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Systematic Review

Organizational Resilience as a Response to the Energy Crisis: Systematic Literature Review

Tomasz Ingram [1,*], Monika Wieczorek-Kosmala [2] and Karel Hlaváček [3]

[1] Department of Entrepreneurship and Management Innovation, Faculty of Economics, University of Economics in Katowice, 1 Maja 50, 40-287 Katowice, Poland
[2] Department of Corporate Finance and Insurance, Faculty of Finance, University of Economics in Katowice, 1 Maja 50, 40-287 Katowice, Poland
[3] Department of Economics, Faculty of Economics, VSB Technical University of Ostrava, 17. Listopadu 2172/15, 708 00 Ostrava-Poruba, Czech Republic
* Correspondence: tomasz.ingram@uekat.pl; Tel.: +48-502-590-969

Abstract: In this paper, we provide a literature review on the topic of organizational resilience, in relation to the energy crisis. The concept of organizational resilience refers to the capability to respond and adapt to shocks. Undoubtedly, the recent energy crisis may be considered an external shock, as it has raised energy prices and exerts a significant pressure on decision makers. Although the energy crisis has impacted organizations significantly in recent months, there is little knowledge on how companies should respond to this threat. Thus, to fill in this research gap, we apply the method of a systematic literature review (SLR), combined with text mining tools, to map the topics covered by 124 works in the field. Based on our results, we uncover several important gaps in the existing studies. We also provide suggestions on relevant future research directions that could broaden the scope of the management of energy crisis, in line with the concept of organizational resilience.

Keywords: organizational resilience; energy crisis; literature review

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1. Introduction

The organizational environment strongly influences how organizations perform. Countless studies explain the role of diverse aspects of the environment in everyday organizational life. Three aspects of the organizational environment have attracted considerable attention: turbulence, hostility, and complexity [1]. These refer to the uncertainty in the task environment, which entails regulations, strategic partnerships, suppliers, or customers.

The influence of environmental turbulence and hostility on organizations has been widely studied from numerous perspectives, including by financial, organizational, and project teams. Not that much attention, however, has been directed toward the changes in the general environment of organizations. The interest in changes in the environment on which organizations have little to no influence is, however, rising rapidly, especially on account of the recent COVID-19 pandemic [2] and, more recently, the war in Ukraine [3]. Thus, numerous works have recently refreshed the concept of "organizational resilience", which has been given considerable research attention (in the field of management in particular) [4]. Numerous alternative understandings and diverse perspectives on what "organizational resilience" means exist. However, the prevalent concepts link organizational resilience with dynamic capabilities. Simply, a resilient organization can adapt to adversities, counteract them, and enable bouncing back to the state preceding the change [5].

The purpose of our paper is to offer a literature review of studies that cover various facets of organizational resilience. However, our intention is not to revise the whole body of literature in this field, but the content of the papers that discuss organizational resilience and the impacts of the energy crisis. Our motivation behind the focus on this aspect is

driven by the outcomes of the war in Ukraine, which has led to severe disturbances in the economic landscape, such as the energy crisis [6]. The prices of oil, gas, electric energy, and coal have increased rapidly. These affect companies' cost levels and limit profitability and significantly influence everyday operations. For decision makers, this situation is extremely difficult, and often enables the accurate prediction of the scale of the energy crisis impacts on the performance of their organizations. This poses significant threats to numerous organizations, especially micro-, small-, and medium-sized organizations, since they frequently are not well prepared for such conditions. From this perspective, the recent energy crisis emerges as an external shock that challenges organizations' resilience capabilities. Despite the severity of the impact of the energy crisis on organizations to this day, little is known about how firms should respond to challenges arising from growing energy prices. We seek to fill this research gap by conducting a systematic literature review.

The literature review that we offer in this paper is anchored to academic papers that cover jointly the topics of organizational resilience and energy crisis impacts. Our literature review is aimed at uncovering potential gaps in the existing studies and then to map the problems that need further exploration. Our literature review was performed with the application of the SLR (systematic literature review) methodology, in line with Korber and McNaughton's [7] work. The SLR requires a rigorous procedure for the sake of identifying which academic works should be subjected to further text-mining-based explorations. For text mining, we applied the functionalities of VOSviewer software. Based on our findings, we identified the main research streams in the literature on resilience and energy crisis. These are related to energy policy, climate change, sustainability and resilience, energy systems, and energy security.

Then, by means of an in-depth analysis of the papers falling in each stream, we identify the "blank spots" in the field of organizational resilience studies, if the energy crisis is considered. Based on this analysis, we suggest topics that shall be given further research attention.

The remainder of this paper is organized as follows. In the Section 2, we set the scene of our literature review with a short discussion on the major stages of the evolution of literature on organizational resilience, and the relevance of the energy crisis as an external shock. In Section 3, we explain the methodological aspects of our literature review, in line with the requirements of the systematic literature review (SLR) method. In Section 4, we present our analysis's results, followed by a discussion of the identified fields of interest and the existing gaps within. Section 5 renders the conclusion.

2. Setting the Scene: The Energy Crisis as an External Shock and Challenge for Organizational Resilience

The roots of organizational resilience date back to the early 1980s [8,9] and are strongly related to the evolutionary theory of organizations (change, selection, and survival mechanisms) as well as learning mechanisms [10]. The notion of resilience gained attention after numerous accidents, including Bhopal (1984) and the Chernobyl disasters (1986), the Exxon Valdez oil leak, leading to a natural disaster (1989), and the NASA space shuttle Challenger disaster. In this vein, Weick and Roberts [11] developed the concept of a high-reliability organization, emphasizing the role of collective mindfulness in relationships in social systems. In 1992, Diamond [12] introduced the term "organizational resilience" to the management literature, claiming that it manifests in a latent capability for responsive leadership. Later, Hind, Frost, and Rowley [13] argued that resilience is an apparent phenomenon resulting from the need to adapt to new situations and quickly learn from experience. In the same vein, Mallak [14] defines resilience as an organizational capability based on the constructive perception of experience, enlarging the borders of decision making, and exercising organizational bricolage (developing capabilities to create new, "immediate", solutions using the resources at hand). Further, Paton [15] argues that resilience is a way of reacting to incidents or disruptive external events using Weicks' sensemaking concept. Finally, Coutu [16] describes organizational mechanisms in response to the crisis caused by WTC

terrorist attacks. He drew attention to confronting reality, seeking sense in critical events, and using the available resources while employing ritualized creativity.

Since the new millennium, the works on organizational resilience have been addressing organizations' dynamic capabilities. In other words, the concept of organizational resilience has been presented as a set of mechanisms that enable an organization to respond to the turbulences in its environment. One of the most cited works on organizational resilience, authored by Hamel and Valikangas [17], explicitly claims that companies' environments became highly turbulent, and organizations struggled to follow these changes, which, in turn, led to failures caused by inadequate changes in their business models. Ponomarov and Holcomb [18] highlighted that resilience manifests as a readiness for potentially disturbing events, an adequate response, and the ability to rebuild. Pettit, Fiksel, and Croxton [19] present a complex organizational resilience model based on the flexibility of a supply chain, the ability to change forms of delivery, accessibility of resources, productivity, visibility, adaptability, anticipation, return to the initial stage (before the crisis), resource decentralization, cooperation, adequate organization of internal functions, market competitiveness, security, and slack resources. Burnard and Bhamra [20] develop a conceptual model of organizational responses to external threats and discontinuities and manifests in abilities to change and adapt to new conditions. In their model, resilience leads to organizational learning, which helps to monitor the environment and develop organizational attention. Finally, the work by Lengnick-Hall, Beck, and Lengnick-Hall [21] grounds resilience in human resource management theory. They argue that organizational resilience is a capability built on developing the individual competencies of key organizational players. It reflects specific cognitive capabilities, appropriate behaviors, and environmental factors. The authors show how human resource management policies and practices contribute to organizational resilience.

To sum up, until the beginning of the 2nd decade of the 21st century, the literature on organizational resilience was filled with diverse, untested concepts based on different theoretical backgrounds [18–22]. This is, in fact, an early stage of the conceptual development of knowledge in the field of organizational resilience. A significant rise in the concept's popularity began in 2014, when theories were tested, and papers on organizational resilience were recognized in the most influential journals in the discipline of management. Still, however, the underlying concepts are rooted in organizations' capabilities to respond to external shocks [23].

In 2015, Van der Vegt et al. [24] framed the concept of resilience on the foundation of risk management and indicated its important role in systems, networks and resources, structures, and decision making. They created a conceptual map of problems worth studying, suggesting individual and social resilience as well as internal and external coordination mechanisms in the face of crisis, studying the nature of resilience itself, the resilience of networks of organizations, and issues related to cooperation with the third sector. A year later, in 2016, Ortiz-de-Mandoyana and Bansal [25] compared data from 242 organizations over a 15-year period. Resilience was tested through the lens of short-term financial performance and results from socially responsible business practices. In the same year, Williams and Shepherd [26] focused on building resilience and sustenance in newly created companies in the face of disruption—the Haiti earthquake, in this instance. Based on six case studies, they identified two groups of companies concerning the perception of opportunities in the environment. They also linked the characteristics of companies to the organizational performance that activates latent resilience mechanisms and capabilities. They created a model describing relationships between social capital, managerial approach, fake or deviant resourcefulness, company transformation, and business continuity. In 2017, Williams et al. [27] tried to join resilience and crisis management research streams. They created a complex model of relationships between critical events, organizational adaptation, responses to main threats, and organizational results. These relationships are complemented and interrelated through the resilience feedback loop, perceived as sensemaking processes, individual interpretations of disturbances, and knowledge sharing.

Resilience is strongly dependent on leadership, time flow, the complexity of adversity, and key organizational players' awareness. It leads to the sustainability and reliability of the organization and the capability to act in the face of adversity.

In 2019–2022, many authors focused on organizational resilience, mainly testing newly created scales and providing evidence for most conceptualized relationships. From a plethora of papers published in this period, there are at least two worth significant attention. The first one is the work of Duchek [28], where resilience is conceptualized from a perspective of dynamic capabilities, emphasizing its temporal and processual nature (phases of anticipation, handling the crisis, and adaptation with diverse mechanisms fostered at different phases). In the second paper, Hillmann and Guenther [4] analyze 71 diverse resilience definitions and compare 14 different measurement tools. They also created a model of organizational resilience focusing on behaviors, resources, and capabilities.

The short overview of the variety of perspectives and approaches in defining organizational resilience suggests that this is still an evolving concept. Currently, a widely adopted definition of organizational resilience is taken from Williams et al.'s work [27]. Organizational resilience is perceived as a process in which an actor (individual, organization, or society) builds and uses capabilities to interact with the environment in a manner allowing for positive adjustment and maintaining operation before, during, and after the disturbance (an external shock).

The current energy crisis shall be regarded as an important external shock for organizations [29]. It affects individual behaviors by limiting disposable budget, indirectly affects purchase behaviors in the market (towards more sustainable investments [30,31]), leads to price rises, and, from the macroeconomic point of view, drives inflation [31]. For organizations, it leads to increased costs of production, services, and delivery [32], thus limiting their competitiveness [33].

