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Social License for Closure—A Participatory Approach to the Management of the Mine Closure Process

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Abstract: The European Union's climate policy and the assumptions of the European Green Deal require Poland to take decisive transition efforts. The achievement of climate neutrality is a challenge due to the special role of coal in the Polish economy. Closing mines and abandoning coal is the greatest challenge for local communities in mining regions. This article presents the example of Wałbrzych, a Polish post-mining town, which has been experiencing the accumulation of negative consequences of inadequately planned liquidation since the 1990s. The current activities of mining companies in the face of abandoning coal were also analyzed. The gaps identified in the literature indicate the need to define a new method of managing the liquidation processes, based on the consideration of key risks resulting from decommissioning, to minimize the social costs in the first place. In this regard, it is helpful to diagnose the social concerns of the stakeholders. The social aspects of mine closures remain a challenge and finding effective ways to deal with them has become crucial for the industry. This prompted us to propose an approach based on community involvement in the decommissioning processes and the introduction of the social license for closure (SLC). By engaging the community, the SLC gives it a voice, allowing it to accommodate the individual needs of mining regions and ensure a successful and just transition. This article recognizes the key stakeholders and their fears related to the liquidation of mining. The organizational framework for stakeholder approval of the SLC is presented. The analysis was based on the example of Poland, a country facing the challenge of closing hard coal mines. Conclusions formulated on the basis of the case study complement the existing research in the field of social licensing and involving stakeholders in the mine closure planning process in accordance with the idea of corporate social responsibility.

Keywords: mining; decarbonization; mine closure; corporate social responsibility; Green Deal



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1. Introduction

The European Union aims to be the first climate neutral continent. The European Commission has defined a strategy to achieve climate neutrality by 2050. This strategy, known as the European Green Deal, is a plan of political initiatives to protect the environment and prevent climate change. The goals of the Green Deal include transitioning to a clean circular economy, restoring biodiversity, and reducing pollution. Achieving these goals requires converting commitments into a legal obligation [1]. The need to meet the requirements of the European Union's policy means Poland must face the challenge of ensuring its energy security and independence, while giving up hard coal mining, which is still the basis of the Polish energy mix [2,3]. The energy transformation, aimed at the development of renewable energy sources and the reduction of greenhouse gas emissions, is now the most important issue in the context of climate protection.

According to the assumptions of the European Green Deal, hard coal mining will be gradually phased out in line with a climate neutral economy [4,5]. Effective closure planning requires thorough and practical preparation based on knowledge of the expected consequences and costs of decommissioning [6]. The literature on mine closures deals

mainly with environmental and legal aspects, and social issues often receive insufficient attention [6–9]. Moreover, the international literature exposes the problem of limited opportunities for the community to participate in the process of mine closure. For this reason, as emphasized by Gillian, it is necessary to introduce new, flexible, and participatory forms of management with a broad framework [10]. Meeting these expectations, we propose the involvement of key stakeholders in the liquidation process. The main goal of this paper is to show the threats resulting from this process and to emphasize the need to involve the society in decision-making. Additionally, an analysis of the literature showed that the management based on the mine's life cycle and planning of closure at the stage of applying for and maintaining the social license to operate (SLO) tends to ignore important social issues. Moreover, the real problems and fears of the society usually arise immediately before the beginning of this process [7,11]. For this reason, we see the need to introduce the concept of the social license for closure (SLC), which is separate from the SLO. We have attempted to define the framework for the functioning of the SLC.

This article is structured as follows: Section 2 presents the theoretical background and literature review. This section provides a theoretical introduction to the need for a decommissioning management mechanism that ensures active community participation. Therefore, this section deals with the following issues:

1. Decarbonization of the Polish economy. The current situation of the Polish mining sector in the face of transformation activities is described. It is pointed out that the inevitable decarbonization of the Polish economy is a great challenge for Poland.
2. Social acceptance of liquidation. The current methods of involving the community in the decommissioning process and the perceived gaps are presented.
3. Sustainable development and social issues in the context of mine closure. The need to consider the three SD pillars (environment, society, economy) at the liquidation stage is emphasized, and the discussed area is indicated as requiring development and continuing research.

Section 3 describes the materials and methods that were used to achieve the purpose of this article.

Section 4 is divided into two subsections. In the first one, a Case Study of a Polish post-mining town is presented, in which an improperly planned mining decommissioning contributed to the accumulation of negative social consequences. The second subsection presents the current activities of mining companies in Poland in the face of abandoning coal.

Section 5 presents an overview of world practices that involve the community in mine closure planning.

Section 6 comprises the assumptions and framework for the functioning of the SLC. Initially, key stakeholders are identified to emphasize the importance of listening to their voices. Then, the proposed organizational approach aimed at granting the SLC by the stakeholders is presented.

Section 7 is a discussion in which the legitimacy of the concept of the proposed SLC is discussed.

Section 8 contains the conclusions.

2. Theoretical Background and Literature Review

2.1. Decarbonization of the Polish Economy

Poland is the largest producer of hard coal in the European Union, which can satisfy most of the domestic needs with its own extraction. Nevertheless, it should be borne in mind that a significant proportion of hard coal is imported. Eurostat data compiled by Forum Energii show that in 2020 Poland imported 10.5 million tonnes of hard coal, of which over 83% came from Russia [12]. This is due to the decline in the competitiveness of Polish coal, caused by its low calorific value, high extraction costs, and the growing requirements of customers in the energy sector [13]. The decarbonization of the Polish economy and the achievement of climate neutrality are problematic issues from the political, economic, and social point of view [14,15]. The complete abandonment of the use of hard coal poses a

particularly significant problem for the labor markets in mining regions. Therefore, the main challenge related to the transition is faced by the self-governments of mining regions, where employment is strongly concentrated in the mining sector and the regional economy is based on mining [14]. The budget revenues of local government units where minerals are exploited are significant. Mining communes are at the forefront of the rankings of the richest regions in Poland [16].

Figure 1 shows the extraction and employment in the hard coal sector in Poland in the years 1989–2020. There was a clear decline in extraction, which took place in the early 1990s along with the political transformation and transition to a free market economy. Another significant decrease was recorded at the turn of 1997–1998. Since then, a steady downward trend in extraction has been observed, which in 2020 amounted to 48.2 million tonnes. Along with the decline in mining, the number of people employed in the hard coal mining has decreased significantly. Over the years 1989–2020, the number of employees decreased by over 300,000 people.

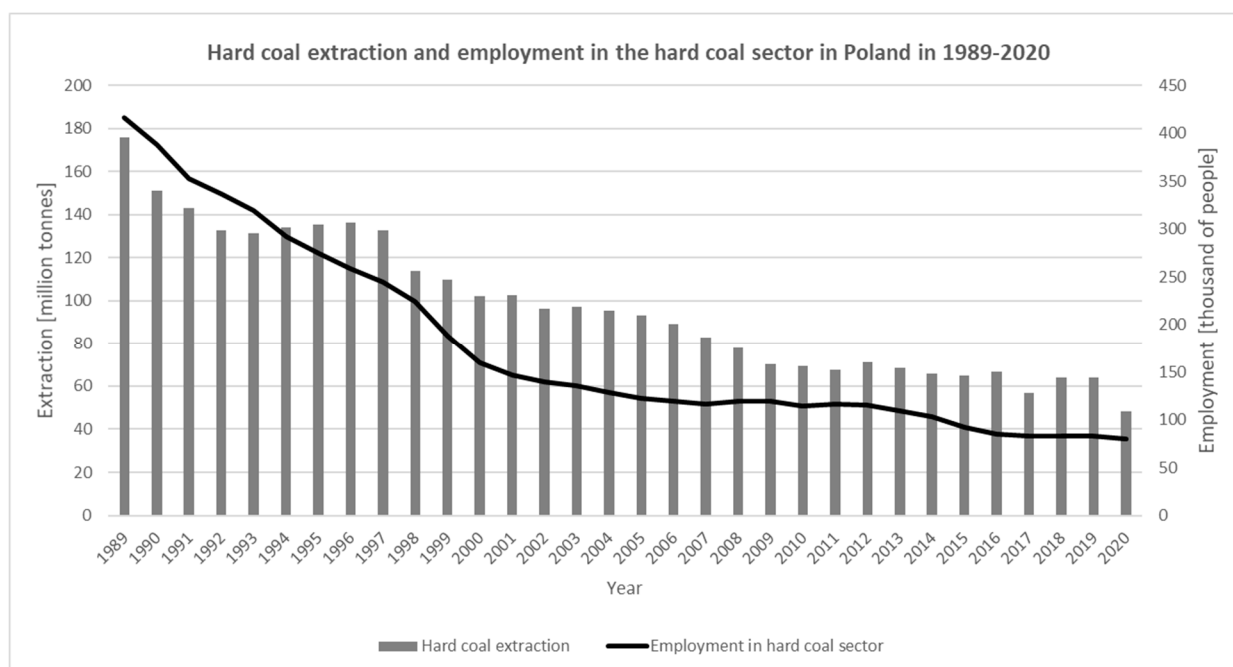


Figure 1. Extraction and employment in the hard coal sector in Poland in 1989–2020 (source: own study—extraction based on data from PIG-PIB [17,18], employment based on data from ARP S.A. [19–21]).

At the end of September 2021, there were 77.9 thousand employees in the hard coal sector in Poland. About 77% of those working in the mining industry are underground workers [22]. Comparing extraction and employment over the years, one can notice an improvement in labor productivity in the hard coal mining industry, but nevertheless Poland in this respect is not equal to the global giants. For example, in 2018, 275.4 million tons of hard coal were mined in the USA, with 53,583 people employed [23]. In Poland, at the same time, with employment in the mining sector amounting to 82,843 people, 63.9 million tons of coal were mined. To compare, per person employed in mining, Poland extracts 770.3 tons of coal annually, and the USA almost seven times as much—5139.7 tons. However, the work efficiency of the Polish mining industry was comparable to that of Germany, where in 2018, 678.8 tonnes of coal per person employed in the same sector were mined [24].

In order to meet the obligations imposed by international and EU agreements and initiatives [5,25,26] aimed at the decarbonization of the Polish economy, with the current rates of extraction and employment in the mining industry and the use of coal in the

energy mix, decisive transformation measures should be taken [27]. These actions should be carried out considering the mistakes, problems, and their solutions known from the past in order to prevent the collapse of the economies of mining regions [14].

2.2. Social Acceptance of Mine Closure

Mine closure can be regarded as a purely technical process. It then refers to the cessation of extraction, dismantling of mine facilities, and land reclamation. From an economic point of view, the sustainable management of post-mining resources should be considered, and in the social aspect, the decommissioning process should aim to provide support for post-mining regions in the context of their development [10].

The social dimension of threats related to the closure of mining enterprises is complex and includes many interrelated issues [28,29]. Closure planning usually takes place during the start-up phase, when the primary efforts are directed towards gaining support and granting the SLO [7]. Marais and de Lange note that the mine life-cycle approach implies that the mine should plan for closure, and that this closure should open up new development opportunities [11]. Thus, they note that the lack of success is due to the neglect of the social consequences of mine closure at an early stage in the process. Countries and mining enterprises at the end of the project life cycle are not adequately approaching the key threats and minimizing the social impact of decommissioning [8,30,31]. Deacon et al. stress that governments should not leave responsibility for the closure of mines to local governments and affected communities [32]. Effective and multi-dimensional management of the effects of closure is expected from owners and chief managers of mining companies. The real cost of decommissioning mining enterprises is underestimated [8]. It is therefore necessary to develop a management system that will ensure the responsibility of companies and full settlement of the costs of decommissioning. Mine closures may then create new opportunities for long-term and more sustainable development [8,33].

The situation of the mining sector in Poland is difficult and leads to social disputes and conflicts [34]. Social objection occurs at every stage of mining activity [35]. Both the operation and closure of mines are met with a wide range of opinions and claims of various social groups, ranging from miners and other mine workers, to residents, and ending with ordinary citizens who, as taxpayers, bear the costs of incorrect management decisions and expect an effective solution to the problems of the mining sector [36,37]. Therefore, decommissioning processes in the extractive industry should be preceded by the preparation of a comprehensive plan in which the voices of the community will be considered [38]. Gillian emphasizes that the management of decommissioning processes should ensure the participation of the involved community in deciding on the directions of post-mining development [10].

The system solutions protecting the employees of mines are guaranteed by social contracts [39]. They do not have a precise operating framework, which is a basic threat to both supporters and opponents of a given purpose. However, they are characterized by certain key elements that allow for obtaining and maintaining social consent. Among these elements, the most important are transparency, trust, and the real commitment of the community [40]. The scope of social contracts varies, which is mainly due to the degree to which a specific project affects the community. Loewe et al. note that these differences are present because in most countries there are certain social groups that are more influential and put more emphasis on the content of social contracts [41]. In Poland, miners are considered to be one of the most privileged and influential social groups and are entitled to additional benefits, shorter working hours, or retirement on special terms [42–44].

