests that very strong evidence should be required to accept that imposing injustices on marginalized populations is necessary for rapid emissions reductions.

ARTICLE HISTORY

Received 26 March 2025

Accepted 5 January 2026

KEYWORDS

Climate ethics; climate justice; inductive risk; just transition; transitional justice

1. Introduction

According to the most recent assessment report from the Intergovernmental Panel on Climate Change (IPCC), keeping global mean warming well below 2.0°C, a central aim of the 2015 Paris Agreement, requires fossil fuel combustion to be mostly phased out, and emissions from other sources like agriculture to be sharply curtailed by midcentury (IPCC, 2023). In short, effective climate change mitigation requires a rapid worldwide energy transition that is currently in its early stages and is by no means assured of being completed in time, if at all. While a transition from fossil fuels stands to provide massive benefits, including reduced risks of adverse climate impacts (Romanello et al., 2022) and improved air quality (Scovronick et al., 2021), environmental justice concerns can also arise for renewable energy projects (Levenda et al., 2021). Consequently, many have emphasized that action on climate change should strive for a just transition, understood as 'a fair and equitable process of moving towards a post-carbon society' (McCauley & Heffron, 2018, p. 2).

CONTACT Kian Mintz-Woo  kian.mintz-woo@ucc.ie  Department of Philosophy, Sustainability Institute, University College Cork, 4 Elderwood, College Road, Cork, Ireland

© 2026 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

A variety of obligations have been associated with just transition. These include preventing impacts on the climate and biodiversity from exceeding an 'ecological ceiling' as well as promoting distributive, procedural, and recognitional justice (Kortemäki et al., 2025; Stark et al., 2023; Wang & Lo, 2021). Briefly, distributive justice means fairly sharing costs and benefits, procedural justice entails fair processes of decision-making, and recognitional justice requires the inclusion of historically marginalized groups and respect for their values (Zimm et al., 2024). Some authors add further duties to this list, including restorative justice, which involves compensation for past and ongoing harms (Abram et al., 2022). Perspectives on just transition can differ in whose interests they tend to prioritize, whether that be workers in professions tied to fossil fuels or members of historically marginalized groups, and in the extent of economic and political changes they see as necessary for achieving justice (Abram et al., 2022; Stark et al., 2023; Wang & Lo, 2021).

This article considers potential trade-offs between rapid climate change mitigation and other duties linked to just transition. A focus on climate change mitigation tends to prioritize transitioning from fossil fuels to renewables as fast as possible (Sharpe, 2023). But rapidly building out renewable energy projects on a large scale and mining minerals needed for technologies that do not run on fossil fuels can also raise procedural, recognitional, and distributive justice issues (Ciplet & Harrison, 2020). Moreover, distributing the costs and benefits of an energy transition equitably may require structural changes to economic and political systems that are unlikely to happen quickly (P. J. Newell et al., 2022). For example, several authors argue that a just transition requires fundamentally overhauling the global capitalist order (Klein, 2014; Wallis, 2010), while others argue that such political and economic transformations would be far too slow to achieve urgent climate targets (Mintz-Woo, 2021; Parenti, 2013).

Different perspectives can be found on tensions between speed and justice in a renewable energy transition. Several authors take such trade-offs seriously, and recommend that they be carefully analyzed and researched (Ciplet & Harrison, 2020; P. J. Newell et al., 2022). Some argue that the urgent need to rapidly bring down emissions and reduce catastrophic risks of climate change can justify a certain degree of injustice along the way (Mittiga, 2024). Still others caution that unjustly implemented mitigation policies may cause political backlash and ultimately slow a renewable energy transition (Abram et al., 2022). Yet moral conundrums confronting just transition have received relatively little attention from philosophers. A recent systematic review found that among 49 lead authors of articles on the meaning of just transition, only one's primary academic affiliation was philosophy (Stark et al., 2023, p. 1282). Just transition and tensions inherent to it, then, merit increased philosophical attention.

Our contribution is to explore the moral consequences of uncertainty in this context. To appreciate the idea, imagine a decision about whether to implement a renewable energy project with a fair stakeholder participation process or without it. We claim that it may be uncertain whether the fair engagement process would delay the renewable energy transition. It might, but it is also possible for stakeholder engagement to avert a lawsuit that would bog down the project even more. And even if forging ahead unjustly results in this project being implemented more quickly, it might generate backlash that delays future projects, and consequently the transition as a whole. These uncertainties mean that claims about speed and justice in a renewable energy transition confront

inductive risks, that is, risks of accepting a claim when it is false (Douglas, 2009). One might accept the claim that the more just process would delay a renewable energy transition when that is false (a false positive), or reject it when it turns out to be true (false negative). Moral assessments of inductive risks turn on finding a moral asymmetry between these two errors. For example, if a false positive is morally worse than a false negative, that can be a reason to demand stronger evidence to accept the claim than to reject it. We argue that there is a moral asymmetry in this case that suggests strong evidence should be required to accept the existence of a trade-off between speed and justice.

The remainder of the article is organized as follows. [Section 2](#) discusses general themes from the literature on just transition and explains how tensions involving speed and justice can arise. In [Section 3](#), we develop our argument on uncertainty and inductive risks in connection with potential trade-offs between a speedy energy transition and other duties associated with a just transition. [Section 4](#) considers the objection that speed-justice tensions are *not* uncertain if just transition is understood to require fundamental transformations of economic and political systems. In response, we argue that a renewable energy transition entails fundamental economic and political transformations whether it is just or not, and consequently that our case for the uncertainty of speed-justice tensions is not limited to smaller-scale decisions. Finally, [Section 5](#) concludes by recapitulating the main themes of our argument and by reflecting on the moral implications of uncertainty for claims about the necessity of compromising the interests of historically marginalized groups for a greater good.

2. Just Transition

It has become common to discuss climate change mitigation in terms of an energy transition from a world economy powered by fossil fuels to one that runs mainly on renewable energy (Patt, 2015; Sharpe, 2023). The term 'energy transition' in general refers to a shift in the primary energy source of an economic sector or of an economy as a whole (Geels et al., 2017). Thus, the Industrial Revolution was an energy transition in which fossil fuels replaced other energy sources in domains such as manufacturing and transportation. Historically, energy transitions have been motivated largely by economic and strategic interests, as illustrated by Great Britain's leading role in developing steamship technology in the 19th century (Geels, 2002). The role of selfish interests in driving energy transitions is important for understanding how they are possible. But it also raises concerns about justice, as new energy sources may be extracted or developed in unjust ways and generate unfair distributions of costs and benefits. Literature on just transition, then, addresses justice concerns related to a renewable energy transition. There is much discussion and debate over what a 'just transition' entails, and several literature reviews have attempted to organize the central themes (Abram et al., 2022; Stark et al., 2023; Wang & Lo, 2021). As we will explain, just transition is linked to a variety of moral obligations that can be interpreted in different ways, which creates the potential for tensions and trade-offs.

