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Multiscalar Institutional Work of System-Building Sustainable Entrepreneurs in Transitioning Coal Regions: A Case of an Energy Cluster

Agata Stasik, Alicja Dańkowska

Abstract: **Background:** Social enterprise is a potential driver of sustainability at the community level in energy sector decarbonization.
Research objectives: We ask how sustainable entrepreneurs' embeddedness in the territorial and institutional contexts of a coal region in transition shapes their ability to exploit sustainable business opportunities, and how they can influence energy transition pathways.
Research design and methods: We introduce the notion of system-building sustainable entrepreneurs, who develop breakthrough niche innovations. Our analytical framework employs a multilevel perspective and multiscalar analysis of institutional work is applied to the case study of an energy cluster.
Results: We identified multiscalar institutional work of SBSEs operating in the niche, presenting the inhibiting and enabling factors at the regime and landscape levels. Although enabling factors created opportunities, they could only be exploited through institutional work.
Conclusions: We identified three key factors shaping the ability of system-building sustainable entrepreneurs to exploit opportunities and shape transition pathways.
Keywords: sustainable entrepreneurs, institutional work, energy transition, multilevel perspective, sustainable opportunity
JEL Codes: D14; G41; G51

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Introduction

Design Nowadays, we face the pressing need to find solutions to the interrelated grand challenges of our times (e.g., Ferraro et al., 2015; George et al., 2016). Thus, there is a growing agreement that the traditional goals of entrepreneurship understood as generating economic growth and financial profit (Kirzner, 1973), albeit often at an environmental or social cost (Pacheco et al., 2010), are no longer viable (Teran-Yepez et al., 2020). These respond to the increasingly widespread recognition that prevailing consumption and production patterns are socially, environmentally, and economically unsustainable, leading to widening social inequalities and transgressing more planetary boundaries (Raworth, 2017). The need to stop climate

change by the joint global effort to decarbonize every area of human activity presents one of the most urgent and complex challenges and thus demands the mobilization of the potential that rests in alternative forms of business and social innovation, including new forms of social entrepreneurship (Wronka-Pośpiech, 2023).

This is of particular significance in the energy sector, shaped by the goal of achieving net zero emissions while preserving and enhancing energy justice (Sovacool & Dworkin, 2015) and creating rich co-benefits for transitioning communities, including members of disadvantaged groups (van der Horst, 2008; Verney et al., 2023). Understood along this line, decarbonization of energy sector encompasses not only socio-technical change, but also creating an opportunity to build more sustainable societies (Wittmayer et al., 2020). Here, social enterprise is recognized as a potential driver of sustainability, particularly at the community level (Hillman et al., 2018; Vernay et al., 2023). While social entrepreneurship focuses on the pursuit of social objectives – e.g., reducing energy poverty – with innovative methods, by creating products, organizations, and practices that yield and sustain social benefits (Austin et al., 2006; Dacin et al., 2011), environmental entrepreneurship connects responses to ecological problems with entrepreneurial activity (Schaper, 2002; Dean & McMullen, 2007). Here, sustainable entrepreneurship, considered as a hybrid of social and environmental entrepreneurship, links entrepreneurs' efforts to resolve societal and environmental problems simultaneously (Shepherd & Patzelt, 2011), and is particularly relevant for actions focused on the transition toward a sustainable and carbon-neutral energy system. The ambition is to tackle both the ecological problem of greenhouse gas emissions and the societal need of energy availability and accessibility for everyone.

One key concept in the literature on sustainable entrepreneurship, and entrepreneurship in general, is the notion of opportunity (Sarango-Lalangui et al., 2018). For innovators and entrepreneurs, sustainable development may be one of the biggest business opportunities in the history of commerce (Hart & Milstein, 1999). In this context, Schumpeterian creative destruction (Schumpeter, 1942) is seen as the ability of entrepreneurs to turn sustainability challenges into entrepreneurial opportunities (Binder & Belz, 2015) to "kick off sustainability transformation" (Hockerts & Wüstenhagen, 2010, p. 488). This has particular relevance in the time of transition toward carbon neutrality.

Against this background, in this study we investigate how sustainable entrepreneurs' embeddedness in the territorial and institutional contexts of a coal region in transition shapes their ability to exploit sustainable business opportunities. Simultaneously, we seek to understand how sustainable entrepreneurs can influence the energy transition pathways through successful development of path-breaking innovations. For that purpose, we introduce the notion of system-building sustainable entrepreneurs (SBSEs) and develop an analytical framework that allows us to follow SBSEs' multiscalar institutional work from a multilevel perspective. We demonstrate how our framework generates new insights on the formation of sustainable entrepreneurial opportunities in the energy transition process by applying it to the case study of a Polish energy cluster operating in a transitioning coal region. To do so, we draw on an extensive analysis of documents, 40 interviews with experts and practitioners in Polish energy policy, and a detailed case study of ZKlaster – an energy cluster operating in the Turów region.

Energy clusters are relatively new initiatives in the Polish energy sector, aimed at creating local energy production and exchange systems (Mataczyńska & Kucharska, 2020). Energy clusters are intended to support hitherto marginalized actors in the energy sector such as municipalities or local entrepreneurs, contribute to optimized local energy management, and develop more environmentally friendly solutions (Dańkowska, 2022). The emergence of energy

clusters, which may be considered an energy community (Horstink et al., 2021), belongs to a relatively recent trend of allowing newcomers to shape the energy system as a means of system decentralization and energy market liberalization.

The concept of SBSEs comes from sustainable entrepreneurship literature, sustainability transition studies, and neo-institutional theory. SBSEs are influenced by shifting institutional conditions and seek to exploit sustainable entrepreneurship opportunities. They aim at influencing the dominant "rules of the game" (Pacheco et al., 2010) by engaging in different types of institutional work. Drawing on the multilevel perspective, we distinguish three levels of analysis: the niche of the SBSEs' efforts, the regime of the Polish coal-based energy system supporting or inhibiting the niche actors, and the landscape containing external factors which influence events and actors at the niche and regime levels (Geels, 2011). By distinguishing between local, regional, and national scales of niche, regime, and landscape developments, we demonstrate the importance of greater spatial sensitivity for a better understanding of the embedded agency of sustainable entrepreneurs (Shrivastava & Kennelly, 2013; Kibler et al., 2015).

