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# Introduction to Rescaling Sustainability Transitions

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## INTRODUCTION

Sustainability transitions have received burgeoning research interest over the past decade as a response to the accelerating problems of the Anthropocene including climate change, biodiversity loss, environmental degradation and the often-accompanying social injustices (Ciplet & Harrison, 2020; Geels et al., 2023; Köhler et al., 2019; Markard et al., 2012; McCauley & Heffron, 2018). The increased interest to address and conceptualise sustainability transitions and their socio-spatial processes have sparked a myriad of research trajectories framed in various ways.

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Often inducing a normative agenda regarding certain preferred global transition pathways, these transformative processes are manifested, materialised and their consequences lived and experienced through various scalar settings. Within this scientific and public debate, the scope of what sustainability transitions imply, aside from their shifting properties of socio-spatial fabric towards more sustainable performance, has been wide-reaching and includes sectoral (Albrecht et al., 2021; Halonen et al., 2022; Lamine et al., 2019) and socio-economic systems transitions (Kanger et al., 2022), politics of transitions (Avelino et al., 2016; Hess, 2018), sustainable finance (Dörry & Schulz, 2018; Esposito et al., 2019; Geels, 2012) and socio-cultural ruptures (Häyrynen & Hämeenaho, 2020), as well as individual repositionings (Huttunen et al., 2021; Kaufman et al., 2021) to name only a few prominent examples. With a dominance of sustainability transitions approaches framed in a multilevel perspective (MLP) framework (e.g. Geels, 2002; Laakso et al., 2021), research on the variegated processes related to sustainability transitions has created a variety of academic communities with a common rhetoric, yet these communities are often separated by varying epistemologies on how to scientifically approach and interpret them.

At the same time, many approaches to study and conceptually frame sustainability transitions have been found to entail a certain spatial insensitivity in relation to the multiplicity of scalar arrangements and socio-spatial heterogeneity of spaces and places that shape transition governance processes and vice versa, causing researchers to call for their integration (Boucquey et al., 2016; Bouzarovski & Haarstad, 2019; Bridge & Gailing, 2020; Coenen & Truffer, 2012; Coenen et al., 2012; Lawhon & Murphy, 2012). Sustainability transitions research has been criticised for its neglect of acknowledging the spatial complexities, regional aspects, alternative socio-spatial configurations and (trans)local relations. Consequently, a valuable stream of research discussing questions of places, scales and geographies in the context of sustainability transitions pointing to the spatial complexities at play has emerged (e.g. Albrecht et al., 2021; Binz et al., 2020; Dunlap & Laratte, 2022; Feola et al., 2023; Madsen, 2022; Mura et al., 2021). Despite the fact that a relational understanding of sustainability transitions processes is increasingly acknowledged, research in its integration of the socio-spatial dimensions of transitions has remained limited due to a predominantly holistic and conceptual lens, and its focus on urban processes (Hansen & Coenen, 2015; Mans, 2014;

Schwanen, 2018). Especially the role and multiplicity of rural and peripheral areas and their spatial complexities (Halonen, 2023; Munro, 2019; Vale et al., 2023) lacks the attention they deserve as key nodes of the socio-spatial unfolding (Wang et al., 2023) of sustainability transitions. Paradoxically, the shifting and contested power relations attributed to the core of sustainability transitions and their importance within and among different regions, localities and spatial imaginaries of development is merely a side issue on the agenda of sustainability transition research while the continuity of centralisation, urbanisation and techno-innovation based regional developments seems to be taken for granted.

Human dependence on fossil fuels and growth-centric views remain strong in most countries and they have favoured almost unlimited economies of scale and techno-innovative solutions within sustainability transitions framed developments. This has, in turn, contributed to a reliance and focus on large-scale and centralised socio-economic structures and their continuous integration into sustainability transitions processes (Albrecht, 2023; Dunlap & Laratte, 2022; Levidow & Raman, 2020). The result is a deepening divide between centres and peripheries, urban and rural, as well as large-scale and small-scale approaches, related policies and actors throughout a variety of societies, production-consumption chains, power hierarchies and living environments (e.g. Kelly-Reif & Wing, 2016; LeVasseur et al., 2021). The approach in which sustainability transitions are only an arena for materialising techno-innovative advancement, as set in many of its policy representations, has been criticised widely (Albrecht, 2024; Levidow & Raman, 2020). However, sustainability transitions also entail the potential for a shift towards more diverse socio-spatial structures which enable more decentralised, local and inclusive forms of societal organisation and value creation. These potentials of sustainability transitions and their implications for the socio-spatial reorganisation towards localised, and potentially small-scale, inclusive approaches of production and consumption systems have received increasing research interest (e.g. Asara et al., 2015; Feola et al., 2023; Hadjimichael, 2018; Levidow et al., 2012).

