

# SOCIAL CONSIDERATIONS FOR INVESTMENTS IN RENEWABLE ENERGY SOURCES IN THE POST-MINING AREAS OF THE KONIN REGION

## UWARUNKOWANIA SPOŁECZNE INWESTYCJI W ODNAWIALNE ŹRÓDŁA ENERGII NA OBSZARACH POGÓRNICZYCH W REGIONIE KONIŃSKIM

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*The article presents an overview of social considerations for location of renewable energy production sites (wind or solar farms) at the overburden disposal areas situated inside Józwin II B and Józwin IIA open pits of the PAK Konin Lignite Mine which are researched in frame of the SUMAD project (entitled “Sustainable Use of Mining Waste Dumps”). The article includes a preliminary investigation of socio-economic variables in order to verify if the new function planned for the post-mining areas meets the needs of a local community.*

**Keywords:** overburden disposal area, reclamation, renewable energy, local community, social needs

*W artykule przedstawiono przegląd uwarunkowań społecznych związanych z lokalizacją miejsc produkcji energii odnawialnej (farm wiatrowych lub słonecznych) na wewnętrznych zwalowiskach górniczych zlokalizowanych w obrębie odkrywek Józwin IIB i Józwin IIA PAK Kopalni Węgla Brunatnego Konin, które są przedmiotem badań w ramach projektu SUMAD (pt. “Zrównoważone wykorzystanie zwalowisk górniczych”). Artykuł obejmuje wstępne badanie zmiennych społeczno-ekonomicznych w celu sprawdzenia, czy nowa funkcja planowana dla terenów pogórnich odpowiada potrzebom lokalnej społeczności..*

**Słowa kluczowe:** zwalowisko nadkładu, rekultywacja, energia odnawialna, społeczność lokalna, potrzeby społeczne

### Introduction

The article presents an overview of social, economic and political factors influencing development of the former overburden disposal areas in the Konin lignite mining region towards renewable energy generation sites. The overview has been prepared in frame of the SUMAD project after two candidate sites were selected for a detailed investigation as possible sites for renewable energy investments. The candidate sites are located within the overburden disposal areas that are operated by PAK Konin Lignite Mine S.A. (PAK Kopalnia Węgla Brunatnego Konin S.A.) which is owned by a large energy generation group, ZE PAK Capital Group (ZE PAK S.A.), producing energy in two coal -fired power plants. In 2020, the power plants of ZE PAK Group generated in total 4.9 TWh of net electricity [1]. The Group has recently adopted a strategy to stop generating energy from coal by 2030 at the latest and transform completely towards renewables. In October 2021 a photovoltaic plant of 70MW, owned by a subsidiary company of the ZE PAK Group, started operation [2]. It is located in the former mining areas of the Koźmin open pit (“Brudzew” farm in the municipality of Brudzew, in the Turek County).

PAK Konin Lignite Mine currently operates three open lignite open cast mines. Two out of those three plan to stop

coal excavation in 2021-2022, therefore their activities in the nearest future will be focused mostly on post-mining land reclamation. The goal of the SUMAD project and this study, in particular, is to investigate possibilities to use the overburden disposal areas as renewable energy production sites (wind or solar power plants) in the nearest future and answer whether this new function planned for the post-mining areas meets the needs of a local community.

The SUMAD project (entitled “Sustainable Use of Mining Waste Dumps”) is funded by the European Commission’s Research Fund for Coal and Steel and co-financed by the Polish Ministry of Science and Higher Education.

### General information on the study area

The two case study areas in the Konin lignite mining region, which have been selected for investigation in the SUMAD project, are situated within the Józwin open pits. Lignite has been extracted from there since 1971, so it is currently the oldest mining area of PAK KWB Konin. Initially, coal mining was carried out at the Józwin I mine from the Pątnów II coal deposit, then at the Józwin II A mine in the northern part of the Pątnów III deposit. Both mines Józwin I and IIA formed in fact one mining area. Production of coal from Józwin IIA mine ended in 2003. The Józwin II B mine

had started operation in 1999 in order to excavate coal from the Pątnów IV deposit and this was a natural continuation of coal excavation Józwin I and Józwin IIA mines. All together 175 million Mg of coal was extracted from these mines until the end of 2020 [3]. When operating these mines, a method of dumping the overburden in a final excavation pit of another mine was used - the overburden from the Józwin IIB mine was initially dumped into the neighbouring Józwin IIA excavation pit and the same method had been earlier applied in the operation of Józwin IIA mine from where the overburden was dumped into the Józwin I pit. In effect, there is no heap built of the overburden material located next to the pits – only internal disposal areas have been formed.

The operation of the Józwin mines is planned to be ceased in 2021. The amounts of the extracted coal systematically decrease – in 2020 1 585 000 tonnes of coal was excavated compared to 2 214 000 tonnes in 2019 and 3 171 000 tonnes in 2018 (according to the “Balance of mineral deposits in Poland 2018, 2019, 2020” of the Polish Geological Institute – National Research Institute [4-6]). At the moment the excavation of lignite takes place in the south-eastern part of the Józwin IIB mining area and moves to the east. In the most western part of the Józwin IIB mining area the internal dump is already reclaimed and the land no longer belongs to the PAK Konin Lignite Mine. Other parts of the Józwin IIB mining area are currently being reclaimed. The Józwin II A post-mining area has been already reclaimed as agricultural land and recreational sites.

The two case study areas in the Konin lignite mining region which have been selected for the investigation in the SUMAD project and for the analysis presented in this article are shown in Fig. 1. These are:

- an area of ca. 420 ha within the inner overburden disposal area of the Józwin IIB open pit, selected as a potential site for wind or solar power plant location;
- an area of almost 300 ha within the inner overburden

