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REVIEW ARTICLE

Conceptualizing transformative climate action: insights from sufficiency research

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ABSTRACT

This synthesis article conceptualizes transformative climate actions (TCAs) by reviewing social-science-based climate and transformation research, with a particular focus on (Western) sufficiency literature. It identifies six key characteristics of TCAs. First, they aim to transform social practices and provisioning systems to reshape society-nature relations, requiring a 'whole-of-government' approach and state capacity building for cross-sectoral coordination. Second, TCAs prioritize sufficiency, using efficiency and substitution as supporting strategies rather than parallel goals. Third, they empower collective agency, shifting the focus from individual behaviour changes to societal structures. Fourth, they presuppose a shift toward a multi-level planning framework that moves beyond market-based governance, integrating top-down steering with bottom-up, reflexive deliberation and experimentation. Fifth, TCAs recognize the distributional character of ecological crises, ensuring universal access to essential provisioning while curbing excess production and consumption through eco-social policy portfolios. Finally, they rely on broad alliances of diverse actors, grounded in everyday interests, with empowered multi-stakeholder platforms to challenge entrenched interests. In developing these six characteristics, the article bridges conceptual debates with real-world policymaking, highlighting key climate policy challenges while demonstrating how integrating these characteristics can drive deep societal transformations and support policymakers in designing holistic strategies for effective climate action.

Key policy insights

- A *whole-of-government* approach, underpinned by state capacity building, is crucial to break down policy silos and enable coordinated, cross-sectoral climate action across the socio-economic system.
- Climate policy should *prioritize sufficiency*, focusing on the *purpose of material and energy services* rather than just material/energy demand and supply. This requires integrating transdisciplinary and qualitative knowledge into decision-making.
- A *multilevel social-ecological planning framework* beyond market-based governance is essential for prioritizing climate change mitigation, adaptation, and well-being over profit.
- Climate policy should address *ecological crises as distributional crises*, using eco-social policy portfolios to set equitable consumption and production corridors.
- *Multi-stakeholder platforms with decision-making power* that enable people in their everyday roles – such as workers, neighbors, and parents – are key to challenging entrenched interests and moving beyond individual consumer behaviour.

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Introduction

This article contributes to a transformative conceptualization of climate actions. Climate research and policy often adhere to an ecomodernist paradigm (Stoddard et al., 2021), which limits climate actions mainly to green-growth-oriented efficiency and substitution strategies (Haas et al., 2023; Shaw, 2024). However, 'minor, marginal or incremental' improvements to existing structures are insufficient to bring about the 'fundamental change in society' (IPCC, 2022a, p. 171) that is required. Deliberate, directional, and transformative changes are needed to 'disrupt existing developmental trends' (IPCC, 2022d, p. 72) – from mindsets to socio-technical systems – while also addressing their uneven distributional impacts (Winkler & Jotzo, 2023). Building on Karl Polanyi's understanding of transformation as both evolutionary and disruptive, this article compares such deep societal change to a metamorphosis, a fundamental shift in *form* (Novy, 2022). Yet unlike the natural process of a caterpillar turning into a butterfly, contemporary long-term transformations are shaped – though not solely dictated – by present-day actions (Polanyi, 2001, p. 45), aptly referred to as 'deliberate transformations' (IPCC, 2022a, p. 172).

The analysis in this article is based on the growing evidence that ecomodernist approaches – primarily emphasizing efficiency (less input per output), substitution (shifting to low-carbon or renewable inputs), trust in future technologies, and, in their neoliberal variant, reliance on market allocation – have perpetuated extractivist, exploitative, and consumerist socioeconomic systems (Brand et al., 2021; Hickel et al., 2022). These approaches have failed to sufficiently curb the ongoing rise in GHG emissions and resource use (Haberl et al., 2020; Vogel & Hickel, 2023), while their assumption that sustained growth in production and consumption is essential for a good life overlooks the intuitive idea of sufficiency (absolute reductions of output): 'As one does more and more of an activity, there can be enough and there can be too much' (Princen, 2003, p. 43).

This article reviews sufficiency-oriented literature, primarily from Western sources and focused on the Global North, to reinterpret and reconceptualize the notion of transformative climate actions (TCAs) in response to its co-optation into an ecomodernist framework within mainstream climate research and policy. After outlining the methods, the Results section applies abductive reasoning to explore why most climate actions to date have lacked transformative potential. Building on these insights, the Discussion employs retroductive reasoning to identify key characteristics of TCAs. In this way, the Results section identifies (policy) challenges for TCAs from a sufficiency perspective, while the Discussion section examines how climate actions can be designed to address these challenges effectively and explores their policy implications. The final section concludes.

Methods: abductive narrative review and counterfactual analysis

The study follows a two-step approach. First, it conducts a narrative literature review (Sovacool et al., 2018), focused on critical, social-science-based research on social-ecological transformation (e.g. Brand et al., 2021; Pichler, 2023; Görg et al., 2017), with a particular emphasis on sufficiency literature. The review explores contrasting interpretations of sufficiency, emphasizing its contested nature, but does not aim to provide a systematic overview of these interpretations – such reviews are available in works like Fuchs et al. (2023), Jungell-Michelsson and Heikkurinen (2022), Zell-Ziegler et al. (2023), and Lage (2022). Instead, it focuses on deriving lessons for TCAs from a specific strand of sufficiency research. Burger et al. (2019, p. 6) refer to this strand as the 'radical' variant of sufficiency, which envisions an alternative to 'consumer society or growth-oriented economy' and is directed toward 'a change of the economic system' rather than primarily addressing 'energy-related household behaviour'. This variant also aligns with degrowth and post-growth research (Hickel et al., 2022; Kallis et al., 2025). Its conception of sufficiency is grounded in both causal and normative reasoning, deriving upper limits (beyond which lies 'too much') from planetary boundaries and social floors (below which lies 'not enough') from eudaimonic conceptions of wellbeing (see also Gough, 2023; Brand-Correa & Steinberger, 2017), with equity and justice integral to this framework. Key representatives of this sufficiency variant include scholars such as Ian Gough, Doris Fuchs, Thomas Princen, Yamina Saheb, Anders Hayden, Sylvia Lorek, and Joachim Spangenberg.

This variant serves as a lens to reinterpret and reconceptualize key challenges for TCAs throughout the narrative review, employing an abductive mode of inference to assign 'new meaning to already known phenomena' (Danermark et al., 2002, p. 91). This form of reasoning relies on creativity and imagination to shift 'from a conception of something to a different, possibly more developed or deeper conception of it' (Danermark et al., 2002, p. 91; Stigendal & Novy, 2018). To mitigate the risk of abduction becoming overly subjective, this article has been developed within the context of several collective research activities involving the co-authors. These include editing the book *Degrowth and Strategy*, a collaborative effort by numerous research-activists from the degrowth movement following the Degrowth conference in Vienna 2021 (Barlow et al., 2022), serving as editors and (coordinating) lead authors of the APCC Austrian Assessment Report on *Structures for Climate-Friendly Living*, an IPCC-like assessment process involving around 70 Austrian climate researchers that covered approximately 2,000 research articles (Görg et al., 2023), and leading the three-year research project *TRANSREAL–Transformative Realism for Effective Climate Actions*, a transdisciplinary project funded by the Austrian Climate Research Programme, which investigated transformative climate actions in rural areas.

To structure the narrative review, it is organized around six guiding questions, beginning with two 'what' questions. The first addresses the problem definition (*What* is the problem?) by examining assumptions, fundamental presuppositions, and underlying motivations, which are often shaped by subconscious, pre-analytic visions (Spash, 2024). The second 'what' question focuses on objectives (*What* is the intention?). The remainder of this section shifts to strategic considerations, as realizing the potential of TCAs depends on strategic agency (Barlow et al., 2022; Bärnthaler, 2024a; Savini, 2024). In this context, three questions are explored: 'how', 'which', and 'who'. These cover present-day agency (*How* to exercise agency for transformation?), governance (*How* to govern transformative change?), instruments (*Which* tools support transformation?), and alliances (*Who* are the collective actors enabling transformation?).

In the second step, building on insights from the abduction-guided literature review and the challenges identified, counterfactual analysis is employed to infer what makes TCAs possible. In this context, retroductive reasoning, a form of counterfactual thinking, uncovers the necessary (though not necessarily sufficient) characteristics that enable TCAs. This method considers what is currently absent – *transformative* climate actions – but imagines what might be possible if certain conditions are met (Danermark et al., 2002, p. 101; Buch-Hansen & Nielsen, 2020, p. 69). Retroduction moves from observable symptoms to unobservable causes, exploring the prerequisites and conditions underlying social relationships, actions, reasoning, and knowledge.

Results: key challenges for transformative climate actions

This section conducts a narrative literature review to analyse key challenges for TCAs, using the six guiding questions to frame the discussion. In doing so, it aims to bridge conceptual debates with practical, policy-level implications.

Pre-analytic vision: what is the problem?

Climate research and policy often frame environmental crises as external issues (*externalities*) – problems positioned 'outside' current socioeconomic systems (Spash, 2021). This perspective reinforces a separation between society and nature, adopting a 'solutionist' approach that treats the environment as something to be managed 'outside the human sphere' (Biermann, 2021, p. 63; Bonneuil & Fressoz, 2017). Consequently, environmental policies often remain siloed, with institutions focused on 'preserving nature' or addressing 'atmospheric issues' that, while interconnected with societal and economic systems, appear detached from them (Haas et al., 2023; Bärnthaler, 2024b). This mindset is particularly evident in climate change mitigation strategies that prioritize decarbonization through net-zero and carbon-neutrality goals, emphasizing green technologies to optimize *existing* systems or capture and store carbon *out there* (see also Malm & Carton, 2024; Anderson et al., 2020). Climate economists often reinforce this perspective, downplaying systemic socio- and political-economic issues by arguing that 'it's tempting to want to stick it [the problem] to the man', but 'we instead need to stick it to carbon' (quote by Gernot Wagner, cited in Harvey, 2023).

However, the epistemological separation between society and nature is increasingly challenged. For example, Yamina Saheb (2021) defines sufficiency as 'a set of policy measures and daily practices that avoid demand for energy, materials, land and water while delivering human wellbeing for all within planetary boundaries'. This definition of sufficiency, also adopted by the IPCC (2022c, p. 31, footnote 59), acknowledges that daily practices – our routinized behaviours shaped by interactions between materials (e.g. infrastructure), meanings (e.g. cultural norms), and competences (e.g. knowledge) (Shove et al., 2012) – are fundamental to society-nature relations and underpin social metabolism (Görg, 2011).[1] Overcoming a dualistic view on society and nature is crucial for TCAs, shifting the focus from treating environmental crises as externalities to recognizing them as inherent to the functioning of current socio-economic systems (Spash, 2021).

Policy challenge: In this context, a key policy challenge is the siloed approach to climate policies, often reflecting similar divisions in the sciences. Ministries frequently fail to integrate environmental considerations across all government sectors – whether focused on infrastructure, social affairs, agriculture, health, or economic planning. The absence of a 'whole-of-government approach' (Mazzucato et al., 2024) and insufficient state capacities to support it prevent climate policy from being positioned above individual ministries and sectors to coordinate efforts effectively. As a result, climate action remains fragmented, lacking the coherence needed to become a shared responsibility and failing to systematically recognize the inherent socio-economic system dimensions of ecological crises.

