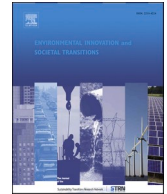




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Advancing the understanding of social innovation in sustainability transitions: exploring processes, politics, and policies for accelerating transitions

ABSTRACT

This introduction to the special issue on ‘Advancing the understanding of social innovation in sustainability transitions’ is situated at the intersection of transition studies and social innovation research. In the past years, linkages between the fields of social innovation research and transition studies have been established: while transition scholars increasingly focus on social innovation phenomena, social innovation scholars engage in better understanding the relations between social innovation and societal transformation and its impacts towards sustainability. With its eight contributions, this special issue further explicates and broadens out this intersection of both fields, with an empirical focus on insights on energy transitions. Social innovation is introduced as a sensitising concept to advance our understanding of sustainability transitions along three themes: process of change; power and politics; as well as policies and policy mixes. This introduction closes by providing future research avenues and implications for policy.

1. Introduction

The term ‘social innovation’ has a long-standing history: as a term and idea, it has been around since post-revolutionary France to refer to schemes that aimed for social reform or an overthrow of the current order (e.g. communism) (Godin, 2019). Having lost some of its earlier significance, social innovation was reintroduced in the twentieth century to counter the emerging focus on technological innovation, and on industry- and government-led societal progress. Referring to “*alternatives to established solutions to societal problems or needs*” (Godin, 2019, p. 14) it was broadly conceived of as new social practices and/or relations (Ayob et al., 2016; Franz et al., 2012; Howaldt and Schwarz, 2016). Today, the assumption that social innovation incites social change that can be supportive for achieving sustainable futures continues to spur public and academic interest.

However, social innovation research is a heterogeneous field, with scholars from different disciplines and from different intellectual communities using the concept (Edwards-Schachter and Wallace, 2017; Howaldt and Kaletka, 2023; Moulaert and MacCallum, 2019). A bibliometric analysis of social innovation research by van der Have and Rubalcaba (2016) distinguishes four intellectual communities: 1) community psychology; 2) creativity research; 3) social and societal challenges; and 4) local development. The body of theory and practice on social innovation thus necessarily exhibits diverse definitions of social innovation, but also an apparent lack of a generally accepted conceptualization (Cajaiba-Santana, 2014; van der Have and Rubalcaba, 2016) (see also section 2). Yet, the last years have seen increasing efforts towards building a community of scholars dedicated to the analysis and conceptualisation of social innovation (Howaldt et al., 2021). Testimony to these efforts is the emergence of dedicated journals (e.g. European Public and Social Innovation Review, Novation, Journal of Social Entrepreneurship), conferences (e.g. International Social Innovation Research Conference), networks (e.g. EMES network, European School of Social Innovation) and connecting efforts such as the recent publication of an Encyclopedia of Social Innovation (Howaldt and Kaletka, 2023).

The increasing academic interest in social innovation is mirrored by an ongoing and growing recognition by policymakers of its potential relevance (Bureau of European Policy Advisers, 2014; Fougère et al., 2017; Harsløf, 2015; Krlev et al., 2019). For example, in

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Europe, numerous research projects have been funded on the topic by the European Union (Moulaert et al., 2017). In addition, the European Social Fund supports the establishment of National Competence Centres on Social Innovation¹, while the OECD has its own ‘Local Economic and Employment Development Forum on Social Innovations’ (OECD, 2021). Similarly, national governments, such as in Germany, have been publishing their own social innovation strategy (BMBF and BMWK, 2023).

In the past years, linkages between the fields of social innovation research and transition studies have been established. Whereas an early review of the sustainability transitions field still distinguished between technological and “non-technical innovation” (Markard et al., 2012, p. 956), the more recent ‘agenda for sustainability transitions research’ (Köhler et al., 2019) mentions social innovation explicitly. It considers it as a way forward to better understand user roles and user collectives and practices and views it as an entry point to studying the politics of sustainability transitions. While this puts a focus on the phenomenon of social innovation, it does not reveal the underlying conceptual understanding of social innovation. Early attempts at linking both fields have been confirmed by a review of the social innovation literature finding “rudimentary linkages [of social innovation] with the literature on socio-technical (sustainability) transitions.” The authors, however, also argue that “More research is needed to get a better understanding of the causal role social innovation plays in shaping, accelerating or decelerating change trajectories” (van der Have and Rubalcaba, 2016, p. 1933). There are thus overlapping interests in understanding what social innovation is and how it interacts with transition trajectories, but more research bridging both fields remains to be done.

This call for a better understanding of social innovation in sustainability transitions has started to be addressed by a growing number of scholars. A case in point are researchers explicitly working on ‘transformative social innovation’ (Avelino et al., 2019, 2017; Castro-Arce and Vanclay, 2020; Dias and Partidário, 2019; Hebinck et al., 2018; Olsson et al., 2017; Pel et al., 2020a; Plohl et al., 2020; Prasad, 2016; Selvakumaran and Ahlgren, 2021; Thompson, 2019; Westley et al., 2016). Other scholars have been more implicitly looking at the phenomenon by searching for new perspectives and concepts to better understand agency in and dynamics of transformative change (Edler et al., 2023; Howaldt and Schwarz, 2021; Matschoss et al., 2022; Moore et al., 2015; Slee, 2020).

We identify at least three shared interests at the intersection of the two fields of transition studies and social innovation research. A first shared interest concerns the process perspective, investigating and tracing the emergence and development of a technology, idea or practice – often in a localised context or niche – and its interrelation with dominant institutions (Gregg et al., 2020; Hewitt et al., 2019; Howaldt and Schwarz, 2021; Westley et al., 2017; Wittmayer et al., 2021). In doing so, we see an exchange of theoretical frameworks and conceptual ideas, like the work by Westley et al. (2017) who explore the evolution of past ‘successful’ social innovations (including birth control, Indian residential schools or national parks) to shed light on the transformative potentials of existing ones. Interestingly, this line of research was inspired by the early longitudinal research in transitions studies (Geels, 2002; Rip and Kemp, 1998). However, rather than focusing on the development of a technological innovation, Westley and colleagues follow the development of an idea, in the Durkheimian sense of a ‘social fact’ and how it can potentially transform societies.

A second shared interest between both fields lies in systemic and structural change rather than just in optimising existing systems (Grin et al., 2010; Lorbach et al., 2017; Moulaert et al., 2013; Westley et al., 2017). While transitions scholars have been focusing on sustainability as a normative direction (Grin et al., 2010), social innovation scholars have paid more attention to social ends or purposes. Researchers from both fields find each other not only around the focus on green social innovation (Schartinger et al., 2020), they also share an increasing interest for ‘deep transitions’, such as the changes in underlying paradigms of capitalism or colonialism (Feola, 2019; Jessop et al., 2013; McGowan et al., 2020; Phillips et al., 2023; Schot and Kanger, 2018). Moreover, they pay attention to other ‘unintended’ consequences of transitions or social innovation work (McGowan and Antadze, 2023; Stirling, 2011; Swyngedouw, 2005; Westman and Castán Broto, 2022).

Finally, both fields share a strong practice and policy orientation. That is, in both fields the co-production of innovation and (transformative) change at the intersection of science, practice and policy has been traced (Audet, 2014; Kemp and Rotmans, 2009; Moulaert and MacCallum, 2019; Turnheim et al., 2020; Voß, 2014). This orientation also means that scholars from both fields pay attention to questions around justice, fairness and equity, as expressed in a growing literature on just transitions (Abram et al., 2022; Hiteva and Sovacool, 2017; Stevis and Felli, 2020; Wittmayer et al., 2021). For example, policy mix research has identified the need to address the broader repercussions of regime destabilisation, such as addressing dominant cultural framings, providing compensation payments, offering reskilling support and facilitating regional diversification, as one key policy intervention point in transitions (Kanger, 2020).

It is at this intersection of the two fields of study that this special issue is situated and that it aims to explicate and broaden out. The dialogue between the two fields of research is facilitated by a focus of the special issue contributions on the context of energy systems and energy transitions. The energy sector is one of the most advanced sectors in terms of going through fundamental transformations (Markard, 2018) and is “perhaps the most prominent, contemporary example of a sustainability transition” (Lindberg et al., 2019, p. 2). This is mirrored by increasing attention given to the social dimensions of sustainable energy transitions and the need to investigate social innovation (Foulds and Robison, 2018; Hirsh and Jones, 2014; Hoppe and de Vries, 2018; Sovacool, 2014; Sovacool et al., 2015; Wittmayer et al., 2020).

In this introduction to the special issue, we start off with providing a nuanced understanding of social innovation as a sensitizing concept for the study of sustainability transitions (section 2). From there, the aim is to advance our understanding of the intersection of social innovation and transition research along three themes. First, we highlight the role of social innovation in key processes underpinning sustainability transitions, especially regarding the wider institutionalisation of novel configurations at the regime level (section 3). Second, we discuss the ways that social innovation engages with structural deficiencies and opens multiple directions for

¹ See <https://ec.europa.eu/european-social-fund-plus/en/competence-centres-social-innovation>, accessed November 17th, 2023

change thereby strengthening attention to the power and politics of transitions (section 4). And finally, we unpack the importance of supportive policies and policy mixes for harnessing the potential of social innovation for accelerating transitions, thereby speaking to the interplay of policy, social innovation and sustainability transitions (section 5). For each of these themes, we explore how the eight contributions in this special issue (see table 1) add to these research avenues. We close the introductory article by proposing directions for future research at the intersection of social innovation and sustainability transitions as well as offering some policy implications arising from this emerging interdisciplinary research.