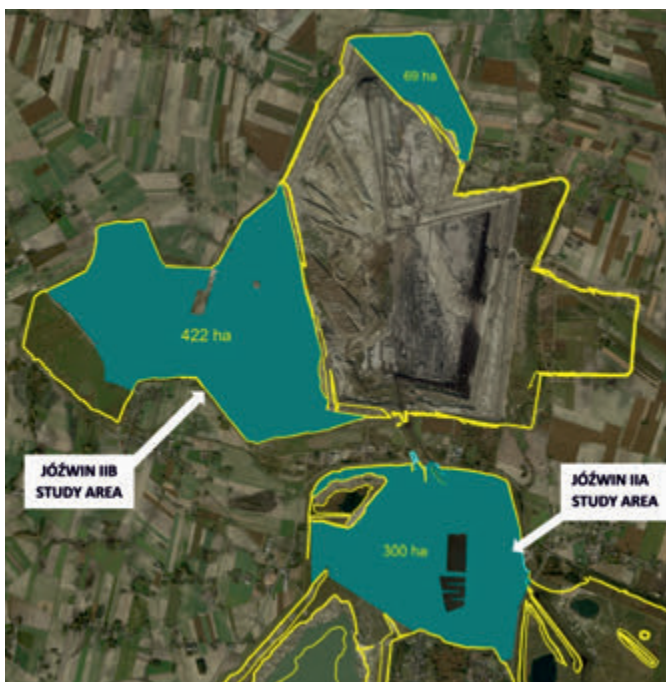


Fig. 1. Location and size of the case study areas selected within the Józwin open pits where the overburden was disposed (dark green polygons).  
Rys. 1 Lokalizacja i wielkość obszarów pilotowych wytypowanych w obrębie odkrywki Józwin, (ciemnozielone pola).

disposal area of the Józwin IIA open pit, selected as a potential site for solar power plant location.

Both are situated within the municipality of Kleczew in the Konin County.

The selection of the study areas within the Józwin II A and II B inner overburden dumping spaces was discussed with the PAK Konin Lignite Mine and is in agreement with the company's intentions to use these areas for renewable energy generation, if possible. The areas where the surface of the dumped materials is stabilized, levelled off and reaches more or less the original level from before the lignite excavation were taken into account as well as areas already reclaimed as agricultural lands. On the other hand, areas already reclaimed as recreational sites as well as mine water reservoirs and ponds were excluded. Moreover, only the areas within the above mentioned dumps which are still in possession of the PAK Konin Lignite Mine were subject to selection.

### Socio-economic characteristics of the local community

Both case study areas are situated within the municipality of Kleczew which is an urban-rural municipality in the Wielkopolska Region (Voivodeship), in the Konin County. The municipality consists of one town, Kleczew, and 37 villages or other small settlements. There are 9,908 people living in the municipality (Local Data Bank of Statistics Poland, 31.12.2020 [7]). Its area is 110.28 km<sup>2</sup>, out of which 7.8 km<sup>2</sup> in an urban area with 4,097 residents of the town of Kleczew. An average density of a population is 90 persons per 1 km<sup>2</sup> but in rural areas it is only 57 persons per 1 km<sup>2</sup> [7].

### Population

The population of the municipality is slowly decreasing as shown in Fig. 2, there is more women than men (Fig. 3).

People in a pre-working age constitute 18,0% of the population, the working and post-working age population is relatively 63,4% and 18,7% (Fig. 4). The chart shows that over the previous years the post-working age population has been systematically growing, while the number of working age people has been decreasing. Due to the fact that the number of people in the pre-working age is also systematically decreasing, it should be expected that this trend of decreasing number of people in the working age will continue in the coming years and the number of non-working people will be growing (Fig. 5).

Until 2020 the registered unemployment dropped approximately twice compared to 2014. In those years, the number of unemployed women was between 1.4 and two times greater than the number of unemployed men.

### Land use

General land use types are presented in the Figure 7.

In terms of land use, most of the activities in the Kleczew municipality are agricultural. 70% of the area of the entire municipality is land used for agricultural purposes, out of which over 90% is arable land (Fig. 8). There are very few forests - they cover only 2% of the area of the municipality (Fig. 7). Built-up and urbanized areas cover 1,760 ha, which is only 16% of the municipality's area, almost half of which

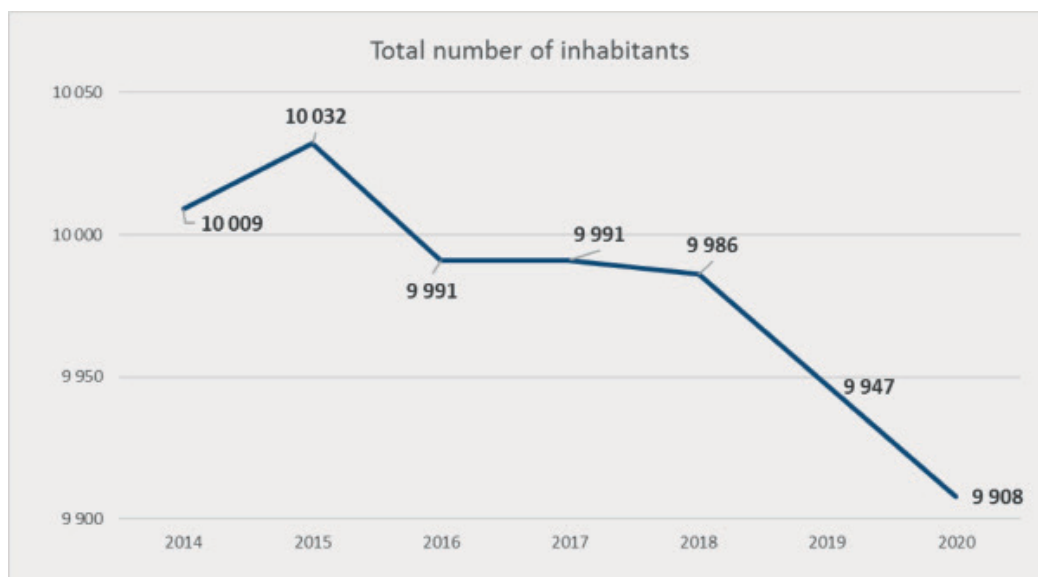


Fig. 2. Number of inhabitants in the municipality of Kleczew (Source: Local Data Bank of Statistics Poland [7]).

Rys. 2 Liczba mieszkańców w gminie Kleczew (źródło: Bank Danych Lokalnych GUS [7]).