Objectives: what is the intention?

Neoliberalism has entrenched an ideology of 'endism', suggesting no alternative to the capitalist market economy, where individuals are primarily seen as sovereign market participant (Hartwig, 2007; Olsen, 2018). In this framework, consumption and investment preferences are viewed as subjective, beyond scientific or public debate. This 'ethical abstinence' (Jaeggi, 2018, p. 1ff) and preference neutrality form the foundation of neoliberal ecomodernism, with the belief that 'there is no arguing about tastes' (Stigler & Becker, 1977). Rationality is confined to optimizing means – markets and technology – without questioning the ends, and pricing does 'the work of morals' (Bowles, 2016). This focus on *how* resources are used, rather than *to what end*, reinforces conventional and conservative approaches. As Elizabeth Shove (2018, p. 786) notes, 'the *un-reflexive* pursuit of energy efficiency is problematic not because it does not work, … but because it *does* work … to sustain, perhaps escalate but never undermine, historically contingent but increasingly energy-intensive ways of life'.

While some sufficiency approaches adopt this preference model, others explicitly critique it (see also Lehtonen & Heikkurinen, 2022), arguing that efficiency is normatively deficient, as it lacks direction and purpose (Pirgmaier, 2017). In a world where empty-world conditions no longer apply, this has significant consequences: 'One can find efficiencies in harvesting so as to save trees just as well as one finds efficiencies to get every last bit of fiber off an acre of forest land' (Princen, 2003, p. 39, 2022). The same critique applies to substitution, as it aims to replace inputs without questioning the purpose of economic outputs. Therefore, a principle of 'sufficiency or enough' (Gough, 2023, p. 2) is necessary in the Anthropocene. Sufficiency prompts societies to discuss, deliberate, and set goals: How much is enough, and what is too much? What is necessary, and what is not? Where should priorities lie? A key challenge for TCAs is thus to define the direction of change, recognizing that neither efficiency nor substitution are societal objectives in themselves.

Policy challenge: Shifting the focus from efficiency and substitution ('means') to defining collective societal goals around sufficiency ('ends'[2]) presents a key challenge for climate policy: overcoming dominant techno-economic knowledge frameworks that prioritize optimization without questioning purpose. Commitments to a particular form of knowledge – and the rationalities and power relations that come with it – predetermine 'the kind of generalizations one can make about the present world, the kinds of knowledge one can have about it, and hence the kind of projects one can legitimately conceive for changing that present or for maintaining its form' (Shaw, 2024, p. 48). The structural favouring of techno-economic knowledge in climate policy – reinforced by climate science dominated by economic orthodoxy, naïve technological optimism, epistemological monocultures of dominant development paradigms, and elitism (Stoddard et al., 2021) – allows fossil-fuel companies to position themselves as key net-zero advisors. They advocate for 'technologically neutral' approaches while

framing themselves as 'key innovators' in implementing negative-emission technologies to *profitably* absorb part of their own *profitably* emitted CO_2 (Bärnthaler et al., 2024). Thus, a key policy challenge is integrating different forms of knowledge that foster transdisciplinarity, multiperspectivity, and qualitative approaches (Kvangraven & Kesar, 2023; Stoddard et al., 2021; Plank et al., 2021), and moving beyond empirical data to examine underlying structures, tendencies, and mechanisms that shape observable phenomena (Spash, 2024; Pirgmaier & Steinberger, 2019).

Agency: how to exercise agency for transformation?

Neoliberal ecomodernist approaches to agency are often based on the 'ABC' framework, which assumes that attitudes (A) drive behaviour (B), and behaviour leads to choices (C) (Shove, 2010). This individualistic perspective shifts the responsibility for change onto individuals, emphasizing personal and voluntary action toward 'eco-sufficient lifestyles' (Heindl & Kanschik, 2016, p. 1), such as 'voluntary simplicity' or eco-conscious consumerism (Alexander, 2013; Verfuerth et al., 2019).[3] However, in neoliberal capitalist societies, frugal behaviour – 'voluntary personal sacrifices' (Lorek & Fuchs, 2013, p. 39) – is largely the privilege of those who live in affluence (Linnanen et al., 2020, p. 10). This limits its potential for broader societal transformations (Alcott, 2008). Additionally, such an understanding of agency obscures how social norms evolve and how behaviour is shaped and sustained by structural conditions.

Rather than focusing primarily on individual behaviour, radical sufficiency variants consider sufficiency a social organizing principle (Princen, 2003, p. 44; Hayden, 2019). This recognizes that agency is both enabled and constrained by structural framework conditions, which shape practices (Lage, 2022, p. 15; Aigner et al., 2023b). In this context, Bob Jessop's (2005, p. 48) 'strategic-relational approach' emphasizes that structures pre-exist human agency and can be reproduced or transformed, but never created *ex nihilo*. These structures privilege certain forces, strategies, and interests over others, shaping which actions are possible (Jessop, 1999, p. 54f). As agency is structurally constrained, context-sensitive, and also structuring, transformative action must navigate existing structures, making a key challenge for TCAs the shift from voluntary individual behaviour to fostering transformative agency within a pre-structured world (Aigner et al., 2023a, p. 20).

Policy challenge: A key policy challenge in this context is developing and implementing regulations, as well as fostering environments and social-ecological infrastructures, that normalize practices of 'enough' rather than treating them as exceptions. Current climate policy often fixates on individual behaviour, exemplified by awareness campaigns that emphasize personal carbon footprints while neglecting the broader structural drivers of overconsumption. This focus on personal responsibility diverts attention from systemic issues, such as corporate influence in delaying climate action (Franta, 2022). Transformative climate policy requires a shift from shallow interventions such as choice editing to deeper structural changes – land use patterns, infrastructure planning, supply chains, and power structures – despite the fact that systemic resistance intensifies as interventions reach deeper into pre-existing structures (Meadows, 2008; Abson et al., 2017). Addressing these deeper leverage points holds the greatest potential to counteract the escalation of socially constructed need satisfiers and curb material- and energy-intensive production and consumption (Brand-Correa et al., 2020).

Governance: how to govern transformative change?

How change is organized depends on governance, defined as 'structures and practices involved in coordinating social relations' (Jessop, 2010, p. 108). Sustainability governance has largely been dominated by what is termed *weak sustainable consumption* governance (Lorek & Fuchs, 2013), a neoliberal ecomodernist approach characterized by three main features: a reliance on markets and undirected efficiency and substitution (*Objectives*), a focus on individual behaviour (*Agency*), and an assumption that market diffusion is the natural goal, with venture capital driving innovation and markets serving as the 'ultimate selection environment' (Hausknost & Haas, 2019, p. 2).

In contrast, radical sufficiency variants highlight the need for *strong sustainable consumption governance* (e.g. Lorek & Fuchs, 2013; Princen, 2005). This approach focuses on social organization (*Agency*) and social provisioning – the organization of livelihood around diverse socio-economic principles (Polanyi, 1977) – within the

framework of 'enough' (*Objectives*). Governing social provisioning challenges the rigid division between production and consumption and recognizes that much of contemporary provisioning occurs outside markets – through states, households, families, communities, or as commons (Spash, 2024). In this context, Jessop (2010, p. 114) identifies four modes of governance in a mixed economy: exchange, command, dialogue, and solidarity. While exchange occurs through markets and command involves top-down management, dialogue and solidarity – often tied to social innovations (Moulaert & Maccallum, 2019) – are based on reflexive deliberation, self-organization, and mutual support (Jessop & Sum, 2020). Governing social provisioning requires multilevel *meta*-governance, with a key challenge for TCAs being to balance the four modes – exchange, command, dialogue, and solidarity – across local to international scales (Jessop & Sum, 2020, p. 92).

Policy challenge: The market-based governance focus of climate policy tends to inhibit required disruptive changes (Hausknost & Haas, 2019). For example, Ursula von der Leyen's recent proposal for a nature credit system exemplifies this reliance on market solutions. By creating a marketplace for biodiversity, it deepens the financialization of nature, displacing planning and direct regulation while fostering the illusion that ecological problems can be solved through profiteering within market capitalism (Spash, 2015). Similarly, the dominance of de-risking private capital for the green transition reflects this market-centric approach, as public funds are used to shield private investors from risk, steering resources toward profit-generating ventures (Kedward et al., 2024). Brett Christophers (2024) further highlights how the renewable energy sector struggles to attract capital due to lower expected profits compared to fossil fuels, reinforcing continued investment in carbon-intensive projects. A key policy challenge, therefore, is to leverage governance mechanisms to redirect productive capacities from what is currently profitable to what is essential for climate change mitigation, adaptation, and well-being – a transition that requires some degree of economic democratization and greater public control over investment and divestment decisions (Steinberger et al., 2024; Hickel & Sullivan, 2024).

Instruments: which tools support transformation?

Neoliberal eco-modernism, rooted in a dualist pre-analytic vision (*Pre-analytic vision*), relies on market-based instruments like carbon pricing to internalize 'externalities' and on technological solutions, such as carbon capture and renewable energy technologies, to *fix the world around us*. These tools primarily aim to manage the environment in order to *avoid* fundamental changes in social practices. This narrow focus on markets and technological solutions has proven insufficient to meaningfully reduce global emissions or prevent the transgressing of planetary boundaries (Stoddard et al., 2021). Moreover, these climate-centred instruments are often 'technical in nature', failing to consider social needs (Middlemiss et al., 2023, p. 768). While sufficiency research critiques these approaches (Zell-Ziegler et al., 2021, p. 2), it can also sometimes overlook deeper social issues like inequality and unmet needs by focusing too narrowly on reduction (Lage et al., 2023). This limitation can weaken support for transformative policies (Aigner et al., 2023a), especially amidst growing public demands for security and stability.

In contrast, more holistic sufficiency approaches define 'enough' in two ways: ensuring the provision of essential need satisfiers (floors) and establishing limits on overproduction and overconsumption (ceilings) (Spengler, 2016; Gough, 2023, Fuchs et al., 2023; Hayden, 2019). As Saheb (2021) notes

> Sufficiency bridges the inequality gap by setting clear consumption limits to ensure a fair access to space and resources. There are two sets of limits for sufficiency: an upper and a lower boundary. The upper limit of sufficiency is the remaining carbon budget with its normative target for distributional equity. The lower limit of sufficiency is the provision of decent living standard's requirements. A decent living standard being a set of essential material preconditions for human well-being which includes housing, nutrition, basic amenities, health care, transportation, information, education, and public space.

This aligns with the emerging field of eco-social policy, which aims to integrate social and environmental goals (Bohnenberger, 2023, p. 329). Eco-social policies emphasize that achieving well-being for all within planetary boundaries requires both addressing inequalities and reducing affluence (Millward-Hopkins & Oswald, 2023; Wiedmann et al., 2020). The challenge for TCAs, therefore, is to move beyond eco-reductionist instruments and adopt eco-social approaches that prioritize equity and justice (Mattar et al., 2021, p. 1307) while enabling

both 'less and more' (Buch-Hansen & Nesterova, 2023; Bärnthaler et al., 2021; Büchs et al., 2023) – for example, reducing transportation and food miles while expanding local agriculture and food processing.

