# Introduction—Navigating the Wealth-Ecology Nexus

*Benedikt Pühmeyer, Inga Seiffert, Judith Terstriep & Stefan Gärtner*

In public debate, the ecological transformation is often cast as a purely technological or regulatory undertaking; yet mounting evidence shows that its trajectory is inseparable from the distribution and composition of wealth (Chancel & Rehm, 2025; Chancel et al., 2024; Drupp et al., 2024; Markkanen & Anger-Kraavi, 2019). In this volume, wealth is understood as a multidimensional construct encompassing material assets (income, property, infrastructure), social and cultural capital (networks, skills, norms), institutional entitlements (legal protections, political voice), and spatial endowments (locational advantages and ecosystem services). These resources shape household carbon footprints, exposure to climate risks, and, crucially, the capacity of social groups, ventures, and regions to influence transition pathways. The interrelationship is reciprocal: decarbonization policies revalue certain assets, create new rent streams, and reorder labor demand, thereby reorganizing the very structure of wealth. If these redistributive effects remain unacknowledged, climate policy could entrench existing inequalities under a "green" veneer, undermining both legitimacy and effectiveness. Contemporary ecological emergencies are tightly interwoven with patterns of social inequality; yet dominant techno-economic paradigms in climate research and policy still frame these challenges mainly as issues of technological efficiency, thereby obscuring their inherently distributional dimensions (Bärnthaler, 2024; Sovacool et al., 2025).

To orient the discussion, the volume is organized around three guiding research questions:

a) How do wealth and ecological transformation co-evolve?
b) Which mechanisms perpetuate or mitigate the outcomes that emerge from this co-evolution?

c) Which policy instruments, ownership arrangements, and social practices can foster a just ecological transition that is both scientifically sound and sensitive to diverse local contexts?

The chapters that follow illustrate these reciprocal dynamics empirically, identify where current debates oversimplify them, and outline the research questions that structure this volume.

Amid the mutually reinforcing dynamics of wealth accumulation and ecological change, a critical question is how—and to what extent—wealth inequalities interact with several aspects of a just transition[1] toward a sustainable future (Bocksch, 2022; Chancel et al., 2023). This analysis proceeds from the assumption that ownership confers decision-making power and that high incomes accelerate carbon emissions through elevated consumption (Chancel et al., 2025; de Arce & Mahia, 2023). Moreover, it is assumed that transformative measures designed to mitigate or adapt to climate change can themselves reconfigure socioeconomic structures, including patterns of wealth distribution (Gazzotti et al., 2021). In this regard Chancel et al. (2025, 4) observe:

> "The remaining carbon budget for 1.5°C is nearly exhausted, with disastrous consequences for ecosystems and human livelihoods. At the same time, the world is marked by extreme wealth inequality, with the wealthiest 10% of the global population owning three quarters of all assets."

Building on this stark observation, while the global inequality estimates by Chancel et al. (2025) are indispensable for framing the debate, they can be critiqued for relying on incomplete or 'patchy' data—particularly because the wealth of the wealthiest households can only be approximated through model-specific assumptions. Sensitivity analyses show that alternative model assumptions (e.g., different Pareto parameters) can lead to substantially divergent results, highlighting the considerable uncertainty in widely cited statistics such as "the top 10% own X% of global wealth". Reliable microdata are exceptionally scarce in many countries, especially in the Global South (Davies et al., 2017), and historical as well as regionally comparative studies confirm that wealth distributions are highly context-dependent (Biewen et al., 2025).

1 Following Stark et al. (2023), "just transition", as employed here, refers to a decarbonization process that fairly shares benefits and burdens through inclusive participation of affected workers, communities, and regions.

Even where data exists, significant cross-country welfare gaps persist. While some studies indicate that partial global convergence in disposable income (Oxford University, 2016), the globally weighted Gini coefficient falls only when economic growth in poorer countries outpaces that of richer ones and wage convergence occurs; at the same time, within-country inequality continues to rise in many nations (Chrisendo et al., 2024). This pattern suggests that globalization may have enabled more people to participate meaningfully in consumption, even if the overall inequality remains pronounced, thereby contributing to increased $CO_2$ emissions. To illustrate the point, from a global perspective, a large share of the German population would fall within the top 10% of global income distribution.