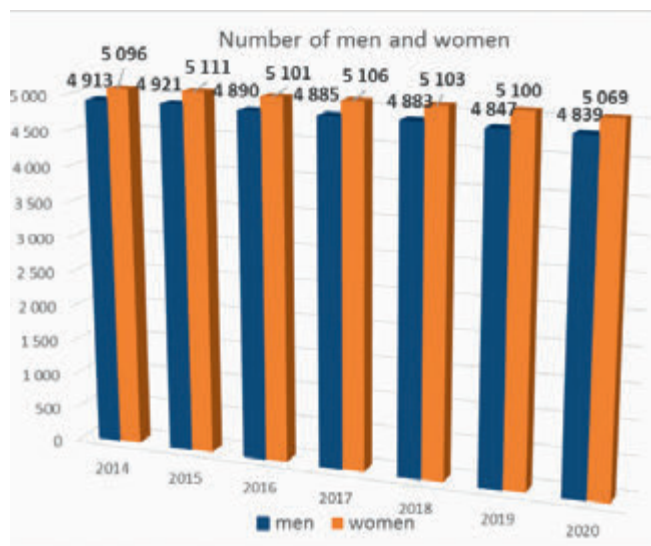


Fig. 3. Number of men and women in the municipality of Kleczew (Source: Local Data Bank of Statistics Poland [7]).

Rys. 3. Liczba mężczyzn i kobiet w gminie Kleczew (źródło: Bank Danych Lokalnych GUS [7]).

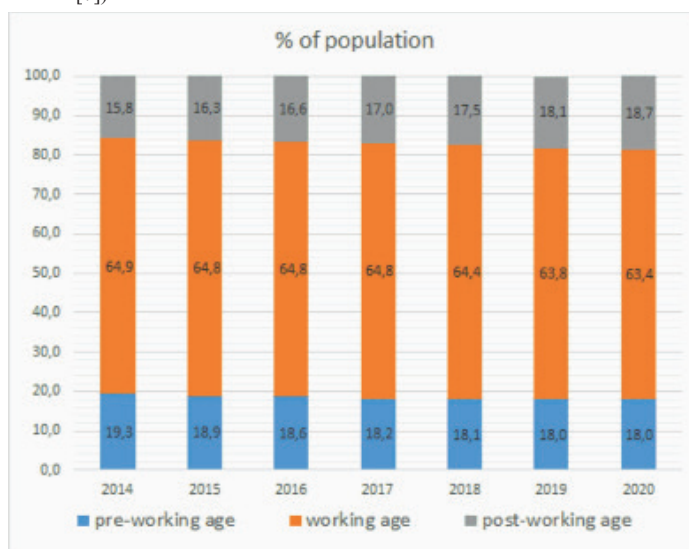


Fig. 4. Pre-working, working and post-working age people [%] in the municipality of Kleczew (Source: Local Data Bank of Statistics Poland [7]).

Rys. 4. Osoby w wieku przedprodukcyjnym, produkcyjnym i poprodukcyjnym [%] na terenie gminy Kleczew (źródło: Bank Danych Lokalnych GUS [7]).

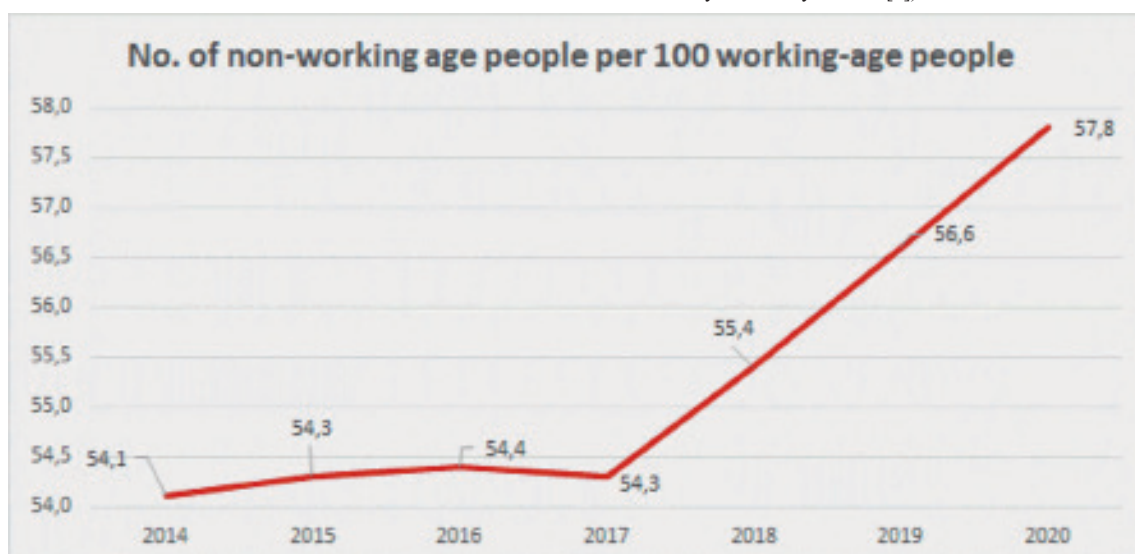


Fig. 5. Non-productive population per 100 working-age people (Source: Local Data Bank of Statistics Poland [7]).

Rys. 5. Ludność nieprodukcyjna na 100 osób w wieku produkcyjnym (źródło: GUS [7]).

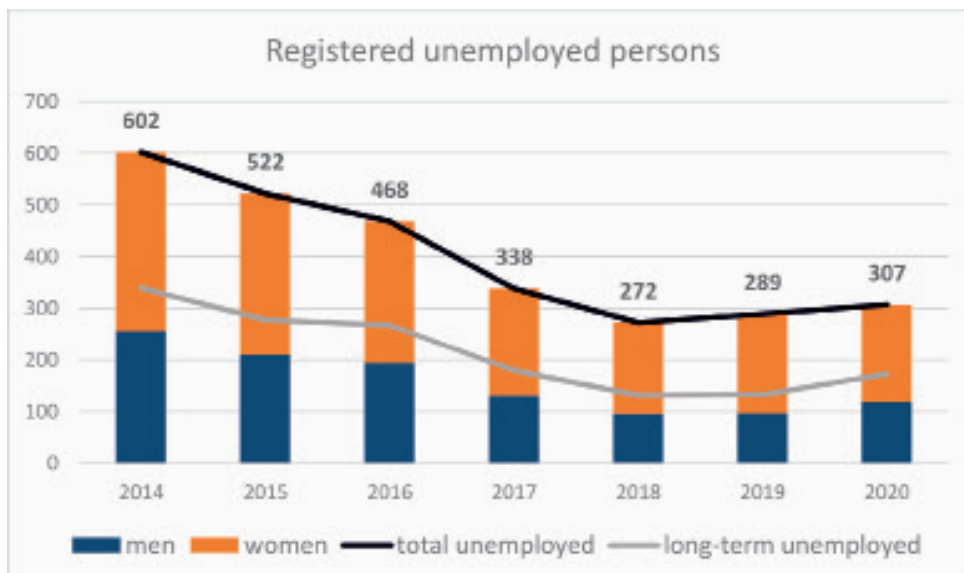


Fig. 6. Number of registered unemployed people in the municipality of Kleczew (Source: Local Data Bank of Statistics Poland [7]).  
Rys. 6. Liczba zarejestrowanych bezrobotnych w gminie Kleczew (źródło: Bank Danych Lokalnych GUS [7]).