As can be observed in the Eurostat data, oil, gas, and coal prices have risen significantly within the past year [34]. Many governments have decided to subsidize households and companies concerning energy prices. For example, Italy has provided a USD 200 "cost of living bonus" to limit the impact of higher costs. British households will receive a GBP 400 subsidy for energy bills this winter. In Poland, individuals and households can apply for a USD 640 subsidy for purchasing coal (the primary heating source). Germany has set out a EUR 200 billion "defensive shield", covering a gas price break and a fuel tax cut to protect companies and households from soaring energy prices. Bulgaria has introduced a discount of BNG 0.25 per liter of petrol, diesel, liquified petroleum gas, and methane as of July [35].

The effects of the increase in energy prices are also alarming, given the financial performance of organizations. Large companies are considered to have more resources and frequently manage the impacts of external shocks better. However, small- and medium-sized businesses are more vulnerable to external shocks. In an article published on 7 September 2022, Reuters journalist J. Strupczewski [36] indicates that surging energy costs are putting European small- and medium-sized businesses at risk of failure without external help. This adversity, as presented in the Wall Street Journal [37], is strongly affecting smaller companies that drive the growth of the European economy. According to the WSJ, gas prices have significantly affected not only the financial performance of companies but also their ability to compete effectively with their counterparts from other parts of the world. The rising gas prices have directly affected numerous companies operating in different branches and impacted the costs of basic operations. An increase in these groups of costs implies the necessity of raising prices for products and services, which makes them less competitive. It also signifies higher customer prices and lower demand for offered goods and services; this, in turn, affects companies' competitiveness.

Given this handful of data that outline the pressure of energy costs on organizations (in particular, small- and medium-sized ones), the energy crisis is considered an important external shock. In this regard, this is a complex problem that falls within the scope of resilience and related dynamic capabilities. However, little is known about what aspects

related to energy cost pressure have been studied in the works on organizational resilience. To fill this gap, we designed the systematic literature review (SLR), which is presented in the following sections of this paper.

3. Systematic Literature Review—Methods and Sources

In this section, we provide the details of our methodical approach to revising these works to explore their link with the problem of the energy crisis. In other words, we aim to establish a deeper understanding of the field of knowledge on organizational resilience considering the energy price shocks.

In Figure 1, we provide a map of the design of the applied research procedure. First, we applied the procedure of SLR (systematic literature review), in line with Korber and McNaughton's [7] work. The sound implementation of SLR requires a clear outline of the process of selecting publications for further text mining analysis.

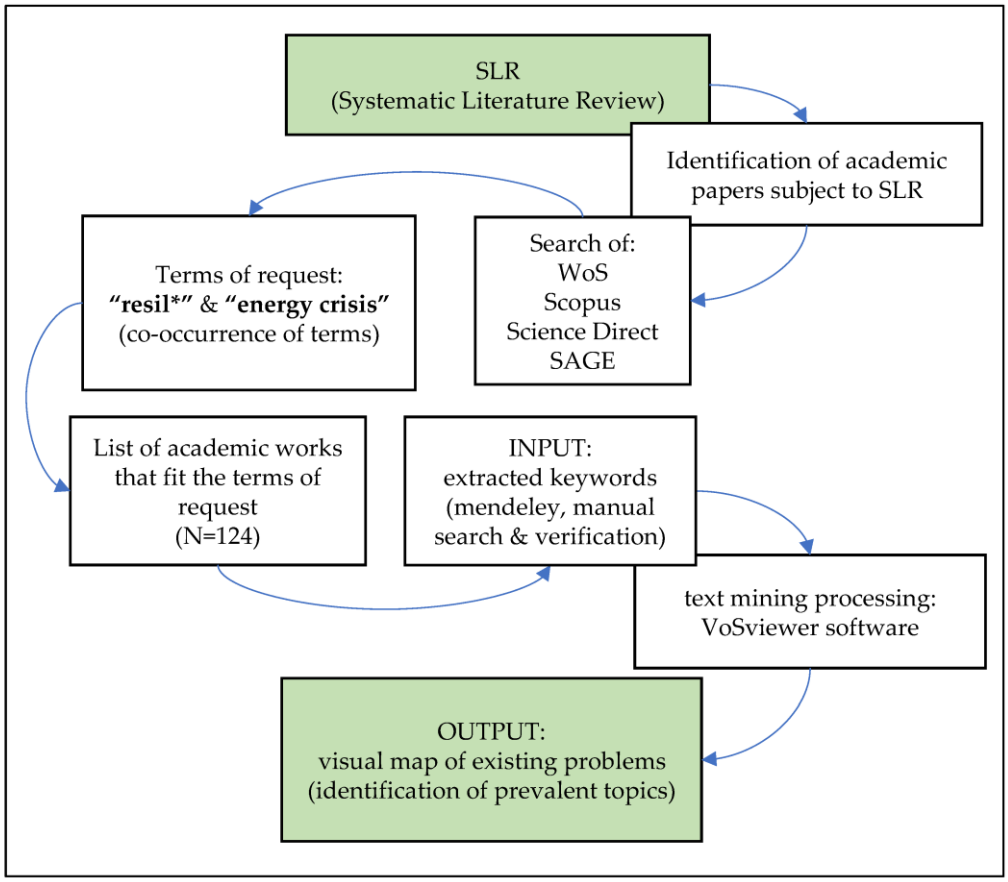

Figure 1. Design of empirical procedure. *–replaces all instances of characters in a string in the search process in the database.

Our search for publications was restricted to works in the fields of social and economic sciences. We applied very tight terms of request, namely the joint presence of the terms "resil*" and "energy crisis". The motivation behind this restriction was to filter out the works that have already revised these two problems jointly to fuel our map of covered problems with more focused works. Such an approach allowed for identifying the core issues related to the resilience of broadly defined social systems. To focus on the most significant studies, we decided to study publications listed in four databases: Web of Science, Scopus, Science Direct (Elsevier), and Sage. Our literature search covered papers published from 2010 onwards. This choice was made considering (a) the limits of the search engines we used; (b) the rising awareness of resilience in the literature from 2010 onwards, especially after the financial crisis from 2007 to 2009 [38–43]. Additionally, we

noted that before 2010, the number of papers that refer to organizational resilience was very low (significantly fewer than three papers per year; for reference, see the work of Linnenluecke [9]).

Further, to identify the works that fit our interest, we searched for the co-occurrence of "resil*" and "energy crisis" in the: (i) title, (ii) author's keywords, and (iii) abstracts. The exact syntax depended on the database search engine. The search took place on the 15th of November 2022. We employed an advanced search in all databases, downloaded complete metadata, and integrated them into Zotero for further analysis. The statistics of the papers found in the databases are provided in Table 1.

Table 1. Number of papers that included the request terms (co-occurrence of "resil*" and "energy crisis").

Database	Web of Science	Scopus	Science Direct (Elsevier)	Sage	In Total
Number of research papers in journals	28	36	61	19	144
Number of articles in conference proceedings	7	10	2	1	20
Number of book chapters	1	5	0	2	8
Number of other entries (short notes)	0	0	18	3	21
Total number of identified publications	36	51	81	25	193

We identified 193 works (documents) with our restrictive request terms. Next, we revised the selected papers (title, keywords, and abstracts) to exclude duplicates or documents with missing keywords. After this revision, we finally obtained 124 works for further analysis. A list of these papers is provided in the Appendix A.

The next stage of our analysis was the extraction of the keywords from the identified documents. We applied automated extraction in Zotero. However, we double-checked the procedure and manually supplemented the list of keywords, if needed.

The list of keywords was then used as the subject of the text mining analysis. We selected the keywords (not the titles or the whole content of the abstracts), guided by the intention to sharpen the relevance of the topics raised in each identified paper, as stated directly by its author(s). As our work was targeted at exploring the areas of issues raised by the papers that fit our selection criteria (joint interest in resilience and energy crisis), the keywords highlighted by the author(s) provided, in our opinion, a clear indication of the interlinked aspects addressed in their works.

The text mining part of our work was based on the application of the VOSviewer software. VOSviewer is an open-source software developed by N.J. van Eck and L. Waltman [44]. This tool was designed to support bibliometric studies by offering a clear and meaningful visualization of the network of terms and words. In our study, we applied VOSviewer for similar purposes; we aimed at mapping the terms that appeared in preselected academic papers to identify the main streams of research in studying resilience to an energy crisis. More specifically, we applied VOSviewer (version 1.6.18) to explore the co-occurrence of terms. The output of the application of this software is a map that demonstrates the close connection network of terms.

The software carries out cluster analysis and operates on so-called "occurrence ratios". These ratios measure the number of co-occurrences of two terms in one studied document (the set of keywords, in our case). The software measures association strengths to draw a map of co-occurrence by establishing the coefficient calculated according to the equation provided below (see details in [45–47]).

$$S_{ij} = \frac{C_{ij}}{(W_i * W_j)}$$

where

S_{ij} denotes the similarity between the objects i and j;

C_{ij} denotes the co-occurrence of the objects i and j;
W_i and W_j denote the occurrence of the objects i and j.

To run the analysis in VOS viewer, the keywords from the identified papers were used to build a thesaurus file [44], and the terms of low relevance were filtered out from the list (in line with the idea of maintaining the relevance of the input). Considering the relatively small number of keywords identified in 124 papers, which equaled 848, we filtered out keywords that appeared only once or twice in papers (the list of keywords is provided in the Appendix A). Next, we manually performed a filtering procedure to remove irrelevant words and manually replaced synonymous phrases with more popular ones (for example, "renewable energy resources" and "renewable energy resource" were replaced with "renewable energy resources"). We performed that action to guarantee that low-relevance words did not appear during the analysis. This left us with 27 significantly interrelated keywords occurring in papers 3 times or more.

4. Systematic Literature Review—Results and Discussion

In Figure 2, we present a map, which is the output of the VOS viewer software. The map indicates several clouds of interrelated problems, and each cloud is highlighted in a different color. This map allows for identifying five main research streams in the international debate on resilience to the energy crisis: energy policy (red color), climate change (blue color), sustainability and resilience (green color), energy security (purple color), and energy systems (yellow color). Below, we briefly characterize each stream by reviewing the scope of the papers that fall into each stream. We also indicate possible implications for organizations with resilience concepts present in organizational studies.