Importantly, economic status is not the sole axis along which climate responsibility and vulnerability are distributed. Gender, race, age, and indigeneity intersect with wealth to shape exposure to environmental hazards, access to adaptation resources, and political voice. Accounting for these intersectional inequalities is therefore essential for designing climate policies that are both effective and socially legitimate.

The picture is therefore less straightforward than it might appear: A common sentiment when social dynamics in tackling climate change are reflected critically can be summarized as follows: If most of the carbon emissions are generated by the richest of the rich people, why would the rest of society invest so much effort in lowering the remaining emissions? Should policy not instead focus on reducing the luxury emissions of the wealthiest decile? Though this perspective appears reasonable at first glance, it risks oversimplification and neglects key mechanisms. It fails to adequately capture the reciprocal relationship between the forces driving transformation and the systems being transformed. Recognizing this limitation underscores the urgent need for a more nuanced understanding of how the process of ecological transformation interacts with society's socio-economic structure.

Public understandings of these intertwined issues are not formed in a vacuum. Instead, discourse on ecological transformation and just transition crystallizes through the dynamic interaction among technological affordances (e.g., social media, algorithms), legal-institutional constraints (e.g., speech and competition law), market incentives (e.g., advertising revenue, green finance), and prevailing social norms. This co-productive process determines which voices are amplified, whose interests prevail, and how distributive questions are framed—gaps the present anthology sets out to address.

In so doing, this volume transcends simplistic dichotomies. It delves into the complexities of a society in transition, facing the uncertainty of a changing climate, struggling with unequal consumption patterns, and possessing disparate capacities to bear environmental harm. To discuss these pressing issues, the authors convened in Gelsenkirchen in September 2024 for a summer school on "Ecological transformation, space and the (re-)production of wealth" funded by the Volkswagen Stiftung. Pooling their disciplinary expertise, the participants facilitated interdisciplinary discourse, formulated new research questions, and pinpointed critical knowledge gaps within organized civil society. Through a series of transdisciplinary workshops with civil society representatives and dialogues among junior and senior researchers, the guiding questions outlined above were refined and operationalized.

## Charting the Journey Toward a Just Ecological Transition

Acknowledging the complexities inherent in achieving a just transition, the summer school convened researchers who presented the multifaceted challenges associated with the reciprocal dynamics of wealth and ecological transformation.[2] Participants discussed introducing a consumption ceiling to delineate a "sustainable consumption corridor" that simultaneously acknowledges a lower threshold for minimum provision (Bärnthaler, 2024; Gough, 2020). However, the proposal raises the question of who qualifies as "rich"—in other words, how should the ceiling be defined (Niehues, 2020). Moreover, it is necessary to strike a balance between the imperative of improving the economic position of many and the obligation to limit overall climate impact. This is particularly difficult as the so-called "Great Acceleration" of human activity, and its impact on Earth's systems is increasingly driven by the global effort to raise income and quality of life for the masses (Oswald et al., 2020; Steffen et al., 2015). This includes expanding essential infrastructure, housing, and healthcare worldwide to levels comparable to those in industrialized societies.

2 During a summer-school workshop, researchers met with civil-society representatives to hear their questions and knowledge gaps on wealth and ecological transformation. We thank Veronika Nickl (Ernährungsrat Bochum), Mark Rosendahl (DGB Emscher-Lippe), Simon Rahn (Attac Essen), Peter Köddermann (Umbaulabor Gelsenkirchen), and Heike Rößler (Quartiersmanagement Bochum) for their candid insights and productive dialogue. Their input grounded our theoretical debates in practical realities and highlighted new research avenues.

Taken together, these dynamics underscore the need for a holistic approach to ecological transformation that integrates the complex interplay of multiple scientific disciplines to effectively address the socio-ecological challenges of our time.

The participants of the summer school addressed these pressing questions, which inevitably entailed a critical reexamination of long-standing assumptions. For instance, because human dominance over the natural environment has long been considered a hallmark of progress, the task is to reconceptualize this notion into a more resilient, equitable, and climate-responsive—hence ecologically grounded—framework. Furthermore, the entrenched separation between economics and the social sciences warrants deeper scrutiny. Interrogating—and, where necessary, dismantling—the methodological barriers that insulate mainstream economics could reveal novel insights.