The rescaling of sustainability transitions plays out in multiple forms and spaces. Rather than being confined to a streamlined conceptual frame, there is clear value in drawing on an array of partially aligned, yet diverse accounts for unfolding its socio-spatial processes and trajectories. Adhering to such an approach of multiplicity and to forward a somewhat different perspective, this book and its chapters are intended to address

three aspects in particular. First, in line with recent calls in literature (e.g. Bouzarovski & Haarstad, 2019; Bridge & Gailing, 2020; Coenen & Truffer, 2012), the book clearly incorporates an increased sensitivity to the multi-scalar processes and effects of sustainability transitions governance, including the contested socio-spatial framings of governmental processes. Second, the book focuses on the role of localities, while not being limited to rural and/or peripheral places and their (trans)national socio-spatial relations within sustainability transitions processes. Third, the book scrutinises the capacities of sustainability transition pathways to rescale by enabling a socio-spatial shift towards localised, decentralised, small-scale and inclusively distributed production/consumption spaces. As presented below and clearly visible throughout the individual chapters, the book does not aim to promote a particular or ‘superior’ epistemological approach to study and conceptualise sustainability transitions, or classify approaches in their legitimacy for assessing the same. Instead, it provides an array of valuable accounts enabling a deeper understanding of how sustainability transitions manifest in different spatial contexts, how they are framed by multi-scalar and continuously shifting socio-spatial relations and how the myriad of (contested) spatial imaginaries are entailed in the governmental rationalisation of its development processes and future trajectories. Hence, it provides accounts of how the three above-mentioned parts of rescaling interfere and work for the complex assembling of sustainability transitions.

## RESCALING SUSTAINABILITY TRANSITIONS THROUGH MULTIPLE PERSPECTIVES

This book explores processes of rescaling in the unfolding of sustainability transitions. The societal changes induced by sustainability transitions assemble as a heterogeneous process reproduced by different socio-spatial contexts and the interplay between scalar constructs. Hence, the practical solutions and impacts of processes framed as sustainability transitions vary between different localities in terms of their natural, material, and human resources, the heritage of the development, their power and market relations, virtual and physical connections as well as shifting individual rationalities—within and across particular continuously transformed spaces (Massey, 2005; Wang et al., 2023). The approaches adopted here provide a twofold perspective in this spatial unfolding and their inherent rescaling processes of sustainability transitions. First, the

topic is approached through a (trans)national lens, which is partially supplemented with a set of regional framings and place-based components (Part I). Second, a set of more specific regional case study types of analysing rescaling processes is presented (Part II). While at times this delineation becomes blurry due to the complex multi-scalar interrelations and reproduction processes, this framing serves as a guide for the structure of the book. Hence, while not representing a restrictive epistemological alignment, the chapters share a conceptual focus on assessing the characteristics and processes deriving from a relational connection among, and reproduction of various scalar constructs with the capacity or intention of rescaling sustainability transitions. The following subchapter provides a brief introduction on the contents of the book, not through an aligned summary of the different chapters in an orderly manner, but by delving into the multiplicity of perspectives along a set of shared framings.