To begin, climate change mitigation is one component, so just transition involves reducing greenhouse gas emissions rapidly and significantly enough to meet urgent climate targets, such as ensuring that global mean heating does not exceed 2°C. This might be thought of as the 'transition' component of just

transition, that is, rapidly transitioning to a low-carbon world economy. A future in which global mean temperatures rise by 4°C within the next 100 years, for example, would not be a just transition. Environmental sustainability considerations of just transition are also commonly taken to include biodiversity, land use change, and nutrient and water use. Together these climatic and environmental criteria have been referred to as the 'ecological ceiling' of just transition (Gupta et al., 2024; Kortemäki et al., 2025).

In addition to staying within the ecological ceiling, just transition is normally understood to involve procedural, distributional, and recognitional justice elements (Kortemäki et al., 2025; Stark et al., 2023; Wang & Lo, 2021). From a distributive justice perspective, it is imperative that benefits and costs of a renewable energy transition be distributed fairly. In addition, renewable energy technologies should be implemented and fossil fuels phased out in ways that are procedurally just, something that is often taken to imply participation of affected parties in decision-making. Procedural justice is linked to recognitional justice, which emphasizes the inclusion of historically marginalized groups along with respect for their values and belief systems. Recognitional justice also links to distributive justice insofar as it highlights the potential for adverse effects of an energy transition to disproportionately fall upon people subject to discrimination and political marginalization. Finally, restorative justice, which involves providing fair compensation to those adversely impacted by the transition or climate change itself, is also sometimes cited as a component of just transition (Abram et al., 2022).

Authors who write on just transition often emphasize different interests or concerns. For instance, some discuss the impacts of climate change itself, which tend to disproportionately harm those with least responsibility for causing the problem and little say in decisions about how it should be addressed (Stark et al., 2023). However, the term 'just transition' emerged from labor movements, and thus originally tended to be associated with protecting the interests of workers, such as coal miners, whose jobs would be threatened by a renewable energy transition (McCauley & Heffron, 2018; Wang & Lo, 2021). Contemporary just transition literature has expanded from this labor-centric focus to emphasize the interests of those with heightened vulnerability and limited political power, such as the rural poor, racialized groups, and Indigenous Peoples (Wang & Lo, 2021).

Differing perspectives also exist about the extent of political and economic change required for just transition, and whether or not it can occur within current political and economic institutions (Biswas et al., 2022; Stark et al., 2023; Wang & Lo, 2021). What we call *structural approaches* link climate change to structural injustices embedded in contemporary political and economic systems, which they argue a just transition must overcome. Structural injustices are collectively produced through pervasive social practices that give rise to undeserved harms and inequitable relations marked, for instance, by race and wealth (Eckersley, 2016). Structural injustices often lack a clear 'culprit', as they involve actions that are normal within prevailing social, legal, political, or economic conditions and therefore are not usually viewed as blameworthy (Young, 2011). Moreover, structures shape and constrain individual choice so that even agents who prefer to act otherwise find it difficult to do so. For instance, environmentally-conscious individuals may prefer to walk or take public transit to work but drive instead because of car-centric infrastructure, limited public transit, or prohibitively expensive housing in cities. The economic

dependence of a country on oil extraction illustrates how similar structural pressures exist for state agents.

One strand of structuralist approaches to just transition emphasizes capitalism as both the root of the climate crisis and a major impediment to climate action (Klein, 2014; P. Newell & Paterson, 2010; Satgar 2018; Wallis, 2010). According to this view, capitalism's need for perpetual economic growth leads to inequality, militarization, and environmental destruction, while 'green capitalism' threatens to replicate these injustices and unsustainable environmental impacts with renewable technologies. As an example, consider lithium mining in Chile's Salar de Atacama, where some researchers suggest that pumping large quantities of lithium-rich brine from aquifers has lowered the water table and sparked local opposition (Liu & Agusdinata, 2020). Thus, according to this perspective, a just transition requires thoroughly reforming the world's capitalist economic system.

Structural approaches to just transition are also common in Indigenous scholarship. In several articles, Kyle Whyte proposes a *kincentric* approach to just transition (Whyte, 2019, 2021a, 2021b). According to Whyte (2021b), the *kincentric* approach is an alternative to the dominant narrative of a ticking climate clock and urgent deadlines for carbon neutrality. When combined with the very real threat of climate change, this linear conception of time produces a mandate to 'seek ways to stop the worst impacts of climate change immediately' (Whyte, 2021b). Consequently, crisis narratives surrounding climate change can promote measures that infringe on the rights of Indigenous Peoples, such as installing wind farms on Indigenous territory without consent (Whyte, 2021a). By contrast, a *kincentric* conception of time and climate change emphasizes changes in relationships, rather than markers of linear time (Whyte, 2021b). For Whyte (2019), climate justice is possible only if relationships between Indigenous Peoples and governments, NGOs and corporations are reshaped (cf. Lightfoot, 2016). For example, according to this view, legal processes for permitting mining, energy or infrastructure projects should be reformed to respect Indigenous sovereignty and the right to free, prior, and informed consent as specified in the *United Nations Declaration on the Rights of Indigenous Peoples* (United Nations, 2007).

Given the variety of obligations associated with just transition and the multiple ways they can be interpreted, the possibility for tensions should be unsurprising. Maximizing one aspect of just transition might interfere with the pursuit of another, with one of us, Mintz-Woo, raising the dynamic issue of 'transitional justice', which is justice having to do with the dynamic trade-offs between other types of justice (Fulvi & Mintz-Woo, 2025; Zimm et al., 2024). Here, we focus on the potential for trade-offs between the duty to rapidly reduce greenhouse gas emissions – necessary for the staying within the ecological ceiling – and other obligations of just transition. For example, Ciplet and Harrison use the term 'sustainability-inclusivity tension' to refer to a situation involving 'conflicts between a rapid and bold policy action in time sensitive contexts and inclusive governance processes' (2020, p. 440; cf. P. J. Newell et al., 2022). Similarly, they define 'sustainability-recognition tension' as 'conflicts between sustainability performance and the recognition of diverse value systems and rights' (Ciplet & Harrison, 2020, p. 440). Ciplet and Harrison take 'sustainability priorities' to include timely and bold action, for instance, to build out renewable energy capacity quickly and on a large scale. In contrast, procedural justice is often associated with inclusivity, that is, conducting a process that is fully inclusive and responsive to the needs of stakeholders. The thought behind the sustainability-inclusivity

tension, therefore, is that an inclusive process is likely to be slow and an obstacle to rapid construction of large-scale renewable energy projects. The sustainability-recognition tension is similar except that it adds the additional concern of recognizing rights linked to value systems of historically marginalized groups, for instance, the sacredness of a mountain or river to an Indigenous nation. Again, the concern is that a pluralistic integration of value systems in a decision may delay climate mitigation measures. Finally, Ciplet and Harrison use the term 'sustainability-equity tension' to refer to situations in which there are trade-offs between distributive justice and rapid climate change mitigation.