Policy challenge: In this context, climate policy needs to address ecological crises *as* distributional crises (Bärnthaler, 2024c), systematically tackling unequal contributions to and distribution of environmental impacts, disparities in access to protective resources, and ensuring equitable resource access. A major task for eco-social policies is to eliminate luxury emissions (Oswald et al., 2023; Cass et al., 2022) while avoiding regressive measures that disproportionately burden disadvantaged groups (Büchs et al., 2021). Redistribution through welfare state mechanisms is essential for ensuring equitable access to sustainable resources and reducing climate-induced inequalities (Bohnenberger, 2023; Hirvilammi et al., 2023). The key challenge, however, lies in shifting from a remedial and compensatory view of the welfare state – focused on mitigating distributional changes caused by climate policies – to a preventative model that proactively plays a transformative role in climate policy (Bohnenberger, 2023).

Alliances: who are the collective actors enabling transformation?

The eco-modernist focus on market-based governance (*Governance*) privileges certain actors and coalitions, primarily linking firms and consumer-citizens to initiatives like recycling, reducing, and reusing products (Bocken & Short, 2016; Heikkurinen et al., 2019), as often seen in slow fashion (Sarokin & Bocken, 2024) and the sharing economy (Bocken & Short, 2016). However, participation in these market-based alliances tends to depend on purchasing power – for instance, the ability to pay a premium price for sustainable goods (Linnanen et al., 2020, p. 10). These alliances, typically involving middle-class consumers and small, local businesses (Nesterova & Buch-Hansen, 2024, p. 89), face inherent limitations: neither group holds significant influence over broader systemic changes (Nesterova & Buch-Hansen, 2024, p. 92), and their engagement often fosters the illusion that ethical consumption fulfills their political role, potentially discouraging other forms of alliance-building or activism. As a result, corporations continue to expand production through efficiency gains while prioritizing short-term shareholder value – an approach fundamentally at odds with the need to reduce aggregate production (Bocken & Short, 2016, p. 57; Heikkurinen et al., 2019; Steinberger et al., 2024).

Challenging corporate power and its alliance with state institutions requires building multi-actor coalitions (Aigner et al., 2023b; Bärnthaler et al., 2024), much like strong sustainable consumption governance depends on integrating multiple modes of governance (*Governance*). Empirical evidence from European citizen assemblies indicates public support for sufficiency measures (Lage et al., 2023), while civil-society actors and social movements often spearhead potentially transformative efforts (Lorek & Fuchs, 2013; Schaffartzik et al., 2021). Other groups, including (un)paid workers in precarious conditions, also have an interest in a transition toward 'enough' (Dengler & Plank, 2024), and, together with trade unions (Keil & Kreinin, 2022), hold significant potential to bring rising living costs, social inequalities, and environmentally harmful, unhealthy, or meaningless work onto the political agenda (Kreinin & Aigner, 2021; Gerold et al., 2023; Barca & Leonardi, 2018). Multi-actor alliances must also engage certain sections of business (Aigner et al., 2023b), particularly SMEs and large enterprises in essential sectors that prioritize need satisfaction and long-term planning over short-term profit maximization (Nesterova & Buch-Hansen, 2024, p. 87; Bärnthaler et al., 2021). Public actors – such as policymakers, public-sector professionals, judiciary representatives, and political parties – are equally crucial to alliance-building, as their authority and mandate can enable public institutions to set binding rules and institutionalize mechanisms of restraint (Princen, 2022; Haderer, 2023; Aigner et al., 2023b). Sufficiency-oriented alliances must, therefore, overcome binary choices – such as civil society versus state actors or pragmatic professionals versus grassroots activists (Aigner et al., 2023a, p. 33) – by fostering 'bold and visionary yet pragmatic' agency (Buch-Hansen & Carstensen, 2024, p. 1), making broad coalition-building a key challenge for TCAs.

Policy challenge: Building broad alliances for transformative climate action requires addressing key policy and structural challenges. One major policy challenge is curbing the political and economic influence of fossil industries while simultaneously establishing frameworks that support workers and communities affected by the transition (Newell et al., 2021; Pichler et al., 2021). Beyond this, Bärnthaler et al. (2024) identify three interrelated challenges for alliance-building. First, coalitions must bridge short-term structural constraints with long-term post-capitalist horizons by incorporating both working-class groups and certain capital factions (see also

Newell, 2019). Second, transformative efforts must operate across multiple policy levels – local, national, regional, and international – ensuring engagement with multi-level institutions rather than being confined to local initiatives. Third, given the strong corporate influence on policymaking – through advisory groups, lobbying, and agenda-setting – democratizing governance requires creating institutional spaces where non-corporate actors can meaningfully shape regulations.

Discussion: characteristics of transformative climate actions

This section conducts a counterfactual analysis to identify the characteristics of TCAs that are necessary – but not necessarily sufficient – to address the key (policy) challenges outlined in the Results. Each subsection provides a policy-relevant example from the land-based mobility sector, demonstrating how the respective TCA characteristic can be applied in climate policy.

Understanding the problem: intervening in forms of life and provisioning systems

Pre-analytic vision identified overcoming the society-nature dualism as a key challenge for TCAs, drawing on practice-theoretical definitions of sufficiency. Social practices comprise materials, meanings, and competences that shape social metabolism and are articulated as *forms of life* and *provisioning systems*. Forms of life are bundles of practices that structure daily activities, perceived as normal and self-evident. Unlike transient lifestyles or fashions, they are expressed through collective institutions and political-economic frameworks, giving them public relevance (Jaeggi, 2018, p. 4). Provisioning systems shape how societies produce, distribute, and consume goods and services to meet their needs and wants, mediating between biophysical resource use and social outcomes. These systems encompass both material components (e.g. infrastructure, technology) and societal components (e.g. social norms, institutions, policies, labour relations) (O'Neill et al., 2018; Fanning et al., 2020; Bayliss & Fine, 2020). As the epistemological society-nature dualism constrains transformative potentials, forms of life and provisioning systems provide alternative frameworks for TCAs to understand and intervene in social-ecological realities.

 Policy implications – example of land-based mobility: Current policies prioritizing the electrification of private transport illustrate a failure to address forms of life and provisioning systems. A trans*form*ative approach requires polices that do more than replace engines and instead reshape the *form* of mobility, which involves transforming the provisioning systems that sustain it. This includes integrating new industries, planning regulations, and skills training through cross-sectoral coordination led by a planning agency that dismantles policy silos. For instance, disruptive industrial policy can reshape the car industry (Pichler et al., 2021), penalizing business models centred on private car ownership and the increasing size of vehicles (Keil & Steinberger, 2024). Transport policies and spatial planning should reduce car dependency by making car ownership less desirable – through car-free zones, revised traffic regulations, higher taxes on SUVs, and substantial public transport subsidies – while simultaneously limiting new road infrastructure and prioritizing compact, mixed-use neighbourhoods that support walking, cycling, and accessible public services (Mattioli et al., 2020; Brand-Correa et al., 2020; Arnz & Krumm, 2023). Cultural and educational policies should shift perceptions of cars as status symbols – through education, outreach, and advertising bans (Theine & Regen, 2023) – while promoting and building skills for shared, multi-modal travel as both sustainable and socially desirable. This could be supported by policies requiring mandatory multi-modal transport training for schools, spatial planners, and developers, as well as mandating company investments in localized shared workspace infrastructure.

Defining objectives: prioritizing judgmental rationality

Objectives emphasized that while efficiency and substitution are necessary, they are not societal objectives in themselves; therefore, TCAs require the prioritization of 'enough' to ensure that efficiency and substitution are directed toward meaningful ends. This shift necessitates replacing the current primacy of instrumental rationality, which focuses on optimizing means (Sachs, 2023), with judgmental rationality, which evaluates and decides between alternative ends (Bhaskar, 1998). To achieve this, scientifically informed collective debates

on alternative development paths are essential, recognizing that not all configurations of provisioning systems and forms of life are equally effective in satisfying needs universally within planetary boundaries (Brand-Correa et al., 2020; Jaeggi, 2018). Prioritizing judgmental rationality means focusing on the purpose of actions rather than mere efficiency and substitution (Bärnthaler, 2024c). As Peter Ulrich (2020, p. 120, own translation) observes, efficiency [and substitution] only become rational when serving meaningful goals, as 'nothing is more irrational' than 'wasting scarce resources and human lifetime, however efficiently [or environmentally improved], on the realization of pointless purposes'. Therefore, for climate action to be transformative, efficiency and substitution must be mobilized *in service of* sufficiency.

Policy implications – example of land-based mobility: Electrifying existing mobility practices focuses on improving the means of mobility ('how do we move around') without addressing its purpose. To what end are people mobile? What needs does mobility satisfy? Addressing these questions requires moving beyond techno-economistic knowledge to explore desired service outcomes. TCAs, therefore, focus on the purpose of energy and material *services* – such as accessing groceries, healthcare, childcare, or workplaces – rather than narrowly on energy and material demand and supply, such as litres of gasoline (Fuchs, Steinberger, et al., 2021; Kalt et al., 2019; Brand-Correa et al., 2020). This means *first* addressing the purpose of mobility and determining how these needs can be met with less travel before meeting the remaining travel requirements with more environmentally friendly inputs and greater efficiency. Supported by transdisciplinary research, transport and economic policies should prioritize reducing the need for travel by promoting local economies, decentralizing essential services, and implementing regulations and incentives for businesses to relocate closer to residential areas and establish decentralized workspaces (Fuchs, Lorek, Mamut, & Rossmoeller, 2023; Arnz & Krumm, 2023). Building on this, policies should systematically integrate the Avoid-Shift-Improve model (Creutzig et al., 2018) into transportation planning, prioritizing measures that *avoid* the need for travel – such as zoning laws promoting mixed-use developments – before *shifting* mobility toward more sustainable modes of transport, like expanding public transit networks, and finally *improving* substitution and efficiency of existing technologies, such as promoting electric vehicle adoption.[4]

Exercising transformative agency: empowering collectives

Agency highlighted the challenge of moving beyond a focus on individual behaviour in TCAs, raising a key question: what kind of collective agency is needed to drive transformative change within existing structures? As Schafran et al. (2020, p. 1) explain, agency – the capacity to act – is always realized within systems that are collectively (re)produced. For example, the capacity for mobility depends on a system that provides mobility, just as the capacity to live in a dwelling relies on a housing system. These systems predate individual agency and are collectively produced, meaning no one creates or sustains them alone (Schafran et al., 2020, 2). Collective provisioning, in this sense, refers to systems larger than individuals or households and is not tied to any specific institutional form (e.g. communal, state-run). Collective provisioning 'is a fact, not a normative assumption or an ideological stance' (Schafran et al., 2020, 15). People's capacities to act – and, by extension, to shape their lives – is a product of collective systems, making their reproduction or transformation 'a primary purpose of politics' (Schafran et al., 2020, 5). Schafran et al. (2020) describe the ongoing negotiation of these systems – shaped by social norms, regulations, and laws – as a 'spatial contract'. These contracts are plural and context-specific, embedded in pre-existing and strategically selective systems shaped by prior negotiations and struggles. Therefore, TCAs require collective, context-specific agency to reshape the structural conditions of these systems (see also Heyen & Wicki, 2024). This form of agency must activate various modes of governance (*Governing transformation*), instruments (*Instruments for transformation*), and coalitions (*Building alliances*). The resulting policy implications will be outlined in the following subchapters.