2. Social innovation: development, definition and distinction of a sensitizing concept

One of the key discussions within social innovation research is about ways and reasons to distinguish social innovation from technological innovation. Such distinction between social organization and technical artifacts, according to Schubert (2018, p. 7), “aims to steer academic and political discourses away from dominant interpretations of techno-economic innovation towards a broader social science perspective”. However, when attempting to investigate certain phenomena empirically and analytically, it needs to be considered that social innovations are part of socio-technical developments, and that technological and social innovation co-shape each other (Schubert, 2018). As such, research on social innovation and sustainability transition can be said to have a similar starting point looking at socio-technical developments.

There are some nuanced differences across both fields that, while not necessarily universal, are interesting to point out. Differentiating between social and technical aspects of innovation as a heuristic prism within research investigations might be useful when thinking about their interactions and the main foci of investigation (Schubert, 2018). Such a heuristic can prevent a limited interpretation of innovation, going beyond concentrating on technological developments and without neglecting the material and technical aspects. Especially in the early years, much transitions research has focused on tracing the emergence and development of technological innovation such as steamships (Geels, 2002) or piped water (Geels, 2005). The social often played a role in investigating changes in socio-technical systems derived from these technological innovations, i.e. how the introduction of technological innovation is shaped by social aspects, whilst also influencing the existing system. Similarly, Shove and Walker (2010, p. 471) have argued that “the socio element of sociotechnical change typically refers to the fact that innovations are shaped by social processes rather than to the ways in which technical systems are implicated in defining and reproducing daily life”. This is also illustrated by the popularity of the technological innovation system approach in early sustainability transitions work, but this techno-centric perspective was also present in research based on the multi-level perspective (Hansmeier et al., 2021; Köhler et al., 2019; Markard et al., 2012; Zolfagharian et al., 2019).

Over the past years, the focus on technological innovation has been complemented by a stronger emphasis on other types of innovation, such as organizational and business model innovation (Brown et al., 2019; Hiteva and Sovacool, 2017). In addition, consumption processes (rather than mainly production ones) have received greater attention as part of socio-technical transitions (Geels et al., 2023; Greene, 2018). For example, attempts have been made to explore fruitful connections between social practice

Table 1

Overview of contributions to this special issue

| | <i>Authors</i> | <i>Title of the article</i> | <i>Topic of the paper</i> |
|---|--|---|--|
| 1 | Havas, A., Schartinger, D., Weber, K.M. | Innovation studies, social innovation, and sustainability transitions research: From mutual ignorance towards an integrative perspective? | Assesses three strands of innovation research to build an integrative analytical framework for the study of goal-oriented transformative change |
| 2 | Krlev, G., Terstriep, J. | Pinning it down? Measuring innovation for sustainability transitions | Reviews the status of measurement across different innovation perspectives and provides elements for advancing existing measurement frameworks |
| 3 | Wemyss, D., Cellina, F., Grieder, M., Schlüter, F. | Looking beyond the hype: Conditions affecting the promise of behaviour change apps as social innovations for low-carbon transitions | Assesses the capability of behaviour change apps to foster transformative social innovation to support sustainability transitions |
| 4 | Pel, B., Wittmayer, J.M., Avelino, F., Loorbach, D., de Geus, T. | How to account for the dark sides of social innovation? Transitions in directionality in renewable energy prosumerism | Explores the dark sides of social innovation in relation to transitions directionality using energy prosumerism as illustration |
| 5 | Strumińska-Kutra, M., Dembek, A., Hielscher, S., Stadler, M. | Innovating Urban Governance for Sustainable Energy Transitions: Between Institutional Design and Institutional Adaptation | Develops a framework of institutional change connecting field- and organization-level analyses of sustainability transition processes to analyse institutionalization of novel governance arrangements |
| 6 | Avelino, F., Hielscher, S., Strumińska-Kutra, M., de Geus, T., Widdel, L., Wittmayer, J.M., Dañkowska, A., Dembek, A., Fraaije, M., Heidary, J., Iskandarova, M., Rogge, K., Stasik, A., Crudi, F. | Power to, over and with: Exploring power dynamics in social innovations in energy transitions across Europe | Conceptualises and analyses power in social innovation in energy |
| 7 | Carroll, J., Denny, E., Ferris, A., Petrov, I., Wu, H. | A socio-economic examination of participation in socially innovative energy projects | Examines the role of citizen investment in scaling up renewable generation through participating or investing in social innovation in energy |
| 8 | Rogge, K., Stadler, M. | Applying policy mix thinking to social innovation: from experimentation to socio-technical change | Analyses the policy mix for social innovation in energy transitions |

theories with the multi-level perspective (Hargreaves et al., 2013; Svennevik, 2022) to go beyond user practices and connecting consumption and production. Such work demonstrates an increasing engagement of transition research with social and technical aspects within changing socio-technical systems. In contrast, social innovation research has always had its analytical focus on ‘the social’, reaching from ideas (Cajaiba-Santana, 2014), social practices (Howaldt et al., 2017; Jaeger-Erben et al., 2015) to social relations (Avelino et al., 2019; Haxeltine et al., 2017; Pel et al., 2020a) and how they develop, travel, and change over time within socio-technical systems. In this context, Schubert (2018, p. 10) has argued that social innovation “differs from general processes of social change in that relevant stakeholders must stand behind it, actively asserting and implementing its novel qualities, without any guarantee of its success”.

Social innovation research, especially in the energy sector, has often focused on the ‘bottom up’ nature of social innovation, focusing on heroic individuals or small collectives (Hewitt et al., 2019; Wittmayer et al., 2020). This cornering of social innovation to community and the third sector (Unger, 2015) might have contributed to the ever increasing number of different types of innovation, including business model innovation, public sector innovation, frugal innovation or democratic innovation (Godin, 2019). At the intersection of the two fields of study, we see a broader take on social innovation agency emerging (Avelino and Wittmayer, 2018, 2019; Howaldt et al., 2016), which is mirrored by the empirical contributions to this special issue, looking into energy cooperatives and societal action groups (Avelino et al., 2023), individuals and citizens (Carroll et al., 2023), city administrations (Strumińska-Kutra et al., 2023) or energy utilities (Wemyss et al., 2023). We also see emerging an understanding of social innovation agency as being “distributed across ‘webs’ or ‘networks’ of social and material relations” (Pel et al., 2020c, 2017) or as functioning within broader ecosystems of social innovations including various actors and material relations working together for these innovations to thrive (Domanski et al., 2020; Kaletka et al., 2016; Terstriep et al., 2020; Vernay and Sebi, 2020).

Social innovation can potentially be used as a ‘sensitising concept’ - as advocated by Schubert (2021) - that can be useful for transitions research to analyse processes of social change. Rather than social innovation becoming a lens it can become a ‘prism’ to better understand social and technological aspects and their relations in social change processes, as it “allows to critically engage with biased notions of either technical or social determinism” (Schubert, 2021:114/115). By focusing on social innovation as a sensitising concept for “breaking up social and technical relations in processes of social change” (Schubert, 2021:114) this special issue aims to strengthen the movement towards taking a broad perspective on innovation that is recognizing the co-shaping of social and technical aspects in changing socio-technical systems (e.g. Loorbach et al., 2020). This implies the inclusion of social and material aspects and a thorough grounding in social science research (Schubert, 2018).

3. Processes of change to understand social innovation

Similar to many researchers in transition studies, social innovation scholars have largely taken process perspectives to understand the emergence and development of social innovation, ranging from simple stage models of how social innovation turns into social change (Murray et al., 2010) to more recent attempts of conceptualizing social innovation as systemic phenomenon (McGowan et al., 2021; Terstriep et al., 2020; Wittmayer et al., 2022) or as more or less transformative in relation to overcoming path-dependencies of established regimes and systems (Pel et al., 2020).

Contrary to transition studies, social innovation research has not yet consolidated its theoretical base around a limited number of core concepts and frameworks but has been argued to be under-theorized and characterized by a large diversity and heterogeneity of theoretical perspectives (Edwards-Schachter and Wallace, 2017; Pel et al., 2020a; van der Have and Rubalcaba, 2016). Attempts have since then been made to conceptualize social innovation processes in wider change processes (Gregg et al., 2020; Hewitt et al., 2019; Howaldt and Schwarz, 2021; van der Have and Rubalcaba, 2016; Westley et al., 2017; Wittmayer et al., 2021). Some of this is drawing on work derived from areas such as innovation management, economic sociology, and institutional theory and indeed, tapping into some of the origins of and works of sustainability transitions research (Butzin et al. 2014). Also at the intersection, one of the articles of our special issue comes with such a conceptual contribution creating an integrative analytical framework for goal-oriented transformative change processes (Havas et al., 2023). In doing so, the authors draw on innovation studies, social innovation research and sustainability transitions research, as they argue that none of these three strands alone can fully capture transformative change processes. In their conclusions, they propose major building blocks of such an integrative framework and reflect on the normative and policy implications associated with it.