The article is structured as follows. In the next section, we discuss concepts that feed into our analytical framework. First, we problematize the concept of opportunity in sustainable entrepreneurship and its institutional embeddedness. Second, we employ the multilevel perspective to differentiate between niche, regime, and landscape levels across local, regional, and national scales. Third, we introduce the concept of system-building sustainable entrepreneurs and discuss the notion of institutional work. This is followed by a description of our study methodology. Afterwards, we present the case study of ZKlaster, showing how system-building sustainable entrepreneurs engage in multiscalar institutional work to build supporting institutional arrangements for their path-breaking innovations. Here, we elaborate on the developments at the regime and landscape levels which hinder and enable SBSEs' efforts. Finally, we offer a discussion by foregrounding how our results advance the scholarly debate on sustainable entrepreneurship and its institutionally embedded agency in the context of regions transitioning from coal. The final section contains the main conclusions of the study.

Literature Review

The Institutional Embeddedness of Sustainable Entrepreneurship

The concept of sustainable entrepreneurship is increasingly examined in the literature (Thompson et al., 2015; Arenas et al., 2020; Ploum et al., 2017), also in the field of renewable energy (Varney et al., 2022; Groot and Pinkse, 2015; Gasbarro et al., 2016). As Hoogendoorn et al. (2019) observe, sustainable entrepreneurs

> start a business to serve self-interests and collective interests by addressing unmet social and environmental needs … [and] fulfil a vital role in society because they offer solutions to complex societal problems that are overlooked, ignored, or unsuccessfully addressed by governments, incumbent businesses, or civil society organizations. (p. 1133–1134)

In line with other sustainability transition scholars, we see energy transitions as complex, long-term, multidomain changes, which require an equal treatment of social, technical, economic, political, and environmental issues (Farla et al., 2012). We argue that sustainable entrepreneurs can significantly contribute to building a transition pathway in the Polish energy sector perceived as a socio-technical system consisting of closely interacting actors such as entrepreneurs, public authorities, and policymakers; institutions, including their legislative, cognitive, and normative pillars; as well as material artefacts and infrastructures (Geels, 2004).

After Munoz and Cohen (2017), we want to move beyond the simplification of portraying sustainable entrepreneurs as autonomous opportunity creators regardless of the relevant conditions and actors influencing the process. Thus, we view sustainable entrepreneurs as territorially and institutionally embedded (de Clercq & Voronov, 2011; Greco & de Jong, 2017; Hoogendoorn et al., 2019), aiming to provide new insights on the formation of sustainable entrepreneurial opportunities in the energy transition process. Drawing on the neo-institutional theory, we ask whether and how institutional conditions can inhibit or foster the discovery, development, and exploitation of opportunities by sustainable entrepreneurs (Lepoutre et al., 2013). In this regard, we build on the existing research on the institutional environment supporting or hampering sustainable entrepreneurship. For example, Groot and Pinkse (2015) analyze institutional barriers perceived by sustainable entrepreneurs in comparison with regular entrepreneurs in terms of financial resources, administrative procedures, and access to information. In turn, Dean and McMullen (2007) focus on market failures such as monopoly power, inappropriate government intervention, imperfect information, and externalities, viewing them as sources of opportunities to make a profit while reducing environmentally damaging economic activities. Munoz and Cohen (2017) introduce the concept of entrepreneurial synchronicity within socio-ecological systems, stressing the vital role of biophysical context as well as informal institutions nurturing the sustainable entrepreneurship process, such as favorable cultural context and social norms supporting the development of new sustainability ventures. Other scholars point to the important role of policymaking (Silajdžić et al., 2015), economic incentives (Clemens, 2006), or government-led knowledge transfer (De Palma & Dobes, 2010).

In this article, we expand the existing research on the institutional embeddedness of sustainable entrepreneurs, recognizing that the institutional structures which frame the opportunity process encompass not only the dominant institutions in the Polish energy sector but also relevant developments in the broader context at the international or global levels. To this end, we employ the multilevel perspective because it allows us to differentiate between three analytical levels of niche, regime, and landscape – discussed in the following section.

The Multilevel Perspective on Sustainable Transitions

The multilevel perspective (MLP) is one of the most important conceptual frameworks in sustainability transition research. The MLP conceptualizes transitions as iterative processes that result from the interactions of phenomena at three analytical levels: niche, socio-technical regime, and exogenous landscape.

First, the niche level can be understood as a locus of radical, path-breaking innovations (Geels, 2011) and a "constellation of culture, practices and structure that deviates from the regime [and] can meet quite specific societal needs, often in unorthodox ways" (van den Bosch & Rotmans, 2008, p. 31). Niches provide a temporary protective space at the initial stages of innovation development, which shields them from prevailing selection pressures (Smith & Raven, 2012). Second, socio-technical regimes encompass specific rules of the game, including all kinds of regulative, normative, and cognitive institutions that represent the deep structure or grammar of socio-technical systems (Fuenfschilling, 2019). The regimes' existence is the reason for the lock-in effect in established systems (Apajalahti & Kungl, 2022), making them stable, path-dependent, and resistant to radical changes (Ruppert-Winkel et al., 2016). Third, the landscape level relates to the wider context, including broader political, economic, and societal trends, which niche and regime actors cannot influence in the short run (Geels, 2011).

The landscape level consists of technical and material artefacts, demographic trends, political ideologies, societal values, and macroeconomic patterns, among other elements (Fuenfschilling, 2019).

Based on this conceptual framework, sustainability transition scholars focus on the interplay of stability and change: on the one hand, they investigate the rigidity and persistence of socio-technical systems, and on the other hand, they examine the evolution and change of those systems. The niche, regime, and landscape levels influence one another in the transition process, which can happen in different ways, resulting in distinct transition pathways.

Importantly, while transition scholars tend to take a conventional view on geography in operationalizing the MLP analytical levels, "equating niche with local, regime with national and landscape with global processes and structures" (Yang et al., 2022, p. 755), a growing number of researchers have recently called for greater spatial sensitivity (Fuenfschilling & Binz, 2018; Hielscher et al., 2022). According to Binz et al., a static approach to the MLP "contradicts state of the art theorizing in human geography, where multi-scalar, relational, and constructivist understandings of scale and socioeconomic processes predominate" (2020, p. 2). In line with this more geographically informed and multiscalar understanding, we analyze the niche–regime interactions at and across different scales, recognizing that institutional arrangements are territorially situated at all levels of analysis (Coenen et al., 2012; Hansen & Coenen, 2015; Murphy, 2015). Such distinct local or regional regime dimensions can play a crucial role in transition processes, opening site-specific windows of opportunity for the possibility of niche innovations to emerge and expand (Longhurst, 2015; Raven et al., 2008).