Governing transformation: strengthening command, dialogue, and solidarity in relation to market exchange

Governance highlighted the importance of multi-level meta-governance for TCAs, emphasizing the need to balance exchange, command, dialogue, and solidarity. Achieving such a balance requires challenging the

dominance of market exchange, which has commodified entire spheres of life and subordinated social reproduction – rooted in dialogue and solidarity (e.g. reciprocity and care) as well as command (e.g. welfare state redistribution) – to capitalist production, thereby sustaining capital accumulation at the expense of its social-ecological foundations (Bärnthaler & Dengler, 2023; Fraser, 2022). Countering this calls for strengthening governance mechanisms of command, dialogue, and solidarity, enabling a shift in how social relations are coordinated. Top-down command plays a crucial role in redistributing societal resources and enforcing binding rules amidst diverse sectional interests. To ensure democratic legitimacy and context-sensitivity, 'top-linked' approaches seek to integrate command with deliberative and participatory democracy, engaging diverse stakeholders in decision-making and implementation (Buch-Hansen & Carstensen, 2024; Novy et al., 2024; Gidin, 2018; Bärnthaler, 2024b). Strengthening these mechanisms helps address public mistrust in climate policy governance (Wamsler et al., 2023, p. 840). Conversely, bottom-up dialogue and solidarity foster creativity, innovation, and social bonding. However, to avoid localist traps, 'bottom-linked' approaches aim to connect these local innovations and movements to broader networks that pool resources, offer collective political representation, and cooperate with public policy institutions (Moulaert & Maccallum, 2019). TCAs must thus draw on both top-linked and bottom-linked approaches to develop new governance models.

Durand et al. (2024) outline the contours of such a governance model, describing a multilevel social-ecological planning architecture designed to transition toward a sufficiency-oriented economy through iterative decision-making (see Figure 1). This framework operates across various scales, granting each level relative autonomy while ensuring alignment with broad social-ecological constraints set by higher levels. The principle of subsidiarity allows local entities to experiment and self-organize, while feedback loops between levels facilitate coordination and adaptability. Democratic bodies, involving diverse stakeholders, guide priority-setting and decision-making to ensure inclusive, science-informed planning. Execution is managed by executive bodies, which operationalize and monitor adherence to plans through mechanisms like carbon accounting and resource allocation. By promoting cross-level collaboration, the planning system remains flexible and dynamically responsive to ecological and social realities.
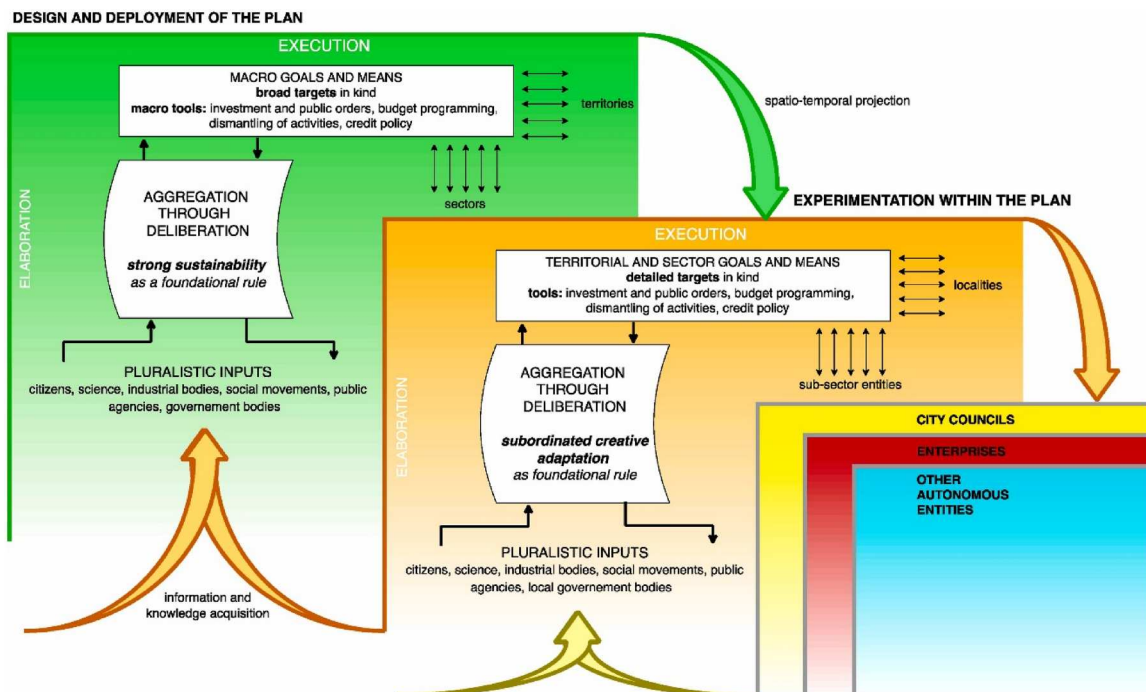

Figure 1. A fractal architecture of multilevel social-ecological planning (from Durand et al., 2024).

Policy implications – example of land-based mobility: Such a multilevel ecological planning architecture shifts away from market-biased meta-governance, which treats mobility as a commodity driven by profit motives – exacerbating issues like mobility poverty, overproduction (e.g. increasing vehicle sizes), accumulation by dispossession (e.g. extractive expansion for critical raw materials), and financialization (e.g. loans and leases) (Keil & Steinberger, 2024). Instead, it adopts an approach that strengthens command, dialogue, and solidarity, ensuring that local, regional, and national entities retain autonomy while aligning with overarching social-ecological limits set by higher governance levels. Within this architecture, top-linked governance establishes regulatory frameworks and constraints – such as land use, traffic regulations, and targets for reducing fossil-fuel dependency – shaping macro-level structures, while democratic bodies at each scale bring together stakeholders – including scientific experts, community members, transport workers, and end-users – to shape priorities. Bottom-linked approaches, in parallel, facilitate local experimentation with sustainable alternatives, allowing communities to develop and test innovative mobility approaches tailored to their needs while remaining aligned with broader social-ecological constraints and priorities. The interaction between these levels enables iterative processes of exnovation – phasing out unsustainable practices, for example, through pilot projects for car-free zones – and innovation, such as micro-mobility services (Novy et al., 2022; Arnz & Krumm, 2023), while feeding insights back to higher governance bodies for cross-level learning and adaptation.

Instruments for transformation: ensuring universal essential provisioning and curbing excess

Instruments highlighted the challenge of moving beyond eco-reductionist instruments toward eco-social approaches that integrate 'less and more'. For example, reducing the need for travel can increase mobility. A corridor-oriented policy framework, endorsed by the IPCC (2022b, p. 514), establishes minimum standards for a good life while setting maximum limits on the use of natural and social resources (Fuchs, Sahakian, et al., 2021; Gough, 2020). The concept of corridors represents the space between these boundaries, with the aim of progressively narrowing this space. This is achieved by raising the floor to meet everyone's basic needs ('more') while simultaneously lowering the ceiling to curb wasteful or harmful overproduction and overconsumption ('less') (Bärnthaler, 2024c). Determining what is necessary and what constitutes excess – or how much is enough – is inherently contested. Addressing this requires, first, new governance models (*Governing transformation*) and, second, an ongoing recalibration process that both emerges from and challenges existing cultural norms around need satisfaction. Governance models must allow for periodic adjustments of minimum and maximum limits based on social and ecological developments, evolving knowledge, and shifting value systems (Fuchs, Sahakian, et al. 2021, p. 35). Additionally, they must account for global emission changes and region-specific progress, ensuring that actions in one region also prompt adaptive measures elsewhere. This approach prioritizes reducing inequalities by shifting production and consumption away from goods and services that fail to meet needs or harm social-ecological systems toward sustainable essential goods and services, guaranteeing universal access. A corridor-oriented framework can effectively guide the design and implementation of diverse eco-social policy instruments by upholding principles such as decommodification (public control of essential services), prevention (addressing systemic issues before harm occurs), and social licencing (imposing eco-social conditionalities on private providers) (Bärnthaler & Gough, 2023). By emphasizing in-kind public provisioning, this approach can reduce excess, inequality, and material insecurity while meeting needs with lower energy requirements (Vogel et al., 2021). Fostering universal essential provisioning while reducing excess production and consumption is thus a key characteristic of TCAs.

Policy implications – example of land-based mobility: Corridor-oriented policymaking addresses both unmet mobility needs (e.g. lack of affordability and access to public transport) and excessive mobility (e.g. SUVs) (Lucas et al., 2021). Mobility poverty limits social participation for low-income groups, while SUVs exemplify high-carbon, highly income-elastic lifestyles (Oswald et al., 2020). The surge in SUV production has not only offset carbon efficiency gains of the entire car fleet (IEA, 2019) but also appropriates limited public space, particularly in urban areas. To address these challenges, a mix of policy instruments is necessary. *Regulatory instruments* could guarantee accessible public transport and essential local amenities while banning car advertisements and restricting SUV use in cities. *Fiscal instruments* could impose high taxes on SUV manufacturers and other producers driving vehicle-size growth while subsidizing public transport tickets and bicycles purchases. *Economic instruments* could

introduce progressive parking fees based on vehicle size and type. *Educational instruments* could improve public understanding of mobility poverty, emphasize the unequal social and ecological impacts of car-centric transport, and build shared multi-modal travel skills. *R&D instruments* could support transdisciplinary research on equitable mobility systems while advancing shared electrified mobility and the development of small electric vehicles. A corridor-oriented approach thus requires a comprehensive policy portfolio. As Arnz and Krumm (2023, p. 8) argue, 'Mobility hubs at city borders show no effect, unless accompanied by car-free inner cities; cycling highways are not as attractive without the ban of car advertisement'. Furthermore, *decommodification* could support fare-free, high-quality public transport, while *prevention* efforts could promote active mobility, easing pressures on health systems. *Social licencing* could require private car-sharing and ride-pooling providers to expand services to peripheral areas in exchange for operating rights in central districts.

Building alliances: activating everyday interests

Alliances emphasized the need for broader, unconventional coalitions. To enable their formation, these coalitions can take the form of 'strategic assemblages' (Barlow, 2022, p. 85) which rely on flexible 'mental maps' (Barlow, 2022, 86) to rediscover universal needs as a foundation for collective action (Bärnthaler, 2024a). These needs are met through essential provisioning systems – such as housing, care, energy, and health – which can serve as the basis for such alliances. Ensuring affordable, accessible, and high-quality essential provisioning addresses universally shared needs and improves material living conditions. By focusing on such everyday concerns, these alliances can transcend traditional political and socio-economic divides (Bärnthaler, 2024b). When backed by appropriate regulations, these efforts can also benefit the large workforce in essential sectors while enlisting companies and capital factions committed to patient, socially licenced, and long-term investment in decarbonized essential provisioning systems. Strengthening these systems and forging alliances to support them is crucial for fostering in-kind provision and collective consumption as integral to sustainable welfare (Gough, 2022). Moreover, such alliances can help overcome public opposition, which often obstructs the implementation of stringent climate policies (Drews & van den Bergh, 2016).