Currently, in Poland, the focus is on the social contract regarding the transition of the hard coal mining sector and selected transformation processes in the Silesian Voivodeship. Long negotiations between the government and trade unions led to an agreement which guarantees social protection for employees of closed mines. It is a prelude to a coherent and comprehensive mining decommissioning plan, which requires the approval of the European Commission and appropriate legislative changes [39,45].

In the project life cycle, meeting the requirements of the society is guaranteed by the concept of a social license to operate (SLO), which aims to fill the gap in the views of all stakeholders and build trust and acceptance of mining activities by the community [37,46]. Conducting consultations and using public opinion should, on the one hand, allow the voice of the local community to be heard and treated as a partner, and on the other hand, act as an advisory body and be a remedy for the success of the mining project and effective restructuring [13,34].

The social license is a specific expression of consent for the presence of the company in the local community [47]. Thanks to it, the final acceptability of decisions made is at a much higher level, even if they are unfavorable [48]. However, it should be borne in mind that both obtaining and maintaining a social license requires honesty and credibility on the part of the enterprise, so that once the trust of local stakeholders is gained, it is constantly built and never lost [49,50].

Brock and Dunlap show that local communities can be overwhelmingly supportive of business when strategies based on corporate social responsibility (CSR) are properly managed [51]. The problem of ignoring and underestimating social risks, described in the literature, often results from the identification of real problems occurring only at the end of the mine's life cycle [7]. It provides a good basis for creating and introducing the concept of a social license for closure (SLC). Decommissioning and restructuring activities must be carried out comprehensively while considering the individual needs of mining regions, which will ensure a successful and just transition [52]. As Gillian points out, decommissioning management should have a broad and flexible management framework so as to favor post-mining development [10]. When planning such activities on a large scale, it is necessary to consider the experiences and mistakes of the past [14]. Properly managed and carried out liquidation of mining enterprises, performed after scrupulous social consultations, will be conducive to the possibility of using the potential of the region and the workforce in projects that fit into the concept of sustainable development [8,29,47,53].

2.3. Sustainable Development and Social Issues in the Context of Mine Closure

Sustainable development (SD), according to the report of the World Commission on Environment and Development: "Our Common Future" [54], is understood as a process of change ensuring that the needs of the present generation are met without adversely affecting the development opportunities of future generations, e.g., thanks to integrated actions for economic, social, and environmental development. The sustainable development goals (SDGs) formulated under the 2030 Agenda for Sustainable Development serve to stimulate action in areas of key importance, and although in the 1980s skeptics of the idea proclaimed that sustainable development was only a slogan that would eventually disappear [55], the opposite has happened. The concept of SD is gaining popularity, and the policies and strategies of companies are built in relation to the goals defined in the 2030 Agenda. This does not mean that there is obligation to monitor the activities of enterprises and validate them. So, the risk of devaluing the concept of SD remains only in scientific considerations [56]. The importance of incorporating the concept of sustainable development into projects and new ventures was discussed, among others, by Rupo et al. [57] and Casali et al. [58]. Companies can also improve their business results by implementing the goals of sustainable development [59]. The concept of sustainable development is an integral part of corporate social responsibility (CSR), and the implementation of CSR tasks is in line with the principles of SD. The idea of CSR has been present all over the world for decades. Business models based on corporate social commitment and corporate social responsibility (CSR) strategies are able to minimize both the future operational risk of enterprises [60] and the negative impact of mining throughout the project life cycle [61].

Particularly noteworthy is the issue of early planning and successive implementation of the process of liquidation and reclamation of post-mining areas. According to the United Nations Development Programme [62], activities in this area should be integrated, i.e., taking environmental, social, and economic planning into account and involving local com-

munities and other stakeholders in the entire process. Involvement of local communities in the mine closure planning process is understood as the right to participate, but also as a necessity to ensure an effective process. The decommissioning plan should be known to the inhabitants of the region, as they will eventually “inherit” the post-mining area. The social dimension is increasingly recognized as crucial to the mining industry, but still remains the least understood aspect of the business concept of sustainable development [63]. In line with the SDGs and their reinterpretation in the context of the mining industry [64,65], the implementation of the SD11 Sustainable Cities and Communities target includes issues related to mine decommissioning, through the implementation of the following activities: preparation of a post-exploitation plan, care for post-mining facilities as cultural heritage, and cooperation with local authorities to develop post-mining areas into places for rest and recreation. In connection with the assumptions of the European Green Deal, leading to a reduction in the exploitation and combustion of fossil fuels, and, consequently, the closure of mining plants that exploit energy resources, the above turns out to be insufficient. Therefore, it is necessary to formulate new concepts and guidelines that will be useful in the closure process.

3. Materials and Methods

The analyses are based on examples of bad and good practices in the management of decommissioning and transformation processes that attempted to define the framework for the functioning of the social license for closure.

Our argument in this article is based on:

- Case study of the Lower Silesian Coal Basin (LSCB) and the city of Wałbrzych to illustrate the unforeseen consequences of the comprehensive and improperly managed liquidation of hard coal mines. The city of Wałbrzych experienced an economic decline after the closure of all mines in the 1990s. To clarify the nature and scale of the problems, an analysis of statistical data on unemployment and population was carried out. The number of unemployed people in the Wałbrzych region in the years 1990–2020 (data source: Powiat Labor Office in Wałbrzych [66]) and population changes in the years 1995–2020 (data source: Central Statistical Office [67]) were analyzed. The differences in the analyzed time periods result from the availability of data. We supplemented this data with the study of the Statistical Office in Wrocław from 2019 [68] to indicate that Wałbrzych is still struggling with problems of a socio-economic nature. A review of the literature describing the scale of problems of the LSCB after its liquidation was carried out. The review was supplemented with information from the documents and studies of the Wałbrzych City Hall: Social Territorial Plan for Just Transformation of the Wałbrzych Subregion [69], Resolution No. XIX/285/2016 of the Wałbrzych City Council of March 29, 2016 (with attachments) [70].
- Presentation of the current activities of Polish mining companies in the face of mine closures based on non-financial reports of mining companies. Reporting non-financial data related to CSR in Poland is regulated by law in accordance with the Accounting Act [71], implementing the EU Directive 2014/95/EU [72]. At the beginning of 2017, the presentation of these data (ESG: E—Environmental, S—Social, G—Governance) became an obligation among selected entities meeting the criteria of the number of employees and the level of financial results. A list was prepared showing the activities planned and implemented by mining companies in environmental and social aspects. Data from three companies mining hard coal in Poland were analyzed: Tauron, Lubelski Węgiel Bogdanka and Jastrzębska Spółka Węglowa.
- Analysis of approaches involving the community in closure planning. The Google Scholar database was searched for the co-occurrence of specific phrases in the articles, such as: “mine closure planning”, “stakeholder engagement”, “sustainability”, “corporate social responsibility”, “social license”, “social contract”, “social acceptance”, “European Union”. Based on this, a review of stakeholder engagement practices in closure planning was made. The guidance on mine closure and mine closure planning

approaches involving the community in planning mine closures were analyzed (prepared by World Bank Group, Department of Mines and Petroleum & Environmental Protection Authority (DMP&EPA, Western Australia), Anglo American, International Council on Mining and Metals (ICMM) and EIT RawMaterials Closurematic project).

This led us to propose the assumptions and framework for the functioning of the social license for closure (SLC). Thanks to an earlier analysis of experiences and plans related to decommissioning, key stakeholders were identified and divided into internal and external ones. Based on the literature review, their main concerns about decommissioning have been presented. The need for a broad and flexible decommissioning management framework highlighted in the literature review prompted us to propose an approach to granting a social decommissioning license that is based on listening to the voices of all key stakeholders. Additionally, the literature review performed earlier shows that the government should participate in the preparation of the decommissioning. As a result, we decided to include guaranteed governmental support and the preparation of professional expertise in the proposed approach.

4. Closure of Hard Coal Mines in Poland—Previous Experience and Prospects

This section presents (1) experiences related to the liquidation of hard coal mines in the Lower Silesian Coal Basin, which took place in the 1990s, and (2) the current activities of mining companies in the face of abandoning coal. There is a visible change in the management of liquidation processes.

4.1. Wałbrzych as an Example of an Incorrect Liquidation Process

Wałbrzych is located in the south-western part of Poland, in Lower Silesian Voivodeship. For centuries, it has been an important and thriving industrial center, in which mining played the most important role. At the turn of the 19th and 20th centuries, the city experienced a very dynamic development, and the main industries, apart from mining, were coke-making, ceramics, and porcelain production, as well as the textile industries. Until the beginning of the 1990s, the economy of the Wałbrzych region was based on the extraction of hard coal, which was particularly desirable due to its properties used in coking [73,74].

In Poland, in 1989, a political transformation took place. The transition from a centrally controlled to a free-market economy has revealed the problem of the unprofitability and need for restructuring of the hard coal mining industry. For this reason, all hard coal mines in Wałbrzych were put into liquidation. This closure, which took place in the 1990s, is seen as an example of an improperly carried out liquidation process. The unexpected decision to liquidate the Wałbrzych mines triggered a rapid de-industrialization and the beginning of economic and social changes in the city. At that time, there was a significant increase in unemployment in the region, contributing to a reduction in the incomes of residents and deterioration of their living conditions, which, among other things, led to an increase in crime, alcoholism, and family problems [70,75,76]. The opinions of the inhabitants of Wałbrzych regarding the closure of the mine are mostly negative and critical, full of bitterness and regret [77]. In retrospect, the liquidation activities left many matters unfinished, which has had a negative impact on post-mining communities. Moreover, the decommissioning was carried out in a manner inconsistent with the principles of sustainable development and the circular economy. At that time, no efforts were made to reuse or minimize the number of demolished facilities related to the mine's operations, and the waste generated as a result of demolition and dismantling was not segregated, recycled, and recovered [69]. The possibility of using the region's potential, infrastructure, and workforce has been lost.

The basis for the liquidation of the coal industry in the Lower Silesian Coal Basin was Resolution No. 1 of the Council of Ministers of October 23, 1990. In 1993, mining in the "Victoria" mine was completed, in 1994 in the "Wałbrzych" mine, and in 1996 in the "Thorez" [73]. In 1990, the mines in Wałbrzych provided employment to 13,000 miners [78]. According to the data presented in Figure 2, in the years 1991–1992, a significant increase

in the number of unemployed people in the Wałbrzych region can be seen (according to the current administrative division, it covers the Wałbrzych County and the Wałbrzych city-local level NUTS4 according to the NUTS classification). The number of unemployed increased then by 11,750 people in comparison to 1990. Unemployment was growing, both among women and men. While mining is “gender-specific” [79] and women working in the mining sector experience exclusion [80], the consequences of redundancies in mines extend beyond the mining facilities. It was caused, among others, by the fact that one workplace in the mine generated three or four workplaces in its environment [81]. Currently, it is estimated that there are indirectly from 1.16 to 1.35 jobs in other sectors of the economy per one place in the hard coal mining industry in Poland [82]. In the following years, unemployment gradually decreased, which may have been caused by the initial possibility of a two-year vacation and then early retirement. However, since 1998, there has been a noticeable increase in the number of unemployed people, which may indicate that unemployed miners could not find employment after the end of their two-year leave [69].

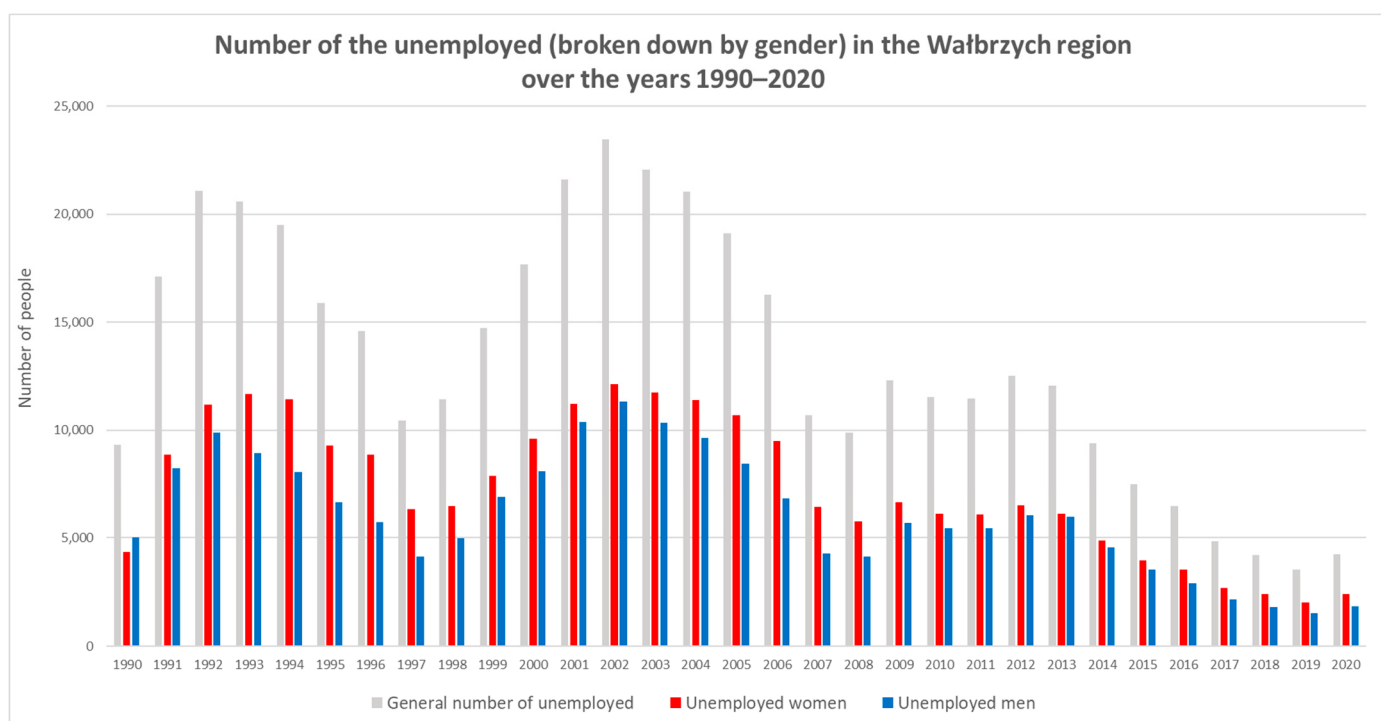


Figure 2. Number of the unemployed in the Wałbrzych region over the years 1990–2020 (source: own study based on data from District Labor Office in Wałbrzych [66]).