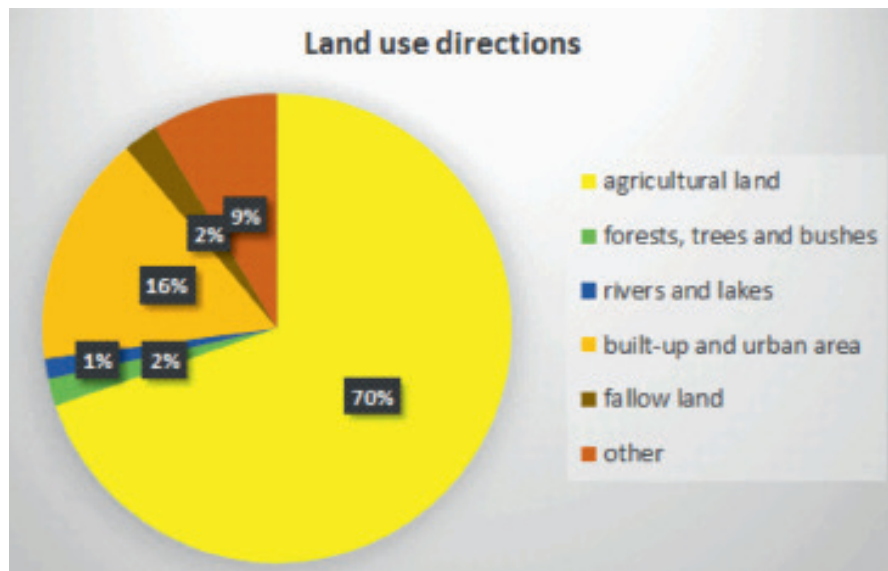


Fig. 7. The use of land [% of a total area] in the municipality of Kleczew (2014; source: Local Data Bank of Statistics Poland [7]).  
Rys. 7. Użytkowanie gruntów [% ogólnej powierzchni] w gminie Kleczew (2014; źródło: Bank Danych Lokalnych GUS [7]).

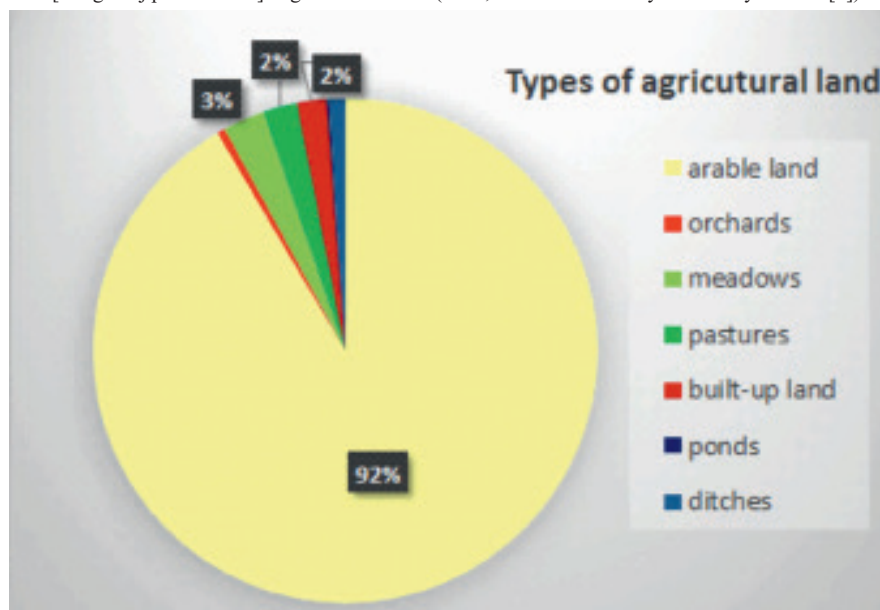


Fig. 8. Agricultural land types [% of a total area of agricultural land] in the municipality of Kleczew (2014; source: Local Data Bank of Statistics Poland [7]).  
Rys. 8. Rodzaje gruntów rolnych [% ogólnej powierzchni użytków rolnych] w gminie Kleczew (2014; źródło: Bank Danych Lokalnych GUS [7]).

are mining areas (823 ha; data from 2014; see Fig. 9). It can be stated that the other half of the built-up and urbanized areas is approximately the area of the town of Kleczew, which covers 780 ha [7]. Industrial activities other than mining take place only on 74 ha which is 0,7 % of the entire municipality's area.

### Economic activities

In 2020, 844 companies operated in the Kleczew municipality (Fig. 10), 96% of which are micro-entrepreneurs (employing up to 9 employees; see Fig 13) [7]. The number of companies has been growing over the years. In the last three years, there were about 2 times more newly opened companies than the companies that closed down (Fig. 11).

There is only one large entrepreneur with over 1,000

employees (PAK KWB „Konin” - the Konin Lignite Mine; see Fig. 13). Apart from the Konin mine, almost 280 entrepreneurs operate in the broadly understood industrial and construction industry, which constitutes 33% of enterprises in general (Fig. 12).

Although 70% of the municipality's area is agricultural land, only 2.5% of entrepreneurs operate in the agricultural and forestry sectors. Over 65% of entrepreneurs conduct activities defined as other (Fig. 12) - these are mainly various types of trade and service activities.