For convenience, we jointly refer to the three tensions described in the foregoing paragraph as *speed-justice tensions*. In each case, there is a tension between rapidly advancing the transition from fossil fuels to renewable energy and other obligations linked to just transition. It is important to bear in mind, however, that rapid emission reductions are a justice concern in their own right because climate impacts are unjustly distributed. The tension, therefore, is not between justice and non-justice concerns. Instead, it is between justice concerns tied to greenhouse emissions and justice concerns arising from the renewable energy transition itself. Quickly reducing greenhouse gas emissions is essential for alleviating unjust climate impacts, but efforts to rapidly deploy renewable energy and associated technologies like electric vehicles can generate justice concerns of their own. That is the background from which speed-justice tensions arise.

Speed-justice tensions appear especially acute given a structural approach to just transition. According to structural approaches, just transition requires substantial reforms to current economic and political systems. Yet Newell and colleagues suggest that a rapid energy transition requires 'financial, technical, and organizational' resources possessed by 'incumbent actors', such as governments and corporations and that as a result, 'a tension arises from the fact that working with such incumbents to accelerate transitions may lead to transition pathways which are less attentive to social justice' (P. J. Newell et al., 2022, p. 3). Moreover, some, including one of us, worry that major sociopolitical transformations called for by structural approaches would be too slow and unacceptably delay urgently needed climate change mitigation policies (Mintz-Woo, 2021; Parenti, 2013). For example, Christian Parenti writes, 'anyone who thinks the existing economic system must be totally transformed before we can deal with the impending climate crisis is delusional or in willful denial of the very clear findings of climate science' (Parenti, 2013, p. 57). According to this perspective, speed-justice tensions are especially acute given structural approaches because these approaches would cause *disastrously long* delays to climate change mitigation.

In sum, just transition entails a cluster of potentially conflicting obligations, including aggressive climate change mitigation and the advancement of procedural, recognitional, and distributive justice. In what follows, we examine the moral consequences of uncertainty for speed-justice tensions.

3. Just Transition and Inductive Risk

In this section, we argue that trade-offs between speed and justice in a green transition are typically uncertain, and that this has important consequences for the ethics of climate change. The uncertainty means claims about speed-justice trade-offs face *inductive risks*,

which arise when there is a risk of accepting the claim when it is false or rejecting it when it is true (Douglas, 2009). Inductive risks are especially worrisome, we suggest, when it comes to erroneously accepting a speed-justice trade-off, since this may impose disproportionate harms on already marginalized communities without any broader compensating benefit. Consequently, we propose that there is a moral reason to tentatively favor the assumption that justice and a rapid renewable energy transition are compatible.

Inductive risks arise when an agent considers whether to accept an uncertain claim that is relevant to decision making (Rudner, 1953). For example, imagine that you have self-administered a COVID-19 test and have difficulty interpreting the results. The second red line, which indicates a positive result, is visible but faint. The claim in this example is that you have COVID-19, and there are two possible errors regarding it: accepting the claim when you do not in fact have COVID-19 (false positive), and rejecting it when you do have it (false negative). Suppose that you are deciding whether to visit your elderly grandmother. A false positive would mean needlessly postponing the visit, while a false negative would mean exposing your grandmother to a potentially fatal respiratory infection. The argument from inductive risk states that the relative severity of these two harms, from a moral perspective, is relevant to what evidence should be sufficient for accepting or rejecting the claim. Given that exposing your grandmother to a fatal infection is worse of the two errors, you should adopt a higher evidential bar for rejecting the claim that you have COVID-19 than for accepting it.

Consider an example of how inductive risks can be relevant to tensions between speed and justice in a renewable energy transition. The Thacker Pass lithium mine, located in the United States (US) state of Nevada, was originally approved by the US government in 2021, but a lawsuit led by Paiute and Shoshone nations delayed its start until 2023 (Solis, 2023). While federally recognized Native American tribes possess the status of sovereign nations within the US (Status of Tribes and Climate Change Working Group [STACCGWG], 2021), mining companies are typically only legally required to consult with impacted tribal communities, not to obtain their consent. That practice appears incompatible with articles concerning free, prior and informed consent in the *United Nations Declaration on the Rights of Indigenous Peoples*. In addition, courts often side with mining companies when legal disputes arise about whether consultation was done 'in good faith.' The Paiute and Shoshone lawsuit claimed that the project would desecrate lands they held sacred, including the site of an 1865 massacre of their ancestors by the US Cavalry, and that Lithium Americas Corporation, who proposed the project, did not meaningfully consult with them. Indeed, the trial proceedings revealed that the Burns Paiute Tribe was removed from a Lithium Americas e-mail list after suggesting consultation with tribes whose reservations were closer to the mining site. Nevertheless, the Court of Appeals for the Ninth Circuit ruled in July 2023 that Lithium Americas had fulfilled its legal consultation requirements and that the project could proceed.

On the face of it, the Thacker Pass mine seems to involve a trade-off between speed and justice in the energy transition. It could be seen as an example of 'sustainable exclusivity', in which timely and bold climate action comes at the expense of procedural justice in the form of adequate community representation in the decision-making process (Ciplet & Harrison, 2020, p. 441). The Thacker Pass case might also be classified as 'sustainable misrecognition', in which climate change mitigation is advanced at the

expense of recognizing the rights and values of marginalized groups (Ciplet & Harrison, 2020, p. 445). We claim, however, that it is uncertain whether the Thacker Pass mine really is an example of a speed-justice tension.

To appreciate the uncertainties here, it is helpful to have a clearer idea of what a just process might have looked like in this case. Consider the *Collaboration Agreement on Large-Scale U.S. Solar Development: Integrating Climate, Conservation and Community* (Stanford Woods Institute for the Environment, 2023), whose signatories include solar energy developers, environmental conservation groups, and representatives of Native American tribes. This agreement, which was reached on 12 October 2023, resulted from the 'Uncommon Dialogue' program at Stanford University's Woods Institute for the Environment (Stanford Woods Institute for the Environment, 2023). The text of the agreement spells out principles that should guide the expansion of utility-scale solar energy in the US. These principles are referred to as the '3 C's': climate, conservation, and community. The first principle states that climate change is an urgent problem and that addressing it requires a rapid expansion of renewable energy, including solar. The second principle states that conservation of biodiversity is also essential, and that impacts on critical habitats and agricultural lands should be minimized. And the third says that communities, especially historically marginalized groups subjected to environmental injustices, should be consulted and have a fair say in renewable energy projects that affect them. The third C states that tribal sovereignty should be an important consideration in this process. The collaboration agreement creates six working groups to address various topics linked to the '3 C's'. One of these is named 'Tribal Nations' and has the following remit: 'Analyze and address the opportunities and challenges tribal nations face regarding large-scale solar development and land conservation and related issues of sovereignty, indigenous culture, federal programs and funding, tax policy, and state authority' (Stanford Woods Institute for the Environment, 2023, p. 5).