Policy implications – example of land-based mobility: The Yellow Vest movement in France illustrates a missed opportunity to build broader social-ecological alliances. Its focus on mobility issues unfolded in parallel with the Climate Marches, yet no significant effort was made to convergence the two, ultimately failing to catalyse a coalition for transforming French mobility policies. Despite substantial barriers (the analysis of which is beyond the scope of this paper), alliances can be strengthened by empowering people in their everyday roles – as citizens, workers, neighbours, and parents – rather than solely as consumers. Subsidiarity-driven, community-led initiatives can empower residents to shape their environments, with neighbourhood redesign yielding multiple co-benefits, such as improved health, revitalized local economies, and enhanced access to essential services like child-friendly urban spaces (Arnz & Krumm, 2023; Karlsson et al., 2020; Svanda & Zech, 2023). These efforts can also align with communities' material interests by lowering living costs through reduced car dependency while supporting caregivers who make frequent short trips for tasks such as grocery shopping and school runs (Cohen, 2021, p. 12). Social movements play a crucial role at both local and wider scales, experimenting with new practices, raising awareness, and resisting socially and ecologically destructive projects (Schaffartzik et al., 2021). By acting as feedback mechanism within governance systems, these movements hold decision-makers accountable and expand the realm of what is considered possible. Progressive trade unions and workers also play a vital role in shifting the narrative from defending outdated car industries to advocating for a just transition centred on accessible public transport for all (Brand & Niedermoser, 2019). Meanwhile, businesses and mobility service providers can support these efforts while benefiting economically from the shift to sustainable transport systems and local economic revitalization. Climate policy should thus actively support multi-stakeholder platforms, such as transformation councils, to mobilize potential alliances and integrate them into decision-making processes. This can empower people in their diverse everyday social roles, fostering critical autonomy – the capacity to critically reflect, assess, question, and act upon given circumstances – while laying the foundation for new alliances.

Conclusion

This article advanced the understanding of TCAs, their challenges, and climate policy implications through a two-step methodology. First, a narrative literature review using an abductive approach identified key challenges for TCAs, drawing on critical social-science-based climate and transformation research, with a particular focus on sufficiency literature. Second, a retroductive approach identified the characteristics TCAs need to address these challenges – characteristics that are necessary but not necessarily sufficient. While our research activities, referenced sources, and analysis are based in the Global North, we cautiously suggest that the six identified characteristics may have universal relevance, as they address broader tendencies of globalized capitalism. However, they must be adapted, interpreted, and evaluated in conjunctural (see Eckersley, 2020), context-specific, and decolonial frameworks. A summary of these characteristics is provided in Table 1.

While no single blueprint for TCAs exists, the six identified characteristics likely enhance the transformative potential of climate actions. This framework can be applied and expanded through future research, tailored to

Table 1. Questions, challenges and characteristics of TCAs.

	Topic	TCA question and challenge (Results section)			TCA characteristic (Discussion section)	
		Key question	Key challenge	Policy challenges	Characteristic	Climate policy implications
1	Pre-analytic vision	What is the problem?	Recognizing ecological crises as inherent to the functioning of current socio-economic systems.	Adopting a 'whole-of-government' approach to break down policy silos and enable coordinated planning.	Intervening in forms of life and provisioning systems.	Strengthening state capacity for cross-sectoral interventions to address socio-economic systems.
2	Objectives	What is the intention?	Defining the direction of change toward sufficiency ('enough'), recognizing that efficiency and substitution are means, not ends.	Expanding knowledge beyond techno-economic frameworks through transdisciplinarity, multiperspectivity, and qualitative approaches in climate policy.	Mobilizing efficiency and substitution (instrumental rationality) in the service of sufficiency (judgmental rationality).	Refocusing from energy and material demand/supply to the *purpose of underlying services*, requiring greater social science integration in climate policy.
3	Agency	How to exercise agency for transformation?	Shaping structures, rather than relying on voluntary individual action within these structures.	Redirecting climate policy from individual behaviour change to systemic leverage points, such as corporate power and social norms.	Empowering collective agency to reshape structures.	*See points 4, 5, and 6 below for further elaboration.*
4	Governance	How to govern transformative change?	Realizing the potential of multi-level *meta*-governance.	Shifting from market-based governance to democratic planning to redirect productive capacities from profit-driven to social-ecological priorities.	Combining top-linked and bottom-linked approaches at all levels.	Establishing frameworks to transition from current governance setups to multilevel social-ecological planning.
5	Instruments	Which tools support transformation?	Implementing eco-social instruments to overcome eco-reductionism.	Addressing ecological crises *as* distributional crises and shifting from a compensatory to a preventive welfare state.	Ensuring universal essential provisioning while curbing excess production and consumption.	Developing eco-social policy portfolios to establish sector-specific production and consumption corridors.
6	Alliances	Who are the collective actors enabling transformation?	Building broad alliances to strengthen collective power and challenge incumbent interests.	Curbing fossil industry influence while supporting workers, fostering cross-class alliances, and democratizing policymaking across all levels.	Forming power-sensitive alliances *based on everyday interests*.	Establishing multi-stakeholder platforms that empower people in their social everyday roles beyond just consumers.

specific actions and (cross-)sectoral interventions, and used to analyse specific practices.[5] In its current form, it provides a foundation for challenging climate research that lacks – or neglects – a holistic approach.

However, with likely less than a decade to act decisively, we must move beyond calls for future research and focus on concrete, scalable actions to drive systemic change. Our findings underscore the need for a whole-of-government approach, backed by state capacity building, to break down policy silos and enable coordinated action across the socio-economic system. Strategic, multilevel planning is essential for prioritizing climate change mitigation, adaptation, and well-being over profit, addressing ecological crises as distributional challenges (through equitable production and consumption corridors supported by eco-social policies), and ensuring efficiency and substitution serve sufficiency. Integrating sufficiency principles into decision-making, in turn, demands qualitative and transdisciplinary knowledge to engage with the purpose of material and energy services. At the same time, empowering multi-stakeholder platforms that enable people in their everyday roles – such as workers, neighbors, and parents – is key to challenging entrenched interests and shifting the focus beyond individual (consumer) behaviour. As climate policy risks being sidelined by narrow competitiveness agendas and urgent security concerns, these shifts are critical to seizing the rapidly closing window for transformative action.

Notes

1. Definitions of sufficiency grounded in s*ocial practice theory* are often articulated through so-called 'Policymaking' and 'Social-Movement' variants of sufficiency (Lage, 2022).
2. Viewing sufficiency as an 'end' does not preclude its role as an organizing principle. As an end, sufficiency aims to be institutionalised as both an enabling and constraining principle, establishing living well within ecological limits – defining social-ecological floors and ceilings.
3. See also: 'Bottom-Up Approach' to sufficiency in Lage (2022); also: Jungell-Michelsson and Heikkurinen (2022, p. 7).
4. All *avoid*-measures are sufficiency measures, while some *shift*-measures also align with sufficiency, and others are considered substitution measures (Arnz et al., 2024).
5. See also Ivanova & Büchs, 2023, who apply similar characteristics to radical sharing.

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Disclosure statement

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References

Abson, D. J., Fischer, J., Leventon, J., Newig, J., Schomerus, T., Vilsmaier, U., von Wehrden, H., Abernethy, P., Ives, C. D., Jager, N. W., & Lang, D. J. (2017). Leverage points for sustainability transformation. *Ambio*, *46*(1), 30–39. https://doi.org/10.1007/s13280-016-0800-y

Aigner, E., Görg, C., Madner, V., Muhar, A., Posch, A., Steininger, K. W., Bohunovsky, L., Essletzbichler, J., Fischer, K., Frey, H., Haas, W., Haderer, M., Hofbauer, J., Hollaus, B., Jany, A., Keller, L., Krisch, A., Kubeczko, K., Miess, M., … Wieser, H. (2023a). Summary for Policymakers. In C. Görg, V. Madner, A. Muhar, A. Novy, A. Posch, K.W. Steininger, & E. Aigner (Eds.), *APCC Special Report: Strukturen für ein klimafreundliches Leben* (pp. 19–33). Springer.

Aigner, E., Görg, C., Madner, V., Novy, A., Steininger, K. W., Nabernegg, S., & Wiedenhofer, D. (2023b). Einleitung: Strukturen für ein klimafreundliches Leben. In C. Görg, V. Madner, A. Muhar, A. Novy, A. Posch, K. W. Steininger, & E. Aigner (Eds.), *APCC special report: Strukturen für ein klimafreundliches Leben* (pp. 173–194). Springer.

Alcott, B. (2008). The sufficiency strategy: Would rich-world frugality lower environmental impact? *Ecological Economics*, 64(4), 770–786. https://doi.org/10.1016/j.ecolecon.2007.04.015

Alexander, S. (2013). Voluntary simplicity and the social reconstruction of law: Degrowth from the grassroots up. *Environmental Values*, 22(2), 287–308. https://doi.org/10.3197/096327113X13581561725356

Anderson, K., Broderick, J. F., & Stoddard, I. (2020). A factor of two: How the mitigation plans of 'climate progressive' nations fall far short of Paris-compliant pathways. *Climate Policy*, 20(10), 1290–1304. https://doi.org/10.1080/14693062.2020.1728209

Arnz, M., Göke, L., Thema, J., Wiese, F., Wulff, N., Kendziorski, M., Hainsch, K., Blechinger, P., & von Hirschhausen, C. (2024). Avoid, shift or improve passenger transport? Impacts on the energy system. *Energy Strategy Reviews*, 52, 101302. https://doi.org/10.1016/j.esr.2024.101302

Arnz, M., & Krumm, A. (2023). Sufficiency in passenger transport and its potential for lowering energy demand. *Environmental Research Letters*, 18(9), 094008. https://doi.org/10.1088/1748-9326/acea98

Barca, S., & Leonardi, E. (2018). Working-class ecology and union politics: A conceptual topology. *Globalizations*, 15(4), 487–503. https://doi.org/10.1080/14747731.2018.1454672

Barlow, N. (2022). Taking stock: degrowth and strategy so far. In N. Barlow, L. Regen, N. Cadiou, E. Chertkovskaya, M. Hollweg, C. Plank, M. Schulken, & V. Wolf (Eds.), *Degrowth & strategy: How to bring about social-ecological transformation* (pp. 72–92). International: Mayfly Books.

Barlow, N., Regen, L., Cadiou, N., Chertkovskaya, E., Hollweg, M., Plank, C., Schulken, M., & Wolf, V. (Eds.). (2022). *Degrowth & strategy: How to bring about social-ecological transformation*. International: Mayfly Books.