The establishment of the Wałbrzych Special Economic Zone in 1997 was aimed at compensating the losses incurred because of the liquidation of the mining industry and the economic activation of the region. Despite the measures taken, the number of unemployed continued to grow. At the time of the creation of the Wałbrzych Economic Zone, the economic situation of the region did not change immediately [83]. The search for a new job that would provide stable employment and a decent salary was difficult to say the least [73]. It was only at the turn of 2006–2007 that the number of unemployed dropped significantly, which was related to the dynamic development of the industrial sector of the Wałbrzych subzone and the creation of new jobs. This decline was also caused by the outflow of the working age population and the reaching of retirement age by the unemployed [70,84]. Migration movements resulting from the need to look for employment contributed to a marked decline in the population of the Wałbrzych region, as shown in Figure 3. In 1995, the region was inhabited by 202.4 thousand people. The population at the end of 2020 was only 165.1 thousand people (based on data from the Central Statistical Office [67]).

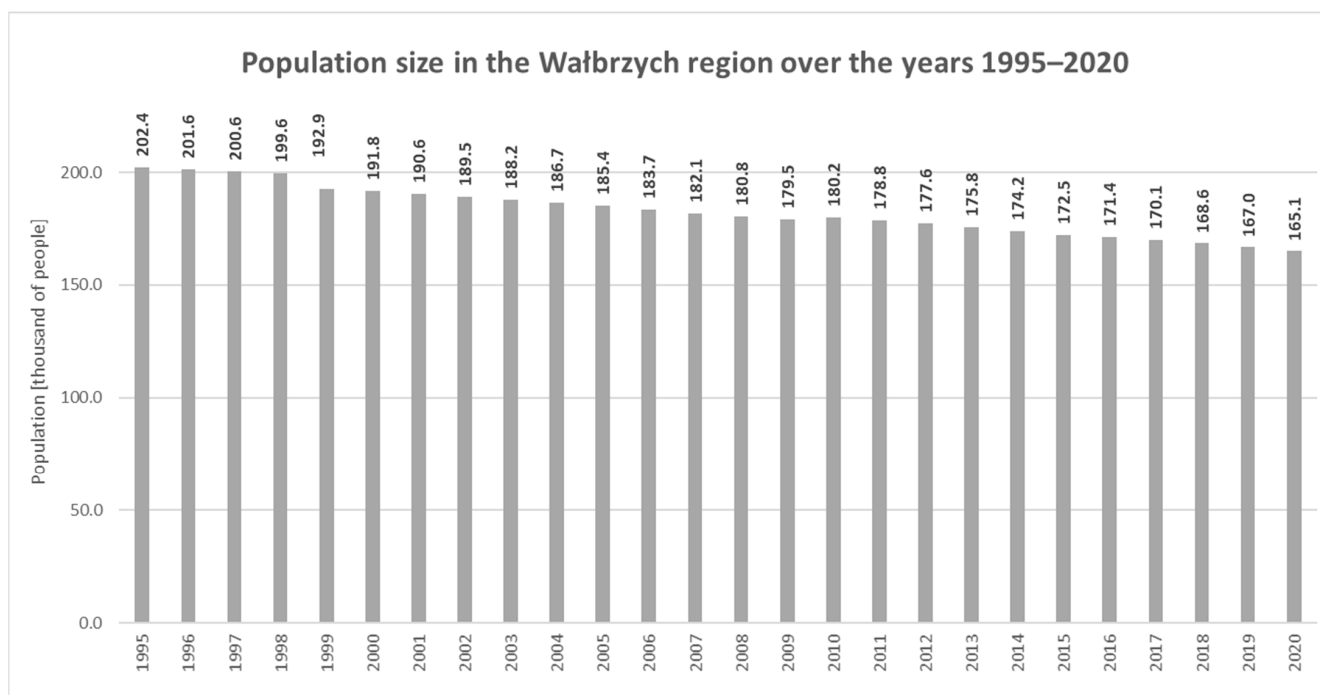


Figure 3. Population size in the Wałbrzych region over the years 1995–2020 (source: own study based on data from Central Statistical Office [67]).

There has been an accumulation of negative phenomena related to decommissioning processes in the mining industry in Wałbrzych. Now, Wałbrzych, 25 years after the last mine was closed, is a city experiencing socio-economic problems on a huge scale [31,70]. Based on the study of the Statistical Office in Wrocław [68], compared to other cities with poviats status (66 cities in total), Wałbrzych in 2019 took:

- 48th place, taking into account the city's own income per capita in PLN, which amounted to PLN 3088, while the first place in the ranking was PLN 7834, and the last place was PLN 2277;
- 62nd place, taking into account completed dwellings per 10 thousand inhabitants—15.2 dwellings, while the first place in the ranking is 177.7 and the last 5.8 dwellings;
- 50th place, taking into account the share of people using social assistance, which amounted to 4.7%, while the first place in the ranking was 1.4%, and the last was 8.0%;
- 42nd place, considering the registered unemployment rate, which amounted to 4.9%, while the first place in the ranking was 1.0% and the last place was 11.3%. The unemployment rate of the City of Wałbrzych is decreasing every year—in 2017 it was 7.2%, and in 2018 it was already 6%. However, it remains higher than in the entire Lower Silesian voivodeship.

The urban landscape of Wałbrzych is full of devastated and abandoned post-industrial facilities. Figure 4 shows examples of post-mining facilities that have been abandoned and have remained unused for years, and their technical condition is very bad. Currently, the city of Wałbrzych is faced with the challenge of comprehensive renovation of areas considered degraded both in spatial and socio-economic terms. For this purpose, comprehensive revitalization activities are carried out [70,85]. Moreover, the Social Territorial Just Transition Plan of the Wałbrzych Subregion, implemented under the Just Transition Fund, assumes real opportunities to improve the quality of life of inhabitants, and the proposed actions are in line with the objectives of the European Green Deal [69]. In the face of the energy transformation and the related decarbonization of the Polish economy, when planning decommissioning activities, one should avoid mistakes of the past, e.g., those that were committed in Wałbrzych. The decommissioning activities should, above all, be properly planned so that the post-mining future of the regions is focused on the development and

the most effective use of the existing potential—both technical and social. The international initiative, which is Just Transition, requires the beneficiaries of the Fund to secure the rights of employees and the interests of residents and entrepreneurs from mining regions [86]. In the face of the transformation of the economy based on sustainable development, all initiatives should be introduced in a gradual manner that does not threaten social interests.



Figure 4. Examples of abandoned post-mining facilities (source: private archives).

It follows from the above that the closure of mines should include consideration of the following:

1. The situation and needs of mine workers. It is reasonable to analyze the labor market vs. professional skills of people leaving mining plants; targeted training response, including improving professional competences and acquiring the skills to look for a new job and preventing professional inactivity (activation of the region's inhabitants).
2. The potential of (post) mining facilities (valorization of facilities and infrastructure), preventing their degradation, and the development and use after a comprehensive analysis of the existing solutions in this area, consistent with the idea of sustainable development [87,88].

4.2. Planned Activities of Mining Companies in the Face of Liquidation of Hard Coal Mines

As presented in this article, mines provide jobs for thousands of people. It is important to assess the environmental awareness of the mining industry and the consequences that the pursuit of climate neutrality will bring to the discussed professional group. Both the environmental and social issues discussed in the non-financial reports of mining companies show a change in the perception of the Green Deal. Due to the inevitability of the regulations being introduced, and the resulting changes related to them, Polish mines provide information on ongoing and planned activities serving the environment and the staff of mining companies. Table 1 contains data from the latest reports of three hard coal mining companies: Tauron, Węgiel Bogdanka, and Jastrzębska Spółka Węglowa. The list does not include the Polish Mining Group, which has not published non-financial data in the form of reports since 2017. Until now, these activities had not been so clearly included in company reports. The choice of companies is justified by the fact that, according to Eurostat, Poland is the country that produces the largest amount of hard coal (96%) among all EU member states.

Table 1. Activities planned and implemented by mining companies (source: [89–91]).

Information	Tauron	Lubelski Węgiel Bogdanka	Jastrzębska Spółka Węglowa
Basic information	6458 employees (in Tauron Wydobycie, employment contract as at the end of 2020), including 566 women. Coal mining is carried out in three plants: Brzeszcze, Janina, Sobieski.	4929 employees (employment contract as at the end of 2020), including 278 women. Mining is carried out at the Bogdanka mine (the mining area is divided into three subareas).	21,973 employees (employment contract as at the end of 2020), including 2071 women. Mining is carried out in the following coal mines: Borynia-Zofiówka, Budryk, Jastrzębie Bzie, Knurów-Szczygłowiec and Pniówek mainly producing coking coal, but also coal for energy purposes.
Planned and implemented activities-environmental issues	Increase in the share of installed capacity in low and zero-emission sources to 28% in 2025 and to 66% in 2030. Decrease in emissions by approx. 50% in 2030 (compared to 2018). The introduction of the “TAURON Green Return” program in 2019, updating the strategic directions of the Group, includes, inter alia, investments in renewable energy	Awareness of changes related to the Energy Policy and taking responsibility for preparing the region for them. Gradual abandonment of thermal coal production and increasing coke production. In 2020, the contractor for the construction of a photovoltaic farm on the company’s premises was selected. Among the strategic initiatives until 2030: sustainable use of heaps. Work in the team preparing the anti-smog resolution for the province Lublin.	Reduction of the carbon footprint, identification and reduction of emissions in the production chain; energy self-sufficiency; use of methane and coke oven gas to produce electricity and heat; has the title of “Climate Aware Company” based on a climate awareness survey conducted by the Reporting Standards Foundation, the Association of Stock Exchange Issuers and Bureau Veritas Polska Awareness of the end of steam coal exploitation.
Planned and implemented activities-social issues	Caring for the competences of employees to match the needs of the changing energy industry: development of new competences, preparation for change management; focusing on acquiring new qualifications and improving employees’ competences. The realization takes place through the implementation of development initiatives and recruitment of staff. Meetings with the “social party” identified as employees (internal stakeholders) concerning, inter alia, financial situation in the TAURON Group or the implementation of the Voluntary Redundancy Program in the Group companies.	Engaging in work on the Territorial Just Transition Plan for the Lubelskie Voivodeship. Preparation of employment guarantees for employees independent of the Social Contract [39].	Awareness and emphasizing of future socio-economic changes in the region. Planning meetings of the JSW management board with local government officials, the purpose of which will be, inter alia, presentation of employment plans (recruited employee profile). System of training and development programs offered to employees as a key element of the low-emission transformation.

Table 1 shows that each of the three companies is aware and acts in the face of the upcoming changes. The aspect of reducing emissions and energy self-sufficiency is emphasized in the Jastrzębska Spółka Węglowa report. Investments in renewable energy sources (RES) are declared by the other two companies. The implementation of training programs and improvement of professional competences is a priority for all the above-mentioned entities. The table shows that mining companies are involved in works aimed at ensuring social interests. The post-mining development of regions and the use of social capital is now an important aspect for mining enterprises. They are consciously approaching the idea of giving up coal. The companies pay attention to the needs of various stakeholder groups. They initiate meetings at the local government level and engage in work in the region (external stakeholders) and meet employees (internal stakeholders) by conducting information campaigns and training programs. None of the companies declares wider public consultations or changes in the supply chain (the role of external enterprises and changes resulting from the energy transformation).