The *Collaboration Agreement* provides a sense of what increased procedural and recognitional justice might have looked like in the Thacker Pass example. The 3 C's emphasize concrete steps to reduce greenhouse gas emissions and promote environmental conservation, while at the same time including historically marginalized stakeholders in the decision-making process, especially Indigenous Peoples. Recognition of Indigenous sovereignty, a central issue from the perspective of recognitional justice, is also a key theme in the *Collaboration Agreement*. A process that followed the 3 C's, we suggest, would have been more just than the one that actually occurred in the Thacker Pass example. But would it have been slower?

Imagine a counterfactual scenario in which Lithium Americas followed the 3 C's from the *Collaboration Agreement*. In this scenario, the sovereignty of the Paiute and Shoshone nations would have been an important consideration in decision-making, alongside concerns to boost lithium production and meet climate targets. In practical terms, this might have meant that Paiute and Shoshone representatives would have had meaningful involvement in decisions relating to the proposed mine. We think it is uncertain whether this counterfactual process would have been slower than the actual legal battle that delayed the Thacker Pass mine until 2023. It might have been slower. Perhaps no agreement would have been possible and the mine would have been delayed indefinitely. Or maybe two years would have been enough to reach an agreement on modifications to the planned mining operation that would have made it acceptable to the Paiute

and Shoshone. This is an example of *local* uncertainty, that is, uncertainty about whether avoiding injustices in the course of implementing a renewable energy project would delay that project.

Uncertainty can also be considered from a *systemic* perspective. A renewable energy transition is a global socioeconomic transformation in which one project is but a small part. Consequently, it is possible that a project is halted but that a renewable transition happens anyhow. And in some cases, not going forward with a particular renewable energy project might even increase the probability of a quicker transition in the long run. This could happen, for instance, if the project involved a gross injustice that would reduce public support for future renewable energy initiatives. For example, the Thacker Pass project might increase opposition to future lithium mining, and to large-scale renewable projects more generally, among environmentalists, Indigenous rights advocates, and the general populace. Local opposition is frequently associated with the failure of energy projects to move forward (Temper et al., 2020). In addition, a recent analysis suggests that opponents of climate action have shifted their strategy from denying the reality of climate change to attacking solutions, such as solar power (Center for Countering Digital Hate [CCDH], 2024). Consequently, unjust renewable energy projects provide organizations that represent fossil fuel interests with material for media campaigns that seek to undermine public support for climate action.

In general, claims about speed-justice trade-offs regarding renewable energy projects are prone to uncertainty for *local* or *systemic* reasons. A more just approach may generate community support rather than opposition in the form of lawsuits, protests and so on. In these circumstances, it may be uncertain whether delays resulting from adequate local engagement would be lengthier than those resulting from opposition. From a more systemic perspective, unjustly implemented renewable energy projects may undermine public support for climate action, and may be seized upon by vested interests that wish to sour public opinion on a transition away from fossil fuels. Thus, even if an unjust approach is the quickest way to implement the project in question, it might slow the pace of subsequent projects and the renewable transition as a whole.

Since claims about speed-justice trade-offs in a renewable energy transition are uncertain, they can be subject to inductive risks. Our next step, then, is to examine those inductive risks more closely. Consider a decision-maker such as industry, government or some conjunction of the two that is committed to quickly moving ahead with a renewable energy project. This project will impact historically marginalized or disadvantaged groups, as in the example of the Thacker Pass mine, and the decision is whether or not to implement a just decision-making process that involves those groups. In this example, the claim at issue is that a just process would delay the renewable energy transition. A false positive would mean accepting this claim when it is false, that is, when a just process would have been equally fast or faster. A false negative would mean rejecting it when it is true, that is, accepting that a just process would be at least as fast when it would actually be slower. Given the decision-makers' commitment to proceeding quickly with the project, they will implement the more just process only if they accept that it will not lead to delays. Then the outcome for a false positive, which we can call *slow injustice*, is injustice with no compensating benefit of an accelerated transition. Indeed, in this case injustice might make the transition slower than if a more just process had been chosen. Slow injustice, therefore, is always a net harm. The result of a false negative, which

we can call *slow justice*, is more just inclusion of marginalized groups directly affected by the project at the expense of a slower renewable energy transition. Whether this outcome is good or bad overall depends on the length of the delay and the justice gain from the improved process. If the delay to the energy transition has negligible effects on the climate system while the increase in procedural justice is significant, then slow justice would be better than proceeding by unjust means. However, a sufficiently long delay of a renewable energy transition would cause injustices of its own due to more severe climate impacts, which disproportionately impact disadvantaged people. Those harms might be worse than the injustices that were avoided by the just implementation of the project.

The above considerations point to a moral asymmetry between harms in the slow injustice and slow justice scenarios. That is, while slow injustice is always a net negative, slow justice can be a net positive when the delay is small. Slow injustice involves a harm with no compensating benefit (unjust implementation without increased, and perhaps even reduced, speed) while slow justice involves a balance between a positive and negative (just implementation and delay). So, when the delay is negligible, slow justice is better than slow injustice. Although the example given above pertains to procedural justice, parallel reasoning would work for distributive, recognitional, or restorative justice. In each of these cases, the bottom line would be that the false positive (slow injustice) is always negative, while the false negative (slow justice) may be a net negative or positive depending on the justice gain and length of delay.

This moral asymmetry between slow injustice and slow justice provides a reason why stronger evidence should be required for accepting rather than rejecting a speed-justice tension. Given a general reason to think the false positive is the worse of the two errors, a higher standard of evidence for accepting the existence of a speed-justice tension is appropriate. If little or no evidence were available regarding the expected delay in a particular case, then that would suggest proceeding on the default assumption that speed and justice are compatible.

It is important to note the limitations of our argument. We do not assert that it is always better to err on the side of a scrupulously fair process, nor do we claim that expedited but less than ideally fair procedures should always be avoided. Rather, our argument provides a moral reason for holding assertions of speed-justice tensions to a higher standard of evidence. In some cases that standard may be satisfied. In the presence of very strong evidence, moral asymmetries linked to harms of error make less difference to decisions about what to accept (Kaivanto & Steel, 2019). However, we think uncertainties relating to speed-justice tensions are common and consequently that inductive risks have an important role in this context.

An additional limitation is that our argument would not hold if delays in the slow justice scenario were far greater than what would result from slow injustice. This situation is possible even if uncertainty is present. One might be uncertain whether a more just approach would be slower but think that, if it was, it would be disastrously slow, while any delays from slow injustice would be minimal. The idea that delays from slow justice would be much greater than those from slow injustice could also be combined with a denial of uncertainty. For example, one might claim that implementing a structural approach to just transition would almost certainly result in catastrophic delays far longer than those from slow injustice. This is essentially the argument we examine in [Section 4](#).



