

## THE ROLE OF SOCIAL INNOVATION IN THE DEVELOPMENT OF THE ENERGY SECTOR

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**Purpose:** The aim of this article is to identify initiatives related to social innovation in the area of energy. The rationale for undertaking research on this topic stemmed from the scarcity of scientific studies on social innovation in the energy sector.

**Design/methodology/approach:** The research used qualitative research methods to verify information from various sources. For this purpose, a case study method was used, which is particularly important when researching complex phenomena.

**Findings:** The results indicate that social innovations fit into the broadly understood concept of sustainable development, stimulating initiatives in the area of renewable energy sources, as well as contributing to energy savings, increased use of renewable energy systems, and improving the quality of life of residents.

**Originality/value:** The issue addressed in this paper concerns social innovations related to the energy sector, which play an increasingly important role in the context of energy savings and increased use of renewable energy systems (RES). Social innovations are derived from the quality of social dialogue of public, non-profit or private organizations contributing to the solution of social problems. Social innovation plays an important role in many areas including energy, especially in supporting a low-carbon society.

**Keywords:** social innovation, renewable energy sources (RES), energy sector.

**Category of the paper:** A literature review.

### 1. Introduction

Currently, resource consumption exceeds the capacity of the environment and climate change poses a threat to current and future generations. This situation requires innovative solutions to transform the consumer society towards sustainability (Mikkonen et al., 2020). An important role in this area is played by innovation, which is the ability and interest of society, entrepreneurs and scientists, to conduct research and search for solutions to improve efficiency, improve technology or create new products. As a result, these activities are supposed to improve the competitiveness of enterprises, which may influence the economic development of regions

or even countries. Innovations are used in every field of the economy. Their search and application is, on the one hand, very risky and unpredictable, but on the other hand, they are also an opportunity for development (Kędzierska-Szczepaniak et al., 2016).

Innovation is usually associated with technical solutions, however, for some time now, the importance of social innovation has begun to be recognized. They play a key role in those sectors where the existing models of innovation fail, are outdated or do not allow for proper use of opportunities arising in the environment (Mulgan et al., 2007). These sectors include environmental protection (Maruyama et al., 2007). Indeed, social innovation in this area can offer tools to support the transformation of existing social structures towards low-carbon societies (Eichler, Schwarz, 2019; Jaeger-Erben et al., 2015).

One of the EU's priorities is to recognize and strengthen the central role of citizens and consumers in the energy transition, to support consumer choices that reduce climate impacts, and to reap additional social benefits that improve their quality of life (European Commission, 2018). Social innovation can therefore play an important role in the energy field, as it is easily diffused at the individual and societal level, while promoting sustainable behavior or lifestyle change.

In recent decades, the energy sector has been under great pressure of transformation. Some of the major trends affecting the energy field over the past years include (Ministry of Climate and Environment, 2027):

- Pressure to reduce greenhouse gas emissions and move away from coal-based generation technologies.
- Growing public environmental awareness.
- Development of renewable energy generation technologies.
- Continuous improvement in energy storage technologies.
- Growing potential of the digital economy and the field of information and communication technology (ICT) applications.
- Breakthrough in hydrocarbon exploration and production technologies.
- The emergence of a global LNG trading infrastructure and market.
- Growing popularity and cost-effectiveness of alternative fuels.
- Role of energy in international relations and geopolitics.
- Pressure to reduce the environmental impact of the energy sector.

These changes have greatly contributed to the emergence of many innovations that enable transformation. Liberalization of the energy market, various regulatory changes and technological advances, and mass production of renewable energy technologies have influenced the emergence of new players in the energy sector. The development of RES technologies and battery solutions has created a group of prosumers - consumers who generate energy themselves. These changes have also brought about management innovations in the energy sector, as a new context for social innovation has emerged. Nowadays, social innovations are not only gaining popularity, but also contribute to building local energy security, as well as being part of environmental and climate protection efforts.

The paper formulates research questions and research hypotheses, which were verified within the framework of the conducted research. The main research problem is focused on seeking answers to the question: what key social innovations are implemented in the field of energy in Poland? As part of the research undertaken, an analysis of the problem was made and its specificity was presented. The results of the research confirmed that social innovations related to the energy sector contribute to energy savings, stimulate initiatives in the use of renewable energy, as well as contribute to a better quality of life of society.