To better understand social innovation as a collective process with multi-actor relationships involved, recent research has taken a ‘fields’ approach, which enables a view beyond individual innovations and initiatives and thus to the regulatory, structural and cultural conditions in change processes. Drawing on institutional theory, fields thinking has been introduced in transition studies, mainly pointing to different levels of ‘structuration’ of fields, as a result of more or less advanced processes of institutionalisation (Fuenfschilling and Truffer, 2014). In the meanwhile, the theory of strategic action fields has been used to analyse questions around agency, institutional context and power in sustainability transitions (Fligstein and McAdam, 2011; Kungl and Hess, 2021). In social innovation research, much work has been done focusing on ‘practice fields’ of related social innovation initiatives, opening up spaces for mutual learning and scope for building common institutionalised elements (e.g. common practices and associated standards). Attention has also gone to more broadly defined ‘policy fields’ covering several such practice fields, for instance in the area of renewable energy, which are characterised by mixtures of cooperation and competition (Rabadjeva and Butzin, 2020). To better understand the emergence and development of social innovation in energy system transformation, both, the more conceptually driven and the more phenomenologically driven work on fields have been used to investigate ‘social innovation fields’ such as around ‘participatory experimentation and incubation’ or ‘framings against fossil fuel based energy pathways’ (Wittmayer et al., 2022).

Building on these previous works, three contributions to the special issue analyse social innovation processes taking a field

approach: [Avelino et al. \(2023\)](#) investigate power dynamics in social innovation fields, [Rogge and Stadler \(2023\)](#) explore an appropriate policy mix for the field of participatory experimentation, and [Strumińska-Kutra et al. \(2023\)](#) investigate internal organizational processes in urban governance within multi-actor governance actor initiatives. In doing so, [Struminska-Kutra et al. \(2023\)](#) propose an overarching conceptual framework that connects field and organizational-level to better understand institutional change in sustainability transitions. Studying six city administrations, they investigate the institutionalization of novel governance arrangements within organizational processes, triggering institutional adaptation and institutional design mechanisms. These processes are supported by elements such as the arrival of institutional entrepreneurs in city administration, being willing to work with local energy initiatives, as well as institutional and organisational infrastructures that allow staff to work on energy issues in the city administration and for an energy agenda to be developed and implemented. These contributions illustrate that taking a field perspective makes it possible to analyse the co-evolution of social innovations and institutional settings, and thus to grasp the role of social innovation in shaping broader transformation processes ([Wittmayer et al., 2022](#))

The extent to which social innovation processes are transformative, or the extent to which they challenge, alter and/or replace dominant institutions (i.e. regimes) in the societal context, has been discussed by scholars at the intersection of both fields in the recent work on transformative social innovation ([Pel et al., 2020a](#)). This work takes social innovation as one key element in transition dynamics and links social innovation processes to institutional changes ([Cajaiba-Santana, 2014](#)), drawing also on institutional scholarship in sustainability transitions research ([Fuenfschilling and Truffer, 2016, 2014; Kungl and Hess, 2021](#)). Like experiments or niches in transition research, social innovations can be regarded as breeding spaces of new solutions to societal challenges and problems or as solutions with a potentially transformative impact. Moreover, and yet another similarity with niches in transition research, social innovation can be studied at different analytical levels ([Krev and Terstriep, 2022](#)). By way of example, contributions to this special issue analyse changing power relations at the level of the energy sector ([Avelino et al. 2023](#)), focus on innovative governing mechanisms at the organizational level ([Struminska-Kutra et al., 2023](#)), or on individual behaviour and practices ([Wemyss et al 2023](#)). The research shows that such levels tend to be blurry and are often not clearly delimited, with boundary actors spanning between different levels and entities. Some scholars consider social innovation to be transformative by definition, working with historical examples from national parks to the right to abortion ([Westley et al., 2017](#)), or emphasizing its political and counterhegemonic ambition ([Moulaert et al., 2013](#)). Others appreciate social innovation as establishing societal relevance and acceptance of technologies ([Maruyama et al., 2007](#)) and thus take more of a practical or instrumental perspective ([Moulaert and MacCallum, 2019](#)). By not assuming social innovation to be automatically transformative nor instrumental, one of the contributions to this special issue analyses the influence of apps on the carbon-emitting practices and behaviours of individuals. ([Wemyss et al. \(2023\)](#)). Thereby, the authors show how closely social and technological learning in niches are intertwined in digital social innovations, but also how easily early hypes about the potential of apps can turn into disappointment. Those perspectives focusing on the transformative potential of social innovation help us put attention to the tensions and paradoxes in the system that social innovations often aim to reconcile, address or develop out of ([van Wijk et al., 2019; Westley et al., 2017](#)).

4. Power and politics around social innovation

Going beyond taking social innovation and sustainability transitions as empirical phenomena to be investigated, issues of normativity, uncertainty and directionality are frequently discussed in both fields ([Edwards-Schachter, 2018; Kemp et al., 2022; Mildenberger and Terstriep, 2023; Stirling, 2011](#)). These point to the open-endedness of futures and the need for public policies to govern directions of change ([Köhler et al., 2019](#)). We see overlaps in the interest around addressing deeply rooted (power) structures as well as around understanding desired and undesired implications of social innovation and sustainability transition efforts.

The extent to which sustainability transitions or social innovations are desirable or not, for whom, under which circumstances and how is subject to much critical debate ([Edwards-Schachter and Wallace, 2017; Haxeltine et al., 2017; Swyngedouw, 2005; Feola and Jaworska, 2019](#)). Some social innovation scholars question the model of social problem-solving linked to social innovation, due to it being seen as mainly filling the gaps neoliberal states with decreasing welfare systems leave behind, such as keeping public services running ([Meichenitsch et al., 2016; Swyngedouw, 2005](#)). We see similar critical debates around the extent to which a transitions discourse is consider an 'ivy discourse' – a discourse that does not deliver on its promise of transformative change but rather reproduces and sustains hegemony ([Westman and Castán Broto, 2022](#)) and cements capitalist or colonial structures ([Arora and Stirling, 2023; Feola, 2019](#)). However, many analyses do not seem to touch on underlying power relations, although the study of power dynamics and policy discourses is necessary to better understand why actors sometimes actively or indirectly maintain existing social problems and structural deficiencies ([Avelino et al., 2019; Fougère et al., 2017](#)). In their contribution to this special issue, [Avelino et al. \(2023\)](#) address this issue and draw attention to power dynamics in social innovation processes around renewable energy. Drawing on three cases about social innovation in energy, [Avelino et al. \(2023\)](#) propose a heuristic to better understand the socio-political dynamics of social innovation processes, focussing on three generic dimensions of power: power to, power over, and power with.

As social innovations often develop out of and aim to reconcile or address tensions and paradoxes in a system ([van Wijk et al., 2019; Westley et al., 2017](#)) this makes them also ambivalent in their processes and outcomes. On the one hand, social innovation may create changes that can aid the process of moving towards 'desirable' directions of change such as sustainability or societal wellbeing ([Hewitt et al., 2019; Schartinger et al., 2020](#)). Consequently, in policy circles or in more instrumental usages of the concept, social innovation has been defined as being social, both in ends and means – and therefore to be 'positive' by definition. On the other hand, by not confusing the desired outcome with actual processes, scholars have warned against conceptualizing social innovation as inherently 'positive' or resulting into positive outcomes. Instead, they call for leaving room for social innovation processes where intended outcomes are not always achieved or even have effects that would be considered 'undesirable' ([Haxeltine et al., 2017; Pel et al., 2023](#)).

This decoupling of processes and outcomes is especially interesting for thinking about social innovation in sustainability transitions, and is closely related to the discussions around transitions directionality (Kemp et al., 2022; Pel et al., 2020b; Stirling, 2011). Such a decoupled analysis draws attention to the need for actively governing social innovation processes, considering directions, uncertainties, and unintended consequences. One contribution to this special issue, Pel et al. (2023) draws attention to the ethical ambiguities of social innovation engaging with its many dark sides. Taking the example of renewable energy prosumerism they discuss mechanisms of commercialisation, instrumentalization or exclusion as possible dark sides. Critiquing researchers' "naïve optimism" or "paralyzing critique" on the phenomenon of renewable energy prosumerism, they draw on transitions directionality to develop a heuristic to engage with the dark sides of innovation in a more balanced way. Social innovation and transitions scholarship thus share concerns around the normative nature of their units of analysis – which need to be taken into account for improving our understanding of social innovation and broader transition processes, including issues of directionality, uncertainty, consequences and power.