### *Setting the Rescaling of Sustainability Transitions in Context*

Sustainability transitions are mostly framed as societal, systemic, economic, political or governmental changes whose manifestations can only be portrayed through their complex spatial contextualisation—regardless of the subject—as the multiplicity of approaches in this book illustrates. Yet, within this multiplicity there are common topical alignments. For instance, transformations or potential shifts in national and regional energy systems are a widely discussed issue in this book. Sören Becker and Matthias Naumann (Chapter 10) provide insights into the regional transformation processes and scalar politics of Lusatia and Rhineland lignite regions in Germany. Using the regions of Taranaki and Southland in New Zealand, Sean Connelly, Etienne Nel and Danielle Lomas (Chapter 8) exemplify rescaling processes through potential *landing points* for new activities such as renewable energy production. Etienne Nel and Lochner Marais (Chapter 11) enter an account of the transformative challenges of coal-dependent communities and their multi-scalar relations in the Mpumalanga province of South Africa. Tarmo Pikner (Chapter 4) focuses on the complex and contradictory assembling of energy encounters between oil-shale transformations and coastal wind energy developments in Estonia, while Ross Wallace and Susana Batel (Chapter 5) focus on variegated and contested socio-technical imaginaries of renewable energy communities proposed in different expert circles in Portugal.

Another area of interest discussed in this book is the transformative changes in permanent or temporary habitation. Laura Sariego-Kluge and Diana Morales (Chapter 3) address the rescaling of sustainability transition through an account of the spatio-temporal rescaling processes of sustainable tourism development in Costa Rica, while Laura Ryser, Sean Markey, Greg Halseth, Martin Mateus and Lars Hallstrom (Chapter 9) approach the topic through the lens of small town planning governance in the context of amenity housing in Canmore, Alberta, Canada. More (trans)national, yet spatially sensitive approaches are provided by several chapters in the book. Germán A. Quimbayo Ruiz (Chapter 7) discusses the processes and spatial tensions accompanying sustainability transition policies in Colombia, and Irene Kuhmonen, Tuomas Kuhmonen and Annukka Näyhä (Chapter 6) address aspects of rescaling by assessing the future potentials and visions between centralisation and decentralisation within different sectors of the circular bioeconomy in rural Finland.

Additionally, sector-specific and transnational insights further address sustainability transitions exemplified through the European Union (EU) bioeconomy, which also raises this policy field's importance to exemplify institutionalised sustainability transition (policy) processes. Moritz Albrecht and Oliver Klein (Chapter 2) scrutinise socio-spatial imaginaries of becoming and the potentials for small-scale and localised developments in four novel, regenerative EU bioeconomy sectors, while Maija Halonen and Linda Lundmark (Chapter 12) focus on the established forest bioeconomy in regional inland peripheries in northeast Finland and northern Sweden. Aside from their topical depths and case study insights, this array of topics treated through different approaches and the wide range of geographical contexts provides novel insights to unfold processes of rescaling sustainability transitions in a wider sense. The following sections provide an analytical overview of the key aspects of the chapters' endeavours.

### *Rescaling as a Methodology and a Subject of Research*

Throughout the chapters of this book, rescaling describes both a methodological orientation and a research focus. As a methodological orientation rescaling reflects the authors' choices on viewpoints, which are most often interlinked with the subject of the research. For example, rescaling is referred to as processes of localising, contextualising or grounding practices, politics or governance in contrast to rather abstract or larger-scale

transitions. This kind of rescaling by localising can be argued for several reasons. As Quimbayo Ruiz (Chapter 7) points out, in contexts such as Colombia, sustainability transitions and their adjunct processes of policy design and implementation cannot be understood or promoted without paying attention to the country's complex and mega-diverse geography and the resulting spatially diverse implementation of sustainability transitions agendas. As for Connelly et al. (Chapter 8), Halonen and Lundmark (Chapter 12) and Kuhmonen et al. (Chapter 6), localised rescaling is attached to the need to emphasise rural and peripheral livelihoods over predominantly urban foci. More broadly, rescaling seems to be—implicitly if not explicitly—related to approaches that focus on the (spatially oriented) viewpoints, agencies and values of locals and other stakeholders (Albrecht & Klein, Chapter 2; Sario-Kluge & Morales, Chapter 3; Wallace & Batel, Chapter 5), especially in resource or amenity communities (Nel & Marais, Chapter 11; Ryser et al., Chapter 9), or in the settings of regions, territories or landscapes (Becker & Naumann, Chapter 10; Pikner, Chapter 4). Assessing localisation capacities or challenges is also a way to address just transitions (Albrecht & Klein, Chapter 2; Becker & Naumann, Chapter 10; Connelly et al., Chapter 8) and reveal power relations (Becker & Naumann, Chapter 10; Sario-Kluge & Morales, Chapter 3) from a socio-spatial perspective.