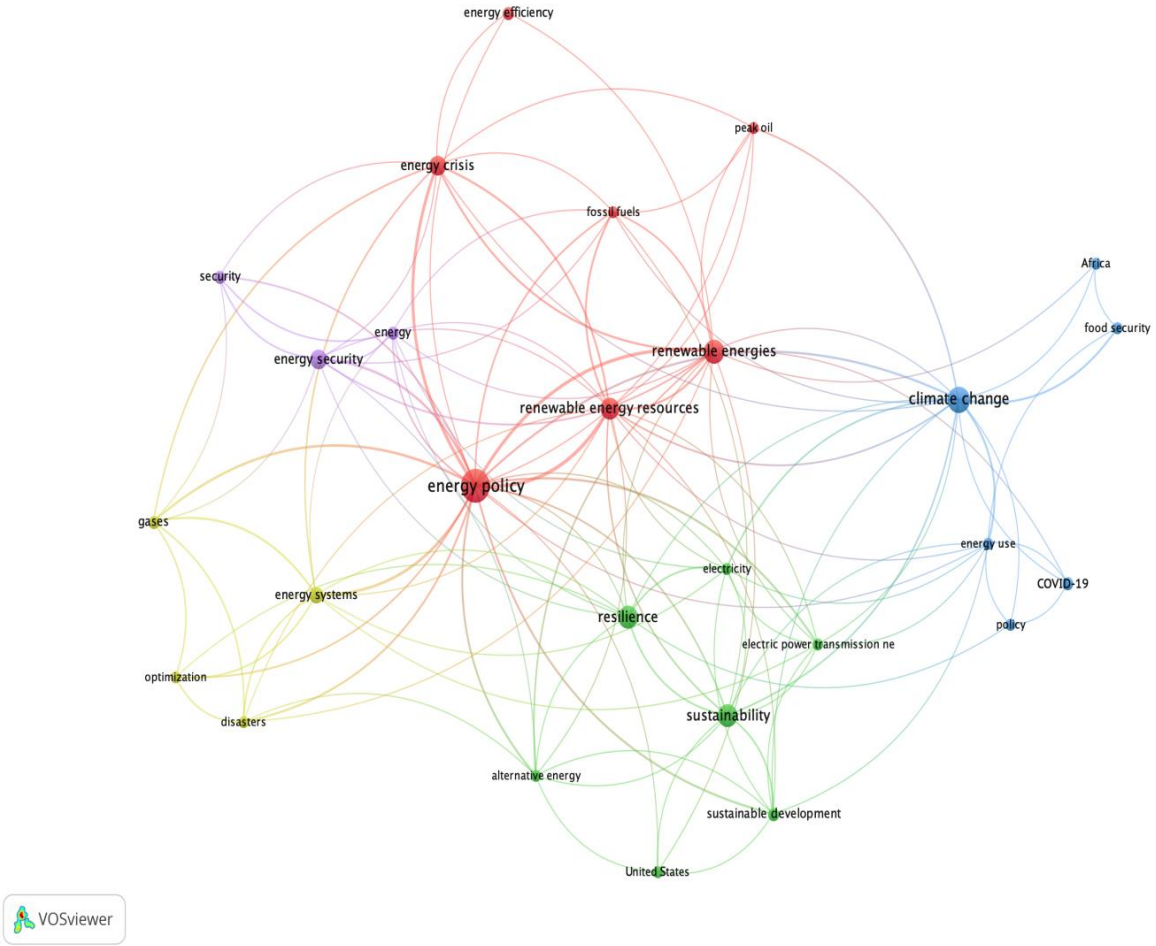

Figure 2. Key topics in the study of resilience and energy crises.

4.1. Energy Policy

Energy policy (Figure 1, red color) is strongly related to renewable energy resources [6], renewable energies [48–50], energy crises [51,52], and energy efficiency [53], which has a strong relationship with energy crises. It is also related to fossil fuel and oil prices while indicating paths of green transformation [31,32,54,55]. In this vein, there is a growing awareness of the necessity of creating appropriate country-level [52,56]) and EU [51] policies concerning alternatives to traditional energy resources considering shortages and rising prices of gas [57], oil [58], or coal [59]. The recent war in Ukraine revealed an even higher pressure to create a sound energy policy—especially bearing in mind the gas and coal shortages resulting from this military conflict [57]. The main issue seems to be finding a satisfactory and economically justified solution to dilemmas related to the transformation from currently prevailing energy production solutions in countries, which, in most cases, are based on natural resources and future-oriented green energy solutions [60]. There is also a growing debate over nuclear power [52,61] and micro-nuclear reactors [48]. To a large extent, resilience in these works refers to the static characteristic of a community or studied entity [62,63] and is perceived as a desirable outcome of deliberately taken actions. Moving beyond the review of the first research stream, to interpret findings from an organizational resilience point of view, it should be noted that these topics create macro-conditions for organizations, affecting costs, profits, and the performance of companies and institutions. However, frequently they remain behind the absolute control of key decision makers in organizations, constituting uncontrollable, exogenous factors [64]. Managers willing to help their companies become resilient should focus on awareness of energy regulations [65] and preparation activities, concentrating on creating internal crisis management plans [61,62]. This also requires organizing resources to fight against potential adversities via governmental policies directly related to accumulating slack resources—especially financial resources [63,64]. Finally, considering that the current debate is focused on renewable energy, this requires a transition towards greener energy solutions, necessitating innovation and investments [66].

4.2. Climate Change

Climate change (blue color in Figure 2) was frequently linked with energy use [67–70], policymaking [71,72], COVID-19 [6,68], and food policy [73,74], and these studies frequently referred to Africa [75–78]. In the studied papers, scholars' attention was mainly focused on problems of sustainable energy use, which strongly correlates with green transition policies [79]. In this vein, the literature strongly focuses on the necessity of optimizing and limiting energy use in the face of an energy crisis, showing how the unsustainable usage of energy may cause climate degradation [80]. Challenges resulting from the energy crisis and the COVID-19 pandemic, as argued by Aktar et al. [68], will surely affect the green transition policy. It will also force decision makers to swiftly respond to thought-provoking and possibly destructive consequences of the joint interaction of the post-pandemic environment and energy crisis. In some regions, the COVID-19 pandemic and energy crisis are also linked to social problems, such as food shortages [81] and resulting food insecurity [69]. This is especially important for African countries [74]. To sum it all up, climate change interactions with energy consumption and food security, among other things, are clearly perceived by scholars. Papers in this stream of research refer mainly to necessary changes, and resilience appears to be both the mechanism through which food security is maintained, among other factors, and an outcome of adequate policies. The understanding of resilience in this stream has much in common with social and ecosystem sustainability. It also naturally focuses on policy change processes, on national [82,83] as well as local levels [78].

From the organizational point of view, this reaffirms the necessity of addressing green transition challenges by introducing sustainable solutions to everyday operations [84]. This requires a proactive, entrepreneurial posture focused on developing organizational solutions help society adapt to the growing challenges resulting from broadly perceived climate change [85]. It is also a call for studying resilience and entrepreneurship links. While

this topic remains undertheorized [86], it also draws attention to innovation implementation and funding [87].

4.3. Sustainability and Resilience

The literature review revealed an interest in sustainability and resilience issues (green color in Figure 2) [88–90] in the context of sustainable development [91,92], alternative energy sources [49,62], electricity and electric power transmission networks [93,94], and electricity [95,96]. In this vein, the country context seems strictly relevant, while three studies refer to the USA [59,97,98]. The debate focuses on the interplay between resilience and sustainability, with both terms being used nearly interchangeably. However, scholars also focused on technicalities, such as, for example, power transmission networks [67] or sustainable biomass energy production and maintaining natural forest ecosystems in Alaska [92]. They also tackled eco-social work activities and their influence on community resilience [88]. Lavric and Petrariu [99] relate the energy crisis and resilience with new technologies (Internet of things and low-power wide-area networks), clearly showing the path for future interdisciplinary studies. This study relates to some extent to industry functioning, referring also to the machine-to-machine industry. The authors show how new technologies can help overcome challenges arising from the energy crisis and help prevent environmental pollution and resource depletion.

Similarly, Masood [93] demonstrate the role of information technologies in creating smart electric power networks that may help mitigate the consequences of the energy crisis. Studies related to climate change also deepen the knowledge on urban energy safety (resilience) [90]. To sum up, resilience in this stream of research refers to the feature or characteristic of a system, the goal to be obtained through an informed, well-planned, and diversified set of actions.

From an organizational point of view, this stream relates strongly to the early stage of studies on organizational resilience, where it was perceived as high reliability in the face of disruption [11,16]. The current literature on resilience largely focuses on creating organizational capabilities [100,101], which are more intangible than practical, technical solutions preventing negative consequences of adversity. It suggests deeper integration of research on the intersection of resilience and crisis management in organizations, as suggested by Williams et al. [27].

4.4. Energy Systems

The next topic of resilience research was focused on investing and gaining a deeper understanding of energy security, especially considering gases [48,70], disasters [95,102,103], and optimization issues [52,93,104]. In this research stream, Bruno et al. [103], focusing on technical details of energy security, show implications for production load and duties, arguing for the necessity of inter-organizational cooperation for balancing energy sources and referring to a systemic perspective. These should not only allow for discrete optimization of input–output time trajectories but also include energy storage technologies, which are the core issues in the energy policy of developed economies. Additionally, Abdussami, Adham, and Gabbar [52] argue for focusing on the implementation of technical solutions related to off-grid energy systems based on nuclear and renewable resources. In a similar vein, Huang et al. [95] call for technical solutions guaranteeing uninterrupted functioning of energy systems via the use of integrated electricity and gas resources. Additionally, Khan and Anwar [49] debate issues of infrastructural investments, helping to strengthen the national economy, adequate capital formation, building human capital through a variety of actions (education, employment opportunities, training, skills, awareness), and installation of renewable energy systems facilitated by governments. This should help to prevent the negative consequences of natural disasters. All these papers show resilience as a state or characteristic of a certain system; it also emphasizes the role of resilience in hazard management and planning. The focus of attention is at the mezzo-to-macro levels

of analysis (networks of organizations, large corporations, or whole countries). Resilience to energy crises remains the goal to be reached.

Moving on to the organizational perspective, there are few implications for decision makers from this stream of research. These issues, similarly to energy policy, frequently remain beyond the direct control of managers, and in most cases, they need to focus on anticipation and passive adaptation [105]. This does not limit the need for continuous monitoring of state-level regulations related to the green transition, with a focus on investing in modern energy solutions/systems and an awareness of weak signals stemming from political decisions [106]. It also necessitates the creation of a resource base enabling adaptation and the green transition in response to the new green transformation related to country- or regional-level policies [107].

4.5. Energy Security

Finally, a few papers in the sample are related to energy security [57,80,108,109]. These papers narrate concrete, albeit energy-policy-related, contexts focused on providing stable, secure solutions guaranteeing energy safety and security. Underwood et al. [108] refer to energy resilience as addressing external threats, such as earthquakes, blockades, or an energy crisis. In this paper, resilience is a passive state of the energy system that should be based on either a centralized or distributed nature, be regionally integrated or nationally isolated, and be based on fossil fuels or renewable energy resources. Developing countries stand in front of decisions related to choices that will determine their energy future. These choices will directly affect country-level energy resilience, create or prevent energy poverty, and lead to perceived justice or injustice.

Energy policy is also strongly related to the functioning of organizations, and SMEs, while these are extremely vulnerable to energy shocks resulting in operational and long-term problems [110]. There are numerous similarities between energy security and energy systems; these issues frequently depend on macroeconomic decisions and lie behind the direct influence of organizational decision makers [111]. Nonetheless, awareness and preparedness for unforeseen policies and social and environmental disturbances are necessary for organizations facing an energy crisis [112]. In the following section, we discuss implications for future research on the resilience of organizations to the energy crisis.

5. Discussion—Tracking Gaps in Existing Streams

The systematic literature review on resilience and energy crisis revealed five main streams of knowledge development in the resilience and energy crisis field. On the other hand, the analysis showed that the focal point of interest is related to macroeconomic issues. The resilience of companies facing challenges resulting from the energy crisis has yet to attract significant attention, apart from a few studies indexed in the ScienceDirect database [113–116]. Although indexed in organizational resilience and energy crises, these are on the borderline of leading research streams. Additionally, their relationship to the topic of resilience, apart from the work of Bravo and Hernandez [113], could be stronger. This work focuses on measuring organizational resilience, brings new operationalization of the resilience concept, and discusses implications from studies on firms' performance (oil and gas industry) in unconventional oil and gas development in the Americas. The authors developed a list of customary indicators to measure organizational resilience after an extreme event. However, these strongly reflect the specificity of the oil and gas industry, making the scale challenging to test in other industries. While it brings new knowledge and fresh ideas into the measurement process, it focuses mainly on financial and operational metrics. It might be an extremely valuable proposition for companies operating with natural resources. However, before it can find application in other companies, the instrument's applicability needs to be tested and requires significant modifications.