System-Building Sustainable Entrepreneurs and the Role of Institutional Work

A growing literature on sustainability transitions investigates the enabling role of agency in overcoming the lock-in of socio-technical systems and influencing dominant institutions (e.g., Brown et al., 2013; Farla et al., 2012; van Doren et al., 2020). Recently, scholars increasingly observe that successful sustainable entrepreneurs are able to exert an impact on their institutional environment, as the existing societal norms and values, business environments, public policies, or market regulations inhibit the legitimization and adoption of more sustainable solutions (Thompson et al., 2015; Greco & de Jong, 2017; Munoz & Cohen, 2017; Hoogendoorn et al., 2019). This way, they may play an important role in creating niche innovation and overcoming regime path dependence. However, the ways in which sustainable entrepreneurs engage in changing institutions remain unclear.

In this study, we build on Woolthuis's (2010) distinction between system-following and system-building entrepreneurs operating in niches. Woolthuis argues that the dominant system and market characteristics influence entrepreneurs' strategies for introducing innovations and dealing with regime pressures. System-following entrepreneurs can count on guidance from the government, as well as subsidies for their growth. They comply with the existing regulations and "jump on the bandwagon" of incumbent actors, connecting with vested interests and existing markets. Thus, system-following entrepreneurs do not engage in lobbying, as they largely use proven technologies, adjusting to the widespread norms and values (de Boer et al., 2009). Conversely, when the socio-technical system does not provide niche actors with the needed resources and the dominant market exhibits strong lock-in, system-building strategies become more common.

Hence, we introduce to this study the concept of system-building sustainable entrepreneurs (SBSEs), referring to frontrunners in the Polish energy sector who develop niche innovations, going ahead of the government, anticipating future legislative developments, and moving "beyond what is legally required or accepted as standard practice" (Woolthuis, 2010, p. 511). SBSEs aim to challenge the existing power relations by building networks of politically-savvy players strongly dedicated to lobbying activities and setting new standards. They address the dominant regulative institutions, which they perceive as barriers to the creation and diffusion of more sustainable solutions. Also, they aim to influence cognitive institutions by persuading others to change their mindsets, but also normative institutions by establishing new norms and values to legitimize their innovations (de Boer et al., 2009).

However, to contribute to systemic change, SBSEs' agency must coincide with the opportunities that arise within the broader institutional context (van Doren et al., 2020). In this regard, scholars have recognized that system-building strategies depend on the resources available at the niche level, but also at the level of the socio-technical regime whose institutional structures have a dual nature, able to constrain or enable SBSEs' goals (Farla et al., 2012). According to Geels (2004, p. 907), during transitions "actors interact (struggle, form alliances, exercise power, negotiate, and cooperate) within the constraints and opportunities of existing structures, at the same time that they act upon and restructure these systems." Thus, to better examine what SBSEs could (not) achieve in the energy transition process, we introduce the concept of institutional work, derived from the neo-institutional theory.

After van Doren et al. (2020), we distinguish three main types of institutional work across different scales that mutually reinforce one another: (1) political work aimed at the regulative pillar of the dominant institutions in the Polish energy sector, (2) technical work aimed at the cognitive institutional pillar, and (3) cultural work aimed at the normative institutional pillar. We argue that institutional work is especially relevant for investigating the process of niche evolution and the multilevel dynamics of energy transitions. To support that, we demonstrate how different kinds of institutional work shape the niche actors' ability to impact energy transition pathways across different scales, building both on the innovations developed by SBSEs and the developments at the regime and landscape levels.

Thus, we propose an analytical framework that allows us to understand how SBSEs use their territorial and institutional embeddedness to exploit the opportunities created by sustainable transition processes and to influence the transition pathway. That is possible by focusing on multilevel interactions between the evolving agency of SBSEs and changing institutional environments. We analyze SBSEs' niche-building activities at and across different scales, following the recognition that institutional arrangements are territorially situated at all levels of analysis. This constitutes an important contribution to the sustainability transition literature, as empirical studies of co-evolutionary dynamics between niche sustainable entrepreneurs and institutional change remain scarce (Brown et al., 2013).

Table 1. The Framework: The Multiscalar Institutional Work of SBSEs in the Multilevel Perspective

	Analytical levels		
Scale	Niche	Regime	Landscape
Local	Political work Technical work Cultural work	Inhibiting factors Enabling factors	Changes opening windows of opportunity
Regional	Political work Technical work Cultural work	Inhibiting factors Enabling factors	Changes opening windows of opportunity
National	Political work Technical work Cultural work	Inhibiting factors Enabling factors	Changes opening windows of opportunity

Source: own elaboration.

Research Method and Material

The data gathering and analysis process comprised four essential stages aimed at interpreting the activities of a specific energy cluster at various scales and within the context of multifaceted interactions among niche, regime, and landscape levels. These stages encompassed the following:

- identification and examination of the evolving energy sector in Poland;
- identification and scrutiny of the most active energy clusters in Poland (totaling eight) and selection of ZKlaster (Zgorzelec Cluster for the Development of Renewable Energy Sources and Energy Efficiency) for an in-depth investigation;
- identification and analysis of the actions taken by ZKlaster;
- an integrated analysis of the multiscalar institutional work of SBSEs in the MLP.

Table 2 presents an overview of the data used for stages 1–3 and the most important outcomes for the integrated analysis. The study covered the period of 2015–2022. A detailed description of the data gathering process and a justification of case selection follows.

In the first stage, we gathered data on events that shaped the regime of the Polish energy system and landscape developments relevant to energy clusters' progress. The data included relevant academic, policy, and grey literature, as well as interviews with experts in national energy policy from different sectors. Part of the data was gathered for the SONNET project, serving as the basis for a report on social innovations in the Polish energy transition (Dańkowska et al., 2021). From this data set, for the sake of this article, we included and reinterpreted 13 interviews with experts and practitioners connected to various aspects of the changing energy system. Additional data – 13 interviews with experts in energy policy, as well as academic and grey literature on energy clusters – were gathered for the NCN SONATA project and used for the first time in the analysis presented below. The interviews lasted between 55 and 170 minutes and were conducted between May 2020 and December 2022.

In the second stage, we analyzed data regarding the activity of energy clusters in Poland. The data originated from public registers, scientific publications, industry reports, conferences, industry meetings, materials published by energy clusters themselves, and websites related to energy sector and local development. These data were complemented by 12 interviews with representatives of various energy clusters. The interviews were conducted between April 2020

and November 2022, with durations ranging from 20 to 95 minutes. After the initial analysis of the available data on energy clusters and conducting expert interviews, we identified ZKlaster as an extreme case due to its exceptional level of activity (Patton, 1990) and its location in a transitioning coal region. Thus, an analysis of this case allows us to better understand how SBSEs may exploit opportunities in specific settings shaped by energy transition processes operating in a region that has depended on coal for decades.