Many chapters refer to scales as levels or how (re)scaling exists through hierarchical order or is framed in an institutional scalar setting, like 'governance transitions to municipal' (Ryser et al., Chapter 9), or 'driven by top-down policies' (Sario-Kluge & Morales, Chapter 3), or making references to multilevel perspectives (Becker & Naumann, Chapter 10; Nel & Marais, Chapter 11). However, this does not imply a simple shift 'from the global and national scales to the local or mere exchanges between them'. Rather, it highlights issues of rescaling based on the shifting relationality between different spatial scales as presented by Nel and Marais (Chapter 11). Whatever the approach and target entity is, sustainability transitions are emphasised as multi-scalar processes where rescaling may occur in different ways and directions even in the same context. For example, while the governance of housing undergoes an institutionalised rescaling from provincial governments to local governments, the same transformation process is accompanied by an upscaling of variegated network relations (Ryser et al., Chapter 9). Furthermore, the energy shifts towards more space-dependent energy production also influence territorialisation dynamics and landscapes bound to energy



production. But at the same time, these processes are, above all else, relational rescaling processes rather than straightforward shifts between scales (Pikner, Chapter 4). Even when small-scale actors are rescaled as a research focus, the large-scale actors cannot be forgotten due to the fact that small-scale operators are a part of the networks of the large-scale actors (Halonen & Lundmark, Chapter 12) or operate within the same policy assemblage (Albrecht & Klein, Chapter 2).

If rescaling by localising emphasises the need for concretising and grounding sustainability transitions, rescaling through imaginaries, expressions and visions underlines the necessity to reach the spaces of thoughts and highlight the governmentalisation aspects of rescaling sustainability transitions. As with Wallace and Batel (Chapter 5), rescaling focuses on the meaning-making, the spatial construction of orders of worth and potential scale jumping in the context of delineating ‘local’ and ‘proximity’ as spatial identifiers of renewable energy communities, while Kuhmonen et al. (Chapter 6) seek to unveil the potential rescaling of circular bioeconomy by probable and preferable visions for future implementation. Albrecht and Klein (Chapter 2) argue that the expressive components, hence the spatial imaginaries of transition trajectories, are supplemented by the material components of EU bioeconomy assembling and treat rescaling through complex socio-spatial territorialisation processes to unveil their capacities and challenges.

Finally, in terms of sectoral rescaling, the point of departure may be referred to as the actual shift in or between the sectors or as a methodological choice. As an example of the first, the sectoral shift of Costa Rica’s tourism sector did not reflect scaling up of the existing socio-technical system, rather, the rescaling occurred as a gradual transition from one socio-technical system to another, which also entailed rescaling of values and beliefs (Sariego-Kluge & Morales, Chapter 3). As an example of the latter form, Halonen and Lundmark (Chapter 12) rescaled their approach from a focus on large-scale forest actors to smaller-scale entities as their methodological choice. As a combination of the two, Albrecht and Klein’s (Chapter 2) critical view towards large-scale bioeconomy development rescales their focus on alternative, localised and small-scale developments representing a potential scale shift within the sector and pairs this ambition with a conceptual rescaling of transition governance.

## CONCLUSION

This book and its contributions highlight the myriad of socio-spatial processes, their alignments, frictions and contradictions for sustainability transitions, and hence, aim to fulfil calls for increased engagement in the scalar aspects of sustainability transitions and their governance. Our argument for rescaling flows from two concluding observations. First, we call for stronger engagement of sustainability transitions research with questions of place and relocalisation practices, their embedded power relations and questions on small-scale trajectories for territorial and economic materialisations in terms of production and market reach as an alternative to the large-scale dominance of resource exploitation and use. Second, we call for increased attention to the relational processes and ontological framings that reproduce mobilities and scalar shifts in governance arrangements that are generated or linked to socio-spatial processes of sustainability transitions. Finally, this book and the diverse range of its contributions show once more that moving beyond the narrow confinements of a particular epistemological research framework carries high value to address the unfolding of socio-spatial becoming in all its complexity.