Bärnthaler, R. (2024a). Problematising degrowth strategising: On the role of compromise, material interests, and coercion. *Ecological Economics*, 223, 108255. https://doi.org/10.1016/j.ecolecon.2024.108255

Bärnthaler, R. (2024b). Towards eco-social politics: A case study of transformative strategies to overcome forms-of-life crises. *Environmental Politics*, 33(1), 92–113. https://doi.org/10.1080/09644016.2023.2180910

Bärnthaler, R. (2024c). When enough is enough: Introducing sufficiency corridors to put techno-economism in its place. *Ambio*, 53(7), 960–969. https://doi.org/10.1007/s13280-024-02027-2

Bärnthaler, R., & Dengler, C. (2023). Universal basic income, services, or time politics? A critical realist analysis of (potentially) transformative responses to the care crisis. *Journal of Critical Realism*, 22(4), 670–691. https://doi.org/10.1080/14767430.2023.2229179

Bärnthaler, R., & Gough, I. (2023). Provisioning for sufficiency: Envisaging production corridors. *Sustainability: Science, Practice and Policy*, 19(1), 2218690. https://doi.org/10.1080/15487733.2023.2218690

Bärnthaler, R., Novy, A., Arzberger, L., Krisch, A., & Volmary, H. (2024). The power to transform structures: Power complexes and the challenges for realising a wellbeing economy. *Humanities and Social Sciences Communications*, 11(1), 1–16. https://doi.org/10.1057/s41599-024-03065-7

Bärnthaler, R., Novy, A., & Plank, L. (2021). The foundational economy as a cornerstone for a social–ecological transformation. *Sustainability*, 13(18), 10460. https://doi.org/10.3390/su131810460

Bayliss, K., & Fine, B. (2020). *A guide to the systems of provision approach: Who gets what, how and why*. Palgrave Macmillan.

Bhaskar, R. (1998). General introduction. In T. Lawson, A. Collier, R. Bhaskar, M. Archer, & A. Norrie (Eds.), *Critical realism: Essential readings* (pp. ix–xxiv). Routledge.

Biermann, F. (2021). The future of 'environmental' policy in the Anthropocene: Time for a paradigm shift. *Environmental Politics*, 30(1–2), 61–80. https://doi.org/10.1080/09644016.2020.1846958

Bocken, N. M. P., & Short, S. W. (2016). Towards a sufficiency-driven business model: Experiences and opportunities. *Environmental Innovation and Societal Transitions*, 18, 41–61. https://doi.org/10.1016/j.eist.2015.07.010

Bohnenberger, K. (2023). Peaks and gaps in eco-social policy and sustainable welfare: A systematic literature map of the research landscape. *European Journal of Social Security*, 25(4), 328–346. https://doi.org/10.1177/13882627231214546

Bonneuil, C., & Fressoz, J.-B. (2017). *The shock of the Anthropocene: The earth, history and us*. Verso.

Bowles, S. (2016). *The moral economy: Why good incentives are no substitute for good citizens*. Yale University Press.

Brand-Correa, L. I., Mattioli, G., Lamb, W. F., & Steinberger, J. (2020). Understanding (and tackling) need satisfier escalation. *Sustainability: Science, Practice and Policy*, 16(1), 309–325. https://doi.org/10.1080/15487733.2020.1816026

Brand-Correa, L. I., & Steinberger, J. K. (2017). A framework for decoupling human need satisfaction from energy use. *Ecological Economics*, 141, 43–52. https://doi.org/10.1016/j.ecolecon.2017.05.019

Brand, U., Muraca, B., Pineault, É., Sahakian, M., Schaffartzik, A., Novy, A., Streissler, C., Haberl, H., Asara, V., Dietz, K., Lang, M., Kothari, A., Smith, T., Spash, C., Brad, A., Pichler, M., Plank, C., Velegrakis, G., Jahn, T., … Görg, C. (2021). From planetary to societal boundaries: An argument for collectively defined self-limitation. *Sustainability: Science, Practice and Policy*, 17(1), 264–291. http://doi.org/10.1080/15487733.2021.1940754

Brand, U., & Niedermoser, M. K. (2019). The role of trade unions in social-ecological transformation: Overcoming the impasse of the current growth model and the imperial mode of living. *Journal of Cleaner Production*, 225, 173–180. https://doi.org/10.1016/j.jclepro.2019.03.284

Buch-Hansen, H., & Carstensen, M. B. (2024). What kind of political agency can foster radical transformation towards ecological sustainability? *Policy & Politics*, 1–19.

Buch-Hansen, H., & Nesterova, I. (2023). Less and more: Conceptualising degrowth transformations. *Ecological Economics*, *205*, 107731. https://doi.org/10.1016/j.ecolecon.2022.107731

Buch-Hansen, H., & Nielsen, P. (2020). *Critical realism: Basics and beyond*. Red Globe Press.

Büchs, M., Cass, N., Mullen, C., Lucas, K, & Ivanova, D. (2023). Emissions savings from equitable energy demand reduction. *Nature Energy*, *8*(7), 758–769. https://doi.org/10.1038/s41560-023-01283-y

Büchs, M., Ivanova, D., & Schnepf, S. V. (2021). Fairness, effectiveness, and needs satisfaction: New options for designing climate policies. *Environmental Research Letters*, *16*(12), 124026. https://doi.org/10.1088/1748-9326/ac2cb1

Burger, P., Sohre, A., & Schubert, I. (2019). Governance for sufficiency: A new approach to a contested field. In *Sustainability governance and hierarchy* (pp. 157–177). Routledge.

Cass, N., Lucas, K., Adeel, M., Anable, J., Büchs, M., Lovelace, R., Morgan, M., & Mullen, C. (2022). *Curbing excess: High energy consumption and the fair energy transition*. CREDS. Retrieved February 15, 2024, from https://www.creds.ac.uk/publications/curbing-excess-high-energy-consumption-and-the-fair-energy-transition/

Christophers, B. (2024). *The price is wrong: Why capitalism won't save the planet*. Verso Books.

Cohen, M. (2021). *Revitalising local communities: UK feminist green new deal policy paper*. UK Feminist Green New Deal Policy Papers. Women's Budget Group. Retrieved February 22, 2022, from https://wbg.org.uk/wp-content/uploads/2021/10/Revitalising-Local-Communities-FINAL.pdf

Creutzig, F., Roy, J., Lamb, W. F., Azevedo, I. M. L., Bruine de Bruin, W., Dalkmann, H., Edelenbosch, O. Y., Geels, F. W., Grubler, A., Hepburn, C., Hertwich, E. G., Khosla, R., Mattauch, L., Minx, J. C., Ramakrishnan, A., Rao, N. D., Steinberger, J. K., Tavoni, M., Ürge-Vorsatz, D., … Weber, E. U. (2018). Towards demand-side solutions for mitigating climate change. *Nature Climate Change*, *8*(4), 260–263. http://dx.doi.org/10.1038/s41558-018-0121-1

Danermark, B., Ekstrom, M., Jakobsen, L., & Karlsson, J. (2002). *Explaining society: An introduction to critical realism in the social sciences*. Routledge.

Dengler, C., & Plank, C. (2024). Foregrounding invisible foundations: (eco-)feminist perspectives on provisioning systems. *Sustainability: Science, Practice and Policy*, *20*(1), 2312667. https://doi.org/10.1080/15487733.2024.2312667

Drews, S., & van den Bergh, J. C. J. M. (2016). What explains public support for climate policies? A review of empirical and experimental studies. *Climate Policy*, *16*(7), 855–876. https://doi.org/10.1080/14693062.2015.1058240

Durand, C., Hofferberth, E., & Schmelzer, M. (2024). Planning beyond growth: The case for economic democracy within ecological limits. *Journal of Cleaner Production*, *437*, 140351. https://doi.org/10.1016/j.jclepro.2023.140351

Eckersley, R. (2020). Greening states and societies: From transitions to great transformations. *Environmental Politics*, *30*(1-2), 245–265. https://doi.org/10.1080/09644016.2020.1810890

Fanning, A. L., O'Neill, D. W., & Büchs, M. (2020). Provisioning systems for a good life within planetary boundaries. *Global Environmental Change*, *64*, 102135. https://doi.org/10.1016/j.gloenvcha.2020.102135

Franta, B. (2022). Weaponizing economics: Big oil, economic consultants, and climate policy delay. *Environmental Politics*, *31*(4), 555–575. https://doi.org/10.1080/09644016.2021.1947636

Fraser, N. (2022). *Cannibal capitalism: How our system is devouring democracy, care, and the planetand what we can do about it*. Verso.

Fuchs, D., Lorek, S., Mamut, P., & Rossmoeller (2023). Fifty shades of sufficiency: Semantic confusion and no policy. In H. Jörgens, C. Knill, & Y. Steinebach (Eds.), *Routledge handbook of environmental policy* (pp. 347–357). Routledge.

Fuchs, D., Sahakian, M., Gumbert, T., Giulio, A., & Maniates, M. (2021). *Consumption corridors: Living a good life within sustainable limits*. Routledge.

Fuchs, D., Steinberger, J., Pirgmaier, E., Lamb, W., Brand-Correa, L., Mattioli, G., & Cullen, J. (2021). A corridors and power-oriented perspective on energy-service demand and needs satisfaction. *Sustainability: Science, Practice and Policy*, *17*(1), 162–172. https://doi.org/10.1080/15487733.2021.1912907

Gerold, S., Hoffmann, M., & Aigner, E. (2023). Towards a critical understanding of work in ecological economics: A postwork perspective. *Ecological Economics*, *212*, 107935. https://doi.org/10.1016/j.ecolecon.2023.107935

Gidin, S. (2018). Socialism for realists. *Catalyst*, *2*(3).

Görg, C. (2011). Societal relationships with nature: A dialectical approach to environmental politics. In A. Biro (Ed.), *Critical ecologies: The Frankfurt school and contemporary environmental crises* (pp. 43–72). University of Toronto Press.

Görg, C., Brand, U., Haberl, H., Hummel, D., Jahn, T., & Liehr, S. (2017). Challenges for social-ecological transformations: Contributions from social and political ecology. *Sustainability*, *9*(7), 1045. https://doi.org/10.3390/su9071045

Görg, C., Madner, V., Muhar, A., Novy, A., Posch, A., Steininger, K. W., & Aigner, E. (2023). *APCC Special Report: Strukturen für ein klimafreundliches Leben*. Springer.

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

Gough, I. (2022). Two scenarios for sustainable welfare: A framework for an eco-social contract. *Social Policy and Society*, *21*(3), 460–472. https://doi.org/10.1017/S1474746421000701

Gough, I. (2023). Sufficiency as a value standard: From preferences to needs. *Ethics, Policy & Environment*, 1–22. https://doi.org/10.1080/21550085.2023.2269055

Haas, W., Muhar, A., Dorninger, C., & Gugerell, G. (2023). Kapitel 23. Synthese: Pfade zur Transformation struktureller Bedingungen für ein klimafreundliches Leben. In C. Görg, V. Madner, A. Muhar, A. Novy, A. Posch, K. W. Steininger, & E. Aigner (Eds.), *APCC special report: Strukturen für ein klimafreundliches Leben* (pp. 613–647). Springer.