Table 2. An Overview of Data Sources for Research Stages 1–3

Stage	Data	Outcome
Analysis of the transitioning energy sector in Poland	Desk research: relevant academic, policy, and grey literature. Expert interviews: 26 interviews with experts and practitioners connected to various aspects of the changing energy system (2020–2022).	Identification of key events on regime and landscape levels creating opportunities for SBSEs.
Analysis of the most active energy clusters in Poland (8); selection of ZKlaster	Desk research: grey literature and reports on energy clusters; clusters' own material (PowerPoint presentations, video materials, public presentations on conferences and industry events). Interviews: 12 interviews with clusters' representatives.	Identification of ZKlaster as an intensive case of SBSE.
Qualitative analysis of ZKlaster's actions	Desk research: intensive analysis of the data available on the Internet from the period 2016–2021. Interviews: two interviews with the leading members of ZKlaster: the founder and the former CEO (December 2020), and the next CEO (June 2021).	Identification of ZKlaster's actions as SBSE.

Source: own elaboration.

After case selection, in the third stage, we gathered detailed data regarding the activity of ZKlaster. We conducted an intensive analysis of the data available on the Internet from the period 2016–2021, employing search keywords "zklaster," "zgorzelec klaster," and "klaster zgorzelecki." The final data set included 43 different text and video materials on ZKlaster, including press articles and interviews with ZKlaster's representatives (e.g., Chojnacki, 2019), PowerPoint presentations (e.g., Fryc et al., 2017), video conferences or webinars (e.g., III Forum Energetyki Rozproszonej, 2021), reports regarding the cluster's activities (e.g., Micek et al., 2021), and web notes (e.g., e-legnickie.pl, 2020). Additionally, we conducted two interviews with the leading members of ZKlaster: the founder and the former CEO (December 2020) and the next CEO (June 2021).

Table 3. The Interviews Analyzed for This Study

Categories of interviewees	Number of interviews
NGO – protection of climate and environment, local actions for decarbonization Academics, experts from think-tanks, consultants, journalists Politicians, representatives of public administrations (serving and former) Representatives of various energy clusters ZKlaster's leaders	8 (interviews 1–8) 11 (interviews 9–19) 7 (interviews 20–26) 12 (interviews 27–38) 2 (interviews 39–40)
Total numer	40

Source: own elaboration.

In the final stage, we imported all collected data to software for qualitative data analysis, MaxQDA, to carry out a deductive coding process. We employed concept-ordered categories and time-ordered categories to analyze the relevant developments over time (Miles & Huberman, 1994).

The category system underlying the coding scheme resulted from the choice of institutional work and the MLP as a key concept building a framework to understand SBSEs' actions. Thus, it was based on the following data structure:

- Types of SBSEs' institutional work based on a typology according to van Doren et al. (2020) distinguishing political, cultural, and technical institutional work.
- Scales of SBSEs' institutional work (Yang et al., 2022), divided into a local scale concerning activities within ZKlaster, a regional scale concerning the SBSE's work at the level of the Turoszów Sack subregion, and a national scale covering the SBSE's efforts at the national level. That allowed us to point out the importance of sustainable entrepreneurs' embeddedness in the territorial and institutional contexts of a coal region.
- The regime's impact on SBSEs operating in a niche. In line with Geels (2011), we analyzed both the positive impact that encouraged the actions of niche actors and the negative impact that inhibited those efforts. Similarly to niche actors' institutional work, we analyzed the regime's impact at different scales: local, regional, and national (Yang et al., 2022). The impacts that encouraged the actions of niche actors created opportunities in the transition process.
- The landscape's influence on SBSEs operating in the niche. In line with Geels (2011), we focused on the positive impact that supported the actions of niche actors, as according to the MLP, landscape-level events open windows of opportunity for niches to emerge and grow, and thus create opportunities for SBSEs in the transition process. We analyzed the landscape impact at different scales: local, regional, and national (Yang et al., 2022).

Results and Discussion

ZKlaster as a System-Building Sustainable Entrepreneur

The strategic document "Polish Energy Policy Until 2040" recognizes the important role of energy clusters in the decentralization and decarbonization of the Polish energy sector, which is strongly locked-in and highly coal-dependent: still, over 70% of the national demand for electricity in Poland is covered by coal-fired power plants (Wiśniewski, 2022). The concept of an energy cluster was introduced to Poland's Energy Law in 2016, however, due to severe legal constraints, most energy clusters remain in limbo, waiting for the institutional environment to change (Dańkowska & Stasik, 2021). Against this background, the Zgorzelec Cluster for the Development of Renewable Energy Sources and Energy Efficiency (ZKlaster), which is the focus of our analysis, stands out with its proactive attitude. ZKlaster was the third energy cluster created in Poland and is currently widely regarded as one of the most successful initiatives of this kind (Kurowicki et al., 2022).[1] Due to the lack of favorable legislation and financial support, ZKlaster developed a strong business profile, which enabled it to build the necessary know-how and mobilize resources to conduct its activities despite the difficult institutional condi-

[1] With regard to the recently published media reports (Rzeczkowski, 2024) about possible links between ZKlaster's leaders and Russia, we wish to state that we were not aware of any such allegations at the time of the study. While these are serious allegations, we believe that they do not affect our analysis and findings, which relate to the organizational mechanisms of the cluster and not to its funding sources.

tions. Therefore, after Schaltegger and Wagner (2011), we term the efforts of ZKlaster's change agents contributing to "solving societal and environmental problems through the realization of a successful business" (2011, p. 224) as sustainable entrepreneurship.

ZKlaster operates in the Turoszów Sack subregion, next to the border with Germany and the Czech Republic. The Turoszów Sack is a coal subregion with an open pit mine and the Turów coal-fired power plant functioning since 1962. The Turów energy complex accounts for five percent of the Polish electricity production, being an important part of the national electricity system. Although the region suffers from the negative environmental and social effects of coal mining and combustion, the concession for the Turów coal mine has recently been extended until 2044. At the same time, however, the Polish energy system, and coal regions in particular, are increasingly influenced by external factors fostering decarbonization, such as the EU energy and climate policy or the shifting international markets for fossil fuels and renewable energy sources (RES). Thus, there is a clash between two tendencies in the Turów region: to continue business as usual, supported by incumbent actors and, to a large extent, local communities; or to accelerate green transformation, supported, among others, by sustainable entrepreneurs from ZKlaster and EU policies.