An additional complication has to do with moral uncertainty (MacAskill et al., 2020). The uncertainties discussed so far have been empirical, that is, about the observable consequences of decisions. But it may also be uncertain who can legitimately claim to have been treated unjustly and who is simply using appeals to justice as a delaying tactic to defend an inequitable status quo. As P. J. Newell et al. (2022) observe, one should be careful of the cynical use of local participatory processes as a stalling tactic by fossil fuel interests. So, there may be cases in which a slower, more exhaustive process would be less fair than a quicker one.¹ Moral uncertainty, then, may raise doubts about whether a case really involves a speed-justice tension. The challenge here from an ethics perspective is to provide some guidance about how to distinguish genuine from morally spurious speed-justice tensions. This is a complex question we cannot fully answer here. But we suggest that a key issue has to do with whether those who would suffer the brunt of harm are socioeconomically privileged or whether they are subject to systemic disadvantage along multiple dimensions of well-being (Powers & Faden, 2006). Concerns about injustice, we suggest, are much more acute in the latter situation. Thus, when adverse impacts of a process would fall most heavily upon people subjected to historic and ongoing discrimination, that is a reason to question its justice. This reasoning provides grounds for moral concern about the process in the Thacker Pass example discussed above.

Finally, while discussions of inductive risk have traditionally focused on whether moral values are ineliminable from research science (Rudner, 1953), our argument is focused on policy contexts. Governments, universities, corporations and other entities that enact climate action plans can encourage exploration of ways to further both of these objectives together, thereby reducing the moral hazard of thinking that injustice against marginalized communities is the regrettable price of a rapid energy transition. Since we are focused on policy decisions, our argument is not intended as a contribution to debates about the ideal of value-free science (cf. Betz, 2013; Douglas, 2009). However, our argument does have implications at the level of funding priorities for scientific research, where inductive risks can provide a reason to prioritize funding for research on how to achieve an energy transition that is both fast and just.

4. The Challenge of Structural Change

This section considers the argument that if just transition is taken to demand large-scale structural change, it would be disastrously slow. In the course of defending carbon taxes as an effective climate change policy, for example, one of us (Kian Mintz-Woo) criticizes the idea that genuine solutions to climate change require 'fundamental changes in the economy, such as shifts away from capitalism' (Mintz-Woo, 2021, p. 63). Mintz-Woo argues that fundamental systemic changes would not happen quickly enough and assumes that these would crowd out policy initiatives to reduce greenhouse gas emissions.

To grasp this argument, it is helpful to articulate a key premise that underlies it, which we call the *crowding out assumption*. Mintz-Woo states this assumption as follows.

I am assuming that systemic change would substitute for climate change policies during the transition period. The assumption is that systemic change would be sufficiently socially demanding that it would not make it possible to simultaneously address our carbon usage during a transition. . . . if change takes time, and fundamental change prevents other simultaneous policies being enacted, then fundamental, systemic changes – which may well be

good ideas for any number of independent reasons – would prevent us from addressing climate change quickly enough (Mintz-Woo, 2021, pp. 9–10).

The crowding out assumption states that fundamental systemic changes, such as replacing capitalism with a more just economic system, would prevent policies to reduce greenhouse gas emissions, and consequently that the two would not occur at the same time. Thus, in the passage above, Mintz-Woo argues that fundamental systemic changes would prevent the concurrent implementation of policies to reduce greenhouse gas emissions, such as carbon taxes, subsidies for renewable energy, and afforestation initiatives. The crowding out assumption suggests that enacting structural changes now would delay emissions reductions, potentially making urgent climate targets unattainable. Consequently, Mintz-Woo argues that it is better, at present, to prioritize carbon taxes and other conventional climate change policies.

The crowding out assumption can be found in the writings of other authors who claim that structural approaches to just transition would be too slow. Often, the crowding out assumption is expressed by stating that major structural changes would be implemented first, followed by climate change mitigation. For example, Parenti (2013) writes, 'Dealing with climate change by first achieving radical social transformation ... would be a very long and drawn out, maybe even multi-generational, struggle' (p. 51). These passages imply that radical social transformation would not happen at the same time as efforts to reduce greenhouse gas emissions, just as the crowding out assumption claims, and consequently would cause disastrous delays. While Parenti expresses sympathy for critiques of capitalism, he argues that addressing climate change is possible within a capitalist system. To avoid delays that would risk climate catastrophe, therefore, Parenti recommends focusing on conventional climate change policies first. A potential argument for this position is that an urgent need to prevent catastrophic collapse of political institutions needed to maintain the rule of law can make it morally permissible to temporarily tolerate some injustices (Mittiga, 2024).

The crowding out assumption can also be found in the work of some who attribute climate change to structural forces, like capitalism and colonialism. For example, Malm (2016) traces the origins of climate change to the dawn of the Industrial Revolution. Malm argues that the victory of steam over water wheels in early 19th century English textile mills was primarily due to advantages steam gave capitalists in disputes with laborers. Steam engines allowed mills to be built in urban areas where labor was plentiful, making it easier for owners to break strikes. Nevertheless, Malm expresses pessimism about global socialism as a climate change solution. According to Malm (2016), 'The experiences of the past two centuries indicate that socialism is an excruciatingly difficult condition to achieve; any proposal to build it on a world scale before 2020 and *then* start cutting emissions would not only be laughable, but reckless' (p. 383). As before, this passage illustrates the crowding out assumption. The presumption is that emission reductions and the emergence of global socialism would not coincide, so unacceptable delays would result from pursuing fundamental political reforms. However, Malm's recommendations sharply differ from those of Mintz-Woo and Parenti. Rather than conventional climate policies followed by possible structural reforms in the distant future, Malm (2021) calls for violent opposition to fossil fuel projects and infrastructure.

From the perspective of our inductive risk argument, two things stand out in the arguments above. First, these arguments deny empirical uncertainty about speed-justice tensions when it comes to structural approaches to just transition. They claim that if just transition requires fundamental structural changes to political and economic systems, then delays will definitely result. Second, they presume that those delays would be disastrously long, and presumably much longer than what could result from some alternative approaches. Thus, they reject the conditions assumed by our inductive risk argument presented in [Section 3](#). They deny that speed-justice tensions are uncertain and that delays associated with greater justice would be relatively small in relation to the energy transition as a whole.

Our response, then, addresses both of these points. Start with the claim that structural approaches to just transition would definitely delay climate change mitigation. As explained above, that claim rests on the crowding out assumption, according to which basic structural changes would preclude the concurrent implementation of policies to reduce greenhouse gas emissions. The rationale for the crowding out assumption appears to be that major policy initiatives require political capital and institutional resources, so that only one major initiative can happen at a time. The policy must be mapped out in detail, citizens and politicians must be convinced to support it, and public institutions must learn to implement it effectively. Given that political capital and resources are limited, governments inevitably prioritize some policy initiatives over others. Not only that, fundamental structural changes are especially demanding, due to being highly controversial, untested and requiring far-reaching economic and political reforms. In contrast, a carbon tax works within existing systems, and might be rolled out as one component of a broader policy package aimed at addressing climate change. The argument, therefore, is that large-scale structural changes aimed at creating a just society would displace other initiatives, including climate change policies (Mintz-Woo, [2021](#)).