Tong and Germany's [114] work draws attention to industrial manufacturing, storing, and transferring of hazardous materials (easily flammable and toxic explosives). Using Bayesian networks, the authors propose a framework helping to measure the resilience of

facilities vulnerable to accidents in the production processes. This technical work can help mitigate potential accidents, thus serving as a practical tool helping to increase safety in the workplace and limit potential hazards for the company's infrastructure and environment.

Valentino and Perez-Valls [116] concentrate on the long-run sustainability of organizations (corporations) by introducing the concept of "moral wayfinding," combining immersive engagement in a social environment with moral commitment. This plays a vital role in pursuing sustainable goals, making more socially responsible decisions, and motivating green-transition-related investments. This paper addresses challenges with more complex decision making and loosely relates to the energy crisis. Finally, Leal Filho et al. [115] address issues related to post-COVID-19 recovery and climate change by addressing new technologies (artificial intelligence and data technologies). The authors argue that AI may help in green transformation by allowing the identification of innovative solutions to pressing climate threats. Considering the nature of the energy crisis, this brings new possibilities to the table, but we will have to wait to see its effects.

To sum up all the above arguments, the state of knowledge on organizational resilience to the energy crisis is relatively poor. Although the sheer number of studies on organizational resilience may give the impression that the field is well developed, in fact, there are very few papers addressing the issue of the energy crisis. While the prevailing number of papers on resilience are focused on the response to a disaster [117,118], there are relatively few studies concentrating on long-lasting negative trends, such as crises [5,39]. Organizations are theoretically supported when it comes to overcoming brief shocks. However, long-lasting handling of adversities—such as an energy crisis—will most likely require a different set of capabilities and resources. So far, the literature has not offered a sound unifying theory for handling such situations; there is a clear gap in this regard. We are convinced that the discussion on resilience to the energy crisis should be brought down from the overall macroeconomic perspective to include an organizational point of view.

The literature review revealed a need to study the energy crisis's influence on the functioning of small- and medium-sized companies. The consequences of rising energy prices may be highly detrimental to SMEs, and in most cases, they are financially unprepared for such a situation [119]. Solutions and practices working in large organizations might not work for smaller entities. Thus, there is a clear need to recognize the influence of the ongoing energy crisis on the operational and sustainable performance of this group of organizations. This should be complemented with available solutions and best practices. Case study research designs can achieve this. The COVID-19 pandemic brought several exciting observations in the tourism/hospitality industry [120–122]. More studies on this topic are needed in other industries as well.

Next, most studies on organizational resilience focus on capabilities or intangible resources which can be used to mitigate the disturbance [123,124]. An apparent concentration on strategic perspective in combatting adversities in organizations is present. However, an operational aspect of resilience also exists; for the organization to become resilient, it must survive the hit first. In this instance, organizations need resources—especially financial ones. Financial performance and the ability to survive or grow under pressure are interrelated [125]. Thus, studies on organizational resilience to the energy crisis should focus on finding the balance between operational efficiency, continuity, and seeking opportunities for growth [126].

Finally, only a few papers show the implications of the green transition in the face of the energy crisis in organizational settings. While there are some works related to this issue at the macroeconomic level [6,59], during the review, we were not able to find any papers discussing the implications of the energy crisis for organizations considering the transition to green solutions. This could be exciting, considering the regulations set out in the European Green Deal policy. From one point of view, the energy crisis catalyzes changes and introduces more sustainable solutions based on renewable resources. On the other hand, increasing operation costs limit companies' investment capabilities. This dilemma still needs to be recognized in the literature and should attract more attention.

This is a very relevant and timely topic, with relevant policy implications. For instance, the Network of Central Banks, on 7 September 2022, published a note [127] on the effects of the energy crisis originating from the war in Ukraine and their relationship to the latest scenarios. Its authors argue that the crisis might provide the opportunity for a net-zero transition from a carbon-intensive economy by 2050, as indicated by the Paris Agreement. This, however, requires swift operation and might be hard to follow for less-developed economies. According to the authors, decision makers are currently at a crossroads, and there are two paths they can choose. These companies may focus on increasing the carbon intensity of energy systems, which is a step backward from meeting the regulations and objectives of the Paris Agreement, or moving towards net zero, leaving fossil fuels behind, which might improve the chances of a less costly low-carbon transition. The choice of the first path may lead to catastrophic climate changes. Similarly, the European Think Tank Group [128] has shown how the war in Ukraine has fostered an energy crisis and discussed implications for the Green Deal and its regulatory aspects. The need to act immediately is clearly shown in the European Green Deal, energy security, supply chains, food security, environmental protection, coordination, and coherence of actions with regard to EU policymakers, social protection, and international cooperation. These suggestions refer to critical countermeasures taken to help mitigate the consequences of the energy crisis. However, as noted by FitchRatings.com [129], such actions will strongly influence countries' fiscal systems by counteracting disruptions.

To comply with the Green Deal policy, organizations will have to invest heavily, and for SMEs, such a challenge might become the final nail in the coffin. It would significantly affect SMEs, especially considering that their customers are unwilling or unable to accept higher prices. These companies usually have insufficient financial reserves to help them withstand the shocks [130]. With institutional help, such SMEs might survive the pressure of investments related to green technology introduction and rising energy prices.

In Figure 3, we present a map of gaps in the existing topics that emerged from our literature review and are discussed above. It is worth mentioning that the map of co-occurrence of keywords (the output of VOS viewer, presented in Figure 2), highlights many words that refer to changing external conditions and the reaction to or perception of a single organization, although these problems are systemic by nature. Additionally, some keywords are simply contemporary "buzzwords" (e.g., sustainability, renewables, climate change, and COVID-19).

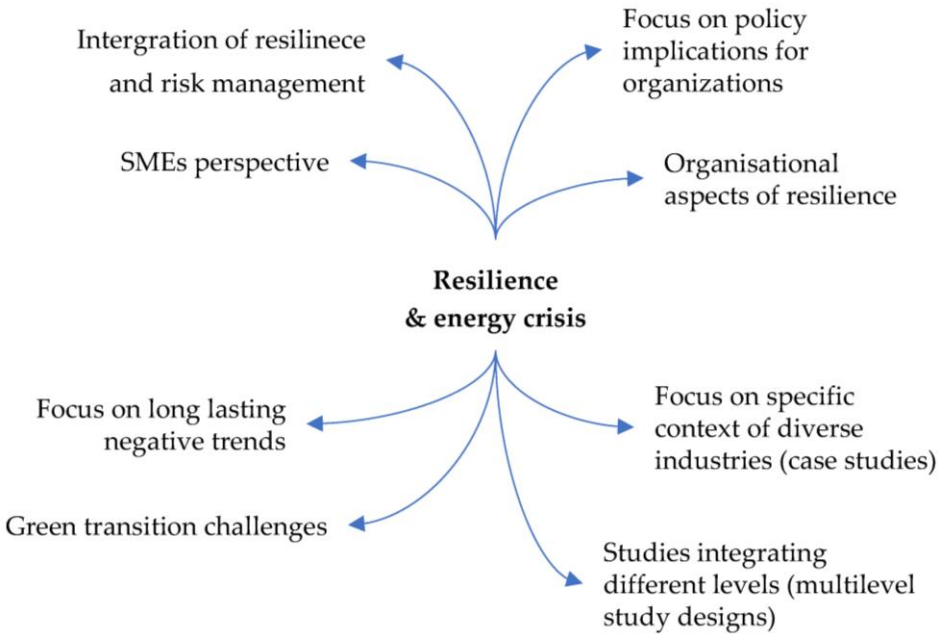

Figure 3. Uncovering blind spots in existing research on resilience and energy crisis.

Uncovered blind spots indicate future research directions for scholars interested in studying organizational resilience and energy crisis issues. Firstly, since the potential influence of the energy crisis on small- and medium-sized organizations can be perceived as detrimental to their existence [131], there is a clear need for more studies on the influence of the crisis on the functioning of these organizations. These studies should focus on identifying adaptation mechanisms to this threat, such as those in the papers on coping mechanisms in the face of the financial crisis [132,133] or natural disasters with long-lasting effects on the economy [134]. This draws attention to organizational aspects, such as preparedness [135], maintaining a sufficient stock of resources to mitigate the long-lasting negative influence of the energy crisis [136], or preparation of an effective response plan for discontinuities in energy supply [137].

Considering the scarcity of natural resources [138], the energy crisis will most likely constitute a long-lasting negative trend that affects the functioning of organizations. To the best of our knowledge, few studies have compared the effects of sudden incidents, which strike unexpectedly and usually end shortly after they begin (hurricanes, earthquakes, and other natural disturbances), and long-lasting negative trends (such as financial crises, wars, and pandemics). Little is known about the effectiveness of organizational responses to these two distinct types of negative disruptions. In particular, the knowledge of successful mechanisms (for example, crisis management plans) in dealing with hurricanes' consequences [139] is equally efficient in response to prolonged tendencies. Thus, the effectiveness of organizational responses to long-lasting negative trends requires more attention.

Looking at the national and international debate on climate change [140], and its influence on the regulation of energy markets [141], researchers interested in resilience studies should also pay closer attention to policy implications for the well-being and survival of organizations [142]. The green transition significantly strains an organization's everyday life, impacting costs, profits, and investments [143]. More studies are needed to establish a better understanding of the repercussions of legal regulations in this regard for organizations. In this vein, case study research might bring necessary knowledge about triggers and mechanisms that enable organizations to prepare for the uncertain future [144].

It also seems rational to focus more on the specific context, or the industry, in which organizations operate [145]. A lot is known about the resilience of tourism organizations to crises—mainly because numerous studies on this topic appeared in the field after the COVID-19 outbreak [146,147], as well as many on supply chain management [148]. However, relatively little attention has been paid to the resilience of companies functioning in industries less affected by the crisis. The energy crisis will most likely strike whole economies, and companies operating in numerous industries that were previously unaffected will have to face this challenge. Highly energy-dependent organizations and industries (production and construction in particular) especially will be placed in a very uncomfortable position.

From the theoretical point of view, it is also high time to face the challenge of clearly setting the stage and recognizing mutual relationships between organizational resilience and crisis management concepts. Although the first work on this subject has already been published, much must be done to evaluate its conceptual propositions and validate them in organizational practice [27]. Since resilience occurs at different levels of analysis [21], multilevel studies [149] carried out among employees, teams, organizations, industries, and possibly countries, seem necessary. This requires much theoretical insight into justifying relationships between different levels of resilience since the knowledge in this field needs to be improved to link constructs conceptually contributing to resilience at different levels.