Moreover, the activities presented as part of non-financial reporting are updated. A short-term comparison of company reports (2020 vs. 2019) provides the following information: Tauron previously noted the role of external stakeholders and the need to engage them, but at the stage of future investments, awareness of the need for initiatives, dedicated to employees and communities in the face of the energy transition, is a new Group reporting element; the current activities of Lubelski Węgiel Bogdanka include engaging in work on the anti-smog resolution and the Territorial Just Transition Plan, as well as the subsequent stages of the implementation of renewable energy investments; Jastrzębska Spółka Węglowa, on the other hand, for the first time openly informs about the upcoming socio-economic changes and the planned initiatives.

5. Involving Communities in Closure Planning—An Overview of World Practices

There is limited literature that addresses the topics of closure planning with community involvement. Below, in Table 2, there is a summary of Google Scholar database searches (no time limit was used). The general query “mine closure” returned 18,400 results, while the “mine closure planning” query only returned 1080. The research showed that the literature on mine closure planning is much less developed than that on mine closure itself. When compared with the phrases “social contract” or “social license” or “social acceptance”, it returns only 159 results. In turn, adding the phrase “stakeholder engagement” reduced the results to 236, and “European Union” to 112. There are only 10 publications that deal with mine closure, including the expressions “stakeholder engagement”, “sustainable development”, “corporate social responsibility”, and “European Union”.

Table 2. Google Scholar search results.

Searched Phrases	Number of Results
“mine closure”	18,400
“mine closure planning”	1080
“mine closure planning” AND “sustainability”	685
“mine closure planning” AND “corporate social responsibility”	171
“mine closure planning” AND “social contract” OR “social license” OR “social acceptance”	159
“mine closure planning” AND “stakeholder engagement”	236
“mine closure planning” AND “stakeholder engagement” AND “sustainable development” AND “corporate social responsibility”	73
“mine closure planning” AND “European Union”	112
“mine closure planning” AND “stakeholder engagement” AND “sustainable development” AND “corporate social responsibility” AND “European Union”	10

The literature devoted to “stakeholder engagement” in “mine closure planning” emphasizes that all aspects of mine closure must be socially consulted. The literature in this regard mainly focuses on the claim that the lack of stakeholder engagement is a major mistake in mine decommissioning [92]. The authors describe different approaches to decommissioning planning, from which one emerges: the need for effective stakeholder engagement. Rosa et al. [93] and Morrison-Saunders et al. [94] describe the ecosystem services concept, which is a tool that facilitates stakeholder engagement in defining post-closure planning objectives and targets. They reviewed mine closure practices in Brazil and Australia and explored the theoretical and practical foundations for stakeholder engagement to raise the debate on the need to increase public participation in decommissioning processes. Vivoda et al. [9] examined the extent to which regulatory instruments in Australia include provisions that require proponents to consider the social aspects of mine closure. Based on their analyses, they conclude that active government involvement and the creation of a legal basis in legislation are required so that sufficient attention is paid to social issues related to mine closures. Heymann et al. [95] describe the case of a South African coal mine where the Anglo American Mine Closure Team was involved in the preparation of the closure plans. A review of the existing plans for the decommissioning of the Landau mine revealed the need to pay the greatest attention to social issues of closure. The Mine Closure Toolbox requires a detailed closure plan that, from a social point of view, requires ‘proven’ social and health needs with authorities, employees, and affected and interested parties through involved consultation. As Worden [96] notes, the Anglo American, as a mining company, has its own Integrated Closure Planning System that is implemented worldwide. Arroyo and Caron [97] examined the extent to which Social and Environmental Reporting (SER) can be considered “pluralistic accounting, open to a public dialogue, given

differences in power, beliefs, and desires of constituencies”. As an example of “community engagement internal practices”, we considered Teck Cominco, a company that is engaged in mining and mineral development. Teck Cominco’s long-term goal and commitment is to ‘develop a more diverse and far-reaching stakeholder engagement program’. The company aims to gain social acceptance for its activities through the development of social metrics.

The literature in which the phrase “European Union” appears does not focus on citing EU examples related to closure planning, but rather on a general description of the need to involve the community in planning decommissioning processes. Instead, we will find, among others, an example of a conflict that has developed due to the water allocation problem after the phase-out of pits mining in the Spree/Schwarze Elster river basins [98]. In order to find a compromise and resolve the conflict, a working group was set up consisting of a number of interested parties including representatives of water, mining, and environmental authorities, large water-using sectors (energy and mining) and other water users which were represented by the ‘Lusatia Initiative’. We can also consider the example of Sokolovská Uhelná, the smallest lignite mining company in the Czech Republic, which is aware of the need to agree with local communities when it comes to planning remedial actions. A noted and accompanying problem is the inability to make effective decisions within the communities and the regional development organizations [99].

The practice of engaging stakeholders in closure planning may differ due to the various values represented by the affected communities. These values depend on local history, traditions, and policy [92]. As Fleury et al. [100] state that good integrated closure planning requires a high level of corporate commitment. Nowadays, those responsible for mine decommissioning are aware of the need to prepare an integrated closure plan that involves the affected and interested parties. Based on the guidance on mine closure and mine closure planning, approaches involving the community in planning mine closures were analyzed. The results of these analyses are presented in Table 3.

Table 3. Review of guidelines for mine closure planning.

Source & Author	Identified Stakeholders	Comments
Toolkit for sustainable decommissioning prepared by World Bank Group (2010)	Four stakeholder categories: authorities (central, provincial/regional & local governments), responsible parties (company, joint venture, or operator), potentially affected parties (communities, employees/workers, local businesses), interested parties (lenders/development agencies, decommissioning subcontractors, industry organizations, insurance/bond/third party guarantee providers, civil society, other)	Prepared toolkit encourages to use stakeholder engagement to better understand key community priorities and to contribute as partners in closure planning, while at the same time fine-tuning government’s role in this process.
Guidelines for Preparing Mine Closure Plan made by DMP & EPA (2015)	Internal: mine managers, mine planners, engineers, staff involved in mine planning; External: government (regulatory agencies, local authorities), post-mining land owners, local community members or groups, non-government organizations, adjacent landholders, downstream users of surface and groundwater resources.	The guidance suggests that the Mine Closure Plan should include Stakeholder Engagement Register (identifying the rehabilitation and closure consultation that has been conducted) & Stakeholder Engagement Strategy (identifying the stakeholder engagement)
The Integrated Closure Planning System (ICPS) developed by Anglo American (2015)	Four stakeholder groups: employees, affected parties, interested parties & regulators	The identified ICPS sub-processes related to target conditions include but are not limited to evaluate internal and external stakeholder expectations and implement the Stakeholder Engagement Plan. Via the ICPS social aspects are fully integrated.
Guidelines prepared by ICM (2019)	Internal: mine employees; External: local community members, indigenous community leaders, regional and local government representatives	The guidelines emphasize that the stakeholders should include informal and traditional representatives of women, youth, community associations, vulnerable groups, and under-represented minorities
Closurematic project funded by EIT RawMaterials (2018–2021)	Internal (including working contractors) & external	Introduction of the digital management system for mine closure and mechanism for interaction with both internal and external stakeholders: dedicated digital stakeholder engagement systems.

The plans, guides, and projects presented in Table 3 are examples of good practice ensuring properly planned and sustainable mine decommissioning. Each of them emphasizes the need to involve the community in planning for closure. The approach to

stakeholder identification is similar and is based on the division into internal and external ones. However, as emphasized in the literature, community involvement depends on cultural conditions [94]. As DMP & EPA emphasizes in their guidelines, mine closure plans must be site-specific and based on adaptive management, that is, experience from other mine sites should be considered [101]. ICMM states that mine employees' engagement is needed to understand their concerns and visions for the future and to ensure a successful employment transition [102]. Anglo American points to the need to prepare detailed decommissioning plans well in advance, amounting to 5–10 years [103]. The management of decommissioning processes requires keeping documentation, constant monitoring, and integration of various data. For this reason, the use of a special digital system, prepared as part of the Closuresmatic project, can support the management of mine closures [104]. The World Bank Group notes that the involvement of stakeholders, including government, allows for the co-creation of post-closure scenarios. An important issue with closure planning and community involvement is government support and the provision of a regulatory framework that allows for active participation [38].

6. Social License for Closure—Assumptions and Framework of Functioning

The issues presented in the previous section clearly show the need to involve the community in the decommissioning processes. The social license for closure proposed here aims to involve stakeholders in planning the liquidation of mining enterprises. There is no definition of a social license for closure in the literature, as the term is new and extends the social license to operate. A social license for closure, similar to the social license to operate, is an informal consent to conduct activities. We consider the separation of SLO and SLC to be critical to the success of the decommissioning process. As indicated in the literature review, the life-cycle approach and decommissioning planning at the SLO stage favor the neglect and underestimation of real problems that usually arise only at the end of the mine's life cycle [7]. Identifying social problems at the stage of the mine's operation is characterized by little consideration of the dynamics of the changes taking place [9]. As in the case of SLO, we will be dealing with a whole set of concepts that represent different values, tools, and practices [105]. SLC can be treated as a project in which various stakeholders are actively involved. It is necessary to identify them and determine the impact on the implementation of the project aimed at granting a social closing license, as presented in the first subsection. The proposed organizational approach for awarding the SLC is presented in the second subsection.

6.1. Identification and Mapping of the Stakeholders

The social approval for the liquidation of mining enterprises should be considered on several levels in the context of what we understand as social. By definition, a community is "the people living in one particular area or people who are considered as a unit because of their common interests, social group, or nationality" (Cambridge Dictionary). We propose the division of stakeholders into the following levels: internal, first level, and external, second, and third level. These levels correspond to the need to influence decisions related to the decommissioning of mining. The first level at which the assumptions and framework of the SLC should be considered are therefore employees of mining enterprises, who should be treated as internal stakeholders. The second level concerns stakeholders inside mining regions, where the economy and labor market are highly dependent on coal mining. Among them, there are local entrepreneurs and suppliers, regional authorities, and residents of the mining region. The third level is made up of other stakeholders who are not directly affected by the liquidation processes, but demand assurance of energy security and responsible spending of taxpayers' money. These include other working groups and other citizens. The second and third level stakeholders are external stakeholders who are in the environment and who will feel fewer negative effects of liquidation than mine workers. Table 4 shows the expected stakeholders included in each level and their concerns and opportunities connected with decommissioning.

Table 4. Expected stakeholders and their concerns and opportunities connected with mine closure.

Level	Expected Stakeholders	Decommissioning Concerns	Decommissioning Opportunities
1	employees of mining enterprises	- finding stable employment, ensuring decent earnings [8,106];	- retraining and development of new skills; - finding employment in a safe working environment
2	regional authorities	- increase in unemployment in the region, increase in social assistance costs [107]; - migrations, population decline, shrinking cities [107]; - lower investment attractiveness of the region [108]; - reduction of the region's tax revenues and reduction of investment expenditure [108]; - abandoned post-mining infrastructure and reduced attractiveness of the region [109]; - environmental changes (i.e., disturbances in water conditions [110], deterioration of water quality [111], pollution and contamination of air, waters, river sediments and soil [112,113], changes in abiotic conditions for habitats and species of plants and animals, secondary deformations site [114]), requiring long-term monitoring, intervention and protection;	- economic development of the region, use of post-mining facilities in directions that provide income, e.g., tourism; - development of renewable energy investments ensuring a clean environment for residents; - attraction of new investments to the region; - investments in new public utilities;
	inhabitants of the mining region	- liquidation of workplaces indirectly related to the operation of the mine [73]; - deterioration of the technical and social infrastructure [88]; - degradation of urban space [75,85]; - increase in inappropriate social behavior [28];	- creating new jobs related to the transformation of the region; - increasing the attractiveness of the urban landscape, improving the quality of life of the inhabitants;
	entrepreneurs and suppliers from the mining region	- de-industrialization of the region, shrinking economy, decline in demand for goods and services [106,115];	- creating new cooperation opportunities;
3	other working people	- favoring one social group (miners), no system support in the case of liquidation of other workplaces [116,117];	- no need to maintain unprofitable mines;
	citizens	- ensuring energy security; - high and unpredictable decommissioning costs [8]; - economic collapse.	- development of new technologies providing an inexhaustible source of energy.

When analyzing the information contained in Table 4 and the concerns related to the closure of mines among various stakeholder groups, it can be seen that preventing one problem may result in others not occurring at all. For example, properly conducted competency management and qualification adaptation to changes will prevent an increase in unemployment in the region, increased social assistance costs, outflow of the population, and an increase in negative social phenomena. Proper management of the post-mining infrastructure will prevent abandonment and destruction and negative impacts on the local landscape. Ensuring post-mining development will keep local entrepreneurs, making the region an attractive investment site, which will guarantee tax revenues. It should be borne in mind that when developing the SLC, the most important thing is to create solutions that will prevent the negative effects of decommissioning and not simply mitigate them after the fact [118]. A properly planned and conducted decommissioning process will create new opportunities for the affected community, which is shown in Table 4.