However, this defense of the crowding out assumption is questionable. While it is possible for one policy initiative to crowd out others, it is also possible for differing policy objectives to be mutually reinforcing. One and the same policy might enact justice-enhancing structural reforms while promoting climate change mitigation. To appreciate this point, recall the changes called for by the *Collaboration Agreement* discussed in [Section 3](#). Among other things, this document recommended greater recognition of Indigenous sovereignty in the US in the course of building out renewable energy capacity. That would be a structural change if put into practice. As discussed in [Section 2](#), reforming decisions processes about infrastructure and energy projects to increase respect for Indigenous sovereignty is one of the main themes of structural approaches to just transition. If a policy can promote wind and solar power while strengthening Indigenous sovereignty, then the crowding out assumption is mistaken to claim that structural changes preclude climate change mitigation. Similar points can be made for several other proposals made by advocates of structural approaches to just transition discussed in [Section 2](#). For example, Klein ([2014](#)) links climate change to deregulated capitalism and proposes a variety of environmental regulations and economic policies as solutions. A ‘green new deal’ package of environmental regulations, renewable energy incentives, and measures to increase economic equality illustrates the point that a policy initiative can promote multiple, mutually supporting objectives. Contrary to the crowding

out assumption, therefore, it is possible for a policy to promote both structural justice and climate change mitigation at the same time. Rejecting the crowding out assumption undermines the argument that structural approaches to just transitions would definitely lead to delays. That puts uncertainty about speed-justice tensions back on the table.

Perhaps Mintz-Woo, Parenti, and Malm would respond that their arguments concern *fundamental* changes, like dismantling capitalism, and that restructuring the relationships between national governments and Indigenous Peoples or a 'green new deal' do not count as such. This response has the disadvantage of heavily relying on the vague term 'fundamental.' Judgments about what counts as 'fundamental change' appear highly subjective, and consequently are shaky grounds for an argument that speed-justice trade-offs definitely exist. For instance, while implementing the *Collaboration Agreement* might not seem fundamental to a Marxist, it might well seem fundamental to someone advocating for Indigenous rights. In addition, this response confronts the difficulty that changes can accumulate. Even if the structural changes wrought by one policy are not 'fundamental', the changes brought about by a series of policies over several decades may be. An emphasis on 'fundamental change', then, does not alter our argument that it is uncertain whether structural approaches to just transition would be slower or faster than alternatives. One can imagine scenarios in which they are slower, as Mintz-Woo (2021) does. But one can also imagine that policies that promote structural justice along with climate change mitigation would be faster due to reducing political backlash. But we believe that an energy transition will necessarily involve major changes to social and economic systems, so disentangling fundamental changes from aggressive climate action is not so straightforward in practice as in theory.

Whether just or not, a renewable energy transition entails fundamental changes to economic and political structures. We presently live in a world where fossil fuels are essential for agriculture, transport, industry, and many other needs. Transitioning to a global economy in which fossil fuels are a minor factor, therefore, unavoidably involves basic changes in how societies and economies operate. Current scholarship suggests that energy transitions should not be viewed as merely swapping one technology for another, but rather as a system-wide transformation (Geels et al., 2017; P. Newell, 2021). That is because important technologies, such as those linked to fossil fuels, exist within a *socio-technical regime* of mutually supporting laws, regulations, infrastructure, social norms, economic activities, political support, co-technologies, and culture (Geels, 2002). The transition, therefore, is not simply to new energy sources but to a new socio-technical regime with a refigured network of regulations, infrastructure, political alliances, social norms, and so on. One effect of a socio-technical transition can be to reduce the power of entrenched interests that defend the status quo, thereby facilitating other changes. Thus, a green transition entails significant decline in demand for fossil fuels and a corresponding loss of economic and political power among fossil fuel interests (Mercure et al., 2021). A future where the price of oil is of little economic or political importance and where fossil fuel companies lack resources to bankroll politicians would be fundamentally different from the world that exists today. Consequently, the notion that we should aim for a renewable energy transition while avoiding fundamental, systemic changes is a non-starter (Geels et al., 2017).

All of the arguments examined above mention capitalism specifically. So, perhaps the concern isn't with fundamental changes in general, but with capitalism in

particular. Is there something about capitalism that presents insuperable obstacles to change? We provide a few observations to suggest that the answer to this question is clearly *no*. There is ample evidence that capitalism evolves, just like other forms of socio-economic organization. For example, academic literature on capitalism often points out that capitalism of today differs significantly from the capitalism of Marx's time (Harris & Delanty, 2023), and it has become common to distinguish different types of capitalism, such as liberal capitalism and political capitalism (Milanovic, 2019). Change over time and diversification into sub-varieties are, of course, hallmarks of evolution. For capitalism, a renewable energy transition would be a major event in this evolutionary process. Malm (2016) argues that fossil fuels are inherent to capitalism as we know it. If that is correct, then a renewable energy transition would transform capitalism. Since there is no generally agreed upon definition of 'capitalism' (Harris & Delanty, 2023), it is not even clear at what point a socio-economic system would cross the line from capitalism into something else. In sum, we see no reason why fundamental changes to capitalism could not occur as part of a renewable energy transition.

We close this section by considering one final example of an author who suggests a tension between structural justice and rapid climate change mitigation. In an article titled, 'Too late for Indigenous climate justice', Whyte (2019) examines two scenarios whereby a green transition could occur. The first involves a rapid transition from fossil fuels without regard for the rights of Indigenous Peoples, while in the second, 'nations and other privileged parties and influencers seek to *first* establish and repair the qualities of consent, trust, accountability, and reciprocity' with Indigenous Peoples before transitioning from fossil fuels (Whyte, 2019, p. 3; emphasis added). In the first scenario, global mean warming above pre-industrial levels is kept below 2°C, while in the second scenario the transition is just but occurs too slowly to prevent crucial ecological tipping points from being breached (Whyte, 2019). These two scenarios illustrate the crowding out assumption: in both, emissions reductions and efforts to restore structural justice do not happen at the same time. In the first scenario, a green transition happens without changes to political structures needed to secure justice for Indigenous Peoples, while in the second those structural changes happen first and delay policies that bring down emissions.