## REFERENCES

- Albrecht, M., Grundel, I., & Morales, D. (2021). Regional Bioeconomies: Public Finance and Sustainable Policy Narratives. *Geografiska Annaler: Series b, Human Geography*, 103(2), 116–132. <https://doi.org/10.1080/04353684.2021.1921603>
- Albrecht, M. (2023). A Norwegian Seaweed Utopia? Governmental Narratives of Coastal Communities, Upscaling, and the Industrial Conquering of Ocean Spaces. *Maritime Studies*, 22, 37. <https://doi.org/10.1007/s40152-023-00324-2>
- Albrecht, M. (2024). A Billion-Euro Industry? (De-)territorialisation Processes of Norway's Seaweed Farming Assemblage. *Tijdschrift Voor Economische En Sociale Geografie*. <https://doi.org/10.1111/tesg.12609>
- Asara, V., Otero, I., Demaria, F., & Corbera, E. (2015). Socially Sustainable Degrowth as a Social-ecological Transformation: Repoliticizing Sustainability. *Sustainability Science*, 10, 375–384. <https://doi.org/10.1007/s11625-015-0321-9>

- Avelino, F., Grin, J., Pel, B., & Jhagroe, S. (2016). The Politics of Sustainability Transitions. *Journal of Environmental Policy & Planning*, 18(5), 557–567. <https://doi.org/10.1080/1523908X.2016.1216782>
- Binz, C., Coenen, L., Murphy, J. T., & Truffer, B. (2020). Geographies of Transition—From Topical Concerns to Theoretical Engagement: A Comment on the Transitions Research Agenda. *Environmental Innovation and Societal Transitions*, 34, 1–3. <https://doi.org/10.1016/j.eist.2019.11.002>
- Boucquey, N., Fairbanks, L., St. Martin, K., Campbell, L. M., & McCay, B. (2016). The Ontological Politics of Marine Spatial Planning: Assembling the Ocean and Shaping the Capacities of ‘Community’ and Environment’. *Geoforum*, 75, 1–11. <https://doi.org/10.1016/j.geoforum.2016.06.014>
- Bouzarovski, S., & Haarstad, H. (2019). Rescaling Low-carbon Transformations: Towards a Relational Ontology. *Transactions of the Institute of British Geographers*, 44(2), 209–436. <https://doi.org/10.1111/tran.12275>
- Bridge, G., & Gailing, L. (2020). New Energy Spaces: Towards a Geographical Political Economy of Energy Transition. *Environment and Planning a: Economy and Space*, 52(6), 1037–1050. <https://doi.org/10.1177/0308518X20939570>
- Ciplet, D., & Harrison, J. L. (2020). Transition Tensions: Mapping Conflicts in Movements for a Just and Sustainable Transition. *Environmental Politics*, 29(3), 435–456. <https://doi.org/10.1080/09644016.2019.1595883>
- Coenen, L., & Truffer, B. (2012). Places and Spaces of Sustainability Transitions: Geographical Contributions to an Emerging Research and Policy Field. *European Planning Studies*, 20(3), 367–374. <https://doi.org/10.1080/09654313.2012.651802>
- Coenen, L., Benneworth, P., & Truffer, B. (2012). Toward a Spatial Perspective on Sustainability Transitions. *Research Policy*, 41(6), 968–979. <https://doi.org/10.1016/j.respol.2012.02.014>
- Dunlap, L., & Laratte, L. (2022). European Green Deal Necropolitics: Exploring ‘Green’ Energy Transition, Degrowth & Infrastructural Colonization. *Political Geography*, 97, 102640. <https://doi.org/10.1016/j.polgeo.2022.102640>
- Dörny, S., & Schulz, C. (2018). Green Financing, Interrupted. Potential Directions for Sustainable Finance in Luxembourg. *Local Environment*, 23, 717–733. <https://doi.org/10.1080/13549839.2018.1428792>
- Esposito, L., Gatti, E., & Mastromatteo G. (2019). Sustainable Finance, the Good, the Bad and the Ugly: A Critical Assessment of the EU Institutional Framework for the Green Transition. *Quaderno n. 4/febbraio 2019*. Vita E Pensiero, Milano.
- Feola, G., Goodman, M. K., Suzunaga, J., & Soler, J. (2023). Collective Memories, Place-framing and the Politics of Imaginary Futures in Sustainability