## 2. Literature review of social innovations and discussion

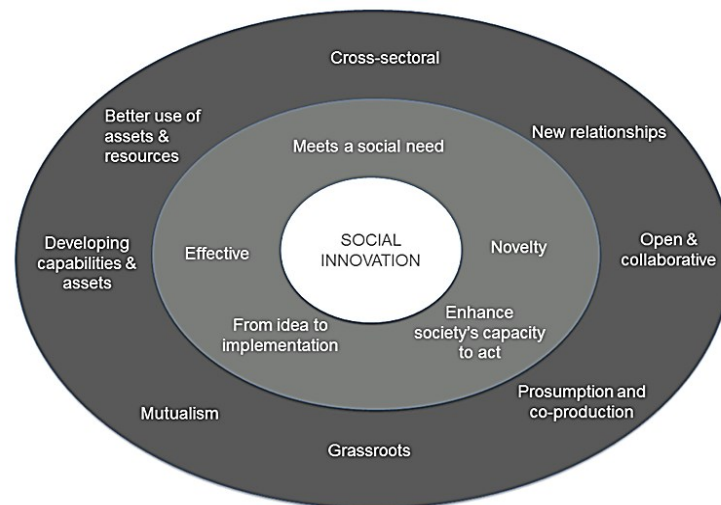
In the literature to date, no single unambiguous definition of social innovations concept has been developed, there are various approaches to it proposed, which are often not consistent with each other (Phills et al., 2008; Caulier-Grice et al., 2012; Moulaert et al., 2017; Avelino et al., 2019). Table 1 summarizes some illustrative selected definitions of social innovation.

**Table 1.**  
*Choosing definitions of innovation*

Source	Definitions
Alvord et al. (2004)	„Social innovations provide sustainable solutions to social problems by mobilising scarce resources”.
Phills et al. (2008)	„Any novel and useful solution to a social need or problem, that is better than existing approaches (that is, more effective, efficient, sustainable, or just) and for which the value created (benefits) accrues primarily to society as a whole rather than private individuals”.
European Commission (2011)	"Social innovations are those that respond to social needs that are not traditionally met by the market or existing institutions and that target vulnerable groups in society."
Mulgan (2012)	„Social innovations are innovations that are social both in their ends and in their means”.
Olejniczuk-Merta (2013)	„Social innovation can be defined as new social actions aimed at improving the quality of life for individuals, nations, and entire communities."
Bureau of European Policy Advisers (BEPA) (2013)	„Social innovation can be defined as the development and implementation of new ideas (products, services and models) to meet social needs and create new social relationships or collaborations. It represents new responses to pressing social demands, which affect the process of social interactions.”
Niekerk, L. et al. (2021)	„One key aspect of social innovation is grounded on the role of citizens and their participatoryrole, as they are the ones in the position to evolve “initiatives from a localised level to amacro-level.”
Centre for Social Innovation (2022)	„ Social innovation is a process that supports social progress by developing and implementing effective solutions to challenge social and environmental issues”
Dantas et al. (2022)	„The concept of social innovation is drawn on multiple layers and encompasses multipleelements, such as the transformation of governance arrangements, tools, and participationforms; new relationships within society and its different actors; systemic adaptation at the social level”.

Source: own study based on literature.

The term social innovation has no single definition to fully understand its essence. Social innovations are new ideas that meet social needs in a more effective way (Jędrych, 2013). They consist in solving social problems thanks to entrepreneurial initiatives that are oriented towards individual responsibility and limited role of the state. They rely on the ingenuity of citizens, NGOs, local communities, businesses or public entities. Based on a survey of the European Commission, there are three types of social innovation according to its purpose: Any kind of innovative solution, which aims at improving social and communal relationships, and the effectiveness of various communal groups and organizations can be considered social innovation.; Social innovations should concentrate on meeting societal needs and finding answers and solutions to the given societal challenges; We may think of social innovation as a process, which aims at changing the structure and operation of a certain community through the employment of new ideas and theories, thus offering a solution to the potential social problems (Oslo Manual, Guidelines for Collecting, Reporting and Using Data on Innovation, 2013). Innovation always indicates a response to some kind of problem, so it is true, that „there is no social innovation without a problem, to which it serves as an answer” Forray, Kozma, 2020). It can be concluded that social innovations tend to mitigate economic and social inequalities. Figure 1 shows the key elements and main features of social innovation.



**Figure 1.** Core elements and common features of social innovations.

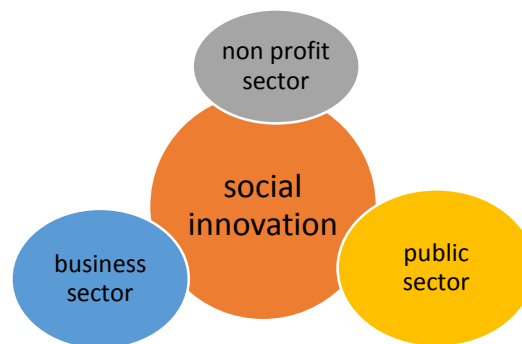
Source: Defining Social Innovation. Part 1, Tepsie Project, 2012, p. 18.