The impact of individual stakeholders on the success of the SLC award is varied, which results from the importance of their concerns and expectations, and above all from the impact of satisfying their needs regarding the total social cost of decommissioning. The impact of individual stakeholders on the process of developing and awarding the SLC was visualized on the stakeholder map (Figure 5). Of course, the greatest impact is exerted by internal stakeholders, i.e., mine employees, which is due to the fact that providing them with stable employment will limit or completely eliminate some of the potential problems of stakeholders of other levels, which are related to, inter alia, the increase in unemployment resulting in an increase in social assistance costs, liquidation of workplaces indirectly related to the functioning of the mine, reduction of tax revenues, migrations, and shrinking regions. Subsequently, in terms of impact, there are regional authorities, which are responsible for activities related to the management of local labor markets and ensuring the attractiveness and security of the region. The inhabitants of mining regions have a lower impact, for which improper management of the liquidation process may result in the loss of jobs indirectly related to the activities of mining enterprises. Reducing the attractiveness and security of the region may lead to an outflow of the population, especially of young

people, and even result in a reduction in the value of private property. Local entrepreneurs and suppliers whose existence on the market depends on the operation of the mine, and who also provide jobs and tax revenues to local budgets, have the lowest impact on the success of the awarding of the SLC. This is also confirmed in the analysis of non-financial reports (Section 4.2). This group was not included as addressees of social activities planned and implemented by mining enterprises. Other working groups and other citizens have a negligible impact on the granting of licenses because the decommissioning of the mine does not affect them directly. It should be emphasized, however, that recognizing the concerns of these social groups is necessary and meeting their expectations may turn out to be important. As shown in Figure 5, stakeholders are divided into those directly affected (employees of mining enterprises and mining region authorities), who should be closely managed, those indirectly affected (inhabitants and entrepreneurs from the mining region), who feel the need to be informed, and those with whom minimal contact should be maintained (other working group and other citizens).

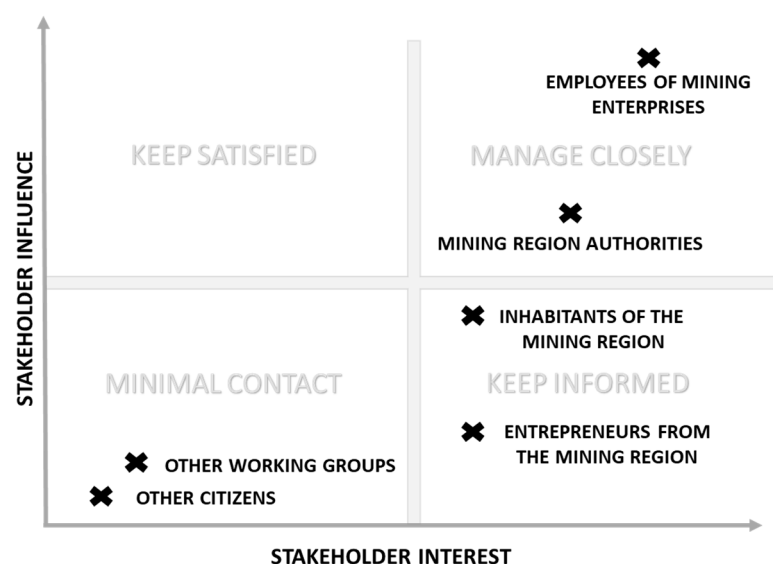


Figure 5. Stakeholder map.

6.2. Proposed Organizational Approach

The need to ensure a broad and flexible decommissioning framework and to listen to all relevant voices, underlined in this article, prompted us to propose an approach based on several levels of stakeholders. The described multi-level nature means that the SLC should strive to ensure comprehensive protection of all identified stakeholders, which entails the necessity to cooperate at several levels: local (in the context of an enterprise/mine), regional, and state. Ensuring cooperation based on good relations is a prerequisite for achieving the common goal of carrying out the liquidation process in which the social cost will be minimized. The goal of achieving climate neutrality makes the SLC a new path that businesses and governments must first identify properly and then take.

First and foremost, ensuring transparency and fairness in the context of mine closures and the granting of licenses requires organizational preparation and a precise management framework [119]. An important issue is the individuality of the licenses granted, because each mine is characterized by a different level and profitability of extraction, the number of people employed, or work safety, which translates into different needs and expectations on the part of the community. Therefore, it is important to build a foundation for the successful awarding of the SLC.

Figure 6 shows a diagram in which we propose an organizational framework for awarding the SLC. For the community, granting a license requires public consultations to gather views and learn about concerns and expectations. We propose that these consulta-

tions should be carried out on a multi-level basis, involving all stakeholders. Each level should be represented by a dedicated committee that would be responsible for continuous communication with the community and the Liquidation Council. It should be borne in mind that the Level 1 Committee will represent the interests of employees of a single mine/enterprise, while Level 2 will represent stakeholders of individual mining regions, which may include several/a dozen mines, and Level 3 will represent the voices of other stakeholders. This will ensure that solutions that will meet the expectations of all stakeholders will be developed. The Recommendation Committee and the Liquidation Council, composed of representatives of individual committees, will work on the development of these solutions.

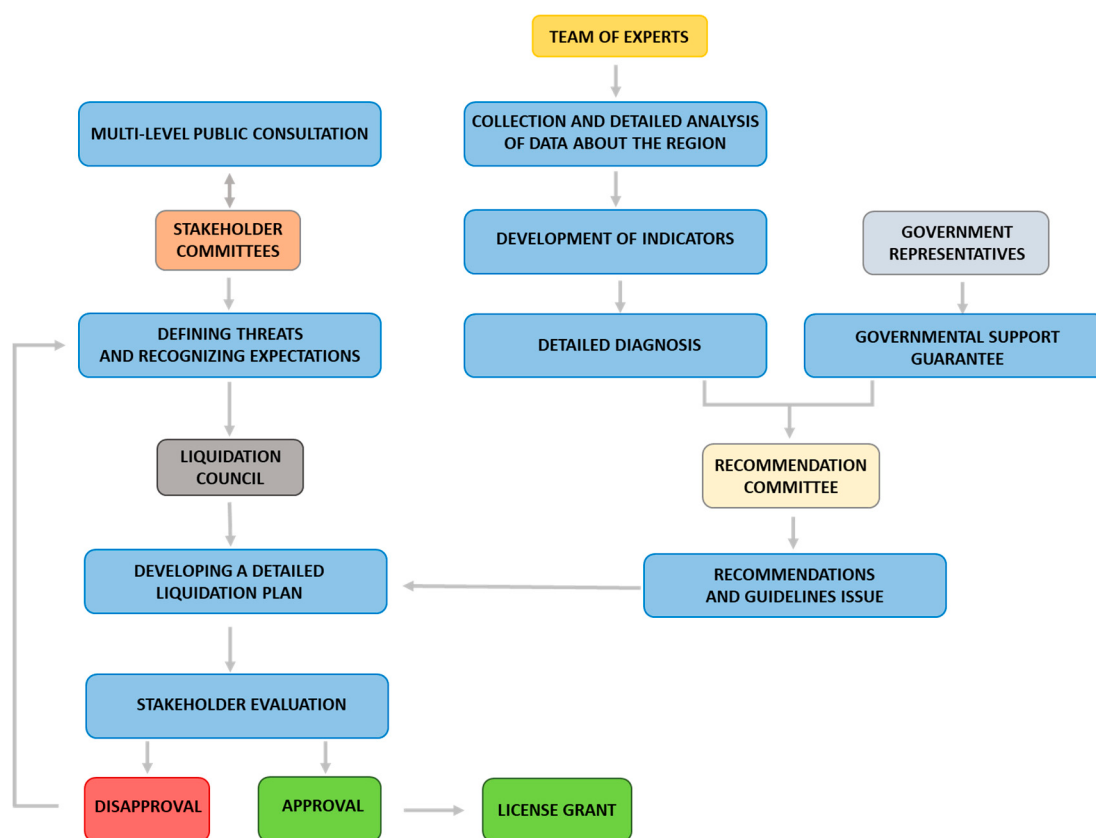


Figure 6. A diagram of the organizational framework for awarding the SLC.

A detailed diagnosis and the support provided by the government form the basis for the development of recommendations and guidelines. For this purpose, the Team of Experts responsible for collecting and analyzing data and developing indicators will conduct a comprehensive diagnosis. An example of such a study is the Mining Regions Sensitivity Index to the energy transformation developed by the Polish Economic Institute. This indicator is based on five pillars—three defining resilience to external shocks: economic development, the labor market, and the quality and structure of social capital, and two focused on the mining sector and determining the scale of the shock, which will be the decommissioning of mining [120].

The detailed Liquidation Plan should be assessed by stakeholders. This evaluation may lead to an approval or rejection of a proposed Plan. In the event of rejection, its cause should be identified, stakeholder concerns and expectations redefined, and the necessary modifications to the Plan made.

This approach can appear overly complex and threatening to the success of the SLC. Opposition and dissatisfaction from part of the society occurs with every initiative. However, as mentioned earlier, a properly conducted CSR policy, which includes discussion,

building of relationships and trust, and, above all, transparency of the conducted activities, makes the community much more willing to support such initiatives. Low awareness amongst the inhabitants of the role they play in the implementation of the project and low levels of knowledge about the SLO, as confirmed by the research of Woźniak and Jurczyk [121], prompts the consultation to be preceded by campaigns to inform the community about social responsibility, sustainable development, and the influence of stakeholder groups on the success of the changes.

7. Discussion

As industry reports show, mine closure is one of the biggest operational threats in the mining sector [122]. The Polish economy is based on hard coal mining. Despite the steady decline in production and employment in the hard coal mining sector (as shown in Figure 1), it is still an important branch of the Polish industry, providing direct employment to around 80,000 people. The World Bank notes that the loss of the dominant economic sector poses a particular threat to so-called mono-industry coal towns. The example of Wałbrzych, a city that has been associated with mining for centuries, shows that the effects of unprepared liquidation affect post-mining regions for many years. The social consequences of liquidation, the real costs of which are often difficult to estimate, are a problematic issue. International literature recognizes that mining creates long-term dependencies which, as a result of a sudden closure, complicate the identification of specific social consequences and costs [7]. According to the World Bank Group, the negative effects of mine decommissioning are prevented by the adoption of comprehensive reform programs, and the success of minimizing social costs depends on several factors: strong government commitment, regulatory review, and real stakeholder engagement [38]. It should be borne in mind that what we understand as *social* often refers to the economic and political [8]. It should also be noted that preventing some of the negative consequences of mine closures will result in others not occurring at all. The situation of the Wałbrzych region is an excellent example of the domino effect that was caused by liquidation, and which triggered a whole series of events: a significant increase in unemployment, deindustrialization and impoverishment of the region, an increase in negative social phenomena (alcoholism, crime), the breakdown of families, and the outflow of the population. Over time, problems with undeveloped and abandoned post-mining facilities and underinvested infrastructure became apparent, which negatively affect the surroundings. The accumulation of destructive phenomena and processes led to the degradation and socio-economic collapse of the city.

Currently, in Poland, in the face of the energy transformation, enterprises are trying to plan activities in advance that are meant to minimize the costs and negative effects of abandoning coal. Mining companies are undertaking activities aimed at securing the employees, residents, and other entrepreneurs of mining regions. The awareness of the risk of changes in employment in mining companies translates into the organization of training and retraining of staff, as well as dialogue and consultations with local authorities and the local community. As can be seen in the list (Table 1), these activities more and more often meet the principles of sustainable development and the circular economy. Each of the three companies discussed in this article plans and undertakes activities aimed at reducing emissions. Companies obliged to provide non-financial reporting in their annual reports more and more often refer directly to the SDGs. They consider both environmental and social aspects, also in the context of mine closure. Although the description of planned and implemented activities is not detailed and does not fully implement the recommendations of the United Nation Development Programme, it indicates a growing awareness of climate change and legal regulations in this area. Unfortunately, this is not in line with the opinion of the miners, who still believe that coal mining in Silesia should not be abandoned. A survey conducted on a group of 600 people (including miners, miners' partners, and residents not related to mining) in 2021 shows that almost nine out of ten miners (88%) believe that hard coal mining should not be abandoned. Among people not related to this profession, 67% of respondents are against the liquidation of mines. Moreover, the opinion

that the EU climate policy is an attack on the Polish mining industry is prevalent among miners and their partners. At the same time, in the face of decommissioning, miners expect support when changing jobs, feeling the need to increase qualifications [123]. The sense of being threatened by a difficult financial situation is justified by the analyses of local budgets carried out by Jonek-Kowalska and Turek [124]. We prove that in the face of the closure of mines, it is necessary to prepare transformation paths many years in advance, ensuring employment and preventing social degradation. The case study proves that the cities with diversified economic activities are in a better economic situation after the closure of mines.