It can be summarized that in the Kleczew municipality the majority of the business entities are natural persons conducting economic activity, i.e. individual entrepreneurs, employing up to 9 people and conducting trade and service activities. Their number has been slightly growing in the last years (Figs. 12 and 14). A greater increase in the number of

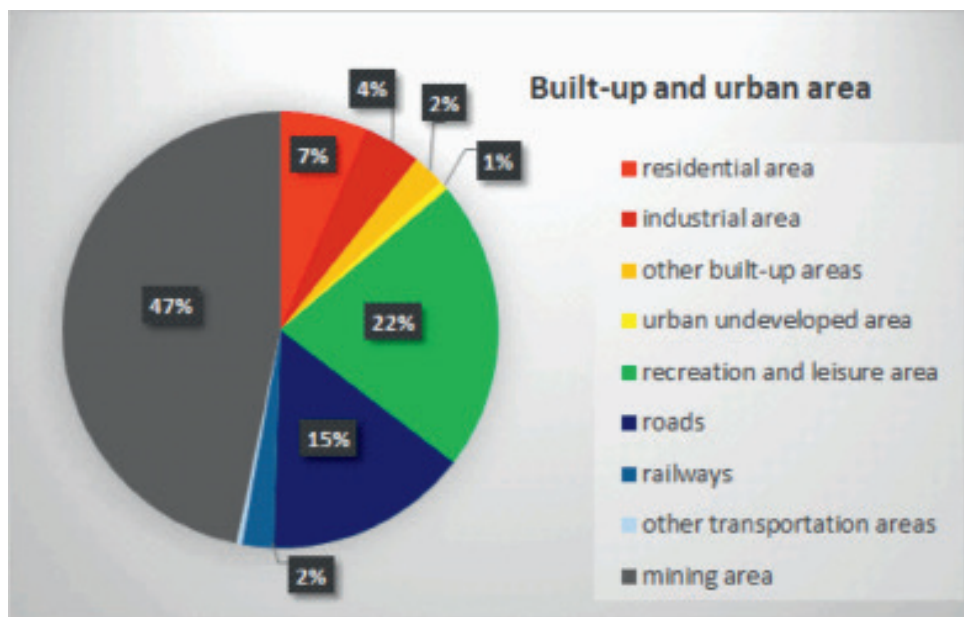


Fig. 9. Different uses of built-up and urban areas [% of a total built-up and urban area] in the municipality of Kleczew (2014; source: Local Data Bank of Statistics Poland [7])

Rys. 9. Różnice w użytkowaniu terenów zabudowanych i miejskich [% ogólnej powierzchni zabudowanej i miejskiej] na terenie gminy Kleczew (2014; źródło: GUS [7])

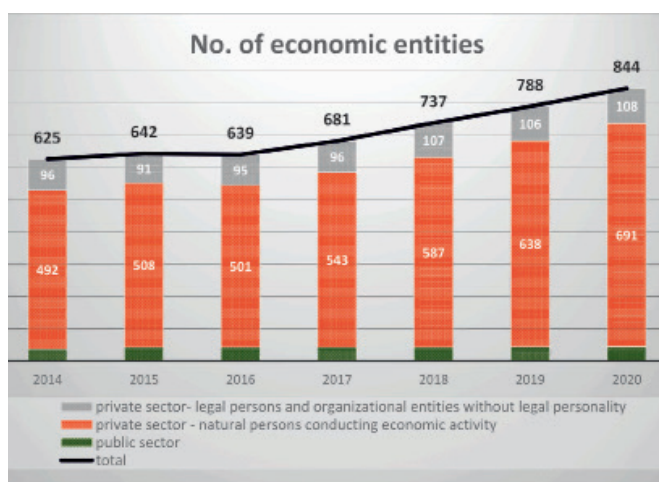


Fig. 10. Number and type of economic entities in the municipality of Kleczew (Source: Local Data Bank of Statistics Poland [7]).

Rys. 10. Liczba i rodzaj podmiotów gospodarczych w gminie Kleczew (źródło: GUS [7]).

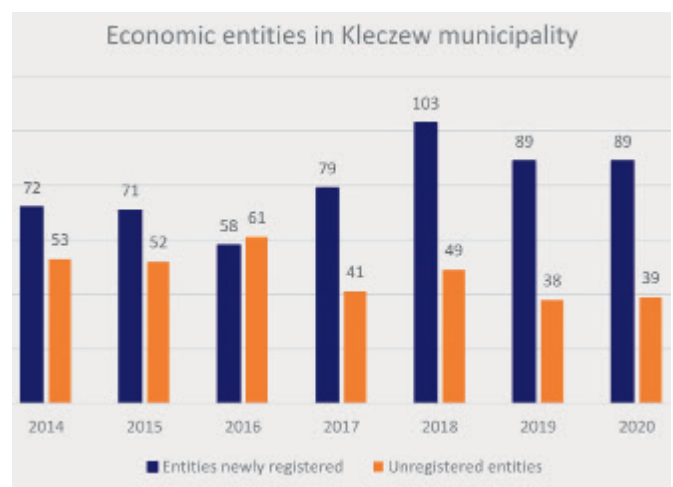


Fig. 11. Newly registered and unregistered economic entities in the municipality of Kleczew (Source: Local Data Bank of Statistics Poland [7]).

Rys. 11. Nowo zarejestrowane i niezarejestrowane podmioty gospodarcze w gminie Kleczew (źródło: Bank Danych Lokalnych GUS [7]).

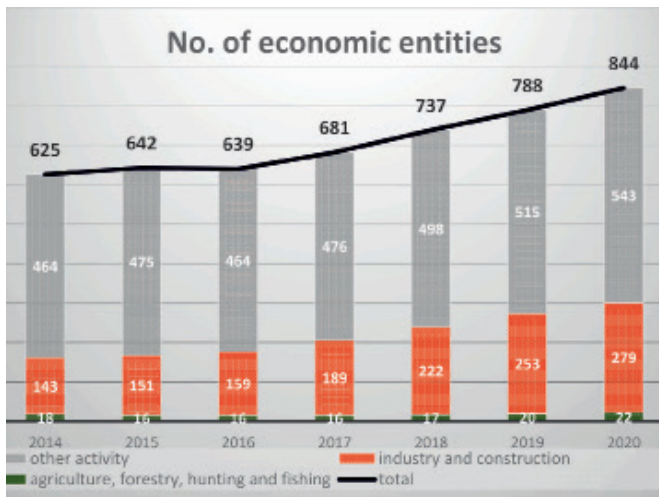


Fig. 12. Number of entities in different economic sectors in the municipality of Kleczew (Source: Local Data Bank of Statistics Poland [7]).

Rys. 12. Liczba podmiotów w poszczególnych sektorach gospodarki w gminie Kleczew (źródło: GUS [7]).