Addressing the consequences of climate change thus means addressing the structures that condition, accelerate, and are themselves affected by it. On an individual level, this includes psychological processes associated with climate (mis)information. On a structural level, it involves assessing both the relevance and ownership of infrastructures, as these factors shape political decisions on ecological policy. Finally, the summer school turned to the practical realm: Which local and regional policy instruments have proven effective, and what lessons can be drawn from existing examples?

## The Contributions

This anthology provides a nuanced understanding of a just transition toward a sustainable future by pooling diverse expertise to identify critical knowledge gaps. Drawing on interdisciplinary insights from economics, political science, sociology, philosophy, and psychology, it aims to improve the effectiveness of climate-related policy decisions. Further the book addresses the substantial gap between theoretical expectations and empirical evidence in the implementation of climate-related policy measures by proposing that a more comprehensive understanding of social, local and behavioral factors is essential for designing policies that are ecologically effective and socially acceptable. The ten chapters are each written to answer the questions that were formed during the summer school.

The volume targets scholars, policymakers, and civil society practitioners interested in the distributive dimension of ecological transformation. Orga-

nized in three parts—Diagnosis & Challenges, Challenging the Status Quo, and Reimaging Transformation—it combines conceptual clarifications, empirical analyses, and methodological reflections. Each chapter's disciplinary perspective differs, yet all contribute to the overarching research agenda introduced above, thereby ensuring thematic coherence.

In the following, the chapters are summarized.

## Part I—Diagnosis & Context

The opening section asks what conceptual and empirical baselines are required to understand the reciprocal dynamics between wealth and ecological transformation. Bringing together perspectives from political economy, environmental philosophy, and socio-metabolic research, the three chapters lay the definitional and normative groundwork for the remainder of the volume.

**Stefan Gärtner and Judith Terstriep** inaugurate the discussion by highlighting the definitional ambiguities that hamper research and policy on green transition. In Chapter 1, they disentangle four often conflated concepts in scholarly and public discourse: *structural change*, *transformative change*, *just transition*, and *transformative regional development*, and situate them in a cascading logic that connects each concept to specific measurement challenges, governance mechanisms, and demonstration projects. They conclude by proposing avenues for future research designed to capture the complexity of ecological transformation while remaining actionable for policymakers.

**Marlen Reinschke** then critically examines the Enlightenment's linear concept of progress, which emphasizes human mastery over nature, arguing for a necessary reconceptualization that effectively responds to current ecological realities and ethical imperatives (Chapter 2). Drawing on the complementary frameworks of Hans Jonas's ethics of responsibility and Bruno Latour's actor-network theory, she elaborates an ecologically informed concept of progress. She foregrounds an ethic of care and stewardship, promoting mutual entanglement and collaborative survival instead of traditional exploitative paradigms.

Taking a political science perspective, in Chapter 3, **Philipp Schepelmann** complements these discourses by interrogating the entrenched "rich versus poor country" dichotomy that underpins many debates on resource distribution. Using comparative resource-use data, he shows that the expansion of decent living conditions in middle-income countries has become a significant

driver of global environmental change. Recognizing this overlooked source of resource demand alters the equity calculus.

## Part II—Challenging the Status Quo

Where Part I sets the stage conceptually, Part II asks which structural and behavioral lock-ins impede a just ecological transition and how interdisciplinary perspectives can uncover "blind spots" in widely used policy instruments. The contributions draw on infrastructure studies, heterodox economics, political sociology, and environmental psychology to identify mechanisms that reproduce both carbon intensity and socio-economic inequality.

**Christian Hein** begins by demonstrating the relevance of infrastructures for an ecological transformation, as well as their role in shaping the social sphere (Chapter 4): Not only do they form the backbone of transportation and commerce, but they also encode societal priorities and lock in emission trajectories for decades. Because planning horizons are long and sunk costs enormous, he argues that infrastructures must be subjected to critical, anticipatory evaluation if they are to serve as levers of decarbonization rather than obstacles.

Economic analyses of carbon pricing are presented in the Chapters 5 and 6 **Michelle Alfers** and **Elias-Johannes Schmitt** show, through a detailed case comparison, that economics can benefit from insights from political science and sociology when evaluating real-world carbon pricing schemes. By exposing disciplinary blind spots—most notably regarding power relations, behavioral rebound effects, and administrative feasibility—they arrive at a more realistic appraisal of the instrument's effectiveness.