The goal of achieving climate neutrality for coal-based economies requires scrupulous preparation. In planning for the liquidation process, it is most important to ensure specific conditions and a framework for the transformation of the mining industry, which will guarantee the constant economic development of post-mining regions. The literature analysis has shown that the success of the decommissioning process and the development of post-mining regions require a broad and flexible management framework [10]. The ICMM and World Bank Group also emphasize that closing mines requires open dialogue and cooperation. It is underlined in the literature that it is especially difficult to predict and estimate the social consequences and costs of decommissioning during the business phase [6,8,9]. It is also emphasized that too little attention is paid to social issues [6,7].

The data and studies presented here show that the voice of the community is needed and increasingly taken into account. It should be emphasized that the sense of belonging and responsibility built-up by the community during the operation of a given mining enterprise largely eliminates the later problems related to the recognition of its liquidation [125]. Therefore, it is important to build proper relationships with stakeholders in advance and to try to obtain and maintain a social license to operate (SLO). In the literature, particular attention is paid to the great emphasis on the obtaining of the SLO by mines at the beginning of the mining process [6]. The earliest possible involvement of stakeholders is also a specific right of the community to participate in projects that have a direct impact on the safety and comfort of life, which was emphasized by the United Nations Development Programme [62]. Attention is drawn to the fact that planning decommissioning while trying to gain a social license to operate ignores social issues that may emerge prior to or during the decommissioning [11]. Bainton and Holcombe describe the social aspects of mine closures as occurring at the end of its life cycle [8]. Vivoda et al. emphasize that planning social closure takes little account of the dynamics that occur after closure [9]. For this reason, we recommend separating SLC from SLO.

The methodology of defining the framework for the functioning of the social closure license (SLC) presented in this article may constitute a universal approach for managing the liquidation process of mining enterprises. We emphasize an important aspect of the individuality of mine closures, which is in line with the DMP & EPA claim that mine closure plans must be site-specific. For this reason, we initially identify stakeholders and conducting multi-level public consultations. As Solomon et al. note, the range of issues that should be understood as social extends beyond local communities. The proposed approach allows various social groups to speak [63]. An important element of the entire methodology is issuing recommendations and guidelines for specific cases after a careful analysis of their situation. The proposed approach provides a flexible decommissioning management framework, the need of which has been highlighted by Gillian [10].

Both SLO and SLC have one main goal: to convince stakeholders of the rightness of the activities carried out. As is shown from the in-depth literature analysis, by means of dialogue, people can be made aware of the inevitability of actions and the reasons from which they arise (e.g., closing for economic, geological, legislative, climatic/environmental reasons) and trust can be built by proposing alternative solutions, offering concrete countermeasures, organizing public consultations, and involving stakeholders in the planning process. Identification and accountability increase the chances of success of the project. We emphasize that the guarantee of success is a properly conducted CSR policy, based on transparency of the conducted activities and openness to dialogue. The difference between

SLC and SLO is durability—the proposed approach is assumed to lead to a one-time license for the entire decommissioning process, and the SLO is granted by the community at every stage of the company's operation and may be lost at any time in the event of unacceptable actions [125]. Receiving the SLC is to be based on transparent rules and the ensuring of multi-level social consultations as well as detailed diagnoses and recommendations. The implementation of the detailed decommissioning plan developed on this basis, approved by the stakeholders, ensures the stability of the SLC.

The success of the SLC granting may seem insignificant; however, failure to meet stakeholder expectations may lead to a build-up of negative phenomena—as in the case of the SLO, where the level awarded to the company is inversely proportional to the level of socio-political risk [126]. It is obvious that certain social groups will have the intention of receiving the most favorable promises. Therefore, as ICMM emphasizes, it is important to know the opinions of many different stakeholders to prevent unfavorable decisions, because the economic viability of the planned activities should be considered [102]. Postponing liquidation and attempts to maintain permanently unprofitable mines from the taxpayers' point of view are completely unjustified and result in a sense of wasting their money. There are many voices on the part of society that are against systemic support for the mining sector. Citizens justify their opinions with the demanding nature of the miners' professional group, too many privileges already in force, and exorbitant expectations. The social license for closure is designed to balance the expectations of each side, while economically justifying the proposed solutions.

The social contract prepared in Poland, concluded between representatives of the government and trade unions, significantly differs from the proposed SLC. The main difference is the issue of allowing other social groups to speak—not only miners—which may influence specific actions when managing the liquidation process. The agreement concluded in its current form is negatively received by other citizens, mainly due to the postponement of the liquidation process of unprofitable mines.

The solutions proposed in this article are based on a reliable and fair assessment of individual cases, which may increase social trust in the decisions made. The above analysis justifies the need to introduce comprehensive solutions preceding the closure of mines and the continuation of research in the field of SLC.

8. Conclusions

In the face of the challenges imposed by the European Green Deal, the problem of managing the liquidation processes of mining enterprises will become more and more important. Based on a case study of the specific area (Lower Silesian Coal Basin and Wałbrzych city), whose economy was based on hard coal mining, this article shows that decommissioning must be properly planned. The example of Wałbrzych shows the dangers of ignoring social needs. The management of the liquidation process should respond to the needs of local communities in advance to prevent negative consequences and the socio-economic collapse of the region. Based on an analysis of the current activities of mining companies in Poland, one can see a growing awareness of enterprises related to the hard coal sector, concerning both the need to prepare solid foundations for transformation processes and the involvement of the community in them. The Just Transition Initiative requires decommissioning activities to be conducted in a manner that protects the interests of mining regions.

This article is a contribution to the literature, focusing on the social aspects of mine closure. It complements the existing small number of works that deal with the need for real stakeholder involvement in the decommissioning processes. The existing literature pays too little attention to the social aspects of decommissioning [7]; the need to introduce new, participatory, and flexible forms of management [10], ensuring appropriate cooperation [11,63], and allowing all relevant voices to be heard [7,38]. The literature also recognizes the problem of ignoring and underestimating the social consequences and costs of decommissioning [8], which may be the result of an inadequate life-cycle approach and

planning for closure at the wrong time [7]. Therefore, we have proposed the concept of a social license for closure. The proposed approach tries to meet the needs and fill the gaps identified in the literature which are in line with good practices proposed by international organizations and mining companies. The proposed separation of the liquidation process from SLO and introducing the SLC is intended to focus only on closing and ensuring development in the post-mining future. Stakeholder engagement, in the described multi-level dimension, ensures a focus on a comprehensive approach to recognizing community concerns and expectations. Accordingly, the problem of ignoring social aspects in the face of liquidation will be eliminated. The presented concept provides both flexibility and a professional approach to each case. This is due to the inclusion of both multi-level public consultations and the preparation of the diagnosis of each case under consideration in the development of the SLC. The success of an SLC award depends both on the mine–society relationship built throughout the mine’s life cycle, and on the pursuit of policy and commitment in the face of the decommissioning.

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References

1. A European Green Deal. Available online: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en (accessed on 2 November 2021).
2. Rybak, A.; Włodarczyk, E. Energy Policy until 2040 and the Future of Hard Coal in Poland. *IOP Conf. Ser. Earth Environ. Sci.* **2020**, *609*, 012009. [CrossRef]
3. Rybak, A.; Rybak, A. Methods of Ensuring Energy Security with the Use of Hard Coal—The Case of Poland. *Energies* **2021**, *14*, 5609. [CrossRef]
4. Kougias, I.; Taylor, N.; Kakoulaki, G.; Jäger-Waldau, A. The Role of Photovoltaics for the European Green Deal and the Recovery Plan. *Renew. Sustain. Energy Rev.* **2021**, *144*, 111017. [CrossRef]
5. Wolf, S.; Teitge, J.; Mielke, J.; Schütze, F.; Jaeger, C. The European Green Deal—More Than Climate Neutrality. *Intereconomics* **2021**, *56*, 99–107. [CrossRef]
6. Owen, J.; Kemp, D. *Mine Closure and Social Performance: An Industry Discussion Paper*; Centre for Social Responsibility in Mining, Sustainable Minerals Institute, The University of Queensland: Brisbane, Australia, 2018.
7. Sesele, K.; Marais, L.; van Rooyen, D. Women and Mine Closure: A Case Study of Policy in South Africa. *Resour. Policy* **2021**, *72*, 102059. [CrossRef]
8. Bainton, N.; Holcombe, S. A Critical Review of the Social Aspects of Mine Closure. *Resources Policy* **2018**, *59*, 468–478. [CrossRef]
9. Vivoda, V.; Kemp, D.; Owen, J. Regulating the Social Aspects of Mine Closure in Three Australian States. *J. Energy Nat. Resour. Law* **2019**, *37*, 405–424. [CrossRef]
10. Gillian, H. Gregory Rendering Mine Closure Governable and Constraints to Inclusive Development in the Andean Region. *Resour. Policy* **2021**, *72*, 102053. [CrossRef]
11. Marais, L.; de Lange, A. Anticipating and Planning for Mine Closure in South Africa. *Futures* **2021**, *125*, 102669. [CrossRef]
12. Jędra, M. Forum Energii. Transformacja Energetyczna w Polsce. Edycja 2021. Available online: <https://www.forum-energii.eu/pl/analizy/transformacja-2021> (accessed on 30 January 2022).
13. Jonek Kowalska, I. Challenges for Long-Term Industry Restructuring in the Upper Silesian Coal Basin: What Has Polish Coal Mining Achieved and Failed from a Twenty-Year Perspective? *Resour. Policy* **2015**, *44*, 135–149. [CrossRef]
14. Spencer, T.; Colombier, M.; Sartor, O.; Garg, A.; Tiwari, V.; Burton, J.; Caetano, T.; Green, F.; Teng, F.; Wiseman, J. The 1.5 °C Target and Coal Sector Transition: At the Limits of Societal Feasibility. *Clim. Policy* **2018**, *18*, 335–351. [CrossRef]