5. Policies and policy mixes for social innovation

Both social innovation and sustainability transitions are closely related to policy agendas. On the one hand, social innovation has become a topic of increasing interest to policymakers in general (Bureau of European Policy Advisers, 2011), and in the environmental domain, including in energy, in particular (Mikkonen et al., 2020). Researchers have investigated the understanding and framing of the concept in policy documents often related with changes of the welfare system, where social innovation is considered as a way of addressing challenges associated with poverty, social inequality, and education. In doing so, social innovation research has, for example, critically examined the usefulness of the concept of social innovation for developing sound policies able to tackle social issues (Borzaga and Bodini, 2014). It has also reflected on the inclusion of social innovation in EU policies and the transformative potential of specific policies in these areas (Sabato et al., 2017) as well as offered comparisons across countries (Krlev et al., 2019). In addition, such policy-related research covers how certain social innovations are impacting policymaking processes, for example through creating public awareness, for instance at the urban level (Becker et al., 2016; Blanchet, 2015). Typically, the focus was on the role of policy at one governance level, such as the EU, national or urban level, but less so across multiple governance levels, while more recent research has investigated the impact of policies on specific social innovations in various systems, such as health, energy, mobility, or the environment. A case in point for considering policies within in-depth research into the processes of social innovation are large European research projects such as SI-DRIVE (Oeij et al., 2018).

On the other hand, a growing body of transitions research is investigating the link between policy and innovation in the context of environmental innovation and sustainability transitions more generally. This line of policy-focused research has originated in environmental economics (Popp, 2019), largely focusing on technological change. Among others, it found that the policy instrument type is less important for innovation than the actual instrument design, identifying stringency as a key design feature determining the innovation impact of environmental policy (Kemp and Pontoglio, 2011). Research in innovation studies also found that a balanced instrument mix combining policy tools that target technology push and demand pull is beneficial for stimulating innovation, such as in the case of energy efficiency technologies (Costantini et al., 2017). In light of long-term policy objectives, research in transition studies has also pointed to the importance of policy strategies for driving sustainability transitions, including technology-specific strategies such as those for solar PV (Quitow, 2015). Yet, whether these findings also hold for social innovation remains largely under-investigated. In particular, the broad policy mix thinking that has seen many conceptual and empirical studies on technological innovation and sustainability transitions (Kern et al., 2019) has not yet been specifically applied to social innovation.

Taken together, dedicated research on the interplay between policy, social innovation and transformation is still emerging in both social innovation research as well as in transition studies (Edler et al., 2023). In addition, such integrated efforts remain largely disconnected from the policy mix literature investigating this interplay for sustainability transitions. This research gap is tackled by Rogge and Stadler in this issue, who present the first application of such broad policy mix thinking specifically dedicated to social innovation. For this, they develop a simple analytical framework combining two complementary policy mix approaches in a 2×2 matrix of policy mix elements (strategy and instrument mix) and functions (creation and destruction). Based on a case study of the field of participatory incubation and experimentation in energy in Germany, Rogge and Stadler (2023) delineate the focal policy mix (relevant) for social innovation – both through a top-down and bottom-up approach. Their investigation leads them to question the suitability of differentiating policy instruments into technology push, demand pull and systemic instruments within the context of social innovation; consequently, they propose to move towards differentiating between socio-technical push and pull instead. Ultimately, in the spirit of bridging social innovation and transitions research, they suggest conceptualizing, designing and evaluating policy mixes for socio-technical change, particularly as we enter the acceleration phase of sustainability transitions (Markard et al., 2020). For this, they offer a phase-sensitive overview of policy mixes for sustainability transitions which support technological, social and socio-technical innovation in the emergence and acceleration phase of transitions through elements of creation and destruction.

However, policy makers beyond the domain of innovation policies have a long way to go to ensure that sectoral and environmental policies will truly harness the potential of social innovation for accelerating sustainability transitions (Rogge et al. 2023). For this, several preconditions need to be met before sophisticated policy mix approaches can be implemented in practice, such as a clear definition of social innovation as foundation for its improved measurement to enable evidence-based policy making. It is this gap that is tackled in this issue by Krlev and Terstriepe (2022) who highlight the importance of measuring social innovation as a phenomenon, as this constitutes an important precondition of good policy (mix) design, monitoring and evaluation. For this purpose, they suggest a broad set of key indicators that can help to capture the systemic nature of sustainability transitions, with a particular focus on social innovation. At the same time, they caution about some gaps in the availability of data, that should urgently be closed to improve the basis for evidence-based policy making, as only then policies can be purposefully designed to harness the potential of social innovation

for accelerating sustainability transitions.

For example, as shown by Carroll et al. (2023) in this special issue, data from citizen surveys dedicated to social innovation can provide valuable insights into different forms of citizen engagement in social innovation as pre-condition for evidence-based policy making. In their study, they investigate citizen participation in energy cooperatives, crowdfunding and peer-to-peer platforms across several European countries, thereby covering different types of social innovation in energy. Among other things their analysis provides insights into the type of individuals that policy makers eager to support social innovation in energy could target most easily to increase uptake of certain social innovations in the short term. Furthermore, Carroll et al. (2023) offer suggestions of how the hard to reach older individuals could be convinced to participate in long-term investments, too. In addition, they also point to educational measures aimed at improving financial literacy which they expect to have positive impacts on individual's participation in socially innovative and financially attractive energy initiatives.

6. Conclusion

This introduction to the special issue on 'Advancing the understanding of social innovation in sustainability transitions' is situated at the intersection of transition studies and social innovation research. We have shown that transition scholars increasingly focus on social innovation phenomena, whilst social innovation scholars engage in better understanding the relations between social innovation and social change and its impacts towards sustainability. With its eight contributions, this special issue further explicated and broadened out this intersection of both fields, with an empirical focus on insights on energy transitions. Social innovation was introduced as a sensitising concept to advance our understanding of sustainability transitions along three themes: process of change; power and politics; as well as policies and policy mixes. Our focus on the intersection of both fields made visible their existing connections and potential for future exchanges and learnings. Therefore, we close with offering some directions for future research and implications for policy.

6.1. Directions for future research

While this special issue does not offer all answers about social innovation in and for sustainability transitions, it showcases the relevance of continuing to bridge the fields of transition studies and social innovation research. To continue this cross-pollination, we propose three future research directions to further explore the linkages between the fields.

First, we have established that the research on social innovation and sustainability transitions shares a focus on understanding processes of social innovation in relation to institutional change. We see an emergence of novel conceptualizations on transformative change, new perspectives on fields and institutional change, as well as insights on the transformative potential of social innovation. We argue that in order to deepen our knowledge on social innovation processes, more research efforts need to go into investigating how, to what extent and under what conditions social innovation can contribute to broadening out and opening up existing processes of change. Since social innovation initiatives are co-shaped by broader changes of the social, political and material orderings of the world, they are not able to easily achieve their aims. To unpack this, there is a need for a greater focus on institutions as well as notions of politics, power and governance within research on social innovation in relation to institutional change.

Second, social innovation and transitions scholarship share concerns around the normative nature of their units of analysis – which need to be considered for increasing our understanding of social innovation and broader transition processes, including issues of directionality, uncertainty, conflict and power. Therefore, we argue that more work needs to go into social innovation processes and their directionalities, in particular possible ways to govern these processes and more open and transparent ways on deciding which directions to take. Although some governments proclaim 'pro-innovation' and 'sustainable policies', as argued by Stirling (2009, p. 2), they often do this "without specifying which options or values are prioritized". Future research on social innovation in and for sustainability transitions needs to engage much more with questions such as 'which way', 'decided by whom' and 'for what reason' – especially in the energy context where the pathways for the coming era are now being built and old structures persist but are actually in need of being dismantled. This involves an acknowledgement of the normative implications of sustainability and how they remain disparate, ambiguous, and contested between diverse actors. This is not only relevant to increase a general understanding thereof, but also to build a repertoire of strategies for social innovation actors (Pel et al. (2020a, p. 11).

Third, we see several avenues for future research on the interplay between policy, social innovation and sustainability transitions, in particular studies building on existing research on innovation policy mixes for transitions. While the analysis on policy mixes for social innovation included in this special issue is limited to policy mix elements, it points to the need to develop new policy instrument typologies better aligned with the specificities of social innovation. In addition, future research should address the politics of policy change processes, and thus assume a broader perspective that combines policy mix elements and processes. Such broader policy mix studies should pay more attention to policy efforts aimed at stabilising the existing, unsustainable regime and thus hampering the transformative potential of social innovation. Furthermore, as demonstrated by the insights from the bottom-up approach in policy mix delineation, future research should pay more attention to multi-level policy mixes and their role for enabling and hindering social innovation. More fundamentally, however, what is needed for such policy-relevant research and the better consideration of social innovation in policy making is to improve the measurement of social innovation. For this, better data and a sound standardisation of indicators are needed.

6.2. Key policy implications

Next to offering these directions for future research, we also derive several key policy implications from the contributions to this special issue for decision makers interested in advancing social innovation for sustainability transitions. First, normative dialogues among innovators, policymakers and other stakeholders can help to establish shared societal goals guiding policy support for social innovation (Havas et al., 2023). These and other exchanges facilitated by governments at various levels can benefit from being innovative when it comes to the social relations with other actors (Strumińska-Kutra et al., 2023).