However, Whyte concludes by suggesting, albeit somewhat ambiguously, that the crowding out assumption may be false. On the one hand, he writes, 'I do not see how it cannot be anything but too late for some indigenous peoples to avert further injustice' (Whyte, 2019, p. 5). That seems to imply that the dilemma between the two pessimistic scenarios is unavoidable, in line with the crowding out assumption. Yet he follows up that claim by asking whether justice for Indigenous peoples can 'be established at the pace of urgency' (Whyte, 2019, p. 5). And the final sentence of his article states, 'Urgency must be aimed at addressing ecological and relational tipping points together' (Whyte, 2019, p. 6). We take this sentence to suggest the possibility of a rapid transition that averts ecological disaster unfolding alongside structural changes that restore relationships between Indigenous and non-Indigenous Peoples. This coincides with the perspective on structural approaches to just transition that we suggest here.

5. Conclusions

Just transition is an important ethical concept comprised of a variety of obligations that can be in tension with one another. As such, it can benefit from sustained ethical analysis. We have focused on potential trade-offs between the obligation to aggressively mitigate climate change and duties to advance procedural, recognitional, and distributive justice. The former demands haste, while the latter often suggests a more methodical approach. However, the existence of speed-justice tensions, we argue, is often uncertain, and this uncertainty has moral consequences linked to inductive risks.

Our analysis of inductive risks reveals a moral asymmetry that suggests stronger evidence should be required for accepting the existence of a speed-justice tension than for rejecting it. The morally worse error in this case, we suggest, is to needlessly impose injustices upon disadvantaged populations in the name of a rapid shift to renewables. There are limitations to our argument. For example, it would not hold if delays from more just processes were disastrously lengthy. In [Section 4](#), we examined an argument along these lines, which asserted that structural approaches to just transition would displace climate policies and thus postpone emission reductions by decades. In response, we explained that a single policy initiative might promote both climate change mitigation and more just economic or political structures. In addition, since energy transitions upset an existing socio-technical regime, they inherently involve structural change. As a result, structural change is unavoidable in a transition from fossil fuels to renewable energy, no matter whether it is just or not. We believe, therefore, that our argument has broad relevance to climate change mitigation.

To conclude, our discussion has explored how justifications of claims about speed-justice tensions have a moral as well as factual dimension. In the presence of uncertainty, morally asymmetric errors can be relevant to how much evidence is sufficient to accept a claim. An examination of inductive risks should make one wary of accepting that imposing injustices on marginalized populations is necessary for addressing climate change.

Note

1. The adage, 'Justice delayed is justice denied,' draws attention to this possibility.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Funding

The work was supported by the Social Sciences and Humanities Research Council of Canada [AWD-021159 SSHRC 2021].

ORCID

Daniel Steel  <http://orcid.org/0000-0003-4448-3748>
 C. Tyler DesRoches  <http://orcid.org/0000-0002-7318-6948>

References

Abram, S., Atkins, E., Dietzel, A., Jenkins, K., Kiamba, L., Kirshner, J., Kreienkamp, J., Parkhill, K., Pegram, T., & Santos Ayllón, L. M. (2022). Just transition: A whole-systems approach to decarbonisation. *Climate Policy*, 22(8), 1033–1049. <https://doi.org/10.1080/14693062.2022.2108365>

Betz, G. (2013). In defence of the value free ideal. *European Journal for Philosophy of Science*, 3(2), 207–220. <https://doi.org/10.1007/s13194-012-0062-x>

Biswas, S., Echevarria, A., Irshad, N., Rivera-Matos, Y., Richter, J., Chhetri, N., Parmentier, M., & Miller, C. (2022). Ending the energy-poverty nexus: An ethical imperative for just transitions. *Science and Engineering Ethics*, 28(4), 36. <https://doi.org/10.1007/s11948-022-00383-4>

Center for Countering Digital Hate. (2024). *The new climate denial: How social media platforms and content producers profit by spreading new forms of climate denial*. <https://counterhate.com/research/new-climate-denial/>

Ciplet, D., & Harrison, J. L. (2020). Transition tensions: Mapping conflicts in movements for a just and sustainable transition. *Environmental Politics*, 29(3), 435–456. <https://doi.org/10.1080/09644016.2019.1595883>

Douglas, H. E. (2009). *Science, policy, and the value-free ideal*. University of Pittsburgh Press.

Eckersley, R. (2016). Responsibility for climate change as a structural injustice. In T. Gabrielson, C. Hall, J. M. Meyer, & D. Schlosberg (Eds.), *Oxford handbook of environmental political theory* (pp. 346–361). Oxford University Press.

Fulvi, D., & Mintz-Woo, K. (2025). Assessing carbon dioxide removal technologies through transitional justice: Challenging the moral hazard argument. *Ethics, Policy and Environment*, 1–18. <https://doi.org/10.1080/21550085.2025.2567824>

Geels, F. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy*, 31(8–9), 1257–1274. [https://doi.org/10.1016/S0048-7333\(02\)00062-8](https://doi.org/10.1016/S0048-7333(02)00062-8)

Geels, F., Sovacool, B., Schwanen, T., & Sorrell, S. (2017). The socio-technical dynamics of low-carbon transitions. *Joule*, 1(3), 463–479. <https://doi.org/10.1016/j.joule.2017.09.018>

Gupta, J., Bai, X., Liverman, D. M., Rockström, J., Qin, D., Stewart-Koster, B., Rocha, J. C., Jacobson, L., Abrams, J. F., Andersen, L. S., McKay, D. A., Bala, G., Bunn, S. E., Ciobanu, D., DeClerck, F., Ebi, K. L., Gifford, L., Gordon, C., Hasan, S., & Gentile, G. (2024). A just world on a safe planet: A lancet planetary health–Earth commission report on Earth-system boundaries, translations, and transformations. *The Lancet Planetary Health*, 8(10), E813–E873. [https://doi.org/10.1016/S2542-5196\(24\)00042-1](https://doi.org/10.1016/S2542-5196(24)00042-1)

Harris, N., & Delanty, G. (2023). What is capitalism? Toward a working definition. *Social Science Information*, 62(3), 232–344. <https://doi.org/10.1177/05390184231203878>

IPCC. (2023). *Climate change, 2023: Synthesis report. Contribution of working groups I, II and III to the sixth assessment report of the Intergovernmental Panel on Climate Change* [Core Writing Team, H. Lee and J. Romero (eds.)].

Kaivanto, K., & Steel, D. (2019). Adjusting inferential thresholds to reflect nonepistemic values. *Philosophy of Science*, 86(2), 255–285. <https://doi.org/10.1086/702027>

Klein, N. (2014). *This changes everything: Capitalism vs. the climate*. Simon & Schuster.

Kortemäki, T., Timmermann, C., & Tribaldos, T. (2025). Just transition boundaries: Clarifying the meaning of just transition. *Environmental Innovation and Societal Transitions*, 55, 100957. <https://doi.org/10.1016/j.eist.2024.100957>

Levenda, A. M., Behrsin, I., & Disano, F. (2021). Renewable energy for whom? A global systematic review of the environmental justice implications of renewable energy technologies. *Energy Research and Social Science*, 71, 101837. <https://doi.org/10.1016/j.erss.2020.101837>

Lightfoot, S. (2016). *Global indigenous politics: A subtle revolution*. Routledge.