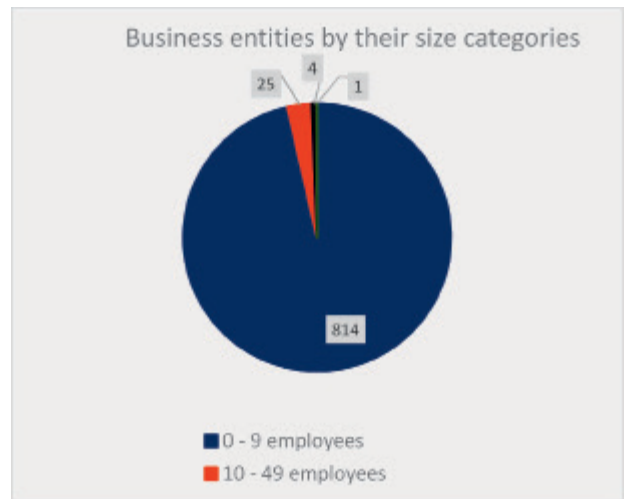


Fig. 13. Number of economic entities of different sizes in the municipality of Kleczew in 2020 (Source: Local Data Bank of Statistics Poland [7]).

Rys. 13. Liczba podmiotów gospodarczych różnej wielkości w gminie Kleczew w 2020 r. (Zródło: GUS [7]).

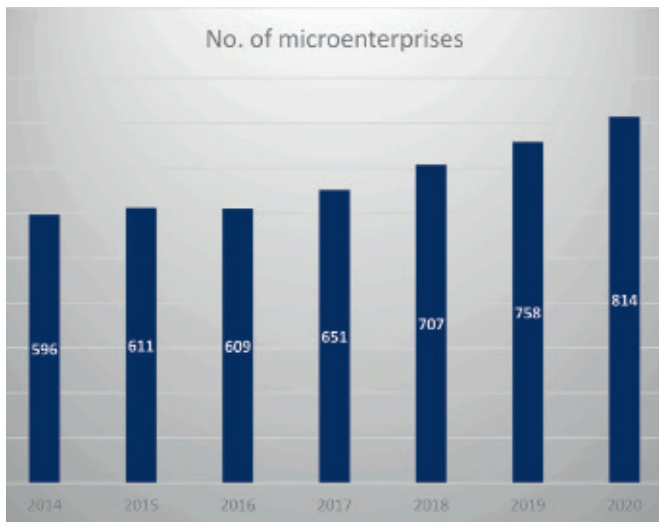


Fig. 14. Number of microenterprises (0-9 employees) in the municipality of Kleczew ( source: Local Data Bank of Statistics Poland [7]).

Rys. 14. Liczba mikroprzedsiębiorstw (0-9 zatrudnionych) w gminie Kleczew (źródło: Bank Danych Lokalnych GUS [7]).

entrepreneurs is recorded in the industrial and construction sector - about 30 more companies each year, mostly in the construction sector (some of them might be of course larger than 9 people) (Fig. 12). Generally, it was observed that in 2016-2020 the total number of microenterprises increased every year by an average of 7.2%. The analysis in the group of microenterprises in Poland indicates that their number in 2016-2019 increased annually by an average of 3.4% [8].

### Local energy management

In 2015 the Kleczew municipality adopted a Low-emission Economy Plan [9]. The Plan indicates that the energy infrastructure in the Kleczew municipality is well developed, which creates favourable conditions for the development of renewable energy sources based on both wind and solar energy. It also mentions that the post-mining nature of the municipality's area is favourable for construction of installations utilizing energy potential of winds blowing there and quite high intensity of solar radiation and that the use of this form of ecological energy production will enable avoiding production

of energy in large-scale coal-fired (condensing) power plants and transmission losses, and as a result will help to avoid CO<sub>2</sub> emissions to the atmosphere (Tab. 1). It is clearly stated in the Low-Emission Economy Plan that due to the large energy potential and large area for investments in renewable energy sources in the Kleczew municipality, these opportunities for the development of renewable energy generation should be used by both the municipality authorities and private investors, which will contribute to environment protection by reducing the demand for traditional fuels, and thus will reduce carbon dioxide emissions.

Moreover, on April 3, 2019, the municipality of Kleczew signed an "Agreement on Eastern Wielkopolska's just energy transition" along with the Board of the Wielkopolska Region and over 40 entities (so far nearly 100 entities has signed the agreement) such as local and regional authorities, including the neighbouring municipalities, the private sector including, ZE PAK Capital Group and non-governmental organizations [10]. The signatories has recognized the importance of working towards a just transition while taking into account sustainable development and civil society participation. The agreement has laid the foundations for the establishment of working groups in the Eastern Wielkopolska, which have already started work on the Territorial Just Transition Plan 2021-2027. The plan is an outline of the transformation process that will ensure the transition to a climate-neutral economy and it will indicate social, economic and environmental challenges that will be associated with the transformation process. Preparation of the Territorial Plan necessary to obtain financial support from the European Just Transition Fund.

As a starting point of the just transition process a "Concept of just transition of Eastern Wielkopolska" was presented in October 2020. This document constitutes a basis for the Territorial Just Transition Plan for Eastern Wielkopolska [11]. The proposals for a vision, objectives and priorities of the transformation and planned directions of intervention are presented in the document (Tab. 2) – they take into account the suggestions and findings of the working groups.

As can be seen from the initiatives presented above, both the municipality of Kleczew and ZE PAK Capital Group are active participants in the energy transformation processes in the region.

Tab. 1. Summary of the Kleczew Low-Emission Economy Plan findings [9].

Tab. 1. Podsumowanie założeń Planu Gospodarki Niskoemisyjnej Kleczewa [9].

Low-Emission Economy Plan for the Kleczew Municipality (2015)	
Existing Renewable Energy Sources (i.e. „industrial” wind farms and solar farms, no prosumer installations and installations on buildings)	6 wind turbines with a total capacity of 7.5 MW. Moreover, another 9 turbines are under construction, the total capacity of which will be 25.8 MW. It is planned that in the future, about 16 more wind turbines will be built, the total capacity of which will be about 50 MW*
Existing renewable energy potential	Very favourable wind conditions High solar energy potential
Strategic goal for the implementation of renewable energy technologies	Improvement of the quality of the natural environment of the Kleczew municipality by implementing measures to reduce carbon dioxide emissions
Planned activities directly related to the development of renewable energy sources	Using the potential of renewable energy sources in the municipality Changes in the land use plan, allowing the location of renewable energy sources

\*situation in 2015; the planned 50 MW wind power plant was not implemented

Tab. 2. Summary of objectives, priorities and actions presented in the Concept of just transition of Eastern Wielkopolska, regarding renewable energy development in the post mining areas [11].

Tab. 2. Zestawienie celów, priorytetów i działań przedstawionych w koncepcji sprawiedliwej transformacji Wielkopolski Wschodniej w zakresie rozwoju energetyki odnawialnej na terenach pogórnich [11].