Against this background, ZKlaster was formally established in March 2017 by representatives of local governments, local entrepreneurs, and an expert from a technical university. The cluster's founders defined it as "a civil-legal agreement to build a local market for electricity and thermal energy based on local RES resources, supported by the development of stable high-efficiency cogeneration units using the most efficient and cleanest technologies available" (Fryc et al., 2017, p. 3). ZKlaster was the third energy cluster created in Poland and is widely regarded as one of the most successful projects of this kind (e.g., Micek et al., 2021). As the former CEO of ZKlaster emphasizes in an interview, the cluster's beginnings date back to 2015, when several entrepreneurs and innovators initiated efforts to build the region's first photovoltaic farm. From the beginning, the cluster operated as a business venture:

We decided to choose the most effective model, which is a business based on private capital. It is the strongest entity. We approach it like entrepreneurs: we have a mission and we implement it with business tasks. And that has been the key to success. … It allows the cluster to operate with more momentum and a kind of freedom. (Interviewee 39)

ZKlaster's leaders realized that the dynamic development of an energy cluster was only possible through an active effort to make room for investments in renewable energy in the region, the development of advanced technologies, as well as reaching beyond the local and regional focus and engaging in cooperation with other actors at the national level to foster the development of distributed energy in Poland.

In this section, we present how ZKlaster exploited opportunities in the sustainable transition process by engaging in political, cultural, and technical institutional work in relation to multilevel dynamics between niche, regime, and landscape levels across different scales. That allowed it to act as a system-building sustainable entrepreneur, using the transformative potential of niche innovations in the context of coal regions.

Table 4 sums up the multiscalar institutional work of SBSEs operating in the niche, presenting both the inhibiting and enabling factors at the regime and landscape levels. Although the enabling factors created opportunities, they could only be exploited through institutional work. The high intensity of inhibiting factors implies that the pioneering energy cluster must act as a system-building, not system-following sustainable entrepreneur.

Table 4. The Multiscalar Institutional Work of ZKlaster in the Multilevel Perspective

	Niche	Regime	Landscape
Local	Political work: building a coalition around an energy cluster and hands-on learning about the required legislative changes. Technical work: a smart microgrid demonstration project. Cultural work: changing the social attitudes of local communities toward RES.	Inhibiting: – DSO's hostility toward ZKlaster; – lack of dedicated funding and proper legislation; – negative attitudes of local communities attached to coal-based economy. Enabling: – introducing an energy cluster and an auction system to the RES Act; – establishing the Competition for Pilot Energy Cluster Certificates; – grid congestion problems (which ZKlaster aimed to solve); – increasing public acceptance for RES.	Developments in clean energy technologies. International social movements fostering the green energy transition pathway.
Regional	Political work: coordinating the regional transition committee. Technical work: expert analysis of replacing the coal mine with a pumped-storage plant. Cultural work: changing social attitudes toward the green transition of coal region.	Inhibiting: – continued operation of the Turów lignite mining complex: extension of the operating license until 2044.	CJEU ruling on halting the Turów coal mine. EU's Platform for Coal Regions in Transition and Just Transition Fund.
National	Political work: networking and lobbying for legislative changes. Technical work: planned distribution of ZKlaster's green energy to the national power system. Cultural work: changing social attitudes toward dispersed energy and the role of energy clusters in the Polish energy system.	Inhibiting: – lack of the coal phase-out date; – misalignment between energy infrastructure designed for centralized energy system and RES development. Enabling: – launching the KlastER Project; – "Polish Energy Policy Until 2040" and the vision of creating 300 "autonomous energy regions" based on the energy cluster model; – general public opinion support of green transition.	EU's Clean Energy for All Europeans Package (CEP) and the revised Renewable Energy Directive (RED II) introducing new rights for energy communities. EU funds for the development of dispersed energy.

Source: own elaboration.

Below, we present in detail how SBSEs from ZKlaster exploited opportunities and shaped transition pathways by engaging in political, technical, and cultural institutional work, and in what ways this was inhibited or supported by external factors at local, regional, and national scales. Each section begins with a description of relevant developments across levels – on the regime and landscape levels – followed by a description of ZKlaster's actions.

Political Work Across Scales: Building Coalitions and Lobbying for Legislative Changes

In 2017, the Ministry of Energy issued an open call for energy clusters to grant ministerial certificates to the best and most promising initiatives. Some of our interviewees observed that certified energy clusters were to be the first to receive financial support for their projects (Interviewees 6, 11, 19). However, after the initial enthusiasm of clusters' representatives who decided to apply for the certificates, they discovered that the public financial support did not follow, and that the legal form of an energy cluster did not allow them to carry out their plans (Interviewees 20, 22). Soon, it became apparent that the vast majority of certified energy clusters functioned "only as a PowerPoint presentation" (Interviewee 8). As our document analysis revealed, to understand better the barriers and opportunities for cluster development, the Ministry of Economic Development and Technology launched the project "Development of Distributed Energy in Energy Clusters" (KlastER) (2019–2022), which served as a platform for experience exchange, knowledge generation, and visioning on the future of energy communities in Poland. The most important problems identified in the project included the lack of energy clusters' legal personality, dedicated legal solutions – for example, regarding the trade of electricity between cluster members – and public funds, as well as unregulated relations with Distribution System Operators (DSO) (Micek et al., 2021). Similarly, according to ZKlaster's representative, "in the current reality, the biggest problem is the energy legislation in Poland. Not only is it unsuitable for the development of distributed energy but it is also terribly complicated" (as cited in Chojnacki, 2019).

In this context, the EU policy enforcing goals on the proportion of renewable energy in the national energy mix and introducing energy market liberalization played an important role. The Clean Energy for All Europeans Package (CEP), agreed upon by the EU Council and the European Parliament in May 2019, allowed citizens to become active and central stakeholders in the energy markets by creating energy communities that jointly produce, store, consume, and sell energy. On this basis, the Directive (EU) 2018/2001 (RED II) specified the concept of a renewable energy community. According to several of our interviewees, these developments contributed to a shift in the Polish energy sector (Interviewees 5, 12, 16). Ultimately, it influenced the national energy strategy "Polish Energy Policy Until 2040," which emphasized the key role of energy clusters in creating 300 "autonomous energy regions" able to balance their energy production and consumption. Nevertheless, our interviewees stressed that the strategic documents did not provide clear guidance for energy cluster functioning.