6. Final Remarks

The reviewed and briefly summarized papers deal with the ability to react (adapt) to changing conditions (changes in the external environment) that come as various external shocks that cause uncertainty, instability, and volatility. However, for organizations of all

kinds that are not homogenous, the impact of the shock may vary. There is evidence of shocks (followed by volatility and uncertainty) that are causing significant impacts and can thus be overcome only when an organization is resilient enough (can adapt, is flexible); these occur in areas that used to be stable for long periods (decades). Such islands of stability (safe havens) were energy prices, distribution of electricity and commodities, the climate, supply chains, and energy policy. Either they were stable for ages, such as the weather, or were evolving gradually and thus were predictable.

A certain level/amount of resilience is needed for an organization to withstand sudden changes in formerly stable variables. Resilience can be developed inside the organization (flexible management, entrepreneurial mindset, building up reserves and organizational slack, practicing risk management) or, as the analyzed studies show, it can be boosted via innovations, national level regulation and interventions (e.g., energy policy), international cooperation (EU energy and security policy), global actions (climate action movement and agreements), advancements in technology, and last but not least through availability of knowledge and sharing good practice.

Our study faces some limitations. First and foremost, we focused on papers from the last 12 years, showing the growing interest in the field of resilience to energy crises over time. We intentionally applied rigorous selection criteria to focus on papers directly referring to the notion of organizational resilience to the energy crisis as a specific type of disturbance. We did so to intentionally highlight the existing gaps. To our surprise, only a few works focused on issues related to mitigating the negative impact of the energy crisis from the perspective of organizations. We believe that further developments in the literature on resilience and the energy crisis will provide a more in-depth view into the topics we highlighted as blind spots. The green transition, which has only just begun, and the war in Ukraine show how important it is to be prepared for energy insufficiency and an increase in prices. On the other hand, war only accelerates the crisis, which, sooner or later, will strike organizations. Finally, the map presented in Figure 2 is based on keywords. It would be interesting to dig deeper into the papers and analyze whole articles. This was, however, beyond our reach due to the number of papers and difficulties in obtaining copies that would enable such an analysis. This paper signals gaps in our knowledge in the management field and outlines gaps that should be filled in with empirical and theoretical studies.

From the practical standpoint, the map showing research gaps indicates the necessity of an ambidextrous approach to managing organizations [150]. Simultaneous balancing of past, present, and future seem necessary in highly volatile environments. Additionally, an organizational focus on operational efficiency and sustainable development requires swift movements between alternative and frequently conflicting forces. Our study also highlights that practicing mindfulness and organizational attention to weak signals may determine organizational survival [151] and help organizations prepare for future adversities. Entrepreneurs should also focus on creating sound relationships with key stakeholders, especially local and national level institutions, which can help to overcome temporal difficulties. There is a clear indication of the role of inter-organizational cooperation under external pressure. Temporal co-work aiming to identify solutions may safeguard the future of clusters of organizations or whole industries [152].

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Appendix A

Table A1. Keywords and sources used for systematic literature review.

Author	Year	Title	Publication Title	Keywords
Bosher	2010	Turbulent Worlds	*Theory, Culture & Society*	Energy Policy; Fossil Fuels; Renewable Energies; Renewable Energy Resources; Energy Crisis; Climate Change; Carbon Footprint; Carbon Neutrals; Key Elements; Metropolitan Area; Peak Oil; Sustainable Transport
Cooper	2010	Prioritizing Climate Change Adaptation and Local Level Resilience in Durban, South Africa	*Environment and Urbanization*	Biopolitics; Debt; Environmental Politics; Financial Markets; Imperialism
Hanjra; Qureshi	2010	Consuming the Planet to Excess	*Theory, Culture & Society*	Price Dynamics; Climate Change; Energy Use; Food Security; Climate Effect; Food Market; Food Policy; Irrigation; Resource Scarcity; Water Supply
Roberts	2010	Urban Futures: Energy Crises and Sporadic Responses	*Building Research and Information*	Climate Change Adaptation; Development; Local Government; Resilience
Sarkar	2010	Global Climate Change, Emissions Trading and Sustainable Energy Development	*Asia Pacific Business Review*	Global Climate Change; Emissions Trading; Sustainable Energy; Carbon Management; Carbon Offsetting and Foot Printing; Carbon Literacy; Looking Beyond Copenhagen
Urry	2010	Global Water Crisis and Future Food Security in an Era of Climate Change	*Food Policy*	Climate Change; Complexity; Contradictions; Marx; Peak Oil
Bannister	2011	Climate Change, Adaptation, and Vulnerability: Reconceptualizing Societal–Environment Interaction Within a Socially Constructed Adaptive Landscape	*Organization & Environment*	Spacecraft And Planetary Communications; Interplanetary Internet; Planetary Lander Radio Systems; Radio Science; Solar System Missions
McLaughlin, Paul	2011	Communication Challenges for Solar System Exploration Missions	*Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering*	Adaptation; Vulnerability; Climate Change; Evolution; Agency; Constructionism; Thoery; Organizational Sociology; Social Movements
Altieri; Funes-Monzote; Petersen	2012	Agroecologically Efficient Agricultural Systems for Smallholder Farmers: Contributions to Food Sovereignty	*Agronomy for Sustainable Development*	Climate Change; Ecosystem Resilience; Africa; Agroecology; Brazil; Crisis Management; Crop Production; Cuba; Decadal Variation; Developing World; Empowerment; Farming System; Food Security; Indigenous Knowledge; Nongovernmental Organization; Peasant Agriculture; Philippines; Smallholder; Sovereignty; Water Resource

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Baker; Stoker; Simpson	2012	Assessing the Prospects for a Revival of Nuclear Power in Britain	*Proceedings of the Institution of Mechanical Engineers, Part A: Journal of Power and Energy*	Nuclear Power; Britain; Energy Policy; Historical Institutionalism
Rhodes	2012	Feeding and Healing the World: Through Regenerative Agriculture and Permaculture	*Science Progress*	Permaculture; Regenerative Agriculture; Forest Garden; Soil Degradation; Desertification; Peak Oil; Fracking; Hydraulic Fracturing; Shale Gas And Oil; Plant Nutrition; Carbon Capture; Biochar; Glomalin; Soil Fungi; Transition Town; Water Treatment; Mineral Deficiency; Vitamin Deficiency; Obesity Epidemic
Bhattachaya	2013	Sustainable Biomass Energy and Indigenous Cultural Models of Wellbeing in an Alaska Forest Ecosystem	*Ecology and Society*	Energy Policy; Climate Change; Computer-Aided Instruction; E-Learning; Economic Instability; Engineering Education; Global Education; Information Technology; Online Systems; Problem Solving; Resilience Development; Scenario-Based Learning; Social Transformation; Teaching; Teaching And Learning; Technological Advancement; Technology-Enhanced Learning
Boyd; Ghosh	2013	Achieving Economic Gains through the Setting of Environmental Goals: The Case of California	*The Next Economics*	Innovations For Enabling Urban Climate Governance: Evidence From Mumbai
Grose	2013	Building Resilience through Real-Life Scenario-Based Technology Enhanced Learning Environment Design	*2013 IEEE Region 10 Humanitarian Technology Conference, R10-Htc 2013*	Energy Efficiency; Employment Growth; Resource Efficiency; Green Economy; Renewable Portfolio Standard
Masood; Baig; Raza	2013	Innovations for Enabling Urban Climate Governance: Evidence from Mumbai	*Environment and Planning C: Government and Policy*	Smart Grid; Advanced Metering Infrastructure; Information And Communication Technologies
Sikka; Thornton; Worl	2013	Role of ICT in Smart Grid	*Journal of Electrical Engineering*	Alternative Energy; Sustainability; Alaska; Bioenergy; Carbon Footprint; Energy Policy; Forest Ecosystem; Indigenous Population; Quality Of Life; Sustainable Development; Tongass National Forest; United States
Bruno; Dassisti; Scala; Chimienti; Stigliano; Palmisani	2014	Evolution of Information Content from an Institutional Perspective: El Alcázar Brewery (1928–1993)	*Accounting History*	Discrete Optimal Control; Energy Hub; Energy Management Systems; Networked Enterprises; Smart Grids
Chirambo	2014	The Climate Finance and Energy Investment Dilemma in Africa: Lacking amidst Plenty	*Journal of Developing Societies*	Africa; China; Climate Finance; Clean Development Mechanism (CDM); Renewable Energy; Foreign Direct Investment (FDI)

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Duru; Fares; Therond	2014	Urban Energy Policies and the Governance of Multilevel Issues in Cape Town	*Urban Studies*	Sustainability; Agroecology; Agricultural Systems; Decision Making
Elgin	2014	Exploring QSTR Modeling and Toxicophore Mapping for Identification of Important Molecular Features Contributing to the Chemical Toxicity in *Escherichia coli*	*Toxicology In Vitro*	Great Transition; Stories; Scenarios; Sustainable Future
Hershfield; Bang; Weber	2014	Managing Networked Hybrid-Energy Systems: A Predictive Dispatch Approach	*IFAC Proceedings Volumes*	Environmental Behavior; Environmental Performance; Intergenerational Connectedness; Decision Making; Judgment
Jaglin	2014	National Differences in Environmental Concern and Performance Are Predicted by Country Age	*Psychological Science*	Cape Town; Electricity Services; Africa; Urban Energy
John	2014	Great Transition Stories for Becoming a Global Eco-Civilization	*World Futures Review*	South Korea; South Korean Foreign Policy; Structural Foreign Policy; Middle Power; Middle-Power Diplomacy
Moreno; Cámara	2014	Becoming and Being a Middle Power: Exploring a New Dimension of South Korea's Foreign Policy	*China Report*	Accounting History; Content Analysis; Qualitative Information; Annual Report; Minutes; Institutional Environment
Pramanik; Roy	2014	A Conceptual Framework for Thinking Now (and Organising Tomorrow) the Agroecological Transition at the Level of the Territory	*Cahiers Agricultures*	Controlled Study; Models; Algorithms; Article; Bacteria (Microorganisms); Bacterial Toxins; Biochemistry; Biodiversity; Biodiversity; Biological; Chemical; Chemical Structure; Chemical Toxicity; Computer System; Databases; Ecosystem Resilience; Ecotoxicity; Escherichia Coli; Factual; Genetic Algorithm; Hydrophobic And Hydrophilic Interactions; Hydrophobicity; Imaging; Microbial Community; Molecular; Multiple Linear Regression Analysis; Nonhuman; Prediction; QSTR; Quantitative Structure Toxicity Relation; Quantitative Structure–Activity Relationship; Reproducibility Of Results; Sensitivity And Specificity; Software; Statistical; Statistical Model; Statistical Modeling; Structure Activity Relation; Theoretical; Three-Dimensional; Toxicity Testing; Toxicophore; Toxicophore; Validation Process