- Transitions and Transformation. *Geoforum*, 138, 103668. <https://doi.org/10.1016/j.geoforum.2022.103668>
- Geels, F. W. (2002). Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-level Perspective and a Case-study. *Research Policy*, 31(8), 1257–1274. [https://doi.org/10.1016/S0048-7333\(02\)00062-8](https://doi.org/10.1016/S0048-7333(02)00062-8)
- Geels, F. W. (2012). The Impact of the Financial–economic Crisis on Sustainability Transitions: Financial Investment, Governance and Public Discourse. *Environmental Innovation and Societal Transitions*, 6, 67–95. <https://doi.org/10.1016/j.eist.2012.11.004>
- Geels, F. W., Kern, F., & Clark, W. C. (2023). System Transitions Research and Sustainable Development: Challenges, Progress, and Prospects. *Proceedings of the National Academy of Sciences*, 120(47), e2206230120. <https://doi.org/10.1073/pnas.2206230120>
- Hadjimichael, M. (2018). A Call for a Blue Degrowth: Unravelling the European Union’s Fisheries and Maritime Policies. *Marine Policy*, 94, 158–164. <https://doi.org/10.1016/j.marpol.2018.05.007>
- Halonen, M. (2023). Optimisation, Polarisation, Peripheralisation: Alternative Development Paths of the Regions of the East and North Finland in the Frame of Spatial Justice (Finnish). *Alue ja Ympäristö*, 52(2), 47–66. <https://doi.org/10.30663/ay.130476>
- Halonen, M., Näyhä, A., & Kuhmonen, I. (2022). Regional Sustainability Transition Through Forest-based Bioeconomy? Development Actors’ Perspectives on Related Policies, Power, and Justice. *Forest Policy and Economics*, 142, 102775. <https://doi.org/10.1016/j.forpol.2022.102775>
- Hansen, T., & Coenen, L. (2015). The Geography of Sustainability Transitions: Review, Synthesis and Reflections on an Emergent Research Field. *Environmental Innovation and Societal Transitions*, 17, 92–109. <https://doi.org/10.1016/j.eist.2014.11.001>
- Hess, D. J. (2018). Energy Democracy and Social Movements: A Multi-coalition Perspective on the Politics of Sustainability Transitions. *Energy Research & Social Science*, 40, 177–189. <https://doi.org/10.1016/j.erss.2018.01.003>
- Huttunen, S., Kaljonen, M., Lonkila, A., Rantala, S., Rekola, A., & Paloniemi, R. (2021). Pluralising Agency to Understand Behaviour Change in Sustainability Transitions. *Energy Research & Social Science*, 76, 102067. <https://doi.org/10.1016/j.erss.2021.102067>
- Häyrynen, S., & Hämeenaho, P. (2020). Green Clashes: Cultural Dynamics of Scales in Sustainability Transitions in European Peripheries. *Palgrave Commun*, 6, 90. <https://doi.org/10.1057/s41599-020-0472-x>
- Kanger, L., Tinits, P., Pahker, A.-K., Orru, K., Tiwari, A. K., Sillak, S., Šeĵa, A., & Vaik, K. (2022). Deep Transitions: Towards a Comprehensive Framework for Mapping Major Continuities and Ruptures in Industrial Modernity. *Global*