15. Gawlikowska-Fyk, A. Poland: Coping with the Challenges of Decarbonization and Diversification. In *New Political Economy of Energy in Europe: Power to Project, Power to Adapt*; Godzimirski, J.M., Ed.; International Political Economy Series; Springer International Publishing: Cham, Switzerland, 2019; pp. 195–214. ISBN 978-3-319-93360-3.
16. Pactwa, K.; Woźniak, J. Environmental Reporting Policy of the Mining Industry Leaders in Poland. *Resour. Policy* **2017**, *53*, 201–207. [CrossRef]
17. Państwowy Instytut Geologiczny-Państwowy Instytut Badawczy. The Balance of Mineral Resources Deposits and Groundwater Resources in Poland (In Polish: Bilans Zasobów Kopalini i Wód Podziemnych w Polsce) as of 31 December: 1989–2010. Available online: <http://surowce.pgi.gov.pl> (accessed on 15 November 2021).
18. Państwowy Instytut Geologiczny-Państwowy Instytut Badawczy. The Balance of Mineral Resources Deposits in Poland (In Polish: Bilans Zasobów Złóż Kopalini w Polsce) as of 31 December: 2011–2020. Available online: <http://surowce.pgi.gov.pl> (accessed on 15 November 2021).
19. Bluszcz, A. *Proces Przemian Struktury Zatrudnienia w Górnictwie Węgla Kamiennego*; Studia Ekonomiczne/Uniwersytet Ekonomiczny w Katowicach: Katowice, Poland, 2014; pp. 103–113.
20. Stan Zatrudnienia | Polski Rynek Węgla-Agencja Rozwoju Przemysłu, S.A. Available online: <https://polskirynekwegla.pl/raport-dynamiczny/stan-zatrudnienia> (accessed on 13 December 2021).
21. Przybyłka, A. *Wpływ Programów Restrukturyzacji Na Ograniczenie Zatrudnienia Górników*; Studia Ekonomiczne/Uniwersytet Ekonomiczny w Katowicach: Katowice, Poland, 2013; pp. 102–112.
22. Agencja Rozwoju Przemysłu, S.A. Oddział Katowice Zatrudnienie, Wydajność, Płace i Przepracowany Czas Pracy w Górnictwie Węgla Kamiennego w Polsce w Styczniu 2021 r. 2021. Available online: <https://polskirynekwegla.pl/statystyka-publiczna> (accessed on 15 November 2021).
23. U.S. Department of Energy, Independent Statistics & Analysis; U.S. Energy Information Administration. *Annual Coal Report 2018*; U.S. Energy Information Administration (EIA): Washington, DC, USA, 2018.
24. EUROCOAL. *The Voice of Coal in Europe 2020*; EUROCOAL: Bruxelles, Belgium, 2020.
25. Zaklan, A.; Wachsmuth, J.; Duscha, V. The EU ETS to 2030 and beyond: Adjusting the Cap in Light of the 1.5 °C Target and Current Energy Policies. *Clim. Policy* **2021**, *21*, 778–791. [CrossRef]
26. Massai, L. The Kyoto Protocol in the EU: European Community and Member States under International and European Law. In *The Kyoto Protocol in the EU: European Community and Member States under International and European Law*; Massai, L., Ed.; T.M.C. Asser Press: The Hague, The Netherlands, 2011; pp. 289–308. ISBN 978-90-6704-571-1.
27. Instrat. *Instrat Policy Paper 01/2020*; Instrat: Warszawa, Poland, 2020.
28. Siyongwana, P.Q.; Shabalala, A. The Socio-Economic Impacts of Mine Closure on Local Communities: Evidence from Mpumalanga Province in South Africa. *GeoJournal* **2019**, *84*, 367–380. [CrossRef]
29. Monosky, M.; Keeling, A. Planning for Social and Community-Engaged Closure: A Comparison of Mine Closure Plans from Canada's Territorial and Provincial North. *J. Environ. Manag.* **2021**, *277*, 111324. [CrossRef] [PubMed]
30. Crous, C.; Owen, J.R.; Marais, L.; Khanyile, S.; Kemp, D. Public Disclosure of Mine Closures by Listed South African Mining Companies. *Corp. Soc. Responsib. Environ. Manag.* **2021**, *28*, 1032–1042. [CrossRef]
31. Raszka, B.; Dzieżyc, H.; Heldak, M. Assessment of the Development Potential of Post-Industrial Areas in Terms of Social, Economic and Environmental Aspects: The Case of Wałbrzych Region (Poland). *Energies* **2021**, *14*, 4562. [CrossRef]
32. Deacon, L.; Van Assche, K.; Papineau, J.; Gruezmacher, M. Speculation, Planning, and Resilience: Case Studies from Resource-Based Communities in Western Canada. *Futures* **2018**, *104*, 37–46. [CrossRef]
33. Mine Closure. In *Leading Practice Sustainable Development Program. for the Mining Industry*; Australian Government: Canberra, Australia, 2016.
34. Badera, J.; Kocoń, P. Local Community Opinions Regarding the Socio-Environmental Aspects of Lignite Surface Mining: Experiences from Central Poland. *Energy Policy* **2014**, *66*, 507–516. [CrossRef]
35. Zdziarski, M. Społeczne zezwolenie na prowadzenie działalności : Systematyczny przegląd i krytyczna analiza literatury. *Przegląd Organ.* **2017**, *2*, 24–31. [CrossRef]
36. Zientara, P. Restructuring the Coal Mining Industry: Unionism, Conflict, and Cooperation: Evidence from Poland. *East. Eur. Econ.* **2009**, *47*, 41–59. [CrossRef]
37. Komnitsas, K. Social License to Operate in Mining: Present Views and Future Trends. *Resources* **2020**, *9*, 79. [CrossRef]
38. World Bank Group. *Managing Coal Mine Closure. Achieving a Just Transition for All*; World Bank Group: Washington, DC, USA, 2018.
39. Umowa Społeczna dotycząca transformacji sektora górnictwa węgla kamiennego oraz wybranych procesów transformacji województwa śląskiego-Ministerstwo Aktywów Państwowych-Portal Gov.pl. Available online: <https://www.gov.pl/web/aktywa-panstwowe/umowa-spoleczna> (accessed on 7 December 2021).
40. Curran, G. Social Licence, Corporate Social Responsibility and Coal Seam Gas: Framing the New Political Dynamics of Contestation. *Energy Policy* **2017**, *101*, 427–435. [CrossRef]
41. Loewe, M.; Zintl, T.; Houdret, A. The Social Contract as a Tool of Analysis: Introduction to the Special Issue on “Framing the Evolution of New Social Contracts in Middle Eastern and North African Countries”. *World Dev.* **2021**, *145*, 104982. [CrossRef]
42. Banach Outsourcing. *Przywileje Pracownicze w Polsce—Górnicy | Banach Outsourcing 2014*; Banach Outsourcing: Poznań, Poland, 2014.

43. Przybyłka, A. Przywileje socjalne związane z pracą w górnictwie w okresie PRL-u. *Studia Ekon.* **2018**, *353*, 48–58.
44. Garbiec, R. Emerytury górnicze w polskim systemie emerytalnym. *Pr. Nauk. Akad. Im. Jana Długosza W Częstochowie. Pragmata Tes Oikonomias* **2009**, *3*, 97–114.
45. Prenotyfikacja Warunkiem Rozpoczęcia Likwidacji Kopalń-NetTG.PI-Gospodarka-Ludzie. Available online: https://nettg.pl/gornictwo/182691/prenotyfikacja-umowy-jest-warunkiem-rozpoczecia-likwidacji-kopaln-wegla-kamiennego-w-wojewodztwie-slaskim-wiceminister-pyzik-o-szansach-na-zgode-komisji-europejskiej?fbclid=IwAR1wjHhL5i7_TLhUTe5MrvPiG9krpCirnsCGsXeheuPqBV_A_XTJUxBS3gE (accessed on 7 December 2021).
46. Moffat, K.; Zhang, A. The Paths to Social Licence to Operate: An Integrative Model Explaining Community Acceptance of Mining. *Resour. Policy* **2014**, *39*, 61–70. [[CrossRef](#)]
47. Browne, A.L.; Stehlik, D.; Buckley, A. Social Licences to Operate: For Better Not for Worse; for Richer Not for Poorer? The Impacts of Unplanned Mining Closure for “Fence Line” Residential Communities. *Local Environ.* **2011**, *16*, 707–725. [[CrossRef](#)]
48. Besley, J. Public Engagement and the Impact of Fairness Perceptions on Decision Favorability and Acceptance. *Sci. Commun.* **2010**; *32*, 256–280. [[CrossRef](#)]
49. Litmanen, T.; Jartti, T.; Rantala, E. Refining the Preconditions of a Social Licence to Operate (SLO): Reflections on Citizens’ Attitudes towards Mining in Two Finnish Regions. *Extr. Ind. Soc.* **2016**, *3*, 782–792. [[CrossRef](#)]
50. Zhang, A.; Moffat, K.; Lacey, J.; Wang, J.; González, R.; Uribe, K.; Cui, L.; Dai, Y. Understanding the Social Licence to Operate of Mining at the National Scale: A Comparative Study of Australia, China and Chile. *J. Clean. Prod.* **2015**, *108*, 1063–1072. [[CrossRef](#)]
51. Brock, A.; Dunlap, A. Normalising Corporate Counterinsurgency: Engineering Consent, Managing Resistance and Greening Destruction around the Hambach Coal Mine and Beyond. *Political Geogr.* **2018**, *62*, 33–47. [[CrossRef](#)]
52. Pianta, M.; Lucchese, M. Rethinking the European Green Deal: An Industrial Policy for a Just Transition in Europe. *Rev. Radic. Political Econ.* **2020**, *52*, 633–641. [[CrossRef](#)]
53. Syarif, A.E.; Hatori, T. Corporate Social Responsibility for Regional Sustainability after Mine Closure: A Case Study of Mining Company in Indonesia. *IOP Conf. Series. Earth Environ. Sci.* **2017**, *71*, 12029. [[CrossRef](#)]
54. World Commission on Environment and Development. *Report of the World Commission on Environment and Development*; World Commission on Environment and Development: New York, NY, USA, 1987.
55. Mebratu, D. Sustainability and Sustainable Development: Historical and Conceptual Review. *Environ. Impact Assess. Rev.* **1998**, *18*, 493–520. [[CrossRef](#)]
56. Mensah, J. Sustainable Development: Meaning, History, Principles, Pillars, and Implications for Human Action: Literature Review. *Cogent Soc. Sci.* **2019**, *5*, 1653531. [[CrossRef](#)]
57. Rupo, D.; Perano, M.; Centorrino, G.; Vargas-Sanchez, A. A Framework Based on Sustainability, Open Innovation, and Value Cocreation Paradigms—A Case in an Italian Maritime Cluster. *Sustainability* **2018**, *10*, 729. [[CrossRef](#)]
58. Casali, G.L.; Perano, M.; Moretta Tartaglione, A.; Zolin, R. How Business Idea Fit Affects Sustainability and Creates Opportunities for Value Co-Creation in Nascent Firms. *Sustainability* **2018**, *10*, 189. [[CrossRef](#)]
59. Cammarano, A.; Perano, M.; Michelino, F.; Del Regno, C.; Caputo, M. SDG-Oriented Supply Chains: Business Practices for Procurement and Distribution. *Sustainability* **2022**, *14*, 1325. [[CrossRef](#)]
60. Frederiksen, T. Corporate Social Responsibility, Risk and Development in the Mining Industry. *Resour. Policy* **2018**, *59*, 495–505. [[CrossRef](#)]
61. Hamann, R. Mining Companies’ Role in Sustainable Development: The “why” and “How” of Corporate Social Responsibility from a Business Perspective. *Dev. South. Afr.* **2003**, *20*, 237–254. [[CrossRef](#)]
62. United Nations. *Development Programme Extracting Good Practices: A Guide for Governments and Partners to Integrate Environment and Human Rights into the Governance of the Mining Sector*; United Nations: New York, NY, USA, 2018.
63. Solomon, F.; Katz, E.; Lovel, R. Social Dimensions of Mining: Research, Policy and Practice Challenges for the Minerals Industry in Australia. *Resour. Policy* **2008**, *3*, 142–149. [[CrossRef](#)]
64. Mapping Mining to the SDGs: An Atlas | United Nations Development Programme. Available online: <https://www.undp.org/library/mapping-mining-sdgs-atlas> (accessed on 19 April 2022).
65. Pactwa, K. Achieving United Nations Sustainable Development Goals by the Mining Sector—A Polish Example. *Gospod. Surowcami Miner. Mineral. Resour. Manag.* **2021**, *37*, 57–80.
66. Wortal Publicznych Służb Zatrudnienia prowadzony przez Powiatowy Urząd Pracy w Wałbrzychu-aktualna strona : Statystyki i analizy urzędu. Available online: <https://walbrzych.praca.gov.pl/rynek-pracy/statystyki-i-analizy> (accessed on 13 December 2021).
67. GUS-Bank Danych Lokalnych. Available online: <https://bdl.stat.gov.pl/bdl/start> (accessed on 21 January 2022).
68. Urząd Statystyczny We Wrocławiu/Statystyczne Vademecum Samorządowca. Available online: <https://wroclaw.stat.gov.pl/statystyczne-vademecum-samorzadowca/> (accessed on 15 December 2021).
69. Plan Sprawiedliwej Transformacji | Oficjalny Serwis Miasta Wałbrzycha. Available online: <https://um.walbrzych.pl/pl/news/plan-sprawiedliwej-transformacji> (accessed on 10 November 2021).
70. Załącznik Nr 2 Do Uchwały Nr XIX/285/2016 Rady Miejskiej Wałbrzycha z Dnia 29 Marca 2016 r. w Sprawie Wyznaczenie Obszaru Zdegradowanego i Obszaru Rewitalizacji Miasta Wałbrzycha. Available online: <http://bip.um.walbrzych.pl/attachments/download/16106> (accessed on 30 January 2022).