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Andrijanič	2015	Vital Systems Security: Reflexive Biopolitics and the Government of Emergency	*Theory, Culture & Society*	US Energy Independence; Shale Gas; Tight Oil; Middle East; Energy Markets; EU
Bomberg; Gibson; Zhang	2015	Public Participation: Energy Policy Aspect to Support Rural Electrification Program in West Java	*Procedia-Social and Behavioral Sciences*	Building Physics; Building Science; History Of Building Physics; System Integration; Thermal Upgrade; Thermal Rehabilitation; Ventilated Cavities In Multi-Layered Walls; Hygrothermal Insulations
Collier; Lakoff	2015	A Concept of Integrated Environmental Approach for Building Upgrades and New Construction: Part 1—Setting the Stage	*Journal of Building Physics*	Beck; Biopolitics; Disaster; Emergency; Foucault; Risk; Security
Gorgee; Herbert; Özçağlar-Toulouse; Robert	2015	Synchronous Failure: The Emerging Causal Architecture of Global Crisis	*Ecology and Society*	Sufficiency; Sustainability; Dominant Social Paradigm; Frugality; Downshifting; Needs; Macromarketing
Homer-Dixon; Walker; Biggs; Crepin; Folke; Lambin; Peterson; Rockstom; Scheffer; Steffen; Troell	2015	Coherent or Inconsistent? Assessing Energy Security and Climate Policy Interaction within the European Union	*Energy Research & Social Science*	Climate Change; Conventional Oil; Financial System; Global Crisis; Grain Supply; Social-Ecological System
Nurlaila; Yuliar; Kombaitan; Madyo	2015	Designing a Resilient Oil Supply Network with an Intelligent Solution Algorithm	*Uncertain Supply Chain Management*	Behavior Change; Local Culture And Energy Security; Policy Impact; Public Participation
Rabbani; Bahadornia, S.M.; Torabi, S.A.	2015	Are Regional Political Decisions the Key Element in Reducing Seasonal Variation in Tourism? The Case of the Balearic Islands	*Tourism Economics*	Oil Supply Disruption; Energy Security; Resiliency; Scenario-Based Planning; Continuous Facility Layout; Meta-Heuristic Algorithm
Sastre; Hormaeche, Trías	2015	What Do We Really Need? Questioning Consumption Through Sufficiency	*Journal of Macromarketing*	Seasonality; Marketing Plan; Tourism Destination; Balearic Islands
Strambo; Nilsson; Månsson	2015	The American Energy Revolution: Challenging Europe and the Middle East	*European View*	Energy; Security; Coherence; Europe; Mitigation
Ahmed; Martinez-Zarzoso	2016	Blessing or Curse: The Stabilizing Role of Remittances Compared with other Financial Flows	*Journal of South Asian Development*	Blessing Or Curse: The Stabilizing Role Of Remittances Compared With Other Financial Flows

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Berezowska-Azzag; Abdelatif; Bouallag-Azoui; Akrour; Srir	2016	System Interrelations between Spatial Structures, Energy Demand, and Energy Supply	*Springerbriefs in Applied Sciences and Technology*	Urban Resilience; Urban Environmental Performances; Intermunicipality; Environmental Governance; Algiers' 2031 Development Strategy
Fotuhi-Firuzabad; Safdarian; Moeini-Aghtaie; Ghorani; Rastegar; Farzin	2016	Spatial Archetypes in the Energy Turn	*Springerbriefs in Applied Sciences and Technology*	Energy Policy; Renewable Energy Resources; Power; Renewable Resource; Electric Power Transmission Networks; Sustainable Development; Aging Infrastructure; Climate Change; Climate Change; Controlled Islanding; Economic Development; Economic Growth; Electrical Power; Electricity; Electricity-Consumption; Emission; Energy Resource; Energy Use; Environmental Emissions; Future Power System; Future Prospect; Industrial Revolutions; Living Standard; Power Generation; Power Industry; Power Industry Challenge; Power Industry Solution; Resilient Power System; Scientists And Engineers; Sustainability; Sustainable Power Systems; System Sustainability
Hayat	2016	Upcoming Challenges of Future Electric Power Systems: Sustainability and Resiliency	*Scientia Iranica*	Smart Cities; Sustainable Development; Water; Food; Waste Management; E-Governance
Lin	2016	"You Are the First Journalist and You Are the Last Journalist Who Will Ever Come Here": Nuclear Secrets and Media Practices of Access-Trespass	*Media, Culture & Society*	Metabolism; Avant-Garde Movement; Utopia; Megastructure; Group Form; Ruins; Asian City
Mukherjee	2016	Metabolist Utopias and Their Global Influence: Three Paradigms of Urbanism	*Journal of Urban History*	Environmental Debates; Experiments; Interaction; Journalism; Media Practice; News Culture; Nuclear Energy; Secrecy
Rambe; Modise	2016	Principles and Criteria for Assessing Urban Energy Resilience: A Literature Review	*Renewable and Sustainable Energy Reviews*	Self-Leadership; Locus Of Control; Energy Crisis; Electricity Supply Leadership; Coal-Powered Generators
Renuga; Ezhilan	2016	Power Distribution at Eskom: Putting Self-Leadership, Locus of Control and Job Performance of Engineers in Context	*African Journal of Business and Economic Research*	Technology Education; English Language Teachers; Challenges; Needs; Transformations
Sharifi; Yamagata	2016	Smart Cities: A Global Perspective	*India Quarterly*	Resilience; Assessment; Climate Change Mitigation And Adaptation; Criteria; Principles; Sustainability; Urban Energy

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Stoeglehner; Narodoslawsky; Erker; Neugebauer	2016	Language Teachers of Technology Education: Challenges, Needs and Transformations	*Journal of Asian and African Studies*	Energy Policy; Renewable Energies; Energy Crisis; Energy Resources; Energy Supplies; Energy Management; Energy Demands; Energy Efficiency; Energy Planning; Regulatory Elements; Spatial Structure; Systems Analysis
Stoeglehner; Narodoslawsky; Erker; Neugebauer	2016	Searching for Inter-Municipal Cooperation Links in Algiers by the Assessment of the Local Environmental Performances [La recherche d'intercommunalité par l'évaluation des performances environnementales locales à Alger]	*Mediterranee*	Energy Policy; Renewable Energy Resources; Energy Crisis; Spatial Structure; Inherent Characteristics; Renewable Energy Generation; Renewable Resource; Rural Areas; Shape Energy; Spatial Planning; Suburban Areas; Urban Planning
Case	2017	Governing Metropolitan Climate-Energy Transition: A Study of Lyon's Strategic Planning	*Urban Studies*	Social Work; Community Development; Social Work Theory; Environment; Community Resilience; Eco-Social Work; Water Activism
Chi; Boydstun	2017	The Scenario of the Potential Analysis Alternative Energy in Order to Strengthening District's Energy Resilience (The Case Study in South Sumatera Province)	*IOP Conference Series: Earth and Environmental Science*	Gasoline Price; Residential Location; Smart City; Smart Community; American Housing Survey
Coren	2017	Conflict, Cooperation, and Change in the Politics of Energy Interdependence: An Introduction	*Energy Research & Social Science*	Mass Transit; Infrastructure; Transportation Planning; Urban Parks; Downtown; Places; New Urbanism; Planning Eras; Planning Approaches; Sustainability; Resilience; Master Plans; Planning Practice; Urban Design; North America; Regions; New England
Erker; Stangl; Stoeglehner	2017	Modeling and Simulation of Energy Aware Smart Micro Grid	*IEEE International Conference On Power Electronics, Drives and Energy Systems, PEDES 2016*	Resilience; Energy Resilience; Regional Energy Resilience; Regional Energy Resilience Assessment
Erker; Stangl; Stoeglehner	2017	Natural Gas and the Russia-Ukraine Crisis: Strategic Restraint and the Emerging Europe-Eurasia Gas Network	*Energy Research & Social Science*	Resilience; Regional Energy Resilience Assessment; Factual Level; Value Level; Energy Crises

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Kottayil; Vadana	2017	Are Gasoline Prices a Factor in Residential Relocation Decisions? Preliminary Findings from the American Housing Survey, 1996–2008	*Journal of Planning Education and Research*	Energy Policy; Renewable Energies; Electric Power Transmission Networks; Environmental Impact; Charge–Discharge; DEMS; Dynamic Energy Managements; Energy Management Systems; Frequency Excursion; Grid Conditions; MATLAB; Model And Simulation; Models; Power Electronics; Power Management; Smart Micro Grids; Smart Power Grids
Muhrom; Nitibaskara; Herdiansyah; Sari,	2017	Interface: Providence and the Populist Roots of a Downtown Revival	*Journal of Planning History*	Energy Policy; Energy Security; Renewable Energies; Resilience; Alternative Energy; Analytical Hierarchy Process; Closed-Loop Systems; Conventional Systems; Earth Sciences; Electricity Generation; Energy Management; Geology; Geothermal Energy; Hierarchical Systems; Non-Renewable Energy; Through Transmission
Nance; Boettcher	2017	Climate Change Impact and Resilience in the Electricity Sector: The Example of Austria and Germany	*Energy Policy*	Energy Policy; Energy; Energy Security; Security; Social Science
Rocher	2017	Resilience in the Light of Energy Crises—Part I: A Framework to Conceptualise Regional Energy Resilience	*Journal of Cleaner Production*	Climate Change; Energy Transition; Lyon; Metropolitan Governance; Planning; Urban Policies
Stulberg	2017	Resilience in the Light of Energy Crises—Part II: Application of the Regional Energy Resilience Assessment	*Journal of Cleaner Production*	Energy Security; Energy Networks; Gazprom; Russia
Totschnig; Hirner; Mueller; Kranzl; Hummel; Nachtnebel; Stanzel; Schicker; Formayer	2017	Eco-Social Work and Community Resilience: Insights from Water Activism in Canada	*Journal of Social Work*	Resilience; Climate Change; Cooling; Electricity; Fuel Price Shocks; Heating
Chen; Li; Wu; Han; Zeng; Li; Chen	2018	Impact Assessment of Bio Priming Mediated Nutrient Use Effciency for Climate Resilient Agriculture	*Climate Change and Agriculture in India: Impact and Adaptation*	Energy Security; Complex Network; Global Energy Flows; International Trade; Multi-Regional Input–Output Analysis
Heizmann; Liu	2018	Consent and Consumption of Spectacle Power and Violence	*Critical Sociology*	Discourse; Identity; Leadership; Leadership Development; Narrative; Sustainability

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Lavric; Petrariu	2018	Becoming Green, Becoming Leaders: Identity Narratives in Sustainability Leadership Development	*Management Learning*	Energy Policy; Budget Control; Environmental Pollutions; Internet Of Things (IOT; Long Ranges; Lorawan; Low-Power Electronics; LPWAN; Modulation; Performance Evaluations; Short-Range Wireless Communications; Spread Spectrum Communication; Sustainability Analysis; Sustainable Development; Wide-Area Networks; Wireless Sensor Networks; Wireless Telecommunication Systems
Mola; Feofilovs; Romagnoli	2018	LoRaWAN communication protocol: The new era of IoT	*2018 14th International Conference on Development and Application Systems, DAS 2018—Proceedings*	Energy Policy; Renewable Energies; Energy Crisis; Automation; Climate Impacts; Energy Resilience; Environmental Technology; Information Sources; Intelligent Buildings; Literature Reviews; Methodological Approach; Scientific Articles; Thermal Processing (Foods)
Morley	2018	Energy Resilience: Research Trends at Urban, Municipal and Country Levels	*Energy Procedia*	Environmental Subconcussive Injury; Axonal Injury; Chronic Traumatic Encephalopathy
Rakshit	2018	Global Energy Flows Embodied in International Trade: A Combination of Environmentally Extended Input–Output Analysis and Complex Network Analysis	*Applied Energy*	Bio Priming; N Use Efficiency; Crop Yield And Climate Resilient Agriculture
Rothe; Collins	2018	Environmental Subconcussive Injury, Axonal Injury, and Chronic Traumatic Encephalopathy	*Frontiers in Neurology*	Critical Sociology; Critical Criminology; Spectacle; State Violence; Consumption; Neoliberalism; Consent; Commodification
Asamoah	2019	Learner Support Services for Postgraduate Students: A Qualitative Approach	*E-Learning and Digital Media*	Blended Learning; Learner Support; Support System; E-Learning
Hachinski; Einhäupl; Ganten; Alladi; Brayne; Stephan; Sweeney; Zlokovic; Iturria-Medina; Costantino Iadecola et al.	2019	Buildings with Environmental Quality Management, Part 3: From log Houses to Environmental Quality Management Zero-Energy Buildings	*Journal of Building Physics*	Stroke; Dementia; Prevention; Risk Factor Reduction; Policy; Cognitive Impairment; Alzheimer's Disease; Neurovascular Unit; Treatment; Resilience
Hickmann; Stehle	2019	The Embeddedness of Urban Climate Politics in Multilevel Governance: A Case Study of South Africa's Major Cities	*The Journal of Environment & Development*	Climate Change; Developing And Emerging Economies; Local Climate Policy Making; Multilevel Governance; South Africa; Transnational City Networks