Second, two key innovation policy instruments appear particularly promising for promoting social innovation: experimentation and information provision. Regarding the former, Havas et al. (2023) encourage more policy experiments, for which policymakers should create space and appropriate mechanisms. Regarding the latter, Carroll et al. (2023) suggest that the large potential of social innovation in energy can be tapped by raising the public's awareness of the existence and benefits of participating in socially innovative initiatives and by communicating positive experiences of those already participating in such initiatives as well as more widely highlighting the available public support for them. In addition, following the logic of Rogge and Stadler (2023), policy mixes for social innovation should also include sectoral policies, and consider both the supportive role of sectoral policy for accelerating the scaling of social innovations and the detrimental impact from regime supporting policies which should be reduced. Finally, when designing supportive policies, policy makers should consider inclusivity and the distribution of benefits, so as to ensure that participation in social innovation initiatives does not contribute to further social inequalities (Carroll et al., 2023).

Third, following the logic of policy mixes implies a need to orchestrate policy objectives and instruments across policy fields and governance levels – under the umbrella of transformative change as overarching goal (Havas et al., 2023). Such orchestration requires better monitoring of social innovation and its impact, with novel system and process indicators (Krlev and Terstriep, 2022).

Finally, impact assessments of social innovation should include ethical considerations, because social innovation is normatively as ambivalent as any other kind of innovation and thus requires case-specific assessments of both the bright and dark sides of specific social innovations. This requires the development and continuous updating of normative standards enabling the evaluation of positive as well as negative impacts of social innovation (Pel et al., 2023).

Part of Special Issue

This paper is the editorial introduction for the Special Issue on 'Advancing the understanding of social innovation in sustainability transitions'.

CRedit authorship contribution statement

Julia M. Wittmayer: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. **Sabine Hielscher:** Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. **Karoline S. Rogge:** Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. **K. Matthias Weber:** Conceptualization, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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References

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

- Arora, S., Stirling, A., 2023. Colonial modernity and sustainability transitions: A conceptualisation in six dimensions. *Environmental Innovation and Societal Transitions* 48, 100733. <https://doi.org/10.1016/j.eist.2023.100733>.
- Audet, R., 2014. The double hermeneutic of sustainability transitions. *Environmental Innovation and Societal Transitions* 11, 46–49. <https://doi.org/10.1016/j.eist.2014.02.001>.
- Avelino, F., Hielscher, S., Strumińska-Kutra, M., de Geus, T., Widdel, L., Wittmayer, J., Dañkowska, A., Dembek, A., Fraaije, M., Heidary, J., Iskandarova, M., Rogge, K., Stasik, A., Crudi, F., 2023. Power to, over and with: Exploring power dynamics in social innovations in energy transitions across Europe. *Environmental Innovation and Societal Transitions* 48, 100758. <https://doi.org/10.1016/j.eist.2023.100758>.
- Avelino, F., Wittmayer, J.M., 2018. Transformative Social Innovation and its Multi-Actor Nature. In: Howaldt, J., Kaletka, C., Schröder, A., Zirngiebl, M. (Eds.), *Atlas of Social Innovation - New Practices for a Better Future*. Sozialforschungsstelle. TU Dortmund University, Dortmund, pp. 47–50.
- Avelino, F., Wittmayer, J.M., Kemp, R., Haxeltine, A., 2017. Game-changers and transformative social innovation. *Ecology and Society* 22. <https://doi.org/10.5751/ES-09897-220441>.
- Avelino, F., Wittmayer, J.M., Pel, B., Weaver, P., Dumitru, A., Haxeltine, A., Kemp, R., Jørgensen, M.S., Bauler, T., Ruijsink, S., O’Riordan, T., 2019. Transformative social innovation and (dis)empowerment. *Technological Forecasting and Social Change* 145, 195–206. <https://doi.org/10.1016/j.techfore.2017.05.002>.
- Ayob, N., Teasdale, S., Fagan, K., 2016. How social innovation “Came to Be”: Tracing the evolution of a contested concept. *Journal of Social Policy* 45, 635–653. <https://doi.org/10.1017/S004727941600009X>.
- Becker, S., Blanchet, T., Kunze, C., 2016. Social movements and urban energy policy: Assessing contexts, agency and outcomes of remunicipalisation processes in Hamburg and Berlin. *Utilities Policy* 41, 228–236. <https://doi.org/10.1016/j.jup.2016.02.001>.
- Blanchet, T., 2015. Struggle over energy transition in Berlin: How do grassroots initiatives affect local energy policy-making? *Energy Policy* 78, 246–254. <https://doi.org/10.1016/j.enpol.2014.11.001>.
- BMBF, BMWK, 2023. Nationale Strategie für Soziale Innovationen und Gemeinwohlorientierte Unternehmen. Berlin.
- Borzaga, C., Bodini, R., 2014. What to Make of Social Innovation? Towards a Framework for Policy Development. *Social Policy & Society* 13, 411–421. <https://doi.org/10.1017/S1474746414000116>.
- Brown, D., Hall, S., Davis, M.E.M., 2019. Prosumers in the post subsidy era: an exploration of new prosumer business models in the UK. *Energy Policy* 135, 110984. <https://doi.org/10.1016/j.enpol.2019.110984>.
- Bureau of European Policy Advisers, 2014. *Social innovation: a decade of changes : a BEPA report*.
- Bureau of European Policy Advisers, 2011. Empowering people, driving change Social Innovation in the European Union. Publications Office of the European Union, Luxembourg. <https://doi.org/10.2796/13155>.
- Cajaliba-Santana, G., 2014. Social innovation: Moving the field forward. A conceptual framework. *Technological Forecasting and Social Change* 82, 42–51. <https://doi.org/10.1016/j.techfore.2013.05.008>.
- Carroll, J., Denny, E., Ferris, A., Petrov, I., Wu, H., 2023. A socio-economic examination of participation in socially innovative energy projects. *Environmental Innovation and Societal Transitions* 48, 100746. <https://doi.org/10.1016/j.eist.2023.100746>.
- Castro-Arce, K., Vanclay, F., 2020. Transformative social innovation for sustainable rural development: An analytical framework to assist community-based initiatives. *Journal of Rural Studies* 74, 45–54. <https://doi.org/10.1016/j.jrurstud.2019.11.010>.
- Costantini, V., Crespi, F., Palma, A., 2017. Characterizing the policy mix and its impact on eco-innovation : A patent analysis of energy-efficient technologies. *Research Policy* 46, 799–819. <https://doi.org/10.1016/j.respol.2017.02.004>.
- Dias, J., Partidário, M., 2019. Mind the Gap: The Potential Transformative Capacity of Social Innovation. *Sustainability* 11, 4465. <https://doi.org/10.3390/su11164465>.
- Domanski, D., Howaldt, J., Kaletka, C., 2020. A comprehensive concept of social innovation and its implications for the local context – on the growing importance of social innovation ecosystems and infrastructures. *European Planning Studies* 28, 454–474. <https://doi.org/10.1080/09654313.2019.1639397>.
- Edler, J., Ostertag, K., Schuler, J., 2023. Social innovation, transformation, and public policy: towards a conceptualization and critical appraisal. *Science and Public Policy* scad 054. <https://doi.org/10.1093/scipol/scad054>.
- Edwards-Schachter, M., 2018. The nature and variety of innovation. *International Journal of Innovation Studies* 2, 65–79. <https://doi.org/10.1016/J.IJIS.2018.08.004>.
- Edwards-Schachter, M., Wallace, M.L., 2017. ‘Shaken, but not stirred’: Sixty years of defining social innovation. *Technological Forecasting and Social Change* 119, 64–79. <https://doi.org/10.1016/j.techfore.2017.03.012>.
- Feola, G., 2019. Capitalism in sustainability transitions research: Time for a critical turn? *Environmental Innovation and Societal Transitions* 35, 241–250. <https://doi.org/10.1016/j.eist.2019.02.005>.
- Feola, G., Jaworska, S., 2019. One transition, many transitions? A corpus-based study of societal sustainability transition discourses in four civil society’s proposals. *Sustainability Science* 14, 1643–1656. <https://doi.org/10.1007/s11625-018-0631-9>.
- Fligstein, N., McAdam, D., 2011. Toward a General Theory of Strategic Action Fields. *Sociological Theory* 29, 1–26. <https://doi.org/10.1111/j.1467-9558.2010.01385.x>.
- Fougère, M., Segercrantz, B., Seeck, H., 2017. A critical reading of the European Union’s social innovation policy discourse: (Re)legitimizing neoliberalism. *Organization* 24, 819–843. <https://doi.org/10.1177/1350508416685171>.
- Foulds, C., Robison, R., 2018. Mobilising the Energy-Related Social Sciences and Humanities. In: Foulds, C., Robison, R. (Eds.), *Advancing Energy Policy: Lessons on the Integration of Social Sciences and Humanities*. Palgrave Macmillan, Cham, pp. 1–11.
- Franz, H.W., Hochgerner, J., Howaldt, J., 2012. *Challenge Social Innovation: Potentials for Business, Social Entrepreneurship, Welfare and Civil Society*. SPRINGER, Heidelberg.
- Fuensschilling, L., Truffer, B., 2016. The interplay of institutions, actors and technologies in socio-technical systems — An analysis of transformations in the Australian urban water sector. *Technological Forecasting and Social Change* 103, 298–312. <https://doi.org/10.1016/J.TECHFORE.2015.11.023>.
- Fuensschilling, L., Truffer, B., 2014. The structuration of socio-technical regimes—Conceptual foundations from institutional theory. *Research Policy* 43, 772–791. <https://doi.org/10.1016/J.RESPOL.2013.10.010>.
- Geels, F., 2005. Co-evolution of technology and society: The transition in water supply and personal hygiene in the Netherlands (1850–1930)—a case study in multi-level perspective. *Technology in Society* 27, 363–397. <https://doi.org/10.1016/j.techsoc.2005.04.008>.
- Geels, F.W., 2002. Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy* 31, 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., Kern, F., Clark, W.C., 2023. Sustainability transitions in consumption-production systems. *Proc. Natl. Acad. Sci. U.S.A.* 120 <https://doi.org/10.1073/pnas.2310070120> e2310070120.
- Godin, B., Howaldt, J., Kaletka, C., Schröder, A., Zirngiebl, M., 2019. From Innovation to X-Innovation to Critical Innovation. *Atlas of Social Innovation. 2nd Volume - A World of New Practices*. oekom Verlag GmbH, Munich, pp. 12–15.
- Greene, M., 2018. Socio-technical transitions and dynamics in everyday consumption practice. *Global Environmental Change* 52, 1–9. <https://doi.org/10.1016/j.gloenvcha.2018.05.007>.
- Gregg, J.S., Nyborg, S., Hansen, M., Schwanitz, V.J., Wierling, A., Zeiss, J.P., Delvaux, S., Saenz, V., Polo-Alvarez, L., Candelise, C., Sciuillo, A., Padovan, D., 2020. Collective action and social innovation in the energy sector: A mobilization model perspective. *Energies* 13. <https://doi.org/10.3390/en13030651>.
- Grin, J., Rotmans, J., Schot, J., 2010. *Transitions to sustainable development: new directions in the study of long term transformative change*. Routledge, New York.
- Hansmeier, H., Schiller, K., Rogge, K.S., 2021. Towards methodological diversity in sustainability transitions research? Comparing recent developments (2016–2019) with the past (before 2016). *Environmental Innovation and Societal Transitions* 38, 169–174. <https://doi.org/10.1016/j.eist.2021.01.001>.
- Hargreaves, T., Longhurst, N., Seyfang, G., 2013. Up, Down, round and round: Connecting Regimes and Practices in Innovation for Sustainability. *Environ Plan A* 45, 402–420. <https://doi.org/10.1068/a45124>.