- Environmental Change*, 72, 102447. <https://doi.org/10.1016/j.gloenvcha.2021.102447>
- Kaufman, S., Saeri, A., Raven, R., Malekpour, S., & Smith, L. (2021). Behaviour in Sustainability Transitions: A Mixed Methods Literature Review. *Environmental Innovation and Societal Transitions*, 40, 586–608. <https://doi.org/10.1016/j.eist.2021.10.010>
- Kelly-Reif, K., & Wing, S. (2016). Urban-rural Exploitation: An Underappreciated Dimension of Environmental Injustice. *Journal of Rural Studies*, 47(A), 350–358. <https://doi.org/10.1016/j.jrurstud.2016.03.010>
- Köhler, J., Geels, F. W., Kern, F., & Wells, P. (2019). An Agenda for Sustainability Transitions Research: State of the Art and Future Directions. *Environmental Innovation and Societal Transitions*, 31, 1–32. <https://doi.org/10.1016/j.eist.2019.01.004>
- Laakso, S., Aro, R., Heiskanen, E., & Kaljonen, M. (2021). Reconfigurations in Sustainability Transitions: A Systematic and Critical Review. *Sustainability: Science, Practice and Policy*, 17(1), 15–31. <https://doi.org/10.1080/15487733.2020.1836921>
- Lamine, C., Darnhofer, I., & Marsden, T. K. (2019). What Enables Just Sustainability Transitions in Agrifood Systems? An Exploration of Conceptual Approaches Using International Comparative Case Studies. *Journal of Rural Studies*, 68, 144–146. <https://doi.org/10.1016/j.jrurstud.2019.03.010>
- Lawhon, M., & Murphy, J. T. (2012). Socio-technical Regimes and Sustainability Transitions: Insights from Political Ecology. *Progress in Human Geography*, 36(3), 354–378. <https://doi.org/10.1177/0309132511427960>
- LeVasseur, T., Ruuska, T., & Heikkurinen, P. (2021). Imagining a Prosperous Periphery for the Rural in 2050 and Beyond. In Leal Filho, W., Azul, A. M., Doni, F. & Salvia, A. L. (Eds.), *Handbook of Sustainability Science in the Future* (pp. 1–18). Springer. [https://doi.org/10.1007/978-3-030-68074-9\\_12-1](https://doi.org/10.1007/978-3-030-68074-9_12-1)
- Levidow, L., & Raman, S. (2020). Sociotechnical Imaginaries of Low-carbon Waste-energy Futures: UK Techno-market Fixes Displacing Public Accountability. *Social Studies of Science*, 50(4), 609–641. <https://doi.org/10.1177/0306312720905084>
- Levidow, L., Birch, K., & Papiouannou, T. (2012). EU Agri-innovation Policy: Two Contending Visions of the Bio-economy. *Critical Policy Studies*, 6(1), 40–65. <https://doi.org/10.1080/19460171.2012.659881>
- Madsen, S. (2022). A Constructivist Approach to the Spatial Organization of Transformative Innovation Policy. *Environmental Innovation and Societal Transitions*, 42, 340–351. <https://doi.org/10.1016/j.eist.2022.01.007>
- Mans, U. (2014). Tracking Geographies of Sustainability Transitions: Relational and Territorial Aspects of Urban Policies in Casablanca and Cape Town. *Geoforum*, 57, 150–161. <https://doi.org/10.1016/j.geoforum.2014.08.018>

- Markard, R., Raven, R., & Truffer, B. (2012). Sustainability Transitions: An Emerging Field of Research and its Prospects. *Research Policy*, 41(6), 955–967. <https://doi.org/10.1016/j.respol.2012.02.013>
- Massey, D. (2005). *For Space*. Sage.
- McCauley, D., & Heffron, R. (2018). Just Transition: Integrating Climate, Energy and Environmental Justice. *Energy Policy*, 119, 1–7. <https://doi.org/10.1016/j.enpol.2018.04.014>
- Munro, F. (2019). Renewable Energy and Transition-periphery Dynamics in Scotland. *Environmental Innovation and Societal Transitions*, 31, 273–281. <https://doi.org/10.1016/j.eist.2018.09.001>
- Mura, M., Longo, M., Toschi, L., Zanni, S., Visani, F., & Bianconcini, S. (2021). The Role of Geographical Scales in Sustainability Transitions: An Empirical Investigation of the European Industrial Context. *Ecological Economics*, 183, 106968.
- Schwanen, T. (2018). Thinking Complex Interconnections: Transition, Nexus and Geography. *Transactions of the Institute of British Geographers*, 43(2), 262–283. <https://doi.org/10.1111/tran.12223>
- Vale, M., Peponi, A., Carvalho, L., Veloso, A. P., Queirós, M., & Morgado, P. (2023). Are Peripheral Regions in Troubled Waters for Sustainability Transitions? A Systematic Analysis of the Literature. *European Urban Regional Studies*, 31(2), 116–131. <https://doi.org/10.1177/09697764231194316>
- Wang, C.-M., Maye, D., & Woods, M. (2023). Planetary rural geographies. *Dialogues in Human Geography*, 0(0). <https://doi.org/10.1177/20438206231191731>

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