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Knuth	2019	Energy Contagion Analysis: A New Perspective with Application to a Small Petroleum Economy	*Energy Economics*	Retrofitting; Planetary Repair; Green Growth; Green Gentrification; Political Ecology/Economy
Luthfa	2019	Procedures for the Supply of Energy Users during Energy Crisis	*Advances in Information, Electronic and Electrical Engineering, AIEEE 2019—Proceedings of the 7th IEEE Workshop*	Framing; Environmental Injustice; Media; Bangladesh; Movement; Phulbari; Sundarbans
Mahadeo; Heinlein; Legrenzi	2019	Showcasing Environmental Justice Movements from the South: Comparing the Role of Media in Bangladesh	*Society and Culture in South Asia*	Contagion; Correlation; Exchange Rate; Oil Price; Stock Market; Trinidad And Tobago
Nevercika; Dzelzitis; Jasevics; Laube; Bode	2019	Conceptualising Quality in Spatial Planning	*Raumforschung und Raumordnung-Spatial Research and Planning*	Energy Policy; Energy Crisis; Gases; Natural Gas Systems; Energy Systems; Critical Events; Energy Resources; Energy Supplies; Energy Users; Essential Elements; Gas Supply; Natural Gas Consumption
Stoeglehner	2019	Cities and Planetary Repair: The Problem with Climate Retrofitting	*Environment and Planning A: Economy And Space*	Legal Compliance; Planning Content; Planning Methodology; Planning Process; Planning Quality; Role Of Planners; Spatial Planning
Yarbrough; Bomberg; Romanska-Zapala	2019	Special Topic Section: Linkages among Cerebrovascular, Cardiovascular, and Cognitive Disorders: Preventing Dementia by Preventing Stroke: The Berlin Manifesto	*International Journal of Stroke*	Building Physics; Building Science; System Integration; Thermal Upgrade; Thermal Rehabilitation; Ventilated Cavities; Multi-Layered Walls; Hygrothermal Insulation
Abdullah; Iqbal; Hyder; Jawaid	2020	Sustainability Transitions	*International Encyclopedia of Human Geography (Second Edition)*	Policy; Energy Security Dimensions; Index; Indicators; Themes
Abdussami; Adham; Gabbar	2020	How Cuba Survived Sanctions and the Lessons for Zimbabwe	*Jadavpur Journal of International Relations*	Energy Policy; Renewable Energy Resources; Renewable Energy Source; Benchmarking; Different Economic Systems; Hybridization Methods; Key Performance Indicators; Loss Of Power Supply Probability; Optimal System Configuration; Optimization Problems; Particle Swarm Optimization (PSO); Particle Swarm Optimization Algorithm; Potential Energy; Reliability; Sensitivity Analysis
Brosemer; Schelly; Gagnon; Arola; Pearce; Bessette; Schmitt Olabisi	2020	Nostalgic Environmentalities in the EPA's Documerica and State of the Environment Projects	*Visual Communication*	Energy Sovreignty; Energy Justice; Environmental Justice; COVID-19

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Carlson; Mabee	2020	Fabrication of an Ingenious Metallic Asymmetric Supercapacitor by the Integration of Anodic Iron Oxide and Cathodic Nickel Phosphide	*Applied Surface Science*	Climate Change; Sustainability; Efficiency Improvements; Incremental Change; Incumbent Systems; Lifestyle Change; Lock-In; Societal Transitions; Sociotechnical Change; Transformational Change
Cho	2020	Resilience-Based Hardening Approach for Integrated Power and Natural Gas Systems	*ISPEC 2020—Proceedings: IEEE Sustainable Power and Energy Conference: Energy Transition and Energy Internet*	Energy Regime; Energy Transition; Environmental Crisis; Governance; Progressive City; Resilience
Gabbar, H.A.; Abdussami, M.R.; Adham, M.D.	2020	Reliability Modeling and Evaluation of Urban Multi-Energy Systems: A Review of the State of the Art and Future Challenges	*IEEE Access*	Energy Policy; Renewable Energy Resources; Energy Crisis; Renewable Energy Source; Benchmarking; Particle Swarm Optimization (PSO); Sensitivity Analysis; Chemical Reactors; Diesel Engines; Diesel Genset; Energy Systems; Gen-Sets; Large-Scales; Micro Energy Grids; Micro-Reactor; Natural Resources; Net Present Cost; Nuclear Reactors; Off-Grid
Greenwalt; Creech	2020	Micro Nuclear Reactors: Potential Replacements for Diesel Gensets within Micro Energy Grids	*Energies*	Documerica; Environmental Citizenship; Nostalgia; Survey Photography; Sustainability; State Of The Environment
He; Yuan; Yang; Huang; Tu; Li	2020	Modeling and Performance Analysis of Nuclear-Renewable Micro Hybrid Energy System Based on Different Coupling Methods	*Energy Reports*	Energy Policy; Integrated Energy Systems; Reliability; Coupling Characteristic; Coupling Component; Cyber Physical System; Electric Power Transmission Networks; Embedded Systems; Energy Utilization; Gas Pipeline Networks; Multi-Energy Systems; Reliability Assessments; Transportation Network; Uncertainty Analysis; Uncertainty Factors
Hove; Ndawana; Nhemachena	2020	Urban Resilience through Progressive Governance: The Case of the "One Less Nuclear Power Plant" Policy, Seoul, Korea	*Urban Studies*	Cuba; Zimbabwe; Sanctions; Lessons; Survival; United States
Kim; Surendran; Chae; Lee; An; Han; Park; Kim; Sim	2020	The Energy Crises Revealed by COVID: Intersections of Indigeneity, Inequity, and Health	*Energy Research and Social Science*	Energy Policy; Anodic Oxidation; Asymmetric; Asymmetric Supercapacitor; Crystallinity; Electrochemical Activities; Energy Storage Systems; Fabrication; High Cyclic Stabilities; Hybrid Supercapacitors; Hybrid Systems; Iron Oxides; Low Temperatures; Magnetite; Morphology; Nanoparticles; Nickel Compounds; Nickel Phosphide; Supercapacitor; Temperature

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Li; Huang; Liang; Li; Tian; Bie	2020	Earthquakes, Blockades and Energy Crises: A Conceptual Framework for Energy Systems Resilience Applied to Nepal	*Energy Research and Social Science*	Energy Policy; Gases; Natural Gas; Disasters; Natural Disasters; Optimization; Environmental Concerns; Integrated Energy Systems; Progressive Hedging Algorithm; Gas Generators; Hardening; Integrated Power; Monte Carlo Methods; Natural Gas Systems; Piecewise Linearization; Stochastic Models; Stochastic Optimization Model
Rizzo	2020	Megaprojects and the Limits of "Green Resilience" in the Global South: Two Cases from Malaysia and Qatar	*Urban Studies*	Global South; Green Resilience; Green Urbanism; Megaprojects
Trudelle; Zhang	2020	Energy Security Indicators for Pakistan: An Integrated Approach	*Renewable and Sustainable Energy Reviews*	Sustainability; Japanese Metabolism; Prefabrication; Cultural Resilience
Underwood; Hill; Lamichhane	2020	The Reintroduction of Japanese Metabolism to Sustainable Architecture	*Proceedings of the International Conference of Architectural Science Association*	Energy; Resilience; Nepal; Earthquake; Blockade; Energy Systems; Electricity; Fuel Supply; Disaster Response
Aktar; Alam; Al-Amin	2021	Research Status and Development Trend of New Automotive Q&P Steel	*Cailiao Daobao/Materials Reports*	Climate Change; CO Emissions; COVID-19; Economic Crisis; Energy Use; Policy
Benach	2021	Regional Entrepreneurial Ecosystems: Technological Transformation, Digitalisation and the Longer Term—The Automotive and ICT Sectors in the UK and Bulgaria	*Local Economy*	Capitalism; COVID-19; Eco-Social Crisis; Health Inequalities; Policy Change; Public Health
Bose; Saini; Yadav; Shrivastava; Parashar	2021	We Must Take Advantage of This Pandemic to Make a Radical Social Change: The Coronavirus as a Global Health, Inequality, and Eco-Social Problem	*International Journal of Health Services*	Energy Market; Decentralization; Household Energy; India; Parameterization; Performance Assessment; Renewable Resource; Rural Population; Solar Power

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Du; Feng; Zhang	2021	Caribbean Economic Thought: Advances, Retreat, Current Challenges	*Agrarian South: Journal of Political Economy*	Accident Prevention; Advanced High Strength Steel; Alloying; Alloying Elements; Automobile Bodies; Automobile Steel; Automotive Industry; Automotive Steels; Cold Rolling; Crystal Structure; Dynamic Mechanical Property; Emission Control; Energy Conservation; Grain Boundary Transformation Strengthening; Grain Boundary Transformations; High-Strength Alloys; High-Strength Steel; Hot Rolling; Microstructure; Optimization; Process Control; Q&P Steel; Quenching; Resilience; Second Generation; Strong Mechanism; Third Generation
Focacci; Kirov	2021	Global Economic Crisis, Energy Use, CO_2 Emissions, and Policy Roadmap Amid COVID-19	*Sustainable Production And Consumption*	Automotive Sector; Digitalisation; United Kingdom; Bulgaria; Technological Revolution; Regional Business Ecosystems
Gupta; Singh; Verma; Chandel; Bhatla	2021	Chapter 1—Impact of Climate Change and Water Quality Degradation on Food Security And Agriculture	*Water Conservation in the Era of Global Climate Change*	Climate Change; Food Security; Agriculture Productivity; Water Quality Degradation
Hein; Hauer; Schmid; Stoeglehnerot; Stumpp; Ertl; Graf; Habersack; Haidvogl; Hood-Novotny; Laaha; Langergraber; Schmid; Schmidt-Kloiber; Schmutz; Schulz; Weigelhofer; Winiwarter; Baldan; Canet-Marti; Eder; Floedl; Kearney; Ondiek; Pucher; Pucherias; Simperler Tschikof; Wang	2021	Energy Trilemma Based Prioritization of Waste-to-Energy Technologies: Implications for Post-COVID-19 Green Economic Recovery in Pakistan	*Journal of Cleaner Production*	Integrated River Research; Interdisciplinary Research; River Management; Transdisciplinarity
Huang; Li; Xiao; Bie; Sun	2021	Energy Efficiency and Emissions Control: The Response of the Second-Hand Containerships Sector	*Energy Economics*	Energy Policy; Gases; Disasters; Optimization; Constraint Generation; Electricity And Gas; Environmental Concerns; Integrated Energy Systems; Minimax Regret Criterion; Natural Gas Energy; Optimal Placements; Progressive Hedging Algorithm
Knuth	2021	Decentralized Solar Energy Access and Assessment of Performance Parameters for Rural Communities in India	*Sustainability and Climate Change*	Renewable Energy; Financial Geographies; Politics Of Taxation; Rent And Rentierism; United States