Against this background, ZKlaster's ex-leader decided to establish and lead the National Chamber of Energy Clusters. It was launched in April 2020 with the aim to gather Polish energy clusters, represent their interests, facilitate know-how exchange, and "allow clusters to unite and be more visible … [as] large lobbying organizations" (Interviewee 24). The Chamber representatives took part in consultations in relevant ministries, and published opinions and recommendations on desirable policy development in the energy sector. The main postulates of the Chamber included expectations of simplifying the rules for energy clusters' operations, giving clusters the status of a full participant in the energy market, and facilitating the use of existing energy network infrastructure by clusters. Notably, as ZKlaster's ex-CEO stated in our interview, the Chamber developed its recommendations based on experiences from the ZKlaster's operations. For example, the document on current barriers to photovoltaic investments was largely prepared drawing on the lessons learned in ZKlaster:

> We were guided by the experience of our members, in particular ZKlaster that is building the largest photovoltaic farm in Poland. We want to show the directions and legal solutions that will not only promote investments but also enable a just energy transition. (as cited in energia.rp.pl, 2020)

Thus, setting up a functioning energy cluster and engaging in specific local struggles enabled SBSEs to partake in institutional work by indicating the necessary kinds of legislative changes, such as regulating the relations with DSOs or introducing special tariffs for energy distribution within an energy cluster.

Moreover, ZKlaster engaged in political work at the regional scale, drawing support from the EU. In December 2017, the European Commission established a platform for Coal Regions in Transition (CRiT) with the aim to develop regional energy transition strategies toward low-carbon economies in cooperation with local communities and experts. In July 2019, ZKlaster became a coordinator of the Regional Committee for Transition (Interviewee 25). The Committee was established to cooperate with the European Commission in preparing the region for the transition and obtaining funding from the Just Transition Fund. The latter was formed within the Just Transition Mechanism launched in January 2020 to support coal regions that could receive financial support for their energy transition plans. Consequently, ZKlaster became the region's official representative on the EU arena. In this context, as ZKlaster's CEO stresses in our interview, the cluster needed to skillfully manage its relations with European institutions, such as the European Commission and relevant Directorates-General (DG Energy, DG Regio). The cluster's efforts soon received a favorable reception from important European politicians, such as Jerzy Buzek, Poland's former Prime Minister and MEP, a co-initiator of the Just Transition Fund, who said:

> You are perfectly prepared for the inevitable changes that will take place in Europe and Poland in the coming years. I have not heard of any Polish region, or even German or Czech regions, being so comprehensively prepared at the local level for the challenges that lie ahead. The sophistication that I see in you is a fantastic argument that I will be using [in the European Parliament]. (as cited in Zamorowska, 2020)

This kind of endorsement from strong transnational allies clearly supported the political institutional work of SBSEs.

ZKlaster's CEO claims in an interview that ZKlaster had an ambitious vision of the post-coal region, where the mine and power plant would be replaced by renewable sources. Clean energy was expected to become a flywheel for the regional economy, attracting large, energy-intensive companies that would offer new jobs. According to ZKlaster's ex-CEO, "where there are no green solutions, no economic zones will be created, as no one will bet on high-emission technologies" (Interviewee 39). He also notes that a holistic transition strategy was necessary to gain the residents' support, creating a sense of security and addressing their concerns about job losses:

> People need to be made aware that the process ahead of us is inevitable, but they need to have comfort that they are not left alone, that local governments are prepared for this and are thinking about how to create jobs. (as cited in Gramwzielone.pl, 2021a)

Moreover, ZKlaster's CEO observes that the cluster's involvement in the regional transition became even more important when, in February 2021, the government of the Czech Republic filed a lawsuit against Poland to the Court of Justice of the European Union (CJEU) regarding the negative impact of the Turów mine on the state of groundwater in the area. As a result, the CJEU ruling obliged Poland to immediately halt coal mining in Turów, pending judgment. Although the Minister for Climate and Environment extended the concession for the Turów

coal mine until 2044 despite this order, the local stakeholders' recognition of the need to seek viable solutions to replace the coal industry has become higher than ever before.

Technical Work: Providing Expert Analyses and Developing Demonstration Projects

An important development that prepared the ground for Polish energy clusters to emerge was the introduction of an auction system for renewable energy investments (Iskandarova et al., 2021). It was enacted in February 2015 as a part of the RES Act, enabling the first major RES investment in Zgorzelec County, which involved the future members of ZKlaster (Interviewee 39). Several years into ZKlaster's functioning, the installed capacity of all its photovoltaic farms reached almost 100 MW.

However, as ZKlaster's CEO states in an interview, to use the real potential of cooperation in the energy cluster, its goal was not only to erect new solar power plants, but also to build an efficient local energy market. The cluster aimed to operate in an energy billing system connecting electricity producers with consumers based on real-time demand and data flows managed by AI algorithms. This way, the system would guarantee attractive prices for both sides of the transaction while simultaneously serving as a power control unit able to reduce the load for the central electricity grid. To make it possible, ZKlaster undertook research and development efforts to set up a smart grid demonstration project. As a pilot project, it operated at a low capacity of 56 kWh and, due to legal barriers, energy was not sold to users as part of the experiment. The second stage of the project development aimed at allocating surplus energy to the production of computing power – High-Performance Computing – and selling it translocally (Interviewee 40).

According to ZKlaster's ex-CEO, the primary objective of this local experiment was to prove that energy clusters could perform a critically important function in the national system by relieving the growingly congested national grids. A ZKlaster's representative admitted: "Above all, we hope that with the data we collect from this experiment, we will be able to defend the idea of energy clusters altogether" (as cited in Gramwzielone.pl, 2021b). Consequently, although the cooperation between ZKlaster and DSO Tauron Dystrybucja was initially difficult, the demonstration project enabled ZKlaster to strengthen its negotiating position. ZKlaster's representatives state in the interviews that the DSO became keen to cooperate with the cluster because with the growing number of prosumers feeding surplus energy into the national system grid, operators began to have trouble maintaining adequate capacity. ZKlaster's ex-CEO explains:

> We can see that with local generation and consumption based on the smart grid we are able to relieve the burden on the national power system. … This could be an ideal example of how local energy can affect the national power system. (as cited in Gramwzielone.pl, 2021b)

Consequently, a ZKlaster's representative stresses: "We've stopped being treated as a direct enemy by these distributors already. Well, they don't have [an option], they just have to cooperate with us" (Interviewee 40). This change of attitude shows that the energy system incumbents have started to accept that energy clusters will become an important part of the transforming system, and look for possibilities for their integration with the system.

On top of that, SBSEs engaged in technical work by producing expert analyses indicating ways in which one can creatively leverage the material coal infrastructure for the development of stable RES. In this regard, experts from ZKlaster together with partners from academic institutions developed a project for large-scale investment in a pumped-storage hydroelectricity plant on the site of the Turów open-pit mine after its phase-out (Interviewee 25). Moreover,

ZKlaster's CEO admits in the interview that the cluster's long-term goal is to take over the distribution and transmission lines built for the purpose of power output from the Turów power plant to the National Power System. This way, the energy cluster's embeddedness in the territory shaped by and for conventional energy became creatively reinterpreted as an asset and not an obstacle in ZKlaster's operations.