Among the main characteristics of social innovations we can point out that they are: effective, innovative, lead from idea to its implementation, increase social capacity to act and above all respond to social needs. In turn, the key elements of social innovation include: they create new relations, are open to cooperation, assume presumption and co-production, grassroots, interdependent, creating new opportunities, making better use of assets and resources, intersectoral. M. Daszkiewicz emphasizes that the main principle distinguishing this type of innovation is that in their case social welfare is a goal, not just a consequence (Daszkiewicz, 2015).

Social innovations consist of such elements as society, social well-being, culture and market, civil society, community development, social needs, social expectations, improvement of quality of life, new forms of organization, collective learning sustainable development, new rules, procedures, models (Wyrwa, 2015). Analyzing the above components, it can be pointed out that most of them emphasize two important characteristics, i.e. development and society. These two components are the foundation of social innovation.

Three main dimensions of social innovation are analyzed in the literature. The first of them concerns the satisfaction of human needs. The second - exposes processes and changes in social relations, while the third - shows the benefits of social innovations, such as, among others, greater access to resources of specific social groups or increasing their socio-political capabilities (Moulaert et al., 2005).

Social innovation occurs at the intersection of three interwoven dimensions: public, private, and nonprofit. This is illustrated in the figure 2.



**Figure 2.** Social innovation.

Source: Own study.

Some researchers believe that social innovations are created between four sectors: public, non-profit, informal and private - in a quadruple helix model (Wiktorska-Święcicka et al., 2015). Nevertheless, the most important element of their emergence is the cooperation between NGOs, businesses, science or administration. At the interface of different sectors, solutions can be developed that will contribute to solving social problems.

Implementation of social innovations is important from both the economic and social point of view. For companies, they provide an opportunity to reduce costs or maintain a strong position in the market, while from the perspective of society, they contribute to the efficient functioning of those areas that are often neglected by state authorities.

### 3. Methodology

The research process consisted of the following stages: theoretical-cognitive research, cognitive gap identification, qualitative research formulation of research hypotheses and their verification.

As part of the theoretical-cognitive research, the methodology of literature review was used which formed the basis for the proper formulation of research questions and hypotheses, as well as the interpretation of the obtained results of empirical research (Czakoń, 2016). Based on the theoretical-cognitive research, an extrinsic gap was identified reflecting the paucity of scientific research on social innovation particularly in the energy sector.

One of the qualitative scientific research methods, the case study, was chosen for the study. A case study is an empirical inference that deals with a phenomenon in its natural context, especially when the boundary between a case and its context cannot be clearly defined (Yin, 2013). This method analyzes and evaluates phenomena occurring in reality. On the basis of the collected information, the case study method makes it possible to make an in-depth analysis of the studied problem, to present its specifics, its interaction with other elements of the organization or its environment (Kostera, 2011).

In the literature, the case study is seen as an attractive method for solving problems in institutional economics, company theory, strategy, strategic management, organizational culture, decision-making, network relationships, strategic marketing and international management (Wójcik, 2013). In this case, qualitative research provides empirical, in-depth insights into social innovation initiatives in the energy field. R. Yin recommends using the case study method in situations where there is a need to find answers to questions that are exploratory in nature, that is, about "how" and "why" a phenomenon occurs (Wójcik, 2013; Czakoń, 2016). The qualitative research focused on the main research problem formulated in the form of the following question: what key social innovations are implemented in the energy area in Poland?

As part of the qualitative research, data were collected and analyzed, using press and online sources for this purpose. Based on the collected information, an in-depth analysis of the studied problem was made and its specificity was presented. The research was also used to formulate research hypotheses.

In relation to the research problem defined on the basis of the literature analysis and the conclusions resulting from the qualitative research, the following specific research questions were formulated:

- what are the key features and elements of social innovation in Poland?
- what factors/trends influence the development of the energy sector?
- What are the opportunities and barriers to the development of social innovation in the energy area?

Seeking answers to the research questions, the following research hypotheses were formulated:

H1: the use of social innovation in the energy field contributes to the reduction of energy consumption in everyday life.

H2: social innovation in the energy area stimulates initiatives in the use of renewable energy.

H3: the use of social innovation in energy contributes to a better quality of life for citizens.