71. The Accounting Act: Journal of Laws of 2021, Item 217. Available online: <https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20210000217> (accessed on 30 January 2022).
72. Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 Amending Directive 2013/34/EU as Regards Disclosure of Non-Financial and Diversity Information by Certain Large Undertakings and Groups. Available online: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0095> (accessed on 30 January 2022).
73. Kosmaty, J. Wałbrzyskie tereny pogórnice po 15 latach od zakończenia eksploatacji węgla (EN: Wałbrzych post-mining land 15 years after coal extraction was ended). *Górnictwo I Geol.* **2011**, 131–148. Available online: <http://www.polsl.pl/Wydzialy/RG/Wydawnictwa/Strony/KwartalnikRG.aspx> (accessed on 30 January 2022).
74. Gawlicz, K.; Starnawski, M. “To Nie Jest Życie”. Ubóstwo Kobiet, Perspektywy Pomocy i Wyzwaia Miejskiego Ładu Lokalnego Na Przykładzie Wałbrzycha. In *O wspólnocie obywatelskiej w cieniu kapitalizmu: Ład lokalny, lewica, demokracja*; Żuk, P., Ed.; Oficyna Naukowa: Warszawa, Poland, 2010; pp. 143–180.
75. Czupryn, B. Rewitalizacja przyszłości Wałbrzycha. *Pr. Nauk. Wyższej Szkoły Zarządzania I Przedsiębiorczości Z Siedzibą W Wałbrzychu* **2016**, 38, 55–74.
76. Jaroszewska, E.; Wieczorek, M. Przemiany Starych Miast Przemysłowych w Kontekście Koncepcji Zależności Od Ścieżki (Path Dependence). *Rozw. Reg. I Polityka Reg.* **2016**, 32, 107–122.
77. Rejowska-Pasek, A.; Pasek, Z. Dyskurs żalu czy ulgi? Wałbrzych w dwadzieścia lat po zamknięciu kopalń. *Politeja-Pismo Wydziału Studiów Międzynarodowych I Politi. Univ. Jagiellońskiego* **2017**, 14, 171–185.
78. Wałbrzych: Jak likwidowano kopalnie?—Wałbrzych.dlawas.info-portal informacyjno-rozrywkowy. Available online: <http://walbrzych.dlawas.info/historia/walbrzych-jak-likwidowano-kopalnie/cid,11232,a> (accessed on 1 November 2021).
79. Pactwa, K. Is There a Place for Women in the Polish Mines?—Selected Issues in the Context of Sustainable Development. *Sustainability* **2019**, 11, 2511. [CrossRef]
80. MINING.COM. Mining a ‘Laggard among Laggards’ on Female Representation-Report. 2021. Available online: <https://www.mining.com/mining-fingered-as-a-laggard-among-laggards-on-female-representation-report/> (accessed on 30 January 2022).
81. Górnictwo Silnie Wpływa Na Rynek Pracy i Generuje Zatrudnienie w Swoim Otoczeniu—Górnictwo-NetTG.PL-Gospodarka-Ludzie. Available online: <https://nettg.pl/news/167420/gornictwo-silnie-wplywa-na-rynek-pracy-i-generuje-zatrudnienie-w-swoim-otoczeniu> (accessed on 31 January 2022).
82. Frankowski, J.; Mazurkiewicz, J. Województwo Śląskie w Punkcie Zwrotnym Transformacji. IBS Research Report 02/2020. Available online: https://ibs.org.pl/app/uploads/2021/02/IBS_Research_Report_02_2020.pdf (accessed on 30 January 2022).
83. Hasińska, Z.; Sipurzyńska-Rudnicka, K. Wpływ Wałbrzyskiej Specjalnej Strefy Ekonomicznej na Lokalne Rynki Pracy; Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu. 2008, pp. 82–99. Available online: <https://yadda.icm.edu.pl/yadda/element/bwmeta1.element.ekon-element-000161608426> (accessed on 30 January 2022).
84. Woźniak, E. Rola Wałbrzyskiej Specjalnej Strefy Ekonomicznej “Invest-Park” w opinii mieszkańców Wałbrzycha. *Rozw. Reg. Polityka Reg.* **2013**, 24, 147–168.
85. Kozłowska-Woszczycka, A. Degradation of Urban Space as a Negative Effect of Mine Closures. *IOP Conf. Ser. Earth Environ. Sci.* **2021**, 942, 012028. [CrossRef]
86. Fundusz Sprawiedliwej Transformacji i Krajowy Plan Odbudowy wesprą polską energetykę—Ministerstwo Funduszy i Polityki Regionalnej-Portal Gov.pl. Available online: <https://www.gov.pl/web/fundusze-regiony/fundusz-sprawiedliwej-transformacji-i-krajowy-plan-odbudowy-wespra-polska-energetyke> (accessed on 14 April 2022).
87. Pactwa, K.; Konieczna-Fuławka, M.; Fuławka, K.; Aro, P.; Jaśkiewicz-Proć, I.; Kozłowska-Woszczycka, A. Second Life of Post-Mining Infrastructure in Light of the Circular Economy and Sustainable Development—Recent Advances and Perspectives. *Energies* **2021**, 14, 7551. [CrossRef]
88. Pactwa, K.; Woźniak, J.; Dudek, M. Sustainable Social and Environmental Evaluation of Post-Industrial Facilities in a Closed Loop Perspective in Coal-Mining Areas in Poland. *Sustainability* **2021**, 13, 167. [CrossRef]
89. TAURON. *Tauron-Znaczenie Zrównoważonego Rozwoju dla Grupy*; TAURON: Katowice, Poland.
90. Jastrzębska Spółka Węglowa SA. Available online: <https://www.jsw.pl/> (accessed on 30 January 2022).
91. Bogdanka, S.A. -Węgiel, Opał, Kopalnia Węgla, Węgiel Handel, Węgiel Groszek, Węgiel Orzech, Węgiel Cena, Węgiel Kamienny, Węgiel Energetyczny, Sprzedaż Węgla, Miał Węglowy, Ceny Węgla. Available online: https://www.lw.com.pl/pl,2,s471,raport_zintegrowany_za_2020_r.html (accessed on 21 January 2022).
92. McCullough, C.D.; Fourie, A.B.; Tibbett, M. *Key Mine Closure Lessons Still to Be Learned*; Australian Centre for Geomechanics: Crawley, Australia, 2016; pp. 325–338.
93. Rosa, J. Improving Stakeholder Engagement in Closure Planning through an Ecosystem Services Approach. In *Proceedings of the 2nd International Congress on Planning for Closure of Mining Operations*, Santiago, Chile, 7–9 November 2018.
94. Morrison-Saunders, A.; Fourie, A.B.; Tibbett, M. *The Action Is Where the Social Is! The Ecosystem Services Concept and Other Ideas for Enhancing Stakeholder Engagement in Integrated Mine Closure Planning*; Australian Centre for Geomechanics: Crawley, Australia, 2019; pp. 5–18.
95. Heymann, E.F.; Botha, P.R.; Grant, C.D.; January, M.; Fourie, A.B.; Tibbett, M. *Social Closure Planning: Scoping, Developing and Implementing—A Case Study*; Australian Centre for Geomechanics: Crawley, Australia, 2016; pp. 213–227.
96. Worden, S. *Integrated Mine Closure Planning: A Rapid Scan of Innovations in Corporate Practice—Centre for Social Responsibility in Mining*; University of Queensland: Brisbane, Australia, 2020.

97. Arroyo, P.; Caron, M.-A. Social and Environmental Reporting: A Suitable Promise? In Proceedings of the 2016 Alternative Accounts Conference, San Jose, CA, USA, 7–12 May 2016; Telfer School of Management: Ottawa, ON, Canada.
98. Geller, W. Case Studies and Regional Surveys. In *Acidic Pit Lakes: The Legacy of Coal and Metal Surface Mines*; Geller, W., Schultze, M., Kleinmann, R., Wolkersdorfer, C., Eds.; Environmental Science and Engineering; Springer: Berlin, Heidelberg, 2013; pp. 265–435. ISBN 978-3-642-29384-9.
99. Falck, W.; Reichel, V.; Zelenkova, K.; Hanise, B.; Kylychbaev, E. Corporate Policies in a Mineral Extraction Context.- Earth Observation for Monitoring and Observing Environmental and Societal Impacts of Mineral Resources Exploration and Exploitation, CEC FP7 Project EOMINERS, Deliverable D1.1-1. 2012, p. 57. Available online: <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.457.2199&rep=rep1&type=pdf> (accessed on 30 January 2022).
100. Fleury, A.; Parsons, A.S.; Fourie, A.B.; Tibbett, M. *Integrated Mine Closure Planning in AB Fourie & M Tibbett (Eds)*; Australian Centre for Geomechanics: Crawley, Australia, 2006; pp. 221–226.
101. Department of Mines and Petroleum & Environmental Protection Authority. *Guidelines for Preparing Mine Closure Plans 2015*; Department of Mines and Petroleum & Environmental Protection Authority: Western Australia, Australia, 2015.
102. ICMC • Mine Closure. Available online: <https://www.icmm.com/en-gb/environmental-stewardship/mine-closure> (accessed on 4 November 2021).
103. Grant, C.D.; Lacy, H.W.B.; Fourie, A.B.; Tibbett, M. *Developing Anglo American's Integrated Closure Planning System Requires People, Process, and Technology Working Together*; Australian Centre for Geomechanics: Crawley, Australia, 2016; pp. 581–594.
104. Kauppila, T.; Bellenfant, G.; Solismaa, L.; Mittelstadt, P.; Fourie, A.B.; Tibbett, M. *Digitalisation of Continuous Mine Closure Planning and Management: An EIT RawMaterials Initiative*; Australian Centre for Geomechanics: Crawley, Australia, 2019; pp. 1023–1030.
105. Nelsen, J.L. Social License to Operate. *Int. J. Min. Reclam. Environ.* **2006**, *20*, 161–162. [CrossRef]
106. Haney, M.J.; Shkaratan, M. Mine Closure and Its Impact on the Community: Five Years after Mine Closure in Romania, Russia, and Ukraine. *Russ. Ukr.* **2003**. [CrossRef]
107. Harfst, J. Utilizing the Past: Valorizing Post-Mining Potential in Central Europe. *Extr. Ind. Soc.* **2015**, *2*, 217–224. [CrossRef]
108. Archer, K.; Bradbury, J. The Life and Death of a Company Town. In *Coping with Closure: An International Comparison of Mine Town Experiences*; Neil, C., Tykkylä, M., Bradbury, J., Eds.; Routledge: London, UK, 1992; pp. 169–191. ISBN 978-0-415-06651-8.
109. Harfst, J.; Wirth, P. Structural Change in Former Mining Regions: Problems, Potentials and Capacities in Multi-Level-Governance Systems. *Procedia Soc. Behav. Sci.* **2011**, *14*, 167–176. [CrossRef]
110. Jonek-Kowalska, I. Corporate Social Responsibility a Środowiskowe i Społeczne Skutki Likwidacji Kopalń. *Zesz. Nauk. Wyższej Szkoły Bank. Wydział Zamiejscowy Chorzów* **2014**, *16*, 27–45.
111. Razowska-Jaworek, L. *Wpływ Likwidacji Górnictwa Na Środowisko Wodne Na Przykładzie Regionu Częstochowskiego i Górnośląskiego*; Państwowy Instytut Geologiczny: Warszawa, Poland, 2003.
112. Duda, A. Identyfikacja zdarzeń środowiskowych związanych z procesem likwidacji kopalń na przykładzie zamykanych kopalń w wybranych krajach Unii Europejskiej. *Przegląd Górniczy* **2018**, *74*, 7–14.
113. Gruszecka, A.; Helios-Rybacka, E. Pb, Tl i As w wodach, osadach i glebach w otoczeniu składowisk odpadów poftłocacyjnych w rejonie Bukowna-ocena ryzyka ekologicznego. *Geol. Akad. Górniczo-Hut. Im. Stanisława Staszica W Krakowie* **2009**, *35*, 233–242.
114. Głowacki, T.; Milczarek, W. Powierzchniowe deformacje wtórne dawnych terenów górniczych. *Min. Sci.* **2013**, *20*, 39–55. [CrossRef]
115. Edwards, J.; Maritz, A. Social Aspects of Mine Closure: The Elephant in the Room. In *Mine Closure 2019: Proceedings of the 13th International Conference on Mine Closure*; Australian Centre for Geomechanics: Crawley, Australia, 2019; pp. 305–316.
116. Antonów, K. Zasady równości i sprawiedliwości społecznej w prawie emerytalnym. *Ann. Univ. Mariae Curie-Skłodowska. Sect. G Ius* **2015**, *62*, 9–27. [CrossRef]
117. Comments to the article: Transformacja górnictwa będzie kosztować. Unijne środki to jedynie część potrzebnych funduszy-górnictwo. Available online: <https://www.wnp.pl/gornictwo/transformacja-gornictwa-bedzie-kosztowac-unijne-srodky-to-jedynie-czesc-potrzebnych-funduszy,441633.html> (accessed on 9 December 2021).
118. Stacey, J.; Naude, A.; Hermanus, M.; Frankel, P. The Socio-Economic Aspects of Mine Closure and Sustainable Development: Literature Overview and Lessons for the Socio-Economic Aspects of Closure-Report 1. *J. South. Afr. Inst. Min. Metall.* **2010**, *110*, 379–394.
119. WWF Polska | Sprawiedliwa Transformacja Regionów Węglowych. Available online: <https://www.wwf.pl/aktualnosci/sprawiedliwa-transformacja> (accessed on 28 November 2021).
120. Juszczak, A.; Szpor, A. *Wskaźnik Wrażliwości Regionów Górniczych Na Transformację Energetyczną-Obraz Na Podstawie Danych z Powiatów*; Working Paper, Nr 4; Polski Instytut Ekonomiczny: Warsaw, Poland, 2020.
121. Woźniak, J.; Jurczyk, W. SLO in CSR Perspective—A Comparative Case Study from Poland (2018–2020). *Resour. Policy* **2022**, *77*, 102654. [CrossRef]
122. Mining Journal World Risk Report 2017. Available online: <https://www.mining-journal.com/edition/1000006/mining-journal-world-risk-report-2017-featminehutte-ratings> (accessed on 12 April 2022).
123. *Stan Polskiego Górnictwa Według Górników, Ich Partnerów i Otoczenia Społecznego. Raport z Badania*; Kantar Public, Instytut Jagielloński: Warsaw, Poland, 2021.
124. Jonek-Kowalska, I.; Turek, M. The Economic Situation of Polish Cities in Post-Mining Regions. Long-Term Analysis on the Example of the Upper Silesian Coal Basin. *Energies* **2022**, *15*, 3302. [CrossRef]

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125. Thomson, I.; Boutilier, R. Social License to Operate. In *SME Mining Engineering Handbook*, 3rd ed.; Darling, P., Ed.; Society for Mining, Metallurgy & Exploration, Incorporated: Littleton, CO, USA, 2011; ISBN 978-0-87335-264-2.
 126. Thomson, I.; Boutilier, R. Modelling and Measuring the Social License to Operate: Fruits of a Dialogue between Theory and Practice. *Soc. Licence* **2011**, *1*, 1–10.