Objective/Priority	Direction of intervention	Planned main types of actions
Objective 1. A dynamic and zero-emission circular economy Priority 1.1. Energy (r)evolution towards climate neutrality	1.1.1. Development of renewable energy sources and dispersed energy	• construction and expansion of renewable energy installations generating electricity and heat together with energy and heat storage
	1.1.3. A zero-emission energy sector resilient to climate change	• expansion and modernization of energy networks in the direction of ensuring stability of supplies and reducing energy transmission losses, as well as a possibility of energy transfer from existing generation sources or connecting new powers
Objective 2. High-quality integrated space Priority 2.1. Regenerated natural environment	2.1.1. Development of degraded areas	• support for the preparation of local land use plans of post-industrial areas; • adaptation of post-industrial areas to perform new economic functions

## Social aspects of the post-mining area reclamation

### On-going reclamation

The reclamation of the overburden disposal areas of the Józwin I and IIA open pits, which had formed in fact one mining area, is practically completed. Production of coal ended in 2003 and the post-mining area was reclaimed as agricultural and recreational areas (Fig. 15). A recreation park with a water reservoir called “Malta”, beach and infrastructure for sports was created within the Józwin IIA open pit area, east of the town of Kleczew. In the northern part of the former overburden disposal area PAK KWB Konin still owns a significant amount of land and they wish to use it economically. Within the post-mining area of the „Józwin I” open pit, which is generally reclaimed as agricultural land, there is a municipal waste landfill and waste treatment installation - located in the village of Genowefa, it covers an area of 12 ha. There is also a private fish farm in a place of former technical water reservoirs used by the mine. In 2015, Józwin Wind Park was established (9 wind turbines: 8 x 2.85 MW / 1 x 2.53 MW, a total capacity of 25.3 MW) in the area located south from the municipal waste landfill.

At the moment the coal excavation takes place in the most south-eastern part of the Józwin IIB mining area and is planned to be finished in 2021. In the opposite, westernmost part of the Józwin IIB mining area, where the excavation started, the internal dump is already reclaimed and the land no longer belongs

to the PAK Konin Lignite Mine. The area near the village of Złotków was created as a recreational site of about 21 ha. The main element of this area is a hill, formed at a request of a local municipality. The top of the hill and one of the slopes were planted with park and forest trees, and the other escarpments were planted with alfalfa. At the bottom of the hill there is a small pond, which is also part of the area intended for recreational purposes. The other parts of the overburden dumping site in this area are reclaimed as agricultural lands (Fig. 15).

The area of the Józwin IIB overburden disposal site located east from the already reclaimed part is planned to be transformed into agricultural lands, forests and a large water reservoir created in the final excavation pit. A water surface area is anticipated to reach 840 ha after many years of filling the pit with water. The formation of the reservoir involves two phases. The first one involves forming reservoir slopes by stackers and has been already implemented for a few years. The second phase is slope profiling with bulldozers and this stage will be carried out after completion of the overburden material dumping and will last three years.

Regardless of the planned reclamation towards agricultural lands or forest plantations, the PAK KWB Konin is considering construction of renewable energy installations at the Józwin IIB dumping site. The land plots situated within the former Józwin IIA dumping site are also considered.

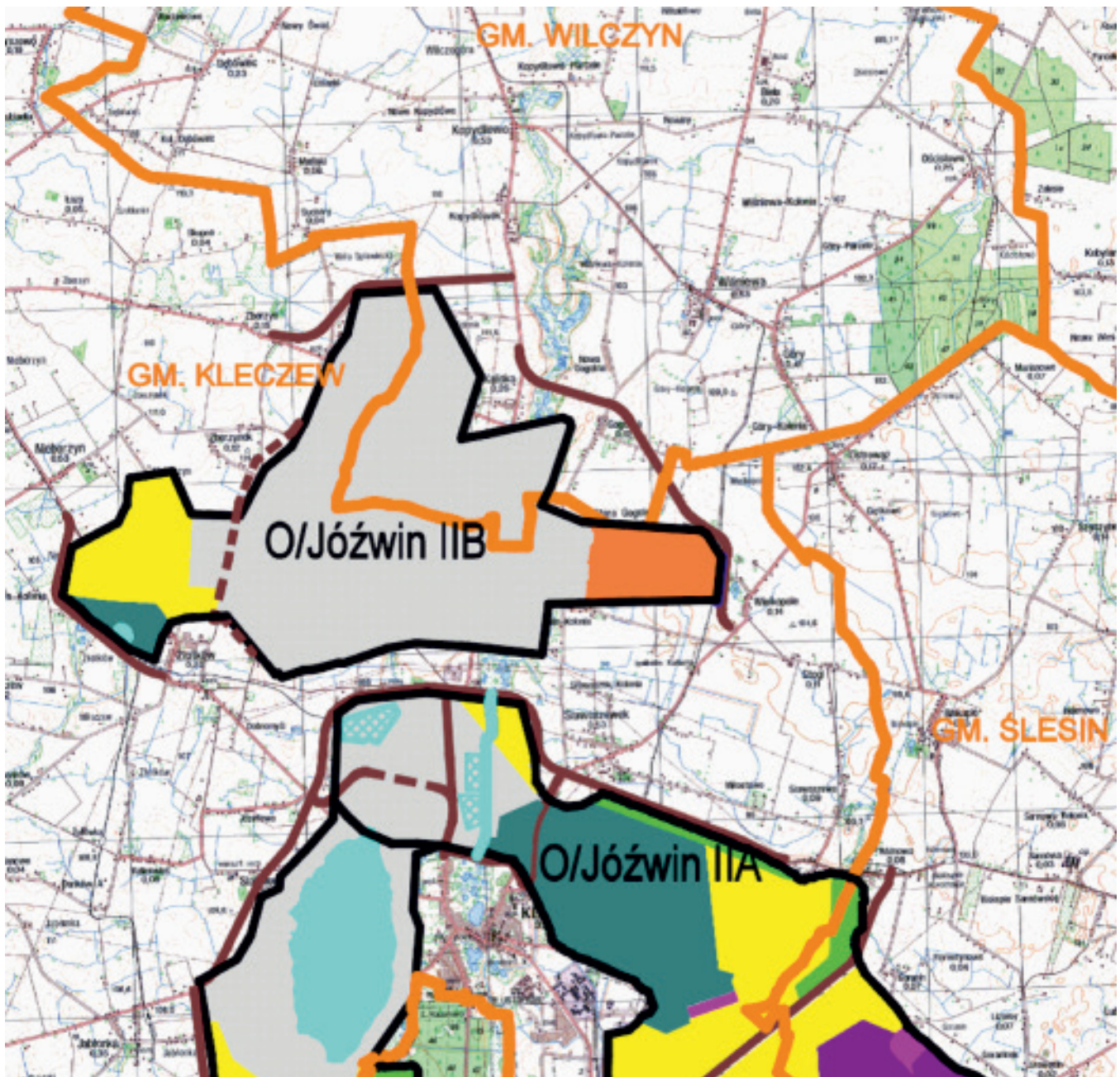


Fig. 15. General view of the mining and reclaimed areas at the Józwin IIA and IIB open cast mines (Source: PAK KWB Konin) .