The formulated research questions and hypotheses resulted from the conducted theoretical and qualitative research. The research shows that energy-related social innovations contribute to energy savings and increased use of renewable energy systems, as well as increase and improve people's quality of life.

#### **4. Social innovation in the energy sector**

Preliminary studies worldwide on social innovation in energy include renewable energy production and energy collectives (e.g., shared purchasing, co-housing), local energy production, local and neighborhood energy systems, working with smart meters, general energy services, and energy-efficient mobility (Ooms et al., 2017).

In Poland, environmental awareness and related social innovation in the field of energy and is an area that is still evolving. Some interesting social innovation initiatives in the field of energy, which are often part of larger European projects, are presented below. The SONNET project (Social Innovation in Energy Transitions, European Union's, 2020) aims to co-create a rich understanding of the diversity, processes, contributions, successes and future potentials of social innovation in the energy sector (SIE). As part of the project, an urban experiment City Lab was conducted in Warsaw, aimed at finding ways to reduce energy consumption in everyday life. A dozen or so Warsaw households took part in the experiment, in which current energy consumption and factors affecting the indoor climate - carbon dioxide concentration, humidity and temperature - were measured. In the next stage, the participants were given recommendations on how to reduce energy consumption, and in the final stage, the scientific team processed the collected data, presented conclusions and solutions. The whole experiment allowed to gain knowledge on how to consume less energy in homes by eliminating energy inefficient behaviours. The solutions developed during the citylab can be used by other housing communities or housing cooperatives, as well as by tenants of city-owned buildings (City Council of Warsaw, 2022).

Another interesting idea, also funded by the European Union, is the Future Internet Public Private Partnership initiative, in which leading energy and ICT companies, research institutes and universities have formed an international consortium FINSENY (Future INternet for Smart ENERGY - Future Internet Public-Private Partnership). Part of this initiative is the Orange OZE (Renewable Energy Sources) energy saving project. This project consisted in installation of micro-installation based on photovoltaic panels on the roof of Orange Labs in Warsaw. The aim of this project is to check whether the renewable energy sources installations will be successful in powering telecommunication infrastructure devices in Polish climatic conditions. The project included construction of four different micro-installations consisting of photovoltaic panels and a wind turbine. Each of these installations was characterized by similar power but different technology of panels and inverters. Thanks to using several RES installations in one place, it was possible to conduct power supply tests for telecommunication devices. The RES installation allowed to estimate the savings generated by the production of own "green energy". The installed installations will power network devices tested in Orange Labs, and the knowledge developed will help to apply RES on a wider scale in the future (Kulik, Innovation in Orange Polska, Vision 2050). It is worth mentioning that Orange Labs closely cooperates with many universities and scientific units in the country and abroad, involving the local community including students in the creation of innovations.

Another example of innovation is a mobile social application, which was also developed at Orange Labs. It uses smartphones, location and Augmented Reality technology to promote ecology and development of the country in harmony with nature - eco. The Polish application provides the latest news and information on events, as well as presents the most interesting eco places. The product complements the functions of the vortal [www.eco-Polska.pl](http://www.eco-Polska.pl), which is a place to meet and discuss eco-friendly activities (Kulik, Innovation in Orange Polska, Vision 2050).

Thanks to new technologies and greater awareness of individuals, energy production can now be done by anyone, by installing solar panels or micro-grids (Okraszewska, 2016). Any individual, society or local business can be both a producer and a consumer, i.e. they have the opportunity to sell or buy electricity and at the same time be connected to other users by a smart grid (Szwed, Maciejewska, 2014). In Poland, according to the Energy Development Agency, at the end of March 2021, the installed capacity of RES reached 13,068.8 MW and represents more than 25.15% of the power installed in the National Electricity System (Mikołajuk et al., 2021). Table 2 presents the amount of electricity generated from RES in 2018-2020.



**Table 2.**

*The amount of electricity generated from RES in 2018- 2020, confirmed by certificates of origin, issued until 31.12.2020*

Type of RES installation	Amount [MWh]		
	Electricity generation period		
	2018	2019	2020
Biogas plants	1 010 937,483	932 637,188	635 537,773
Biomass installations	4 084 445,101	4 942 446,242	2 295 923,186
Solar energy installations	95 803,210	93 661,383	66 621,733
Wind energy installations	12 793 466,739	14 990 716,052	11 412 176,088
Hydropower installations	575 731,628	466 697,556	345 403,795
Installations co-firing biomass, bioliquids, biogas or agricultural biogas with other fuels	841 994,111	1 012 975,256	702 303,064
total	19 402 378,272	22 439 133,677	15 457 965,639

Source: own study based on: <https://www.ure.gov.pl/pl/oze/potencjal-krajowy-oze/5755,Ilosc-energii-elektrycznej-wytworzonej-z-OZE-w-latach-2005-2020-potwierdzonej-wy.html>, 6.05.2022.