Haberl, H., Wiedenhofer, D., Virág, D., Kalt, G., Plank, B., Brockway, P., Fishman, T., Hausknost, D., Krausmann, F., Leon-Gruchalski, B., Mayer, A., Pichler, M., Schaffartzik, A., Sousa, T., Streeck, J., & Creutzig, F. (2020). A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part II: synthesizing the insights. *Environmental Research Letters*, 15(6), 065003. http://doi.org/10.1088/1748-9326/ab842a

Haderer, M. (2023). Experimental climate governance as organized irresponsibility? A case for revamping governing (also) through government. *Sustainability: Science, Practice and Policy*, 19(1), 2186078. https://doi.org/10.1080/15487733.2023.2186078

Hartwig, M. (2007). *Dictionary of critical realism*. Routledge.

Harvey, F. (2023, November 22). Who are the polluter elite and how can we tackle carbon inequality? *The Guardian*. Retrieved December 17, 2023, from https://www.theguardian.com/environment/2023/nov/22/who-are-polluter-elite-how-can-we-tackle-carbon-inequality

Hausknost, D., & Haas, W. (2019). The politics of selection: Towards a transformative model of environmental innovation. *Sustainability*, 11(2), 506. https://doi.org/10.3390/su11020506.

Hayden, A. (2019). Sufficiency. In A. Kalfagianni, D. Fuchs, & A. Hayden (Eds.), *Routledge handbook of global sustainability governance* (pp. 151–163). Routledge. Retrieved February 27, 2024, from https://www.taylorfrancis.com/chapters/edit/10.43249781315170237-13/sufficiency-anders-hayden

Heikkurinen, P., Young, C. W., & Morgan, E. (2019). Business for sustainable change: Extending eco-efficiency and eco-sufficiency strategies to consumers. *Journal of Cleaner Production*, 218, 656–664. https://doi.org/10.1016/j.jclepro.2019.02.053

Heindl, P., & Kanschik, P. (2016). Ecological sufficiency, individual liberties, and distributive justice: Implications for policy making. *Ecological Economics*, 126, 42–50. https://doi.org/10.1016/j.ecolecon.2016.03.019

Heyen, D. A., & Wicki, M. (2024). Increasing public support for climate policy proposals: A research agenda on governable acceptability factors. *Climate Policy*, 0(0), 1–10.

Hickel, J., Kallis, G., Jackson, T., O'Neill, D. W., Schor, J. B., Steinberger, J. K., Victor, P. A., & Ürge-Vorsatz, D. (2022). Degrowth can work — here's how science can help. *Nature*, 612(7940), 400–403. http://doi.org/10.1038/d41586-022-04412-x

Hickel, J., & Sullivan, D. (2024). How much growth is required to achieve good lives for all? Insights from needs-based analysis. *World Development Perspectives*, 35, 100612. https://doi.org/10.1016/j.wdp.2024.100612

Hirvilammi, T., Häikiö, L., Johansson, H., Koch, M., & Perkiö, J. (2023). Social policy in a climate emergency context: Towards an eco-social research agenda. *Journal of Social Policy*, 52(1), 1–23. https://doi.org/10.1017/S0047279422000721

IEA. (2019). *Growing preference for SUVs challenges emissions reductions in passenger car market – Analysis*. Retrieved December 20, 2022, from https://www.iea.org/commentaries/growing-preference-for-suvs-challenges-emissions-reductions-in-passenger-car-market

IPCC. (2022a). *Climate change 2022 – Impacts, adaptation and vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.

IPCC. (2022b). *Climate change 2022: Mitigation of climate change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.

IPCC. (2022c). Summary for policymakers. In P. R. Shukla, J. Skea, R. Slade, A. Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, & J. Malley (Eds.), *Climate change 2022: Mitigation of climate change. Contribution of working group III to the sixth assessment report of the intergovernmental panel on climate change* (pp. 1–48). Cambridge University Press.

IPCC. (2022d). Technical summary. In P. R. Shukla, J. Skea, R. Slade, A. Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, & J. Malley (Eds.), *Climate change 2022: Mitigation of climate change. Contribution of working group III to the sixth assessment report of the intergovernmental panel on climate change* (pp. 51–147). Cambridge University Press.

Ivanova, D., & Büchs, M. (2023). Barriers and enablers around radical sharing. *The Lancet Planetary Health*, 7(9), e784–e792. https://doi.org/10.1016/S2542-5196(23)00168-7

Jaeggi, R. (2018). *Critique of forms of life*. Belknap Press: An Imprint of Harvard University Press.

Jessop, B. (1999). The strategic selectivity of the state: Reflections on a theme of Poulantzas. *Journal of the Hellenic Diaspora*, 25(1-2), 1–37.

Jessop, B. (2005). Critical realism and the strategic-relational approach. *New Formations: A Journal of Culture, Theory and Politics*, 56, 40–53.

Jessop, B. (2010). Metagovernance. In M. Bevir (Ed.), *The SAGE handbook of governance* (pp. 106–123). SAGE Publications.

Jessop, B., & Sum, N.-L. (2020). Putting solidarity in its place in metagovernance. In P. V. D. Broeck, A. Mehmood, A. Paidakaki, & C. Parra (Eds.), *Social innovation as political transformation: Thoughts for a better world* (pp. 90–97). Edward Elgar Pub.

Jungell-Michelsson, J., & Heikkurinen, P. (2022). Sufficiency: A systematic literature review. *Ecological Economics*, 195, 107380. https://doi.org/10.1016/j.ecolecon.2022.107380

Kallis, G., Hickel, J., O'Neill, D. W., Jackson, T., Victor, P. A., Raworth, K., Schor, J. B., Steinberger, J. K., & Ürge-Vorsatz, D. (2025). Post-growth: The science of wellbeing within planetary boundaries. *The Lancet Planetary Health*, 9(1), e62–e78. https://doi.org/10.1016/S2542-5196(24)00310-3

Kalt, G., Wiedenhofer, D., Görg, C., & Haberl, H. (2019). Conceptualizing energy services: A review of energy and well-being along the energy service cascade. *Energy Research & Social Science*, 53, 47–58. https://doi.org/10.1016/j.erss.2019.02.026

Karlsson, M., Alfredsson, E., & Westling, N. (2020). Climate policy co-benefits: A review. *Climate Policy*, 20(3), 292–316. https://doi.org/10.1080/14693062.2020.1724070

Kedward, K., Gabor, D., & Ryan-Collins, J. (2024). Carrots with(out) sticks: Credit policy and the limits of green central banking. *Review of International Political Economy*, 31(5), 1593–1617. https://doi.org/10.1080/09692290.2024.2351838

Keil, A. K., & Kreinin, H. (2022). Slowing the treadmill for a good life for all? German trade union narratives and social-ecological transformation. *Journal of Industrial Relations*, 64(4), 564–584. https://doi.org/10.1177/00221856221087413

Keil, A. K., & Steinberger, J. K. (2024). Cars, capitalism and ecological crises: Understanding systemic barriers to a sustainability transition in the German car industry. *New Political Economy*, 29(1), 90–110. https://doi.org/10.1080/13563467.2023.2223132

Kreinin, H., & Aigner, E. (2021). From 'decent work and economic growth' to 'sustainable work and economic degrowth': A new framework for SDG 8. *Empirica*, 49(2), 281–311. https://doi.org/10.1007/s10663-021-09526-5

Kvangraven, I. H., & Kesar, S. (2023). Standing in the way of rigor? Economics' meeting with the decolonization agenda. *Review of International Political Economy*, 30(5), 1723–1748. https://doi.org/10.1080/09692290.2022.2131597

Lage, J. (2022). Sufficiency and transformation–A semi-systematic literature review of notions of social change in different concepts of sufficiency. *Frontiers in Sustainability*, 3, 954660. https://doi.org/10.3389/frsus.2022.954660

Lage, J., Thema, J., Zell-Ziegler, C., Best, B., Cordroch, L., & Wiese, F. (2023). Citizens call for sufficiency and regulation — A comparison of European citizen assemblies and National Energy and Climate Plans. *Energy Research & Social Science*, 104, 103254. https://doi.org/10.1016/j.erss.2023.103254

Lehtonen, T., & Heikkurinen, P. (2022). Sufficiency and sustainability: Conceptual analysis and ethical considerations for sustainable organisation. *Environmental Values*, 31(5), 599–618. https://doi.org/10.3197/096327121X16328186623878

Linnanen, L., Nyfors, T., Heinonen, T., Liimatainen, H., Nissinen, A., Regina, K., Saarinen, M., Seppälä, J., & Viri, R. (2020). The sufficiency perspective in climate policy: How to recompose consumption. *Finnish Climate Change Panel*.

Lorek, S., & Fuchs, D. (2013). Strong sustainable consumption governance – Precondition for a degrowth path? *Journal of Cleaner Production*, 38, 36–43. https://doi.org/10.1016/j.jclepro.2011.08.008

Lucas, K., Cass, N., & Adeel, M. (2021). Social divisions in energy justice in the transport sector: Personal car ownership and use. In J. Webb, F. Wade, & M. Tingey (Eds.), *Research handbook on energy and society* (pp. 184–199). Edward Elgar.

Malm, A., & Carton, W. (2024). *Overshoot: How the world surrendered to climate breakdown*. Verso.

Mattar, S. D., Jafry, T., Schröder, P., & Ahmad, Z. (2021). Climate justice: Priorities for equitable recovery from the pandemic. *Climate Policy*, 21(10), 1307–1317. https://doi.org/10.1080/14693062.2021.1976095

Mattioli, G., Roberts, C., Steinberger, J. K., & Brown, A. (2020). The political economy of car dependence: A systems of provision approach. *Energy Research & Social Science*, 66, 101486. https://doi.org/10.1016/j.erss.2020.101486

Mazzucato, M., Doyle, S., & Kuehn von Burgsdorff, L. (2024). *Mission-oriented industrial strategy: Global Insights*. UCL, Institute for Innovation and Publi Pupose. https://www.ucl.ac.uk/bartlett/public-purpose/publications/2024/jul/mission-oriented-industrial-strategy-global-insights

Meadows, D. H. (2008). *Thinking in systems: A primer (D. Wright, Ed.)*. Chelsea Green Publishing.

Middlemiss, L., Snell, C., Morrison, E., Chzhen, Y., Owen, A., Kennedy, K., Theminimulle, S., & Carregha, T. (2023). Conceptualising socially inclusive environmental policy: a just transition to Net Zero. *Social Policy and Society*, 22(4), 763–783. http://doi.org/10.1017/S1474746423000180

Millward-Hopkins, J., & Oswald, Y. (2023). Reducing global inequality to secure human wellbeing and climate safety: A modelling study. *The Lancet Planetary Health*, 7(2), e147–e154. https://doi.org/10.1016/S2542-5196(23)00004-9

Moulaert, F., & Maccallum, D. (2019). *Advanced introduction to social innovation*. Edward Elgar.

Nesterova, I., & Buch-Hansen, H. (2024). Depths of sufficiency in business. Diving through the planes of social being. In M. Gossen & L. Niessen (Eds.), *Sufficiency in business* (pp. 85–96). Transcript.