Rys. 15. Widok ogólny obszarów górniczych i rekultywowanych w kopalniach odkrywkowych Józwin IIA i IIB (Źródło: PAK KWB Konin) .

### Renewable energy production - a new direction of reclamation

There are many different directions in which the reclamation of the post-mining areas can be implemented. Through the years the PAK Konin Lignite Mine have been applying all these various directions in the Józwin mining areas, but now seeks for new solutions such as preparation of post-mining lands for investments in renewable energy sources. Usually, economic factors largely determine the way how the post-mining lands are developed. Large-scale renewable energy installations can be economically profitable for the investors but the question is how they will influence the local community.

When choosing the method of reclamation towards renewables, social considerations should be taken into account. One should consider the potential benefits for the local

community while taking into account employment of people in the local community, income for local governments, new small business start-ups, living standards, promotion of the region, local traditions, political context, etc. The overview of social considerations for renewable energy generation in the post-mining areas in the municipality of Kleczew is broadly presented in Table 3.

### Conclusions

Installation of large-scale renewable energy plants is proposed as one of the possible ways of the post-mining areas (i.e. the overburden dumping sites) reclamation and development after the coal mining ceases. This way of development will certainly find an economic justification based on financial benefits and costs for the investor. Moreover, it



Tab. 3. Combination of different factors characterizing the socio-economic impact of renewable energy generation in the post-mining areas in the municipality of Kleczew.

Tab. 3. Zestawienie różnych czynników charakteryzujących społeczno-gospodarcze oddziaływanie energetyki odnawialnej na terenach pogórnicznych w gminie Kleczew.

<p><b>SOCIAL FACTORS:</b></p> <ul style="list-style-type: none"> <li>• social activity</li> <li>• level of unemployment</li> <li>• demographics of the community</li> <li>• social needs</li> </ul>	<p>Demographics of the community of Kleczew is not satisfactory. The number of inhabitants systematically decreases, the number of people in the working age also decreases comparing to other groups. The society is ageing. Although unemployment in the municipality is not high at present (in 2020, the unemployment rate was 4.9% - 3.6% for men and 6.4% for women [7]), it may increase in the coming years as a result of the gradual phasing out of mining activities (the Józwin IIB mine will end coal mining in 2021 and the last mine in the Konin region will operate no longer than 2030). In order to stop these unfavourable social changes, a new development impulse is needed in the community. The energy transition towards renewables may partly respond to these challenges.</p>
<p><b>ECONOMIC FACTORS</b></p> <ul style="list-style-type: none"> <li>• job market</li> <li>• variety of economic activity</li> </ul>	<p>PAK KWB Konin is the largest employer in the municipality of Kleczew and the only large company based within the municipality's area. Employment in the mine has been systematically decreasing since the end of the 1990s, the significant decline in employment in 2013-2015 was particularly acute. Currently, the Konin mine employs over 1,000 workers (compared to over 7,000 employees in the mid-nineties [12]). However, along with the reduction of coal mining until its complete cessation in 2030, this number of people will have to find jobs outside of the mining sector. So far, little has been done to make the local economy less dependent on coal.</p> <p>The inhabitants of the municipality are, in a way, used to be faced with the need to seek employment or other possibilities, and the total number of existing enterprises is constantly growing. However, they are mostly micro-entrepreneurs. The number of small and medium-sized enterprises is minimal. With the cessation of the exploitation of coal, it is necessary to constantly develop the economic activity of the local community. The simple introduction of renewable energy production instead of mining will allow for only a partial use of the social potential but will contribute to a significant change in the local job market. It must be remembered that a wind or solar farm generates few permanent jobs directly at the facility, because only a few people are needed to operate even a large installation. More people find employment in the investment preparation and construction, but these are temporary jobs. Especially when building a large-scale photovoltaic farm, the benefits for the local community need to be carefully considered, as huge areas are blocked off for other investments and few people work there. A wind farm can be more efficient in terms of land use, as the wind turbines take up little space on the ground and the surrounding land can be used for agriculture. A different situation is when the post-mining area is unsuitable for other investments due to for instance land degradation or pollution. Then, using it solely for large scale renewable energy installations seems reasonable.</p> <p>Investments in renewable energy generation facilities can definitely help to diversify local job market, However, they can boost the municipality's economic potential only to some</p>
<p><b>CULTURAL FACTORS:</b></p> <ul style="list-style-type: none"> <li>• historic background</li> <li>• identity of the place</li> <li>• tradition and customs</li> </ul>	<p>Kleczew municipality is a part of a larger area of Eastern Wielkopolska which is traditionally perceived as a coal mining and coal-derived energy region. Introducing renewables to the post coal mining areas of the municipality will allow maintaining the region's traditional status as an energy generation region. Moreover, it will contribute to upgrading the region's status from degrading the environment to protecting the environment.</p>
<p><b>POLITICAL FACTORS</b></p> <ul style="list-style-type: none"> <li>• local and regional government aspirations</li> <li>• local and regional development strategies</li> </ul>	<p>There is a strong political commitment in the region of Eastern Wielkopolska as one of the EU coal regions to take part in just transition processes. However, it is strongly emphasized by local and regional administration that just transition is understood not only as an energy transition towards renewables but as a transition to sustainable coal-free economy without negative impact on local population and placed in the broad social context [10].</p>

will be a very important element of the energy transformation process in the Konin region. However, answering the question whether this new function planned for the post-mining area meets the social needs and whether the entire community will benefit from it is a more complicated issue. This study has presented a selection of different factors which characterize the socio-economic impact of renewable energy generation in the post-mining areas on the local community.

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