Based on the above table, it can be concluded that the tendency of utilization of renewable energy sources by the society is increasing, despite the fact that in 2020 the value has significantly decreased compared to previous years. Such a situation could be related to the pandemic situation, infrastructural limitations, high investment expenses or legal regulations of support.

Changing the model of energy generation from centralized to distributed with the use of renewable energy sources allows the use of local energy potential and resources and activation of local communities. Public participation has a great influence on the realization of goals set by the European Union related to the increase of RES share in electricity generation. It can be said that society expresses greater acceptance for renewable energy infrastructure and also gets involved in the process of energy production from renewable sources. Thus, social innovations understood in this way become a way to improve the quality of life of citizens as a result of their implementation (Mulgan, 2006; Pol, Ville, 2009; Vision 2050 Social Innovation, 2013).

The above presented social innovations are a certain contribution to the development of social innovations in the field of energy. It can be noted that social innovations are not necessarily bottom-up initiatives implemented by the society. Unfortunately, the creation of new ideas and breakthrough solutions is associated with high costs, high risk and therefore the support of other entities is necessary.

However, it is safe to say that social innovations bring many benefits to society. Among them we can point out, among others:

- They contribute to the democratization of society, which means the participation of the whole society in the creation of innovations (so-called cosolving), by means of idea banks, hackathons, incubators or web portals dedicated to the creation of new solutions (Kulik, Innovation in Orange Polska, Vision 2050).
- Increase the capacity of society to act.
- Contribute to better communication and cooperation between actors (companies, NGOs, public institutions).

- Provide access to innovative solutions.
- Create new jobs.
- Reduce poverty and citizens' awareness.
- Raise and improve people's quality of life.

The biggest barriers to the development of innovation include:

- Lack of cooperation, communication and culture of innovation.
- Low involvement and support of public, private and non-profit sector activities.
- Orientation mainly on technological innovations.
- Low financial support related to the risk incurred.

In order to increase the level of development of social innovations and their dissemination, it is necessary to have active cooperation of entities from the public, private and non-profit sector, as well as their support not only financial, but also infrastructural (technology parks, business incubators, clusters), and above all education of the society promoting sustainable behavior and change of lifestyle.

## 5. Conclusion

Energy security is a strategic issue, and the generation and transmission of electricity determines the smooth functioning of the economy. The rapid development of technology, the liberalization of the energy market and related regulatory changes, and the production of renewable energy have all contributed to attention to the potential for social innovation in the energy sector. Social innovation can support the transformation of existing social structures toward low-carbon societies.

Despite the great interest in the topic of social innovation, there is no single, universally accepted definition of the term. Many authors dealing with this issue, also do not agree on the components of social innovation. The main feature of this type of innovation is that, in their case, social welfare is a goal, not just a consequence. Social innovations in the energy field can be understood as new solutions that meet social needs and raise public awareness of the development of a low-carbon society. Most energy-related social innovations are technological innovations and are global in nature, while energy-related social innovations tend to be local and have a limited focus on scaling.

The article assumes that the use of social innovations in the field of energy contributes to reducing energy consumption in everyday life. Based on the analysis presented, it can be concluded that through the use of innovative technologies and greater awareness of individuals to eliminate energy inefficient behavior, energy consumption can be reduced.

It is also assumed that social innovation in the energy field stimulates initiatives in the use of renewable energy. This is evidenced by the increasing number of implemented projects aimed at saving energy through self-generation, as well as the use of new energy solutions through households or other entities.

The article also states that the use of social innovation in the energy industry contributes to improving the quality of life of citizens. The use of social innovation brings many benefits not only to the local community, but also nationwide. These benefits manifest themselves in the form of savings leading to a reduction in poverty, but also increased awareness of citizens or building a community focused on the process of renewable energy production.

To sum up, social innovation largely stimulates renewable energy initiatives, and contributes to energy savings, increased use of renewable energy systems and improved quality of life for residents.

In order to spread social innovation on a wider scale, it is important to undertake educational and informational activities for residents that contribute to changing their behavior and habits and promote environmentally friendly attitudes. A key aspect related to the emergence of social innovations is cooperation and partnership, which are key elements that determine their development.

The analysis presented in the article is a prelude to further extended research on the concept of innovation in the energy field.

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