Liu, W., & Agusdinata, D. B. (2020). Interdependencies of lithium mining and communities sustainability in Salar de Atacama, Chile. *Journal of Cleaner Production*, 260, 120838. <https://doi.org/10.1016/j.jclepro.2020.120838>

MacAskill, W., Bykvist, K., & Ord, T. (2020). *Moral uncertainty*. Oxford University Press.

Malm, A. (2016). *Fossil capital: The rise of steam power and the roots of global warming*. Verso.

Malm, A. (2021). *How to blow up a pipeline: Learning to fight in a world on fire*. Verso.

McCauley, D., & Heffron, R. (2018). Just transition: Integrating climate, energy and environmental justice. *Energy Policy*, 119, 1–7. <https://doi.org/10.1016/j.enpol.2018.04.014>

Mercure, J.-F., Salas, P., Vercoulen, P., Semeniuk, G., Lam, A., Pollitt, H., Holden, P. B., Vakilifard, N., Chewpreecha, U., Edwards, N. R., & Vinuales, J. E. (2021). Reframing incentives for climate policy action. *Nature Energy*, 6(12), 1133–1143. <https://doi.org/10.1038/s41560-021-00934-2>

Milanovic, B. (2019). *Capitalism, alone: The future of the system that rules the world*. Harvard University Press.

Mintz-Woo, K. (2021). Will carbon taxes help address climate change? *Les Ateliers de L'éthique*, 16(1), 57–67. <https://doi.org/10.7202/1083645ar>

Mittiga, R. (2024). *Climate change as political catastrophe*. Oxford University Press.

Newell, P. (2021). *Power shift: The global political economy of energy transitions*. Cambridge University Press.

Newell, P. J., Geels, F. W., & Sovacool, B. K. (2022). Navigating tensions between rapid and just low-carbon transitions. *Environmental Research Letters*, 17(4), 041006. <https://doi.org/10.1088/1748-9326/ac622a>

Newell, P., & Paterson, M. (2010). *Climate capitalism: Global warming and the transformation of the global economy*. Cambridge University Press.

Parenti, C. (2013). A radical approach to the climate crisis. *Dissent*, 60(3), 51–57. <https://doi.org/10.1353/dss.2013.0047>

Patt, A. (2015). *Transforming energy: Solving climate change with technology policy*. Cambridge University Press.

Powers, M., & Faden, R. R. (2006). *Social justice: The moral foundations of public health and health policy*. Oxford University Press.

Romanello, M., Napoli, C. D., Drummond, P., Green, C., Kennard, H., Lampard, P., Scamman, D., Arnell, N., Ayeb-Karlsson, S., Ford, L. B., Belesova, K., Bowen, K., Cai, W., Callaghan, M., Campbell-Lendrum, D., Chambers, J., van Daalen, K. R., Dalin, C., Dasandi, N., & Dasgupta, S. (2022). The 2022 report of the Lancet Countdown on health and climate change: Health at the mercy of fossil fuels. *The Lancet*, 400(10363), P1619–P1654. [https://doi.org/10.1016/S0140-6736\(22\)01540-9](https://doi.org/10.1016/S0140-6736(22)01540-9)

Rudner, R. (1953). The scientist qua scientist makes value judgments. *Philosophy of Science*, 20(1), 1–6. <https://doi.org/10.1086/287231>

Satgar, V. (Ed.). (2018). *The climate crisis: South African and global democratic eco-socialist alternatives*. Wits University Press. <https://doi.org/10.18772/22018020541>

Scovronick, N., Anthoff, D., Dennig, F., Errickson, F., Ferranna, M., Peng, W., Spears, D., Wagner, F., & Budolfson, M. (2021). The importance of health co-benefits under different climate policy cooperation frameworks. *Environmental Research Letters*, 16(5), 055027. <https://doi.org/10.1088/1748-9326/abf2e7>

Sharpe, S. (2023). *Five times faster: Rethinking the science, economics, and diplomacy of climate change*. Cambridge University Press.

Solis, J. (2023, July 20). 9th Circuit says Thacker Pass lithium mine can proceed. *Nevada Current*. <https://nevadacurrent.com/2023/07/20/9th-circuit-says-thacker-pass-lithium-mine-can-proceed/>

Stanford Woods Institute for the Environment. (2023). *Collaboration agreement on large-scale U.S. solar development: Integrating climate, conservation and community*. https://woodsinstiute.stanford.edu/system/files/publications/Solar_Uncommon_Dialogue_Agreement_-101223.pdf

Stark, A., Gale, F., & Murphy-Gregory, H. (2023). Just transitions' meanings: A systematic review. *Society and Natural Resources*, 36(10), 1277–1297. <https://doi.org/10.1080/08941920.2023.2207166>

Status of Tribes and Climate Change Working Group. (2021). *Status of tribes and climate change report* (D. Marks-Marino, Ed.). Institute for Tribal Environmental.

Temper, L., Avila, S., Bene, D. D., Gobby, J., Kosoy, N., Billon, P. L., Martinez-Alier, J., Perkins, P., Roy, B., Scheidel, A., & Walter, M. (2020). Movements shaping climate futures: A systematic mapping of protests against fossil fuel and low-carbon energy projects. *Environmental Research Letters*, 15(12), 123004. <https://doi.org/10.1088/1748-9326/abc197>

United Nations. (2007). *United Nations declaration on the rights of Indigenous peoples*. https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf

Wallis, V. (2010). Beyond "green capitalism". *Monthly Review*, 61(9), 32. https://doi.org/10.14452/mr-061-09-2010-02_3

Wang, X., & Lo, K. (2021). Just transition: A conceptual review. *Energy Research and Social Science*, 82, 102291. <https://doi.org/10.1016/j.erss.2021.102291>

Whyte, K. (2019). Too late for indigenous climate justice: Ecological and relational tipping points. *Wiley Interdisciplinary Reviews: Climate Change*, 11(1), e603. <https://doi.org/10.1002/wcc.603>

Whyte, K. (2021a). Against crisis epistemology. In B. Hokowhitu, A. Moreton-Robinson, L. Tuhiwai-Smith, C. Andersen, & S. Larkin (Eds.), *Routledge handbook of critical indigenous studies* (pp. 52–64). Routledge.

Whyte, K. (2021b). Time as kinship. In J. Cohen & S. Foote (Eds.), *The Cambridge companion to environmental humanities* (pp. 39–55). Cambridge University Press.

Young, I. M. (2011). *Responsibility for justice*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195392388.001.0001>

Zimm, C., Mintz-Woo, K., Brutschin, E., Hanger-Kopp, S., Hoffmann, R., Kikstra, J. S., Kuhn, M., Min, J., Muttarak, R., Pachauri, S., Patange, O., Riahi, K., & Schinko, T. (2024). Justice considerations in climate research. *Nature Climate Change*, 14(1), 22–30. <https://doi.org/10.1038/s41558-023-01869-0>