- Harslof, I., 2015. European Policy and Social Innovation. In: Bertin, G., Campstrini, S. (Eds.), *European Policy and Social Innovation. Equiwellfare and Social Innovation : A European Perspective* 107–121.
- Havas, A., Schartinger, D., Weber, K.M., 2023. Innovation studies, social innovation, and sustainability transitions research: From mutual ignorance towards an integrative perspective? *Environmental Innovation and Societal Transitions* 48, 100754. <https://doi.org/10.1016/j.eist.2023.100754>.
- Haxeltine, A., Pel, B., Wittmayer, J.M., Dumitru, A., Kemp, R., Avelino, F., 2017. Building a middle-range theory of Transformative Social Innovation; theoretical pitfalls and methodological responses. *European Public & Social Innovation Review* 2, 1–19. <https://doi.org/10.31637/epsir.17-1.5>.
- Hebinck, A., Galli, F., Arcuri, S., Carroll, B., O'Connor, D., Oostindie, H., 2018. Capturing change in European food assistance practices: a transformative social innovation perspective. *Local Environment* 23, 398–413. <https://doi.org/10.1080/13549839.2017.1423046>.
- Hewitt, R.J., Bradley, N., Baggio, C.A., Barlagne, C., Ceglaz, A., Cremades, R., McKeen, M., Otto, I.M., Slee, B., 2019. Social Innovation in Community Energy in Europe: A Review of the Evidence. *FRONTIERS IN ENERGY RESEARCH* 7. <https://doi.org/10.3389/fenrg.2019.00031>.
- Hirsh, R.F., Jones, C.F., 2014. History's contributions to energy research and policy. *Energy Research & Social Science* 1, 106–111. <https://doi.org/10.1016/j.ERSS.2014.02.010>.
- Hiteva, R., Sovacool, B., 2017. Harnessing social innovation for energy justice: A business model perspective. *Energy Policy* 107, 631–639. <https://doi.org/10.1016/j.enpol.2017.03.056>.
- Hoppe, T., de Vries, G., 2018. Social innovation and the energy transition. *Sustainability (Switzerland)* 11. <https://doi.org/10.3390/su11010141>.
- Howaldt, J., Kaletka, C., 2023. *Encyclopedia of Social Innovation*. Edward Elgar Publishing, Cheltenham and Northampton.
- Howaldt, J., Kaletka, C., Schröder, A., 2021. A Research Agenda for Social Innovation - the emergence of a research field. In: Howaldt, J., Kaletka, C., Schröder, A. (Eds.), *A Research Agenda for Social Innovation*. Edward Elgar Publishing, Cheltenham.
- Howaldt, J., Kaletka, C., Schröder, A., 2016. Social Entrepreneurs: Important Actors within an Ecosystem of Social Innovation. *European Public & Social Innovation Review* 1. <https://doi.org/10.31637/epsir.16-2.4>.
- Howaldt, J., Schröder, A., Butzin, A., Rehfeld, D., 2017. Towards a general theory and typology of social innovation, SI-DRIVE Social Innovation: Driving Force of Social Change. *European Union's Seventh Framework Programme* f.
- Howaldt, J., Schwarz, M., 2021. Social innovation and social change. In: Howaldt, J., Kaletka, C., Schröder, A. (Eds.), *A Research Agenda for Social Innovation*. Edward Elgar Publishing, Cheltenham and Northampton.
- Howaldt, J., Schwarz, M., 2016. Social Innovation and its Relationship to Social Change. Verifying existing Social Theories in reference to Social Innovation and its Relationship to Social Change (Project: SI-DRIVE), *SI Drive* 612870.
- Jaeger-Erben, M., Rückert-John, J., Schäfer, M., 2015. Sustainable consumption through social innovation: a typology of innovations for sustainable consumption practices. *Journal of Cleaner Production* 108, 784–798. <https://doi.org/10.1016/j.jclepro.2015.07.042>.
- Jessop, B., Moolaert, F., Hulgård, L., Hamdouch, A., Hulgard, L., Hamdouch, A., 2013. Social Innovation Research. A New Stage in Innovation Analysis? In: Moolaert, F. (Ed.), *The International Handbook on Social Innovation. Collective Action, Social Learning and Transdisciplinary Research*. Edward Elgar Publishing, pp. 110–130. <https://doi.org/10.4337/9781849809993.00020>.
- Kaletka, C., Markmann, M., Pelka, B., 2016. Peeling the Onion. An Exploration of the Layers of Social Innovation Ecosystems. *European Public & Social Innovation Review* 1.
- Kanger, L., 2020. Neglected systems and theorizing: A comment on the transitions research agenda. *Environmental Innovation and Societal Transitions*. <https://doi.org/10.1016/j.eist.2020.01.001>.
- Kemp, R., Pel, B., Scholl, C., Boons, F., 2022. Diversifying deep transitions: Accounting for socio-economic directionality. *Environmental Innovation and Societal Transitions* 44, 110–124. <https://doi.org/10.1016/j.eist.2022.06.002>.
- Kemp, R., Pontoglio, S., 2011. The innovation effects of environmental policy instruments — A typical case of the blind men and the elephant? *Ecological Economics* 72, 28–36. <https://doi.org/10.1016/j.ecolecon.2011.09.014>.
- Kemp, R., Rotmans, J., 2009. Transitioning policy: Co-production of a new strategic framework for energy innovation policy in the Netherlands. *Policy Sciences* 42, 303–322. <https://doi.org/10.1007/s11077-009-9105-3>.
- Kern, F., Rogge, K.S., Howlett, M., 2019. Policy mixes for sustainability transitions: New approaches and insights through bridging innovation and policy studies. *Research Policy* 48, 103832. <https://doi.org/10.1016/j.respol.2019.103832>.
- Köhler, J., Geels, F.W.F.W., Kern, F., Markard, J., Onsongo, E., Wiczorek, A., Alkemade, F., Avelino, F., Bergek, A., Boons, F., Welch, D., Wells, P., Fünfschilling, L., Hess, D., Holtz, G., Hyysalo, S., Jenkins, K., Kivimaa, P., Martiskainen, M., McMeekin, A., Mühlemeier, M.S., Nykvist, B., Pel, B., Raven, R., Rohracher, H., Sandén, B., Schot, J., Sovacool, B., Turnheim, B., Welch, D., 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>.
- Krlev, G., Einarsson, T., Wijkström, F., Heyer, L., Mildenerberger, G., 2019. The Policies of Social Innovation: A Cross-National Analysis. *Nonprofit and Voluntary Sector Quarterly* 089976401986650. <https://doi.org/10.1177/0899764019866505>.
- Krlev, G., Terstriep, J., 2022. Pinning it down? Measuring innovation for sustainability transitions. *Environmental Innovation and Societal Transitions* 45, 270–288. <https://doi.org/10.1016/j.eist.2022.11.005>.
- Kungl, G., Hess, D.J., 2021. Sustainability transitions and strategic action fields: A literature review and discussion. *Environmental Innovation and Societal Transitions* 38, 22–33. <https://doi.org/10.1016/j.eist.2020.10.004>.
- Lindberg, M.B., Markard, J., Andersen, A.D., 2019. Policies, actors and sustainability transition pathways: A study of the EU's energy policy mix. *Research Policy, Policy mixes for sustainability transitions: New approaches and insights through bridging innovation and policy studies* 48, 103668. <https://doi.org/10.1016/j.respol.2018.09.003>.
- Loorbach, D., Frantzeskaki, N., Avelino, F., 2017. Sustainability Transitions Research: Transforming Science and Practice for Societal Change. *Annual Review of Environment and Resources* 42, 599–626. <https://doi.org/10.1146/annurev-enviren-102014-021340>.
- Loorbach, D., Wittmayer, J.M., Avelino, F., von Wirth, T., Frantzeskaki, N., 2020. Transformative innovation and translocal diffusion. *Environmental Innovation and Societal Transitions* 1–10. <https://doi.org/10.1016/j.eist.2020.01.009>.
- Markard, J., 2018. The next phase of the energy transition and its implications for research and policy. *Nature Energy* 3. <https://doi.org/10.1038/s41560-018-0171-7>.
- Markard, J., Geels, F.W., Raven, R., 2020. Challenges in the acceleration of sustainability transitions. *Environ. Res. Lett.* 15, 081001 <https://doi.org/10.1088/1748-9326/ab9468>.
- Markard, J., Raven, R., Truffer, B., 2012. Sustainability transitions: An emerging field of research and its prospects. *Research Policy* 41, 955–967. <https://doi.org/10.1016/j.respol.2012.02.013>.
- Maruyama, Y., Nishikido, M., Iida, T., 2007. The rise of community wind power in Japan: Enhanced acceptance through social innovation. *Energy Policy* 35, 2761–2769. <https://doi.org/10.1016/j.enpol.2006.12.010>.
- Matschoss, K., Mikkonen, I., Gynther, L., Koukoulakis, G., Uihlein, A., Murauskaitė-Bull, I., 2022. Drawing policy insights from social innovation cases in the energy field. *Energy Policy* 161, 112728. <https://doi.org/10.1016/j.enpol.2021.112728>.
- McGowan, K., Antadze, N., 2023. Recognizing the dark side of sustainability transitions. *J Environ Stud Sci* 13, 344–349. <https://doi.org/10.1007/s13412-023-00813-0>.
- McGowan, K., Kennedy, A., El-Hussein, M., Bear Chief, R., 2020. Decolonization, social innovation and rigidity in higher education. *SEJ* 16, 299–316. <https://doi.org/10.1108/SEJ-10-2019-0074>.
- McGowan, K., Westley, F., Moore, M.-L., Alexiuk, E., Antadze, N., Geobey, S., Tjornbo, O., 2021. The importance of systems thinking and transformation for social innovation research: the evolution of an approach to a social innovation. In: Howaldt, J., Kaletka, C., Schröder, A. (Eds.), *A Research Agenda for Social Innovation*. Edward Elgar Publishing, Cheltenham.
- Meichenitsch, K., Neumayr, M., Schenk, M., 2016. Editorial. In: Meichenitsch, K., Neumayr, M., Schenk, M. (Eds.), *Neu! Besser! Billiger! Soziale Innovationen Als Leeres Versprechen*, 7–13. Mandelbaum. Mandelbaum, Wien, Wien, pp. 7–13.