Newell, P. (2019). Trasformismo or transformation? The global political economy of energy transitions. *Review of International Political Economy*, 26(1), 25–48. https://doi.org/10.1080/09692290.2018.1511448

Newell, P., Paterson, M., & Craig, M. (2021). The politics of green transformations: An introduction to the special section. *New Political Economy*, 26(6), 903–906. https://doi.org/10.1080/13563467.2020.1810215

Novy, A. (2022). The political trilemma of contemporary social-ecological transformation – Lessons from Karl Polanyi's The Great Transformation. *Globalizations*, 19(1), 59–80. https://doi.org/10.1080/14747731.2020.1850073

Novy, A., Barlow, N., & Fankhauser, J. (2022). Transformative innovation. In L. Pellizzoni, E. Leonardi, & V. Asara (Eds.), *Handbook of critical environmental politics* (pp. 593–610). Edward Elgar.

Novy, A., Baumgartner, B., Grabow, S., Plank, L., & Volmary, H. (2024). Greening *Red Vienna*: Lessons for social-ecological housing provision. *Sustainability: Science, Practice and Policy*, 20(1). http://doi.org/10.1080/15487733.2024.2312674

Olsen, N. (2018). *The sovereign consumer: A new intellectual history of neoliberalism* (1st ed. 2019 ed.). Palgrave Macmillan.

O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. (2018). A good life for all within planetary boundaries. *Nature Sustainability*, 1(2), 88–95. https://doi.org/10.1038/s41893-018-0021-4

Oswald, Y., Millward-Hopkins, J., Steinberger, J. K., Owen, A., & Ivanova, D. (2023). Luxury-focused carbon taxation improves fairness of climate policy. *One Earth*, 6(7), 884–898. https://doi.org/10.1016/j.oneear.2023.05.027

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(3), 231–239. https://doi.org/10.1038/s41560-020-0579-8

Pichler, M. (2023). Political dimensions of social-ecological transformations: Polity, politics, policy. *Sustainability: Science, Practice and Policy*, 19(1), 2222612. https://doi.org/10.1080/15487733.2023.2222612

Pichler, M., Krenmayr, N., Schneider, E., & Brand, U. (2021). EU industrial policy: Between modernization and transformation of the automotive industry. *Environmental Innovation and Societal Transitions*, 38, 140–152. https://doi.org/10.1016/j.eist.2020.12.002

Pirgmaier, E. (2017). The neoclassical Trojan horse of steady-state economics. *Ecological Economics*, *133*, 52–61. https://doi.org/10.1016/j.ecolecon.2016.11.010

Pirgmaier, E., & Steinberger, J. K. (2019). Roots, riots, and radical change—A road less travelled for ecological economics. *Sustainability*, *11*(7), 2001. https://doi.org/10.3390/su11072001

Plank, C., Haas, W., Schreuer, A., Irshaid, J., Barben, D., & Görg, C. (2021). Climate policy integration viewed through the stakeholders' eyes: A co-production of knowledge in social-ecological transformation research. *Environmental Policy and Governance*, *31*(4), 387–399. https://doi.org/10.1002/eet.1938

Polanyi, K. (1977). *The livelihood of man*. Academic Press.

Polanyi, K. (2001). *The great transformation: The political and economic origins of our time*. Beacon Press.

Princen, T. (2003). Principles for sustainability: From cooperation and efficiency to sufficiency. *Global Environmental Politics*, *3*(1), 33–50. https://doi.org/10.1162/152638003763336374

Princen, T. (2005). *The logic of sufficiency*. MIT Press.

Princen, T. (2022). Sufficiency and the state: A prospective project. *Frontiers in Sustainability*, *3*, 956139. https://doi.org/10.3389/frsus.2022.956139

Sachs, W. (2023). Sufficiency. In N. Wallenhorst & C. Wulf (Eds.), *Handbook of the Anthropocene* (pp. 799–803). Springer International Publishing.

Saheb, Y. (2021). COP26: Sufficiency should be first. *Buildings & Cities*. https://www.openexp.eu/posts/cop26-sufficiency-should-be-first

Sarokin, S. N., & Bocken, N. M. P. (2024). Pursuing profitability in slow fashion: Exploring brands' profit contributors. *Journal of Cleaner Production*, *444*, 141237. https://doi.org/10.1016/j.jclepro.2024.141237

Savini, F. (2024). Strategic planning for degrowth: What, who, how. *Planning Theory*, *24*(2), 141–162. https://doi.org/10.1177/14730952241258693

Schaffartzik, A., Pichler, M., Pineault, E., Wiedenhofer, D., Gross, R., & Haberl, H. (2021). The transformation of provisioning systems from an integrated perspective of social metabolism and political economy: a conceptual framework. *Sustainability Science*, *16*(5), 1405–1421. http://doi.org/10.1007/s11625-021-00952-9

Schafran, A., Smith, M. N., & Hall, S. (2020). *The spatial contract: A new politics of provision for an urbanized planet*. Manchester University Press.

Shaw, C. (2024). *Liberalism and the challenge of climate change*. Routledge.

Shove, E. (2010). Beyond the ABC: Climate change policy and theories of social change. *Environment and Planning A: Economy and Space*, *42*(6), 1273–1285. https://doi.org/10.1068/a42282

Shove, E. (2018). What is wrong with energy efficiency? *Building Research & Information*, *46*(7), 779–789. https://doi.org/10.1080/09613218.2017.1361746

Shove, E., Pantzar, M., & Watson, M. (2012). *The dynamics of social practice: Everyday life and how it changes* (1st ed). SAGE Publications.

Shukla, P. R., Skea, J., Reisinger, A., Slade, R., Fradera, R., Pathak, M., Khourdajie, A., Belkacemi, M., Van Diemen, R., Hasija, A., Lisboa, G., Luz, S., Malley, J., Mccollum, D., Some, S., Vyas, P. R., Shukla, J., Skea, R., Slade, A. … Lisboa, S. (2022). *IPCC, 2022: Summary for Policymakers*. Cambridge University Press.

Sovacool, B. K., Axsen, J., & Sorrell, S. (2018). Promoting novelty, rigor, and style in energy social science: Towards codes of practice for appropriate methods and research design. *Energy Research & Social Science 45. Special Issue on the Problems of Methods in Climate and Energy Research* (pp. 12–42).

Spash, C. L. (2015). Bulldozing biodiversity: The economics of offsets and trading-in Nature. *Biological Conservation*, *192*, 541–551. http://doi.org/10.1016/j.biocon.2015.07.037

Spash, C. L. (2021). The contested conceptualisation of pollution in economics: Market failure or cost shifting success? *Cahiers d'économie politique*, *79*(1), 85–122. https://doi.org/10.3917/cep1.079.0085

Spash, C. L. (2024). *Foundations of social ecological economics: The fight for revolutionary change in economic thought*. Manchester University Press.

Spengler, L. (2016). Two types of 'enough': Sufficiency as minimum and maximum. *Environmental Politics*, *25*(5), 921–940. https://doi.org/10.1080/09644016.2016.1164355

Steinberger, J., Guerin, G., Hofferberth, E., & Pirgmaier, E. (2024). Democratizing provisioning systems: A prerequisite for living well within limits. *Sustainability: Science, Practice and Policy*, *20*(1), 2401186. https://doi.org/10.1080/15487733.2024.2401186

Stigendal, M., & Novy, A. (2018). Founding transdisciplinary knowledge production in critical realism: implications and benefits. *Journal of Critical Realism*, *17*(3), 203–220. https://doi.org/10.1080/14767430.2018.1514561

Stigler, G. J., & Becker, G. S. (1977). De Gustibus Non Est Disputandum. *The American Economic Review*, *67*(2), 76–90.

Stoddard, I., Anderson, K., Capstick, S., Carton, W., Depledge, J., Facer, K., Gough, C., Hache, F., Hoolohan, C., Hultman, M., Hällström, N., Kartha, S., Klinsky, S., Kuchler, M., Lövbrand, E., Nasiritousi, N., Newell, P., Peters, G. P., Sokona, Y., … Williams, M. (2021). Three decades of climate mitigation: Why haven't we bent the global emissions curve?. *Annual Review of Environment and Resources*, *46*(1), 653–689. http://doi.org/10.1146/energy.2021.46.issue-1

Svanda, N., & Zech, S. (2023). Raumplanung. In C. Görg, V. Madner, A. Muhar, A. Novy, A. Posch, K. W. Steininger, & E. Aigner (Eds.), *APCC special report: Strukturen für ein klimafreundliches Leben* [APCC SR Klimafreundliches Leben] (pp. 529–546). Springer Spektrum.

Theine, H., & Regen, L. (2023). Mediendiskurse und -strukturen. In C. Görg, V. Madner, A. Muhar, A. Novy, A. Posch, K. W. Steininger, & E. Aigner (Eds.), *APCC special report: Strukturen für ein klimafreundliches Leben* [APCC SR Klimafreundliches Leben] (pp. 547–566). Springer Spektrum.

Ulrich, P. (2020). Effizienz, Resilienz, Suffizienz. Perspektiven postcoronaler Vitalpolitik. In A. Brink, B. Hollstein, M. C. Hübscher, & N. Neuhäuser (Eds.), *Lehren aus Corona* (pp. 111–122). Nomos.

Verfuerth, C., Henn, L., & Becker, S. (2019). Is it up to them? Individual leverages for sufficiency. *GAIA - Ecological Perspectives for Science and Society*, *28*(4), 374–380. https://doi.org/10.14512/gaia.28.4.9

Vogel, J., & Hickel, J. (2023). Is green growth happening? An empirical analysis of achieved versus Paris-compliant CO2–GDP decoupling in high-income countries. *The Lancet Planetary Health*, *7*(9), e759–e769. https://doi.org/10.1016/S2542-5196(23)00174-2

Vogel, J., Steinberger, J. K., O'Neill, D. W., Lamb, W., & Krishnakumar, J. (2021). Socio-economic conditions for satisfying human needs at low energy use: An international analysis of social provisioning. *Global Environmental Change*, *69*, 102287. https://doi.org/10.1016/j.gloenvcha.2021.102287

Wamsler, C., Osberg, G., Panagiotou, A., Smith, B., Stanbridge, P., Osika, W., & Mundaca, L. (2023). Meaning-making in a context of climate change: Supporting agency and political engagement. *Climate Policy*, *23*(7), 829–844. http://doi.org/10.1080/14693062.2022.2121254

Wiedmann, T., Lenzen, M., Keyßer, L. T., Steinberger, J. (2020). Scientists' warning on affluence. *Nature Communications*, *11*(1), 3107. https://doi.org/10.1038/s41467-020-16941-y

Winkler, H., & Jotzo, F. (2023). Climate policy in an era of polycrisis and opportunities in systems transformations. *Climate Policy*, *23*(10), 1213–1215. https://doi.org/10.1080/14693062.2023.2287284

Zell-Ziegler, C., Sanchez, M. O., Borragán, G., Liste, V., & Toulouse, E. (2023). *Sufficiency–A Scoping Paper*. Oeko-Institut Working Paper 3. https://www.oeko.de/fileadmin/oekodoc/03-WP-Sufficiency-Scoping.pdf

Zell-Ziegler, C., Thema, J., Best, B., Wiese, F., Lage, J., Schmidt, A., Toulouse, E., & Stagl, S. (2021). Enough? The role of sufficiency in European energy and climate plans. *Energy Policy*, *157*, 112483. http://doi.org/10.1016/j.enpol.2021.112483