Cultural Work: Influencing the Existing Identities and Creating a Success-Story Image of ZKlaster

From the very beginning of its functioning, ZKlaster got involved in the collective effort of remaking the regional identity in the Turoszów Sack, where, as one of our interviewees states, "three generations were brought up on a coal culture" (Interviewee 39). Historically, the regional economy was strongly tied to the coal industry, but as the sector was gradually shrinking, much of the region did not see economic development in years (Micek et al., 2021). As ZKlaster's ex-CEO observes, early in the cluster's development, green energy was widely seen as a threat to coal-based energy production, evoking negative emotions in the local community, strongly connected to the coal industry. However, as the EU pressures toward the phase-out of mining increased, ZKlaster became a growingly important player engaged in the co-creation of the vision for the region's post-coal future. In this aspect, the cluster reached beyond its business orientation, seeking how to combine its business goals with solutions beneficial to other local stakeholders, such as municipalities and workers of the declining industries. Notably, one interviewee from ZKlaster stresses: "We were the first to notice the problem of transformation of the region, and called: wake up, local governments!" (Interviewee 24). According to Micek et al. (2021), the problem was a widespread belief among local officials that the national government and large energy companies should make all the key decisions in the domain of energy.

A remarkable milestone in the development of trust between ZKlaster and local government officials took place in May 2018, when ZKlaster was awarded the Pilot Energy Cluster Certificate by the Ministry of Energy. ZKlaster's ex-CEO mentions that since he could use a business card with the ministerial logo and the inscription "Certified Energy Cluster," the attitude of local officials changed entirely as they became much less skeptical about the idea of energy clusters.

Moreover, ZKlaster actively promoted its achievements at the national level, presenting itself as a pioneer in the development of the latest technologies and innovative solutions for RES. In the media and at numerous trade events, ZKlaster representatives proudly presented multiple projects accomplished in Poland for the first time: an off-road electric vehicle, a hybrid medium voltage line, the first company belonging to an energy cluster to obtain a license for energy distribution, a microgrid based on renewable sources and energy storage, or the largest photovoltaic farm in Poland. As ZKlaster's CEO claims in the interview, the cluster served as a model for new energy clusters by sharing its best practices, know-how, and operational strategy. ZKlaster's ex-CEO stated that the cluster's ambition was to inspire similar initiatives: "We hope that our projects will be an example for other regions, not only in Poland but also in Europe" (as cited in e-legnickie.pl, 2020). Creating the ZKlaster's image as a success story was supposed to win further allies at the local, regional, national, and international levels, and encourage other clusters to imitate this organizational model, which in turn would reinforce the cluster's bargaining position in lobbying for favorable legislation. These efforts proved successful: ZKlaster became widely regarded as a model energy cluster in Poland, as reflected in leading politicians' statements. Krzysztof Kubów, Deputy Minister for Energy, noted:

> Since the beginning, I have been observing the development of the Zgorzelec Cluster with great satisfaction. I am very appreciative of its members' achievements. I believe that the success of ZKlaster is an example for such entities in the whole country. (as cited in PowiatZgorzelecki.pl, 2019)

Similarly, the Government Plenipotentiary for Renewable Energy Sources, Ireneusz Zyska, stated that ZKlaster's ex-CEO was "the leader of an energy clusters' environment on a national scale. We would like to present the investment here [in ZKlaster's photovoltaic farm] as a model example which could be replicated in other places in Poland" (as cited in Serwis Samorządowy PAP, 2020).

Moreover, this intensive PR campaign was underpinned by education and information projects for local communities, fostering the "green regional identity" development. ZKlaster also actively engaged in local sponsorship, for example, by funding a photovoltaic installation for a local primary school, providing electric cars with free charging to a nongovernmental organization, making its computing units available to fight the COVID-19 pandemic, or funding solar streetlights in a village where ZKlaster built its photovoltaic farm. This way, ZKlaster gained more social acceptance for its further local development and the energy transition of the coal region. In this context, the dynamic growth in the number of prosumers nationally and the increasing public support for RES – to a large extent inspired by international climate movements – were also highly relevant (Hielscher et al., 2022).

Conclusions

In this article, we proposed and applied an analytical framework that allows one to understand how sustainable entrepreneurs can exploit the opportunities emerging in the sustainable transition process and how they can influence transition pathways. We claim that, to this end, one must scrutinize sustainable entrepreneurs' engagement in political, cultural, and technical institutional work in relation to multilevel dynamics between the niche, regime, and landscape levels. Moreover, it is important to investigate how they act and use the resources coming from across different scales. The same analytical framework may serve to follow the activities of other types of social entrepreneurs in the sustainable transition process. Still, we claim that sustainable entrepreneurship is particularly relevant in decarbonization because it jointly addresses the environmental concerns – that is, the effort to radically reduce greenhouse gas emissions – and the social concerns, namely just energy transition and energy justice.

The case study of ZKlaster shows how sustainable entrepreneurs in a coal region developed system-building strategies in response to the incumbents' multiscalar attempts to maintain the coal-based status quo, skillfully using the emerging windows of opportunity for sustainable business to develop. We demonstrated how SBSEs engaged in political, technical, and cultural institutional work by lobbying activities, developing new technological solutions, and promoting new vision of the region's post-coal future. Our study adds to the sustainability transition literature by enhancing the understanding of how innovations emerging in a niche can gradually influence the dominant regime structures. We showed that to better grasp this phenomenon, it does not suffice to observe internal niche processes. What is equally important for "system-building" strategies (Farla et al., 2012) is the actions of niche actors who skillfully win their place among the existing institutions by taking advantage of the possibilities that emerge as the windows of opportunity start to open.

The case study allowed us to identify three key factors that shaped the agency of sustainable entrepreneurs in ZKlaster to identify, develop, and exploit sustainable business opportunities.