- Mikkonen, I., Gynther, L., Matschoss, K., Koukoulfikis, G., Murauskaite-Bull, I., Uihlein, A., 2020. Social innovations for the energy transition. Publications Office of the European Union, Luxembourg. <https://doi.org/10.2760/555111>.
- Mildenberger, G., Terstriep, J., 2023. Normativität im Konzept "sozialer Innovation". In: Hüttemann, M., Parpan-Blaser, A. (Eds.), *Normativität im Konzept "sozialer Innovation. Innovative Soziale Arbeit. Grundlagen, Praxisfelder Und Methoden* 15–28.
- Moore, M.-L., Riddell, D., Vocisano, D., 2015. Scaling Out, Scaling Up, Scaling Deep: Strategies of Non-profits in Advancing Systemic Social Innovation. *Journal of Corporate Citizenship*.
- Moulaert, F., MacCallum, D., 2019. *Advanced Introduction to Social Innovation*. Edward Elgar Publishing Cheltenham and Northampton.
- Moulaert, F., MacCallum, D., Mehmood, A., Hamdouch, A., 2013. *The international handbook on social innovation: collective action, social learning and trans-disciplinary research*. Edward Elgar Publishing, Cheltenham.
- Moulaert, F., Mehmood, A., MacCallum, D., Leubolt, B., 2017. *Social innovation as a trigger for transformations - the role of research*. Publications Office of the European Union, Luxembourg.
- Murray, R., Caulier-Grice, J., Mulgan, G., 2010. *The Open Book on Social Innovation*. The Young Foundation/NESTA, London.
- OECD, 2021. *Building local ecosystems for social innovation: A methodological framework* (No. No. 2021/06). OECD Local Economic and Employment Development (LEED) Papers. OECD Publishing, Paris.
- Oeij, P.R.A., van der Torre, W., Vaas, S., Dhondt, S., 2018. *Understanding Social Innovation as an Innovation Process*. Research carried out during the EU-FP7 Project "SI- Drive, Social innovation: Driving force of social change. TNO, Leiden, pp. 2014–2017.
- Olsson, P., Moore, M.L., Westley, F.R., McCarthy, D.D.P., 2017. The concept of the Anthropocene as a game-changer: A new context for social innovation and transformations to sustainability. *Ecology and Society* 22. <https://doi.org/10.5751/ES-09310-220231>.
- Pel, B., Dorland, J., Wittmayer, J.M., Jørgensen, M.S., 2017. Detecting Social Innovation agency. *European Public & Social Innovation Review (EPSIR)* 2, 1–17. <https://doi.org/10.1145/1869790.1869795>.
- Pel, B., Haxeltine, A., Avelino, F., Dumitru, A., Kemp, R., Bauler, T., Kunze, I., Dorland, J., Wittmayer, J.M., Jørgensen, M.S., 2020a. Towards a theory of transformative social innovation: A relational framework and 12 propositions. *Research Policy* 49, 104080. <https://doi.org/10.1016/j.respol.2020.104080>.
- Pel, B., Raven, R., van Est, R., 2020b. Transitions governance with a sense of direction: synchronization challenges in the case of the dutch 'Driverless Car' transition. *Technological Forecasting and Social Change* 160, 120244. <https://doi.org/10.1016/j.techfore.2020.120244>.
- Pel, B., Wittmayer, J.M., Avelino, F., Looibach, D., de Geus, T., 2023. How to account for the dark sides of social innovation? Transitions directionality in renewable energy prosumerism. *Environmental Innovation and Societal Transitions* 49, 100775. <https://doi.org/10.1016/j.eist.2023.100775>.
- Pel, B., Wittmayer, J.M., Dorland, J., Jørgensen, M.S.M.S., Søgaard Jørgensen, M., 2020c. Unpacking the social innovation ecosystem: an empirically grounded typology of empowering network constellations. *Innovation: The European Journal of Social Science Research* 33, 311–336. <https://doi.org/10.1080/13511610.2019.1705147>.
- Phillips, A., Luo, R., Wendland-Liu, J., 2023. Shifting the paradigm: A critical review of social innovation literature. *International Journal of Innovation Studies* S2096248723000292. <https://doi.org/10.1016/j.ijis.2023.08.003>.
- Plohl, U., Petritz, H., Stern, T., 2020. A social innovation perspective on dietary transitions: Diffusion of vegetarianism and veganism in Austria. *Environmental Innovation and Societal Transitions* 36, 164–176. <https://doi.org/10.1016/j.eist.2020.07.001>.
- Popp, D., 2019. *Environmental policy and innovation: a decade of research*, CESifo Working Paper, No. 7544. Center for Economic Studies and Ifo Institute, Munich.
- Prasad, S.C., 2016. Innovating at the margins: The system of rice intensification in India and transformative social innovation. *Ecology and Society* 21. <https://doi.org/10.5751/ES-08718-210407>.
- Quitow, R., 2015. Assessing policy strategies for the promotion of environmental technologies: A review of India's National Solar Mission. *Research Policy* 44, 233–243. <https://doi.org/10.1016/j.respol.2014.09.003>.
- Rabadjeva, M., Butzin, A., 2020. Emergence and diffusion of social innovation through practice fields. *European Planning Studies* 28, 925–940. <https://doi.org/10.1080/09654313.2019.1577362>.
- Rip, A., Kemp, R., 1998. *Technological change*. In: Rayner, S., Malone, E.L. (Eds.), *Human Choice and Climate Change: Vol. II, Resources and Technology*. Battelle Press, pp. 327–399.
- Rogge, K.S., Stadler, M., de Geus, T., Hielscher, S., Wittmayer, J., Broich, A., Kotler, A., Mischkowski, N., Stasik, A., Ranville, A., Vernay, A.-L., 2023. Fit for social innovation? Policy reflections for EU energy and climate policy making. *Oxford Open Energy* 2, oiac 010. <https://doi.org/10.1093/oenenergy/oiac010>.
- Sabato, S., Vanhercke, B., Verschraegen, G., 2017. Connecting entrepreneurship with policy experimentation? The EU framework for social innovation. *Innovation: The European Journal of Social Science Research* 30, 147–167. <https://doi.org/10.1080/13511610.2017.1282308>.
- Schartinger, D., Rehfeld, D., Weber, M., Rhombert, W., 2020. Green social innovation—towards a typology. *European Planning Studies* 28, 1026–1045. <https://doi.org/10.1080/09654313.2019.1677564>.
- Schot, J., Kanger, L., 2018. Deep transitions: Emergence, acceleration, stabilization and directionality. *Research Policy* 47, 1045–1059. <https://doi.org/10.1016/j.respol.2018.03.009>.
- In Benoît Godin, Dominique Vinck, Gerald Gaglio (Eds.): Schubert, C., 2021. *Social innovation. Contested understandings of social change*. In: Godin, B., Vinck, D., Gaglio, G. (Eds.), *Handbook of Alternative Theories of Innovation*. Edward Elgar Publishing, Cheltenham, pp. 106–121.
- Schubert, C., Rammert, W., Windeler, A., Knoblauch, H., 2018. *Social Innovation*. In: Hutter, M. (Ed.), *Innovation Society Today: Perspectives, Fields, and Cases*. Springer Fachmedien, Wiesbaden, pp. 371–391.
- Selvakkumaran, S., Ahlgren, E.O., 2021. Understanding social innovation in local energy transitions processes: A multi-case study. *Global Transitions* 3, 1–12. <https://doi.org/10.1016/j.glt.2020.12.001>.
- Shove, E., Walker, G., 2010. Governing transitions in the sustainability of everyday life. *Research Policy* 39, 471–476. <https://doi.org/10.1016/j.respol.2010.01.019>.
- Slee, B., 2020. Social innovation in community energy in Scotland: Institutional form and sustainability outcomes. *Global Transitions* 2, 157–166. <https://doi.org/10.1016/j.glt.2020.07.001>.
- Sovacool, B.K., 2014. Analyzing fifteen years of energy scholarship and proposing a social science research agenda. *Energy Research and Social Science* 1, 1–29. <https://doi.org/10.1016/j.erss.2014.02.003>.
- Sovacool, B.K., Ryan, S.E., Stern, P.C., Janda, K., Rochlin, G., Spreng, D., Pasqualetti, M.J., Wilhite, H., Lutzenhiser, L., 2015. Integrating social science in energy research. *Energy Research & Social Science* 6, 95–99. <https://doi.org/10.1016/j.ERSS.2014.12.005>.
- Stevs, D., Felli, R., 2020. Planetary just transition? How inclusive and how just? *Earth System Governance* 6, 100065. <https://doi.org/10.1016/j.esg.2020.100065>.
- Stirling, A., 2011. Pluralising progress: From integrative transitions to transformative diversity. *Environmental Innovation and Societal Transitions* 1, 82–88. <https://doi.org/10.1016/j.eist.2011.03.005>.
- Stirling, A., 2009. *Direction, Distribution and Diversity! Pluralising Progress in Innovation, Sustainability and Development*. STEPS Working Paper 32. STEPS Centre, Brighton.
- Strumińska-Kutra, M., Dembek, A., Hielscher, S., Stadler, M., 2023. Innovating Urban Governance for Sustainable Energy Transitions: Between Institutional Design and Institutional Adaptation. *Environmental Innovation and Societal Transitions* 48, 100751. <https://doi.org/10.1016/j.eist.2023.100751>.
- Svennevik, E.M.C., 2022. Practices in transitions: Review, reflections, and research directions for a Practice Innovation System PIS approach. *Environmental Innovation and Societal Transitions* 44, 163–184. <https://doi.org/10.1016/j.eist.2022.06.006>.
- Swyngedouw, E., 2005. Governance innovation and the citizen: The Janus face of governance-beyond-the-state. *Urban Studies* 42, 1991–2006. <https://doi.org/10.1080/00420980500279869>.
- Terstriep, J., Rehfeld, D., Kleverbeck, M., 2020. Favourable social innovation ecosystem(s)?—An explorative approach. *European Planning Studies* 28, 881–905. <https://doi.org/10.1080/09654313.2019.1708868>.
- Thompson, M., 2019. Playing with the Rules of the Game: Social Innovation for Urban Transformation. *International Journal of Urban and Regional Research* 43, 1168–1192. <https://doi.org/10.1111/1468-2427.12663>.