**Michelle Alfers** widens the lens yet further, arguing that policies promoting sustainability must integrate concerns about economic equality. She synthesizes three streams of literature to explicate that inequality (i) reinforces unsustainable consumption patterns, (ii) erodes social cohesion and institutional trust, and (iii) concentrates political power in constituencies least vulnerable to climate impacts. Without explicit redistributive design features, she concludes, green policy may inadvertently worsen both environmental and social outcomes.

**Marvin Fendt, Fabian Reinwarth and Peter Adriaan Edelsbrunner's** close Part II by investigating the individual-level drivers of credibility judgments regarding climate change information, specifically focusing on manipulative content (Chapter 7). Drawing on a survey of 675 participants, they distinguish

*mis*information (false or inaccurate content) from *dis*information (deliberately deceptive content), exploring how various factors influence discernment and sharing behavior. Their findings—conspiracy thinking undermines, while persuasion knowledge strengthens, credibility assessment—have direct implications for science communication and counter-disinformation strategies in climate policy.

## Part III—Reimagining Transformation

If Part II uncovers barriers, Part III explores how ownership models, governance arrangements, and forward-looking methodologies can be redesigned to realign wealth, power, and ecological imperatives. The chapters engage critical infrastructure studies, scenario planning, and commons theory to put forward actionable pathways for transformational change.

**Carlotta Terhorst** opens with an empirical analysis of the European Union's strategic turn toward hydrogen (Chapter 8). Treating infrastructures as socio-political objects, Terhorst shows how incumbent gas-pipeline owners leveraged their positional power—through lobbying, standard-setting, and control of technical knowledge—to shape policy, often prioritizing their assets over scientific consensus and delaying genuine transformation. This ownership-based carbon inequality leads her to the provocative question: "Who owns the present, owns the future?"

Acknowledging that climate change and digitalization pose challenges, especially for public administration, **Elias-Johannes Schmitt** then examines qualitative scenario planning as a governance tool in this context (Chapter 9). Using two cases from the city of Bochum—one conducted with local government, the other with the Smart City Innovation Unit—he illustrates how scenario workshops can integrate multiple stakeholders under conditions of deep uncertainty. The chapter notes both the method's capacity to open imaginative space and its limitations, including participation fatigue and the tendency to reproduce existing power hierarchies if facilitation is weak.

In Chapter 10, **Hannah Müller** concludes the volume with an integrative literature review of local energy commoning practices. She develops an analytical framework that links community activities, governance structures, and collective negotiation processes to broader outcomes of the energy transition. Synthesizing cases from Europe and the Global South, Müller argues that energy commons can contribute simultaneously to decarbonization and social

cohesion, but that their effectiveness depends on legal recognition, access to finance, and compatibility with municipal planning regimes.

Together, the three parts move the discussion from conceptual clarification to critical interrogation of existing structures to empirically grounded proposals for transformative change. Although many issues inevitably remain unresolved, the three parts collectively answer the summer school's guiding questions and offer empirically grounded pathways for a just ecological transition.

The book also highlights the need for further research to clarify how expanding wealth participation in the Global South can proceed without exacerbating climate change. Specifically, it calls for policy instruments—particularly in the Global North—that can preserve a high level of human well-being while simultaneously achieving climate targets. For example, higher energy prices or other climate policy measures must be calibrated so that particularly affected, lower-income groups receive compensation proportional to their income, thereby avoiding the emergence of new severe climate-damaging consumption patterns. Concurrently, research should identify which social and physical infrastructures can simultaneously enhance quality of life and mitigate climate impacts, and clarify how these measures can be utilized at local and regional scales.

By identifying established insights and illuminating the research frontiers that remain, the volume positions itself as a springboard for future interdisciplinary collaboration. Accordingly, it serves scholars, policymakers, and civil-society practitioners seeking to realign prosperity with planetary boundaries while attending to distributive justice.

## References

Bärnthaler, R. (2024). When enough is enough: Introducing sufficiency corridors to put techno-economism in its place. Ambio. 53, 960–969. https://doi.org/10.1007/s13280-024-02027-2.