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Kokosalakis; Merika; Triantafyllou	2021	Optimal Placement for Integrated Electricity and Gas Energy System Considering Natural Disasters and Man-made Attacks	*Dianwang Jishu/Power System Technology*	Energy Efficiency; Containerships; Second-Hand Ship Price
Lee; Bailey-Serres	2021	Application of Control Strategy to DC Micro Grids: A Survey	*Proceedings of the 7th International Conference on Electrical Energy Systems, ICEES 2021*	Gene Expression; Genetic Transcription; Genetics; Cell; Cell Nucleus; Cell Nucleus; Chromatin; Chromatin; Cytoplasm; Gene Expression Regulation; Gene Expression Regulation; Genetic; Genome; Hypoxia; Hypoxia; Hypoxic Conditions; Pigment; Transcription; Transcription Factor; Transcription Factors; Transcription Initiation; Transcriptional Activation
Little	2021	Conserved and Nuanced Hierarchy of Gene Regulatory Response to Hypoxia	*New Phytologist*	Infrastructure Policy; Infrastructure Funding; Build Back Better
Mack; Mazzio; Badisa; Soliman	2021	Metabolic Response to the Mitochondrial Toxin 1-Methyl-4-phenylpyridinium (MPP Plus) in LDH-A/B Double-Knockout LS174T Colon Cancer Cells	*Cancer Genomics & Proteomics*	Glycolysis; Cancer Cells; LDH; Mitochondria
Nadaleti; Lourenço; Americol	2021	Green Hydrogen-Based Pathways and Alternatives: Towards the Renewable Energy Transition in South America's Regions—Part A	*International Journal of Hydrogen Energy*	Hydrogen; Hydroelectric Plants; Sustainable Energy Transition; Wasted Energy
Padhi; Mishra	2021	What's Next for a National Infrastructure Policy: An Encore or a Requiem?	*Public Works Management & Policy*	Energy Policy; Renewable Energy Resources; Atmospheric Pollution; Distributed Generations (Dgs); Microgrid Structures; Microgrids; Multilevel Control; Power Electronics Interface; Renewable Energy Source; Renewable Energy Systems (RES); Stability Performance; Surveys; System Stability
Saleem; Mahmoodan; Sarjoughian; Nasir; Malikar	2021	The Coupled Socio-Ecohydrological Evolution of River Systems: Towards an Integrative Perspective of River Systems in the 21st Century	*Science of the Total Environment*	Modeling And Simulation; Water Evaluation And Planning; Sustainable Water Use; Urban Water Resource Management; Water Demand And Supply Gap Analysis; Water Conservation
Shah; Longsheng; Solangi; Ahmad; Ali	2021	A Water Evaluation and Planning-Based Framework for the Long-Term Prediction of Urban Water Demand and Supply	*Simulation*	COVID-19; Green Economic Recovery; MCDM; Renewable Energy; SDG 7; Waste-To-Energy

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Tsai; Chen; Yang	2021	Morphology Evolution, Mechanical Properties, Mullins Effect, and Its Reversibility of Polylactide/Nitrile Butadiene Rubber Thermoplastic Vulcanizates Plasticized by Dioctyl Phthalate	*Journal of Thermoplastic Composite Materials*	Renewable Energy; Solar Photovoltaic; Diamond Model; MADM; Competitiveness
Witter	2021	Rentiers of the Low-Carbon Economy? Renewable Energy's Extractive Fiscal Geographies	*Environment and Planning A: Economy And Space*	Caribbean; Economic Thought; Critical Tradition; Plantation Economy; Dependency
Zhang; Jiang; Wang	2021	Using Porter's Diamond Model to Assess the Competitiveness of Taiwan's Solar Photovoltaic Industry	*Sage Open*	Polylactide; Nitrile Butadiene Rubber; Dioctyl Phthalate; Dynamic Vulcanization; Mullins Effect; Morphology
Aggarwal	2022	Energy Aware Resource Control Mechanism for Improved Performance in Future Green 6G Networks	*Computer Networks*	Energy; Scarcity; Import; Renewable; Growth
Arroyo; Quintian; Calvo-Rolle; Basurto; Herrero	2022	Towards Resilience: Energy Efficiency in Urban Communities-Case study of New Borg El Arab City in Alexandria, Egypt	*International Journal of Sustainable Development and Planning*	Renewable Energies; Clustering; Neural Networks; Regression; Solar Energy
Fritz	2022	The Impact of Irrigation Modes on Agricultural Water-Energy-Carbon Nexus	*Science of the Total Environment*	Ethical Decision Making; Stakeholder Theory; Supply Chain View; Sustainability Mindset; Sustainable Operations And Supply Chains; Teaching Sustainability; Theory Development
Ganguly; Joseph; Dutta; Dey	2022	Theorizing "Variegated Bonding as SME Diversification Strategy" to Extend Business from Traditional to Emergent Sectors	*South Asian Journal of Business and Management Cases*	Telework; Work Contract; Monitoring; Employee Performance Appraisal; Manager; Teleworker
Haan-Cao	2022	The Geo-Ecological Turn in Sociology and Its Implications for the Sociology of the Arts	*Cultural Sociology*	Resource-Based View; Crisis Management; Competitive Advantages Smes; Business Innovation; Energy Sector Transition
Holt	2022	Examining the Impact of Energy Price Volatility on Commodity Prices from Energy Supply Chain Perspectives	*Energies*	Climate Sociology; Disciplinary Transformation; Environmental Sociology; Music Sociology; Sociology Of The Arts

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Khan; Anwar	2022	Assessing the Relationship between Electricity and Natural Gas Prices in European Markets in Times of Distress	*Energy Policy*	Energy Policy; Investments; Renewable Energies; Renewable Energy Resources; Alternative Energy; Capital Formation; Capital Formation; Disaster Management; Disaster Prevention; Disasters; Foreign Direct Investment; Foreign Exchange Reserve; Foreign Reserves; Generalized Method Of Moments; Hazard Management; Human Capital; Human Capitals; Inflow; Infrastructure; Investment; Method Of Moments; Natural Disasters; Purchasing; Reserve Accumulation; Sendai Framework
Kyzy	2022	Young People's Situated Capacity to Imagine a Desired Post-Pandemic Future: A Qualitative Methodology for Assessing Futures Consciousness	*Futures*	Case Study Research; Kyrgyzstan; Entrepreneurship; Family Business; Process Study; SME Diversification; Blockchain
Masry; Esawey; El-Araby; Osama	2022	Natural Disasters and Foreign Exchange Reserves: The Role of Renewable Energy and Human Capital	*Renewable Energy*	Highways; Operations And Traffic Management; Planning And Forecasting; Vehicles And Equipment;
Merheim-Eyre	2022	Pandemic, War, and Global Energy Transitions	*Energies*	EU Funds; Energy Finance; Energy Security; Affordable Housing; Emergency Housing; Social Housing; Central And Eastern Europe
Min	2022	Taiwan's Energy (In) Security: Challenges to Growth and Development	*Jadavpur Journal of International Relations*	Commodity Prices; Commodity Pricing; Costs; Energy Policy; Energy Price Volatilities; Energy Supply Chains; Oil Prices; Oils And Fats; Petroleum Deposits; Petroleum Transportation; Policy Makers; Secondary Data Analysis; Supply Chain Mapping; Supply Chain Resiliences; Supply Chains; Trend Analysis
Ragheb	2022	A Supply Chain View of Sustainability Management	*Cleaner Production Letters*	Alexandria (Egypt); Conceptual Framework; Egypt; Energy Efficiency; Spatiotemporal Analysis; Urban Area; Urban Planning; Urban Population
Schismenos; Stevens; Georgeou; Emmanouloudis; Shrestha; Thapa; Gurung	2022	Addressing the Consequences of Russian Aggression towards Ukraine: The Case of Affordable Housing in Central and Eastern Europe	*European View*	Renewable Energy; Flood Hazard; Early Warning; Prototype Development; Remote Research
Sools; Groot; Coppers; Triliva	2022	Operational Impact of Microcars on Urban and Suburban Road Corridors	*Transportation Research Record*	COVID-19; Future Orientation; Futures Consciousness; Pandemic Futures; Qualitative Analysis; Young People

Table A1. *Cont.*

Author	Year	Title	Publication Title	Keywords
Taneja; Rani; Garg; Hassan; AlQahtani	2022	A HAIS Approach to Predict the Energy Produced by a Solar Panel	*Hybrid Artificial In^{TEL}Ligent Systems, Hais 2022*	6G; Cooperating Access Points; Power Control; Spectral Efficiency; Sustainable Green Networks
Uribe; Mosquera-López; Arenas	2022	Flood and Renewable Energy Humanitarian Engineering Research: Lessons from Aggitis, Greece and Dhuskun, Nepal	*Geosciences (Switzerland)*	Costs; Energy Policy; Energy Security; Power Markets; Denmark; Electricity Generation; Electricity Prices; Electricity Supply; Energy Crisis; Energy Market; Energy Shortages; European Markets; Finland; Gases; Germany; Integration; Market Design; Natural Gas; Natural Gas; Natural Gas Disruption; Natural Gas Price; Power; Power–Gas Integration; Price Dynamics; Risk Assessment; Risk Assessment; Security; Sweden; Tail Risk
Zakeri; Paulavets; Barreto-Gomez; Echeverri; Pachauri; Boza-Kiss; Zimm; Rogelj; Creutzig; Ürge-Vorsatz; Victor; Bazilian; Fritz; Gielen; McCollum; Srivastava; Hunt; Pouya	2022	PTI: Coping with the COVID-19 Crisis from a Resource-Based View	*The International Journal of Entrepreneurship and Innovation*	Energy Policy; Supply Chains; Carbon; Decentralized Energy; Decentralized Energy Storage; Energy; Energy Markets; Energy Security; Energy Trade; Energy Transitions; Energy System Models; Fossil Fuels; Global Warming; International Energy Market; Investments; Power Markets; Renewable Energies; Renewable Energy Resources; Renewable Energy System Model
Zhu; Zhao; Li; Hu; Jiao; Xiao; Xie; Sun; Wang; Yang; Zhang; Chuai	2022	Exploring the Employer–Employee Relationship: A Management Versus Employee Perspective of the Vicissitudes in the Virtual Workplace	*Global Business Review*	Carbon Emissions; Coupling Coordinate Model; Henan Province; Irrigation Modes; Water and Energy Consumption; WEC Nexus

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