- Turnheim, B., Asquith, M., Geels, F.W., 2020. Making sustainability transitions research policy-relevant: Challenges at the science-policy interface. *Environmental Innovation and Societal Transitions* 34, 116–120. <https://doi.org/10.1016/j.eist.2019.12.009>.
- Unger, R.M., 2015. Conclusion: The Task of the Social Innovation Movement. In: Nicholls, A., Simon, J., Gabriel, M. (Eds.), *New Frontiers in Social Innovation Research*. Palgrave Macmillan, Houndmills & New York.
- van der Have, R.P., Rubalcaba, L., 2016. Social innovation research: An emerging area of innovation studies? *Research Policy* 45, 1923–1935. <https://doi.org/10.1016/j.respol.2016.06.010>.
- van Wijk, J., Zietsma, C., Dorado, S., de Bakker, F.G.A., Martí, I., 2019. Social Innovation: Integrating Micro, Meso, and Macro Level Insights From Institutional Theory. *Business & Society* 58, 887–918. <https://doi.org/10.1177/0007650318789104>.
- Vernay, A.L., Sebi, C., 2020. Energy communities and their ecosystems: A comparison of France and the Netherlands. *Technological Forecasting and Social Change* 158, 120123. <https://doi.org/10.1016/j.techfore.2020.120123>.
- Voß, J.P., 2014. Performative policy studies: realizing “transition management. *Innovation* 27, 317–343. <https://doi.org/10.1080/13511610.2014.967666>.
- Wemys, D., Cellina, F., Grieder, M., Schlüter, F., 2023. Looking beyond the hype: Conditions affecting the promise of behaviour change apps as social innovations for low-carbon transitions. *Environmental Innovation and Societal Transitions* 47, 100702. <https://doi.org/10.1016/j.eist.2023.100702>.
- Westley, F.R., McGowan, K., Tjörnbo, O., 2017. *The Evolution of Social Innovation. Building Resilience Through Transitions*. Edward Elgar Publishing, Northampton.
- Westley, F.R., McGowan, K.A., Antadze, N., Blacklock, J., Tjörnbo, O., 2016. How game changers catalyzed, disrupted, and incentivized social innovation: Three historical cases of nature conservation, assimilation, and women’s rights. *Ecology and Society* 21. <https://doi.org/10.5751/ES-08811-210413>.
- Westman, L., Castán Broto, V., 2022. Urban Transformations to Keep All the Same: The Power of Ivy Discourses. *Antipode* 54, 1320–1343. <https://doi.org/10.1111/anti.12820>.
- Wittmayer, J.M., Avelino, F., Pel, B., Campos, I., 2021. Contributing to sustainable and just energy systems? The mainstreaming of renewable energy prosumerism within and across institutional logics. *Energy Policy* 149. <https://doi.org/10.1016/j.enpol.2020.112053>.
- Wittmayer, J.M., de Geus, T., Pel, B., Avelino, F., Hielscher, S., Hoppe, T., Mühlemeier, S., Stasik, A., Oxenaar, S., Rogge, K.S., Visser, V., Marín-González, E., Ooms, M., Buitelaar, S., Foulds, C., Petrick, K., Klarwein, S., Krupnik, S., de Vries, G., Wagner, A., Härtwig, A., 2020. Beyond instrumentalism: Broadening the understanding of social innovation in socio-technical energy systems. *Energy Research & Social Science* 70, 101689. <https://doi.org/10.1016/j.erss.2020.101689>.
- Wittmayer, J.M., Hielscher, S., Rohde, F., Rogge, K.S., 2022. Soziale Innovationen in Transformationsprozessen - die Energiewende. In: Howaldt, J., Streicher, J. (Eds.), *Zukunft Gestalten Mit Sozialen Innovationen. Neue Herausforderungen Für Politik. Gesellschaft Und Wirtschaft*. Campus, pp. 123–138.
- Zolfagharian, M., Walrave, B., Raven, R., Romme, A.G.L., 2019. Studying transitions: Past, present, and future. *Research Policy* 48. <https://doi.org/10.1016/j.respol.2019.04.012>.

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