Biewen, M., Glaisner, S., & Kleimann, R. (2025). The shape of the wealth distribution and differences in wealth inequality across Euro area countries. The Journal of Economic Inequality, 23(1), 1–25. https://doi.org/10.1007/s10888-024-09630-z

Bocksch, R. (2022). Der riesige CO2-Fußabdruck der Reichen. Retrieved November 27, 2025, from https://de.statista.com/infografik/26885/anteil-der-einkommensschichten-an-den-globalen-co2-emissionen/

Chancel, L., & Rehm, Y. (2025). Accounting for the carbon footprint of capital ownership advances the understanding of emission inequality. Climatic Change, 178(11). https://doi.org/10.1007/s10584-025-04044-w

Chancel, L., Bothe, P., Voituriez, T. (2023). Climate Inequality Report 2023, World Inequality Lab Study 2023/1. Retrieved November 29, 2025, from https://wid.world/document/climate-inequality-report-2023/

Chancel, L., Mohnen, C., Bothe, P., & Semieniuk, G. (2024). Climate Change and Wealth Inequality: A Literature Review and Numerical Insights. World Inequality Lab, Working Paper, 2024/27. Retrieved Novermber 29, 2025, from https://wid.world/document/climate-change-and-wealth-inequality-a-literature-review-and-numerical-insights-world-inequality-lab-working-paper-2024-27/

Chancel, L., Mohren, C., Bothe, P., Muti, S., & Villaverde, P. (2025). Climate Inequality Report 2025. Climate Change: A Capital Challenge. Why Climate Policy Must Tackle Ownership. World Inequality Lab Key Report 2025. Retrieved Novermber 29, 2025, from https://wid.world/www-site/uploads/2025/10/Climate_Inequality_Report_2025_Final.pdf

Chrisendo, D., Niva, V., Hoffmann, R., Masoumzadeh Sayyar, S., Rocha, J. C., Sandström, V., Solt, F., & Kummu, M. (2024). Income inequality has increased for over two-thirds of the global population. Research Square. https://doi.org/10.21203/rs.3.rs-5548291/v1

De Arce, R. & Mahía, R. (2023). Unbiasing the estimate of the role of income in carbon footprint of households: Analysis of the Spanish case as a a pilot study. Heliyon, 9(6), e16394. https://doi.org/10.1016/j.heliyon.2023.e16394

Drupp, M. A., Kornek, U., Meya, J. N., & Sager, N. (2024). The Economics of Inequality and the Environment. cesinfo Working Papers, 11036. Retrieved Novermber 29, 2025, from https://www.ifo.de/DocDL/cesifo1_wp11036.pdf

Gazzotti, P., Emmerling, J., Marangoni, G., Castelletti, A., Van der Wijst, K., Hof, A. & Tavoni, M. (2021). Persistent inequality in economically optimal climate policies. Nature Communications, 12(1), 3421. https://doi.org/10.1038/s41467-021-23613-y

Gough, I. (2020). Defining floors and ceilings: the contribution of human needs theory. Sustainability: Science, Practice and Policy, 16(1), 208–219. https://doi.org/10.1080/15487733.2020.1814033

Davies, J. B., Lluberas, R., & Shorrocks, A. F. (2017). Estimating the Level and Distribution of Global Wealth, 2000–2014. Review of Income and

Wealth, International Association for Research in Income and Wealth, 63(4), 731–759. https://doi.org/10.1111/roiw.12318

Markkanen, S., & Anger-Kraavi, A. (2019). Social impacts of climate change mitigation policies and their implications for inequality. Climate Policy, 19(7), 827–844. https://doi.org/10.1080/14693062.2019.1596873

Niehues, J., Stockhausen, M. (2020) Vermögensgrenzen: große gruppenspezifische Unterschiede, IW-Kurzbericht, Nr. 105, Köln

Oswald, Y., Owen, A. & Steinberger, J.K. (2020). Large inequality in international and intranational energy footprints between income groups and across consumption categories. Nature Energy 5, 231–239. https://doi.org/10.1038/s41560-020-0579-8

Oxford University (2016). Global income inequality down in relative terms, up in absolute sums. Retrieved November 30, 2025 from https://www.ox.ac.uk/news/2016-08-25-global-income-inequality-down-relative-terms-absolute-sums

Sovacool, B. K., Devine-Wright, P., Mander, S., Rowley, J., & Ryder, S. (2025). Realising a locally-embedded just transition: Sense of place, lived experience, and social perceptions of industrial decarbonisation in the United Kingdom. Global Environmental Change, 94. https://doi.org/10.1016/j.gloenvcha.2025.103051

Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., & Ludwig, C. (2015). The trajectory of the Anthropocene: The Great Acceleration. The Anthropocene Review, 2(1), 81–98. https://doi.org/10.1177/2053019614564785