First, the sustainable entrepreneurs' territorial embeddedness in a coal region proved both hindering and enabling for their efforts. Previous studies (e.g., Dańkowska & Sadura, 2020) recognize that the regime's strength is especially evident in coal regions, where the coal industry has contributed to the production of local economies and identities, including the pride in powering the national industry and the resulting difficulty in imagining an alternative, attractive vision of the regions' future after phasing out coal. Nevertheless, our results show that the context of a coal region can both hinder and enhance the sustainable entrepreneurs' agency to identify, develop, and exploit sustainable business opportunities. On the one hand, the coal regime lock-in is particularly strong in these settings but, on the other hand, there is increasing external pressure for regional decarbonization, in which sustainable entrepreneurs can play a leading role. The growing landscape pressures – mainly EU climate and energy policies – become visible first and foremost in coal regions as they threaten the local institutions that order everyday life. The decision issued by the Court of Justice of the European Union that mining at the Turów open-pit mine must cease immediately is the most notable but not the only sign of this process, which motivates local actors to explore different transition pathways. Furthermore, at the time of the growing decarbonization pressures, coal region-based niches that develop solutions for a low-carbon future receive the biggest support from EU mechanisms. The possibility to reach dedicated funds motivates local and regional actors from different sectors – including local government representatives – to further engage in cooperation with niche actors and co-create the vision of the regional energy transition. This way, niche actors who act against the coal-based socio-technical regime may use their embeddedness in the coal region as an unexpected asset, which eventually amplifies their impact. In demonstrating this dual implication of the territorial embeddedness in a coal region viewed as a dynamic geo-social space (Munoz & Cohen, 2017), our research contributes to place-based approaches to studying sustainable entrepreneurship.

Second, the SBSEs' ability to advance system-building strategies proved crucial in influencing the regulative, cognitive, and normative institutions which they perceived as barriers to the creation and diffusion of more sustainable solutions. Despite a large dose of creativity in their efforts to circumvent the considerable limitations of the current Polish energy system, the niche actors realized from the outset that, to succeed, they had to change the institutional conditions that constrained them. Importantly, proactivity across the scales – local, regional, and national – allowed the niche actors to influence the regime's transition pathway. The SBSEs recognized the need not only to engage in the local development of an energy cluster, but also to become active at the regional level and thus increase the support for the RES development, as well as to develop the national-level innovation ecosystem promoting their lobbying efforts. Nonetheless, importantly, the transformation of coal regions in a highly centralized system is closely interdependent – economically, socially, infrastructurally, and politically – with the national transition process. Hence, the institutional work performed by the SBSEs at the local or regional scale had a more or less direct bearing on changes at the national level. For example, the regional energy transition resulted in the formulation of plans to use the existing coal infrastructure to produce and transmit green energy transregionally. Also, ZKlaster's smart grid experiment was aimed at proving that local energy markets could reduce the central grid's load and support the idea of "autonomous energy areas" as described in the Polish energy strategy. This way, by showing how the developments at the niche, regime, and landscape levels manifested and interacted at local, regional, and national scales, our study contributes

to a more geographically informed and multiscalar understanding of sustainability transitions in energy sectors.

Finally, the SBSEs skillfully used "transnational linkages" (Wieczorek et al., 2015) to enhance the potential of opening windows of opportunity for sustainable business to grow. In developing their system-building strategies, the SBSEs established overarching linkages at the EU level to receive much-needed support for their institutional work performed across all three spatial levels. Based on our findings, we argue that in particularly unfavorable institutional settings, it becomes crucially important to create such transnational linkages with strong allies supporting the SBSEs' efforts. This is due to three main reasons. First, they imbue the SBSEs' activities with legitimacy at the regional and national levels. Second, the interaction of the niche and landscape actors intensifies the pressure on the regime, increasing the chances for beneficial institutional changes. Third, external allies offer opportunities for tangible support of SBSEs' activities such as expert assistance, knowledge exchange, and dedicated funding.

Our study entails several suggestions for future investigations. First, as the article explores a single case study, further research is needed to test and modify the proposed framework against a bigger number of diverse cases from across different institutional, geographical, and material settings to shed more light on the interaction between niche sustainable entrepreneurs and institutional change for sustainable transitions. As the SBSEs' location in a coal region allowed us to examine their actions in the territorial and institutional context where the regime exhibits strong resistance embedded at local, regional, and national scales, we suggest that regions shaped by industries facing phase-out resulting from climate actions offer especially relevant settings for such studies. They may further allow scholars to observe how SBSEs strive to creatively reinterpret institutional arrangements to foster sustainable innovations locally, regionally, and nationally. Such observations can contribute to the discussion on strategies of just transition and show how the opportunities created by institutional change result from the interplay of actions conducted across different scales.

Second, the focus on multiscalar institutional work opens an interesting avenue for further research on the impact of energy communities, collective energy prosumption, and other forms of local initiatives and experiments with the production and exchange of green energy. Most studies on energy communities focus on countries where this form is well established and encouraged, such as Germany or the Netherlands (e.g., Dóci & Gotchev, 2016). Future research on the strategies employed by energy community leaders acting as SBSEs in the context of national energy systems still marked by strong carbon lock-ins and little support for more decentralized solutions may broaden our understanding of bottom-up initiatives' ability to change the dominant "rules of the game."

Finally, in this study, we analyzed the sustainable entrepreneurs' system-building strategies using van Doren et al.'s (2020) categorization distinguishing three types of institutional work: political, cultural, and technical. Future studies could examine SBSEs' institutional work drawing on a different categorization. For example, after Giezen (2018), scholars could conduct a relevant analysis of SBSEs' creating, maintaining, and disrupting strategies. It would be particularly interesting to investigate how SBSEs engage not only in creation work by attempting to form new institutions, and in disruption work aimed at the erosion of existing institutions, but also in maintenance work, understood as "reproducing existing norms and belief systems" (Lawrence & Suddaby, 2006, p. 230). As Dańkowska (2022) observes, such work is needed so as "not to cross the boundaries of the legitimate, risking the rejection of the nascent innovation by the key audiences before entering more mature stages of innovation development" (p. 174).

Moreover, future research could explore in more depth the limitations of SBSEs' institutional work as well as its unintended consequences, such as shifting the sustainability problem elsewhere in the socio-technical system (Dańkowska, 2022).

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About the Author

Agata Stasik*, Ph.D.
Department of Management in Networked and Digital Societies
Kozminski University
ul. Jagiellonska 57/59, 03-301 Warszawa, Poland
e-mail: astasik@kozminski.edu.pl
ORCID: 0000-0002-4761-9148
*** Corresponding author**

Alicja Dańkowska, Ph.D.
LUT School of Energy Systems
LUT University
Yliopistonkatu 34
P.O.Box 20 FI-53851, Lappeenranta, Finland
e-mail: adankowska@kozminski.edu.pl
ORCID: 0000-0002-0289-7603

Author contributions

A.S., A.D.: conceptualization; A.S., A.D.: writing, original draft preparation; A.S., A.D.: writing, review, and editing; A.S.: supervision
All authors have read and agreed to the published version of the manuscript.

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